Fabbrica della Conoscenza

Le Vie dei Mercanti | X Forum Internazionale di Studi

less
more

architecture
design
landscape

Carmine Gambardella

Less More Architecture Design Landscape

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Aversa | Capri
May 31st – June 1st, 2nd, 2012

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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   220 abstracts received from:

Algeria, Brazil, Bulgaria, China, Cuba, Denmark, Egypt, Estonia, France, Germany, Greece, Holland, India, Indonesia, Iran, Italy, Japan, Jordan, Kosovo, Malaysia, Malta, Mexico, Netherlands, New Zeland, Poland, Portugal, Puerto Rico, Russia, Saudi Arabia, Spain, Taiwan, Turkey, United Arab Emirates, United Kingdom, USA

More than 350 authors involved.

163 papers published.

Preface

Less, often leads us to reducing considerations and its linguistic application, generally, characterizes a condition of inferiority, decay or deprivation. If we make reference to the scope of our researchers, Architecture, Industrial Design, Landscape and to their deeper meanings, and if we use "less" before them we might involve a critic situation, or homologate a century.
An example is from the historical period we are living in, where Western economies are generically dealing with their budgets by cutting down on expenses rather than investing on their own heritage in order to create richness and workplaces.

On the contrary, our Researchers, Scholars, Businessmen and Civil Services Representatives want to use less to promote a shareable cultural reflection about the reduction of the waste of goods (raw materials, human resources, assets). That's why we are going to arrange the X International Forum "Le Vie dei Mercanti". In this perspective Less does not mean less investments or cuts, but to identify a hierarchy of relevant sustainable investment funds based on the search for the know-how.

Less in Architecture, Less in Industrial Design, Less in Landscape subsumes more if we are able to supply regenerative models based on integrated system visions.
Consequently, More research in Architecture, More research in Industrial Design, More research in

Landscape if Local Human Resources are set up to create an efficient training education to be involved in the management, protection and regeneration of raw materials and human needs.

All along the past editions of the Forum I have drawn people's attention on our heritage as expression of "actual developing" (modernity).
Modernity, in fact, is an integrating part of history, an inexhaustible mine supplying raw materials to the Factory of Know-how which, as mentioned above, must get the same local phisycal geometric connotation as the generative humus about the production of fascinating items for Architecture, Industrial production, Landscape.

The projects our Faculty has dealt with, "Pompei Fabbrica della Conoscenza 0079/2013" or "l'Atlante del Cilento", witness as by sizing tangible and intangible heritage we can give rise to a productive factory aiming at art works and competitive Cultivated products and services.

So, scientific contributions aiming at collecting and spreading out the best practices and paradigmatic sustainable projects about system activities and elaborated in an assembly International dimension, are expected. Such contributions must be useful at enhancing an increasing Research process characterized by a constant learning and a great Know-how passion.

Carmine Gambardella

Less/More Architecture, Design, Landscape

Carmine GAMBARDELLA
ARV Architettura Luigi Vanvitelli, Seconda Università di Napoli, Italy
carmine.gambardella@unina2.it

The *"Le Vie dei Mercanti"* Forum is now in its tenth edition. I would like to recall the reasons for the title, chosen the first time ten years ago to address the climate of cultural fervor that during the Renaissance, through its calculations, inventions and economics managed to define a new way *ante litteram* to combine scientific research and business. The merchants, in the middle of the fifteenth century, at the margin of international trade, united research and training in new ways, realising the value of the territory as a resource, promoting the redevelopment and reclamation of wasteland. [1]

Luca Pacioli, a versatile figure and best known as author of the essay *De Divine Proportione*, as tutor to the Venetian family of merchants, Rompiasi, invented the double entry in order to not only create a language to be shared by both researchers and the outside world but also to produce wealth and assets by applying the concepts of proportion and proportionality to economic development. [2-3]

Fig. 1: *Pacioli e Leonardo alla corte di Ludovico Sforza.*
Fresco by Nicola Cianfarelli, 1841.

Humanism succeeded in integrating good governance and knowledge that, in the declination in physicality, took shape in the City and Renaissance Architecture. A global project of society that led to the *Res Publica* of statesmen such as Coluccio Salutati and Leonardo Bruni, the mathematician Paolo dal Pozzo Toscanelli, to name a few, Leon Battista Alberti, who reminds Paolo of the ancient lesson, with innovation not only being of *homo renatus* but also *homo civis* in a single consideration that goes from *De Re Aedificatoria* to the *Libri dell'Economia*.

The conference venue, the island of Capri, is the same as where the first "Conference of the Landscape" was held 90 years ago, in July 1922, organized by the Municipality of Capri, with the then mayor being the engineer and writer Edwin Cerio. The politician Giovanni Rosadi, undersecretary of Fine Arts, and promoter of the law in defense of Antiquities and Fine Arts dated June 20, 1909, inspired the Congress as well as supported the work of the Cerium,

The "Conference of the Landscape" was the most important cultural event held on the island of Capri in the first half of the twentieth century, and was attended by eminent speakers such as the Deputy Director General of Fine Arts, Luigi Parpagliolo, the Secretary to the Prime Minister Giovanni Porzio, as well as Filippo Tomaso Marinetti, author of the famous Futurist Manifesto. [4]

The conference ended with the approval, unanimously, of several orders of the day. One of these, presented by Filippo Tomaso Marinetti, and Luigi Parpagliolo, condemning the continuous disfigurement of the Italian landscape, expressed the commitment, while recognizing the needs of modern life, that the use of new materials and construction methods respected the environment and were in harmony the local landscape.

Another appealed to the Ministry of Education to study the possibility "of a least weekly propaganda" that, beginning in elementary school and continued into the middle schools, spread "the cult of heritage of the beauty of Italy".

Fig. 2: Ruins of the Certosa in Capri. From: E. Cerio, *La casa nel paesaggio di Capri*, Ed. Alfieri e Lacroix, Roma 1922.

These are cultural references which the Forum recalls, as denounced 90 years ago by the First Congress of Landscape, with the resolutions that were unanimously approved having been completely disregarded. They can still be considered targets of primary importance both with regard to the fight against the disfigurement of the environment as well as the need for public education, starting at school, and respect the protection of the landscape and the environment at all levels.

In the current era characterized by the economy of knowledge, the cultural identity of places is an essential asset in the learning process in order to raise human capital as well as render the territory competitive and attractive. The identity of places is the result of the memory of ancient traditions and knowledge as well as the material evidence of the past that has shaped its physical form.

In order to preserve historical continuity, guaranteeing man a better living environment, a balance between the spaces of the past and present needs should be created, offering innovative solutions to meet the different needs in terms of sustainability.

The historical centres, monuments and even the degraded landscapes are the raw material of our investigation, the *hardware* on which the consideration and integration of the competencies act like a *software* to develop a repertoire of solutions appropriate to return to those areas of the community through a protective regenerative action.

In this context, international confrontation is vital so as to share virtuous examples of the protection and management of monuments, sites and historic environments, in which conservation and development coexist in positive role models and that can be exported to other contexts.

Hence the reasons for the choice of the theme of this year's Forum, *Less/More Architecture, Design, Landscape.*

Less, almost always leads to reductive considerations and its very linguistic application, for the most part, characterizes a state of inferiority, degradation or loss. In fact, when referring to the areas of interest, Architecture, Industrial Design, Landscape and other categories that include these terms, *less* could mean a state of crisis, or approval to an era, like the one we are experiencing, in which the economies of Western countries are aimed at readjusting their budgets by cutting their expenses, rather than investing in its assets to create wealth and jobs.

With *less*, however, we want to foster a common consideration of academics, researchers, entrepreneurs and representatives of the Public Administration on the creation of a development based on the reduced waste of Assets (raw materials, human capital, resources). In fact, *Less* does not mean less investment or generals cuts, but rather the identification of a hierarchy of significant investments supported by knowledge.

From *Less is More*, Mies van der Rohe's motto and rationalist architecture, we take the idea of an architecture based on material honesty and structural integrity, but expanded, assuming the idea of an honesty in investments as well as in the realization of objectives truly capable of being the driving force for local development, and above all integrity in design ethics.

We also agree with his idea of shortening the distance between professional and research activities, and his words on architecture as a tool to educate young people. "The aim of architecture is to educate architects with the necessary knowledge, but also to train man educating him, and enabling him to make the right use of the knowledge acquired. Thus, teaching is aimed at a practical purpose, while education aims at values. In fact, the meaning of education is to train and mobilize, it must counter those personal opinions that do not undertake the obligation of exact knowledge, it must lead from the sphere of the arbitrary and random balance to that of clarity of a spiritual order".[5]

From the more recent, *More with Less*, reworking the motto of Mies by the Spanish designer Campo Baeza, to emphasize his research on essentiality through a subtraction of material and addition of significance, we take the idea of rigor, to avoid the excessive and ephemeral in favour of truly innovative solutions that can meet the needs of man and enter into a relationship with his environment and culture.

More with Less also deals with the issues of sustainability, where living spaces, designer goods, orchards and gardens, introduce new ways of behaving in search of a balance between man and nature, demand and resources, in a time when everyone is becoming aware of the environmental, economic and ethical unsustainability of the lifestyle that has characterized the West over recent years.

Attention should therefore be directed to the great mines that surrounds us, the raw materials of the *Knowledge Factory* that are the resources of the territory in which we live and work which, if crossed by

knowledge, can produce attractive products as well as a competitive global marketplace, guaranteeing work and quality of life.

The *governance* of the production cycle, understood in its regenerative and modifying action of the infrastructures, landscapes and products can only be substantiated if the complexity of the values of our identity are discretized and measured by knowledge, in their dual activities of multidimensional knowledge of the physical produced and to be produced, and returned as a heritage to citizens and stakeholders of the territory to take up economic activities at different scales of sustainable investment. This results in products that will be more valuable, the higher the degree of knowledge that can be transferred to any part of the production cycle is.

The city of the future, therefore, is characterized more and more by the city of the present, as the town planner Italo Insolera recalled, [6] in a future that has an ancient heart, where the roots of the genetic heritage of our sites are the reassuring refuge and fertile soil to envisage innovation that does not transform it actually changes, sharing the organic, natural and evolutionary culture, and therefore always contemporary, which, against every transplant of predetermined patterns, accompanies a regenerative stem cell function, because it is removed from our own identity.

Less in Architecture, Less in Industrial Design, Less in Landscape, includes the *More* if we are able to provide regenerative models, based on integrated visions as well as the system.
Therefore, *More research in Architecture, More research in Industrial Design, More research in Landscape,* means preparing the Human Capital of the Territory through effective training in order to be included in the management, protection and regeneration of the raw materials as well as the needs of those who live in Cities and Territories.

Since I strongly believe in the importance of training, the students of the Faculty have been involved with these issues throughout 2012, through a series of meetings, national and international, with planners, designers and landscape architects. The aim of these meetings was to avoid any academic self-referentiality, offering students the opportunity tomeet with those working in architecture, industrial design, landscape, as well as explore different points of view and experiences.

Even the choice of hosting the first day of the Forum at the Faculty, intended as the final event of this year of reflection and research on the theme of *Less/More*, aimed to involve our young people and open them up to the experiences presented by researchers from around the world.

Fig. 3: Some of the meetings organized about Less/More Architecture.

Fig. 4-5 (next pages): Some of the meetings organized about Less/More Design and Less/More Landscape.

Fig. 6: Some of the meetings organized about Less/More Landscape.

As for the practical experience, the example of the projects carried out by our Faculty, "Pompeii Knowledge Factory 0079/2013" or the Atlas of the Cilento, show that starting from a measurement of the tangible and intangible heritage of the places, it is possible to transform the environmental resources of an economic income into sources of environmentally sustainable development, not only in relation to the knowledge of the potential within the territory, but also in stimulating the competitiveness of values between territories. [7]

The studies, analyses, measurements and projects on the city of Pompeii carried out by research groups from different subject areas in constant synergy under my supervision, analysing the territory according to multiple perspectives, will shortly be published in the Atlas of Pompeii.
In the realization of these volumes, I have interpreted the word Atlas in its broadest sense, as a "complete and orderly collection of information relating to a particular science, bound in one volume", configuring it as an "Atlas of Knowledge", which analyzes and integrates knowledge, multidisciplinary research and studies in order to produce a reading of the territory as a whole.

The territory, in the case of Pompeii, is not only the enclosed archaeological site, but rather the whole city, the carrier of critical elements, with an enormous potential to expose and valorise it. It has a huge touristic and cultural value (2.5 million tourists a year visit the archaeological excavations, and 4,000,000 pilgrims a year visit the shrine of Our Lady of Pompeii), but burdened by severe problems arising from the current form of tourism, that in the absence of sustainable planning has damaged the heritage and local identity, without bringing wealth and prosperity to the local inhabitants.
Thus, a vast and diversified territory was analysed, on which even to study only the geometric and morphological aspects, it was necessary to use different methods and technologies, each in the context in which it was more appropriate: from the archaeological area to the monumental buildings, from the urban centres to the suburbs.
The research was carried out as if a test on the integrated use of experimental measuring techniques and equipment, a field laboratory to develop a validated integrated multidimensional and multi-scalar digital methodology that can be used in other contexts .

These investigations were supported by the contribution of the other specific areas: for example, historical research and archives, which have allowed us to formulate novel hypotheses on the evolution of the territory of Pompeii before the first archaeological excavations were carried out, monitoring of the environmental and noise pollution and the designing of soundscapes; structural investigations on different types of building to design environmentally friendly design protocols for the recovery and rehabilitation of historic buildings; investigations on the seismic safety levels; the study of an integrated sustainable transport system and the

generation of electricity (from art greenhouses and solar parks) for a better use of the cultural and tourist area of the excavations.

The studies can be of great use for the protection of the site. The collapses that have repeatedly affected the archaeological area of Pompeii in the last months have sparked much debate on how to protect one of the most important sites in the world, a UNESCO World Heritage Site.

The call for projects for the Great Pompeii Project has finally been published, with the intention of being an integrated regional development project which, apart from the necessary protection and enhancement of the archaeological site, is an attempt to attract a growing tourist demand as well as business initiatives to the area.

Our group has already been working for several years on research in this direction and has carried out an aerial scanning of the area with a Daedalus AA3500 sensor, which has allowed us to detect and map the presence of water on the surface, obtaining an accurate representation of the conditions of the site on the days when the collapse occurred in the House of the Moralist.

Faced with the deterioration of many cultural and natural sites of our country, we should begin to discuss less and do more.

Fig. 7: Fly over Pompeii excavations on November 19th 2010.
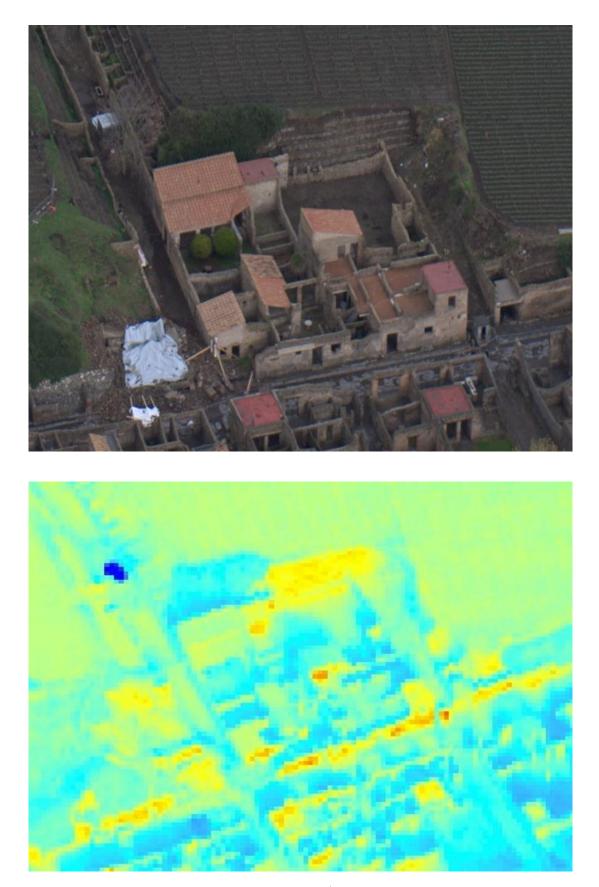
Fig. 8-9: Fly over Pompeii excavations on November 19th 2010. Detail of the *Moralist Domus* and view in false color.
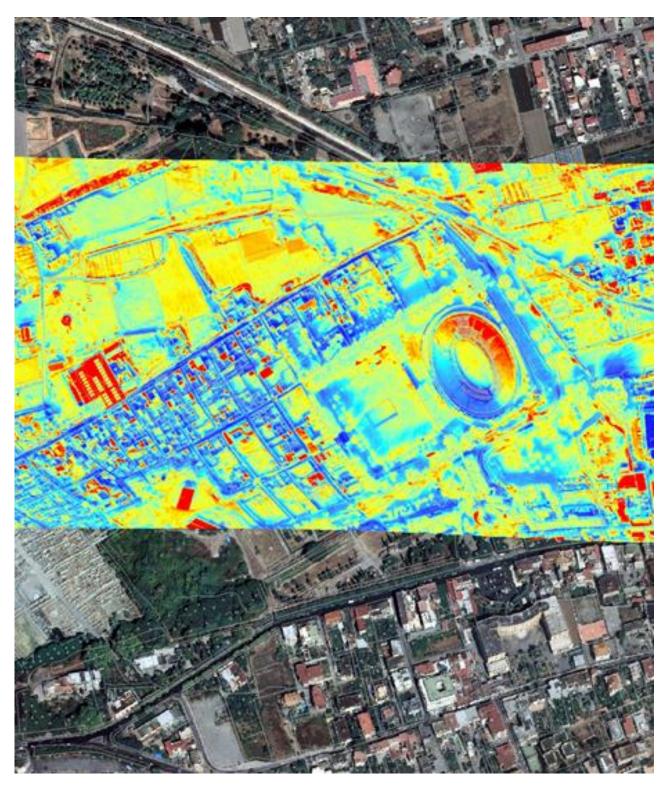
Fig. 10: Multisensory dates about Pompeii excavations.

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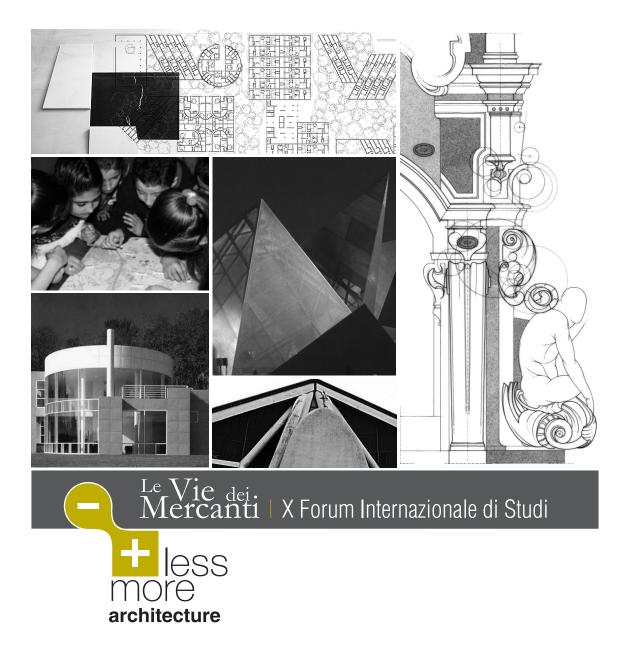
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Less or More. Evolution of the concept of measurement and its precision

Manuela PISCITELLI
ARV Architettura Luigi Vanvitelli, Seconda Università di Napoli, Italy
manuela.piscitelli@unina2.it

Abstract
The measurement problem can be considered as exemplary of the evolution of science and thought over the centuries.
If the measuring of space means to assign numbers and symbols to describe its properties, it is evident that the measurement problem cannot be separated from the perception and meaning attributed to the surrounding world. For modern man, space is an accessible reality, homogeneous and measurable; for ancient man, it is a rugged terrain, uneven and symbolic.
Not surprisingly, primitive measuring had a significant nature, expressing something human, symbolic, tied to the anthropomorphic characteristics or conditions of life and work. On the contrary the meter, modern unit of measurement, is connected to the dimensions of the terrestrial sphere and is devoid of further meanings or references in addition to that of a unit of measurement.
The procedures and results of measurements depend on the philosophical, economic, political and cultural context in which the operations are carried out and the conclusions reached. The language adopted from the respective communities to represent the whole of knowledge are valid in a particular historical moment, and change over time in relation to the cultural and social climate, as well as the techniques used to measure and represent reality.
Even the concept of measuring precision depends on the historical period, not only for the obvious evolution of tools and measurement techniques, but also for the evolution of thought and creation of a suitable language to express the results.

Keywords: measurement, anthropomorphic unites, precision, survey, standardization.

Oportet enim rationem mensurae ex mensurato accipere
Tommaso D'Aquino

Introduction
Measuring, in general terms, can be defined as "the assignment of numbers to represent properties". To describe in this way a phenomenon, it is necessary preliminarily identify the unit of measurement required to describe it.
Any measuring operation implies a degree of uncertainty in its result. Knowing how to properly evaluate the uncertainty of a measurement is essential both in science, to fix the limits of validity of the theories describing natural phenomena, as well as in technology, to assert the reliability of products and procedures.
The ISO standard states that is meant by measure the series of operations that produce the determination of the value of the quantity subjected to measurement, and highlights how uncertainty is an integral part of the result.

"The objective of a measurement is to determine the value of the measurand, that is, the value of the particular quantity to be measured. A measurement therefore begins with an appropriate specification of the measurand, the method of measurement, and the measurement procedure. In general, the result of a measurement is only an approximation or estimate of the value of the measurand and thus is complete only when accompanied by a statement of the uncertainty of that estimate". (ISO, 1993, 4).

The problem, however, is not only of a technical nature, in the sense that the major or minor accuracy of the measurement depends not only by the unit of measure and the instruments available. The measurement problem cannot be separated from the perception and meaning attributed to the surrounding world.

For modern man, space is a reality accessible, homogeneous, measurable; for ancient man, it is a rugged terrain, uneven and symbolic. Not surprisingly, the primitive measures had a significant nature, expressing something human, symbolic, tied to the anthropomorphic characteristics or conditions of life and work.

The Egyptians, for example, first elaborated anthropometrical canons, and the first measurement unit derived from the dimensions of the human. The Egyptian unit of measurement was the cubit, tied to the length of the forearm and probably derived from a cord coiled between the elbow and thumb, used to measure the fields after the flooding of the Nile.

The meter is connected to the size of the terrestrial sphere (in its first definition, it was considered the equivalent of the ten millionth part of the arc of the meridian between the North Pole and the equator). The reason for this choice was to use a unit that had nothing arbitrary or specific to any nation on earth.

Later, the meter was disassociated from the size of the Earth, since 1960 with the definition of the meter as a multiple of the optical wavelength of the light emitted by the krypton 86th isotope. In 1983, it was again redefined as the distance covered by light in vacuum during a defined time interval. The meter is now a derived unit, while the second, as in the pendulum-second, is the real "measure of all things".

This has passed from a plurality of units on the same category of measurement to a unique mathematical language to measure and express the notion of space and time; borrowing the words of the famous essay by Alexandre Koyré, to be passed "from the world of approximately to the universe of precision". [1]

Fig. 1: Stele dedicated to Harakhty. (New Kingdom/Dynasty XVIII-XX (1550-1070 BC). Torino, Egypt Museum. Harakhty the god, lord of heaven, is standing above a cubit.
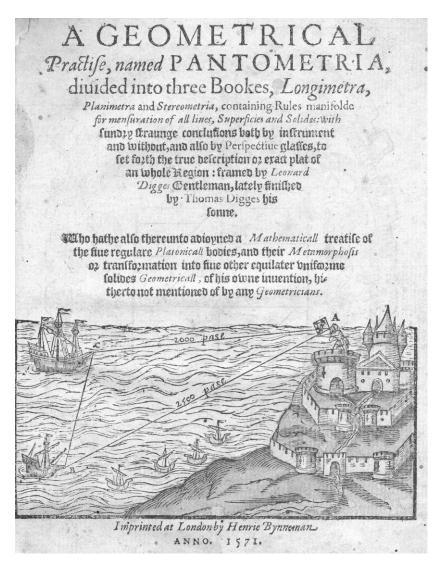
Fig. 2: Pantometria, by Thomas Digges, 1571.

Evolution of the concept of measurement

Measuring is one of the most ancient human social practices, and at the same time, one of the most advanced achievements.

According to the historian of metrology Witold Kula, the process through which concepts are formed on the measures is an essential component of the evolution of human representations of the world, forming classification systems and abstract concepts. [2]

The language adopted from the respective communities to represent the whole of knowledge are valid in a particular historical moment, and change over time in relation to the cultural and social climate, as well as the techniques used to measure and represent reality.

In all societies, to dispose of measures is one of the characteristics of power. This means to confer to measurements, a reason to be law, and manage samples of units, that often in the ancient world had a sacred character. Samples of measurements, which had dedications to the gods, were kept on the Acropolis of Athens and the Capitol in Rome. Moreover, among the public office of the *polis* there was the *verifier*.

The need to preserve samples of weights and measurements to be a national reference, marked with inscriptions in the name of the king and deposited in the main temples, was recognized at least since 2000 B.C. The artifacts found during excavations in Egypt and many other places, confirm how important it was in ancient times, from a practical point of view, to have a standard of weights and measurements of space and time in commercial trades.

Fig. 3: Reel, XVI century.

The first stage of metrology (the science of measurement), which began in the early days of civilization, and was only really concluded with the birth of modern science, has been characterized by highly heterogeneous anthropomorphic units, both in the methods of measurement and in the representation of the measures. Measurements were initially identified by concrete representations, and therefore subjective, and only later passed to abstract concepts. [3]

Next to lines or notches present on isolated bones or objects in stone, we can observe the appearance of signs. These annotations represent the first rudimentary representations of measurements and conceptually precede the invention of writing. Scholars hypothesize that soon there was a link between having an even rudimentary ability to measure and the possession of power.

The knowledge that Western civilization had of the quantification, dating back to Neolithic times, took centuries to become a genuine intellectual passion. Ptolemy, Euclid and other mathematicians of the ancient Mediterranean were devoted to issues related to measurements and mathematics, but few were able to access, in the early Middle Ages, to such works.

In the sixth century B.C., Pythagoras discovered that musical harmony depended on relations between small integer numbers, and concluded that everything in the universe was a Number. However, the birth of mathematics is related more to the solution of practical problems, than the need to measure. If it is obvious to us that the material world is intimately linked to that of mathematics, this was not so for the Ancients. Although it probably had its origin in mathematics from the practical necessities of measurement, they soon diverged. The weight calculation and surveying were considered tangible assets, while mathematics was abstract, mysterious and perfect, enough to become part of religious orders and mystics.

From that point, pure mathematical sciences and metrology became separated sciences. The first belonged, according to Plato, to philosophy, and allows to reach the truth. The second instead was part of transient things such as war or trade, which required mathematical knowledge to perform practical operations.

Plato advised to turn away from the material world, and seek beauty, goodness and absolute virtues, to the triangle, square and circle ideals, abstractions that exist independently from the material world. He was certain that the knowledge of such entities could be reached through the intellect, starting from the study of mathematics. Plato advised the philosopher-kings to study mathematics to arrive, with the help of pure thought, to contemplate the real nature of numbers. [4]

Fig. 4: Cross-staff, XVI century.

The consequence of this separation of a knowledge considered abstract from a practical one, implied the absence of interest in an exact measurement of the physical world (space, time, weight, etc.).

Moreover, the ancients were able to measure, as demonstrated by the precision of the design of the base of a column or a capital, and also possessed measuring instruments based on the same principles of current survey instruments, as proved by a theodolite drawing handed down by Vitruvius.

The Greeks, like other civilizations, also observed and measured the sky with surprising accuracy, using measuring instruments and calculations, and assuming that the motions of the stars were subject to the laws of mathematics and geometry. However, they have not attempted to apply the same geometrical and mathematical rules to the measurement of the terrestrial world, except through art and architecture.

According to the text of Vitruvius, the Greeks already used some instruments to perform accurate measurements on the elements of their temples. The cross-staff was a measuring stick with a movable rod placed at a right angle: taking the measurement of angles and combining it with the prescribed distance between the measuring points, it was possible to calculate the height of something that was not directly accessible.

The birth of the Greek colonial system marked the beginning of a new relationship with the territory. Colonization implied in fact, along with taking possession of a territory, its measurement and distribution in equal batches according to a geometric plan. During the colonial period in the Italy, the Greeks realized an efficient road system, which required a knowledge of the topography of the area. [5]

However, even then the Greeks were not able to describe scientifically the subjected area, mainly because their geography continued to have as a privileged point of view, the vision from the sea, that was materialized in the production of those species of archaic pilot books, the Periplus. The Greeks perceived space as one-dimensional, like a series of paths that were developed in a single dimension; hence the production of the periplus without indication, that signaled only the succession of points along the path. Not having an understanding of space seen from above, as in a map, resorted to long detailed descriptions of territories. [6]

The political particularism of ancient Greece was reflected faithfully in the particularism of measures and weights. The new *polis* created their own samples as a symbol of their sovereignty, while to captured city the winners imposed its own measures as a symbol of their dominion. The measures standards differed in varying degrees, in relation to the various city-states and the historical period. For example, the length of the foot in the different regions ranged between 27 and 35 cm.

The systems of weights and measurements of the ancient oriental empires, from the valleys of the Tigris and Euphrates, were adopted by the Greeks and, later, passed to the Romans. These, in turn, extended their procedures for measuring to the whole European continent, and consequently many features of the measurement systems used in modern times reflect the Roman system.

The definitive consolidation of metrology is due to the Romans, and in later centuries it was essentially preserved in the various countries of the West, although with large local variations.

One of the reforms intended by the Emperor Augustus (27 BC - 14 AD) was the unification of local measurements in use in all the territories of the empire with those of Rome: this led to the introduction of the foot, corresponding to 29.65 cm about; it became the basis of both surface and volume measures.
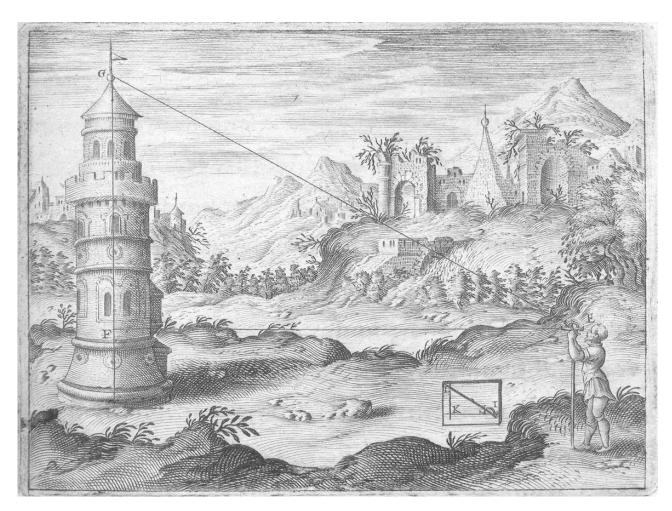
Fig. 5: *Graphometre in use.* By Danfrie 1597.

One of the main applications of measurements was in surveying, the measurement and division of the land, according to geometrically regular schemes. These operations were carried out with a special instrument, the groma, only found complete in Pompeii. To measure the miles traveled by vehicles and vessels, there was a rather complex mechanism with paddle wheels, called odometer, known only through literary sources, especially Hero and Vitruvius.

Abstract mathematics and practical metrology, even if joined by some figures of classical civilization such as Ptolemy, remained separate throughout the Roman Empire and even more in the Middle Ages. In the Middle Ages, the time is not seen as changing and evolving. Every reality is perceived as stable and solid. Even medieval space agrees with these purposes: there is not a measurable and equal space, preexisting to human actions. The moral dimension explains and justifies everything. Medieval man cannot imagine space and time devoid of human action, preexisting and autonomous, and therefore does not attribute them the characteristics of homogeneity and measurability that we consider intrinsic. The medieval geography is a moral geography, as exemplified by the representation of Dante's world: centered on the holy city of Jerusalem, excellent place for the concrete signs of God's presence; under the earth's crust, the great chasm created by the fall of Lucifer. [7]

Medieval images, paintings, miniatures, sculptures are striking due to the disproportion between the environment and figures. The figures seem flattened in an environment represented much smaller than reality, without regard to the perspective of vision.

In this context, the master builders of Gothic cathedrals, which raised buildings of beautiful proportions and great strength, represented somehow an exception; however their geometry was purely practical.

Fig. 6: Theodolite. Erasmus Habermel, Praga, XVI century

They did not know of Euclid, but practiced geometry by combining a few basic shapes: triangles, squares, circles. Their patrimony of knowledge was transmitted orally, and measuring was up to the master builder who, pointing to the stone with the stick, symbol of his role, indicated where to cut. [8]

Around 1300, there was a significant change, especially in practical applications. In those years, the first mechanical clock and the first cannon were built in Europe, means that forced the Europeans to think of time and space in quantifiable terms.

The pilot books, pictorial perspective, the double-entry bookkeeping are all indices of change in the way of measuring and representing measurements.

During the late Middle Ages and the Renaissance, a new model of reality emerged in Europe: it was a quantitative model, able to replace the old qualitative model. Copernicus, Galileo, the artisans who became experts in the construction of cannons, the cartographers who mapped the coasts of the earth just known, the bureaucrats and the businessmen who administered the new empires, the bankers who controlled the new cash flows, they all thought of reality in terms of quality. [9]
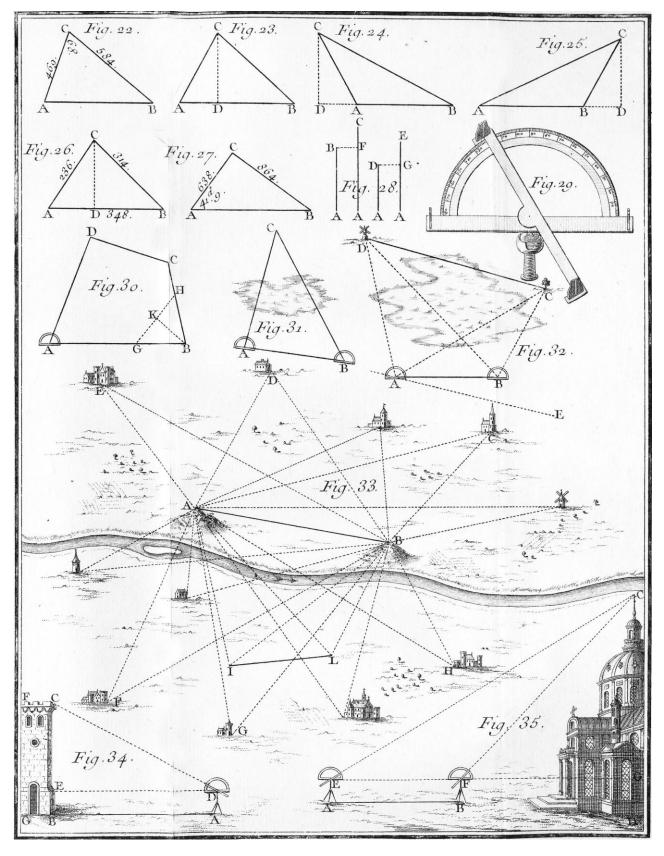
Fig. 7: *Surveying*. By Deparcieux, *Nouveau traites de trigonometrie*,1741.

The measurement standardization

The problem of measurement units unification, however, was approached in a serious way only in the time of the French Revolution. In 1790, the National Assembly began the first attempt to build a system of universal measurements, with the declared intention to be "for every people, for every age."

The task of setting the units and samples of the fundamental length and mass was assigned to a committee of eminent scientists.

Even before being adopted in France, the metric system was seen as a future international institution: the committee hoped - and time has confirmed this hope - to get it accepted in all countries of the world.

Condorcet continued to consider as the main objective of the reform its universality: in his view, the reform should not have any particular or national character, so it can be accepted by the whole world. For this reason, the measurements were to be "taken from nature". Nature, in fact, especially for philosophers of the Enlightenment, was common to all peoples and was considered as a unifying element.

The metric system, in contrast to all the measuring units previously used, had as a basis the most reliable and available scientific principles at the time of its invention. It was conceived in order to satisfy the new requirements emerged after the development of commerce and industry. The civil commitment that characterized the Enlightenment was certainly behind this massive effort aimed at resolving in practical ways the problems of daily life.

From a historical and social viewpoint, the metric system marks an important stage for humanity towards the goal of a global common language for understanding, communication and mutual cooperation. The meter, "dehumanizing" measurements, making them independent from man, "objective" to him, morally neutral, becomes a medium that can facilitate understanding and collaboration among people .

Setting the measurement units and the methods for their exact representation, the evolution of the measure has now become a matter of available technology, as meaning that the evolution of the instruments for the survey not only allowed a more exact knowledge of the geometrical and dimensional characteristics, but also to go beyond the visible range in order to investigate inside the structures and highlight failures, degradation, or material not visible from the outside.

The problem of the surveyor is no longer how to obtain data, but is the contrary, how to filter and interpret the enormous amount of data on a single object. The measurement accuracy has become an operator choice, when it sets the tools tolerances for that single survey, or transfers data. The ISO standards, at the same time, have created a coded and global language, shared by all, as they had imagined at the time of the French Revolution.

What perhaps today is lost, is the "poetry" implied imagining that the world can be measured with the human feet, arms, fingers.

Fig. 8: International Prototype Meter standard bar, made of platinum-iridium, used as standard until 1960.

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A "laboratory" open air in the urban landscape of Palermo

Francesco DI PAOLA
DARCH Dipartimento di Architettura, Facoltà di Ingegneria, Università degli Studi di Palermo, Palermo, Italia
francesco.dipaola@unipa.it

Abstract

The study intends to make new contributions to knowledge of a interesting "laboratory" in the open air in the urban landscape of Palermo, a cultural and scientific heritage in which architecture, art and decoration coexist in an experiment of collective synergies.

The Botanical Garden C enter, with its ten acres of land appears, still, a fervent creative process between artifice and nature, the expression of a specific historical and cultural climate in which expectations converged of a intellectual, scientific and institutional fervor.

The academic institution, founded in 1789 with the intention of cultivating useful plants to the arts, crafts and medicine, contributed to the spread of tropical tree species introduced later, in parks and gardens, public and private, enriching the natural heritage and transforming the landscape of the sicilian coast.

The fifth stage overlooking the garden consists of a unique architectural complex that is articulated in a central amphiprostyle doric building a square plant, the Gymnasium, and two lateral buildings, arranged symmetrically, the Tepidarium and Calidarium, a rectangular plan designed by Dufourny collaboration with local architects such as Pietro Trombetta, Domenico Marabitti and Venazio Marvuglia.

On the basis of a precious monograph of the architect G.B.F. Basile, you will critically revisit all the buildings, full of stylistic features of the greek temples and symbolic codes siceliots of the masonic Enlightenment, the first example of neoclassical architecture in Sicily. In particular, using the latest topographic non-invasive and photogrammetric technologies in acquisition, development and exploration of metric data, we report unedited representations of some devices that characterize the monumental work.

Key words: neoclassical architecture, conservation, 3D modeling

The architectural plant of the Botanical Garden Center of Palermo is well integrated with the adjacent Villa Flora (now commonly called the Villa Giulia). It is established in 1789 in the "Piano di Sant'Erasmo" on part of the lands of "Vigna del Gallo", near the moat of the walled perimeter. The final project designed by french architect Leon Dufourny is realized in collaboration with local architects such as Pietro Trombetta, Domenico Marabitti e Venanzio Marvuglia. Along the Avenue d'Alcala (now Lincoln Street) in front of the Spasimo's bastion the main front consists of a unique architectural complex that is articulated in a central amphiprostyle doric building a square plant, the *Gymnasium*, and two lateral buildings, arranged symmetrically, the *Tepidarium* and *Calidarium*. These last two buildings are equipped for greenhouse crops in temperate and warm temperatures. These three examples can be considered the first project experiences of neoclassical architecture in Sicily, full of stylistic features of the greek temples and symbolic siceliots codes of the masonic Enlightenment, the first example of neoclassical architecture in Sicily.

Inside the garden, in front of the buildings stands the first nucleus of the general layout of the Garden, is also the work of french architect, divided into paths that identify a specific number of beds available for the plants, according to the classification of Linnaeus.

The preliminary study of architectural and typological scheme, the conspicuous photographic documentation of current and the archival documents and historical and iconographic ones directed the steps and criteria of the survey in-depth knowledge.

A precious monograph by architect G.B.F. Basile (published in "New Annals of the Buildings, Arts and Industries" of Sicily, 1872), Dufourny's design drawings and the finding of some previous designs of direct survey, the works of careful experts (Nicolò Puglia, Enrico Naselli, Vincenzo Capitano) was a major point of departure for the revisiting of the buildings, run through the formulation of critical comments and the editing of graphic-geometric analysis [1].
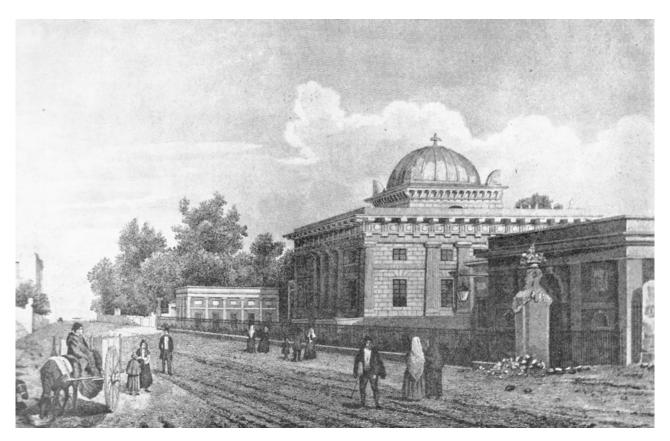
Fig. 1: Entrance to the Botanical Garden (*Dessiné d'apres nature par Benoist Lit. Bachelier*), n. 10039, Gab. Stampe Gall. Reg. Sic., Pal. Abatellis, Palermo.

1. The *nec plus ultra* of greek doric and the generating module

The commission directly received by the Vicerè Principe of Caramanico is for the french architect Leon Dufourny a valuable opportunity to test and to summarize his planning theories about the doric order's renewal *des anciens grecs*. He proposes a lexicon greek Revival with functional and formal solutions free from chief concern items handed down from classicality, which he describes in his comment "lexical abuse" and "arbitrary syntactic".

His works in Palermo and in Sicily communicate a new language that follows the European debate (in France: Le Roy, Laugier, Blondel; in England: Stuart, Revett; in Italy: Piranesi; in Germany: Winckelmann, Hittorff, Klenze, Schinke) on the critical study of classical antiquity in Renaissance key, moving away from a neoclassical revival of imitative behavior which shows in its entirety in project drafting the fee proportional language of ancient temples[2].

The Dufourny's theory based on scientific method and on geometric and modular rigor has as its model the reference carrier the doric archaic order "without basis" with the fluted stems of the columns.

The cultural knowledge acquired in the training period at the *Académie Royale d'Architecuture*, the review of "royalties" described in the treatises and his careful measurements of the direct survey of ancient ruins in his

long exploratory itineraries combine to provide an unprecedented process of designing and unique in its kind, which he defines as the *nec plus ultra*, which is the "perfect Doric".

His arguments on the art of building and on the testing of the ancient personal solutions applied are gathered in his manuscript *Ub 236 4°, t. III*, kept in the *Cabinet des Estampes della Bibliothèque National* in Paris. A precious book, published by researchers Liliane Dufour and Giuseppe Pagnano, shows the translation and a large collection of original project drawings[3].

The morphological characteristics, the linguistic apparatus of the masonry score and compositional organization outside of the three buildings of the Botanical Garden Center makes clear the different design criteria adopted. The most imposing central building, the hub of academic activities and the temple of Botany, of a "richer and more refined Doric," is opposed to the two side pavilions of support, of a "simple and rising Doric ".

Fig. 2: Palermo – Orto Botanico, central building (*Gymnasium*). In the foreground the portico of Doric tetrastyle overlooking the garden.

2. A comparison of models

Inside and outside the structures the composition of together, the symmetry and the clear hierarchy of parts harmoniously articulated clearly emphasize the unique characteristics that make the original method of Dufourny. The entire project (the three buildings and linnaean garden) is governed and regulated by a modular system that proportionally divides the space in plan and elevation, in multiples and submultiples.

The diameter of the column base of the School measures 5 palms exact corresponding to 60 ounces or inches (1.27 m), the french architect divided into 60 equal parts the module obtaining the reference unit which is, indeed, an ounce (0.0213 m).
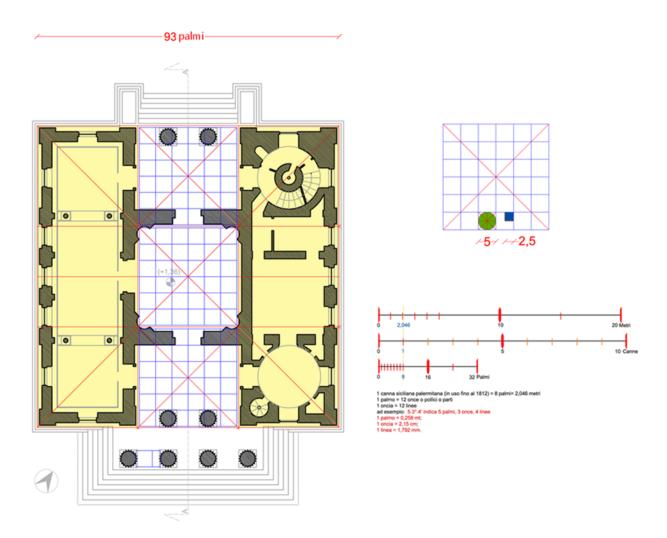
Fig. 3: On the left, the floor plan of representation in the *Gymnasium*. Top right, graphic design of the modular system that regulates the division of space, below, scales, and comparing unit conversion.

The geometric analysis, carried through the creation of modular schemes, have revealed the compositional rigor that governs the articulation of the interior and exterior spaces [4].

From the writings and from some pencil sketch that the architect Dufourny hands down to us, we learn that the original idea of the monument of the first project of the *School* had a compositional structure and location within the Garden radically differ from what appears today. The original choices would give the visitor a completely different view of the whole organism architecture. Initially, he proposes to raise the order of the ground creating a base path vaulted galleries, instead of the current stylobate divided into three tiers that develops without interruption for the entire perimeter of the building. This solution, then abandoned probably for reasons attributable to the excessive cost required for implementation, would create greater visibility of the garden from the the Avenue d'Alcala and, functionally, would be more convenient to isolate the building from humidity of the soil.

The knowledge process undertaken aims to provide useful interpretations for future conservation and for fruition of the site. The creation of digital models of the first idea of the architectural design and of the current state allowed to mature through the overlay layer transparency in plan and in elevation, a greater awareness of the interrelationships between the spatial and volumetric typological systems. The procedure of realization of models has provided key insights into the genesis of the building structure and to highlight the changes that have since characterized the current volume.
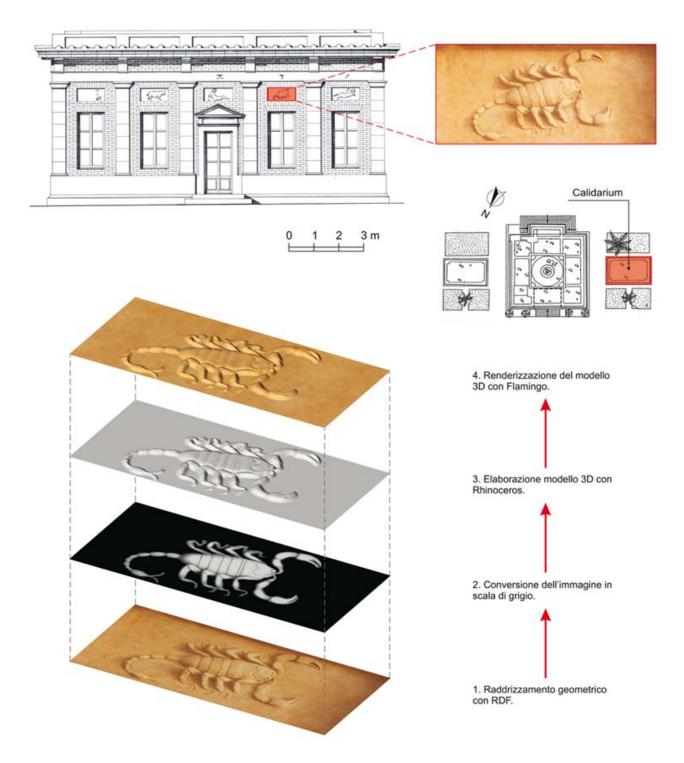
Fig. 4: Phases of one of the twelve zodiacal signs sculptured in relief on the facades of the *Calidarium*.

Fig. 5: Two perspective views of the digital models compared of *Gymnasium*. On the left, the first design hypothesis, that was never built; on the right, the current state.

Fig. 6: Perspective view of the digital model of the *Calidarium*.

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First results of an experimental campaign to study the influence of cement/sand ratio on strength of cement mortar

Luigi MOLLO
Department of Civil Engineering, Second University of Naples, via Roma 29, Aversa, Italy
E-mail luigi.mollo@unina2.it

Abstract
One of the problems encountered during the design of building restoration is the evaluation of the mechanical strength of the mortar. Mortar is the material responsible for the distribution of stresses in masonry structures. This work aims to evaluate the mechanical behavior of cement mortar for different cement/sand ratios. To do this, in accord with literature, water/cement ratio is fixed. The first results of the experimental campaign allowed to identify, knowing cement/sand ratio, a model to predict the strength of mortar.

Key words: technologies, mortar, mix design, mortar strength
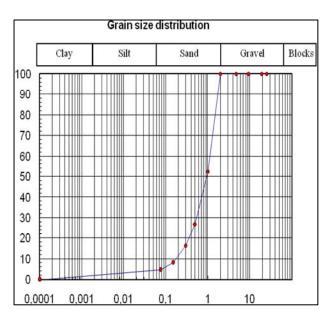
1. Introduction
After the work of Feret, who first recognized the importance of water/cement ratio on the strength of concrete, many studies on different properties of mortar have been made. After about two decades, Abrams formulated his law on the effect of water/cement ratio on concrete strength. According to Abrams' generalization law, Rao [1] confirms that the compressive strength of concrete varies inversely with the water/cement ratio for concrete and so directly with the cement content. However, from time to time, the water/cement ratio law has been criticized as not being a fundamental law. Besides ascribing importance to the water/cement ratio, the influence of cement/sand ratio on strength of cement mortar also should be recognized. Information on the influence of water/cement ratio and cement/sand ratio on the strength of mortar is very limited. From an extensive experimental study by Curie and Sinha [2], it has been observed that the important factor affecting the compressive strength of mortar appeared to be the water/cement ratio. It has also been revealed from the investigations that the relationship between compressive strength and water/cement ratio was unaffected by the use of different sands and sand gradings. It has been observed that the Bolomey expression relating strength of concrete to water/cement ratio can be applicable in normal hardened cement pastes with water/cement ratio > 0.15 [3]. It has been noticed that Bolomey parameters depend on the degree of hydration. Pozzolana cement is one of the most active component between aggregates in mortar and concrete [4]. Generally, it has been observed that the physical properties of cement-based materials are primarily affected by the water/cement ratio, the chemical composition, micro-structure and pore geometry of the cementitious materials, properties of aggregates, cement/sand ratio, and properties of cement/aggregate interfacial zone [1,5,6,7,8, 9,10,11,12,13]. This study has been carried on assuming constant sand weight and constant water/cement ratio hence solely cement/sand ratio has changed, this to understand the influence of cement/sand ratio on strength of cement mortar.

2.0 Materials and methods
Ordinary pozzolana cement CEM IV/BP 32.5 R conforming to EN 197-1 was used for the present experimental investigation.

Designation	cement [g]	Sand volumes [l]	Sand weight [g]	water [g] (water/cement ratio constant (0,50) + 1% of sand weight as wetting water)	cement/sand [%]	sand/dry total [%]	cement/dry total [%]
MC1	0	0,5	800	8,00	0,00	100,00	0,00
MC2	50	0,5	800	33,00	6,25	94,12	5,88
MC3	100	0,5	800	58,00	12,50	88,89	11,11
MC4	125	0,5	800	70,50	15,63	86,49	13,51
MC5	150	0,5	800	83,00	18,75	84,21	15,79
MC6	175	0,5	800	95,50	21,88	82,05	17,95
MC7	200	0,5	800	108,00	25,00	80,00	20,00
MC8	225	0,5	800	120,50	28,13	78,05	21,95
MC9	250	0,5	800	133,00	31,25	76,19	23,81
MC10	275	0,5	800	145,50	34,38	74,42	25,58
MC11	300	0,5	800	158,00	37,50	72,73	27,27
MC12	375	0,5	800	195,50	46,88	68,09	31,91
MC13	400	0,5	800	208,00	50,00	66,67	33,33
MC14	425	0,5	800	220,50	53,13	65,31	34,69
MC15	450	0,5	800	233,00	56,25	64,00	36,00
MC16	475	0,5	800	245,50	59,38	62,75	37,25
MC17	500	0,5	800	258,00	62,50	61,54	38,46
MC18	600	0,5	800	308,00	75,00	57,14	42,86
MC19	700	0,5	800	358,00	87,50	53,33	46,67
MC20	800	0,5	800	408,00	100,00	50,00	50,00

Figure 1. Grain size distribution
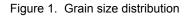
Figure 2. Mix proportions of experimental mortar

Natural river sand with sand fraction going through 2 mm sieve and retained on 600 µm sieve was used in this research program. The grain size distribution is shown in fig.1. Care has been taken to avoid the presence of organic and silt particles in the adopted sand fraction. The fineness modulus of sand was 4.92 with a specific gravity of 2.78. The bulk density of the sand was 1530 kg/m^3.

Tap water available in the laboratory with pH value of 7,9 was used for mixing mortar and curing the mortar specimens as well.

In order to study the influence of sand/cement ratio on strength of mortar, mortar mixtures were designed with a constant water/cement ratio of 0.50 and cement/sand ratio varying from 0 to 1 with an increment varying from 0.031 to 0.125. Fig. 2 shows the mix proportions of experimental mortar.

The samples for the present experimental investigation were prepared in accord to the EN 196/1. The samples were prisms of dimensions 40 mm x 40 mm x 160 mm. Standard metallic molds were used for the preparation of the test specimens

The compacted mortar samples were demolded after 24 h and immersed in water till the time of testing (fig.2a). According to the EN 196-1 the samples were subjected, after 28 days, to flexural and compression test. In particular, in the flexural test, the prismatic sample was placed in the flexural test device, with a side face disposed on the support

Figure 2. a) Sample delivery – b) flexural test device

rollers and the longitudinal axis normal to the support. The load roller applied, until rupture, a growing load

with an uniform speed of 50 ± 10 N/s (fig.2b). The flexural strength is determined, for each sample, with the relation Rf= 0.00234375Ff where Ff is the max load [N].
For each mortar composition, the values of flexural strength were determined as the arithmetic mean on a series of nine samples (tot. 171 samples).

Strength parameters					
Design ation	Compression strength σc [MPa] $R_e = \dfrac{F_R}{A}$	Flexural strength σt [MPa] $R_f = \dfrac{1.5Fl}{B^3}$	Cohesion [MPa] $C = \dfrac{\sigma_t \sigma_c}{\sigma_c - \sigma_t}$	Angle of friction $\varphi = arcsen \dfrac{\sigma_c - \sigma_t}{\sigma_c + \sigma_t}$	C/tan φ [MPa]
MC1	0	0	-	-	-
MC2	0.81	0.33	5.34	24.90	1.15
MC3	4.11	2.10	4.29	18.88	4.61
MC4	8.67	3.40	5.59	25.89	11.52
MC5	16.43	5.15	7.50	31.51	12.23
MC6	19.69	6.45	9.59	30.43	16.33
MC7	17.04	6.16	9.64	27.97	18.16
MC8	23.94	6.85	9.59	33.71	14.38
MC9	27.43	7.89	11.07	33.59	16.67
MC10	32.90	8.75	11.92	35.44	16.74
MC11	33.75	8.49	11.34	36.73	15.20
MC12	36.37	8.32	10.78	38.88	13.37
MC13	38.84	8.85	11.46	38.96	14.17
MC14	39.01	8.35	10.62	40.34	12.51
MC15	38.87	9.13	11.93	38.28	15.12
MC16	45.78	9.94	12.69	40.03	15.11
MC17	31.24	8.05	10.84	36.17	14.83
MC18	40.35	8.8	11.40	39.71	13.72
MC19	37.80	8.72	11.33	38.69	14.15
MC20	34.82	8.20	10.72	38.23	13.61

Figure 4

Figure 3. Strength parameters of experimental mortar

After the flexural test each sample was divided in two semi-prism of dimension 40 mm x 40 mm x 80 mm. The semi-prisms, resulting from flexural test, were kept in the wet state and thereafter used for the compression test. The compression test was made using a compression test device. The sample (semi-prism) was supported on the test plate so that the long side of the sample (40 x 80) was centered with the plates of the machine (40 x 40). The load plate applied, until rupture, a growing load with an uniform speed of 2400 ± 200 N/s. The compressive strength was determined, for each sample with the relation Rc=Fc/1600 where Fc is the max load [N].

3.0 Results and discussion
For each type of mortar the test machine determined the compression and flexural test parameters for each sample.
From the data provided by the test machine, the medium value of flexural strength are calculated, for each type of mortar, using the relation Rf= (1.5 Ff L)/B3 = 0.00234375Ff where Ff is the max load [N], L= distance between devices = 106.7 mm and B = 40 mm. The medium value of compressive strength was determined, for each type of mortar, using the relation Rc=Fc/A=Fc/1600 where Fc is the max load [N] and A = area of plate load=1600 mm2. The results are shown in the fig 3.
The experimental study shows the influence of sand/cement ratio on the strength of cement mortar. In particular, fig 4 shows the variation of compressive and flexural strengths with respect to the variation of cement weight.
The experiments were carried by assuming constant sand weight and constant water/cement ratio, thus solely cement/sand ratio was changed. Both flexural and compressive strengths increase with increasing cement content, asymptotically reaching the strength of the cement alone.
A first experimental estimate of the optimal cement content is cement/sand ratio around 0.30÷0.40, in agreement with the traditional workmanlike, which suggested a ratio of 1/3. Mortar strength is indeed less sensitive to further increase in cement content and after the ratio C/S=0.6÷0.7 is reached, the mortar strength practically assumes the asymptotic value corresponding to cement matrix strength.
Physical explanation of this results is in the mortar structure and behavior. Like all composite materials, mortar consists of a matrix (cement) and of a dispersed phase (sand). The sand, dispersed in the matrix, has the function, in ordinary mixture with water/cement ratio greater than 0.45, to provide rigidity and mechanical strength, taking upon itself the greater part of the external load applied to the material. Instead, the cement matrix has the task to act as a filler. The cement paste, initially, in the state of viscous fluid, fills all the spaces

to adhere fully to particles of sand; afterwards, it undergoes a solidification process which allows to give stability and geometry to the structure. The matrix adhere to the particles of sand to transmit them, with tangential stress, the external loads applied.

The increment of cement improves the mortar strength up to cement/sand ratio = 0.30÷0.40 is reached, because, in this range, the cement fills the pores of the sand, in fact the porosity of the sand assumes normally the value 0.30. After this value of cement/sand ratio and up to cement/sand ratio = 0.60÷0.70, the increment of cement improves slowly the strength of mortar because the cement, dispersing the phases, can wrap up all grains of sand and, so, the friction is eliminated and the external loads applied are transmitted only with tangential stress. When the value of cement/sand ratio is greater than 0.6÷0.7, the phase is so dispersed that does not contribute anymore to the strength, and so the mortar strength tends asymptotically to that of the matrix (≈ 39 N/mm^2).

The experimental data has been fitted by S-shaped curve with equation:

$$\sigma = Ke^{-e^{\frac{\frac{C}{S}-A}{B}}}$$

[1]

Where C/S is the cement/sand ratio; K is a parameter depended by the max value of strength of cement used, A and B are empirical parameters.

For the mortar used in experiments, the values of K, A and B, for compression strength and flexural strength, are reported in following table.

	Compression strength	Flexural strength
A	0.20	0.15
B	0.10	0.07
K	38.90	8.77

Really the curve [1] does not pass through the point zero but it is coherent with reality because, in any case, the only mixture of sand and water develops a strength different from zero although it is very close to zero. It is interesting to note that, when cement/sand ratio is smaller than 0.13, the increase of strength is growing much more slowly with increasing of cement probably because up to this point the external loads applied are transmitted predominantly by friction with a minimum component of tangential stress.

The relation [1] can be used as empirical model to predict the compressive and flexural strength using cement/sand ratio when the water/cement is equal to 0.5.

4. Conclusion

The mortar strength seems depending on cement/sand ratio when the cement/water ratio is kept constant. It is important to note that the quantity of cement weight plays, respect to sand, a main role. It is evident that more studies need to be carried on in order to evaluate complete influence of all different contributions to the mortar strength.

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MORE OR LESS
Imprecise precision in "regulatory designs" by Galeazzo Alessi

Paolo BELARDI[1]
[1] Dipartimento di Ingegneria Civile e Ambientale, Facoltà di Ingegneria, Università degli Studi di Perugia, Perugia, Italia
belardi@unipg.it

Abstract

As Bruno Zevi stated in the early 70s, Perugia does not have a characterizing urban design, at least not in its most common interpretation. It is not by chance that its acropolis has interjected the hyppodamian scheme inherited by the etruscan-roman nucleus which refuted the papal fortress built under Paul III. Nevertheless, the central area between the hills of *Landone* and *Sole* are still today an extraordinary typological example, where an atypical constructive process became real and rose above not only the abstractness of the program-plan but also the concreteness of the building itself. Indeed, Bernard Rudofsky totally agreed with Zevi; in those years, he was celebrating the floating architecture of the ancient *Peroscia*, noticing in its interrupted character and in its pensile houses, the enzymes of an exclusive urban landscape. And he compares the spatial elusiveness of *via Maestà delle Volte* with the volumetric complexity of the Tsukji neighbourhood of Tokyo, establishing a supra link between Kenzo Tange and Galeazzo Alessi. Just as in the case of the japanese neighborhood, also in the perusian acropolis the multi-prospective vocation is not casual; on the contrary, it is the result of a planned "urbatettonico" monitored by Alessi through veritable "regulatory designs". Its precision lies in its imprecision. By honing the remote control technique defined in Genoa, Alessi does not prescribe dimensional norms nor does he impose constructive choices but rather suggests spatial relations and proposes ornamental models in his basilica of *Santa Maria Assunta in Carign*ano, and after in *Varallo*, with the organ plan of *Sacro Monte*. In very few years, he transforms the austere medieval acropolis in a sumptuous Renaissance citadel.

Key words: Perugia, Alessi, regulatory design, urbatettura.

1. Perugia: a multi-prospective city

As Bruno Zevi stated in the early 1970s, Perugia does not possess a characteristic urban design [1]. At least not in its most common interpretation. It is not by chance that its acropolis has interjected the hyppodamian scheme inherited from the etruscan-roman nucleus and refuted the papal fort set up by Paul III. However, the central area between the *Landone* hill and the *Sole* is still today an extraordinary typological sample, where an atypical constructive process became real and rose above not only the abstractness of the program-plan but also the concreteness of the building itself. Bernard Rudosky totally agreed with Zevi's statement when in those same years, he celebrates the floating architecture of the ancient *Peroscia*, noticing in its interrupted character and in its pensile houses, the enzymes of an exclusive urban landscape [2]. And he compares the spatial elusiveness of *via Maestà delle Volte* with the volumetric complexity of the Tsukji neighbourhood of Tokyo, establishing a supra link between Kenzo Tange and Galeazzo Alessi. Just as in the case of the japanese neighbourhood, also in the perusian acropolis the multi-prospective vocation is not casual; it is due to the drastic morphological changes induced by the construction of the *rocca paolina* (1540-1543) in the heart of the forma urbis made magnificent by Leon Battista Alberti. Just as widely illustrated by the scientific community and the local scholars [3]. What still remains a mystery (on which scholars disagree) is whether

there is an intelligent design aimed at an urban revolution going on in ancient Peroscia during the pontificate of Paul III (1534 – 1549), in which the fort, although personifying an innovative intervention from a typological point of view (having both a military and a civilian role), and ground-breaking from the environmental point of view (as it engulfs an entire neighbourhood), represents 'only' the spectacular seal of a much larger political scheme, aimed at replacing the organic austerity of the Baglioni acropolis with the rational splendour of a Farnese citadel [4]. This was done with a manifest intention to emend the rebellious community with an eternal physical mark. On the other hand, it is obvious that the cartesian plot carried out with plano-altimetric geometry of the road network, along with the regularity of the visual hierarchy established with the capillary dissemination of a scenographical floor and of the panoramic balconies and the strategy of the figurative realization of the impressive facades in brick adorned by minute ornaments in travertine show how an initial urban plan was necessary. Moreover, of obvious pauline matrix, based on the same re-composing techniques already well proven by the Farnese pope in the classicistic transfiguration of medieval Rome, when for example "[…] the principle is introduced whereby new avenues could be built through destruction, in areas where no construction is planned or in area which are unsuitable, for whatever reason, for anything other than *connecting* both physically and optically two poles" [5]. This regards the entire acropolis, from *via Riaria* (today *via Baglioni*) to *via Nuova* (today *via Mazzini*) up to *piazza Grande* (today *corso Vannucci*), where work to widen and repair seem even more pronounced because they have to make do with a very large place to begin with: just as in the specific cases of palace *Baldeschi*, of palace *Graziano* and of the extension of palace *Priori*. In this way, it is not surprising that to carry out a plan which would not be disrespectful to the environment [6], Paul III was forced to terminate an architect who was so incurably old-fashioned such as Antonio da Sangallo il Giovane, and hire an emerging personality such as Gaelazzo Alessi for the normative and executive transposition, since he possessed all the necessary prerogatives: he was born in Perugia of a noble lineage, he was raised in Rome in the best craftsmen's shops and known by the most prestigious people in office in the Vatican.

2. The alessian DNA

Documents showing Paul III's building policy carried out by Galeazzo Alessi are scarce due to the suppression of the magistrates between 1540 and 1553. This is true up to 1873 when the first list of his works is available; this is when Adamo Rossi reporting "the memoirs of the writers and archivists", records that "during Cardinal Tiberio Crispo's legislation, a road was opened which linked the main road to the *Sopramuro* and this is where the *Church of the Madonna del Popolo* was built, then the *piazza della Paglia*, the road which leads to the *Prome* and from the start from where the Perugian Switzerland can be seen, a porch early turned in a little church; the building next to the one of the *Popolo* was shortened for governmental residence use and a balcony was built to crown it; the *Campo di Battaglia* was levelled; the bridge on the *Chiagio* was built which is now known as *Bastiola*. It was customary that the Cardinal would task Alessi as requested by his predecessor – cardinal Ascanio Parisani – and from his own works" [7]. An enviable portfolio for a thirty-six year old architect (this was Alessi's age when he signed the contract with the Saulis for the design of *Santa Maria Assunta in Carignano*), but still not enough for an infamously untrusting administration such as Genoa to task him with the integral urban renovation of that city. There was probably more to the story. It is not by chance that besides the seemingly occasional acclaimed work by Alessi (the division of the *via Nuova*, the rebuilding of the *Church of Santa Maria del Popolo*, and the *Church of Sant'Angelo della Pace*), the entire blueprint of the Perusian acropolis exudes an elegant design, composed of a mixture of broken lines and sinuous bends which remind us of two opposing tridents (which originated the current *piazza della Republica* on one end and *piazza Danti* on the other), yield a scenographic reform pursued in Rome in the early 1500s under the aegis of Raffaello Sanzio and marks a profound divide from the narrow-minded character of the ancient *platea magna communis* as sketched in 1469 by Benedetto Bonfigli in the *Traslazione del Corpo di Sant'Ercolano da San Pietro alla Cattedrale* [4]. This inspired the idea that Alessi after having successfully headed the construction of the *rocca paolina*, may have been tasked to head a project *ante litteram*, which did not (this is the novelty) prescribe dimensional norms and did not impose building choices, but suggested spatial relations and ornamental models. All this was possible through a series of regulatory designs the precision of which laid in its imprecision: quality vs. quantity. This explains the impasse of the critique produced by a long series of architectures which, although stylistically akin, could not be claimed as Alessi's (also for chronological reasons as well) and clarifies why many of the works of Ignazio Danti's, Valentino Martelli's and Bernardo Sozi's are inspired by Alessi's way of composing architectures of facades which aimed to support perceptive alterations due to a slanted vision. An example is *via Bontempi*, the urban area of the Perusian acropolis where perhaps the gradual gap imposed by the pauline reform is most evident. Furthermore, this is even more significant due to the figurative collision

between the masked-monumental facades of Alessi's legacy and the moderated pre-existing medieval urban fabric.

3. The *Academia del Dissegno*

In a short missive dated January 1570 sent to cardinal Fulvio della Corgna attached to his design for the façade of the roman *Chiesa del Gesù*, Galeazzo Alessi openly confesses his poetic creed, sadly stating that, in order to surpass the "ordinary form", "new things [...] needed to be done, provided that they did not clash with the rules and terms of Architecture" [8]. This statement summarizes the most original value of Alessi's school of thought, which is known to be both conformist and eccentric thanks, among other aspects, to the mastery of all the representative techniques [9], of organizing designs with rationality typical of Sangallo and to create facades with freedom typical of Serlio. On the other hand, Alessi was not only a great master of drawing experience [10], but also well-versed in remote controlling [11]: that is when geographically distant, he controls through detailed epistolary instructions and when temporally distant, through appropriate graphical instructions. When geographically distant, we can note his prolonged correspondence with the Sauli (creators of the genovese *Basilica of Santa Maria Assunta in Carignano)* which Alessi would gloss with explanatory sketches to compensate for his prolonged absences from the construction site [12]. On the other hand, when temporally distant, two of Alessi's essays written in the last years of his life are worth mentioning: the *Libro dei Misteri* (1569), dealing with the coordinating design of the *Sacro Monte di Varallo* and includes the typological repertoire which introduces the imminent achievement of the "normalizing design" [13], and the *Libro di Fortificazione in modo di Compendio* (1570) in which he is the first to claim that the design "allows the architect to state his opinion effectively as opposed to others" [14]. Above all, it is the birth of the *Academia del Dissegno* in Perugia: an establishment which aimed at conferring a new social status to artists and founded by the painter Orazio Alfani and by the mathematician Raffaello Sozi in the spring of 1573, right after Alessi's death (December 30th 1512). Very little is known about the original organization of the perugian institution since there is no name list of the academic staff nor a statute of its organization; on the other hand, it is true that the *Academia* along with the entire city, was greatly influenced by Alessi's legacy [15]: in the aegis of a *Dissegno* so dedicated to guaranteeing widespread quality. This is proven directly by the rational order of the new *via Nuova* (currently *via Mazzini*) where the regulatory design aiming to organize the several facades in a unitary spread is proven through the organizations of the pavements of the corner buildings carefully aligned with the cornices of the "serliana" of the *Santa Maria del Popolo* church: this is perhaps imprecise from the point of view of construction norms but precise from an architectural point of view since it allows to organize the private buildings and to guarantee continuity of the scenographic backdrop. This is also proven by the portal bosses (more than one hundred each equal to the other) which were aligned in the historical center of Perugia in the second half of the XVI century: this is the legacy of the regulatory design of Alessi which the local craftsmen shops made popular [16].
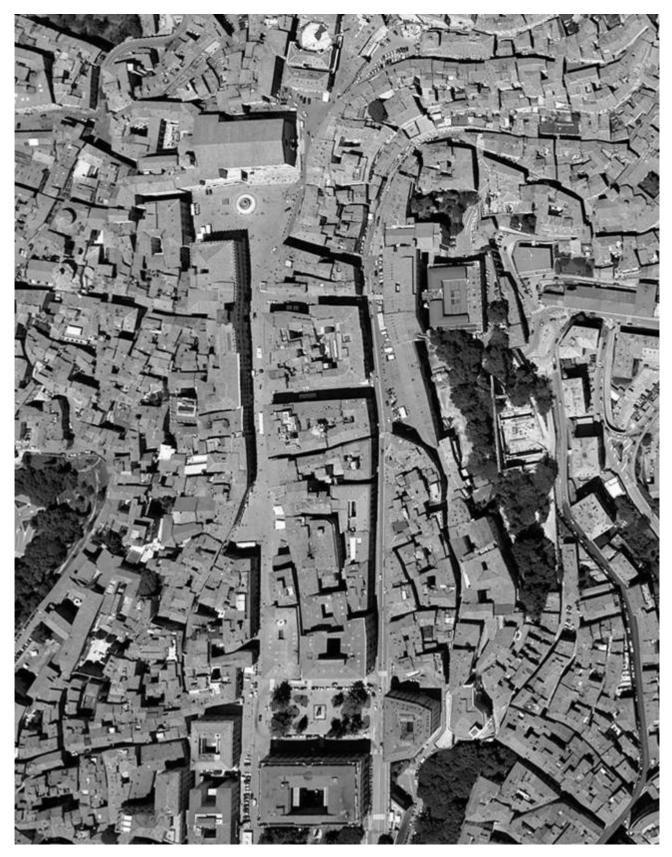
Fig. 1: Perugia, zenital view of the acropolis

Fig. 2: Perugia, bird's-eye view of the acropolis

Fig. 3: Perugia, bird's-eye view of the acropolis

Fig. 4: Perugia, view of the loggia of palace Priori
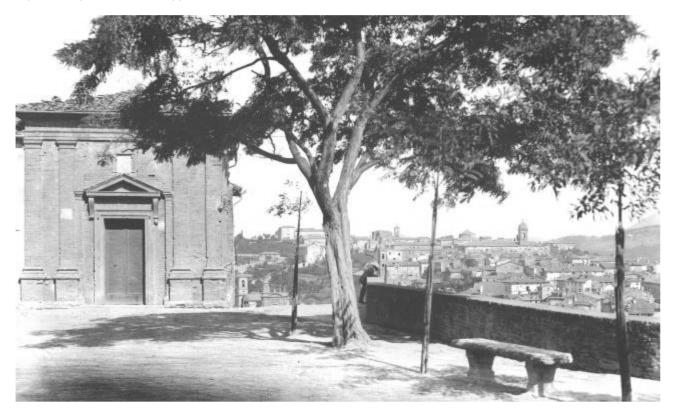
Fig. 5: Perugia, view of the *Church of Sant'Angelo della Pace* in the beginning of the twentieth century

Fig. 6: Perugia, *via Mazzini*, architectural survey, elevation (IDeA, DICA, University of Perugia; scientific supervisor: Paolo Belardi, coordinator: Fabio Bianconi, operators: Marco Armeni, Simone Bori, Luca Martini, Valeria Menchetelli, Cecilia Scaletti)
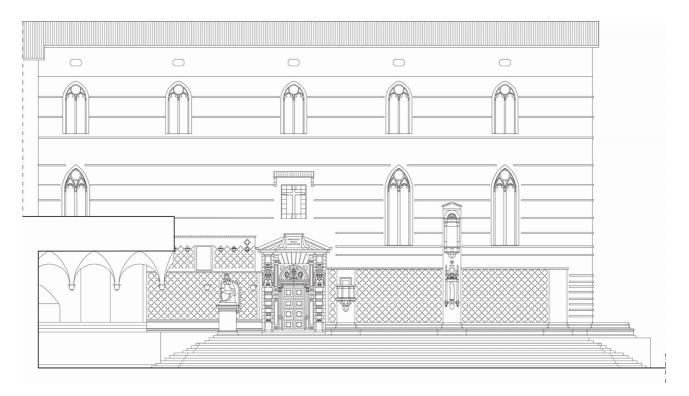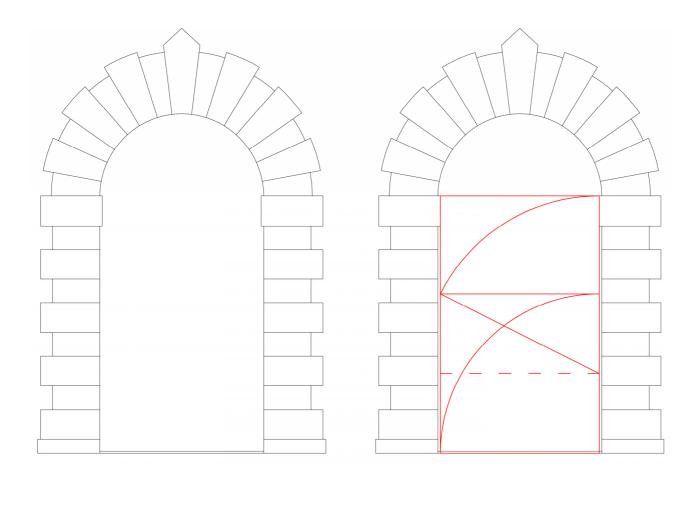
Fig. 7: Perugia, southern portal of the San Lorenzo cathedral, architectural survey, elevation (IDeA, DICA, University of Perugia; scientific supervisor: Paolo Belardi, coordinator: Fabio Bianconi, operators: Marco Armeni, Valeria Menchetelli)
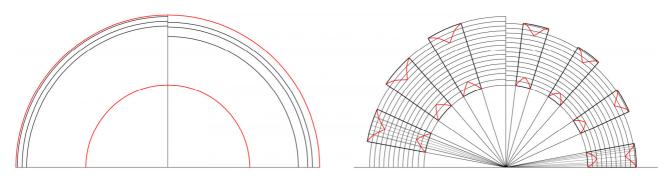
Fig. 8: Perugia, architectural survey and classification of a type portal, regulating lines
(IDeA, DICA, University of Perugia; scientific supervisor: Paolo Belardi, coordinator: Valeria Menchetelli, operators: Francesco Aureli, Manuela Boccali, Laura Piazzoli, Gabriele Prenni)

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The traditional house and rational architecture

Flamur DOLI[1], **Jetik DOLI**[2]
[1]Department of Architecture, Faculty of Civil Engineering and Architecture, University of Prishtina, Prishtina, Republic of Kosovo
E-mail: flamur_doli@hotmail.com
[2]E-mail: jetik.doli@hotmail.com

Abstract:
Genius Loci: The tradition acquired through centuries of ancient masters resulted in the creation of certain construction principles for the conception of cities in harmony with the spirit of place, or genius loci. Ecopolis: The complex natural features like geographical and topographical position of the city, adaptation to the topographic features of the land, the rational orientation - the extension of the city along the south side of Alp Mountains, types of zoning and construction adapted to the climatic conditions, the natural and planned water potential system conditioned and directly influenced the formation of an urban and architectural environment of the old city of Peja which was characterized by the genuine features of an ecopolis. The ancient masters as a result of an over century experience managed to act in harmony with the spirit of nature. Therefore, the spirit of nature with the spirit of physical structures is presented in a synthetic harmony creating an expression of regional architecture with distinct features of high value. Districts and units constructed in accordance with nature and bioclimatic conditions: The districts of Peja respectively the south-oriented yards of the houses were constructed in accordance with bioclimatic conditions. In this context the traditional house design in Peja included all bioclimatic architecture components. Hence, these houses bearing architectural and functional high values can be considered as energetic and ecologic models. Typological and rational features of Peja's traditional house are: Articulated and typified volumetry of the house; proper thermal orientation and zoning; proper house connection with the terrain-greenery and water; orientation corresponding to the view; interlacement of interior and exterior spaces; articulated functional and shaping interlock due to the tradition of ancient Albanian masters; compactness of form - a prerequisite for minimal heat loss. It has been ascertained that many Peja traditional houses achieved the degree of spatial perfection. The principles of architectural configuration of these houses are very similar to those of today. Knowledge of principles and methods of their creation is a criterion for their renovation and revitalization and also for the conception of new types of construction and neighborhoods, as to maintain the specific expressions of a regional architecture.

Keywords: harmony; tradition; city concept; urban environment; typological features; orientation; zoning; volumetry; form compactness.

1. Genius loci
Twenty centuries ago Vitruvius in his treaty for construction mentioned the deeper awareness for respecting the qualities and the spirit of land, respectively the genius loci. The tradition of ancient masters based on the knowledge acquired through centuries resulted in creation of certain construction principles for conception of cities in harmony with the spirit of a building land, or the genius loci.

2. Ecopolis and the old city of Peja

The complex natural features that directly influenced and conditioned the formation of an urban and architectural environment in Peja, the city characterized by the genuine features of an ecopolis, are:

➤ Geographical and topographical position of the city;
➤ Adaptation to the topographical features of the land;
➤ Rational orientation - the extension of the city along the south side of Alp Mountains;
➤ Zoning and construction types adapted to the climatic conditions;
➤ Natural and planned water system potential:
▪ River (Lumbardhi)
▪ Drains
▪ Ravines
▪ Water flow lines.

The ancient masters as a result of an over century experience accomplished to act in harmony with the spirit of nature. Therefore, the spirit of nature with the spirit of physical structures is presented in a synthetic harmony, reaching an expression of high value regional architecture with distinct features. architecture structure of this part is characterized with an organized spontaneous development, which in its wide concept harmoniously synthesizes all the upper mentioned features and principles.
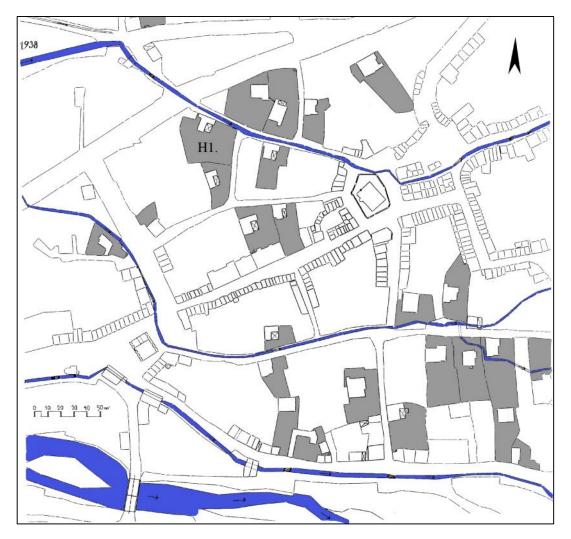
Fig.1.0. The geodesic survey of a part from the old city core of Peja, dated 1938

The districts of Peja city and their subunits like the south oriented house yards were constructed in accordance with bioclimatic conditions. The design of traditional houses of Peja included all components of the bioclimatic architecture. After the general analysis which is uncovered in detail in the following paragraphs, it will be concluded that these houses share high architectural and functional values and are considered as energetic and ecologic models.

3. Typological and bioclimatic characteristics of Peja traditional houses:
3.0 - Typified and articulated volumetry of the house;
3.1 - Compactness of form - prerequisite for minimal heat loss;
3.2 - Designing different spaces for summer and winter seasons;
3.3 - Articulated functional and shaping interlock;
3.4 - Proper orientation and thermal zoning;
3.5 - Window apertures according to climatic criteria;
3.6 - Application of thermal tampon zones;
3.7 - Proper house connection with the land- greenness and water;
3.8 - Orientation corresponding to the view;
3.9 - Interlacement of interior and exterior spaces.

3.0 Typified and articulated volumetry of Peja traditional houses
When analyzing the plan layouts of Peja traditional houses, which are presented in the following figures, we can draw the conclusion that these houses are characterized by a compact volumetry.

3.1 Compactness of form as a prerequisite for minimal heat loss
The compact volumetry or spatial formation of the traditional house is in a direct and organic relationship with its plan layout, the latter being always distinguished by its square or rectangular contour, with a minimal perimeter. The plan layouts of these constructed houses create an architectonic volumetry that determines a minimal ratio between the exterior surfaces and the volume of the house, ensuring minimal heat loss. The volumetric compactness determines a minimal house surface in the direct contact with the outside cold air; hence the heat loss is also minimal. This implies that ancient masters managed to optimize the house surfaces, reducing the heat loss in proportion with the reduction of house exterior surfaces. Again, the plan layout with a contour of a square has a minimal perimeter, while the plan layout with a contour of a rectangle is 10 % larger than the former. All the houses included in this study share square and rectangle contour plan layouts. The plan layout contour of house floors: H1 (fig.2.2); H2 (fig.3.2); H5 (fig.6.2), and especially the house plan layout H6 (fig.7.1 & fig.7.2) are almost in a square form. Meanwhile, the houses: H3 (fig.4.2); H4 (fig.5.2) and H7 (fig.8.1 & fig.8.2) [1] contain a rectangle plan layout. In this respect, a specific feature characterizes the ground-floors of H6 and H7 houses, that is all the ground-floor walls, including the exterior and interior ones, have a higher thickness, which means a higher thermal mass.

3.2 Designing different spaces for summer and winter seasons
The idea of ancient masters was that with a proper architectonic structure of walls, window spaces and cross ventilation to maintain the solar energy as a source of heat during winter, and meanwhile to ensure cooling during summer, as back then they did not have active temperature control systems. In this geographical position, the city has major seasonal temperature differences; therefore ancient masters used the concept of designing different living spaces for winter and summer months. As it is seen in fig. 7.1 (2.) and fig.8.1 (2.), living rooms for winter months are positioned in the ground-floor between the high thermal mass thick walls.
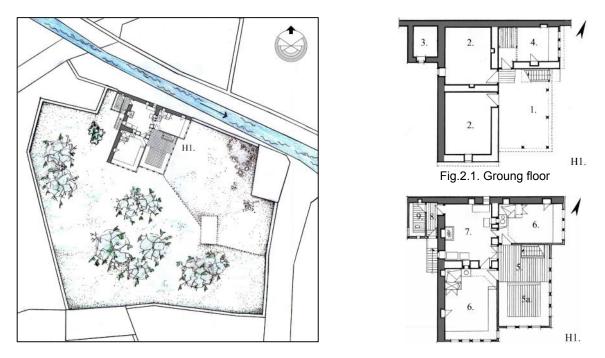
Fig.2.0. Site plane - H1

Fig.2.1. Groung floor

Fig.2.2. Upper floor

These walls are made of high density materials: stone, bricks, or adobe. These high thermal mass materials can conserve energy and when slowly radiating it add a pleasant effect to the living conditions. In accordance with climatic criteria living rooms were positioned among these walls and small dimension windows were opened. The different bioclimatic disposition of living rooms and protuberant parts of corridors suitable for stay in summer offer pleasant living conditions. The east oriented rooms and the parts of corridors for stay offer great commodity during summer afternoons, while the same spaces when south oriented are more suitable for utilization before noon.

Fig.2.3. Perspective view - H1

3.3 Articulated functional and shaping interlock

Regarding Peja urban houses, and in general Kosova urban houses, it must be said that ancient Albanian masters due to their old tradition ensured an organic harmony between spatial, compositional and the functional structure of the house. Peja urban houses in a certain phase of their development gained crystallized stylish features. Hence, there is no coincidence in considering Peja traditional houses to have achieved the degree of a perfect spatial crystal. In these houses, the functional and spatial structure almost always was realized according to an asymmetric shaping concept. Therefore, traditional houses of Peja from the end of 18th century and 19th century are distinguished for the building typology and the crystallized stylish features.

3.4 Proper orientation and thermal zoning

As it is depicted in fig. 7.1 (2.) and fig. 8.1 (2.), the three rooms (2.) of H6 house and the two rooms (2.) of H7 house for winter living are east and south oriented. Their windows are also set in respect to climatic criteria, mainly in south and east parts. Owing to their experience and ingenious dexterity, Albanian ancient masters as far as proper orientation and thermal zoning was concerned, applied the concept of "tampon zones", which translates in designing helping spaces with compact structure in the north or northwest parts that aim to protect or slow the cooling process of thermal mass walls. As the plan layouts of H1 and H7 houses show, all these houses share high thickness walls in their north or northwest parts, as it is these walls that maximally protect the thermal mass of inner walls from the cold winds, which almost always blow from the north.

Fig.3.1. Ground floor

Fig.3.2. Upper floor

Fig.3.0. Site plane - H2

3.4 Proper orientation and thermal zoning

As it is depicted in fig. 7.1 (2.) and fig. 8.1 (2.), the three rooms (2.) of H6 house and the two rooms (2.) of H7

house for winter living are east and south oriented. Their windows are also set in respect to climatic criteria,mainly in south and east parts. Owing to their experience and ingenious dexterity, Albanian ancient masters as far as proper orientation and thermal zoning was concerned, applied the concept of "tampon zones", which translates in designing helping spaces with compact structure in the north or northwest parts that aim to protect or slow the cooling process of thermal mass walls. As the plan layouts of H1 and H7 houses show, all these houses share high thickness walls in their north or northwest parts, as it is these walls that maximally protect the thermal mass of inner walls from the cold winds, which almost always blow from the north.

3.5 Window apertures according to climatic criteria
In the fig.2.0; 3.0; 4.0 and 7.0 plan layouts, and in all other house plan layouts presented below, the positions for window apertures for house upper floors are made based on climatic criteria. All window apertures are positioned in the south, east or southeast in the main house upper floors. An exception is at the windows of the upper floor of H2 house (fig.3.2). Here windows are positioned in the south and west side, because of the urbanism disposition of the house parcel. This type of functional and architectonic window structuring allows capturing passive solar energy, as windows are exposed to the sun. It enables a direct gain from the solar energy during the cold seasons of the year. Respecting climatic criteria, windows permit solar radiation to enter directly inside the house. This heat in its largest part is conserved within the house as it is absorbed by thermal mass walls. After the sunset, the same heat starts to radiate back to the house keeping an almost constant temperature even during night temperature drops. In addition, compositional window structuring based on the continual series concept actualized in an organic harmony with the house spatial formation built centuries ago is defined by modern architectural features, which is also inspiring for contemporary designers. The functional structure of Peja traditional houses is distinguished for a high level functionality covering even today's requirements.

3.6 Application of thermal tampon zones
From the plan layouts of H1-H5 house upper floors it is noted that thermal tampon zones are designed in their architectonic and functional structure. Thermal tampon zones in H1-H5 plan layouts are presented with parallel lineament (fig.2.2; fig.3.2; fig.4.2; fig.5.2 & fig.6.2). They function as communicating areas within the house floor, are used for living during summer, and are sun oriented. While, during winter they act as buffer zones between warm living areas and the outside cold climate. Thermal tampon zones prevent living spaces from cooling during cold seasons, and meanwhile prevent living spaces from excessive solar heat during summer. As it is further noted in these plan layouts, tampon zones and all the living spaces along the sun side are enfolded by thin small thermal mass walls that cool during the night. Other architectonic elements that protect the living spaces form excessive solar heat are deep sheds. In summer months, when the sun is up high, these sheds block the sun rays from penetrating the inner living spaces, while in winter when the sun is in a lower level, rays penetrate from the numerous windows into living spaces in ground and upper floors. Thick inner walls with high thermal mass absorb parts from this heat and release it when the sun sets ensuring constant warmth in living spaces. Natural summer cooling of the house was also managed through cross ventilation. In the fig. 3.3; 6.3; 6.7 [2], respectively in the plan layouts of ground floors: fig. 2.1 (1); fig.3.1 (1); fig.4.1 (1); fig.5.1 (1) and fig.6.1 (1), it is noted that houses include porticos in their ground floors, that are under shadow during summers and contain a cooler air than the air above the roofs. The specific weight gradient of cool and warm air forces its circulation. Air circulates from the portico through the stair space to the corridor, open air traditional kitchen and finally makes to the dormer, the roof opening. It is through this vertical cross ventilation that the natural, passive cooling of the house was achieved. Another mean of passive cooling was also horizontal cross ventilation through the openings of south exterior wall windows, and north oriented small windows.
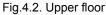
3.7 Proper house connection with the land - greenness and water
The philosophic or urban and architectonic concept of middle age Kosova houses consists in organizing life in harmony with the sun, water and greenery. This principle has naturally conditioned a proper house connection to the land, respectively positioning the house to the side of the sun, greenery and water. Therefore, in many middle age cities of Kosova, the natural water infrastructure is so planned, that in almost every house yard flowing water system is present

Fig.4.0. Site plane - H3

Fig.4.1. Ground floor

Fig.4.2. Upper floor

3.8 Orientation corresponding to the view

Ancient masters in the context of micro urban conception of the houses always sought that the orientation of window openings to be in accordance not only with climatic criteria but also with the best views that could be attained. Hence, windows are sun oriented and in the same time open to the side of yard greenery and grove. Such conception enabled a decent interlacement of exterior and interior spaces.

3.9 Interlacement of interior and exterior spaces

Ancient masters interlaced the interior space with the exterior through many window openings, especially in the main house floor. The system of window openings in series, based on actual principles, enables viewing the entire exterior yard greenery. In this way, even the stay inside the house offered the commodity and the pleasure as like staying outside in the cultivated yard gardens.
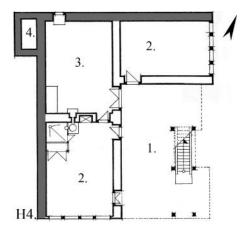
Fig.5.1.Ground floor

Fig.5.2. Upper floor
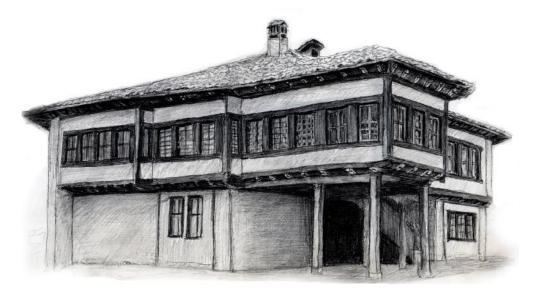
Fig.6.3. Perspective view - H5
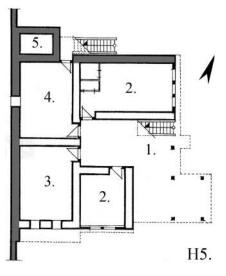
Fig.6.1. Ground floor
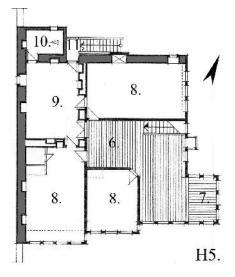
Fig.6.2. Upper floor

Fig.6.4. Perspective view - H5

Fig.6.5. Perspective view - H5

Fig.6.6. Perspective view - H5

Fig.6.7. Perspective view - H5
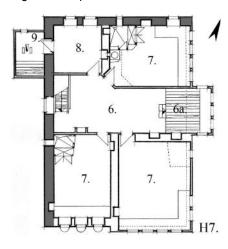
Fig.8.1. Ground floor
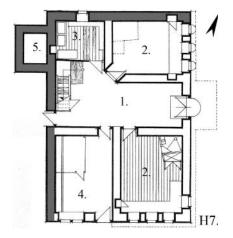
Fig.8.2. Upper floor

Conclusion

In the conclusion of this study, it must be added that the architectonic formation of traditional houses consists of similar principles as those of today. Knowledge of principles and methods of their creation sets a criterion for their renovation and revitalization and also for the conception of new types of construction and neighborhoods, respectively for establishing a special expression featuring architecture

Fig.7.0. Site plane - H6

Fig.7.1. Ground floor

Fig.7.2. Upper floor

References

[1] All the plan layouts and the site plan of H2 house are from the Institute for Protection of Cultural Monuments, Prishtina. The plan layout surveys date from 1955. The plan layouts are redrawn by Flamur DOLI. The site plan of H1; H3; H5 and H6 houses is taken from the geodesic survey of Peja city of the year 1938.

[2] Perspective views: fig.3.3; fig.6.3; fig.6.4; fig.6.5; fig.6.6; & fig.6.7 are done by Jetik DOLI, a third year Architecture student, at the Faculty of Civil Engineering and Architecture, University of Prishtina.

Promotion of Cultural Heritage. A case of a little village in Apennines

Valentina CINIERI[1]
[1] Dipartimento di Ingegneria Civile e Architettura, Facoltà di Ingegneria, Università degli Studi di Pavia, Pavia, Italia
valentina.cinieri01@universitadipavia.it

Abstract

Territory is a non-renewable resource, whose preservation and promotion should help to main and strengthen Local Identities.

Embresi is a place on the Apennines, characterized by high naturalization, without services and easy routes. There are marks of important past events, despite severe abandonment's damages. Its tower rises as a landmark in the middle of stone buildings and the carved faces are peculiar.

Interesting issues were revealed by a multidisciplinary study, developed within a degree thesis of Architecture and Building Engineering.

The Architecture is related to a territorial and economical organization's process, arranged by Lombard sovereigns (VII-VIII century), through the activities of Saint Colombano's and Saint Paul's monasteries, to improve and control a territory bordering on the Byzantine State and necessary step to reach Rome.

The X-ray diffraction revealed the nature of the limestone ashlars, mainly made of calcite, quartz and dolomite. There's a connexion between content, strength and function. The builders had a profound knowledge of materials, in according to the hypotheses.

The strength of Embresi is the position along the ancient roads. The idea is to create temporary housing for visitors, who like History and Landscape, despite obstacles and isolation. Stonework becomes the envelope in which missing features are inserted like boxes.

Key words: Cultural Heritage, Restoration, High-Medieval, Stonework

1. Aim of the work

This work belongs to the group of the researches relating to the conservation of the historical building heritage, developed at the University of Pavia and, in particular, regarding the Interdepartmental Centre of Research on the Conservation of Cultural Heritage.

This research started with the work of a graduation thesis (tutor: prof. Ing. Marco Morandotti, co-tutors: proff. Massimo Setti, Ing. Daniela Besana, University of Pavia) then subject of a publication [1], and develops an approach which should have a real effect in the field of design, because it combines the process innovation with the issues of design quality. This innovation concerns both the diagnostic techniques and the definition of intervention strategies

In particular, the work investigates the connection between the traditional approach to the conservation of Cultural Heritage, which underpins the pair knowledge/design, and the relationship between re-use, observant of conservative needs, and its sustainable promotion.

The importance of conservation is accepted by all of us, because the building heritage is considered harbinger of primary needs which have to be preserved, but there are also evident needs of fruition of a historic building, seen as a trigger valorization processes and cultural developments.

The preservation of building heritage is important for the improvement of the quality of life and for the safeguard of traditions and history, but it is also significant for the economy of a territory, because the cultural and the traditional heritage increases the tourist interest in this territory.

The case of study is a little rural village placed in an interesting territorial background, filled with history and naturalistic beauties. The main reason of interest in it is the fact that this hamlet shows distinctive features, which demonstrate its importance and prove as it is not only the result of a poor rural civilization.

The aim of the work was to consider an ancient hamlet, which had never been a subject of scientific studies, with the goal to plan the recovery of its ancient buildings and an appropriate re-use, which allows for historic features and discoveries, made from cognitive researches.

2. Promotion of Building Heritage: opening notes

The Italian law (*Codice dei Beni Culturali e del Paesaggio, D.Lgs 22/01/2004, n.42; art. 6*) explain that the promotion, which is compatible with the safeguard and doesn't prejudice needs, is the practice of functions and the control of activities designed to promote the knowledge of Cultural Heritage and to provide the best conditions of use and fruition, to the purpose to promote the development of culture.

There is a connection between the safeguard of the Cultural Heritage and the use of it. The safeguard is considered in its meaning of conservation and preservation, because the Cultural building Heritage is seen as a bearer of important messages and history, which have to be safeguarded. The use is the element that spark off the cultural development [2]. This connection between "conservation" and "use" is the element that most of all should be investigated. On this front, the research, which was conducted, attempts to provide a reflection.

The start point is the importance of knowledge, that is the basic condition to actions of restoration, of recovery or valorization. Each historic building can be seen as a text, characterized by several writings, gaps, additions, integrations, which make it specifically a "palimpsest". So, the terms "knowledge" and "interpretation" are at the centre of the study. The quality of the memory is bound up with the authenticity of the fabric of the monument, which, when altered, distorts the memory and therefore diminishes the value of the artifact [3]

In a restoration, it is important to foresee a re-use with the purpose of preventing the conservation comes down to "embalming" and "fetishism" [4]. Re-use is connected with the use value of the architecture, which demands a continuous change of needs, connected with living. Without a re-use, each conservation planning would be meaningless, because it could satisfy the image, but the really goal would lack, that is the comparison with people who will benefit the building.

The building recovery includes different intents [5]. One of these intentions is the simple rehabilitation, without a change of use. Another way is a new use, that has to be compatible with the historic building. Finally, there is the intent to capitalize a resource. Changes of users and needs impose adaptations and that causes problems of conservation.

So, conservation, re-use and development have to be planned unitarily, starting at the knowledge of heritage, without the fear of innovative and bold suggestions, to the aim to preserve buildings of historic values, respecting today's rules of safeguarding and putting in connection the simple building with the economical and territorial background.

3. The promotion and the recovery of Embresi (PC)

3.1 Background and a short historical summary

Embresi is a little hamlet in the territory of Trebbia valley in the Emilia Apennines. It is on a slope at 480 m, in a place quite isolated, without easy communications with other villages, situated in the territory of Mezzano Scotti, a district of the municipality of Bobbio (Piacenza).

The country roads are not easily practicable and, at some previous time, when the near stream *Dorba* was in flood, the passage was interrupted. So, the most ancient buildings of Embresi were in a condition of a fossil-village for many years, showing features of an important past, in spite of rehashes and serious damages, caused by the lack of repairs and the today's neglect.

The buildings are made of facing stone and their roofs are the typical roofs made of stone slabs. A tower emerges in the middle of the hamlet as a landmark. In spite of it was lowered twice, it still has a considerable high (23 m at eaves level). The presence of two graven faces are peculiar, too.

Fig. 1: The landscape near Embresi and, in particular, the relief *Pietra Parcellara* (Piacenza)

Fig. 2: The tower of Embresi in the landscape

Fig. 3: The ancient buildings of Embresi

The territory is a beautiful landscape, filled with natural beauties and history. The near towns Bobbio and Travo (PC) are known for the prestigious cultural past and archaeological discoveries. The valley of Trebbia is famous also for its geology (it is a tectonic window) [6].

The predominant element of the landscape near Embresi is the imposing ophiolitic relief *Pietra Parcellara* (836 m), mainly made of black serpentine, which belongs to a Site of Community Importance (SIC IT4010005) [7] with the near relief *Pietra Perduca* (659 m).

The place has features of mountain territories: the human settlements are small and centred in compact groups and the agriculture takes place on terraces, because fields are on steep hill sides. In the past, these small villages made profit from the territory, in which they grew respecting natural features and ties, but they was also able to supply needs of comfort; the economy was based on agriculture and commerce at the markets down in the valley.

The rocky fields, which are not fit for cultivations were called zerbide and the inhabitants used them to pasture the livestock, but the *zerbide* were also source of income: people harvested berries of junipers, which are very common in the territory. This activities are proved by old inhabitants and by documents of Estimi Rurali Farnesiani, a census of every properties that dukes Farnese wanted (XVI-XVII century) with the intention to determine the value of taxes for each family.

Important historic findings were made in Trebbia valley. The historical knowledge of this territory permit to set Embresi in a peculiar historical background.

The discoveries go since Neolithic period. The arrival of Ligurian population is proved by many findings; their reign continued for five centuries. Then Celtic populations arrived. The Romans began a war, because they wanted to keep down the expansionism of these populations and the Romans civilization of this territory began in 14 a. C.

The picks of mountains were holy places [8], which were destinations of pilgrimages. In particular, there were some places of worship near Embresi, as *Pietra Perduca*, a sacred pick since the Neolithic, where there is an high-medieval church. The Christian religion replaced the local pagan worships. The ways of this territory were also the communications with Rome. Probably there were garrison houses to control the roads.

A process of severe degradation of the territory and the local economy happened with the fall of Roman Empire. When the Lombard arrived in Italy (VI sec.), reaching the valley of Trebbia, the communications were degraded, because of the lack of maintenance. The news ways favored high ground villages.

The Lombard sovereigns complied with the wish of Irish monk Colombano to build his monastery at Bobbio for political and economical needs. Another important monastery was the Saint Paul monastery at Mezzano [9]. Saint Paul monastery had a task similar to this one of Saint Colombano monastery. In this way, the Lombard put to use a process of territorial and economical organization. The monasteries controlled the communications to Rome near the Byzantine border and monks reorganized the economy and the structure of the territory.

The local commerce was important. This consideration is proved by the findings of an important Lombard settlement along the ways that connected Embresi and Mezzano with the level plain towns (Piana di San Martino, Pianello V. T., PC) [10]. A group of archaeologists discovered a great quantity of coins of different periods and different countries near the roads, mark of a flourishing commerce [11].

The position of Embresi is related to the ancient ways of commerce and pilgrimage. The most known pilgrims way is the Francigena Way, which was going from the plain cities to Rome, through the passage of Cisa in the Apennines; but there was another shorter way called Way of Abbots, that is getting across mountains and the territories of Trebbia valley. The Way of Salt was a very important commercial itinerary, too, and the Caminus Janue, which was the ancient way to join Genova and the sea, was overstepping the territory near Embresi. Close to Embresi, there is a place called "the Boat" on the bank of Trebbia. Historically, here there was a passage to reach the other riverbank by boat.

The stone buildings of Embresi, the morphology of the hamlet and the tower remembers a fortification near the ancient medioeval ways, which was situated in this historical background, near tourist centres, in a territory of great natural potential.

3.2 Construction features along high-medieval ways

The contructions, which were located in territories amministated by Saint Colombano's monastery, present the same construction features [12]. The repetition of serial charachteristics seems to be the result of the action of skilled workers, in spite of that buildings have always considered only rural construction without any importance. In particular, this situation is thought in connection with the planning and the process of colonization, that were wanted by Lombard kings (VII-IX centuries).

Stone and wood were easily found in the territory, thanks to the presence of forests and rocks and the villages, in which are shown the construction trademarks described, are quoted in high-medieval documents. In the opinion of researchers, an action like this had to take place in a period of reorganization and social reconstruction after the slump that followed the Roman empire decline and the next barbaric invasions.

The particular way in which are built windows and doors is peculiar and this feature is always found in the high medieval constructions, located along the Lombard communications. Door and windows frames are made of stone blocks (1-7 elements), bigger than other ashlars used for the masonry, and these blocks are, one after the other, in vertical and horizontal position.The same peculiarity was used to built the corners of buildings. In some exemples the windows frames are made of an only big element, which has trapezoidal shape in order to mechanich reasons.The stone blocks are worked only on three faces. The fourth face is only rough-shaped, because it is turned to the interior of the masonry. The pattern of the walls are regular and the mortar between stone element are not visible in the external face. The two door frames stay on a monolithic element, which constitute the doorstep. It was one of the stones that are put at fist during the moment of the construction. In fact a resistant area of support was necessary for the foundation of the frames, which has a considerable height. The frames support the architrave, which can be linear or curved. Sometimes there is not a lintel, but a stone arch made of two or more element. The ashlars of these arches are worked in the same way than the blocks of frames and lintels.
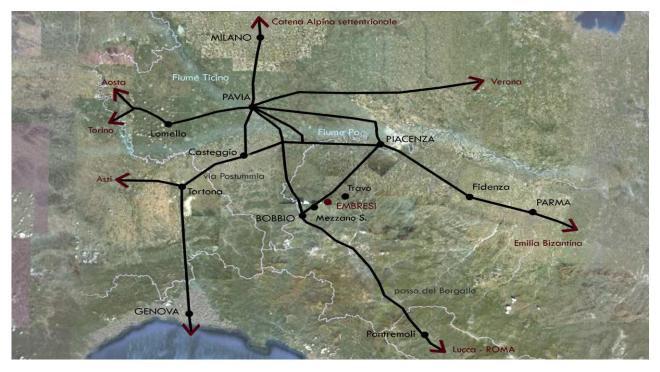
Fig. 4: The position of Embresi in connection with the Lombard ways (VII century). (Satellite picture by Google Earth)

Fig. 5: Graven faces on the wall of a building

Fig. 6: A window with monolithic frames

Fig. 7: the pattern of the masonry of Embresi

Fig. 8: A monolithic doorstep at Embresi
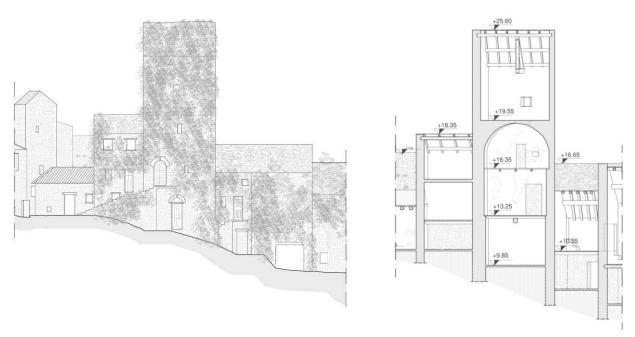
Fig. 9: The west front view of the tower and its longitudinal section

Doors and windows of Embresi have got all these features. In particular, the two doors of the tower has stone arches made of two ashlars and there are some little windows with monolithic frames and architraves, which are much smaller in the external faces than their internal this one. Some windows has the frames that present these feature, but the stone architrave is changed with a wood lintel. Probably, some of these windows suffered rehashes and changes. Doors and windows of Embresi are set in a background that shows the morphology and the characteristics of high-medieval buildings; so it is very probable that Embresi was really a fortification of Lombard age. The masonry is made of two faces of stone blocks and it is at least 50 cm in thickness. The walls of the tower is nearly 1 m at the foundations. The corners are particularly studied. The stonework remembers dry masonry, because the joints between ashlars are very thin and the mortar doesn't appear in facings.

There are different hamlets that shows the features described, in Liguria and in other place connected with the Lombard reign and, in particular, with the monasteries of Saint Colombano. In some examples, the stones used to made the blocks of corners and the frames of doors and windows are different from the stone used to made other ashlars. Sometimes this is clearly visible also in the colour of materials. The stone material used to build ancient building of Embresi has similar features; in fact, mineralogical analyses of some different stone blocks shows differences in composition connected with the position of the element and, so, with its use, too. X-ray powder diffraction (XRD) analysis was made at the Department of Earth Science of the University of Pavia (prof. M. Setti) and it demonstrated that the builders of Embresi had to have an exact knowledge of materials and techniques, as the hypotheses said. The stones used to make Embresi's ashlars are limestone, mainly made of calcite, dolomite and quartz. The findings of the analyses show the limestone used to built corners, doorstep, door frames, steps have more quantity of quartz then the stones of the other ashlars. Quartz is more resistant then calcite or dolomite, so the builder used the most resistant materials to realized elements which are apt to more wear and strain.

Buildings of Saint Colombano's age were built on slopes, along north-south direction and stone stairs rose to the differences in high. The plans were square and they changed according to constant sizes. Buildings has two or three above ground floors and, sometimes, a basement floor. Rooms at the ground floors were services and real houses are placed at the upper floors. Embresi has these features, too.

At Embresi, a second tower was remembered by the old people; it was torn down, because of the construction of the driveway. However, the two towers and some carved stone faces are peculiar features, that are rare in other similar hamlets.

3.3 Planning strategies and hypothesis of re-use

Embresi is a small settlement, that is perfectly included in a territory characterized by landscape values. Its importance is not only given by itself, but it depends on the close connections with the environment: the morphology is connected with the orography and the natural surroundings.

The village is been as an uncomfortable place, because of the costs of interventions and due to the unsuitable living conditions. This situation is common with many unknown historic centres, in spite of people is involved with them. However, this weakness is able to be turned in opportunities to enhance value of the frail territory and to create a new development [13]. The historic villages set in rural landscape are able to answer to many non-material needs, which have surfaced in modern society. Nature, calm, psychophysical regeneration are in contrast to the hectic life in cities. This is the starting point of the planning.

It is significant to set Embresi in the present, respecting its historic and architectonic features. Many villages of the territory were drastically changed and few places preserve the peculiarities of the place. So, the importance of conservation of local identities is obvious. The approach is critical and it wants to argue cultural values, which have to be preserved, now and again at the expense of the design.

Embresi suffered deterioration and rehashes and it has now come to us as a rural settlement with several structural damages. The planning follows on deep investigations about architectonic features, materials, historical stratifications. So it was carried out activities of metric survey, of studies of materials and techniques. At the same time, the research included a study of the local history, essential support to understand the truth. The hypotheses of re-use sprang from the interpretation of the local spirit. Embresi is near some holiday resorts as Bobbio and Travo, known for their cultural history and for their landscape beauties. Therefore it seems natural the choice of temporary houses, thought to play host to tourists, who can be called the today's pilgrims to the discover of ancient ways and local traditions, or who choose a short holiday in peaceable places. The aim is to give a new life to the ancient buildings, preventing they remain *embalmed memories* [14].

The buildings of Embresi are houses and, so, the planning maintains the residential functions, even if they don't keep to comfort rules, needed for living conditions. Ground floors maintain theirs service functions. They were sheds or cellars and did not communicate with the real houses. The bathrooms didn't exist in buildings. The entrance stairs were outside. Internal rooms are not usually high according to the law and there were wooden ladders to reach possible upper levels.

The idea is to preserve geometric features, masonries, existing windows and doors. The re-use supports the choices, because obstacles and country roads and the isolation from the city represent the potential of Embresi.

The plan divides the hamlet in nine living units and it creates some common rooms. The tower, instead, is suitable to become an exhibition centre, in which photos, rural tools and other documents connected with the history of Embresi can be shown. The creation of residential units and common services has taken account of the possible movement flows that might occur within the hamlet.

It isn't possible create shops or restaurants, in fact this idea would be unsustainable because of the bonds and the distance from cities.

The design approach is the insertion. The existing buildings are the envelops, or rather the casings in which the missing functions are inserted. It is like to create "rooms in rooms", specifically adapted to the existing spaces, thought as transpositions of the external walls toward the inside of buildings.

The new functions (bathrooms, kitchens) are thought as boxes, inserted in the buildings. These elements are designed as standalone boxes, that are detached from masonry.

The favourite material is wood. The timber has already been used in floors and roofs, this material is suitable to be used in combination with the stone and it is available in the territory. Timber structures seem to be temporary elements and they represent the precariousness and the reversibility of the design in according to the restoration rules. The internal stairs are wooden structures, too.

The floorings of the ground floor were clay court or stone floorings. At the upper floors, floorings were usually made of planks of wood. If the flooring no longer exists, the plan is to make new wood floors.

The plan is to preserve chimneys or insert wood stoves, which can act as boilers. This project proposes to use radiating panels. In summer, the activity of the stoves is replaced with the activity of gas boilers. So, the planning wants to pay attention to the aspect of sustainability. The design wants to favour the dry techniques, too, in agreement with the concept of reversibility.

The restoration of an ancient hamlet and the creation of accommodation facilities, that don't cause the overbuilding of the landscape, are an effective way for the development of the territory.
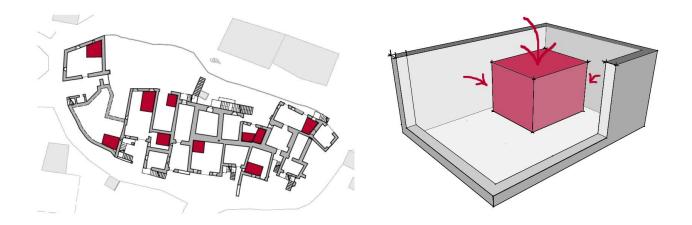
Fig. 10: Layout of insertions in the plan and conceptual schema of the design approach

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City and Architecture
Marginality and reappropriation
The Case of *Cavone* in Naples

Riccardo FLORIO

Department of Architectural and Enviromental, Faculty of Architecture, University of Naples Federico II, Naples, Italy
E-mail: riccardo.florio@unina.it

Abstract

Contemporary town calls for a peculiar attention nowadays.
Its text exegesis, written by history through stratified emersion of its becoming, is requiring a critical interpretation in order to understand its final state, which is expressed by the forms of its contemporaneousness.
The connected operations of interpretative reading and dynamic representation put us in the privileged condition of catching deeper meanings which are translating terms such as latent information into manifest information.
Those are suggesting possible scenario(s) to define suitable and well-balanced intervention's strategies.
If Survey is not only collecting data and Representation is not only an empiric restitution of information through sign vocabulary, Survey and Representation together are a complex operation to prime a process of stratified knowledge in order to delete hampering parameters to the unveiling identity of a place, of its characterizing components, of interferences (meaning genetic crossing-over), all of which are marking the place's belonging to town and to environment.
It is like looking for a subtle and hidden vein within which the town's genoma is flowing. It means referring to this to be able to imagine and think over that place's identity renewal and the criteria to confirm and consolidate the spirit of its domain.
The experience I would like to propose as a good practice is that concerning the study of "Cavone" area in the city of Naples. This area was at first a river-bed and then a tufa quarry until XVIII century. It was situated outside city walls in front of what was once called Largo Mercatello. Today the area has been totally absorbed by the tumultuous plot of contemporary urbanization.
It is a difficult area, as far as its morphological origin, its urban character, its social and living conditions. This area is pervaded by an atavic imprimatur of degradation and marginality (less) which is imposing at this time the promotion of a total regenerative action (more) in order to bring back town's role of strategic relevance as a whole.

Key words: excavation, porosity, division, regeneration, re-appropriation

1. Introduction

"I dare say that an urban x-ray is far more beautiful than its photograph, it beyond any doubt leads us into pathological areas, showing us deformations we did not see, but always astonishing us because the miracle of urban life is revealed. Among the cities whose x-rays are most extraordinary that of the most amazing of cities cannot but emerge: Naples. What other city could have maintained the meaning of "cave", this shadowy and mysterious, sinister and divine place?... And before we see these grottoes, caverns, caves, quarries, still less

Fig. 1: View of Lafrery, 1566, detail. The Porta of S. Maria di Costantinopoli and Porta Reale are indicated with n. 7 and 8.

Fig. 2: View of Baratta, first edition, 1628, detail. To be noted Colle di San Potito with cliff over the Cavone and the Granaries..

we knew of Naples and of her fascination; beauty of history and construction, and indeed of other things... But we were also beginning to perceive that the city could not be fully known without its sections, and how alternative life in these sections was"[1].

The study proposed regarding the urban area of Naples derives exactly from these considerations: a hidden beauty, disregarded, often vilified, which calls for a motion of emergence which passes through a difficult needle eye of conscious recognition thus, a recovery to a sense of belonging to the city. It is most true, a part of the city discovered through an in depth x-ray exploration, a part of the city that on photograph remains reticent, indifferent and devoid of character. It is still very true that this city needs to be dissected through incisions that evidence its naked beauty often made to shreds distractedly by man, but unavoidably resurfaces in conditions closest to misery. It is necessary to descend into the intimacy of form because "Beauty is a severe and difficult affair and does not allow to be conquered at the first attempt: the moment in which it is ready must be attended, then it must be spied, stalked and tied firmly to force its surrender. Form is a Proteus far more ungraspable and much richer than fairy tales traps: only after endless struggles, it is possible to force it to reveal its true resemblance"[2].

The shape of the numerous figures of the Cavone which crystallizes according perpetual motion never succeeding to embody it, as if belonging to a continuous flow, it deposits itself on the multitude of these buildings disposed in a labyrinth hive-like where life takes place according to ancient rituals and processions, competing daily with outdoor spaces, annexing and consuming them, conferring them always new and various forms. An agglomerate sequence of caves and buildings togheter where "for urban architectural forms of the past here is no longing. Only allusion to principles that have 'nourished' all the past times and still the present. The shape and materials of the constructions become recipients of a living nature - eternal projects depersonalizing buildings and making them timeless -. The man-made visual insults, always acknowledged by the outbreak of Spring"[3].

2. Features of history and urban growth

The furrow of the Cavone along the ancient and steep walls of the tufaceous reefs, was configured within two high grounds in correspondence to two hills: the south-western one around the Pontecorvo ridge and the north-eastern one beneath the *Costigliola* plain, where the "Limpiano boundary was set"[4]. The marked depression was determined by the development of one of two arenas that encircled the *Pendino* slope, upon which the ancient city settled, in particular from the ditch of the *Arenella*[5], which conveyed the torrential waters coming from the upper part of the city, that were in part distributed along the *Infrascata*, presently named via Salvator Rosa, enclosed the entire *Costigliola* high ground, later named of the *Colle di San Potito*. The valley exceeded

in a difference of proportion, today the difference in height between the two extremities of Via Francesco Correra, the road that occupied the sediment of the riverbed watercourse converging a steep gradient on Salvator Rosa, and on the other side 'flowing' almost at ground level on Via Pessina, is over 40 m.

The area was so densely vegetated between the two tuff banks that it was barely accessible until the Angevin period, when in the late fifteenth century a hunting lodge was built. Celano reported the allocation of the construction to the Fosse del Grano near Largo Mercatello: "There are wonderful and numerous ditches to store grains in the necessary periods, afterwards the conservation resulted lacking for the city had grown in expansion throughout the entire area up to Porta Alva. Opposite this area of storage, on the left, a ditch- like may be seen, and within it a building made all of travertine pipernini, with windows adorned of white marble, which is now possessed by the Prince of Leporano of the noble Muscettola family of piazza di Montagna. This site is said to be the Conigliera (rabbit hatch), because it once was a rabbit hunting ground. Here King Alfonso came often, and, to spend some time on this hill, on which today is located the Monastery of San Potito, he build the present lodge ... In those days these places were rather savage..."[6].

Therefore Celano refers to not only to the initial condition of the area, but also to the growth of the city, particularly the suburban boroughs which involved the whole city of Naples in the second half of the sixteenth century, as a result of population growth and substantial migratory pressures from the countryside. On the one hand, the plan for urban renewal wanted by Don Pedro de Toledo, established with the objective to draw back into the city old and feudal nobles, and on the other the pragmatic Viceregals, who followed one another from 1566 to 1631, in order to prevent construction outside the city walls, they resulted in a combined effect drawing into the capital a considerable flow of peasants, farm workers and people with very poor financial possibilities who could not afford housing in the city due to the extremely high costs and who did not disdain to build and live on the margins, contrary to the prohibitions established in the vice-regal notices[7].

Complicating the situation even more, which already recorded practiced a continuous and intensive development of boroughs, the so-called "*right to the island*" contributed even more. It was exerted by many religious orders during the seventeenth century which,

Fig. 3: Giacomo Conforto, *Abbraccio della Platea della Costigliola dell'Ill.mi sig.ri Carafa sopra li Regi Studi fuori la...*, 1614. The map was updated in 1722.

Fig. 4: View of Baratta, second edition, 1670, detail. To be noted Porta Reale, the Porta d'Alba and the Cavone with a series of houses.

Fig. 5: *Mappa topografica della città di Napoli e de'suoi contorni*, Giovanni Carafa duca di Noja, 1775, detail.

Fig. 6: *Pianta topografica dei Quartieri di Napoli disegnata da Luigi Marchese*, 1804, detail.

with the support of the Spanish Government and the Church, chose Naples to establish and build churches, monasteries and various religious foundations. "The progressive expansion of ecclesiastical property and land contributed to worsen the housing shortage..." to the point that on numerous occasions "the municipality of Naples was obliged to appeal to the king to put a brake on scandalous raiding of land and property accomplished by the most powerful religious Orders"[8].

The creation of major religious complexes on both sides of the Cavone determined, albeit indirectly, the characteristics of its settlement during the '600, features which to some extent still remain today. In fact, along both the Pontecorvo hill and the southwestern edge of the Costagliola important religious buildings succeed one another. "Representative the salita Pontecorvo.... «Coming from the Church of Gesù e Maria you encounter the Conservatory of S. Maria della Maddalena ... built in the early seventeenth century»... further on, the church and cloistered conven of S. Francesco delle Cappuccinelle and lastly the great fanzago-style temple of S. Giuseppe delle Scalze"[9].

On the opposite side the urbanization of *Costigliola* Carafa is regulated by a proper estate development plan assigned to architect Giacomo Conforto, who in 1614 designs a map in which an orthogonal plant of evident ippodamea inspiration can be traced[10]. The new monasteries of S. Potito and S. Giuseppe dei Vecchi rise and reach considerable dimensions on the tufa border overhanging the Cavone, the first initially due to the conversion of the building and garden of Vincenzo Capece in 1614, and for subsequent annexations of lands bordering with the construction of the church starting from 1630[11]; the second was established, also in 1614, through the purchase made through the Chierici Regolari Minori of the Fabrizio Carafa palazzo "which occupied a privileged area on the top of the hill. The palazzo was restored rapidly"[12], but only in 1634 the construction of the church began on a project designed by Cosimo Fanzago. You can see in a 1629 view by Baratta, the small church of S. Maria dell'Olivo, presently S. Giuseppe dei Nudi, while "the monasteries of S. Monica and SS. Sacramento ... founded later are not yet visible", along the Cavone there are already numerous construc-

Fig. 7a: Orographic section of the Avvocata territory, from the park of Scudillo to via Falcone Beneventano.

tions"[13].

Even Celano when describing the area of Mercatello, following the alley "which ends at Santa Maria dell'Avocata…. founded by friar Alessandro Mollo of the Carmelite order, where he founded a small convent; in approximately 1580….", focuses on the shape of cavone and on the urban development which until then, 1692, in this large ditch was recorded: "After this alley, there is another by which you climb to the convent of 'the Capuchin Fathers, called the Cavone, because through it the torrent rain water come down from the above mount; today these waters are diverted, and the area reduced to a road, populated from one side to the other by comfortable housing. Across from this, on the right our famous public Wheat Storage …. This beautiful machine was made from the design and layout by Giulio Cesare Fontana, beneath the wall..."[14].

Celano describes "comfortable houses that populate" the big ditch, even if, in fact, the systematic urbanization on both sides, on which, as we have seen, constructions merge and expand to accommodate monasteries, convents, churches and new middle-class houses, taking advantage of better, more pleasant, scenic and certainly more attractive positions as the plains that developed above the two tufaceous banks, confining in the lower part, inside the ditch, the population without means and easily adaptable to the particular conditions of promiscuous living which branded the community of the Cavone from the beginning. "The first speculative works are carried out mainly along the cavone, where until the eighteenth century the construction activity was minor, though constituting authentic channels for rainwater collection, thus, very poor living conditions"[15].

However prior to 1775, the date of the plant designed by Giovanni Carafa, Duca di Noja, the urban structure around the two margins of the Cavone was nearly defined: on the side of the Costigliola small buildings succeed one another and at S. Giuseppe dei Vecchi the unwinding of the first '*fondaci*' (trading posts) appear, first S. Joseph and second S. Anna; on the Pontecorvo side the large '*fondaco*' Cafaro warehouse opens and appears already completed "as... seen on O. Tango's plant, a structure of communication with connecting alleys, in the construction of the 'Cavone' and between the monasteries of the Cappuccinelle and Maddalena"[16].

To be considered that urban development within the vast depression did not register the presence of noble palazzos let alone the presence of religious buildings, this confirmed an exclusive residential inclination made possible by settlements obliged to a complete adaptability. If initially the present cavities, including the warehouses, were used mainly for storage of merchandise related to businesses and sale, these activities soon gave way to the increasing need of homes. From the beginning this need was accompanied by a considerable versatility of subservience to terribly prohibitive and unhygienic conditions, which often compromised the health of the entire settlement.

3. Cavone the porous city

Consequently, it would appear, from the considerations reported up till now, that the name *Cavone* derives from the action of burrowing made by the torrential waters over the years restituting after their course, not only a large carved ditch, but also a series of more or less marked cavities, and that these places, rugged and full of asperities, from the beginning of the seventeenth century were inhabited. Indeed, to this etymological indication

Fig. 8: Orographic section of the Avvocata territory, from corso Vittorio Emanuele to vico largo S. Agostino degli Scalzi.

Fig. 7b: Orographic section of the Avvocata territory, from via Falcone Beneventano to piazza Cavour.
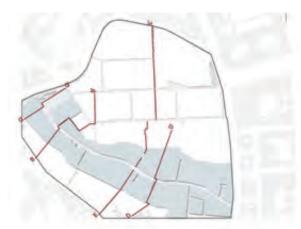
Fig. 9: Planimetric reference.

Fig. 10: Section G-G', from via Gesù e Maria to via S. Rosa

should also be added the one that shows the unnatural but real action of the anthropogenic transformation exerted on the rugged and steep ridges of the tufaceous walls. "In fact, because for centuries the waters washed away the loose material overlying the roof of the tufous, creating the engraving, the optimal conditions were determined for the extraction of such material that visually resulted suitable for both open air and underground cultivation. Don Pedro de Toledo's decree came in corroboration of this hypothesis… which forbade extracting tufa within the city walls, and given that for the entire Viceroy period ... the Cavone was external to that circle, and precisely in that period, within those limits, a myriad of cavities and quarries came to exist, which in addition to, giving the area its name, they contributed to its enlargement facilitating settlements"[17].

Moreover, besides those cavities definable superficial and used for the extraction of tufous, other cavities, rainwater cisterns and all empty spaces caused by the erosive flows of water, are present in this area and are called deep cavities, referable to an ancient system of water distribution, which together constitute a network of tunnels and cisterns connected internally among themselves in a sort of resistant underground structure, which from time to time surfaces towards the open air excavation.

The aqueduct which supplied this area was attributed in all probability to "that of the Carmignano, which began in fact in 1629. Assertiveness, in the present case, does not stem from a syllogism or an analogical test, but from the fact, unique in all of Naples that on a wellhead of the area, precisely at num. 16 of Via Tommasi, a marble plaque was found with the inscription 'Acquedotto del Carmignano'"[18].

A collection composed and diversified of cavities and openings, of tuffaceous depressions and impossible raised sections, of unexpected gardens and amazing twists, an unexpected *canyon* which opens into the compact city and reveals its gorges and its permeability. A geological and architectural porosity, where "nothing is finite and completed", porosity that eventually becomes human, where every site is used twice, three times, a

Fig. 11a: Section E-E', from salita Pontecorvo to via Salvatore Tommasi.

thousand times, in which matter seems to absorb and enslave human life. This unique blend of men and things, that seems to dissolve everything in a constellation of "dismembered fragments embedded in discontinuous reliefs" of *disiecta membra*, "a mosaic of fragments" [19], reveals the real credible face of this incredible city.
"Architecture is as porous as this stone. Construction and action interpenetrate in courtyards, arches and stairways. Everywhere appropriate space is maintained to become the theater of new unforeseen circumstances. This avoids what is definite, formed. No situation appears as it is, forever thought, no form declares its «like this and not otherwise»[20]. In this passage Benjamin manages to grab "a salient character of the city, interpreted as the unity of men and stones, where no form (whether social or architectural) is« conceived forever». There is a perpetual transience, a constant becoming, a passing from one state to another that is exactly the opposite of the «all completed» of Berlin, the barrack-city by antonomasia, compared with the amoeba-Mediterranean cities from Naples to Marseille"[21].
The Cavone is a large, open space, towards which it seems everything agrees then escapes. It is a gash in the city, a gash in its social substrate and in its material sequence, regaining in matter the prime meaning of its genetic affiliation "'matter' has the same root as 'mother', 'mater'. Therefore rock is the mother of the building. Matter is mother"[22].
The Cavone is a great chasm in which a portion of the city converges in its tumult and everyday disorder that needs to be investigated by additional divisions, so that it goes beyond the veil of the sudden event manifestated on the surface and in which indepth activities of knowledge are undertaken. The Cavone is moreover a wound which the city evades, wanting to leave its healing in a condition of marginalization which, in the moment of its conversion, produces an urban and social suffocation.
Can we today, in a position of taking on new principles for the setting in motion of actions addressed to the regeneration of historic structure, strongly stratified and, subsequently, crowded of functions, of inhabitants and other activities, imagine that the city expels from its body with obvious violence a part which could to be reconsidered in a strategic propensity of renovation and re-appropriation?
This role into contemporary town calls for a peculiar attention nowadays.
Its text exegesis, written by history through stratified emersion of its becoming, is requiring a critical interpretation in order to understand its final state, which is expressed by the forms of its contemporaneousness.
The connected operations of interpretative reading and dynamic representation put us in the privileged condition of catching deeper meanings which are translating terms such as *latent information* into *manifest information*. Those are suggesting possible scenario(s) to define suitable and well-balanced intervention's strategies.
If Survey is not only collecting data and Representation is not only an empiric restitution of information through sign vocabulary, Survey and Representation together are a complex operation to prime a process of stratified knowledge in order to delete hampering parameters to the unveiling identity of a place, of its characterizing components, of interferences (meaning genetic *crossing-over*), all of which are marking the place's belonging to town and to environment.
It is like looking for a subtle and hidden vein within which the town's genoma is flowing. It means referring to

Fig. 11b: Section E-E', from via Salvatore Tommasi to via Salvator Rosa.
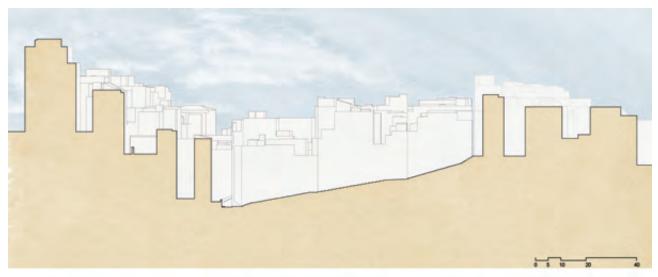
Fig. 12: Section B-B', from via Gesù e Maria to via S. Giuseppe dei Nudi.

this to be able to imagine and think over that place's identity renewal and the criteria to confirm and consolidate the spirit of its domain.

It is a difficult area, as far as its morphological origin, its urban character, its social and living conditions. This area is pervaded by an atavic *imprimatur* of degradation and marginality (*less*) which is imposing at this time the promotion of a total regenerative action (*more*) in order to bring back town's role of strategic relevance as a whole.

The present-day targets directed to the proper action of regeneration of historical cities concern the pursuit of quality in the transformations of physical space and environment as well as the convergence, via the implementation of multiple public and private strategies among the citizens' expectations and that of the economic operators and the public institution policies towards a joint project regarding the city's future in terms of urban quality, landscape and environmental sustainability and social cohesion.

In this new system of relationships attention has to be focused on this area of the city of Naples that has over time acquired, above all in the contemporary, the role of "*casting off*" urban area, despite its strategic location in the consolidated historic structure of the city and within the district of the Avvocata, which proposes itself as an essential hinge for the potentials it is capable of expressing and for the inclinations that have characterized it in the urban role.

Fig. 13: Section D-D', from salita Pontecorvo to via Salvatore Tommasi.
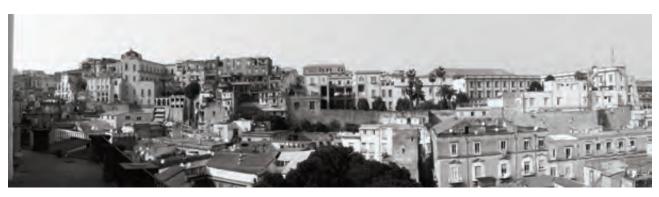
Fig. 14: The Cavone from the edge of Pontecorvo.

Fig. 15: The Cavone from the edge of via S. Tommasi.

The network of the *good practice*, founded on the fundamentals of knowledge and on the administration of the existing tangible and intangible resources and pursued through the instruments of cultural importance and representation, wants to establish a regenerative process aimed at attaining high quality standards, recovering restored characterizing components in the matrix of contemporary cities, as the *mixité* (blend), the hybridization of spaces, overlapping of functions, the new "*shape*" of the city and, by this means, the governing of sustainability of intervention and its renewed urban dimension.

It is necessary to regain possession of the awareness that this city, partly dug underground, irregular in form and promiscuity of customs and habits is a confidential part of the other city and "it would be useless and foolish to discover some immediate functionality, infrastructure and tourism whatever it may be. To be part of the city means that it can and should be covered through, perhaps to the square, possibly to the sea... and it is in this idea of covering through that the project will originate and form. The increase of the city's consciousness lies within its strength. In this manner the drawing does not insinuate itself, nor does it retrace the urban topography, but rather... it precipitates it, almost a sudden transition of the physical state of matter. That same matter which by its addition and subtraction indicates the origin and osteological development of the city"[23].

Fig. 16: Aldo Rossi, Studio composto di insieme, Napoli 1988.

The drawing of fig.10 is by Reinhard Unterpertinger and Christa Löffler; of fig. 12 is by Morena Beatrice Mennella, Francesca Paola Milione, Vincenzo Montella; of fig. 13 is by Roberto Fusco, Flora Lellevé, Maria Luigia Manzi, and are elaborated during a course on *Urban and Environmental Survey* by prof. Riccardo Florio in 2009-2011.

The drawings of figg.11a, 11b, are by Reinhard Unterpertinger.

The drawings of figg.7a, 7b, 8 are by Riccardo Florio.

All drawings have been re-elaborated by Alma Esposito.

The photos of figg. 14, 15 are by Riccardo Florio

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[11] Cfr. FERRARO Italo, *Napoli Atlante… op. cit.*

[12] AMIRANTE Giosi, *Le fabbriche religiose*, in GAMBARDELLA Alfonso e AMIRANTE Giosi, *Napoli fuori… op. cit.*, pp. 74-75.

[13] AMIRANTE Giosi, *L'integrazione dei borghi alla città*, in GAMBARDELLA Alfonso e AMIRANTE Giosi, *Napoli fuori… op. cit.*, pp. 36-37.

[14] CELANO Carlo, *Notitie del bello…, op. cit.*, p. 4.

[15] GAMBARDELLA Alfonso, *Lo sviluppo urbano…, op. cit.*, p. 12.

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Title: Heritage architecture: a complex design with natural light

Mounjia Abdeltif, Mejda Benchaabane
School of Architecture, Algiers, Algeria
Ecole Supérieure des Beaux-Arts
abmounjia@gmail.com
mejdaben@gmail.com

Abstract

The ancient city of Algiers (the "*Medina*"), "a master piece of human creative genius," according to United Nations, has been a universal heritage site since 1992. The original codified language of the architectural morphogenesis of the medina is unknown.

Our specific research deals with the language of morphogenesis of "**Dar** El-Djezair" which is more than a house. It is a place where a lot of functions could take place without altering quality and harmony. In order to understand the generative process, we decided to use fractal geometry which helps build efficient models.

Complexity theory is a more appropriate theoretical framework because it could help us understand the underpinnings of complex built. During the twentieth century modernist ideas were about reductionism, separation of fields, and simplification of forms. Today ugliness is a true reality.

In Algeria future sustainable architecture should be rooted in heritage. In our research we have been re-constructing the intelligibility of this "DAR" through a fractal model called "Menger's sponge". In this kind of architecture **natural light** is a kind of "designer". Through a metaphorical approach the immaterial light enters a volume in its center and starts a process of "carving" central spaces connected with fractal rules. In final, we aim to elaborate a pattern language for this "Dar".

Key words: morphogenesis, Dar, light, language, fractals.

1. Introduction

1.1 Heritage

In Algeria, after the event of colonization (1830), most of valuable heritage architecture became French colonizer's property. Algerian people had to leave their houses and their city. Thousands of beautiful houses collapsed during nineteenth century. At the starting of twentieth century, French administration began to value that local precious architecture. Algerian society did not have the right to get an education. A very few went to school. At the time of independence (1962), ninety per cent did not know how to write and read. The Algerian society has been discovering the quality of its heritage architecture for about ten years. The old quarter of Algiers (capital) has been world's heritage since 1992. Despite that it is degrading day after day. Authorities and scholars ignore the urban and architectural **code** of that fabric. It urges to undertake researches because buildings are disappearing. They are the only witnesses of that period (seventieth and eighteenth century). Timeless beauty, complexity, harmony, designs with nature and efficient way of building are the characteristics of El-Djezair (ancient city of Algiers).

1.2 Theoretical framework

El-Djezair is a city composed mainly of houses named "Dar(s)"because they are more than houses. Their design morphology is suitable to numerous functions. Overtime, whatever the use, quality of space did not alter. Spaces inside always fit to inhabitants. Even esthetically, until now, people from all over the world are surprised by such beauty. We became aware of its value and decided to find adequate methodology to elaborate the pattern language (code) of this "Dar". Our framework has been <u>complexity theory, fractal geometry, analogical and metaphorical approach</u>. Since we could not decompose such a shape, we had to find its mathematical model in order to keep it as a whole while studying its intelligibility.

2. Research

2.1 Morphogenesis and interiority

"The architecture of a shape is the logic of its morphogenesis, during the process the shape is unfolding", Jean Chrétien Favreau.

Ancient Algiers, as a medieval city is a compact fabric that matches with local land form and river system (network). Very often, streets were rivers or contour lines. Most of the buildings have only one wall facing the street. All, without exception, are courtyard units. Interior living places **had to get natural light** through the courtyard named "West Ed Dar" (centre of the Dar). It is actually the centre of life, the main connector, the well of light and the place where all events keep occuring.

In our metaphorical approach, we consider that at the first stage of design, we start with a cubic block corresponding to the buildable three dimensional piece of land inside a compact fabric. Theoretical generative process is the action of creating void inside the given volume. Through a fractal interior organization (Karl Menger's sponge), the light coming from the sky, "falls" inside the cube. Then, for the next stages, light is expanding, creating infinite surface and reducing volume to zero. The sponge is a model for natural organisms. These are structured at infinite scales. But manmade organism has limited levels of scale. We aim to describe and explain a number of scales in this **Dar**. Hausdorff's dimension of the sponge model is 2, 7, between 2 and 3. It is actually a fractal model and the most interesting one for architects. The process of creating void with natural light helped us understand all specificities of the Dar: proportions, special place for each needed space, dimensions, proportions, degree of connectivity, quality of arrangements and the right measure for elements at each level of scale. We could explain the "why" of a lot of specific features.
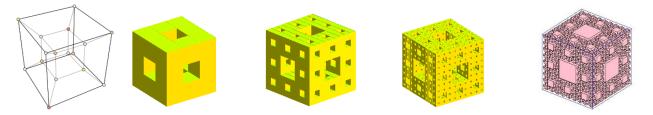
Fig. 1: Some images for Karl Menger's sponge

2. 2 Dar as a case study

The morphogenesis of Dar is a complex process inspired of natural organisms such as lungs or sponge. It is a step by step process similar to an algorithm. This shape is made of four parts: a base related to urban landscape, two main inhabited levels and a terrace ("Stah"). The base is convenient for sloping ground as well as flat ground.
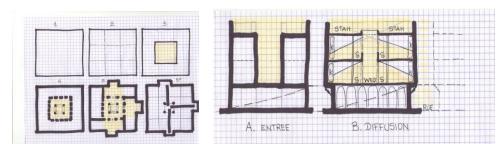
Fig. 2: Interior process

Inside a solid cube the light coming from the sky vault enters the volume vertically following a nine square grid. This center's proportion is 1/9. After dilatation in order to get "shin" (gallery around), it becomes 1/5. This rule is observed in all Dar(s) without exception. According to fractal iteration (Menger's sponge) we start with 9 squares and one void.

Natural light is not static. Changing with sun position in the sky, light generates emotion. It is the main criteria in the design of spaces inside the Dar. We are facing a challenge today: how to save energy? Working with natural light doesn't belong to the past, it is a timeless attitude. Alternating light and shadow provides positive sensations in Mediterranean climate.

Step two:

The empty volume of West Ed Dar (WED=center) is designed with arches and columns and four interior walls which are the actual façades. Specific places are chosen for doors, windows, stairs and ornamental features. Each detail has a fractal relation with others at many scales (auto similarity). For example, rooms around WED are arranged as a helix, columns are twisted, spirals are carved on doors and we can see helix on tiles that decorate walls. Turning shape has been chosen for aesthetical and symbolical reasons since early ages. "Dar" coming from "Daara" in Arabic language means "to turn". We are working on this particular case: "Dar Abdeltif" which was restored in 2008.

Fig. 3: Turning shapes

Step three: Natural light has filled the WED. Then it penetrates laterally to illuminate each Beit. This light goes through large and high doors and two windows. It reaches the center of the Beit: the Kbou which is a niche facing the door (in all cases). Two smaller niches face the two windows, in two sides of the Kbou. These niches are made of three parts. They are built-in closets and can be open or closed par inhabitants. This axis organization is part of specific language of Dar. We could never find a column facing the door of Beit. It always matches with an arch which is also specific in El-Djezair. It is a middle broken arch that can fit all dimensions of WED and number of arches. There are four types of Dar: 4, 8, 12 and 16 columns. Dar Abdeltif is a twelve columns unit.

<u>Step four</u>:
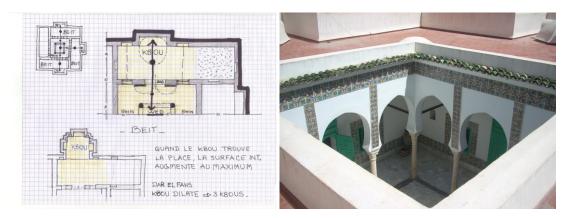
Fig. 4: Axis

Natural light commands the width of Beit and the depth of Kbou. Actually, all spaces are strongly connected. They make this shape a coherent whole. Level of complexity is high because no one could separate parts. Light is obviously participating to build connections. This leads us to establish that the way people, in ancient times, used to organize differently their way of building and constructing. There were teams composed of master builders and workers in different fields as iron, wood, stone, bricks, tiles… They used to coordinate and work together on site. Everyone knows the rules and the specific language and got the process in mind. Measure was not meter but cubit which has always been drawn from human body. The main rules were golden proportion and Fibonacci's series. This means that ancient builders were using natural laws in order to design places at all scales. Christopher Alexander talked about "The Timeless Way of Building" and "Pattern Language". In his last works ("Nature of Order") he made a consistent synthesis to demonstrate that if we want to feel alive in places, we have to work on complex language processes based on Nature.

Of course the process (it looks like an algorithm: simple rules for complex shape) could be made on more steps. Our research is progressing.

Some remarks: In the sponge process, when light "carves" the volume step after step in fractal iterations, the interior volume becomes more **spacious**. This concept is about design not dimensions. A house could be big and non convenient and small but qualitative and full of good places. If the center is full of light we perceive spaciousness. This is a psychological perception. Therefore, we can link spaciousness and interiority.

Fig. 5 : Patterns : WED, Beit, Kbou, Niches, Doors, Columns, Windows.

El-Djezair (today Algiers) as a city, is a large complex system made of two subsystems. One is mineral:

Fig. 6: Mineral city

The other is vegetal:

Fig. 7: Vegetal city

The two systems cannot live separately. Dar Abdeltif is built inside vegetal city. That is why it has exterior windows. Connection with gardens is necessary. Most of people who can afford a second house migrate in summer. These places look like heaven. It is cool, breeze comes from the mediterranean sea through luxurious vegetation.

In summer time, subtle solutions make Dars let the right amount of light in. Different trees provide large shadow and freshness. Inhabitants can migrate inside their Dars. They can sleep on the terrace.

2. 3 About natural light

Working with natural light generates complexity and rich ambiances. Thinking with metaphores connects to philosophy and environmental sciences. We are getting consciousness that all fields should be working as a network for a better world, less ugliness and quality of life. It is of course difficult to use this tool comparing with sun ray which more "scientific" and materialized. Sun ray could be drawn in a triangle. Changing angles depending on latitude, season and day times can be used by anyone easily. But light diffusion is question of place experiment. It is also about intuition. Consequently, it is not really teachable in schools. It is important and urgent to find a way to develop this concept in university because natural light makes projects be more complex, richer and of course they promise to satisfy sustainable development. We should teach how to save energy in looking for efficiency through natural laws. Nature don't waste matter. Everything could be recycled. Our ancestors knew how to save energy. They built with ingenious water systems (Andalusia) and green elements. Organicity made city last until today.

2. 4 Concluding remarks

In Algeria, there is a big gap between schools and practise. Politicians have different values. They decide for urban landscape, they make cities without consulting researchers in urban design and they have been organizing territories by adding disconnected units where housing is outside the urban frabric. Suburban areas are dead places and social diseases are increasing every day.

Buildings don't interact with natural environment. Appartments are so unconfortable that people spend money in air coolers and heaters without reaching real comfort. This attitude goes against nature, it is impossible to make those places maintain over time. They are not convenient and will break down soon.

Fig.8: Disconnected housing

In such units, people get too much light or not enough. Natural light is certainly not a criteria. There is no complexity, no organic process and no connection with nature neither city. The architectural design is very simplified. Researches must propose new methodologies to politicians. Heritage offers valuable knowledge, interesting concepts and sustainable solutions. It should always be a reference.Things must change before we face an ecological problem. When we look at this ugly landscape, a question comes in our mind: **Do we need architects for producing this**?

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Simple tools for complex geometries
Genesis and reconstruction of the Philips Pavilion

Alberto SDEGNO[1]
[1] Department of Civil Engineering and Architecture, Faculty of Architecture, University of Trieste, Trieste, Italy
sdegno@units.it

Abstract
Two small sticks connected one to the other with some rubber bands define the tool used by Le Corbusier and Iannis Xenakis to visualize the hyperbolic paraboloids that constructed the main morphology of the Philips Pavilion. Realized for the 1958 Expo of Bruxelles and destroyed after the event, it is difficult to think that this sort of children's game – which could be played by hands, changing the position of the two linear elements in the space – was at the origin of such an important and complex structure.

The aim of this research was to study the geometrical genesis of this relevant design of the XX Century, starting from all the sketches, technical reports and textual description of the authors, to finally reconstruct all the single forms in a digital way, using the advanced modeling offered by the CAD procedures.

The *Poème Électronique,* as Le Corbusier called this project – a very effective oxymoron that describes the double finality of the work very well – should have been a presentation of the state of the art of a kind of "human technology" used to exemplify the history of the world in a small path in which the people would experience lights, images and sounds in a very impressive way.

The research ended with the realization of a video that showed in detail the evolution of the morphology from the simplified abstractness of the initial phase to the complexity of the final visualization, using algorithms of realistic rendering, the only way we have to save the memory and visit destroyed buildings.

Parole chiave: Le Corbusier, architecture, representation, model, video.

1. Introduction

Two small sticks connected one to the other with some rubber bands, to be manipulated with hands for generating an infinite series of hyperbolic paraboloyds: this is, in brief, the simple and extremely effective mechanism by which Iannis Xenakis explained to Le Corbusier how you could get the complex geometric shapes that would allow the creation of an architecture. Applied to the Philips Pavilion, commissioned in 1956 to the architect by the well-known technologies' firm for the Expo to be held in Brussels two years later, this seemingly simple design procedure would be transformed into a highly elaborate process of composition, which would host the technology event inside, structured in different aspects: sound, video, color. Described by Le Corbusier as the "Poème électronique" – an oxymoron of undoubted efficacy, which refers at the same time the natural character of the poem and the artificial component of the technology – is among the most influential and pioneering works of the twentieth century, which now we can find traces only in publications and in a lot of photographs.
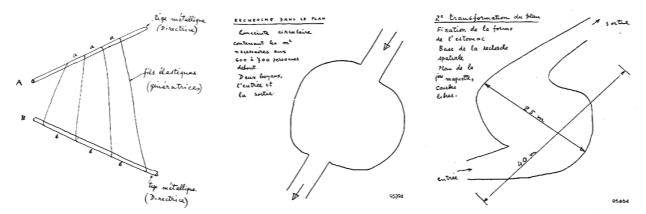
Figg. 1, 2: Photographs of the Philips Pavilion.

The research that is presented here, started at the IUAV University of Venice and continued at the Faculty of Architecture of the University of Trieste, was developed from this simple idea, to analyze two levels of study of the work: on one hand the simplicity with which you could derive articulated forms by the geometrical point of view during the concept phase, thanks to the use of easy operative expedients; on the other hand, the complexity of describing in a graphic and technical way, ending to the final realization, the articulated architectural morphology. Starting from these premises we initiated an accurate investigation of all the hyperbolic paraboloids that make up the external surface, until the realization, in digital form, their reproduction, both from the point of view of the configuration, and from that of photorealistic execution, in order to verify the correspondence with the drawings of the authors and the photographic images available.

2. Brief history

We do not analyze all the steps of the designing process, as there are a lot of publications that describe it, but it is necessary to remember that the design was commissioned to Le Corbusier by the Philips, and precisely by Louis Kalff, who is the light engineer of this well-known firm. As Xenakis remembers, Kalff, in one of the previous meeting, required to Le Corbusier some detailed information: "I would like that you design the Philips Pavilion without exhibiting our products. A demonstration among the most ambitious about the effects of sound and light, where the technical progress could lead in the future" [1]. The great freedom given to the functional aspect – the exhibition – and to the definition of the morphology and to the contents, allowed that the proposal was accepted by Le Corbusier, who signed the contract on 13 October 1956, and started studying the possible design solutions, with the help of the musical composer and engineer Iannis Xenakis. Some days after there was the first idea of the project, and in November there were some details on the sketchbook of the architect. In December the second solution at the scale 1:200 is finished, for the final structural verification. At the same time some physical models of the volume for the analysis of the deformation are built. In the meanwhile Le Corbusier thought about the organization of the direction of the sound space, asking Edgar Varèse to find the soundtrack of a video that should be projected on the interior walls of the pavilion. Despite the opposition of Philips, that did not like the music of this composer, in September 1957 Varèse arrived in Netherland to define the musical composition. On 17 April 1958 there was the official inauguration of the Pavilion, but immediately it was closed to be re-opened on 2 May, due to the complexity of the system. After six months of free exhibition during the Expo and about two millions of visitors, on 30 January 1959 this architecture was destroyed, otherwise there was a proposal of Le Corbusier to transform it in a center of scientific research.
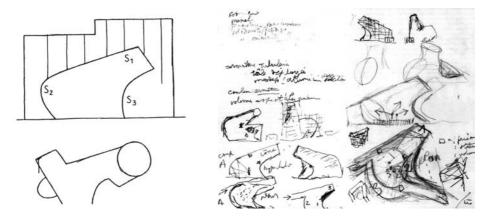
Figg. 3, 4, 5: Drawing of the tool used by Le Corbusier and Xenakis for the study of the hyperbolic paraboloids and first planimetric schemes by Xenakis.
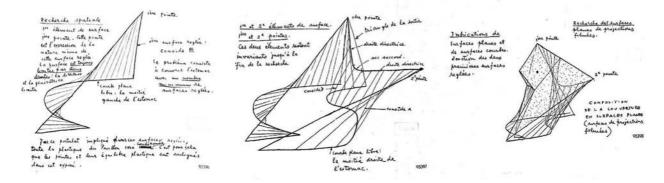
3. Geometrical analysis of the design

As we have written in the beginning, the geometrical genesis of the pavilion is based on a very simple compositive mechanism, represented with a small sketch where two metal sticks A and B – signed as "directrice" in the text of the figure – are united with elastic bands, called "génératrices". The movement of them with hands allows to easily reproduce, such as during a game, a series of spatial morphologies, from the simple to the more complex ones, reproducing forms that the history of geometry has classified as a particular type of ruled surfaces: the "hyperbolic paraboloids". In reality before reaching this result there were some partial steps, that have been defined only thanks to the use of this technical instrument. The initial idea, in fact, should have been to represent a human stomach, as it was drawn for the plan, where entrance and exit would determine the explorative capabilities of the space, but, in the same time, the concept of the bottle should be the focus of the research, as documented by some sketches and notes signed by the architect himself. As Xenakis said: "In October 1956, Le Corbusier proposed to 'translate mathematically' some ideas. He gave me a sketch. Le Corbusier [asked me] to look for a form of a 'bottle' containing the 'nectar of the visual presentation and of the music' for the building. For the cinematographic show, he wanted to have flat vertical walls. For the spatial effect, I asked a bottleneck tapered up to the roof of the pavilion where the projected images would disappear. As for the bright colors, he wanted concave and convex surfaces […] to accept requests from architects who were working near the Dutch pavilion: 'We recommend a simple convex surface for the Philips Pavilion, to not exceed the garden and the foliage surrounding the Dutch buildings'. Because of the darkness within the 'bottle', the beauty was not the main concern" [1].
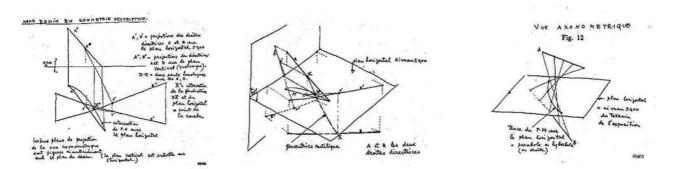
Figg. 6, 7: Drawing in plan and section of the "bottle" configuration and sketches by Le Corbusier.

Figg. 8, 9, 10: Sketches by Xenakis of the volume configuration as a "tent".

Immediately the idea to transform the morphology in a "tent" volume was presented, in which the inclined walls would have been incurred each other, thus avoiding the need for an internal supporting structure. About this first solution there are some sketches and models, which are made with piano wires bent at the elbow and stuck in a board. The second project was carried out using the methods of descriptive geometry, as exemplified by some technical drawings. The tool of the sticks with elastic bands, subjected to torsion, could be represented as plan and elevation on a drawing paper. Once again Xenakis explains the procedure used: "To choose one of the surfaces of the pavilion we proceeded more or less fixing the selected geometric curve in correspondence of a specific drawing. […] For this architecture in three dimensions the architect has to think not only in plan: he needs a three-dimensional representation as the elevations aren't only the result of a parallel movement obtained by the orthogonal projections. The new heights of the three cusps have been chosen and their projections were determined on the horizontal plan, to increase the size of the central cone L. The first cusp was set at 21 meters above the ground, the second at 13 meters and the third at 18. Later, using both the experimental tool and the descriptive geometry, all the paraboloids were modeled, with the conditions that the intersection with the horizontal plan would conform the primitive scheme of the plan itself" [2]. The graphical tool, then, becomes a device essential to understanding the work totally, despite the difficulty of grasping the project in its spatial dimension. Tables and geometric diagrams with orthogonal and axonometric projections, alternate to make explicit the genesis and evolution of form. In particular, the hyperbolic paraboloids are represented in the projective form making use of descriprive geometry, so as to identify the development of each individual surface. From this analysis emerges – as will be confirmed by the digital restitution – that each element takes place also under the floor, and for this reason we decided to evaluate only the upper part of the morphology, leaving out everything that stays under this plane. Although many graphical documents were destroyed in that period, some of them are still available because they were published in the journal called "Philips Technical Review".

Figg. 11, 12, 13: Drawings by Xenakis, describing the geometrical analysis of the hyperbolic paraboloids.

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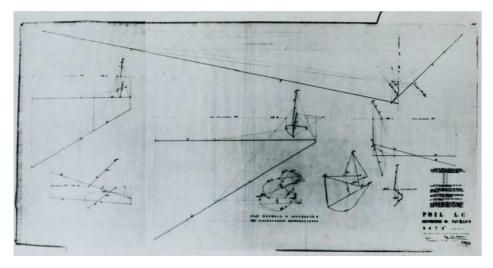
Fig. 14: Geometrical drawing representing the hyperbolic paraboloids.

We have also to notice that the origin of the morphology is in the attempt to define a strict relation between architecture and music. Xenakis, in fact, attempted to propose a graphical method to describe the sound with the work *Metastasis*, thanks to the theoretical proposal of the *Modulor* created by Le Corbusier. It is not a coincidence that the architect himself, impressed by the hypothesis of the assistant, would include in the book *Modulor 2* a brief text and two images describing the musical score by the composer. In the note Xenakis was very explicit: "In the composition 'Les Metastasis', for classical orchestra of 65 elements, the role of architecture is direct and fundamental thanks to the Modulor. The Modulor found an application in the essence of the musical development. […] the six algebraic and temperate intervals of the range of twelve sounds are emitted in times that are proportional to frequencies. […] The sequence of temperate intervals is a geometric progression. The times will be the same. […] On the other side, time has the additive property. A period can be added to another one and their sum is a period too. […] Among all the geometric progressions, there is only one in which the terms have this additive property. It is the progression of the golden section. Here is how the idea of the Modulor created a close structure link between the time and the sounds" [3]. And in another text the composer explains the relation between *Metastasis* and the experience of the Philips Pavilion, above all in reference to the raising and lowering of the height of the sound, known to specialists with the term *glissando*: "If the *glissandi* are long and well intertwined, we could obtain some sound spaces in continue evolution. Among the possibilities, then, there is also that one that allows to arrive graphically (drawing the *glissandi* as some straight lines) to project some complex surfaces. I have done experience in *Metastasis*, the composition for orchestra which was executed in 1955 in Donaueschingen. Well, some years after, when the architect Le Corbusier, where I worked, asked me a proposal for the architecture of the Philips Pavilion in Bruxelles, my project was developed by the experience of *Metastasis*. So, I think in that occasion music and architecture found an intimate correspondence" [4].
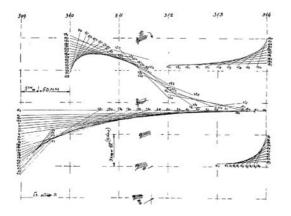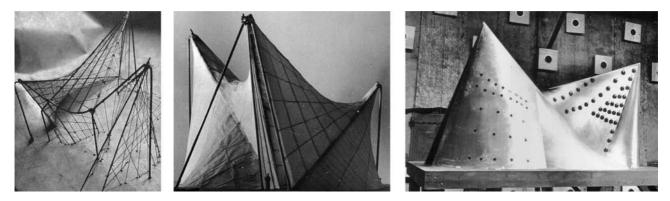
Fig. 15: Graphical transcription of the composition *Metastasis* by Iannis Xenakis.
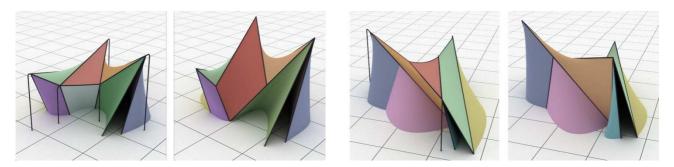
Figg. 16, 17, 18: Models of the pavilion at different scales.

After this graphical works, there were a lot of spatial representations. A large quantity of models in different scales, in fact, were realized for the occasion, starting from some simple studio's *maquettes* – realized with wireframe structures – up to models that tried to reply the whole volume of the architectural object. In particular a model in 1:25 scale. Realized in plaster, served for understand the possible deformations of the structure subjected to its weight and to accidental loads, while a further model in 1:10 scale allowed to verify the assemblage of the plates of the walls and the placement of the cables that should put the structure in tension to ensure the stability in time. The study on scale prototypes allowed the subdivision in one meter squared parts all the surfaces, regulated by a grid of straight lines. The same elements was useful also for the construction, as during this phase was realized a temporary framework which reproduced the drawings of the base composition, able to allow the assembly of about two thousand of fragments of paraboloids, which will be united with concrete, using prestressing steel cables, to weld all the elements together.
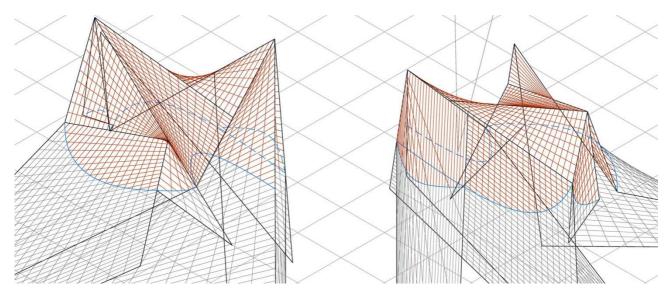
4. The digital reconstruction of the project
After the analysis of the main documents of the design we started the geometric reconstruction, from the available graphical or textual information. A series of simplified models allowed to understand better the real configuration of every single parts. In particular the use of the color was very important to associate every element to the corresponding shape, so to identify single units in homogeneous way, and operate all the necessary deformations to obtain the final aspect of the model. After having identify the linear structure on which anchor the hyperbolic paraboloids of the walls, we started the spatial geometrical reconstruction of every single paraboloid, drawing it in orthogonal projection. The complex grid allowed us to understand the three-dimensional parts that compose the Pavilion, confirming the extension of all the surfaces under the floor.
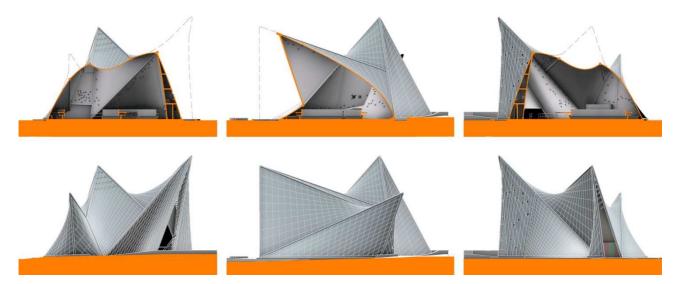
Figg. 19, 20, 21, 22: Geometrical schemes describing the operations of model deformation (elab. M. and M.S. Soraperra).
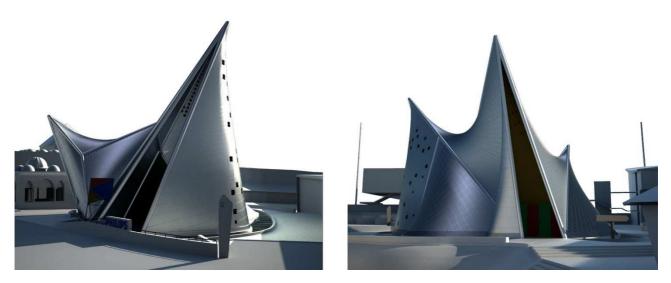
Figg. 23, 24: Wireframe models of the Pavilion with the integral extension of the hyperbolic paraboloids under the groung level (elab. M. and M.S. Soraperra).

After this control phase of the geometry there was the construction of the design at the 1:100 architectural scale, with the insert of all the details regarding the openings (windows, doors, etc.), internal walls and architectural technical spaces, using advanced graphical primitives, such as *spline* and *patches*. The large flexibility of surfaces now allowed in generating digital forms permits us to obtain an equivalent model to the original one, although we did not use a precise quoted drawings as starting document. The geometry, then, was obtained with the interpolation of surfaces from the analysis of the position of cusps and of main inclined elements on which the surfaces should be anchored. As the heights and the plan geometry were known from the technical drawings of the archive, it was possible to define the main volume of the project. To verify the correct execution of the constructive operation we decided to slice the model in progression, both in plan and in elevation, in order to render totally visible the architectural space. As a precise correspondence between the digital model and the graphical information from archives and publications was found, we developed further the representation to realize a photorealistic scene, using some algorithm of light simulation and texture mapping.

Figg. 25, 26, 27, 28, 29, 30: Vertical sections of the digital model (top) and elevations (bottom) (elab. M. and M.S. Soraperra).

Figg. 31, 32: Perspective views of the digital model (elab. M. and M.S. Soraperra).

The final digital model was realized analyzing all the details of the realized project, without omitting the re-drawing of the wireframe structure of the external cables which ensured that all the surfaces were aligned. Then, it was geo-referenced, and integrated with the main pavilions that were built in the same area, near the *Poème Électronique*. One last aspect of the construction phase here described, was the creation of a video animation that could express directly and in an exaustive way the relevant steps of the research, from the analysis of the geometry, thanks to the use of the flexible bands, to the reconstruction of the surfaces and to the realistic simulation of the scene. We defined a series of key-frames to realize some relevant sequences. In details we reproduced the sticks and the elastic bands of the tool used by Le Corbusier and described before, and their continue movement until the position in which the single surfaces appear. Definitively, it was as Le Corbusier's hands were moving and searching the correct location for every element, but translated in digital form, adding all the parts that characterized the architecture itself (details, furniture, devices, etc.).

5. Conclusions

The research allowed a precise identification of the design geometries, a verification of the procedures to generate the morphology, and a perfect correspondence of the empiric methods (use of the tool composed by sticks and bands) and the realized surfaces in the constructive phase. The experimentation has reached the aims defined in the hypothesis, confirming the great scrupulousness and determination by the designers in determining all the aspects of the complex morphology of this important architecture of the XX century.
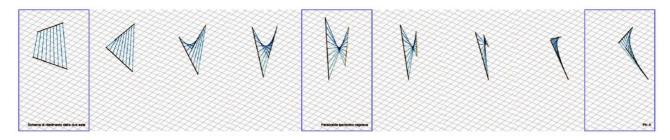
Fig. 33: Key-frames of the video animation (elab. M. and M.S. Soraperra).
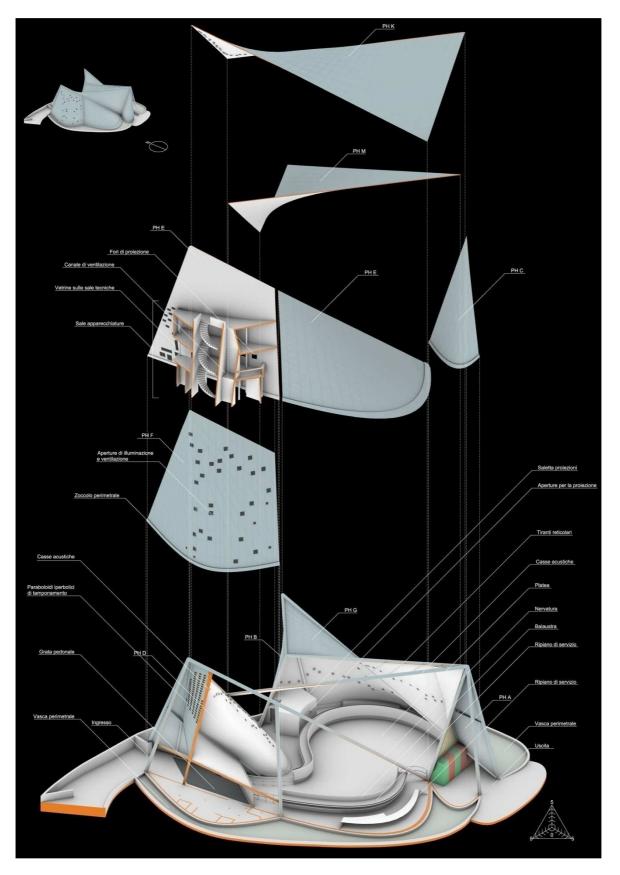
Fig. 34: Axonometry of the digital model with the identification of every single parts (elab. M. and M.S. Soraperra).

Note

A part of these elaborations were done during the graduation thesis presented in the Corso di Laurea in Architettura at the Università IUAV di Venezia by Michele Soraperra and Mery Simonetta Soraperra, titled: *Padiglione Philips (1958). Analisi della geometria configurativa e ricostruzione digitale*, Academic Year 2007-08, supervisors Prof. Alberto Sdegno and Prof. Agostino De Rosa.

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Fig. 35: Section of the buildings in the area and elevation of the Philips Pavilion (elab. M. and M.S. Soraperra).

Innovative tecnology and historic heritage: Itali's wealth

Anna MANDIA,
Dipartimento di Cultura del Progetto, Facoltà di Architettura, Seconda Università di Napoli, Italia
email: anna.mandia@fastwebnet.it

Abstract
Innovation often finds obstacles in a country like ours, one that has such a vast historical-artistic heritage to protect, though this wealth should not become an obstacle to the application of new technologies. This is the case for the C Line of the Rome underground, where the mere thought of building a new metropolitan line is already a challenge. It is an all-Italian project: the General Contractor MetroC is a Consortium of exclusively Italian companies. It has been and still is difficult to define a possible route for the C Line, but the spirit of the project remains unchanged, aiming to unite the suburbs with the city centre, from the south-east to the north-west, passing under the Colosseum and the Tiber River. The innovative technological aspect of the C Line is that it will be a driverless underground train and the Western world's first "heavy type", using trains longer than 100 metres in length that are able to transport 24,000 passengers per hour.The project has had to unite the transport needs of a European capital that today has just two underground lines with the historical and archaeological constraints that a city such as Rome presents. It wasn't enough to dig the tunnels 50 metres deep with ultramodern technology; the real challenge is the historical city centre stations, as the hole needed to be dug from the surface to the platform passes through all of the historical layers present.

Keywords : underground, C Line, Rome, driverless

1. The Project of C line
Such a complex and innovative project, in such a monumental city of the world, cannot be undertaken without careful and detailed analysis on the impact that this will have on the monuments, both during and after the work.
As mentioned above, the section of the C Line underground crosses the city from East to West, passing underneath some of the most important historical monuments.
Work is currently in progress on the first section, from Pantano to San Giovanni station, then proceed to the Fori Imperiali, with recent funding and in the future to the station of Farnesina, as shown in Figure 1, for a total length of 28.5 km.
The most delicate sections, where the tunnels pass underneath the heart of the city's historical centre, are the T2 and the T3; the T3 station, in fact, particularly affects some historical monuments of unique architectural and historical-cultural importance for which a monitoring system will be installed in order to guarantee their safety during the work on the new underground line.
The monuments are:
The Aurelian Walls at Porta Asinaria
The Aurelian Walls at Porta Metronia
The Church of Santo Stefano RotondoThe Celimontano Aqueduct
The Flavio Amphitheatre (Colosseum)
The Massenzio Basilica
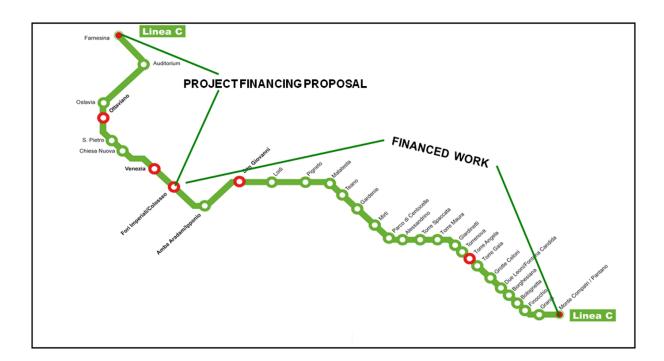
Fig.1 Line C

The Columns of the Nerva Forum
The Columns of Caesar's Forum
Monitoring systems have been arranged for these eight places.

2. Interaction tunnels excavation and buildings

The Department of Structural and Geotechnical Engineering at Rome's "La Sapienza" University together with the S.T.A. have carried out well-defined studies on the interaction between the tunnels excavation and the buildings, gathering the information available and in some cases arranging specialist studies.The section T3 route stretches from Via dei Fori Imperiali, jointly with Caesar's Forum, to Piazzale Appio, where the tunnels of the line underneath cross the existing Line A San Giovanni Station for an overall length of approximately 2,900 metres.

In the pipeline are two new stations - Fori Imperiali and Amba Aradam-Ipponio, and a series of shafts and structures serving the underground line. The tunnels will be dug under the Imperial Forum transiting near the long list of historical places mentioned above,till the manufactured station S.Giovanni, where T3 station ends and where is the connection between line C and line A.

3. Safeguarding interventions

Considering the delicate state in which we were to intervene, the project had to respect the regulations drawn up by the Ministry for Cultural Goods and Activities – Archaeological Office of Rome, due to the presence of important pre-existing archaeological sites. Taking this into consideration, it hasn't been possible to carry out geotechnical canonical interventions such as sub-vertical column sectioning in jet grouting or pole and micro pole bulkheads that, being followed by a campaign plan, would have inevitably altered those very pre-existing sites.

The interventions can essentially be retraced to two categories:

Precautionary interventions to be put into act before starting the excavations. Said interventions are basically to reinforce the elevated and foundation structures. In this category are included interventions aimed at rectifying a pronounced degradation and shoddy state of the structures, effectively found following diagnostic investigations and therefore are not directly linked to the effects caused by the T3 section works, but necessary to guarantee the protection and safety of the workers due to the proximity of the section works building yards.

Interventions to be carried out during the digging phase, aimed at contrasting any subsiding caused by the digging in real time and to prevent total subsiding below the pre-set thresholds. This category also includes interventions to compensate subsiding with cement mixtures injected below the depth structures via perforations equipped with valved tubes (compensation grouting). Because of the existing archaeological restrictions, said perforations have been planned for section T3 next to the monument/historical buildings in shafts of suitable sizes created and equipped before the digging starts. Because of this, the sub-horizontal perforations and the injections are carried out at such a depth so as not to interfere with the archaeological substratum.

Just seeing this route on paper shows how delicate this engineering work is. For this reason numerous monitoring systems are planned, both for the elevated structures (structural monitoring) as well as the land and structures in contact with the terrain (geotechnical monitoring), and also some non-invasive geotechnical investigations.

3.1.1   Objectives of the monitoring

This activity aims to monitor the static behaviour of those monuments affected by the work on the T3 section of the new Rome underground C Line and the annual management of the system itself (remote assistance and maintenance). The Monitoring System has the goal of surveying the monuments to see the effects of the digging of the line through physical measurements (shifting, deformations, opening of fissures, strain and stress). Vital information will be supplied by the measurements registered during the various phases of the work, compared with the theoretical values predicted in the design phase, and will be made available to the works management and designers, to evaluate any corrective action to be carried out.

Obviously, for the choice of the tools to be used, the following series of aspects was considered:
- Type of monuments: historical value and relative restrictions;
- Installation methods of the tools (sensor clamping and via cable);
- Dislocation of the measuring equipment (logger data);

and of many other aspects linked to the elasticity of the system, the flexibility and modular structure

3.1.2   The configuration of the monitoring

The monitoring of the monuments has been divided into 4 sectors:

- SAR system monitoring based on the elaboration of a series of historical data from satellites that refer to individual monuments as well as the whole of Rome's historical centre. The data supplied must allow us to purify any interaction phenomena observed during the construction of so-called "background noises" that may be linked to shifting caused by environmental phenomena.

- Geomatic monitoring, aimed at measuring vertical and horizontal shifting, carried out with Total Stations referring to prisms placed in specific points of the monuments and outside of them. These measures, when necessary, will be integrated with conventional geometric surveys.

- Geotechnic monitoring of the monuments' foundations and the surrounding terrain through the positioning of tools that survey vertical and horizontal shifting as well as variations in interstitial pressure.

- Structural monitoring of the monuments through the positioning of automatic reading tools, fissure gauges, strain gauges and electronic pendulums. These tools allow us to measure the entity of the interaction phenomena in terms of variation of the existing fissures, the formation of new fissures and the rotation of elevated monuments. The monitoring results, acquired through the above-mentioned systems, will be acquired by local units and simultaneously sent to the data processing centre that manages a GIS system that will make them available to the CTS on the appropriate website in real time.

4.   Description of the system

The diagram in figure 2 shows the general configuration of the monitoring system with the connection to the Data Acquisition Position. The system is based on the use of compact peripheral measurement units (PMU) which, if no network power is available, can be powered by solar panels, and communicated to the Data Acquisition Position via GSM telephone line. The connection of the sensors to the PMU is carried out by cable for Phase I sensors (long-term monitoring) and by wireless systems for Phase II sensors (short-term monitoring). Each PMU will be completely independent, acquiring the data from the various connected sensors; all the measurements acquired will be validated, complete
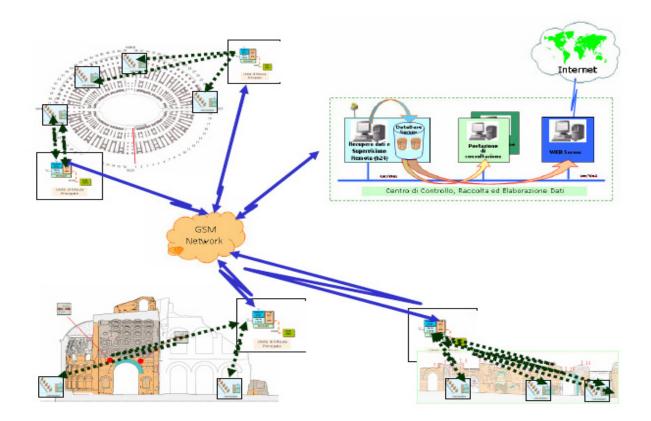
Fig. 2 shows the general configuration of the monitoring system with the Data Acquisition Position connection.

with time reference and validation code, and then archived on local memory devices. In the event of anomaly or measurements carried out outside of the pre-determined thresholds, a text message will be automatically sent to the Data Acquisition Position that will then be activated for the necessary data recuperation operations. As, however, each monument is a case in itself, with its own particular installation layout problems, a unique technical solution has been developed specially for each one.

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5. Purpose of geomatic monitoring

The geomatic monitoring of the buildings is articulated altogether in two distinct phases. The first phase, prior to the digging of the tunnels, intends to supply an outline of the static behaviour of the structures in undisturbed conditions. The second phase, in progress, will serve to control and evaluate the effect of the digging on the stability of the affected structures, in order to be able to survey any acceleration of existing movement or the triggering of new, potentially damaging phenomena.

6. Structural Monitoring

The structures will be monitored figure 3 via the integration of various geomatic sensors (high precision robot total stations figure 4, GPS receptors and bi-axial inclinometers). The motorised total stations will automatically carry out cycles of measurements, suitably programmed and modifiable remotely by the user, of azimuthal directions, zenithal angles and distances to reference retroreflector prisms placed at a distance from the excavatin route in places considered stable or which in any case are not affected by phenomena that may cause shifting on the buildings to be monitored. The prisms of reference will be numbered from 10 – 20, so as to strengthen the network and allow, with the highest precision possible, the determination of the total station position. The positions of the total stations will be arranged considering the criticalities resulting from the surveys carried out on the buildings and monuments affected by the C Line construction. The data originating from the motorised total stations, the GPS sensors and the inclinometer sensors converge in a central processing system whose output parameters, based on definite alert threshold, must highlight any phenomena of instability.

The diagram in figure 2 show the Data Base must take on through which all information of engineering interest resulting from the measurements acquired by the sensors installed for geomatic, geotechnical and structural monitoring (including the accessory sensors, such as meteorological sensors), both in undisturbed conditions for monitoring the background noises, as well as in progress during the digging operations, will be archived, managed and consulted and, if necessary, subjected to primary elementary elaborations. The DB, contextually to the data mentioned above, must also archive and manage the relative metadata and its updating and make it available for consultation figure 3.
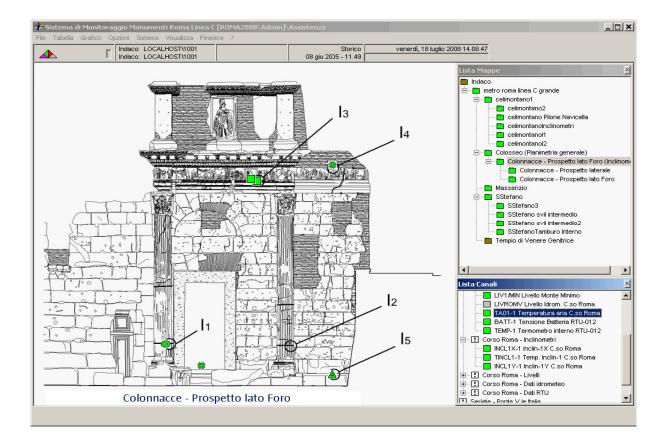
Fig.3 structural monitoring

Fig.4 Total station for monitoring

7. Geotechnic surveys diagnostic investigations

As well as capillary monitoring of the surfaces, detailed analysis and surveys have been carried out in the subsoil; numerous geotechnic surveys have been carried out giving an accurate survey of the various layers of the terrain; sub vertical foundation geotechnic surveys, from 5 to 25 metres in length from the surface, have been carried out to determine the impost depth of the first soil found above the same; continuous logging has been carried out with the withdrawal of an undisturbed sample, carried out in the horizontal masonry, creating holes of diameters of between 65 and 150 mm; videoendoscopic exams have been carried out on the wall structure through reduced-diameter holes made in existing lesions and/or cavities, or holes of approximately 2/3 cm in diameter made in the walls; the testing for strain on the wall face with a single flat jack; numerous trials and tests on soil, walling and plaster samples have been carried out, several laboratory tests have been done in order to obtain a detailed view of the subsoil.

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Non invasive multi-technique analysis of historical architecture for monitoring and conservation purposes

Antonio SGAMELLOTTI,[1,2] Costanza MILIANI[2], Brunetto G. BRUNETTI[2]
[1] Accademia Nazionale dei Lincei
[2] Centro SMAArt and CNR-ISTM c/o Dipartimento di Chimica, Università degli Studi di Perugia, Via Elce di Sotto 8, 06123 Perugia, Italy, Email: sgam@thch.unipg.it

Abstract

The mobile laboratory MOLAB, European infrastructure of the CHARISMA project, avails of numerous portable instruments that exploit the use of non invasive techniques and supply information concerning the elementary and molecular composition of surfaces of historical architecture.
Some case studies carried on monuments of national interest (the portal of Palazzo dei Priori in Perugia) and of international interest (in Spain the portal of the Cathedral of Santiago de Compostela) will be reported to demonstrate the analytical potentiality of the integrated approach of non invasive techniques.

Keywords: non-invasive, analysis, architecture, monitoring, conservation

1. Portal of the Perugia Palazzo dei Priori

In recent years, thanks to increasingly miniaturized and efficient optical and electronic components, portable instrumentations have been developed with a performance comparable to laboratory equipment, opening new possibilities for the non invasive in situ study of cultural heritage materials. The mobile laboratory MOLAB, European infrastructure of the CHARISMA project, avails of numerous portable instruments that exploit the use of non invasive techniques ranging from X-ray fluorescence to the molecular spectroscopies (IR, Raman, UV-Vis absorption and emission etc.) and supply information concerning the elementary and molecular composition of surfaces [1].
The MOLAB portable instrumentations enabled a campaign of non-invasive in situ analyses to be carried out at the different levels of the portal of the Palazzo dei Priori, Perugia during the different phases of the current restoration.
X-ray fluorescence, integrated with the mid-infrared measurements, has provided interesting information on the nature of polychrome residues present on few areas. Mid-FTIR spectroscopy, equipped with fiber optics has permitted the identification and mapping of pollutants, alteration products and restorative materials from previous interventions. It has also been possible to monitor the effectiveness of cleaning by performing measurements before and after the intervention and comparing the information obtained.
The measurements were performed by transporting the equipment directly onto the scaffolding, in Figures 1a and 1b shows the experimental set-up for the two portable techniques.

Fig. 1: experimental set-up for in situ measurements at the Palazzo dei Priori by XRF (a) and mid-FTIR (b)

1.1 Study of polychrome residues

In some panels of the portal residues of polychrome blue, white, black and red are visible. The XRF analysis of the areas of blue showed the presence of significant levels of copper suggesting the presence of a blue pigment characterized by this element. The mid-FTIR with the optical fibers recorded spectra on the blue areas containing copper have shown that the pigment responsible for blue color is a basic carbonate of copper, azurite. It is a natural pigment obtained by grinding the corresponding mineral, widely used in antiquity for paintings on panel, canvas and mural paintings. Its use was common up to the first half of 1700 when it was supplanted by the first synthetic formulations, such as Prussian blue or ultramarine blue. The spectrum obtained on blue decorations are shown in Figure 2, where signals identifying the basic copper carbonate are evidenced, the other visible signals refer to the carbonate matrix and to pollutants present.
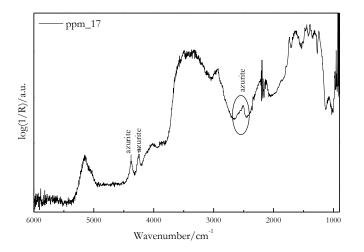
Fig. 2: mid-FTIR spectra recorded on an area that presented residues of blue. The diagnostic signals of azurite are labelled.

It was noted a that white coating was present in some areas, often found on top of a black color. The XRF measurements in these areas showed an increase of signals of lead indicating the presence of the pigment lead white. The white is a white synthetic pigment with excellent covering power, consisting of a mixture of cerussite, lead carbonate, and hydrocerussite, basic lead carbonate. Produced by different synthetic

processes, white lead was used since Roman times up until the late nineteenth century. In the black patina characteristic elements are not detected by XRF, suggesting the use of a black carbon based pigment such as carbon black or bone black.

With regard to red residues, there were no significant concentrations of elements which are clearly due to the presence of a red pigment such as iron for red clay (Fe_2O_3) or lead for red lead (Pb_3O_4). This may indicate the presence then of a lake, an organic dye based pigment that cannot be detected by XRF.

1.2 Study of the distribution of patinas and incrustations

The surfaces of the portal before the restoration were characterized by the widespread presence of patinas and incrustations whose nature was identified through measurements carried out by the fiber optic mid-FTIR spectrometer.

All the mid-FTIR spectra are characterized by the signals of the matrix, calcium carbonate which constitutes the stone carbonate of which the portal is made. In addition to the signals of the carbonate matrix other bands related to pollution or restoration products are observed. In particular in the incrustation, calcium sulfate (gypsum) is identified by the presence of a band inverted at about 1146 cm^{-1}. There is also a diffuse presence of calcium oxalate patina, identified by the characteristic band at 1320 cm^{-1}. The gypsum and calcium oxalate are typical weathering products of carbonate surfaces exposed outdoors. The first can be derived from dry deposition from the environment or from the transformation of the calcium carbonate of the matrix by the action of acid rain containing sulfuric acid, whilst the second is produced by processes of oxidation of natural organic materials used in ancient maintenance interventions or by metabolic processes. Meanwhile, the gypsum, is a partially soluble salt that following phenomena of solubilization and crystallization may cause damage to the surface structure of the object, it is reported that the calcium oxalate, in virtue of its very low solubility also at acidic pH, plays an important protective action for the externally exposed carbonate surfaces. In addition, the surfaces of the portal are characterized by the widespread presence of organic synthetic materials attributable to recent restorations, and in particular an acrylic resin has been identified as probably used for consolidating surface de-cohesions and a silicon resin with protective water repellent functions.

1.3 Control of cleaning interventions

The portable mid-FTIR system is particularly suitable to follow in-situ cleaning processes, as the technique is very sensitive to the presence of surface organic or inorganic materials, and has already been used in the case of mural paintings and sculptures marble obtaining important results to optimize restoration methods [2,3,4].

In the case of the portal of Palazzo dei Priori, from a comparison of the spectra collected on unclean areas and the spectra obtained in the same areas after cleaning it can be seen how the chosen intervention determines the complete removal of sulfates and acrylic resin. The protective silicon is also removed by the cleaning, although only partially. The cleaning did not act at the level of filler, where the signals of acrylic resin and protective are still visible.

Concerns the calcium oxalate, the measurements clearly show that the cleaning method chosen is respectful for this type of coating, as the signals of calcium oxalate are even more apparent after cleaning as they are no longer covered by the absorption bands of the sulfates and the acrylic resin.

The results obtained by integrating the two investigative techniques of XRF and mid-FTIR allowed the constituent materials of the residues of polychrome blue and white, respectively, as azurite and white lead to be identified. The state of conservation has also been assessed in surface areas by identifying the nature of the incrustations, the patinas and products used in past restorations. Measurements carried out in different phases of the cleaning intervention have verified the efficiency of the actual method that has effectively removed the sulfates and residues of acrylic and silicon resins while respecting the patina of calcium oxalate. In conclusion, the work carried out demonstrates the efficacy of non invasive portable techniques in identifying, the constituent materials, in assessing the state of conservation and in optimizing the restoration interventions all carried out in situ and without the necessity of sampling.

2. Portico de la Gloria of the Santiago de Compostela

The MOLAB laboratory carried out a non-invasive study of the polychromy and alteration phases of the Portico de la Gloria of the Cathedral of Santiago de Compostela (see Fig. 3).

Fig. 3: experimental set-up for in situ measurements at the Portico de la Gloria

The following analytical techniques were utilized: elemental analysis by X-ray fluorescence (XRF), molecular analysis by reflectance in the mid infrared (FTIR), UV-vis fluorescence, colorimetric analysis and image analysis by video microscope.

2.1 Incrustations and superficial deposits

Regarding the conservation state, the Portico is characterized by widespread alterations of gypsum and oxalates that are observed macroscopically as white deposits, dark patinas and respectively. Sulfates and oxalates are always present, although not visible to the eye, in all measurement points, even those relative to deep lacunas in the stone support.

In some points of the pillar, areas of sub-efflorescence of calcium sulfate are highlighted, which are visible in the images recorded by the video microscope precisely in the phase of breakage of the external paint layer due to the pressure of crystallization. It is thought that the problems of loss of color in the areas of the skin tones are due to crystallization under the paint layer of calcium sulfate which cannot migrate externally due to the hydrophobicity of the lipid layer.

On the other hand, the diffuse and concentrated presence of gypsum, demonstrates that the sulfate also comes from seepage of water from the outer surface. Of similar origin, are areas of calcite of new formation, mostly found on the left side of the porch. Finally in all the surface, with accumulations in the Pillar of the Evangelists, chlorides are highly diffused, while in many points the presence of nitrates is observed.

2.2 Organic binders

The outer layer of the faces, due to the intervention of Crispin de Evelino who in 1651 was appointed to act on only parts of the complexion of an unknown number of figures, over painted the faces with white lead, cinnabar, and probably red ochre in lipidic binder. Also observed are signals of proteinaceous material, which can also suggest the use of a temper although subsequent maintenance interventions cannot be ruled out. The paint layer shows the typical cracking of the paint in lipid binder and the formation of lead carboxylates, that result from the saponification reaction between the free fatty acids of the lipid binder and the basic lead carbonate. In all the statues analyzed, the outer layers show, in a more or less clear manner depending on the state of conservation, the features discussed above.

The statues of the central arch and epistle pillar present signals of varying intensity of wax in the flesh tones. The reflectance FTIR spectroscopy does not permit the recognition as to whether it is beeswax or microcrystalline wax due to the presence of the lipid binder.. In many statues of the arch, especially in correspondence to the clothes and black writing of the scrolls, synthetic acrylic resins were identified, attributable to the intervention of consolidation of the 1992-1993restoration.

2.3 Metallic decorations

The polychrome presents residues of metallic decorations, the most common are those over lapis lazuli paint layers in correspondence to clothing and are characterized by gold and lipid binder residues. Decorations in gold were also detected in hair and beards. In some brown areas of the robe of the statue of the Angel with Crown of Thorns signals of gold and silver are observed by XRF, suggesting the presence of a metallic decoration that is different from the others. At all points silver is always present along with gold.In some statues, the investigations identify the presence of residues of the applied brocade decoration technique. In these areas, the presence of high levels of wax, residues of gold and tin, traces of lapis lazuli and lipidic material are observed.

2.4 Pigment analyses

Reds - All the red areas analyzed by XRF showed the presence of mercury, an indication to the use of cinnabar. The same pigment mixed with wax, was used to realize the blood on the ribcage and in the stigmata of Christ. UV-vis fluorescence measurements permitted the exclusion of the presence of red lakes residues, in all points analyzed.

Yellows- Residues from the repainting intervention performed with yellow ochre are diffusely present which result to be rich in iron oxides and kaolin. Possible evidence of a lead and tin yellow have emerged in the decorations of vegetation type in the Evangelist pillar.

Blue- All the well preserved and vivid blue colors are made of lapis lazuli and lead white. Traces of natural ultramarine are often found in correspondence of the gold decorations. All blues with green hues are based on azurite and lead white, for example in residues in the clothing of Christ. It would be interesting to understand the sequence of interventions of azurite and lapis lazuli, so as to understand which of the two pigments was used in the original Romanesque polychrome. In this regard, the mantle in the Evangelista pillar statue is predominant in azurite in the lighter zones and inside the folds of the mantle, whilst lapis in found in the darkest areas. This occurrence suggests the presence of two distinct operations rather than the use of azurite as a preparatory layer to lapis lazuli.

Blacks- The blacks of the pupils were systematically analyzed, obtaining in most cases indications of the use of carbon black with a prevalence of protein binder.

2.5 Polychrome alterations

Many polychrome areas of the arch present obvious green alterations that are highlighted by the non-invasive analyses to be of diverse origins.
The arch corners are characterized by severe green alterations affecting both green areas that represent the vegetation and the garments of men. The surfaces have strongly altered in morphology to suggest that the green material is largely a result of a process of secondary crystallization. The XRF analyses showed the presence of high levels of copper and chlorine, suggesting that the alteration is made up of green copper chlorides atacamite / paratacamite. The FTIR analysis showed the presence of high quantities of nitrates, oxalates and sulfates, which also may have contributed to the degradation.
Many areas of the portico that show green blue coloration present traces of azurite and show evidence of high levels of copper to indicate that the process of deterioration is even in these cases due to the formation of copper chlorides resulting from the interaction of chloride ions carried by water with azurite.
The integration of analytical data acquired through a multi-technique approach provides a comprehensive and satisfactory framework of constituting materials of architectural surfaces of art-historical interest, that inform of the principal forms of alteration that sustain the basis of functional diagnostics for preventative conservation projects.

Acknoledgemtns

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RELATIONSHIP BETWEEN FIGURATIVE CODES AND NEW TECHNOLOGIES IN THE 19th CENTURY: KNOWLEDGE OF THE PAST IN ORDER TO DESIGN FUTURE STRATEGIES

FARRONI Laura

DipSA, Facoltà di Architettura, Università degli Studi di Roma Tre, Italia

E-mail: -mail: lfarroni@uniroma3.it

Abstract

At the end of the 19th century the introduction of iron in the construction processes, generates a different way of thinking about architecture; triggering all that industrial production that has led to economic, political and social reversals. Therefore, knowing the ways and strategies adopted in the solution of the contrast between the classical tradition and the new prevailing construction technologies, through the analysis of the production of iron bridges in Europe and beyond (and of some other buildings), is a form of knowledge of the ways, regulated by the humanity, of the use of technology in order to modify the natural environment and then satisfy the needs of an increasingly complex social life. The iron bridges of the 19th century (described in treaties and manuals) become archetypes, whose images are not only a demonstration of the adopted techniques, but, also, of architectural organisms, of spatial and formal values and of their context. In light of such theoretical considerations, developed through an analysis of the treatises, manuals and construction courses, it was felt necessary to verify them in operational terms. The development of a digital model of a pier of the Pio Bridge 1862, made it possible to understand the relationship between geometry, construction and architecture in a given historical period. This strategy provides guidelines for a wide-ranging procedure geared towards selecting the criteria of conservation or reutilisation of buildings classed as examples of industrial archaeology.

Keyword: Architecture, Representation

1. The construction process at the end of the 19th century: realising ideas

At the end of the 19th century, the introduction of iron into the construction process generated a different way of thinking about architecture, triggering all of the industrial production that led to profound economic, political and social upheaval. The conceiving and designing of iron buildings and structures was naturally associated both with the possible production processes of iron as a material and with the development of construction technologies. There was a revising, if not an entirely new arrangement, of the phases of the building process, whereby the construction potential of the initial concept was put to the test through the new static solutions being designed by engineers. The development of architecture made from iron gave architectural design back its essentiality and its construction rationality [1]. New occupations came into being, with very precise remits: designers, educated at the polytechnics; contractors; construction workers; and guilds of master craftsmen. Communication between these various roles was entrusted to technical drawings with a view to reaching the shared objective: the realisation of the building. The technical drawings gradually acquired their own individuality as design drawings, which were deployed in a range of contexts. The necessary search for codification led to the laying down of a universal technical language that was able to ensure unambiguousness in the transmission of information to all those involved in the construction process. For its part, industry – or, rather, the workshops producing the components designed for the construction – also started to take an active part in the construction process. While the workshops had close contacts with the designer and the craftsmen, they also imposed a standardised form of construction onto the market, as

expressed in their component catalogues. The role of the client became fundamental, and the clients put their trust in the contractors. The representation of the design became the main instrument of transmission of the shared intentions of those involved. Structural monitoring, the progress of the steel-working (quantity of the material produced and its quality if cast iron, iron or steel), the features of the manufactured items (profiles or pipes), given that the components of the metal structure were produced in the workshop and then assembled in the yard – all of these elements made it possible to reduce execution and labour times, thereby transforming the construction phasing. In terms of architectural representation, the dimensional control of the object – through the use of the metric system and the identification of the components using the methods of descriptive geometry – allowed for a graphical "narration" of the architecture targeted not only at the formal communication of the object but also at its execution. Factory drawings were produced with indications of the "pieces", their quality and their combinations, alongside drawings for use on site, which showed not only how to assemble the pieces together but also the execution times. In addition, there were the drawings produced by industry, which prior to the realisation of the product had to draft support drawings for the construction of the models and dies. The different methods of casting metal, and the various uses of cast iron and iron, made it possible for the workshop to manage the forms and dimensions of the components. For single die-cast pieces used for interior decoration purposes only, modular elements were produced for assembly as structures.

1.2 Treatises and manuals providing information on 19th-century experimentation

This essay describes the links between figurative codes and new technologies at the end of the 19th century, in a well-defined architectural environment – i.e. that of iron architecture – through the study of the evolution of representation in the context of the construction process. The proclamation during the period of a "new freedom" in the interpretation of traditional culture was linked to the introduction of iron and to the consequent use of architectural components, transforming the process of architecture and, therefore, the process of erecting buildings. The initial re-use of traditional figurative codes was substituted by a careful "re-elaboration" of them, such as for example was the case in the use of the classical order, where the maturation of an architectural language with the capacity to express the sense of space afforded by the use of the new material connoted modifications both of the proportions and of the morphology of the elements, according to the situation. Indeed, the application of the design "invariables" of iron structures came about with modes of representation that presented the object as a machine that could be dismantled, characterised by the relationships between the component systems, and by the modes of processing and of assembly. The presence of different languages in the productions of the period was due to the intentions of the individual designers and to their capacity not only to master the technical data but also to interpret it from the formal perspective. During the 19th century, with the development of the railways and bridges, major industrial production began in earnest; the craftsman was replaced by the worker or the industrialist – a development hastened by the use of the Bessemer process [1], which enabled the industrial-scale production of large quantities of steel. The engineer dealt with verifying the properties of the materials; these checks had become indispensable to guarantee the application of the products being offered by industry. In construction terms, mass production afforded the opportunity for assemblies and combinations of structural elements, which – freed from "historicist" connotations and characterised by new forms – made it possible for different architectural elements to exist side-by-side within a rational, safe system that had been fully designed in advance, in which the design idea found its full feasibility. Architectural drawing in its many guises assumed the primary role in design *per se*: from geometric drawing, which reached its apex in graphic statics, to drawings intended to analyse the types of structural elements and drawings geared towards communicating the assembly methods. In iron architecture, it is clear that the form was linked to the structure and to the technical requirements. On the basis of 19th-century construction courses and manuals whose purpose was, first and foremost, to educate and highlight the "state of industrial progress", it is evident that the theme of the metal bridge underwent a number of evolutionary stages associated with the development of scientific knowledge. This is attested to by the various images featured on the construction courses of Sganzin (1849) and of Demanet (1862), and in the manual entitled the *Appendice all'Arte di Fabbricare* by Curioni (1865), as well as by the works actually constructed. The bridge across the River Severn, constructed in Coalbrookdale in 1779, is the first important structure in which iron was used as the construction material to cover wide spans, and was very much a case in which "the entry of cast iron and iron came about even before the structural possibilities of the materials had been grasped" [2] (Figg.1-6). The cast-iron arched bridge was a solution that still bound the designers to tradition, because the cast iron used was treated as if it were stone. Later on, bridges constructed with wrought iron (which made it possible to exploit the resistance to bending), such as suspension bridges, girder bridges, and trussed bridges, succeeded in deploying new structural forms, decomposing the system into simple elements. The combination of vector graphics and detailed

design drawings in which the formal aspect is reached, represents the expression of that landscape between the concept of "construction as the subconscious of architecture" [3] and the realisation of its expressive image. Within the courses held and manuals produced, it is possible to trace a thread running through the development of the content of 19th-century technical literature that is associated not only with the evolution of the production techniques and the use of new materials such as iron and cast iron but also with the changing attitudes of engineers and architects, who were becoming aware of major changes affecting both the art of building and the communication of technological data. To demonstrate this, the issues dealt with in the treatises and manuals communicate both the technical/scientific aspects of the art of building and the affirmation of a different concept of design drawing, thanks to the appearance, for example, of graphical verifications of the stability of the elements. Treatises analysed in the course of the research include Reynaud's *Traité d'architecture* (1850) and Breymann's *Trattato generale di Costruzioni Civili* (Padova 1884). While substantially different, they represent two successive stages in cultural and technological development: the first displays a still-traditional approach towards new technical possibilities, whereas the second represents the codification of construction systems and architectural languages accompanied by a codification of the "technical drawing". The treatise entitled *Cours complet des dessins des machines appliqué a la construction par M. Robinet Ingénieur-dessineatueur* is strictly mechanical in the way in which it describes architecture and, for example, the classical order is examined as a series of pieces in detail, whose representation consists of a general part of initial schematic drawings and of another part featuring application tables [4] in which the pieces are assembled. Giovanni Curioni's *L'Arte di Fabbricare* (1865-1884) represents a key stage in the development of tools suitable for the transmission of technical and scientific knowledge – not simply at the conceptual level but also in terms of practical application. This stage was hastened by the development of the construction industry following the Unification of Italy [4]. Curioni's teaching, which was delivered at the Scuola di Applicazione in Turin, was intended to make accessible to students the theoretical and practical instruments of the art of building. The approach to planning was a multi-disciplinary one. The tables concerning the iron structures constituted the definitive appropriation of the innovations introduced via the use of iron as a construction material: what was being represented now encompassed a definition that was both technical and formal, so much so that it could be transmitted through teaching. One specific aspect emerges from an analysis of the tables concerning iron constructions: in the volume part, the elements of the construction are represented "in the manner of a real manual" in the sense that, removed from any context, they take on a life of their own, since they are "abacusised", but this is not the case for the tables in the appendices, where there are construction examples, such as bridges, which by communicating graphically the entire design process of the construction demonstrate the practical application of what has previously been discussed in theoretical terms. What is most striking about the tables of the *Appendice all'Arte di Fabbricare*, and specifically those in Volume II, is their narrative character, which is different from that of the other treatises, because the narration not only bears witness to the level of technological development reached but also analyses all the phases of the construction process that led to the definition of the work: soil analysis with associated study of the profile of the river bed, with information on the distances between the banks, both progressive and partial, accompanied by simple wire frame drawings to indicate the position of the bridge relative to the position of the embankment attachments. The exclusive use of dual orthogonal projections emerges as a common thread within all of the tables, since it ties up the architectural, mechanical, urban planning and environmental themes [5], making the layout simple and clear to read: graphic static diagrams (for the verification of the structures), orthogonal projection drawings of the entire construction (to give an idea of the spaces reached), and details of the piers and main joints to demonstrate the specifics of the design and therefore of the execution. 19th-century technical drawings of metal constructions are interpreted as "algorithms of calculus, explaining a procedural phase with which the project is executed" [6], and so the planning and representation processes are combined in a single conceptual operation; citing Edoardo Benvenuto when he states that "the graphical tool does not have a role of useful application, but rises to a founding principle: it becomes the argument, it becomes the evidence to demonstrate and define static concepts", acknowledging "statics as an interpretation with respect to the abstract and rigorous theorems of geometry" and the projective relationships among geometrical entities and the similarity between entities and static sizes (correspondence between force and oriented segment), the concept of correspondence between tensile strength testing and design can be affirmed (Figg.7-10).

1.3 Digital modelling as a survey system: an example of a route to knowledge of the geometric, formal and construction characteristics of Ponte Pio in Velletri

The Ponte Pio – also known as the Santa Anatolia bridge and named after Giovanni Maria Mastai Ferretti, Pope Pius IX – represents the application of the theories of forces on iron constructions and also serves as an application of the canonical classical figurative code. It was described as follows in a document issued by the Pontifical Government: "The bridge with iron struts rests on four supports, the edge supports made from brick and those in the centre from iron; the iron supports are divided into three orders, placed one atop the other – Tuscan, Doric, Ionic – rising up from the base of the valley on a walled plinth to a total height of 41 metres". Interest in the bridge relates not only to the fact that, compared to the four suspension bridges built at the same time in Rome by the Società dei Ponti Sospesi sul Tevere, it has a different structure, but also to the fact that there is "artistic input" in the shape of the piers. To return to Jodice: "the bridge…forces the new technologies of iron and cast iron to retrace the traditional formal and figurative itineraries, deemed necessary to ennoble the cold mechanical nature of the construction. The upshot in any case is a fascinating work, which manifests the signs of a struggle between two heterogeneous, rival ideologies, and in which the separation between "quantity" and "quality", even if yet to recompose itself into a potential expressive unit, is already dramatically evident in the same peremptory physical and linguistic separation of the horizontal girder and its supporting piers". Displaying classical figurative codes, which follow the proportions of Vignola, all of the components of the piers were produced in the workshop, meaning that they were subject to a process of mass production – a concept featured in the images within the manuals studied. The order is treated as a mechanical piece, which serves as decoration, but is however also linked to the structural design, so much so that in the project drawings and from an observation of the work it is possible to discern a correspondence between the structural joints and those of the order. The development of the digital model was a form of analysis and study of the understanding of the relationship between planning strategies adopted and construction processes. The geometric model made it possible to retrace the main theoretical and operational principles of a given period in the history of architecture, starting from the design drawings and the archival documents, and comparing the manuals of the period. Composed of individual elements, the model required thought to be given to measurements, highlighting the relationship between formal units and dimensional units of the individual objects. On the basis of a study of the available documents concerning the construction of the various components, a process was implemented whereby geometry, proportional rules, construction techniques and compositional principles were cross-referenced. A second phase saw the production of abacuses of the "pieces" used in the work as built, returning in this way to the methods proposed by the manuals and catalogues. During the development of the model, the choice of the methods of creation to use for the parts had to take due account of the implementation techniques, relating in this instance to metal. All of this has made it possible to monitor the architectural language adopted, with particular reference to the proportions of the order used and to the morphology of the cornices, columns and capitals. In the orthogonal views, the modularity and proportions have been highlighted, comparing them with the geometry of Vignola, before moving on to the creation of the raw model, starting precisely from the drawing of the profiles used as the generatrix. This procedure involved, then, a cataloguing of families of elements to be enriched in future with technical information, thereby constituting the basis for a model of information geared towards interoperability at the moment when the decision is taken either to conserve or re-utilise (Figg.11-16). In this specific case, since the Ponte Pio is considered a historical construction, it may be understood as the manifestation of certain basic concepts of the industrial era and, therefore, building a model of the bridge has made it possible to abstract the rules of reference for the study of similar works. In this way, from a single example it is possible to extrapolate an array of strategies for future interventions on architectural works made from iron or for projects of industrial archaeology.
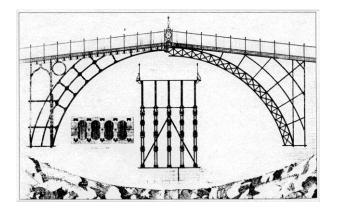
Fig. 1: The Bridge on the river Severn, Coalbroockdale 1779

Fig.2 : G.M. Sganzin, Nuovo Corso completo di pubbliche costruzioni, 1849, Tav. 46
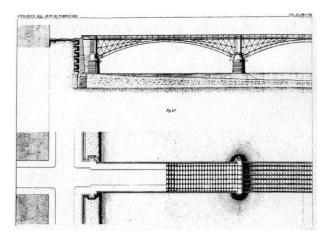
Fig. 3: Robinet, Cours complet des dessins de machines appliqué a la construction, Pl. 129
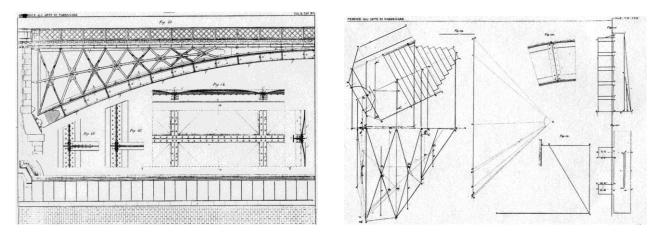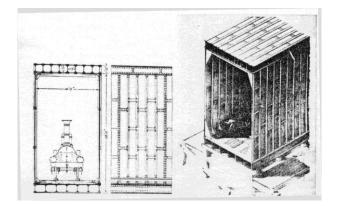
Fig. gg 4,5,6: G. Curioni, Appendice all'Arte di Fabbricare, voll. II, Tav. VII, XIV, XXIII
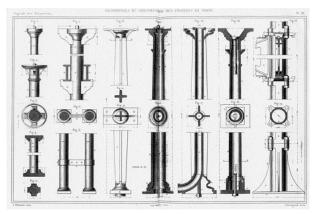
Fig. 7: The Britannia Bridge, Stephenson 1840-1850

Fig. 8: Armengaud. Vignolre des Mècaniciens, Proportion et construction des collonnes en fonte, Pl-20
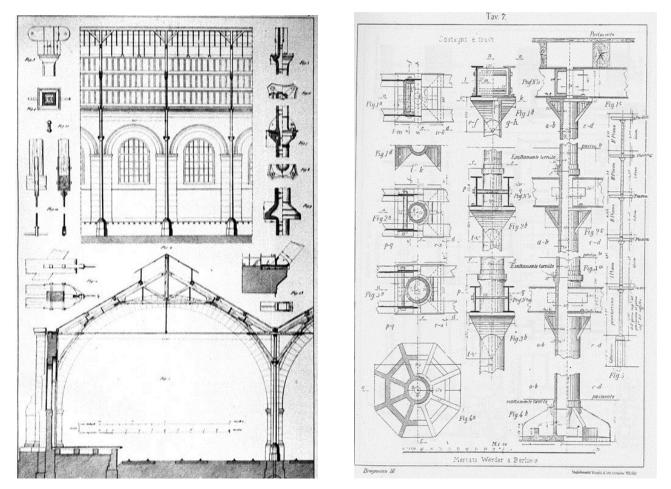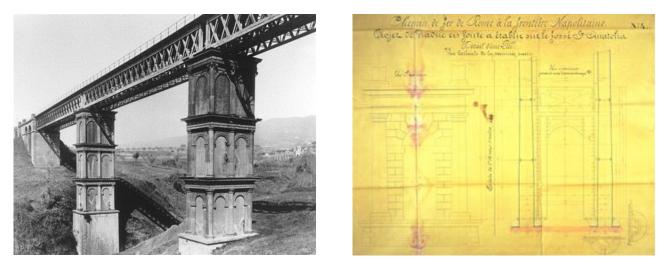
Fig. 9: L. Reynaud, *Traitè d'architecture,* Paris 1850, Tav.74   Fig. 10: G.A. Breymann, *Trattato di costruzioni civili,*Tav. 7

Figg.11,12: Ponte Pio in Velletri, photography of 1940 and design drawings, 1862. A.S.R.
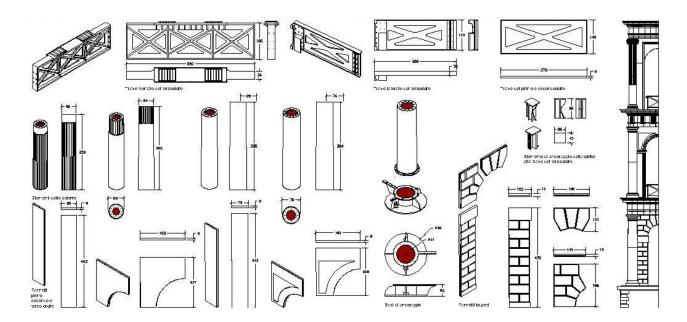
Fig. 13: Ponte Pio, abacus of the components, design author
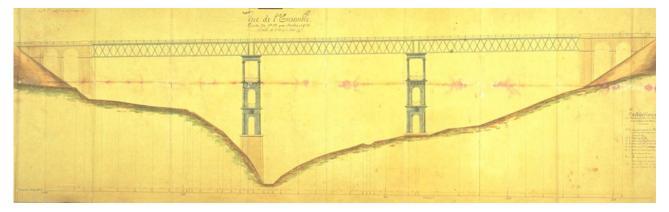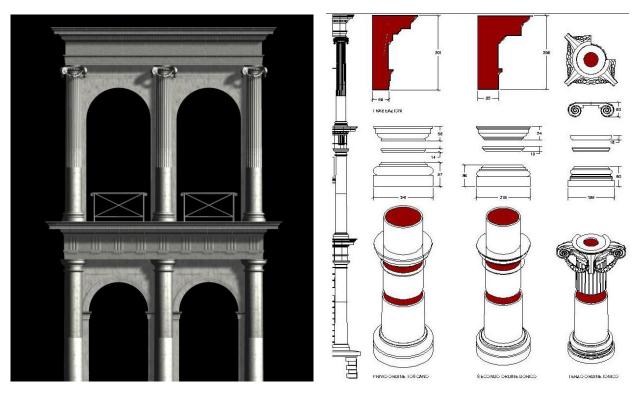
Fig.14: Design drawings, watercolor on paper, 1862. A.S.R.

Figg. 15,16: Ponte Pio, rendering and abacus of the components, design author

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THE SMART DRAWING FOR THE KNOWLEDGE
The historic town of Ruvo di Puglia

Cesare VERDOSCIA,[1] Anna Christiana MAIORANO[2]
DIAC, Facoltà di Ingegneria, Politecnico di Bari, Italia
E-mail: c.verdoscia@poliba.it [1], arch.acmaiorano@gmail.com [2]

Abstract
It is to follow a path to research ways of interpretation of urban form, in order to understand and then communicate, that can make visible through the graphical representation, our conscious perception of the shape of the places and its intangible aspects.
A real and scientific chance to understand the complexity, is to proceed by addressing its parts, identified by initiating an structuring operation, which is conscious act that is defined from time to time in relation to a given purpose.
It is necessary to identify in the complexity, a number of solutions arising from simplifying processes, typical of human mind, which take into account past experience and can anticipate future, which is not emptied the complexity of the real, but add variables of vision of the problems from a different point of view.
These processes are used by humans to minimize the energy, improve and speed the transmission of information, achieve smart essentiality, which can define the word "Less" for the drawing.
The object of this experiment is the urban fabric of the historic town of Ruvo di Puglia – built-up of ancient origin, located north of Bari - rich in important human evidence, and more low-value building products, along testimony of human presence of each historical period.

Parole chiave: model, simplexity, visions, town, communication.

1. The model and the drawing[1]
The reduction of reality in graphical representations involves the interpretation of what you see through the memory formed of empirical experience and its cultural significance, producing forms and things, images and gestures, communicable and achievable.
The knowledge of places and architectures can be manifested through a drawing that materializes a code of intellectual understanding of the real world, which can consolidate the architectural and urban image, witness the membership to an buildings category or town-planning, confirm its origin and especially, put it in connection with his cultural matrices.
Everything can be usefully represented through the figurative traditional system of the drawing and of the graphic scheme that compose symbolic and analog forms identified by lines and colors.
The drawing is memory, understanding, interpretation. Allows the collection of information and the complete knowledge of the thing observed operand selectively to the extracting of those aspects that most interest, ignoring others.
We can proceed to further phases of study from different points view (structural, distribution, figurative, formal and chromatic), applying a process of synthesis that establishes a hierarchy of signs, making a geometric abstraction of shape for simplify the contour and searching objective references.

But, find a path of knowing the world of architecture and of the city is essentially to define a methodological route made of choices that try to discover the secrets of the complexity of the phenomena of the real world to identify the specifics of their nature.

A concrete and scientific possibility to decipher the complexity of an urban structure - which looks like a mesh, a tissue of relationships materials and intangible - is to proceed addressing the its parts identified through a process structuring. A natural phenomenon seems to the mind following to the interpretation and subsequent transformations of the sensory stimulation of the perception act, which requires the ability to look, in the sense of learning the order in which to examine their surroundings, anticipating and guiding the eye and the cognitive action, constituting a reference that builds a mental representation in a *egocentrato* system, that is from the point of view of the viewer, *allocentrico*, from another point of view, or capable of realizing a simultaneous multiple perspective, or from several points of view simultaneously [1].

The idea of an architecture born by immediate perceptual acts , which express to the eyes of the perceiver, events and simple shapes, and from indirect perceptions that may, for example, provide a feeling of pleasure and contentment, which transmits the symmetry, the balance, the proportionality between the parties. It is the result of an act of knowledge derived from a conscious selection and is consists of a mental framework of relations of analog nature with the real phenomenon which represents [2].

This selective and structuring action is an operation that is defined in relation to a function assigned, realizing an iteration between the components of complex phenomena according to a certain point of view, and in this sense can refer to the definition of constitution or form of something that is perceived in its entirety and qualify his understanding.

We can use the concept of structure to indicate a set of elements interconnected by certain relations, such that it can be considered parts of a functional unit and formal, that in the meaning used in architecture can certainly relate to rules of connection (static, functional and formal) between the parties of a building related to each other in an order determined by a particular purpose.

If the target is knowledge and if this can be understood as the ability of man to discover the degree of simplification of complex phenomena, then to make them understandable we must apply of the principles of simplify shared that they can reveal those components that may give meaning.

Examples of structuring, according to principles of simplification, can also come from observation of the biology of living beings, that for their needs - as identified and defined with the term "simplexity" by physiologist of the perception Alain Berthoz - use a variety of solutions arising from processes of simplification, related also to our minds when we should deal with complex situations, which always resolved on the basis of past experience, anticipating the future [3].

Identify the components " simplexity " of a phenomenon, it means adopting an naturally approach, that help us, without changing the complexity of reality of which they are party, to recognize the processes of simplification, that allow the birth of a real phenomenon, and at the nature to build, from a small number of patterns, a multitude of interaction models capable of generating very complex organisms.

We can imagine structures mental " simplexity " that allow us to form the idea of a phenomenon, a model of understanding, that in the presence of an apparent complexity additional, a deviation, allow the vision of the problems from a different point of view, so control the phenomenon or a complex system.

Alain Berthoz writes that "... contrary to what one might think simplification is not simple, because it involves particularly to inhibit, to select, to connect, to imagine" [4], which are the drawing properties and of all operations mentally conscious.

The man in order to minimize the energy and speed up the transmission of information, uses models of structuring of reality the same or similar in different sectors of knowledge and from our point of view, the application of principles of simplify, is an effective tool to learn more about the built environment.

It's important to try to formulate some principles of simplification, that may help us identify and describe the properties and laws that underlie the mechanisms that regulate the life and the expansion of cities, that help us build a model for understanding the observed phenomena, used and identified for each individual purpose, to collect data, process them and provide new evidence to overcome the many problems posed today by the conservation and regeneration of urban centers and for the their sustainable development.

The definition of a model as already theorized by Structural linguistics [5], should be based on some principles that we believe fundamental: those of the pertinence, of the analogy, of the generalization.

The model, must represent a structure according to a specific purpose (describe the facts under one point of view and take into account, of the complex reality only those features that proposes any disciplinary interest, excluding others), with analogical logic (drawing signs and symbols representing something that resembles, that you may consider iconic because it shows the same properties of its referent with varying degrees of similarity) [6], and generalizing (by starting a confrontation between structures of different phenomena, which

seem to have the same meaning and comparable, to infer another more simplified that contains the essential features, so as to express an hypothesis of knowledge valid for all) [7].

Moreover, we can add those what would seem the natural principles that govern the structure of living beings.

The model must differentiate and separate functions for modular decomposition, to locate quickly using elegant and effective solutions the simplest elements of complex phenomena through specialized modules and then reassemble the whole, making a deviation from the "simplexity" according to the cartesian method.

The model must be flexible, or easily modifiable to follow the evolution of the phenomenon and the refinement of the idea, and contain memory of the actions previously performed. By operating an exchange of value as a function of scale reading, it should be possible to identify those elements constituting the model – which in turn, can be structured in the most rapid way - that are detectable even in the schematization of different phenomena.

In short, we must devise models that can accelerate the phase of depth knowledge, the simulation of potential design transformations and improve the transmission of information.

Operationally, this intellectual operation to translates into graphic representations (digitals or analogue) which is characterize: for the position relative to a reference; for the form definable by relations between the geometric components; for assignment of color qualities of the surfaces that bounding the bodies that determine the boundaries; for the scale of enlargement or reduction that identifies the appropriate level of detail.

From our point of view, modeling was an effective tool for study of the built environment, object of our interest, an operation intended at a interpretative vision of the appearance, more that the accurate reconstruction of the object, not a simulation that seeks to replicate exactly [8].

The slavish reproduction of the existing, normally does not no present useful meanings for the knowledge and for the project, even if the prefiguration of a possible transformation is certainly important.

The modeling, as a mental operation, is in its very essence a way to explore what we see and the graphics materialization makes visible the results, realizing of a perceived object, both the representation of the real appearance and his fiction.

The representation methods that science has encoded to return the data of the actually built and its design, help us understand the world, for what concerns us, through the reduction of two-dimensional and three-dimensional space and the discretization of continuum, representing its elements for partial images that allow, through mental processes, to restore the original continuous form.

So, the shadows of the statues of animals and things - narrated in the myth of Plato's cave - which make recognizable the forms of nature to a group of men jailed since her birth, once that free they reached the light, or the clever design of the crab, made by Chuang-Tzu, in an instant with a single gesture, but result of years of painstaking study of the animal - described by Italo Calvino [9] - may become appropriate examples of a representation that quickly reaches a smart simplicity that can define the word "Less" for drawing.

2. Visions and reflections[2]

The design of architecture and its many variations that cross sectors of science, even far from each other, interposes "... between the project and the survey, between the idea that becomes architecture and the constructed architecture that, through analytical routes, goes back to the drawing, between the project leading to the construction and the survey that from the extant, returns to the project, moving in paths space-time, that direct to the future or are modeled on the past, going back to the formative stages. The ideal meeting point for this graphic and creative process, the central hub of the system, is the conceptual moment, from which they have start and are reunited the complex areas of graphic representation"[10].

The experience of research and design of the old town of Ruvo di Puglia (on the occasion of the Convention for the preparation of studies and analysis aimed at drafting the plan of urban and building recovery of the historic center, between the city of Ruvo Puglia (BA) and the DAU of the Polytechnic of Bari, coordinated by prof. Francesco De Mattia), assumes the meaning of the meeting place of ideas, of the expectations about the future of the city, a moment of reflection on the identity of places.

The public spaces, through the interpretation of the data collected, they are tested to verify the ability to accommodate, among the them historical traces and their physical weight consolidated, new forms, new languages, and develop a possible model of urban growth.

In the cultural context on the issues of representation, the research is orientated to know at both the cognitive process, based on reading and processing of scientific data collected in order to suggest possible strategies of transformation, evolution and enhancement of urban environments, at both the communicative aspects of drawing seen as a place of materialization of the idea of the city that has formed in the mind.

In this experience of project and research becomes essential think to the drawing as a very special way to understand and to examine things. The drawing pushes us to think about the essence of the architecture, of the landscape and the world, where the thoughts, reflections and visions are made with visual material.

Reflect on the future of the cities, identifying places and unstable situations, through scientific operations, defining methodologies for the analysis of urban events, means to relate different data, construct a system of values and define categories, to get to develop general criteria intervention, to improve the city, and above all the life into the city. Then imagine, prefigure, create an "environment conducive to life" [11].

By interpreting the thought of Aldo Rossi, we can define the complex analytical work on the city historic center like the research, in every direction and with any means of the current image that is the paradigm of everyday life and identity synthesis of places.

The old town of Ruvo di Puglia (a settlement of ancient origin placed on top of a hill at the northern edge of the plateau of the Murgia. Located in a strategic and important location in the geographical area, since Roman times as Statio on Consular Trajan), boasts the existence of a physical structure ancient and nineteenth-century old still well preserved arise where buildings of great historical and architectural value.

Ruvo has been consolidated over the centuries on two main directions, the axis connecting Piazza Matteotti and Piazza Bovio in which converges Cathedral street. After the demolition of the sixteenth-century city walls, in early nineteenth, Ruvo has developed along the south and west directions where there are the important and representative buildings of the city.

The research and study work has produced interesting results in which the urban spaces and the architecture have undergone figurative experimentations aimed at urban regeneration. The reserch was developed through three matrices: visual, constructive and interactive/multimedia matrix.

The visual matrix is developed through the search for identity of the place that has passed through every step of the knowledge of the places themselves, has inspired analysis and urban survey and guided its definition and translation in graphic way.
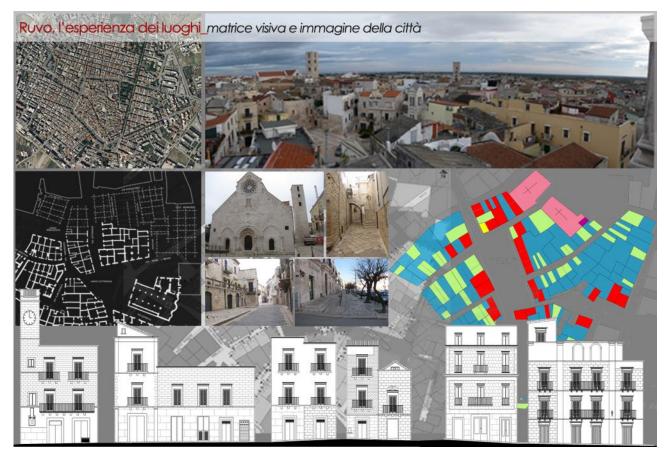
Fig. 1: The matrix and the visual image of the city - Thematic graphs entitled: Ruvo, the experience of places.
(Drawings produced by Pietro Lavalle in the degree thesis in Building Engineering at the Polytechnic of Bari - supervisor prof. arch. Verdoscia Cesare).

The process of knowledge, that starts from the urban survey (for example urban fronts, ground attacks and profiles of the isolates, roofs and attics, etc..), from the analysis of the condition of existing buildings (intended use, state of conservation, infrastructure, paving, etc..), passing through the interpretation of the desires and expectations of citizens which are compared in working groups on specific issues, comes to the definition of the elements of disorder, category in which were included unauthorized building, traffic, barriers to the use of common areas, improper use of internal spaces, and all that it was considered an obstacle to safeguard the image of the city.

A story in pictures that begins with the observation and description of the place and then develops through the interpretation and representation of places. The story of the city in its real state / current is entrusted to the digital tools of visual communication and spatial representation, such as photography, digital graphics and video.

The construction of images (constructive matrix), expressed through the composition of the data and testing the relationships between architecture and world of media, which represents the central moment of the search path, where the architecture is the protagonist of a knowledge process aimed at the redevelopment and enhancement of the rich and complex architectural and urban heritage, implements existing documentation and provides new data and elements to communicate and suggesting new design strategies.

Starting from real situations, from the complex and unresolved areas of the town of Ruvo was possible to realize structured models of cities that can become conceptual forms, within which to test their skills and creative expression, looking for a new image of the city and was possible to process graphic and visual material and going over the threshold of recognition between real and virtual.

In the constructive matrix is addressed the relationship between architecture and digital environments where the drawing is the "place of learning a new system of cognitive values and creative" [12] and represents the main tool to understand and describe reality, designing the transformation and communicate the ideas underlying it.
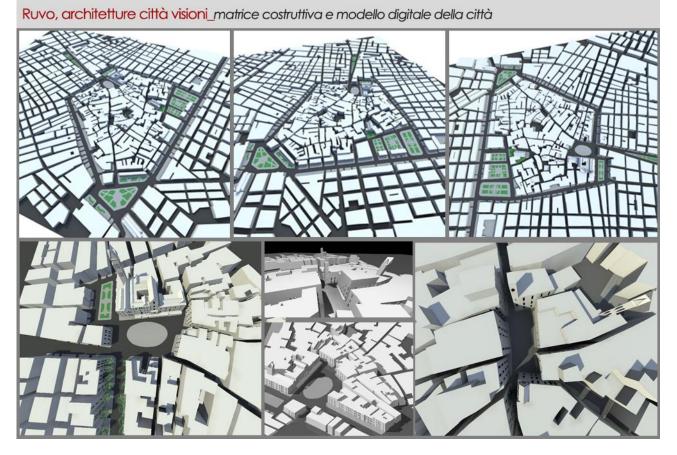
Fig. 2: The matrix construction and the digital model of the town of Ruvo - Thematic graphs entitled: Ruvo, architecture, city, visions. (Drawings produced by Pietro Lavalle in the degree thesis in Building Engineering at the Polytechnic of Bari - supervisor prof. arch. Verdoscia Cesare).

The story of the city has established a process of building and texturing of the environment modeling which has generated new visions, reconstructing that space with buildings, surfaces, objects, etc. through photomontage and solid modeling operations.

And it is here that the representation is equivalent to the thought, to the idea. In this radical form of graphic processing the idea of transformation is contaminated by the medium of communication, in which digital images hide disturbing elements and show new events in a continuous movement that reproduces virtually the action and simulates the perception.

In this contest are born the "Urban Visions", telling the city not only through plants elevations and sections, but are aimed at mending interruptions, interrupting serial elements, reconstruct missing parts, replace with other objects, fill voids, free space, insert new objects, to shape light and color where there is not, and suggest activities.

Some of these operations are extreme acts, but all aimed to suggest possible strategies of composition and design and encourage debate. We operates on the surfaces, spaces, shapes that allude only to the content and whose vision is postponed to a possible, future execution phase of the project.

The process of transformation of some urban areas studied, ends in the interactive and multimedia matrix in which the designer, after some considerations relating to the specifics of the project and compared to the communicate ideas, takes on the role of director of complex system of data, result of the previous stages. The choice of medium of communication shall submit the draft to the verification and delivery it into the hands of those who will move into that space.

New visions of the city are told through the development of communication projects that see video as an expressive tool of great potential and that fit well with the objectives of the project, as it allows the viewing of a work in its context and in its possibilities of use.

Fig. 3: The matrix construction: the new image of the city through the operations of photomontage - Thematic graphs entitled: Ruvo, architecture, city, visions. (Drawings produced by Pietro Lavalle in the degree thesis in Building Engineering at the Polytechnic of Bari - supervisor prof. arch. Verdoscia Cesare).

It includes, summarizes and updates the traditional methods of describing the architecture in a format better suited to the media immediately understandable. The video tells a plot, an urban plot, where the plot term is not random because it is intended both as a narrative of one or more events as well as texture of the built.

Telling a story yet to be discovered is define, perhaps, among the many possible, to suggest other stories by visual stimuli.

Measure yourself with the video and the language of film applied to the theme of the city and the representation of architecture suggests new questions and opens up new themes.

The merger between the different languages of graphic communication and the representation of architecture, of the urban space and landscape, generates an additional language, an space between real and virtual full of content, capable of exteriorize the messages of the project you want to communicate and at the same time tell a story, an event, a past situation or futuristic.

The design of the city as it was described collects all the stresses and inputs dictated by the analysis of the built, added to the predictions of the project and opening the new spatial configurations. The result is a superposition of complex images computer-generated, a concise and intelligent composition of elements ranging from preliminary sketches of the project, to the virtual model, from photographs to technical drawings, from rendering to the photomontage.

This drawing aims to reach all the recipients of the project, offering an immediate approach to content, to the message and the realization of the project. Makes the architecture more understandable not only because virtually reproduced in the figurative sense, but also because it reinterprets it in terms of a story in which the power of visual communication submitted the projects to the attention of the people in visual form.

The research, ultimately, attempts to answer the need for improved communication among engineers and between them and the future users of the project: consider, for example, to participatory planning and the enormous difficulties that the people involved in the process once given the go-to forums, roundtables and debate on the issues. The question is to facilitate the transfer of information from one category to the other without that the process is depleting or risks not to be considered in all its aspects.

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On the connotation of the word "ksour" in the Mediterranean

Marinella ARENA,
Università degli Studi *Mediterranea* di Reggio Calabria
e-mail: marinella.arena@unirc.it

Abstract

The Arab word "Ksour" is widely diffused throughout the "Limes arabicus" and the "Limes africanus" amid the coasts of the Mediterranean Sea. "Ksour" indicate different kinds of earth constructions. Leading academics have studied the etymology of the word "ksar" and its variants: qasr, gsar, qsar and qsayr.

"Ksour", for some, is perhaps borrowed from the Latin word "castrum" or from the Greek/Byzantine word "κάδτρου"; for others, it derived from the verb "qasara" (singular) or "qusur" (plural).

This research tries to verify, through objective data, the true meaning of the word "ksar" and their common elements.

The employed methodology includes an analysis of some cross-cutting issues related to land management and landscape:

1. Location of Limes during the Roman occupation: Finding" ksour" inside the "Limes Africanus" and the "qsar" within the "Limes Arabicus".
2. Identifying the natural characteristics of the territory: the topographic and hydrographic conditions.
3. Analysis of the typological system and construction techniques.
4. The cultivation of wheat in the Mediterranean

This study aims to produce a reference system where previous findings and future studies can be combined, in order to pass on tangible and intangible evidence within these areas, establishing a comprehensive circle where knowledge could lead to architectural recovery and the revitalization of territories that we were once thought to be abandoned.

Keywords: Mediterranean, ksour, Berber, Limes, the cultivation of wheat in the Mediterranean
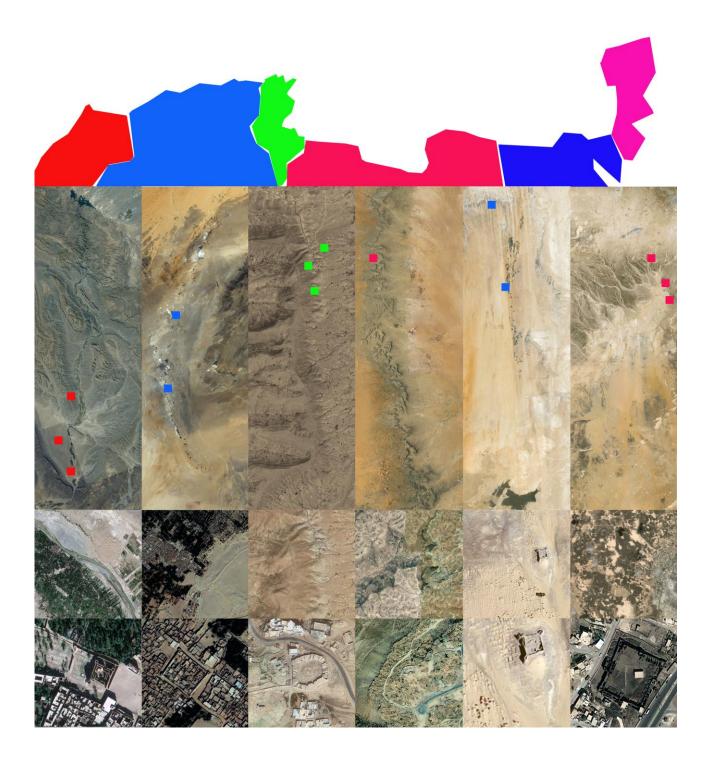
Figure 1: The topography and position of water resources within "Ksour" territories. From left to right: Ksar,Tamegroute in Morocco, Qasr, Tamemitit in Algeria, Ksar, Boujlida in Tunisia, Qsar, Kabau in Libya, Qasr, el-Labeka in Egypt and Azraq in Jordan.

1. Introduction

The Social and Economic condition of North Africa is in great turmoil. European governments have mostly dealt with the transition of these states from colonies to sovereign states. The economic crisis that has recently hit Europe has plagued many already fragile economies, including Egypt and Tunisia. The new air that one breathes in the Maghreb leads, on the one hand, to the vindication of Islamic values, not always recognized cultural identity and on the other, mocks at countries and cultures often disgraced by corrupt governments and patronage practices. All countries in North Africa are represented in Europe, and in particular Italy, a cultural and economic shore. Historically, Maghreb was a place of cultural and religious exchange, with a history interwoven with that of the southern Mediterranean, where traces of a common past resurface in many aspects of daily life: language, place names and architecture.

The policies that new governments are preparing to re-introduce in these areas should not ignore an in depth analysis of available resources.

This study aims to systematically analyze an aspect that, for different reasons, has often been overlooked: spontaneous architecture interrelated to exploitation of the soil. The census and analysis of indigenous architecture, popular in rural areas far from the coast and often made of clay, should be a priority for sustainable development in economically depressed areas. In fact, some government organizations on the Southern shore (the Southern Developmental Board "ODS" in Tunisia, or the Morrocan Ministry of Agriculture with the Marc Vert "Green Marocco plan") have made the development and promotion of these areas their primary objective. On the north shore, The European Union, frequently promotes initiatives to support economic and cultural cooperation between countries facing each other on the shores of the Mediterranean.

In this context it seems useful to provide government organizations, who work in this field, with an objective documentation on the condition of the places and some details on spontaneous architecture which together give a measure of the material and immaterial components of these locations.

2. Roman Limes

In the Maghreb, Egypt and Jordan, examples of" ksour" architecture are commonly found. The Arabic word has many variations due to transliteration or Arabic dialect: qasr gsar, qsar, qsayr. The term could be a derivation of castrum originally from Latin. In actual fact, Roman limes have been documented in the areas of interest and in its fortified buildings, castrum or castles.

This research attempts to verify, using unbiased data, surveys and time analysis, the connotation of "ksar" and the differing common elements. In some regions examples of "ksour" are fortified granaries (Libya and Tunisia), in others they are real citadels (Algeria and Egypt) and in other cases they are still private residences (Jordan). (Fig. 2)

The adopted methodology includes an analysis of some cross-cutting issues related to land management and landscape:

1. Location of Limes during the Roman occupation: Finding" ksour" inside the "Limes Africanus" and the "qsar" within the "Limes Arabicus".
2. Identifying the natural characteristics of the territory: the topographic and hydrographic conditions.
3. Analysis of the typological system and construction techniques.
4. The cultivation of wheat in the Mediterranean

This study aims to produce a reference system where previous findings and future studies can be combined, in order to pass on tangible and intangible evidence within these areas, establishing a comprehensive circle where knowledge could lead to architectural recovery and the revitalization of territories that we were once thought to be abandoned.

Figure 2: Location of the "ksour" in relation to Roman territories and Limes.
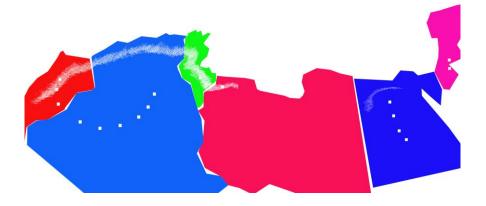
Figure 3: The principal exigency mountains and the placement of "ksour".
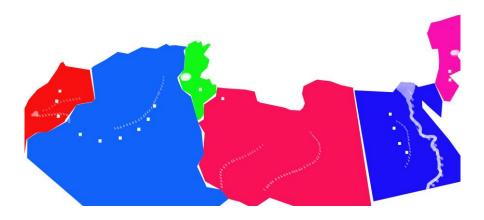
Figure 4: The main water resources of the region.

3. Identifying natural characteristics of the territory: the orographic and hydrographic conditions

3.1. Orography

The Atlas Mountian range characterizes the entire North African orography. The mountain range is divided into small Atlas, Telliano, and the great Atlas, or Saharan Atlas. The first runs along the Moroccan and Algerian coast and merges into the Medjerda mountains in Tunisia. The second, Saharan, is separated from the small Atlas, Telliano by a regular succession of folds grouped into clusters which include the "Ksour", Amour, Zab and finally Aures mountains.

The Atlas mountains spread from the west to the east and create a barrier between the African coast and the Sahara desert. The orographic structure of this mountain range, climatic conditions and anthropological environment have made it the ideal location for the Berber population to build their fortified villages. The Berbers, or more accurately, the "Amazigh" meaning "Free people", are indigenous, semi-nomadic or sedentary, and speak Tamazight. Despite repeated Arab invasions, the Berbers managed to maintain a certain degree of cultural and social autonomy which they have now lost, due to Colonial influences and regimes.

The geographical location of "ksour" does not always coincide with the Atlas Mountains. In actual fact, "ksour" in Morocco are located in the deep valleys of the rivers, such as the Draa. In Algeria, "Ksour "follow the contour of the Atlas Mountains but they are also present further south in the vast desert areas of the M'Zab Valley. In Tunisia and Libya, "ksour" occupy the slopes of the Djebel Demer whereas in Egypt, "ksour" are present in low depressions parallel to the Nile.

By means of aerial photographs it is possible to evaluate the orography of each area: in some cases desert plateaus clearly separate one area from another, in other cases, the measurements have a complex morphology such as Morocco, Tunisia and Libya. (Fig.1-3)

3.2. Hydrography

The aerial photographs also illustrate the river system. On the plateaus of Jordan it is possible to locate the course of water channels that are now dry. In Algeria, it is possible to follow the path of the ganat (underground aqueducts) that carry water from the slopes of the mountains to the valleys or directly to "ksour". It is only under rare circumstances in the Moroccan valleys that water flows to the surface. The quantity and quality of water supply is determined by certain geological factors such as altitude. Moroccan "Ksour" are typically found between 1200 and 600 meters above sea level, while the Egyptian" Ksour" vary from between 50m to 200m. It is important to note that "ksour" are located between 25 and 32 degrees parallel and therefore belong to a very specific climate. (Fig.1- 4).

4. Analysis of the typological systems and construction techniques.

The material culture of the indigenous people of Maghreb, has been the subject of numerous studies which have examined the aspects of anthropological and sociological neglect and in many cases, the relief and representation of artifacts.

The research group I belong to has completed several major campaigns over the last ten years and intends to do further analysis in the Draa Valley in Morocco.

Typological analysis as an approach only hinted at here, can show the relief of around seventy "ksour" situated between Jordan, Tunisia and Morocco. The analyzed "Ksour" belong to different regions and have very different dates for example, some go back directly to the Roman period and others have been made within the last 200 years. Despite this, they are still all classified as "ksour".

The research objective is to single out any common elements that the "ksour" may share. In other words, try to figure out whether the common name hides a cultural and typological continuity between Roman defensive architecture, the spontaneous architecture of the people of Maghreb and the castles of the Umayyad in Jordan. The comparison aims to evaluate these complex elements in order to verify the influence of geographical context and socio-economic and anthropological aspects.

4.1. Typological System

From a typological view point, the planimetric area is very simple: a rectangular perimeter defined by four corner towers. The smaller structures are square while the larger may have a more irregular pattern with rectangular or square towers. Exceptions to this are Tunisian and Libyan "ksour" which often have an irregular form dictated by uneven terrain. The more modern Tunisian "Ksour" are built on plains but resume a square shape that recurs throughout the homes and mosques of Maghreb. It is worth mentioning that even a very old barn like "Ksar", Gattoufa has an original square core.

One of the most obvious variants is the morphology of the turrets.

In Moroccan "Ksour", the tower has a standard dimension, 3 m by 3 m, with a pass of 25-30 m. In Algerian" Ksour", the area between the side of the tower and the perimeter wall is usually larger: the turret is around 2-3 meters while the wall can reach up to 50 meters. The more established "ksour " have a smaller overall size. Each "ksour" is 25 metres and the ratio between the wall and the tower is similar to that of Morocco, for example the" ksar" Adar. Other established "ksour" are not square because they have adapted to the conformation of the ground. This is the case of the "ksar" Irhzer, where there are also cave dwellings.

In Egypt the "ksour " are small or isolated outposts in the desert or citadels in the oases that develop parallel to the Nile. In typology, they are very similar to Moroccan "Ksour", although in some cases, the turrets are rounded.

In Jordan, as well as Syria, there is a return to the square form. Some" Ksour" were Roman forts, as is the case of Azraq or Hallabah, while others like Mushatta and Balqa are palaces. The size and treatment of the turrets illustrate the difference between a fort and a palace. In the fort, the towers are square while in the palace, the size of the turrets are reduced to become decorative counterforts, 2 metres in dimension and with a semicircular plan.

From the research carried out so far, we can draw upon the conclusion that the following factors are common typological elements: closed structure; defense position; protected access by a door and the presence of towers or bastions.

4.2. Construction Techniques

The construction techniques of spontaneous architecture are strongly linked to local resources. In the Draa region and that of Dudes and Ziz the quality of the soil and the presence of water led the local people to use clay. The Moroccan "Ksour" of the Middle Atlas are mostly made using the pise technique, this makes them particularly vulnerable to diverse weather conditions and lack of maintenance. In this region vast palm groves are present which allows the inhabitants to utilize palm trunks for their interior ceilings. In more arid regions, such as Libya and Tunisia, where the desert is made of stone and the presence of wood for the construction of framework is rare, the ceilings of the buildings are made with architectural coverage "Vaults". In Jordan, the construction technique makes ceilings using stone slabs while the supporting walls are constructed with rubble masonry. In some cases, for example Mushatta and Al Tuba, the Persian influence led to the construction of vaults in adobe building materials, using an inclined substructure.
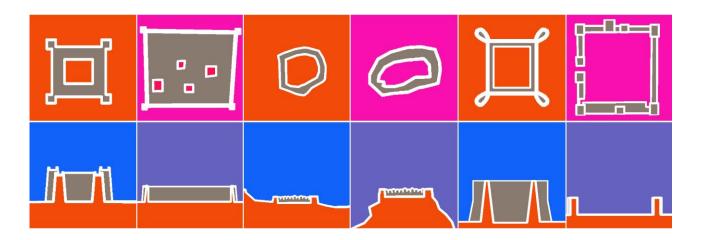
Figure 5: A typological plan and section of various examples of "ksour": From left to right, a Moroccan "Ksour", an Algerian "gsar", a Tunisian" ksar", a Libyan "gsar", an Egyptian "qsar" and a Jordanian "qsayr".

5. The cultivation of wheat in the Mediterranean

There are basically two types of Roman settlements in the Maghreb created to protect the "Limes africanus": "castrum" and castles. The former are large, fortified settlements which reflect the structure of the Roman city. The latter are small and isolated fortified structures designed to protect the Limes and the encampment. Often "castrum" were transformed from temporary housing made of tents into real towns with secure housing, markets and spas. Inside the "castrum" was the granary, whose structure, from a typological point of view, was very similar to the Moroccan.

The theme of wheat and its cultivation and preservation is strongly linked to "ksour", if we consider the term "ksour" to stand for the first buildings created to protect the Berber population and their crops.

6. Conclusion

From initial investigations we can draw some conclusions in relation to the term "ksour " and the quality of architecture of the Berber population in Maghreb. The cases analyzed throughout this study show continuity in their typological composition: "ksours" are closed, defensive, quadrangular structures often with towers. Moreover, "ksours "are mainly fortified farms and so the term can certainly be attributed to Roman domination and the presence of the Limes.

In fact, in other areas, such as the Moroccan Anti-Atlas range, the fortified granaries take the name igouar or agadir in the singular form.

"Ksours" are however, predominantly defensive structures commonly made by the Berber population in the
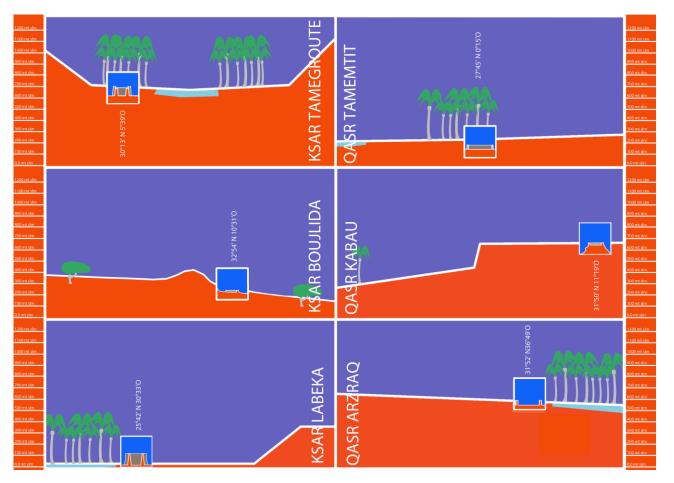
Figure 6: pattern of land on which they insist ksours: From left to rightksar Tamegroute Morocco, Algeria Tamemtit Qasr, ksar Boujlida Tunisia, Libya Qsar Kabau, ksar Labeka, qsayr Egypt and Jordan Azraq.

Atlas mountains. Nevertheless, local governments have only recently begun to recognize the cultural and social importance of the Amazi.

The process of systematically cataloging "ksour" could facilitate the monitoring of these territories and be the driving force behind the recovery and conservation of architectural heritage and landscape.

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Jordan's Umayyad Qasr: variation of invariant features

Paola RAFFA
Dipartimento di Architettura e Analisi della Città Mediterranea, Facoltà di Architettura,
Università degli Studi *Mediterranea*, Reggio Calabria, Italia
paola.raffa@unirc.it

Abstract
The Umayyad Palaces are the first example of civic muslim architecture. In the geographical area that includes Syria, Jordan and Palestine, sources report more than fifty examples of monuments. These monuments have similar typological and functional features. Know as "desert palaces", in Arabic, Qasr, these monuments testify of a typological system based on principles of rational organization of the space, geometric structure of the form, repetition of modular elements, frescoes and stucco decorations. They are an example of innovation, technical and functional, as they represent the synthesis of expressions and combinations of all architectural forms inherited from a pre-Islamic past. The Mediterranean influence is recognizable in the "Roman villa" layout style. Techniques and functional subdivision come from the Byzantine features. Ornamental and decorative art was adopted by Sassanid style. Qasr are one of the elements that compose larger settlement complexes, of which they are the residential built of the aristocratic power. The other elements are crushers, mills, granaries, dams, canals and elaborate irrigation systems, evidence of a flourishing agricultural activity. Other elements are baths and mosques index of the practice of the new religious cult, and in some cases sporadic residences subordinate. Each element structural, functional or formal is repeated in each monument; the different combination of elements constitutes the single variant. The architectural survey of Qasr Hallabat, Qasr Kharranah, Qasr Mushatta and Qasr Qatrana, compared to other examples in Syria and Jordan, compared with other palaces of Jordan and Syria shows that all monuments were designed and constructed by reference to accurate rules of layout and facade scheme. Along with a common type of plan: a square plan with a central courtyard surrounded by rooms; the exterior walls have circular or square corner towers.

Parole chiave: mediterranean heritage, architecture, qasr.

1. Architectural Heritage

The Umayyads palaces represent the first example of civic Muslin architecture. In the geographical area that includes Syria, Jordan and Palestine, sources report more than fifty examples of monuments. These monuments have similar typological and functional characters. Knows as "desert palaces", in Arabic, Qasr, these monuments put evidence on a typological system based on principles of rational organization of the space, geometric structure of the form, repetition of modular elements, frescoes and stucco decorations. They are an example of technical and functional innovation, as they represent the synthesis of expressions and combinations of all architectural forms inherited from a pre-Islamic past. These are combined and tailored to the needs of life of an rising society that changes its own way of life according to religious practices. The influence of Mediterranean style is recognizable in the Roman villa layout style. Building techniques and functional subdivision come from Byzantine characteristics. Ornamental and decorative art was adopted by Sassanid style: geometric patterns alternate in rhythmic harmonies, interweaving and swastikas, round and octagonal rosettes and moldings in a zig zag. On the current hypothesis that the extra-urban Umayyad's palaces were "luxuries seasonal residences of the aristocracy" Paolo Cuneo opposes the assertion that these settlements were fortified agricultural farms, of the Byzantine and Roman characteristics. "Of these they adopt the axial and symmetrical floor plan, and the compactness of the enclosures wall reinforced by cylindrical towers [...] while the layout and construction of the towers and the

decorations are taken from Sassanid models". According to Cuneo the contribution of the Umayyad inventive lies in the union of "these different elements". Oleg Grabar mentions about fifty buildings scattered throughout the suburban area of the Umayyad Empire, built by Sultan Al Walid I (705-715 AD) and his successors. Some of these "buildings were erected outside the main urban centers", others were in semi-desert areas, but most were distributed in "areas permanently cultivated and were all part of large agricultural establishments" (Oleg Grabar).

2. Type and function

Qasr are one of the elements that compose larger settlement complexes, and they represents the residential center of the aristocratic power. Other elements are crushers, mills, granaries, dams, canals and elaborate irrigation systems, evidence of a flourishing agricultural activity. Other elements are thermal baths, mosques and house. The typology of Umayyad Qasr is structurally defined and unambiguous: a square plan with a central courtyard surrounded by rooms or more structured spaces; wall fence reinforced by square or circular, corner towers. The primary function is residential, and as mentioned, they are part of an agricultural type of settlement complexes of which they are the house of aristocratic and government power. Each element, structural functional or formal, is repeated in each monument; the different combination of elements set up the different variant. It is possible to identify two categories of palaces. If the palace is a single unit, the type is a central courtyard surrounded by a portico which distributes more or less extensive local, whose functions are independent on the size and shape. "The main residential unit was a square building, usually of about seventy meters in length. From the outside it seemed a fortress with massive corner towers, a variable number of semitorri on each side and a single entrance. But fortified appearances was only an appearance and unlikely corresponded to some military function" (Oleg Grabar).

Qasr Hallabat, Qasr Hair al-Khaf, Qasr Al Azraq and Qasr Bshir present system of fortified walls and square corner towers. In Qasr Khirbat Al Mynia, Qasr Kharannah, Qasr Al Hair Al-Gharbi the angular towers are cylindrical, and there is the presence of semi-towers leaned to the side walls also when the development in length of the tape wall has small size. The plan layout is always the same: a monumental entrance, a reception room, a mosque, thermal bath, residential area. The monumental entrance is placed on the median axis of the plan square, it is always announced by a large doorway surrounded by the double colonnaded.

It is a hall composed by one or more rooms that are disposed in succession up to enter the central courtyard.

Fig. 1: Umayyad Qasr.
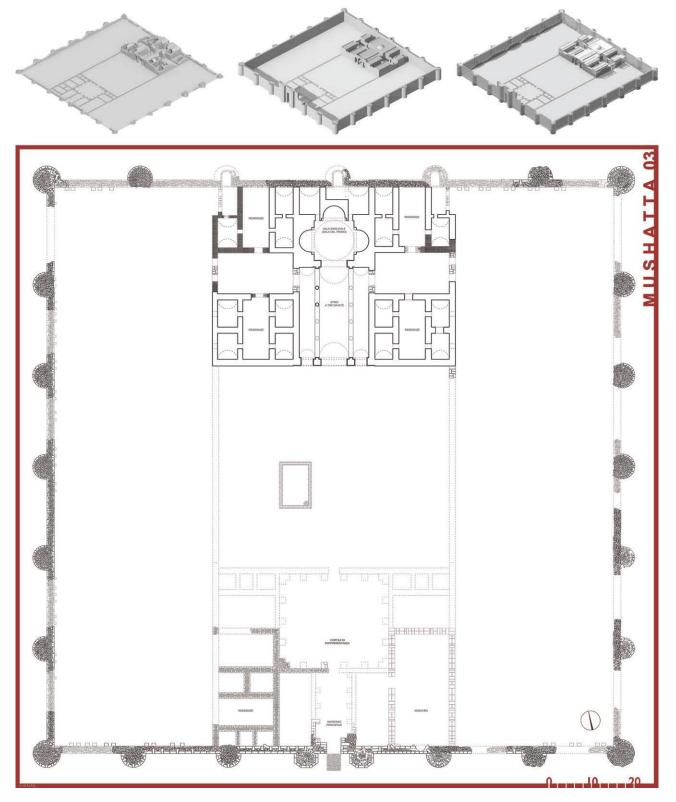
Fig. 2: Qasr Mushatta: plan. (drawings by: G. Luccisano, G. Granieri, E. Morano, M.C. Laurora, M. Fallica)

Sezione D-D'
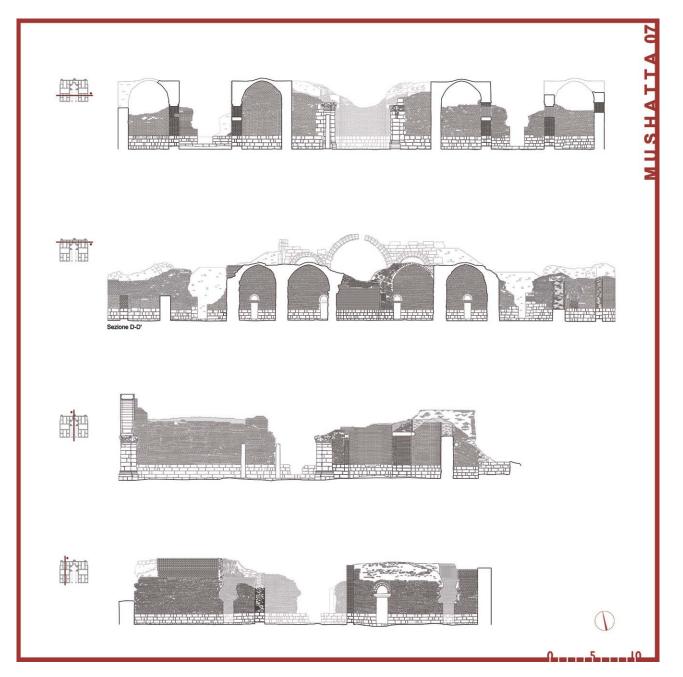
Fig. 3: Qasr Mushatta: sections. (Drawings by: G. Luccisano, G. Granieri, E. Morano, M.C. Laurora, M. Fallica).

PROSPETTO SUD

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MURA DIFENSIVE
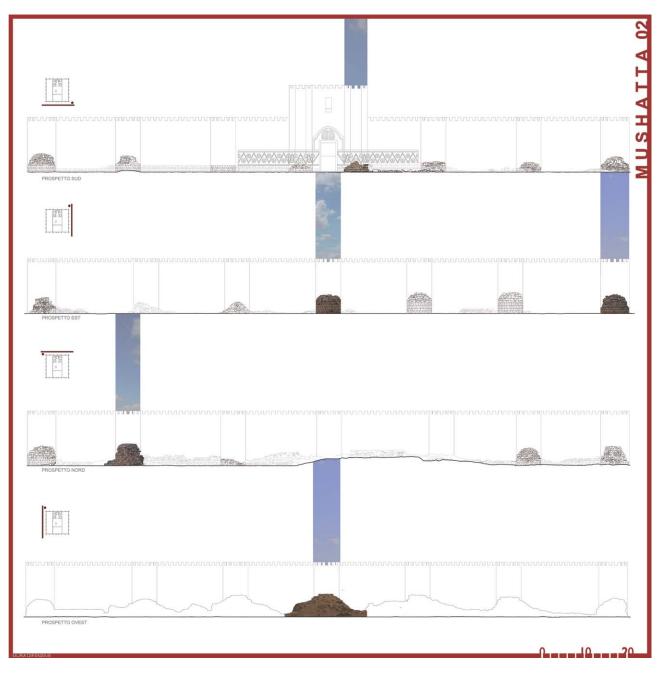
Fig. 4: Qasr Mushatta: facade. (Drawings by: G. Luccisano, G. Granieri, E. Morano, M.C. Laurora, M. Fallica).

Entrance to the palace has the specific function of waiting room; for the subjects asking audience to the prince, or traders who traveled the caravan routes, etc. afterwards these were officially received admitted in the "throne room". The courtyard is a distributive area, it organized the access to different rooms. The presence of the mosque in the building confirms the new religion of the Ummayyad's dynasty. In small palaces, the mosque is usually an external building, located near the palace, or in the case of Qasr Al-Azraq, it is located inside the courtyard. In Khirbat Al Qasr Mynia the mosque is inside the palace, it is a room on the left of the entrance; here is obvious the derivation of the Byzantine chapel inside the palace. Another element always present is the thermal bath. These units, of Roman origin, can be internal or external to the buildings. In the case where the palatium is a large settlement, a real citadel, it is composed of several units side by side but independent of each other, all enclosed just one fortified wall system. It repeats the central courtyard type, which contains smaller units: housing, independent of each other, they do not ever look directly into the central courtyard, but through chicane entrances that reach secondary courtyards around which are distributed small rooms.
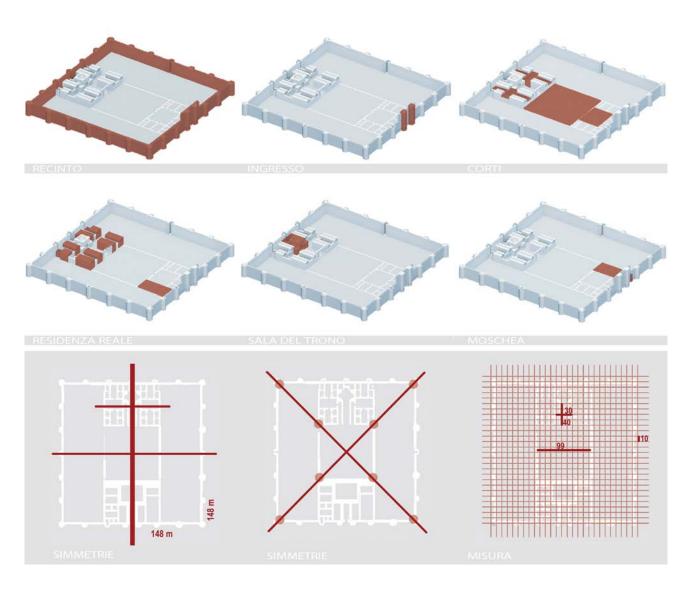
Fig. 5: Qasr Mushatta: plan proportions. (Drawings by: G. Luccisano, G. Granieri, E. Morano, M.C. Laurora, M. Fallica).

In the case of Qasr Hair Al Sharqi there is four symmetrical entrances, placed on the median axes of the square plan, that reach the central courtyard; they are placed side by side to the entrance tunnels and facing to them there are eight square blocks with central courtyards. The tripartite scheme of Qasr Mushatta expresses the same composition. While in the case of Al Qasr Mafjar two courtyards split residential rooms from semi-public spaces, the thermal bath, the piscina, the mosque. If these buildings are cases of adaptation of a new lifestyle to a "vocabulary of preexisting forms " as claimed by Oleg Grabar, we can think that the Umayyad palaces are accurate architectural compositions that accept architectural standards derived by a detailed knowledge of Roman, Byzantine and Iranian architectural code.

3. Geometry, rule and proportion

The careful graphic drawing of surveys of Qasr Hallabat, Qasr Kharranah, Qasr Mushatta and Qasr Qatrana executed in the month March 2011 shows the state of conservation of these monuments; some of which recently have been restored. The architecture analysis performed on schematic models, compared with other palaces of Jordan and Syria, shows that all monuments were designed and constructed by reference to
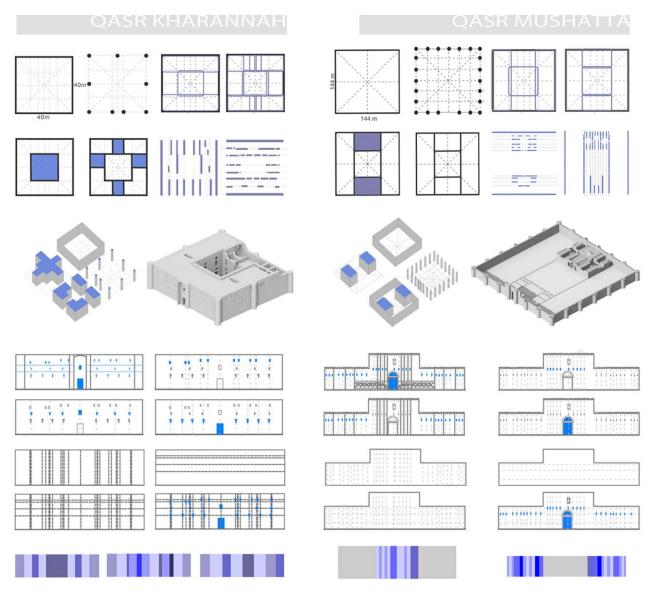
Fig. 6: Geometry, Rule and Function: Qasr Kharranah and Qasr Mushatta (Drawings by: G. Giaimo, S. Firrito)

specific rules of layout and facade scheme. Regular geometric patterns of squares organized symmetrically without any preferential direction or orientation. Rigorous observance of geometric rules, intersections of median and diagonal axes of the shape-generating: the square. Subdivision in modules, submodules and double-modules; repetitive basic architectural unit cadences; symmetric axes accentuated by size, shape and position of the part. The measure is organized on the cubit (57.66 cm), plans are 35, 70 or 140 meters long. Qasr Mushatta is divided in three equal section. This section is further divided into thirds part. A colonnaded hallway conduced into a triple iwan. The facade consists of a zigzag pattern creating a panel of triangular forms. The plan of Qasr Karranah (36.50x36, 50 m.) is a tripartite square: two modules of 9 cubits external include 4 modules of 5.60 cubits of the central courtyard. 4 cylindrical corner towers locked the basic square while a semicircular tower on each side marks the median axis of symmetry, that, however does not correspond to anything important inside element. The same pattern is present in Qasr Khirbat Al Minya (73x73 m.) and in Qasr Al Hair Al Gharbi (70x70 m.); in these two cases the size of the court in larger than the built part. "Beyond elementary measurement and the establishment of the most basic modular principle of designing [...] There is a combination of a set of buildings from a restricted period of time, in a relatively limited space, and with a more or less same patronage "
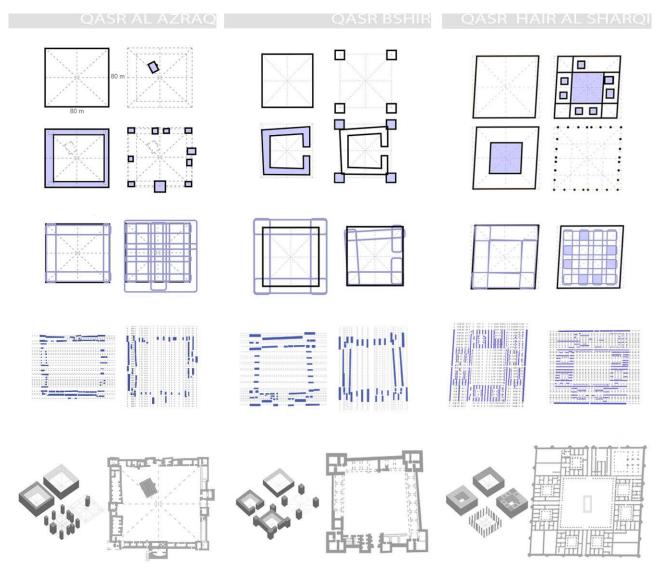
Fig. 7: Geometry, Rule and Function (Drawings by: G. Giaimo, S. Firrito).

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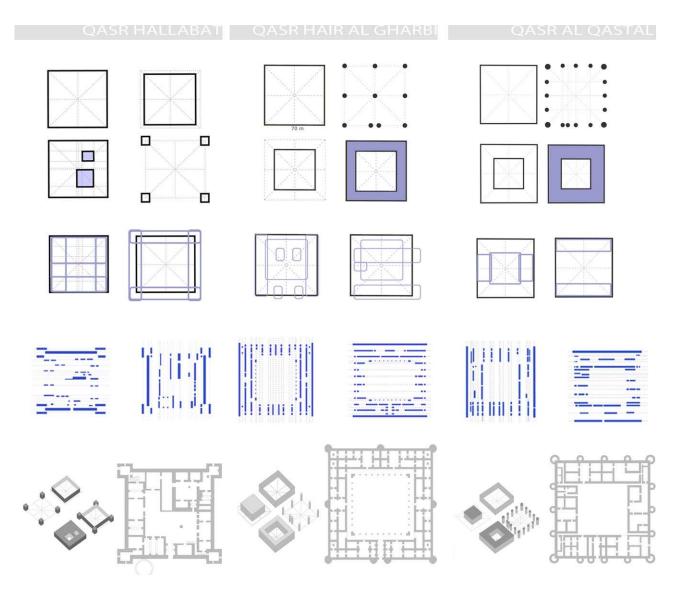
Fig. 8: Geometry, Rule and Function (Drawings by: G. Giaimo, S. Firrito).

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Note: the drawings here published were developed by students of Corso di Rilievo e Rappresentazione dell'Architettura Mediterranea (Laboratorio di Sintesi Finale "Città Mediterranea") conducted by Massimo Giovannini whit Marinella Arena and Paola Raffa. Surveys of Qasr Hallabat, Qasr Mushatta, Qasr Karranah, Qasr Qatrana and Qasr Al Amra were executed in the month of March 2011.
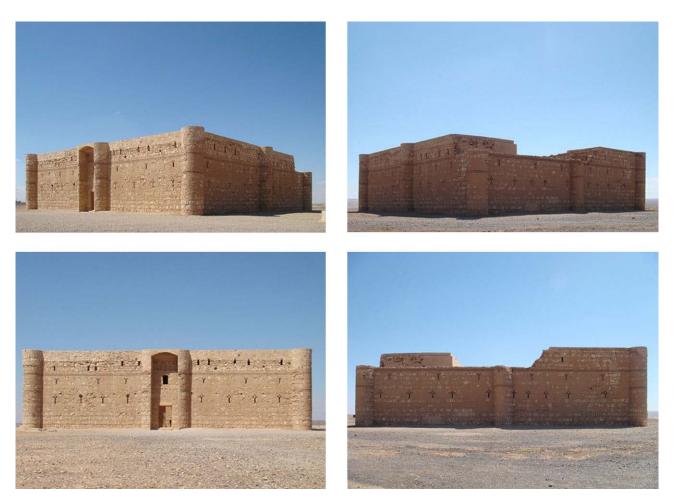
Fig. 9: Qasr Kharranah (photo by Paola Raffa).

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New technologies for the restoration of the modern architecture: the case study of the Church of St. Mary Immaculate of Longuelo

Alessio CARDACI[1], Antonella VERSACI[2]
[1] Faculty of Engineering, University of Bergamo, Italy
E-mail: alessio.cardaci@unibg.it
[2] Faculty of Engineering, Architecture and Motor Sciences, University of Enna "KORE", Italy
E-mail: antonella.versaci@unikore.it

Abstract
The Church of St. Mary Immaculate of Longuelo is one of the most interesting and representative works of the Lombard architect Pino Pizzigoni. This project, which construction began in 1961, was founded on technological innovation assumptions and characterized by a space covered by reinforced concrete thin-shells supported by inclined pillars. The formal configuration of the Church was set in close connection with its religious significance; New Testaments words and meanings were translated by the architect into a building design. From a formal point of view based on a hyperbolic paraboloid, the interior is characterized by an enveloping space emphasized by the light penetrating only from tall windows and inspiring visitors with a deep sense of the sacred. Today, more than forty years after its construction, the geometry of this prestigious example of modern architecture remains almost unknown, understood and/or full accepted by the users. Its forms, sometimes sinuous and winding, sometimes edgy and essential, are affected by many degradation phenomena and lowered by several posthumous interventions (due to new liturgical requirements) not always fully respectful of the architect's intentions. Observed through the eye of laser scanner, in a conscious manner directed by the operators (surveyor-restorer), this paper aims at illustrating the spatial complexity of a place that, more than others, links the materiality of architecture to the spirituality of the Christian faith.

Keywords: Restoration of modern architecture, Pino Pizzigoni, 3D Survey, Longuelo.

1. Introduction: the Church of Longuelo and its architect.

A Christian Church is not a physical space in which believers gather to worship. The Church is the community itself that becomes the place where to meet in prayer (in front of the altar of the Eucharist) and listen the Word of God. The ecclesiastic edifice is then built around the faithful, by using forms and shapes that are the expression of theology of the time of its construction. The churches are not for the Christians new temples replacing the Pagan ones, because Christianity is, for the believer, the mankind's wish to come into contact with the divinity, and the figure of Christ represents the encounter between God and the men. Jesus Christ is for the Christians the temple where to profess their faith and the practicing can thus be considered as the "living stone" of this new building. The Second Vatican Council (also known as Vatican II), addressing the Church's relationship with the modern world, has given back to the believer the role of owner of the liturgical action. The Office of the "priesthood" now belongs to the whole community, and it is no longer strictly reserved to the celebrant, so that "all the faithful should be led to that fully conscious and active participation in liturgical celebrations which is demanded by the very nature of the liturgy and is in their right and duty by reason of their baptism". To this end, the "New Liturgy Constitution" of 4 December 1963 has

therefore created a revolutionary model of church buildings, opening the presbytery towards the faithful congregation.

The strong economic growth and urban expansion experienced by Italy in the years after World War II, as well as the need to rebuild what destroyed during the conflict, has produced from the mid-50s and the late 60s of the last century, an impressive number of religious structures, often characterized by the expression of the free creativity of their designers. Drawing a church was the dream of every architect, not for the economic interest which might be connected, but for the professionalism required for dealing with a topic having at its core the spatial materialization of the spirituality. The decision to build new parish edifices was taken by the bishop that, in agreement with the Curia, had free power to entrust the project to an architect enjoying his esteem and confidence. This is the context in which the architect Giuseppe (Pino) Pizzigoni was commissioned to design the church of *Santa Maria Immacolata* in the new quarter of Longuelo in Bergamo (fig. 1). Pino Pizzigoni, closely linked to cultural and artistic world of Lombardy, was a figure having in mind a mature idea of space as well as an important interpreter of expressive languages of his time. The chronicles describe him as a complete artist who used to quote the phrase "without abstracting, we cannot speak or even think." A multifaceted personality, who loved to experiment, both in sculptural and painting fields, through disassembly, deformation, perspective and geometric distortion procedures. The design of this church was for him a *chance* to find the point of synthesis between sculpture and architecture; a challenge in which sacred space could be melt and sublimed in an enveloping structure with a strong plastic value. This in the aim of translating into constructive materiality the Gospel passage - today written on the ambon: "the Word became flesh and made his dwelling among us" (Gv 1,14). The so-called "hut of the Catholic community" has been the last work of Pizzigoni and can be considered the witness of a complex personality, "certainly not *routinier*" and "a way to understand the practice of architecture as a continuous research for a constant overcoming of acquired positions" [1].

2. The Church yesterday and today: history, geometry and desired contradictions.

The construction of the church was initiated in 1961 and in June 29, 1966 it was consecrated by Archbishop Clemente Gaddi to the Blessed Virgin Mary Immaculate (fig. 2). This has been a work characterized by a great structural commitment and desired contradictions, realized through tensor integral structures and tiny vaults, in order to assign it an innovative look having a high impact. The first studies on the reinforced concrete membranes carried out by Pino Pizzigoni date back to 1955, with the construction of the roof of some industrial buildings and of a kindergarten in the town of Monterosso. The tests undertaken on buildings based on simple systems allowed the architect to acquire the knowledge and experience necessary for the design of the church and its structures, which lasted over two years.

The essentiality of the geometric matrix founded on a quadripartite square along its median axis is not clearly expressed; the spatial complexity of the elevations which varies in size and sections depending on the altitude, hides the simplicity of the central plan, albeit slightly modified during the building phase (fig. 3).

Fig. 1: The Church of Longuelo, today.

The understanding of structural system, easily legible in the plan and in design drawings, is not immediate in the spatial perception of an observer who enters the church for the first time. To the planimetric regular division into four parts correspond many reticular trusses separated by joints that hold vaults and tiny frameworks differently oriented, that constitute the coverage and the vertical closures of the church. The complexity of the outer space that shows the articulated geometry of the structures and that imposes itself with "brutality" on the city, is strongly contradicted inside (fig. 4). The intimate space of the church is, on the contrary rather "romantic", rich in rhythmic relationships and free from decorative constraints. Its proportions are marked by changes in the inclination of the reinforced concrete large areas.

Rods and nodes are in the church interior transformed into surfaces in *béton* brut, along which runs the light coming from small white glasses. The atmosphere of understated simplicity has been researched by Pino Pizzigoni through a coherent use of the materials: this is particularly evident in the chancel where the great Madonna stands out from the grey walls thanks to its light color. The huge work of art realized by geometric elements engraved in relief, with the exception of the faces of the Madonna and the child figuratively made (attributed to the former student of Pino Pizzigoni, Dietelmo Pievani, but that recent studies endorse to the same architect) rises to 11 meters in the pyramidal space of the apse's sail, "abusing" of the sacral space.

The church design project was born from the drawing, considered by the architect as a tool to understand and communicate - to-himself and to the others – the thoughts on his mind. For Pino Pizzigoni, the design was the place on which to elaborate the idea and test the project: "by drawing, I'm getting used to think about what I want to say and not to the elegance and the drafting style of the design". The drawings made for the church of Longuelo are quick sketches, made on common/casual sheets of paper just to halt by the line, any impromptu inspiration; each new design was the evolution of the precedent on which new ideas were refined.

The preparatory drawings of the church project came one after the other and run wildly after each other because when the sign appeared on the paper, the mind of Pizzigoni had already gone further, creating in him the need to steal a blank space to stop new thoughts before they flew away. The architect was used to date and initial any sketch, even the most insignificant ones, not in the aim of documenting the history of the work but to draw a map of its changes, to assess its evolution step by step and even to go back and take other paths (fig: 5). Even the use of perspective, who he taught for more than thirty years at the *Accademia* Carrara in Bergamo, was functional to the understanding of the spatiality of the project, to think about the unresolved issues and then to solve them. The design idea was investigated both with quick doodles made by pencil and with fine collage taken from the redesign of the maquettes' pictures joined with touches of color (fig: 6). The drawing combined with the use of scale models was used by the architect for the control of the project as well as to test the spatial construction and to verify its structure. The models, made of wood, cardboard or nylon, and brass for the countercheck of the curvature of surfaces in the space, was a means of control not only volumetric, but also aesthetics (fig. 7).

The construction site did not follow an easy process because of the geometric complexity of the project and the difficult construction of formworks. In particular, it was difficult to recreate in the reality the exact surfaces and curves of the model, forcing the designer and the building company to make continuous changes in order to place the containment structures of the shells [2]. The real geometry and the true size of the church are nowadays still not known both for the lack of documentation and transcription of changes that were made and for the difficulties in the correct spatial positioning of the nodes that were placed and adapted to the capacity of the workers; in certain cases the real curvatures of the vaults are completely unknown as well as the true distance between nodes.
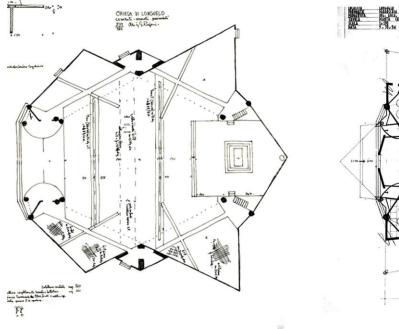
The today's church is very different from Pizzigoni's original design due to the many changes that have been made over the years. The walls are much darker and a faint light of a thousand colors now invades the nave, originally imagined painted white by the architect. Colored light penetrates even from the new framed glass portal made in the 90s by the artist Mimmo Marra [3, 4], replacing the previous gate. The altar has been substantially modified in order to hide the image of the Madonna, considered as a "theological horror" because of its size, larger than that of Christ. Among the last works undertaken there are the confessional and the baptismal font designed by the architect Attilio Pizzigoni, son of Pino who in his interventions, like everyone else, has been able to comply with the architecture of the father. In particular Attilio Pizzigoni has well seized the intentional contradictions in the church design and interpreted them in a modern way. In this sense, he has created a difference between the confessional wall made outside by dark stone to adapt to the concrete walls of the church and inside in light marble to create a reassuring place for receiving and forgive the sins of the faithful. An equal sought contradiction appears in the baptismal font where the pink marble basin harmoniously interacts with the copper sheathing, without screeching in spite of the difference between stone and metal [5].

Fig. 02: The Church of Longuelo in the 60s.
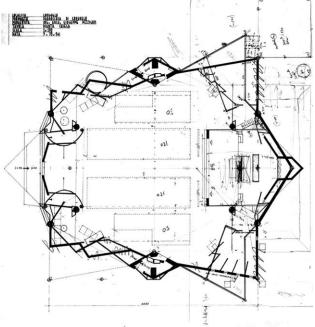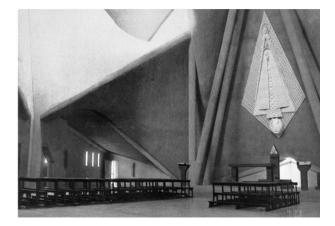
Fig. 03: Church plans: original design (left) and new design with changes envisaged during the construction site (right).

Fig. 04: The Church of Longuelo in the 1960s.
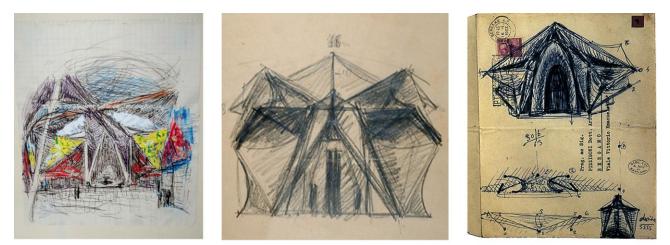
Fig. 05: Pizzigoni's original drawings of the Church.
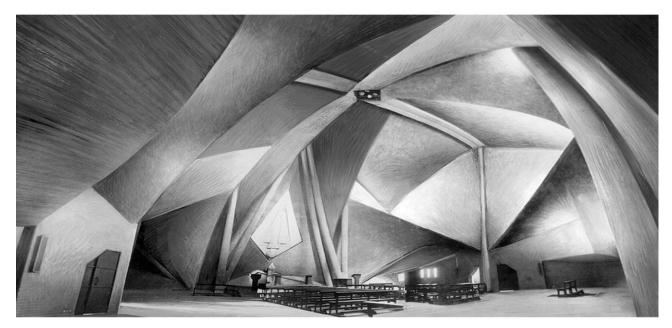
Fig. 06: Interior's photomontage of the Church.
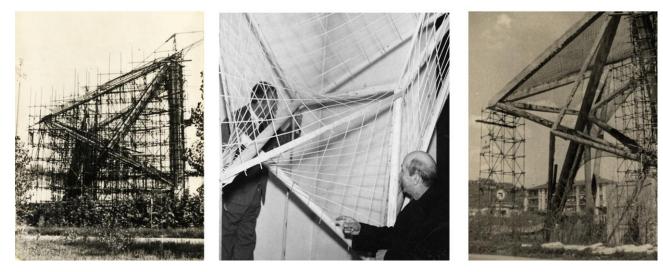
Fig. 07: Model of the study and construction phases.

In the past years, maintenance works have been undertaken on the church but unfortunately they concerned only limited parts of it. Many outdoor areas exposed to the rain are today in an advanced state of deterioration that requires urgent restoration work (fig. 8). The most common problems are related to reinforced concrete structures exposed to the action of rainfall, where the oxidation of the metal bars has caused internal failings of the mortar. However, to establish a conservation project, it is first of all necessary to carry out a complete and accurate survey of the structures that has never been realized. This is what the authors of this work have done through the most innovative methods and technologies.

3. 3D survey for the geometrical knowledge

Today, the use of structured light 3-D measurement system in the architectural framework allows approaching the work of art to be investigated without requiring its prior knowledge. It is actually possible to perceive the architectural space and its environment even in the absence of previous surveys (normally carried out through sketches, pictures and direct measurements) to later really understand them, in the restitution phase. The laser scanning survey is a tool that allows the architect-operator to rejoice with naive wonder of spaces seen for the first time, as a child who is enthusiastic and delighted when something unexpected happens in front of him. It is so that, while the traditional technique forced to the realization of numerous eidotypes to record, from time to time, metric data as well as to annotate the peculiarities of the buildings themselves (i.e. the masonry walls, the characteristics of the materials and their state of conservation), today with the laser scanner is no longer necessary. This instrument gives us the possibility to enjoy the place during the time in which, in an autonomous and automatic way, the instrument makes the job. Laser scanning technology has actually completely revolutionized the practice of surveying for restoration purposes; following the data processing, the point cloud, in addition to ensuring the rapid and complete measurability of architecture (distances, surfaces and volumes) through the definition of plans and cross-sections, allows us to obtain important information related to the structural stability of the building and of its state of decay, providing a reliable and accurate support for the development of the restoration project. Rather than the preparation of the eidotype, it now appears important to plan the survey: the location of bases and support networks, the definition of scanning steps and their resolution, the correct choice of the station points. This in order to obtain a global cloud that could completely cover the building, limiting as much as possible hidden areas.

In the case of architectural elements of highly complex shape, such as the church of Longuelo, the survey project has considered the problems of matching (in jargon, registration) of the individual scans and the need to contain the error within a tolerance of the same order of the instrument uncertainty (e.g. the scanning of a masonry wall must to overlap at the end of recording, without giving rise to two different surfaces located in planes staggered between them). The structural complexity of knots and kinks of the surfaces have also made it very difficult survey operations because of the many shadows and hidden areas visible from any station. The restitution of data measured *in situ* has been made by software based on an advanced form control algorithm that has allowed the overlapping of each scan with a range of tolerance range less than 1 cm. For the purpose of a better use of the algorithm, one of the point clouds has been chosen as reference scan, to keep fixed in the space, and all the others have been roto-translated over it. Several orthophotos related to the cross-sections and elevations have been extracted from point cloud in order to highlight the true geometry of the church so far never redrawn, as well as the possibility of returning the exact plant, complete of all the projected elements. (fig. 9). The continuous model, made up by millions of points, is a source of knowledge only when properly questioned. Excessive information, if not structured and correctly organized, causes the same inconvenience of the lack of information. We need then further elaboration to make use of the acquired metric data: the points cloud has actually to be transformed from a nearly continuous model into a discrete numerical model. This latter can then be considered as a reduced and simplified version of the continuous model, obtained by discretizing only some of the available data, chosen by the operator in an intelligent but arbitrary way. A further simplification arises from the choice of the cross section planes, orthogonal to each other, from which measures are needed. The discretization of the points cloud is then made by cross-sections cut at regular intervals (30×30×30cm): a good compromise in view of the subsequent structural applications necessary to define significant parts of the geometry. The point cloud, so simplified to a grid of spatial curves perpendicular to each others can be used to evaluate the stress state by the F.E.M. (Finite Element Analysis) on the basis of the true geometry for the purpose of a possible monitoring of the structure and the formulation of seismic behavioral hypothesis.

4. Conclusioni

The community of Longuelo has with regard to the church an attitude at times critical. They are frightened and perplexed by the bold geometries that very much deviate from the imaginary typology of sacred space.

Fig. 08: The church, today (outside and inside).
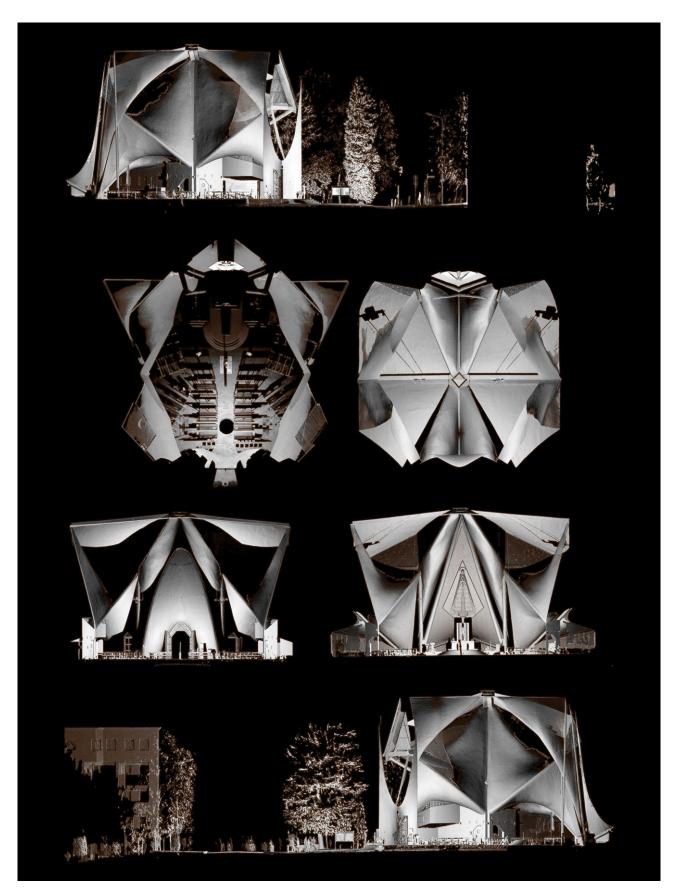
Fig. 09: 3D Survey (plants, cross-sections and front-elevations obtained from point-cloud).

Its position in the urban fabric, the lack of a square in front of the church (it only exists a small *parvis* limited in its dimensions by the presence of the street and trees with large leaves surrounding the lot in the hide), the absence of a bell tower largely considered as a symbolic and representative icon, transform it in an anonymous presence limiting its role of urban catalyst for the communities. The church even today, 50 years after its construction has a certain dignity coming out from its design and construction techniques that continues to arouse attention and interest. Visitors are fascinated more by its forms and architecture than by its sacred importance. The church is a must for scholars of arts and architecture, as well as an attractively destination for the numerous tourists that, intrigued by the information written on the guide-books of Bergamo, decide to visit it (Fig. 9). The church itself is experienced and used as a place for public meetings and conferences that are not strictly related to the sacredness of the liturgical celebrations (Fig. 10).

The originality of the relationship between structure and form, "fundamental in architecture, otherwise the issue of languages is evanescent", reflects the true *raison d'être* of the Longuelo church that is more based on the mathematical model of the structural frame that underlies the project, rather than in the external appearance that of it can be considered a simple consequence [6].

Today, the Curia is very critical towards the project and the architect's inexperience in liturgical setting – the rearward altar, the centrality of the tabernacle, the double ambon- not in keeping with the indication of the 1964 Council, which now make the church unsuitable to liturgical celebrations according to the modern rite. The work of Pino Pizzigoni is instead a significant mark of his genius as he has been able in this work to combine tradition and modernity. The architect has deeply rooted in the project for the church a special sensitivity to "beauty" and a thorough knowledge of the history of art of past centuries The already mentioned contradictions in the relationship between the inside and the outside of the building are the response of his idea to combine the role of tradition with the main concepts of avant-garde architecture. It has accepted the challenge with the great architectural models of the past in creating, in a contemporary way, a complete and coherent synthesis between a classical structure and an experimental spatial construction.

The final judgment on the work of Pino Pizzigoni is entrusted to the local population. The same architect was wondering whether Longuelo was "really art and then architecture, or rather only a construction machine". The same question is addressed to people that one day will give an answer. Will they recognize in this work an innovative value? Will the spatial intuition be recognized by the others and not only by the author? "So if this judgment will be positive, this will certainly say that it is art ... if on the contrary it will be negative, it will mean that the church is only five thousand cubic meters of covered space, useful but not *speaking*. It will thus not to be considered *architecture* nor sacred" [6].

Fig. 10: Lecturing in the Church.

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The perfect proportion

Eugenio MAGNANO DI SAN LIO, DARC "Dipartimento di Architettura", facoltà di Architettura, Università degli Studi di Catania, Catania, Italy.

magnano.e@unict.it

Abstract

The pursuit of perfect proportion has been one of the most dominant themes in the history of Architecture up to our times and, until to day, also if in a less explicit way, it is a dominant theme in contemporary Architecture. We can also state that Architecture itself (which for many architects would be entirely included in the art of architectural composition) is just the research of the perfect relations between different elements, the correct proportion between full and empty –in volumes ad surfaces-, between horizontal and vertical elements, between parallel and orthogonal. The vitruvian *commensuratio* and *simmetria* which obviously had an absolute value, especially in classical Architecture, are willy-nilly, part of our cultural heritage.

Because graphic analysis, that we can make correctly only on original drawings or on careful surveys of the existing buildings, is competence of "Science of Representation", we must define better is cultural role and re-hook this praxis to the age it has been used. It may happen in fact that, pleased for having found a graphic reason of a project, we run the risk to attribute generative way of architectural forms to the author whereas they are only ours and not the author's. The risk is similar to the case of a person that becomes with a greatest case an astrologer after studying old treatises of Astrology, forgetting that Astronomy is the only science which studies stars.

Key words: Proportion, ratio, armonic, rectangle, architecture.

The perfect proportion

The pursuit of perfect proportion has been one of the most dominant themes in the history of Architecture up to our times and, until today, also if in a less explicit way, it is a dominant theme in contemporary Architecture. We can also state that Architecture itself (which for many architects would be entirely included in the art of architectural composition) is just the research of the perfect relations between different elements, the correct proportion between full and empty –in volumes ad surfaces-, between horizontal and vertical elements, between parallel and orthogonal. The vitruvian *commensuratio* and *simmetria* which obviously had an absolute value, especially in classical Architecture, are willy-nilly, part of our cultural heritage.

Because graphic analysis, that we can make correctly only on original drawings or on careful surveys of the existing buildings, is competence of "Science of Representation", we must define better is cultural role and re-hook this praxis to the age it has been used. It may happen in fact that, pleased for having found a graphic reason of a project, we run the risk to attribute generative way of architectural forms to the author whereas they are only ours and not the author's. In order to deal with this theme we shall first consider the

proportional relationship of the simplest and most usual geometrical shape in Architecture, that is the relationship between the sides of a rectangle.

If we consider the remarkable ratio among the sides of a rectangle between the form of a square and the *diapason*, we obtain a thick succession of lines as in figure 1 shows.
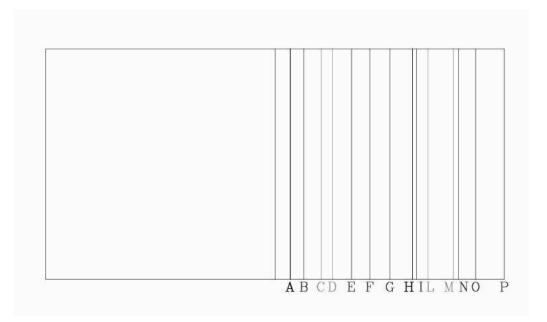
Fig. 1: A – 15:16, second minor; B – 8:9, second major; C – 5:6, thirtd minor; D – 4:5, third major, *sesquiquarta*; E – 3:4, fourth, *sesquitertia, diatessaron*; F – 1:√2, "diagonea"; G – 2:3, fifth, *sesquialtera, diapente*; H – 5:8, sixth minor; I – divine proportion; L – 3:5, sixth major, *superbipartiens tertia*; M – 9:16, *sesquitertia* double, double *diatessaron*; N – 5:9, seventh minor; O – 8:15, seventh major; P - 1:2, Diapason.

If we consider the divine proportion graphically obtained we also take into account the possible proportional relation of a rectangle including those obtained overturning the diagonal on the short side and on the long side.

The resulting graphic shows a thicker succession of segments similar to the barcode of supermarket goods (fig. 2).
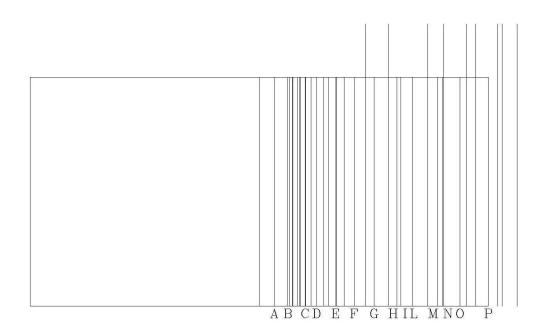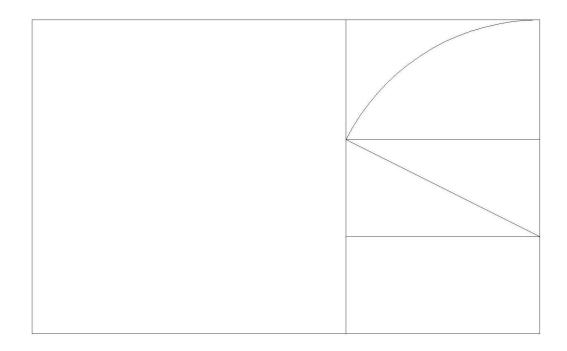
Fig. 2

Perhaps we can obtain any sort of rectangle adding one of that rectangles to one or more square, as in figure 3 shows, for a rectangle obtained adding a rectangle of golden section to a square.

Fig. 3

The analysis of the proportions of rectangular figures in rationalist architecture, characterized by simple surfaces perfectly defined by coplanar lines, requires a clear proceeding, but things change in the case of conformation to classic architectural orders.

The geometrical complexity of moulds makes the reasoning on the perfect proportion not so rigorous as it should be. For instance no-one can establish "a priori" it the thin line of the rectangle used for the proportion must run above the centre-line or above the right or the left edge of the pilaster strips, if the sides of the rectangle must exclude or include the trabeation, only the architrave, also the frieze or the attic, if the base of the stylobate must be included, if the proportion of a facade on a sloping road must be considered in the highest or lowest point of the road or in the centre-line, etc.

Besides it must be taken into account the amount of corrections brought by architects and builders to avoid optical effects and other expressive faults which alter the proportional relations utilized in the project.
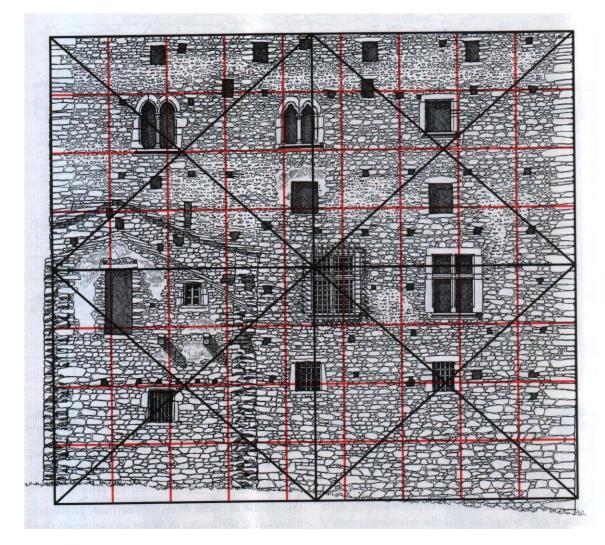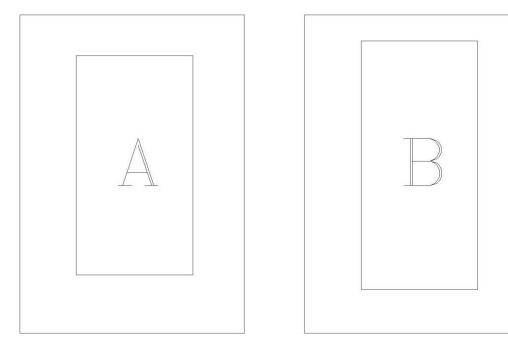
Fig. 4

We must also take into account the uncertainty margin resulting from the analyses done with modern instruments or at the computer and the approximations due to the use of old

instruments an tools, the building site, the corrections brought during the works and the reutilization of pre-existing structures.

The arbitrary use of geometrical analysis is clear in the drawing of a medieval building showed in figure 4.

Under the perceptive point of view the perfect proportion, which is after all just a convention, does not exist and a simple experiment may turn useful to demonstrate it. If we show to unknowing people two rectangles, the former in rapport of seventh major (A in fig. 5) and on the contrary the latter obtained lengthening the rectangle of the diapason by the same quantity (B in fig. 5), asking them to choose which is the perfect rectangle of diapason, they would choose inevitably the rectangle A without noticing that one side is not exactly twice as long as the other.

Fig. 5

Even in those historical periods when projecting involved proportional relations, their use did not hinder a more immediate and less rigorous approach.

This is the case of a door for the small church of Mercy Friars in Catania (1730); as established in the contract, the dimensions of the door were fourteen and a half spans high and seven and a half spans wide: no notable relation were used.

These reflections don not deny the value of geometrical analysis but suggest a more attentive and aware use of it, since it is to architecture as astrology is to astronomy.

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A forgotten architecture

Alessandra MANIACI,[1] Alessandra BRANCATELLI[2]
[1] Facoltà di Architettura, Università degli studi Mediterranea di Reggio Calabria, Italia
alessandra.maniaci@unirc.it, a_brancatelli@libero.it

Abstract

Before the Normans came to the conquest of western Sicily, they spent several years between the two sides of the Strait of Messina. Messina was the first Norman settlement in Sicily, and for years remained the real center of the power of domination over Trinacria, until the recurring and devastating earthquakes over the centuries (1693,1783,1908) have zeroed each track. In the green valley of Mili San Pietro, in the suburb of Messina, we still have a beautiful example of Norman Architecture, the Basilian church of St. Maria, (XI century). The church is in an obvious state of neglect, this place preserves the original structure of the ancient monastery of monks, but needs a restoration, through the rehabilitation of existing materials, bringing to light the techniques of the time, and arrangement of space in front. The church has one nave and the transept. There are three apses as they appear inside, outside only the central one is visible, the other two are included in the thickness of the wall. There are three domes of the transept, the central one, placed on a octagonal drum with internal corner joints; first structural experiments of Byzantine-Norman architecture, like the decorations, the use of red brick, the pointed arches with splayed rings, sometimes intertwined, as in external facing.

1. Architecture

The convent of Santa Maria in Mili San Pietro, was built in the last decades of the eleventh century, it was entrusted to the monks of the Eastern rite, in 1092, with a donation of Count Roger the Norman. The presence of the Abbey, that was the center not only religious but also economic and, for a certain period of time, even political of Mili Valley and surrounding areas, it stimulated activities such as silk production, the cultivation of land belonging to it and grain milling, resulting in the formation of the first places inhabited in the area. The Abbey, between the '300 and '400, went through a period of decline, above all, because of the usurpation of land by some unscrupulous nobles of Messina, whose names appear even in the series of the Abbots of that period. The recovery, based on the few documents discovered to date, had to begin with the sixteenth century, when the church was enlarged, (1511). Then the Abbey had a period of decline,but the end of the religious institution not arrived until 1866, when the newborn Italian State has seized property of religious corporations, putting them on sale to the highest bidder: thus throughout the abbey, with the annexed lands, was divided into several parcels to be used as barns, houses, storages of equipment and agricultural products. Activities that are performed yet today. The convent is now in a precarious stability, the most of it has already collapsed, while the church, had an interim restoration in the early 80s, but the precarious condition of the entrance has determined, in December of 2002, the closing of the Abbey. The architectural complex was also the subject of an intervention project, promoted by Agenda 2000, that had as its objective the creation of a cultural center for conferences and master's students. But the Regional Department for Cultural Heritage, in 2002 stated that the restoration project for the Mili' s Abbey, inserted in the second list of priority ranking for funding of Agenda 2000, it will not be funded with these funds. Sicilian Region has virtually ruled out, once again, the chance to put, Mili 's Abbey, inside of tourist-cultural circuit of Basilian monasteries, together with the churches of St. Philip Fragala of Nebrodi, St. Peter and Paul at

Itala, and that of Saints Peter and Paul in Forza d'Agro.[1] This possibility would fall in a plan for the use and enjoyment of the architectural and landscape, making them also an economic resource. Today, youth associations begin to pursue awareness campaigns for the preservation of places so important, that are part of our cultural and architectural heritage. Thus, such an architectural gem, gradually gives way to the blows that the time to gradually settles down, taking it away from the enjoyment of citizens and tourists who flock here from abroad. The convent, in degradation from decades, is prior to 1092, excavations there have uncovered important remains of a Byzantine monastery prior of that one Norman. So it was reconstructed on the previous, demolished or destroyed for reasons unknown to us. The building, which dates from the eleventh century presents architectonic characteristics of the Basilian churches built at that time this area of Messina. Despite the modest size of the original church (initially measured 7 meters in length), it can be defined the first in a series of churches built under Norman rule in eastern Sicily. The church has one nave, the crypt probably used as a burial crypt has a series of rectangular opening on the walls, of the niches, and a small apse to below the main apse. From reading the plan, one can imagine that the system architecture was a church in Cuba, then stretched in the church hall. The three apses, of which only the central emerges to exterior with its semicircular profile, while the other two lateral remain included within the thickness of the wall. Each one is covered by a dome, of which the central one of larger size, that is supported by an octagonal tambour, not very high, with references to Byzantine and Norman art. In the side facades, the party decorative of the lower part consists in a reason of crisscross arches, typical of Norman architecture. the upper part presents an orderly succession of compartments alternately blind and open. The church is surrounded by the remains of the ancient monastery of the monks of St. Basil, the custodians of the church. In the sixteenth century, during the renovations of 1511, the wooden ceiling was redone, and the church was extended by about a third: the trace is clearly visible in the exteriors walls , where the party's decorative stops, had to finish the original length the church. A Renaissance portal in marble and stone, characterizes the facade, the wooden door dates back to 500, while it surely dates from the Baroque period the apparatus of pinnacles adorning the completion of the facade[2]. In some parts it is possible to recognize the buildings surrounding the remains of the convent, the other buildings surrounding the temple, are the result of a stratified building activity over the centuries, in close relationship with the changes that the monastery has suffered during his history. To the west there is a long building, which develops in a direction perpendicular to the church and had to be probably the old refectory of the convent. This block about 30 meters long, stands on two levels, one side bordered by the wall of the road and the other one with the surrounding countryside, but one time, it was joint with the parallel corps of the convent church, probably the dormitory of monks. This corps exposed to the north is more complicated and compromised by a structural point of view. The ground floor rooms, probably used for processing of agricultural products, and their conservation were accessible by two arches, which in turn are the support of two flights of stairs which lead at the upper floor, which could be, instead, the guest quarters or dormitories monks.
These scales are now completely covered by vegetation. Across the corps which joins the church to the convent, we find the structure of the monastery that today is the most degraded, of which there are only ruins, and fragments of walls. The monastery is situated in a surreal dimension, lost between the old and degradation, it is as if the "Patina of time" had not taken root here. The place where the monastery stands is a very complex place, between the river and the town road, the path that leads to entrance of the monastery is located in the river bed and one part is paved and one part is covered by pebbles, carefully arranged to facilitate the passage of cars, that cross frequently to go no one knows where, maybe in barns, chicken coops and vegetable gardens, a place where the only attraction, the monastery, remains beyond the path, beyond the bed of the river, in a space deliberately forgotten, a mirage only visible from the road but almost completely inaccessible. Recent buildings of brick and reinforced concrete have been matched and superimposed to the ruins of the monastery, only to be abandoned to the actions of the time. Today everything is equally shrouded in vegetation that hides and confuses what is old and what is not, clinging with arrogance until to make disappear all it completely under a carpet of brambles. The side exposed to the South is now completely inaccessible, a wall of vegetation and thorns prevents the passage, just from the street level, it is possible to see the upper part of this prospectus, with the Its arched windows with brick, but is not visible the decorative party of the lower part. John Ruskin, believed that a piece of architecture can be seen in its full bloom no earlier than 4-5 centuries. After more than 900 years this architectural gem can not yet be considered at the height of its splendor, probably because there was not the most basic intervention of restoration, the only admitted by Ruskin, daily maintenance, prevention of damage, without violate the laws of nature to which even the building is subject, no action excessive and artificial has to

[1] http://www.iccd.beniculturali.it/medioevosiciliano/index.php?it/112/catalogo-generale/41/
[2] http://web.tiscali/normannamili

oppose the slow processes of natural aging. In this optical must to be made interventions for conservation and maintenance, extensive and detailed cleanup, and liberation from vegetation are therefore the necessary first step towards making this place livable. The part of monastery, exposed to the east, the ancient refectory, requires a structural consolidation and repair of part of the roof where the tiles are been moved by the wind. There where however the coverage is totally compromised as in the corps that once linked the church to the monastery, and in the part of ruins you should think about a project to rebuild all completely with an appropriate design intervention. Regarding the arrangement of the garden around, instead you might think to realize a garden of aromatic and medicinal plants, to remember the ancient peasant habits of the monks of old.

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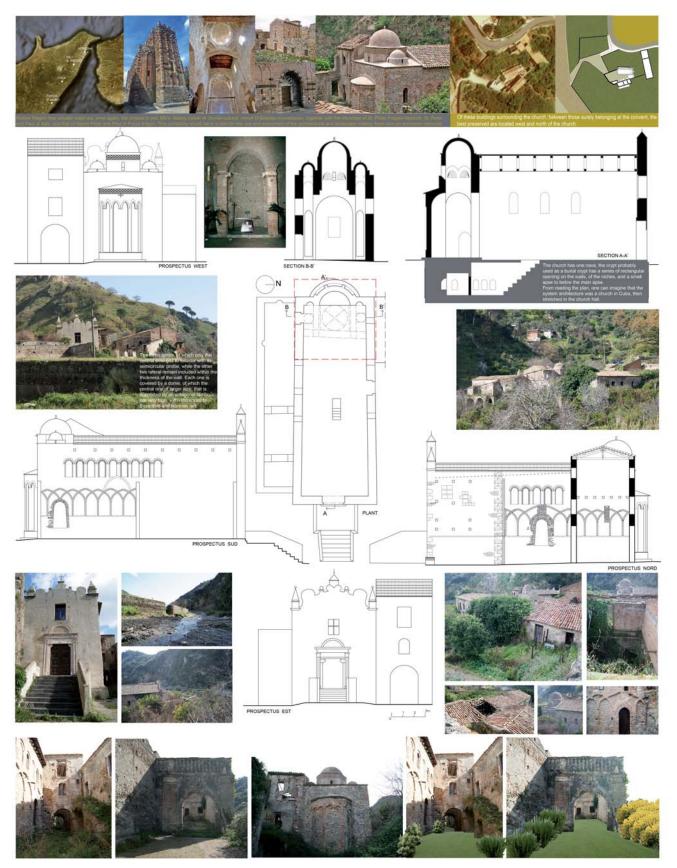
A FORGOTTEN ARCHITECTURE
Memory, Preservation, Project.
ALESSANDRA MANIACI, ALESSANDRA BRANCATELLI
Università degli studi "Mediterranea " di Reggio Calabria, Facoltà di Architettura

Of these buildings surrounding the church, between those surely belonging at the convent, the best preserved are located west and north of the church.

PROSPECTUS WEST

SECTION B-B'

SECTION A-A'

The church has one nave, the crypt probably used as a burial crypt has a series of rectangular opening on the walls, of the niches, and a small apse to below the main apse.
From reading the plan, one can imagine that the system architecture was a church in Cuba, then stretched in the church hall.

The latter apse, of which only the central emerges to exterior with its semicircular profile, while the other two lateral remain included within the thickness of the wall. Each one is covered by a dome, of which the central one of larger size, that is supported by an octagonal tambour, not very high, with references to Byzantine and Norman art.

PLANT

PROSPECTUS SUD

PROSPECTUS NORD

PROSPECTUS EST

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Analysis of the masonry coursing pattern in Casale Castello: representation of the urban development

Ingrid TITOMANLIO
Design Knowledge Department, Faculty of Architecture, Second University of Naples, Aversa (CE), Italy
ingrid.titomanlio@unina2.it

Abstract

The empirical experience shows that cities cannot be considered a whole of streets and squares or a space balance, but are the outcome of historical, economic, religious and social determinants. The planimetric drawing is not always the result of classifiable and detectable historical events, but is often due to dynamic stratification and sequence of town planning and building. This is the case of the "Casale Castello" village which is examined in this paper through the representation of its urban development. Under this perspective, analysis and representation of the city building logic and the wall remains assume a noteworthy interest for investigating the guiding principle of the town planning evolution. Before, activities as site location, roads drawing and ancient bibliography reading are performed; afterward, it is carried out the analysis and cataloguing of masonry walls types testifying the increasing in workmanship and reflecting the time in which the techniques appeared. For Casale Castello were not the notarial acts or historical documents but rather the painstaking study and representation of coursing pattern of walls and masonry veneer to suggest a critical review of the settlement. In fact, they advise a date or a manufactured period. Klaiber, Lavedan and Piccinato several times stated the difficulty to chronologically establish the various types of medieval settlement. However, the period of the decline of the Roman Empire, related to the dissolution of the feudal society, is characterized by the construction of towns in defensible positions, around castles and monasteries. In eleventh century only, the revival of the economy allowed the urban and building activity to show itself as unprompted development of new cities.

Parole chiave: masonry, representation, urban development, dynamic stratification

1. Historical stratification of Casale Castello

Currently in Casale Castle village, you can see only few houses dating back at the beginning of the nineteenth century and survived to the earthquake in 1805. Nevertheless, there are visible signs of the Aragonese domination of the fifteenth century (Figure 1). Living testimony of this domination are the portals on which is carved a flower, symbol of the patriarchal organization of the family [1]. Briefly tracing the history that has characterized the village, it appears that, after the famous battle of Forino (667), the Lombard domination replaced the Byzantine one. In this era, began the building of a castle in visual communication with the Mercato San Severino and Montoro castles that was inserted into the path of the defense system of Roccapiemonte and Serino castles. The original manor position was undoubtedly dominant, but still now you cannot have a precise planimetric reading of the fortress. It is completely covered by vegetation and visible only some pieces are visible (there are the perimeter curtain walls and the base of the square tower in shapeless stones) [2]. The rediscovery of a rich heritage of stories, events, culture has been the research focus, which took place through the careful analysis of archival documents, original texts, reliable historical sources, and above all of the classification and cataloguing of the different coursing patterns of the place.
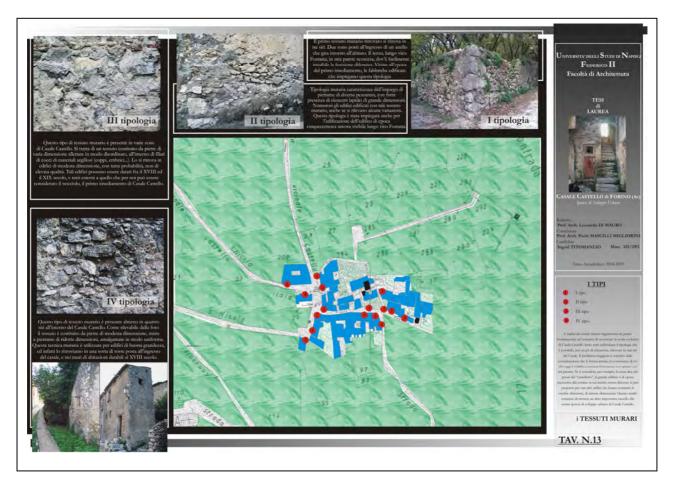
Fig. 1: Casale Castello: Analysis and classification of masonry coursing pattern

It was possible to retrace and experience in their concreteness, although according to a personal idea of proposed development, the economic, legal, manufacturing and cohabitation relationships, in which the difficult and harsh existence of this place moved and burned up. All this in order to "recover" an artistic and cultural heritage that, in the long historical process, showed the rise in wealth and culture of the new bourgeoisie, as an alternative to the structures of the feudal nobility, but which is, apart from rare exceptions, in poor storage conditions. However, the place have an original and not denatured identity (Figure 2). The work done on it was particularly difficult due to lack of "material" evidences destroyed and rebuilt after the harmful environmental events. It is certain that this Casale, built for military and social life needs, reveals the evolution of the human spirit of its dominating people [3]. All the urban traces of this place reflect the serenity of the Greeks pure beauty, the Romans architectural expertise, the mysticism of the Gothic art tending to God, as well as the memory of the civil and political struggles of that period. The shape of the town faced significant changes throughout history, from a central core, densely built, up to a continuous expansion in the nineteenth century. Figure 3 represents the summation of the various surveys carried out that lead us to a representation of the urban development of Casale Castello. With the first comparing analysis, we detected the location of the old travel routes, with the second survey we identified the access roads to the village. The third survey wants to identify common coursing patterns, symptomatic of an era and a contemporary building technique. The fourth survey aims at finding defensive items like towers, square walls (Figure 4), subways, steep walls. The height of the buildings complete the survey allowing to achieve the analysis and cataloguing of worship places, portals and balconies (Figure 5). The study of different historical eras and peoples that dominated Forino, is necessarily linked to the history of Roman Abellinum [4].
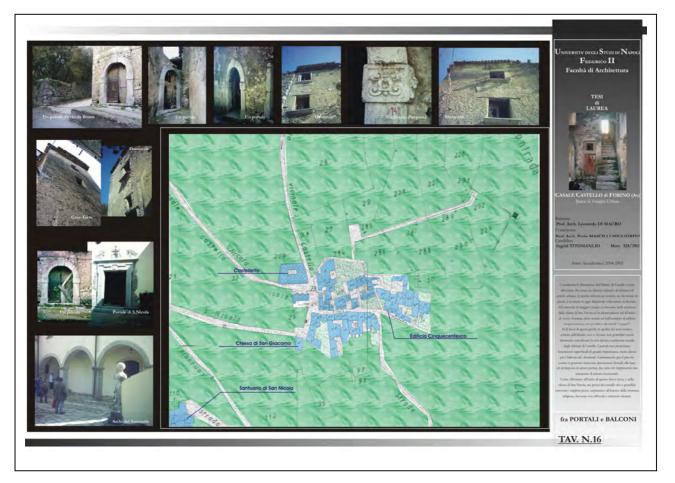
Fig. 2: Casale Castello : Analysis and classification of decorative elements

The Roman Empire implemented a complex defensive system, based on the "castra" (fortified camps of the army) and on "limes", placed at the ends of the territory subject to Rome.The local defense was, however, carried out by the locals and for this reason arose various types of "castella". The capital city (oppidum) together with the territory in which were included the minor towns fortified (castella) or open (vici or pages) formed a single politic unit called civitas. With the barbarian rulers, especially Lombards, the term civitas (political union between town and country) meant an administrative, judicial and military district which included city, villages and countryside [5,6,7]. Among the assets of the colony "Veneria Abellinatum Livia" (Avellino), it is believable that there was a large wood in which arose the towns and castles of Forino (Casale Castello). During the Lombards domination it was born a particular type of habitat, which lasted for centuries, defined by the French historians "fortification". In fact, near the Forino castle, were born the first houses of the peasants built in stone and with only a single floor; only around 1000 d.c. began to build a second floor. These houses had the thatched roof, were made of narrow rooms without balconies, had no toilet, and took air and light from small windows without panes, which were closed with pieces of wood to defend from the elements.The houses were built on a narrow winding path, leaning against each other. Only after the advent of the Normans, among them Roberto il Guiscardo and his brother Ruggiero of the Hauteville (Altavilla) family, the Lombards were expelled from Italy and it was created a strong centralized state with an efficient and widespread bureaucracy, characterized by a perfect financial organization and especially by the great tolerance of different religions and cultures [8,9,10]. The territorial structure was established by the class of "knights" holders of feuds held directly by the King "in capite de domino Rege" which became part of the Royal army with the "professional" Knights, providing the soldiers in proportion to the size of their feuds and feudal organization.

Fig. 3: Casale Castello: Analysis of masonry coursing pattern and hypothesis on urban development

The distribution of conquered lands by the "Connestabilia" and "Contea" which were, however, fundamental categories for Norman military and followed the feudal vassal model [11]. The Norman settlement was characterized by the spread of a new type of fortified castle. However, Norman castles were not good examples of military fortifications, because the Normans, assaulting Lombards fortified villages, which existed before their conquest, adapted and conformed them to the new defensive needs. They were built on an artificial hill called "motta", built with the ground coming from the excavation of a moat that surrounded the hill itself. On the castles appeared the squared or rectangular tower "donjon", with variable height and the thickness of the walls decreasing gradually upwards. The extension of Casale Castello and its reinforcement were made during the Norman rule, and this is as certain, as in 1162 the lord of this castle was Giacomo Francisio, which were entrusted by the Emperor Frederick II of Swabia, the Lombard prisoners Moro Speciale and Egidio Marcellino, so they were kept in a dungeon obtained in the basement of the fortress [12]. As the area was also a worship place, with the first works to the fort, was built the chapel (nowadays on the left of the building), which soon developed becoming a three-aisled building with a bell tower. The portal in travertine is dated around the tenth or eleventh century. The dynasty of the Normans did not last long, because, as the sole heir remained Costanza d'Altavilla, that, as wife of Henry VI, son of Frederick Barbarossa, meant that the Norman crown passed to Swabians, making significant changes to the military order and pre-existing fortifications [13]. The Swabians of Manfredi, with the battle of Benevento, which occurred February 26th, 1266, were defeated by Carlo I d'Angiò, that occupied the kingdom of Naples. After that the Angevin dynasty ruled for more than a century and a half in southern Italy. By transferring the capital of the kingdom from Palermo to Naples, in 1282, Irpinia became an important transit area essential to the expansion in the Balkan Peninsula [14].

Fig. 4: Casale Castello: Analysis of defensive elements

During Angevin dynasty the feud of Forino often changed lord and social life was very turbulent. Among the houses, Castello was already defined and this conformation was retained even in subsequent periods. After, the Aragonese domination left significant traces in the arts. The entrance gates of the houses of Casale Castello and of the oldest houses in the center of Forino had carved flowers which indicated the formation of a new family; every tribe was indicated by the addition of a leaf that was carved on the stem of the flower. This custom meant that from year 1500 to 1700 in some public acts, Forino was referred to as "Floreni", and when the University, in 1500, wanted to use an emblem, a bunch of flowers in the hand of a warrior was chosen [15.16]. Angevin road system was used and maintained by the Aragonese, that resumed the most ancient of the Roman era. With the Viceroyalty advent, the feud system did not change continuing to move from a feudal lord to another. During the Caracciolo principality, two tragic events, which were the earthquake in 30th July 1627 and the terrible Vesuvius eruption, aggravated by several strong earthquakes occurred in 1631, ravaged the inhabitants lives [17]. Despite the obvious importance of the strategic military post, having lost the conditions for its existence, the castle was completely abandoned in the seventeenth century by Caracciolo and suffered devastations by transferring part of its stones to build the Bourbon prison of Avellino [18]. The urbanistic reading of the village is difficult, but we can start analyzing the types of buildings that are assembled in a clear way. They were, in fact, built terraced houses with associated enclosure or compound in blocks of modest size. At the crossroads, around the city walls, near the edges of the paths that departed from the ports, developed a modular housing with continue rhythms, largely due to the conformation of the streets and the territory [19].

Fig. 5: Casale Castello: Analisys and classification of height of buildings

2.The masonry coursing pattern

In sixteenth and seventeenth centuries the roads of the kingdom were devastated and almost nonexistent. The people and foods transport was carried out with the use of beasts of burden which followed trails and short stretches of ancient tracks, the remnants of short stretches of Roman roads. Due to impassable roads and also for safety reasons, the connections began to decrease. Therefore, was created a complex housing that gradually weave to the existing buildings [15]. The structural variety that was created, both planimetrically and typologically, made the abandoned village of Casale Castello interesting and characteristic. The limestone rubble masonry, the arrangement of rocks and blocks of different size and the characteristic thickness of the joints, distinguishes the house units of Casale. The constituent elements of the masonry, while being of the same origin, have variables physical and mechanical characteristics. Their implementation can give rise to different patterns of masonry. The first type of coursing pattern detected is composed of squared stone in large angular blocks (Figure 4 Type 1). Two of these types are present in the corners of a ring that rotates around the village and the third along a steep wall of Vico Fontana with a strong defense system. The buildings that employ this type of construction are close at the time of the original settlement. The second design (Figure 4 Type 2) has limestone of different sizes, placed in a disorderly manner and mixed with pieces of pottery. This wall is present in the princely building of the sixteenth century near Vico Fontana. The third type of coursing pattern (Figure 4 Type 3) is made, as above, from stone material of different size, but has rows of tiles in clay, characteristic of most of the buildings of Casale Castello and not of high quality, belonging to the eighteenth nineteenth-century and located in areas outside the core of the original settlement. The fourth type found shows stones all similar in size and placed more or less orderly, characteristic of only 4 houses placed at strategic points in the housing and having significant height as the tower-houses. The use of limestone depended on the fact that it was easy to find them locally (in the hills)

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and easy to cut to build blocks for buildings. They have different physical-mechanical characteristics and according to their resistance, are defined: hold; semi-hard (such as sandstones whose indicative values of resistance range from 4 to 200 N/mm2) and hard as granite and marble (whose indicative values of resistance range from 40 to 500 N/mm2). The relationship between compressive strength and tensile strength of the latter is normally between 15 and 40, with thickening of values around 30. However, we have to consider that, even if their specific weight is fairly constant for the limestone the compressive strength may vary up to 60% depending on the presence of inclusions.

3. Conclusion

Benedetto Croce said: ""Tanto più energicamente si conosce un passato e tanto più energico sorge l'impeto di andare oltre di esso, progredendo … E' sulla tradizione dei nostri antenati che noi costruiamo il nostro presente; senza passato non ci può essere presente né coscienza di se stessi". It is important not to forget in the "new " things, the beauty of the past, custodian of the high classical ideal, and progress fusing in fruitful synthesis "the ancient and the modern sensibility. " In these words we find the importance of analyzing and working on the concept of memory that should be shared by scholars capable of covering the different aspects of reality, different skills, and able to rework it to better meet the needs of modern life. A wide - ranging historical research, based on mixing of different intelligent professionalism, respecting of others' positions, without ideological prejudice. Where you can not find paperworks due to the succession of catastrophic events like earthquake, you should start, as we have worked for the Casale Castello, with the analysis of the remains of coursing patterns, and any tests on site with appropriate equipment in order to obtain information on the historical stratification of the settlement. Only through the knowledge of the techniques used by the laborers of the past and the study of the structural characteristics of buildings you can get a good urban analysis of areas, representative of cultures that follow each other and overlap, and implement a proper process for restoration and conservation. Casale Castello is a small laboratory, unfortunately abandoned to not cure of the time, that needs to be re-evaluated, detailed, excited to run for a small cultural quarter. A work of territorial marketing can create a smart tourist flow, which aims to consolidate a cultural and historical heritage of great importance. Entirely reconstructing the story is the basis of objective cultural honesty and is the basis for formulating proposals for the future. The multi-disciplinary approach to local knowledge ensures that every corner of the district, each building, each portal can tell about himself, as tangible evidence of Mediterranean history.

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EcoPerspectives Restoration

Maria Vitiello
Department of Design, History of Architecture, and Restoration, Faculty of Architecture, "Sapienza"
University of Rome, Italy.
maria.vitiello@uniroma1.it

Abstract
The time has now arrived to start interrogating oneself on the possibility of also applying the ecological principles within the discipline of restoration.
The need for energy requalification of pre-industrial buildings is now a compulsory regulatory requirement that, before a technological definition of the practical activities required, needs new concepts that can be integrated with the theoretical thoughts behind conservation. Thinking about restoration from an ecological perspective means reaffirming the complex nature of the cultural heritage. During the years this has undergone a double mutation: that of its gradual expansion, and a mutation connected with the recognition of its value, the preservation of which is a moral and social requirement, with the conservation being a subsequent and due action, but not within the inactivity of the binding system.
Buildings, landscape, nature, environment, demographic and ethnographic anthropology objects, and immaterial objects, are the heterogeneous components of the heritage, which main properties are the result of space-time relations made stable by a dynamic and fragile balance, which is subjected to continuous perturbations of natural and anthropic origin. In the same way as other disciplines, like the historic, technical, and chemical ones, ecology can direct its basis towards restoration, contributing to set the methods and the means for the conservation of the existing, within the wider framework of environmental compatibility. This means investigating restoration as a set of objects and processes, with the assessment involving not only the manufactures, but also the relationships between objects and subjects.

Keywords: ecology – restoration – environment – cultural heritage – sustainable development

1. Introduction. The challenges of sustainable development: a little history

Today we live in a situation of "environmental crisis". A situation that we have reached through the indiscriminate use of the territory and its resources, acting as if they are unlimited, and pushing until the their regenerative capacity is no longer intact.
This is a phenomenon which started with the industrial revolution, when the harmonic balance between man and nature started to break, but has become particularly strong during the last century, and particularly in the last few years, when the quick demographic expansion brought an increasing demand in resources, to meet the needs of mankind, with important repercussions on the environment.
The environmental crisis is, after all, also a human crisis. By breaking that ancestral attitude, and entering in tune with nature, mankind has started believing in his almightiness, and somehow lost himself; he has in fact lost the good sense of thinking and acting, of looking for that environmental quality that for centuries, and as a necessity, he has lived by, in the realisation of a local and vernacular architecture.
Mankind has lost himself also because although already at the very beginning of the nineteenth century, and even more in the nineteen twenties and nineteen thirties, the understanding was already well established that the growing city, with all its technological architecture, would have brought to the dehumanization of life, he really did nothing to invert that trend.

Fig. 1 – Chicago, Franswort House, Ludwig Mies van der Rohe, 1945. Transparency and lightness are the expression objective of the removal of the side wall, inborn in the modernist myth of Glasarchitektur. It's the emancipation of the functions of the enclosure, which deviates from its traditional static and massive role, to become the fleeting filter between the various space qualities of the outside and the inside of the building.

Fig. 2 – Alberobello, Trulli. The local architectures of the building tradition are an example of harmonisation of the building with the surrounding nature and its characteristics, and has indeed resulted in the formal differentiation of the building enclosure, the formal differentiation between full and empty, between transparent and massive parts, in relation to height, light, and position.

The changes of the XX° century are today clearer and clearer, and also clearer is that man has been unable to manage its activities on the planet with farsightedness, and has specifically failed in building good structures. Architecture is the oldest human profession, its the first shelter man builds to protect himself, his activities, and to improve his stay on earth.

Bringing together construction, town planning and environment, following an ecological approach of the building practice, is one of the answers to the climate changes indicated by the international summits.

The principles of the Rio Declaration of 1992, collected together under the more popular name of "Agenda 21", recommend in fact an integrated and creative approach for ensuring a sustainable development within the framework of environmental and building policies.

These principles, which are also actual commitments undertaken by the United Nations, have a dimension that goes well beyond the architectural practice, and involve the economic and social fields, proposing a change of the consumption models and the promotion of new kinds of towns. These principles are also tools for fighting against poverty, for improvement in terms of healthcare, and demographic control.

If the Rio Paper has a social type cultural setup, rather based on theory and principles, the Kyoto conference of 1996 offers a more operating approach to the environmental problem, and the implications for the building sector concern mainly the management of territory, town planning, and architecture.

In effect, it is in the sector of new constructions and public works that a higher degree of effort is required in terms of savings in energy and raw materials. Almost two million enterprises, with approximately 11 million collaborators, organise the habitat of 380 million Europeans. The construction and the use of buildings have a very important effect on the environment.

In the same year, during the "Habitat !!" conference in Istanbul, the commitments were set for the application of the concept of sustainable development to the construction sector, giving way, in the various European countries, to sustainability processes in the building sector, with a sharp increase in commitment in the real estate sector, and in the professional associations.

It was only starting from 2002 that the discipline of restoration started to confront itself with the issue of energy, through par. 3 of art. 4 of the 2002/91/EC Directive dated 16 December 2002, which stated that the member States can decide not to apply performance requirements to "buildings and monuments officially protected as designated heritage in view of their special architectural or historic value, if compliance with the requirements would entail an unacceptable alteration of their character or aspect." It becomes clear from the beginning that the adaptation to energy performance issues is significantly less important for protected architectural works pursuant L. Decree 24/2004, as they are subjected to preventive authorisation by the competent bodies.

On the other hand, this is not applicable to basic pre-industrial building, which only in some cases is subjected to direct safeguard, and fall, on the other side, within the operating rules of all other existing buildings.

However, one not only recognises to pre-industrial building its value of representation of human activity, but also its unbreakable connection with the monument, which identifies the uniqueness of the historic-artistic representation that must be protected.

In spite of the clarifications made through L. Decree 192 of 2005 and 311 of 2006, the Italian legislation has been unable to resolve this conflicting aspect (the unnatural separation between text and contest, the monument and the settlement framework of which the building is part) that emerges from the directive.

Besides, it has given way to a process of extreme simplification of the procedures, creating guidelines solely centred on an assessment based on energy balance, or in the exchange of heat between the inside and the outside of a building, as if the problems connected with energy requalification of pre-existing constructions only related to thermal exchange between the building and the environment.

From here, the reductive and obstructive approach by restorers in relation to a regulatory compliance almost always considered against the preservation requirements.

The fact that a building may not be considered only by itself, neither in terms of history, nor in terms of design, but rather as part of an articulated system of connections that mankind has been able to establish between his artefacts and the territory in its orographic and environmental definition, seems to be the required starting point.

The energy problem and the issues connected with the use of renewable sources in pre-industrial architecture must therefore be considered as a tool for reflection, so that energy sustainability will not bring a conflict between tradition and innovation that should solely be solved in technical terms, of "adaptive" technologies, but that it will rather contribute to an expansion of the references between conservation strategies and the values recognised to the cultural heritage that one intends to preserve within a historical, aesthetic, but also ethical and social framework.

2. Ecology, environment, and landscape

The ecologist movement, born in the nineteen-sixties, was supported by a generation that refuted the excesses of the consumer society. It had the merit of bringing to the limelight a term that up to then appeared relegated to a narrow field of academics and biologists, although this did not happen without misunderstandings and improper uses of the word, which was at times intended as the study of pollution, and at times as the conservation of nature, or other similar definitions.

In reality, the definition of ecology is rather different from the one that is normally attributed to the word. It is in fact not only a discipline capable of providing an indication for man on how to behave to ensure respect for nature, but rather a science, or a complex framework of knowledge aimed at studying the relationships between living bodies and the environment.

In the same years, the notion of environment also started spreading within the regulatory sector. The investigation Commission, the so called Franceschini Commission, for the safeguard and enhancement of the historic, archaeological, artistic, and landscape heritage, was instituted in 1964. And it is indeed after these activities that there is the consolidation of the term "cultural object". In particular, talks began of "environmental cultural objects" as an independent category, separate from artistic, archaeological, archival, and book related ones. It's a definition that is still too close to that of landscape as defined in art. 9 of the Italian Constitution, as highlighted by Salvatore Settis, because it does not take into account the necessary and own connotations of the terms that in those years came to light in Italy and in Europe. It is therefore probable that the juridical definition of environment was at the time meant as the picklock to "[...] force open the magic doors beyond which "territory" and "town planning", after becoming one, may in fact swallow the "landscape", providing the lawmakers with the possibility of implicitly also offering the environment as part of the regional competencies. [1] Whether this really happened or not, is not very important in our discussion, as we are still in the middle of having to search for specifications, and of defining the terms.

"Landscape", "territory", and "environments" are not synonyms, but rather disclose, from different perspectives, the peculiar characteristics of the space where life occurs.

The space where we live is a space of nature, consisting of the continuity of mountains, crests, large flatlands, of the diverse vegetation that grows in it, and the fauna that inhabits it. We could say that this is the territory, an element that is not inert, but rather subjected to man and to production mechanisms. The space where we live is in fact also the space of mankind, or a cultural space, because it is reflected in the history of men and women that experienced it, and of the societies that today, and also tomorrow, shall continue to mould it. Using the famous formula of Henry Lefebvre, we can talk of "social space", which limits and transforms both territory and nature following rites, knowledge, and power, turning its initial naturalistic value into something artificial, although not for this reason only marked by architecture, but also by the manipulation of nature and the adaptation of constructions to the same. [2]

Looking carefully at the productive and the manipulation process, the slow modelling of the territory by man, and the opposite one of the environment that impacts on such social activity, are indissolubly interlinked. The words of William Morris come to mind, which define architecture as: "the set of the alterations made to the surface of the earth in view of human activities", [3] and which, therefore, includes all the products resulting from the many actions of mankind, "spurred from the relationship between nature and society, and which occur in that field that belongs to everyone that is the territory," as pointed out by Gaetano Miarelli [4]. Therefore, it is indeed the landscape, that superior entity that collects in a synthetic unit both the "raw material" of the territory, and the vital functions of the environment, as well as the cultural manipulations, which are in the same amount both temporal and spatial at the same time, attributed to the relationship between man and nature.

May be, as suggested a few years ago by Giovanni Urbani, one should really create one single ministry dealing with the environment and the historic and artistic heritage, which is strictly connected with the territory, in order to safeguard its "environmental" nature. [5]

Following this perspective, it becomes much more simple to talk of sustainable restoration as an activity that is not contrary to the conservation of architectural manufactures, which being nothing more than fundamental components of the environment, perishable, unrepeatable due to their authenticity, and which can suffer deteriorations during the times, may be positively considered resources, and as such safeguarded for themselves, and for their strict relationship with the territory they are part of.
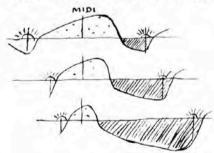
Fig. 3 – Le Corbusier, *Maison Fille di Soleil*, lithography for the *Le Poème de l'angle droit*, Éditions Verve, 1955. Editions Connivences Paris1989, Le Corbusioer Foundation.

Fig. 4 – Le Corbusier, Un Solei se lève, un soleis se cuhe, un soleil se lève à nouveau (da *Le Poème de l'angle droit*, Éditions Verve, 1955. Editions Connivences Paris1989, Le Corbusioer Foundation). Studies on the sun trend.

3. Deterioration, restoration, ecology: definitions, examples, and ambitions

Restoration is a complex discipline based on a set of varied actions aimed at the care for the individual manufactures or objects making up the cultural heritage in its diverse composition. Such actions have the objective of initiating new virtuous processes aimed at preserving the things that over the times the generations have left to us, and which it is our duty to deliver to the future generations, through the maximisation of persistence, and the reduction of the modifications introduced in the material and figurative structure by degrading exogenous and endogenous movements.

The actions that are introduced in organising the restoration operate on the current conformations of the existing heritage. Such conformations are always detected from precise and detailed observations, which are then turned into graphic representations and compared, both through historic-documentary analysis -

aimed at the recreation of a chronological series of the various events objects have been subjected to during the times -, and direct investigations aimed at acquiring a chemical and physical knowledge of the material elements making up the objects. We are talking about a multiform set of studies that give the possibility of defining all those pathological processes that mix together and show themselves through the different shapes of the many components making up the objects; pathologies that require timely and incisive behaviours, to ensure that the conservation of pre-existing objects is conscientiously completed.

In general terms, deterioration may in fact be interpreted as a process of modification of matter that shows itself through more or less deep and significant condition changes, linked to the chemical-physical, mechanical, and formal composition of the manufacture itself. Therefore, the degree of deterioration that may be detected through objective observation may be considered the result of a set of causes, which effects often add together, and operate in synergy with each other.

The speed at which the manifestations of decay occur, and the aspects through which this shows itself, are many and depend on the interaction of several factors: the characteristics of the material, the processing, and the environmental conditions this is subjected to during the years.

In most cases, the degenerative process is initiated by disturbing actions that are external to the structure considered: architectural, artistic, sculptural, landscape, irrespective of its articulation; but it may also be the result of a natural ageing process of the material, or of differences in the matter, if the manufacture is the result of an articulated assembly of materials.

For example, a lesion may constitute the manifestation of several kinds of degenerative actions, both exogenous and endogenous. It may be the expression of a matter discontinuity internal to the masonry structure, caused by a disconnection among the components; but it may also represent the visible part of an underground movement subjected to unidentified collapse mechanisms. Or it may even be the residual element of intense perturbation of the building-soil system, such as telluric perturbation, which leaves the walls with lesions that are typical of horizontal cutting actions. A correct interpretation of what in effect constitutes an interruption of the continuous wall system can only be formulated as part of an overall study of the building and of its relationship with the context, as well as through a diagram of synthesis normally called "map cracking", which gives the possibility of bringing together and linking the individual expression to the overall.

Therefore, in general terms the degenerating phenomena that can be detected on cultural goods may be compared to genetic variations as, not unlike what observed by Darwin in 1859 for the evolution of living organisms, these can show themselves in three separate types of mutations: favourable, detrimental, and neutral mutations. While the first ones increase the heritage of living organisms and spread through the lineage, the second ones must be eliminated to ensure the continuation of the species; however, the third ones may pursue one or the other route, depending on the case.

In this way, continuing with the examples, a black crust may also be defined as a detrimental mutation, because although being part of the material, it is always caused by external occurrences, and it is always harmful, as it leads to a gradual loss of the manufacture.

On the other hand, being a surface alteration caused by a natural process that is part of the matter interacting with the atmosphere and the gases it contains, "patina" may itself be considered phylogenetic, and therefore does not need to be removed, but on the contrary stimulates the emphatic feeling that flows in the attribution of the "antique value".

A variation of destination of use could, on the other hand, be compared to a third species deterioration, because the modifications introduced for the changed functional requirements, which must be preserved as testimony of the demonstration of the mutations the work has been subjected to during the times, a chronological time consisting of unrepeatable moments, of irreversible stories that only historiography can present in contemporary terms; however they could also be removed if the actual conservation and overwriting needs of the monument require it.

The classification of deteriorations suggested here would contribute to an interpretation of the same in relation to the mutations that they cause in the matter.

However, it may be possible to add to this interpretation another different one, aimed at breaking them down depending on the processes involved in their manifestation. And for these, it may be possible to identify the hierarchical levels derived from ecology, which would help to retrace, starting from the conformation of the sign manifestation of the pathologies, the processuality of the codifications denoted by the manufacture.

Starting back from the example of the black crust already proposed, one may attempt to recompose the active series of players and effects making up the degenerating processes.

Crusts are defined by Nor/Mal 1/88 as a "surface layer of alteration of the stone material" and appear at sight as compact and pellicular. They tend to cover the whole material affected by the pathology and, due to the dark colour, cause internal tensions promoted by differentiated thermal dilatations (between the surface and

its substrate); while, in addition to physical deterioration, when together with sulphur dioxide, carbon particulate also causes chemical breakdown phenomena. Sulphur dioxide (the anthropogenetic source of which can be traced back to the combustion processes of solids and fossils, and to the melting of non-ferrous metals) constitutes the main cause of sulphation processes (the formation of gypsum = bi-hydrated calcium sulphate easily washed out by rain), and brings to deterioration and the partial loss of the surface material of the manufacture.

For these reasons, in terms of restoration process the removal of black crusts is a conservation requirement, and therefore always promoted. In view of this, different intervention techniques have been identified, which aim at cleaning the surface and removing the deteriorating film. These are timely actions implemented with the objective of limiting a pathological sign in a certain manufacture, and it is only on the manufacture itself that can occur the positive effects of the restoration action, which must however be repeated several times.

Figg. 5 - 6 – Rome, Obelisc Piazza della Minerva, Gian Lorenzo Bernini, 1667. The interventions planned by the Istituto Superiore per la Conservazione e il Restauro (Higher Institute for Conservation and Restoration -formerly ICR) costed on the overall € 70,000.00. The different forms of deterioration encountered on the monument, with different degree of importance, constitute vulnerability factors. The works concerned: biocidal treatments; the cleaning of loose deposits and black crusts; the removal of unsuitable plaster and its ripristination; the reconstruction of the "cover" at the top of the base of the pachyderm for correct flow of meteoric waters; the treatment of discontinuities; the final chromatic balance and the protection of surfaces.
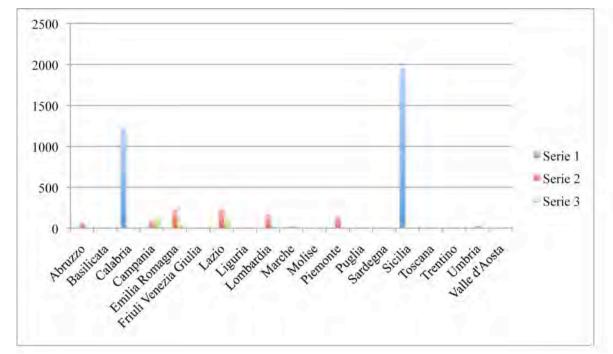
In particular, a study of the Istituto Centrale per il Restauro (Central Institute for Restoration) based on the analysis of stratigraphic samples, has highlighted how in the city of Rome surface restorations are performed at "jubilee" intervals, approximately every 25-30 years. It is a very expensive approach to the issues related with the conservation of the architectural heritage: it entails many interventions in short period, resulting in a decrease in quality and an increase in costs. [6]

 It may be possible to identify the key objectives to pursue in the protection and the conservation of artworks, such as the planning of maintenance times for the reduction of intervention costs, and the improvement of the state of conservation of the manufacture.

These targets may bring benefits that it may not be possible to quantify in economic terms, but in relation to the state of conservation of the manufacture, and therefore to the slowing down of the deterioration process, with a consequent decrease in the loss of original material and a better possibility of enjoying the monument, or the recovery and the conservation of the aesthetic content of the monument, always with reference to the single manufacture, rather than to the heritage considered in its totality and complexity. Although very ambitious, these are nevertheless minimal objectives when compared with the extension of the problem and the amount of cultural heritage that must be safeguarded.

Sulphur dioxide in fact reaches the surface of objects, either walls or sculptures, through acid rains caused by atmospheric pollution mixed with atmospheric particulate (carbon particles, mostly caused by the emissions of fuel oil domestic heating system). Nothing has been tried up to now to reduce this deterioration, with the exception of limited provisional measures, such as the protection of sensitive parts from meteoric waters using roofs and rainshields, which however cannot be considered universally valid.

The reduction of the deterioration process in a tangible and radical way may be obtained only through an action aimed at decreasing the concentrations of acids in the atmosphere, and lowering the levels of pollution. But this would entail the implementation of behaviours that are not only directly aimed at the individual manufacture being taken care of, but rather at extremely distant aspects, which almost appear

estranged to the restoration process: social, economical balance, and cultural sensitivity aspects, which represent in fact the real driving forces.

Fig. 7 – Statistics on the conservation/vulnerability status and seismic risks for objects split by region. Source, ICR Risk Map. Serie 1 as: earthquake risk. Serie 2 as: vulnerable architecture. Serie 3 as: vulnerable archeological

Besides, it is not easy to trace back all the modifications and dynamic forces that generate the deteriorations shown by the alterations that may be detected in a manufacture, in a painting, or sculpture, in a territory, or garden. It would be a difficult, or even impossible, speculation, and it would bring to the definition of an indetermination principle.

It could, however, be possible to attempt a simplification through a schematisation of evolutions. In this way, it would be possible to place the external energies disturbing the system at the first level. These are nothing more than vectors that cause the motion, and which instigate a process of "new coding of the genome". To say it with the words of Rita Levi Montalcini: such are the earthquakes, volcanic eruptions, pandemics, gas and particulate introductions in the atmosphere produced by the activity of a new industry, the planning of a demolition, the designing of an infrastructure with high impact, the modification of use of a building manufacture. [7]

The semeiotic exchanges could on the other hand be identified as the second level of the variation process. To this, it is possible to refer all the internal mechanisms that belong to the reorganisation of the matter, and on the basis of which the same tries to find a new configuration, a new asset.

In ecology this is referred to as "coalescence". The matter disturbed by the external energy tries to establish a new internal balance; a balancing motion that is still strongly dynamic.

Lastly, during the third level, the configuration level, an exchange of energy occurs between units and between systems, following a mechanism that enables the structuration of new assets; a condition that in ecology, like in the field of the restoration of cultural manufactures, brings results that are not always predictable. Deteriorations, therefore, with their many manifestations – lesions, black crusts, biological patinas, and more -, would represent the visible form of this stage, where the mutated matter defines itself in new morphologies.

Mankind, and with him the restoration activity of his competence, can place himself in different moments and perspectives in relation to the deterioration process affecting the heritage. And in fact he must not necessarily arrive at the final moment, promoting conservative interventions in relation to glaring mutations shown by the cultural heritage, following perturbations that have caused variations and disturbance, according to different forms and methods connected with the matter that makes up each manufacture; but he

can be present from the beginning, impacting on the actions originating the unbalance, and which constitute the first level of what may be called the genetic ontology of the heritage.

The mutation process can in fact occur due to different players, such as light, wind, water, heat, but also due to living organisms, either bacteria, algae, or human societies.

The use of the term "player" indicates the repetitive nature of the action, the function carried out by the entity, which repeats its role using a sort of script dictated by chemical of physical laws, or by mechanisms imposed by its organic nature, or again by replicated behaviours that are typical of human society.

The expression of each player is manifested through a motion that initiates a modification process, which causes deteriorations, conditioning, variations in the environment, and in all the objects it contains.
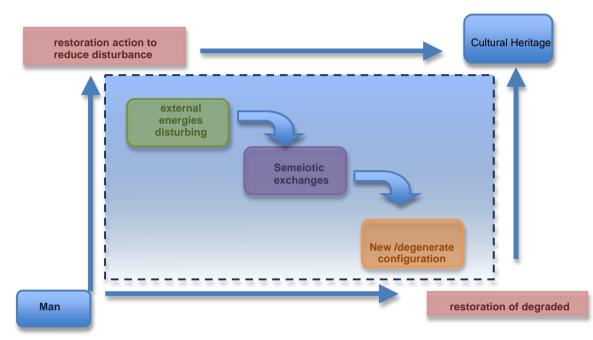
Fig. 8 – Synthesis diagram between: players, processes, and ontology in the conservation of the cultural heritage.

Observing the restoration with an ecologic perspective is therefore very beneficial.

First of all because it brings mankind back to the centre of the restoration activities, identifying him not only as the one who, with his apperceptive activity, recognises in his mind the works of art, imprinting to his conservation activities the desire that they are indeed restoration, but also because it considers the human activity as a whole: the conservational, innovative, and economic activity, and in more general terms the cultural activity, within the framework of the circuit of the ontogenetic dynamics of the conservation of the cultural heritage.

In this way, restoration is not just an action aimed at "preserving and transmitting into the future, making it easier to read, without removing the traces of the passage of time, the works of historic, artistic, and environmental interest" [8] releasing the same, and the care actions implemented, from the environmental framework they are in and live as part of, but becomes a collective movement with a social value.

Already in its famous Theory of restoration, Cesare Brandi defines the "recognition" as an individual's own experience; however, he points out that at the same time that this individual perception occurs, this recognition "belongs to the universal conscience, and the individual experiencing such immediate revelation immediately sets itself the categorical imperative, as well as the moral imperative, of conservation." [9]

The recall to the collective nature of conscience, and to the morality of the restoration activity, brings restoration once again back within the framework of ecological questions. And for this reason, it should not only be configured as a selfish action for the maximisation of the conservational interest of one single manufacture, but it should aim at assessing choices, also on the basis of the overall heritage, considered in its complexity, as well as of mankind as a whole, because acting entirely for the advantage of one, either person or object, cannot be justified.

4. Conclusions

If, in the way of Socrates, we were to ask the question: how must one restore? Ecology may offer a new answer, although this would not be univocal. Like the economic discipline, which shares with ecology the same root in οἶκος (*oikos - casa*), and which answered the question of how must one live with a double solution, also in terms of restoration one could envisage two solutions.

There is in fact in economy an engineering branch that follows the doctrine of Smith, according to which each individual only pursues rationally his or her own "personal interest". And then, there is the one that, starting from the origin of the economy concept itself, leans on moral philosophy and the concept of welfare. Expressing Smith's rationality of the maximisation of personal interest in the own terms of the preservation of the cultural heritage, may mean having to search for the reasons behind restoration only within the screening of those actions that simply tend to consider the advantages for the individual object of interest, taken by itself, without the action bringing some benefits to the historic, cultural, or environmental framework of which the object is a part. In order to describe the conservative action aimed at welfare, it may on the other hand be more beneficial to indeed lean towards the ecology way of thinking.

Mankind, brought back at the centre of the decisional framework, can identify the reasons for his actions following functions that are of direct and unique interest for the architectural, sculptural, painting work or landscape, object of the repair of the degenerative processes detected on the matter; or he may choose other routes that will bring his activities back towards the overall and collective improvement of cultural manufactures.

It is certain that the solution best suited to the objectives of restoration, also on the basis of how this has been interpreted up to now, is to carry out targeted actions aimed at the full conservation of objects in their historic and aesthetic aspects, because the cultural heritage has been considered as the bearer of these needs, and because there is not a direct control on any other objectives, and therefore basing one's own options on non-exemplary actions may appear rather unconvincing.

However, it is also desirable to make choices based on general objectives, so that the possibility of each object running the risk of not being preserved in its integrity may also be considered, if the non total action on one may be beneficial to the overall group the objects making up our heritage, and in which our identity resides.

In any case, restorers must define their own strategies on the basis of the recognition of the exogenous and endogenous modifications shown by the manufacture subjected to the care. To then consider the totality of the systems and the motions that give way to the degenerative processes is a second option. In any case, tangible choices are necessary: one or the other thing must be done, or even nothing, which is also an option; we are talking about preferences identified on the basis of the recognition of values, and which are connected to all the risks that this kind of condition brings: "...in its relapses and selections, which inevitably, and more or less consciously [the restoration activity] entails: [10] because it is not always possible to operate in the confidence of irreprehensible conducts.

It is clear that there must be a suitable reason in order to identify a way of action rather than another, and not always the completeness of the overall judgement on the positivity of the action can be the actual reason. However, an action must be performed, even if only based on a partial judgement.

With this, one does not want to diminish the importance of the "integral conservation" act, but it is believed that this term may not be necessarily capable of affirming the extremization of preservation. In fact, although one may want to consider everything as deserving of attention, and potentially object of conservation, in reality it may not always be possible to operate in such a way, and the decision would nevertheless fall within the framework of one option, even if just as far as procedures, techniques, and tools are concerned. So much so, that it sometimes becomes technically impossible to preserve, and sometimes "...permanence contradicts vital needs". [11]

In this way, although desirable, the predisposition to total historic and aesthetic conservation of the cultural heritage, would present technical, and possibly also ethical, limitations; it would certainly encounter some collective, political, or may be even economical obstacles.

A community, and therefore also a culture, is rich in artistic resources (architectural, sculptural, paintings, landscape, and natural) when it is capable of wisely managing the heritage received from history; by demonstrating full awareness of the identity value that this brings with itself, respecting it, conserving it, enriching it with the addition of new contributions generated by new functional utilisation requirements, but most of all when together with the historic and aesthetic values, it is also capable of recognising the social ones, which entail cultural choices, defined not only in terms of authenticity and respect of the actuality of the action, but also in terms of interdependence of the options and their aesthetic correctness, and on the collective advantage that may result.

The function, the enhancement, the introduction of elements aimed at facilitating the use of renewable energies in aesthetically and historically defined structures, meant as innovative process, cannot in such case be indicated beforehand as anything separate from restoration, as activities that go beyond it, but are also an integral part. Indeed, restoration can be seen as a privileged tool for the overall assessment of systems, functions, and degenerative motions, from which one must obtain the rebalancing actions for the different environmental components occurring in the landscape, in nature, in architecture, in sculpture, and in painting. And in those cases when options are not supported by an immediate intuitive possibility, one should nevertheless favour those which, even if at the detriment of the single one, will ensure an improvement of the overall conditions of the heritage..

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From the complexity of architecture to the knowledge of the construction of Siracusa

Giacinto TAIBI[1], Rita VALENTI[1], Mariangela LIUZZO[2]
[1] DARC, Facoltà di Architettura, sede di Siracusa, Università di Catania, Italia
[2] Facoltà di Ingegneria Architettura e Scienze Motorie, Università di Enna "Kore", Italia
E-mail: giacinto.taibi@gmail.com, ritam.valenti@gmail.com, mariangela.liuzzo@libero.it

Abstract
To comprehend the complexity of Ortigia's architecture, a place rich in history, means creating an interconnection with the foundations of knowledge, which can grasp the context, the site of interest, by investigating its fragmentary stratification.
The systemic recognition of such architectures, strongly articulated in their structural and formal skeleton, involves recourse to methods and approaches of cognitive interventions that may pinpoint regenerative models, which rekindle the human sensory faculty.
The systemic complex of understanding the heritage of Ortigia, intended as an integral part of "contemporaneity in the making", must furnish the raw materials for the Knowledge Factory and constitute an effective driving force that can spark, in the user of that facility, a full sense of responsibility.
This concerns gearing the research for the comprehension of Ortigia towards the creation of a model of cultured knowledge, capable of educating in everyone the respect for the environment in which we live, which in turn is able to change the needs of people and their lifestyle.
In brief, the aim is to create a virtuous circle in which knowledge determines a conscious and therefore responsible use. This in turn steers the necessary transformations that are bound to the needs of contemporary living and also to the respect for the identity of place, which thus does not lose out in vitality, but gains in intrinsic and economic value at the same time.

Keywords: Knowledge, Quality, Innovation, Survey, Modeling.

1. A Charter of Quality for the documentation of the complexity of architecture (G. Taibi)

For a long time, the survey, considered in its comprehensive and complex formulation, correlated to the implicit and articulate issues connected to it, has continually filled our scientific and temporal spaces.
We recall well this multiplicity of cultural encounters, promoted over the years and on various occasions, to give real substance to intuitions and conjectures in the making, directed toward scientific contents that focus on the theory of the survey, rigorously framed with objectivity.
From the outset, the survey has played a procedural role of profound and meticulous understanding of contexts and architectonic and environmental heritage, interpreted in their historical framework.
The survey that, upon the rigorous fact-finding process and the correct critical appraisal of events that characterize its every transformation, unquestionably needs a cross-referenced control between the data deriving from the current status of the urban composition and those deriving from historical documentation, undertaken by an accurate confirmation of the single events and a systematic comparison of heterogeneous data.
Furthermore, the need is also felt today to devise computer graphic systems that can both acquire, implement and modify heterogeneous data, with scientific rigor but also keep apace with the transformations

of a reality in continuous evolution, both to generate clear, interactive and increasingly divulgative communicative elaborations that are technically codified at the same time.

"*The premise of any intervention on cultural heritage is the understanding of the architectonic and environmental asset considered in its entirety, in its overall articulation; it is an awareness of its being the result of a stratification over time, of successive interventions (very often realized with different criteria and constructive techniques).*

Moreover, in markedly historicised buildings, each part is always tied - in its structural, aesthetic and functional rationale - to the whole. In other words, this means reconstructing, through a complex activity of surveying (mensoria, historical-critical, archive, bibliographical, technical, technological), the criteria, procedures and rationale with which the organism has come about over time.

Safeguarding the cultural patrimony represents one of the objectives and equally one of the most important challenges of our time, because only this can ensure the conservation of the documented historical memory of our civilizations; this safeguarding - that we consider here from a scientific, technical and technological viewpoint - is first and foremost a moral, social and educational problem. Indeed, it presents not only working and technical problematic aspects, but also those of a programming and managerial, social and educational kind.

Clearly, the first level of safeguarding is knowledge; to know means, in some ways and in any case, to document. Indeed, documentation constitutes an indispensable support for the protection of the cultural patrimony. In recent times, the evolution of concepts and the progress of technologies have meant that the cultural and scientific debate should evolve in the examination of which type of documentation is the most suitable.

In architecture, this problem has been conceptually surmounted in the survey; a composite operation to which a precise meaning is attributed." [1]

In this work, our attention focuses on understanding the morphological complexity of a historicised site, giving broad room to the fertile growth of the cognitive process on the buildings of Ortigia.

In this systemic picture of the knowledge of the urban situation – realising that the urban form means an inhabited density within a territory, defined by the intimate connotations of the typical essence of that city – it becomes above all important to focus attention on a wider spatiality, in which the features of the urban presence are still manifest and effective in an environment that transfers the existential conditions of the culture of the place and expressive modes, also in cohabitation with a fragmented present situation.

Such a complex issue as this (like the one undertaken at the Laboratory of Representation), namely the fact-finding investigation of a historicised site, culturally engages and involves an immense body of working units, with diverse expertise and competence, able to respond fully with results to different urban fringes, typologically diversified, of the site of Ortigia.

Fig. 1: Aerial view of Ortigia. Stratified materiality of *Palazzo Lanza Buccheri* and of *Palazzo Migliaccio*.

Today, the need to observe city sites by entering their meanders and penetrating their reality with the aim of being able to interpret, understand and appreciate the values of the more recondite intimacies of the places, is increasingly felt.

In many cases, the current urban configuration is the outcome of articulated stratifications and transformations occurring over the course of centuries; in this case, the conceptual operation of interpreting its complexity may happen, only and exclusively, as already mentioned, through the meaningful and appropriate integrated reading of archival, cartographic and calligraphic data of the physical structure.

Tangible testimony is given by those urban centres, recognizable for being, in truth, cities reconstructed in situ, that bring into play and show coherent peculiarities and features, even deriving from natural or intentional stratifications.

In these cases, it is easy to recognize a precise character of the place, defined by the persistence of latent or manifest signs that remain in the fragments of the architecture of the past and are kept over time.

In truth, we are marking the image of that place by understanding it, in a metaphorical sense, as a veil by which to filter and observe the historical, cultural and material contents of the investigated situation.

It is clear that, in any case, the addends of the system, made up by the fascinating enthusiasm of surveying and revealing and by the ensemble of latent or manifest signs, expressed also in cryptic form, confer keen cultural interests and strong emotions to the careful operators in the field.

In all this, the interest and the anxious impulse aimed at achieving an improvement of the procedural course that may give life to a system, above all conceptual, that has the verifiability of the reliability of the survey carried out as its primary objective.

This need arises from the reflection that all the commitments spent at any level to be able to define the rules of the survey never entirely satisfy us.

It is almost like saying that we are affected by a beneficial greed, tending to produce in us a kind of adrenalin tension toward attaining ever more noble objectives.

It is fully shared that it is necessary to obligatorily differentiate the typological sections of the survey in relation to the objectives of future intervention on the study case.

And it is equally fundamental to bring into play the construction of parametric elements, or rather pointers, to support the problematic of interrelation of the data acquired from the investigations with the reality of the context.

"*For the purposes of a partial indication of the possible interpretations of the built environment, considered in its architectonic, urban and environmental complexity, we note (…) some indications (…) related to the* cognitive surveys that are possible to carry out on the ground, outlined in relation to the* forma urbis*, to the* forma architecturae *and to the* modus habitandi*. The ensemble of this fact-finding data, if constructed in a coherent methodological structure, potentially allows creating pointers as useful tools for the progressive interrelation of every survey on the constituent elements of the city.*" [2]

In this sense, with regard to the **forma urbis** and the **forma architecturae**, the historical-evolutionary analysis, the morphologic analysis of the aggregative systems, the typological analysis of the building type, the architectonic/diagnostic/structural analysis and the analysis of infrastructures and services are to be considered determining, while concerning the **modus habitandi,** the building analysis, the settlement analysis, the analysis of the property and economic/productive analysis, are to be considered determining.

But in any case representation' is the "*outcome of an intellectual and applicative work*", [2]; indeed, as Roberto de Rubertis states "*it is the very model of the reality that man constructs in every action of knowledge; … it is the logical scheme by which (he gives) meaning to the complex entirety of appearances with which reality presents itself; … it is an extraordinary process of simulation for the exercise of the mind; … it is the model… of a system of observed, assumed or planned relations ; … it is never reality that is being represented, but only its model, namely only the ensemble of the characteristics that intuitively or deliberately are selected and destined to become sign*". [3]

In this sense, the model, assuming great responsibility, unequivocally becomes the strategic tool of historical-critical knowledge.

"*Such representations, in the unavoidable fluctuation between iconography and symbology (…) constitute (…) one of the many possible images of the surveyed city and at the same time a interpretative document, it itself interpretable as such. The ensemble of images forms the representative model of the historicised urban reality, as the end and current product of the historical process of formation and transformation*". [4]

In a research work curated by Mario Centofanti and Stefano Brusaporci for the city of L'Aquila, the Santa Maria Paganica Quarter, an interpretation oriented toward pinpointing the typological features cross-referenced with the historical-architectonic value, the historical-artistic value and the historical-environmental value, is proposed. In this context they conclude: "*The two-dimensional representative model (…) is*

constituted by a Charter of historical-architectonic values, a register of analysis charts for each single building, by a Charter of the environmental values and by historical-synchronic cross-sections". [4]

In the light of the legacy of research carried out and of the already acquired experience, it is legitimate to hope for the construction of an outline document, namely a *Charter of the Quality of the Survey*, understood as a territorial system of quality aimed at raising awareness toward protecting the landscape, that has its forerunner in the Charter of the Survey of 2000, and that can gather together the results of all the experiments undertaken in the field in the various research centres.

This entails conceiving of a *Handbook of maintenance and safeguarding of the landscape*, an instrument of suitable intervention to read and interpret the constituent elements of the intrinsic structure of the landscape features and that investigates the history and nature of places, analyzing their evolution, stratification, settlement structure and the environmental and landscape configuration, following a disciplined path and with precise scientific rigour.

2. The Knowledge Factory, summary of the survey of Ortigia (R. Valenti)

The continuous improvement in digital instrumentation, a support for the survey at various scales, involves a dynamic process of adapting in the field of applied research.

Undoubtedly, what the operators in the sector demand of technique and the tools that it produces has changed profoundly; but the skill in comprehending the cause-effect relationship that the use of the instrument entails has also changed. The quality of the results of an instrumental survey may be valued, certainly, through a judgment of efficiency and performance of the machine, but this, for the purposes of research, is only one aspect, without doubt important, especially when the laboratory in which one is working is a highly articulated place both in quantitative and qualitative contents, as is the site of Ortigia.

Indeed, the peculiarity of the three thousand year old island consists precisely in having safeguarded the hallmarks of its history in an integral way, in having conserved the traces of successive ages not according to precise episodes, but through a co-existence of elements belonging to different ages in the same building, through a contextualised re-use. In Ortigia, the generations preceding us behaved with a genuine idea of re-using the existing material and its rational insertion in successive usages, directed toward modifying the aspect of the city, adapting it to the styles and functions of the time.

The need for a reasoned order of the parts of the pre-existent historical-architectonic elements, authentic fragments of a compositional language in continuous evolution, which may be found widely at all levels in the urban fabric, from the underground to the visible city, from the elevations to the plans, from the corner joints to the stringcourses, was already sensed when the renewal construction sites brought to light details of a building language of one of the periods of greatest splendour of the city, taken up again with contaminations in ages closer to ours, almost to highlight the nature of the distinguishing signs of a place with a profound history.

Fig. 2: *Palazzo Montalto*. The signs of the identity of a place and the details of a compositional language.

In the variety of observable elements, it is as if one may find again a coherence of language, the expression of a way of doing and intending architecture, even in the apparent range and diversification of forms and typologies.

Ortigia, therefore, has a particular potential, during a fact-finding approach, namely to reveal itself through fragments; by these it is possible to carry out a detailed interpretation that may provide an explanation of the original architectonic nuclei, of the transformations, consequences of political, social, economic, cultural and natural processes which the city has undergone.

If Siracusa, during its territorial expansion, has experienced changeable vicissitudes over its centuries of history, the island of Ortigia may be thought of as the vital nucleus of the city, able to convert and adapt its layout and architectonic fabric to the events to which socio-political and natural destinies have subjected it. Its prominent role as a cultural and economic centre is well known, above all in Greek Antiquity and the Middle Ages, a role that from an architectonic profile has lent it an expressive faculty and a lexicon that makes the island a unique monumental complex.

"*Every urban system always has a highly complex and changing configuration, and it is often difficult to understand its evolutionary logic of transformation. The instrument that perhaps more than others is concerned with seeking to understand such logic and, therefore, control it, is represented by the urban survey.*" [5]

The survey, in implementing the complex fact-finding process, in order to achieve the objective of penetrating the context, must base its articulation on a system of investigation that can focus on the signs and languages making up the substrate of a collective memory that, unconsciously, recognizes in these the very identity of the place.

It should not be forgotten that it is precisely memory that is the measure of the importance and need to safeguard, to restore to a usable condition and intervene in a place in order to ensure its vitality is never forgotten. Moreover, so that the social system in place is durable, it is necessary that it has the capacity to self-reproduce and, therefore, to reformulate the functional requirements according to the expectations and behavioural motivations of citizens.

The opportunely organized understanding, according to ordered schemes, can attribute to the amount of information, ever more abundant, a narrative and evolutionary sequence, able to connect apparently decontextualised signs and substantially linked by the history that unites Ortigia with a broader territory to investigate, including other municipalities of the Val di Noto.

The task of understanding of the city, therefore, follows a fundamental critical course in devising an investigative method that, starting from the profound knowledge of the morphogenetic complexity of the historical built environment, takes into consideration not only the metric aspects, but all those fragmentary elements whose recognition depends on the cultural expertise of the research team. No instrumentation, however sophisticated and precise, can determine the quality of a survey alone ; it is supported by a working technique that makes experience an added, inevitably connected value.

Fig. 3: *Palazzo della Camera Reginale.* Memory as a measure of protection and intervention.

The systemic complex of the knowledge of the heritage of Ortigia is therefore integral to "evolving contemporaneity", in the sense of understanding the architectonic fragments that, in their continuous integration with the whole, contribute to the characterization of the evolution of the *facies.*

In order to do this, what is necessary, as Paolo Marconi affirms, is the "*recognition of the built structures. Such recognition takes place thanks to a profound practical and cultural preparation, in which not only the identification of the histories and images composing them is applied, but also the examination of the stylistic features, as well as that of the working techniques and modes of production*". [6]

The detailed location and highlighting of elements in a global mapping of the site establish a network of easy visualisable thematic connections, whose purpose is to coherently compose what appears fragmentary, so that from the multiplicity of data one can move on to a unique picture, determining for the Knowledge Factory.

This is of fundamental importance in order to start up a process of raising awareness at several levels (administrations, inhabitants, visitors and students) so that the unitary perception according to a thematic nature recalls the memory of a context, endowed with similar qualities extending also beyond its boundary.

It follows that the widespread consent towards conserving historical non-monumental assets, emerges from the usefulness value universally attributed to these by an aware community, since well-informed, and that the safeguarding and valorisation entail a "balanced or sustainable development" [7] tied to the concept of overall social worth, tackled by researchers such as Milan Zeleny, Peter Njikamp, Henk Voogd, Luigi Fusco Girard, which when referring to resources of common interest, represents a paradigm that counters the one of total economic value.

"*The correct knowledge, understood as a whole, can trigger that symbiosis between cultural and economic development that, in the era of globalization, is fundamental in order to insert a territory, however much known and emblematic, into a vital circuit that must be self-maintained and that cannot yield, in order to survive in a qualitatively acceptable way, to fragmentary policies of intervention*". [8]

Following this perspective, the detailed knowledge, by fragments, of the monumental context of Ortigia, organized in synthesis according to thematic qualitative relationships, becomes a tool with which to unravel the signs of an obvious, though not easy intelligible, stratification. Therefore, by structuring knowledge according to a summation of the individual thematic traces it is possible to reconstruct the memory of the place and start an organic process of characterising in the territory. To this end, the use of multimedia technologies also enables sharing the categories of information collected with other situations that, in this case, may have similarities and would in turn help to implement the network.

"*Further investigations in this direction arise from the will to render the virtual medium an instrument, in addition to being fascinating and stimulating from a cultural point of view, are also useful, above all if shared with the bodies in charge of developing the territory*". [9]

Raising awareness of those working in the various administrative sectors and stimulating the sharing of joint policies of intervention, aimed at tourist-cultural routes, may induce benefits of an economic kind in territories with a strong cultural value.

Fig. 4: *Palazzo Chiaramonte*. The signs of the stratified history of Ortigia.

3. Evolutionary systems for the representation and transmission of knowledge (M. Liuzzo)

The research activity undertaken for many years on a rich and complex site such as Ortigia, with the aim of building interpretative models that can recognize and communicate, in a structured way, its multiple stratifications and changing aspects, cannot overlook the implementing and gradual development over time of some underlying principles on the methodological choices and purposes of this study approach.

Those concerned with the knowledge, safeguarding and transformation of the environment in which we live have always raised important questions on the "why", "for whom" and "how" to tackle cognitive processes that are new and different each time.

Undeniably, modern computer technologies, by now widespread and consolidated, are able to offer an immense range of alternatives including choosing to give an answer to the question of "how".

It remains, perhaps, to enquire further into the way in which the indisputable potential of such tools and software can be shaped and, therefore, fully taken advantage of in relation to the cultural and technical-practical requirements of man, on the basis of the "whys" and of the "for whom".

"In this sense, researchers in the field of Representation, of whom it is demanded to keep 'apace' with the fast progress of information technology systems - that has strikingly increased the potential of the interpretative-representative system – must duly approach the aspects of extreme research into expressive effects with a critical sense, sifting, according to culturally and scientifically oriented foundations, the fascinating range of alternative proposals and promoting the gainful embedding of new relationships of interaction between the administrators and users of a city." [9]

The general economic conditions, the difficulties in implementing effective actions in terms of conserving and revitalizing the vast historical-cultural heritage of which the national territory is so abundant, are so onerous as to vehemently motivate the scientific community that – far from being able to remain entrenched in a position of the learned observer, indignant but unheeded regarding the actions of agencies operating in practice and deciding the fate of our territories - cannot absolve itself from dedicating its expertise and specific study areas to the service of the collective, opportunely orienting its own research lines and very own "wherefores".

"The damage to the landscape hits us all, as individuals and as a collective. It kills historical memory, wounds our physical and mental health, offends the rights of future generations. The environment is devastated with impunity every day, the public interest trodden on for the profit of the few. The laws that should protect us are dominated by a paralyzing "friendly fire" between public powers, by conflicts of competence between State and Region. But in this maze it is necessary to find the way out: because the apathy of citizens is the best ally of predators lacking scruples. […] The quality of the landscape and environment is not a luxury, it is a necessity, it is the best investment for our future. […] a strong popular action that again raises the issue of the common good as the foundation of democracy, freedom, legality and equality, is necessary." [10]

If "apathy" towards of our heritage, our cities, the multiple weave of memory of our past and our identity, arises from a general lack of knowledge and awareness, the prime cause of the total absence of a sense of responsibility concerning the common good, it then becomes a priority to implement democratic strategies of transmitting the very process that may create a virtuous circuit in which understanding determines a conscious and hence responsible use. This in turn should be oriented towards the necessary transformations linked to the needs of contemporary living and also to respecting the identity of place, so that it does not lose its vitality, but rather gains in intrinsic and economic value at the same time.

With this responsibility in mind, a suite of digital instruments, online and offline, called "Crabnebula", has been conceived - and applied, in the first instance, to a significant portion of Ortigia [11] - with the aim of uniting and integrating various useful information towards a critical interpretation of the places: from the integrated environmental, urban and architectonic survey, to the three-dimensional rendered model, for an interactive and culturally oriented use of the investigated sites.

A database, that can always be expanded and updated in content and categories of information, accompanies the virtual model. It enables collecting much more information that, suitably catalogued and dated, by superimposing and cross-referencing, constitutes a matrix articulation, useful for an overall understanding based on discernment and reassembly of the parts.

The desire to render knowledge communicable, coherent and accurate at the same time, of the spatiality of the investigated site, has been decisive in choosing a three-dimensional representation of synthesis that, thanks to today's tools of computer modelling, allows a controlled transposition, through mesh and nurbs, of the data of the survey and, therefore, an accurate representation of any architectonic form, ascribable to simple assemblages and rough three-dimensional transformations or the most complex solids and surfaces of free or organic form.

Fig. 5: Simulation and Virtuality. The modeling of the "*ronchi*" aimed at understanding the urban grid of Ortigia.

The intrinsic potential of virtual reality, the ability to express by mimetic representations of phenomenal reality that may be transmitted, without overlooking those aspects of precision and reliability demanded of coded graphic representations, means that the same medium can be imagined to aid the sharing of information with various kinds of users, the foundation in order to favour new and beneficial relationships of cooperation between operators and users of the common patrimony.

On one hand, it has been decided to not abandon encoded two-dimensional graphic representations, to be set alongside the three-dimensional representation of synthesis, not as self-standing designs, but as correlated data, above all in anticipation of accurate transformations of the real scenario to be transferred, in rapid time and coherently, into all the representations, through an interface of dynamic data updating, so that by *"modifying the data of the 2D model in a suitably created file, an updating of the database, the 3D model and of all the information in which the record is present, can be achieved. In this procedure a report of the operations undertaken is generated (log)".* [11]

The in-depth exploration in this direction arises from the aspiration to start up, thanks to the sharing of "Crabnebula", an effective collaboration with the administrative bodies in charge of organising the development of the territory, providing them a useful monitoring tool and control of the changes, able to point out sensitive areas and critical zones, and receiving from these same bodies information in real time on on-going phenomena, facilitating accurate updating of the linked model and database.

On the other hand, believing the chance to exploit the multimedia technologies on the market today a priority, not only to promote tourism but also for a culturally oriented daily use, the "Crabnebula" suite has envisaged associating to the virtual model of Ortigia a *Qrcode*, the code for interactive reading, through suitable devices already in common use such as the smartphone or tablet, with a series of alphanumeric information, that acts as an on-line guide for consultation, by the city community, for a dynamic utilization of the virtual reality.
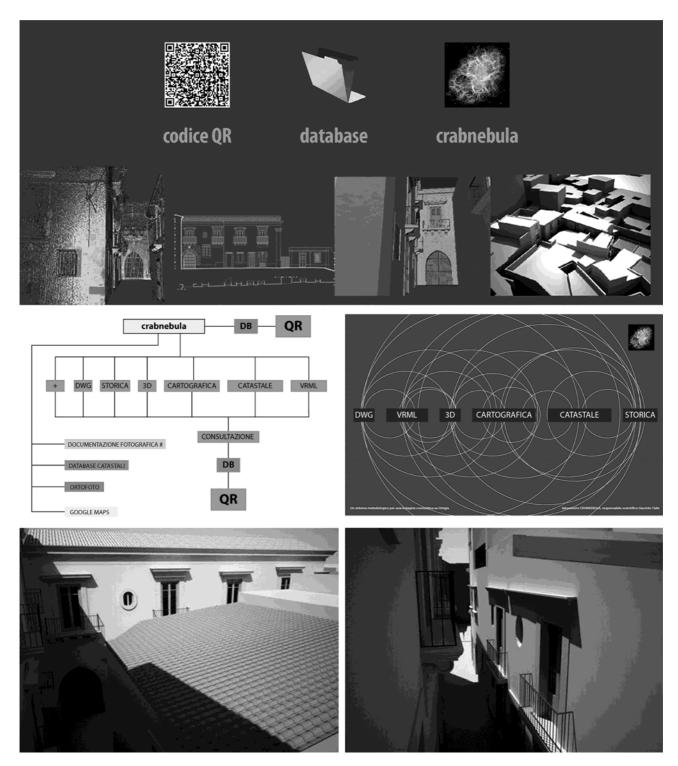
Fig. 6: The Theorem of the Knowledge Factory: Analyze, Explore, Share, Know, Communicate.

What has been achieved is only a first step. However, it appears entirely in line with the current directives of support to research and sustainable development, both international and national, that hope to see the implementation of project ideas aimed at realizing *smart cities and communities*, characterized by applying new technologies of information and communication with the aim of improving the governance, management and enjoyment of the heritage and services to the public.

Such a directive cannot fail to have a particular significance when applied to a country that has one of the greatest resources, and hence responsibilities, in its historical cultural heritage. *"If Europe has singled out the priorities in energy and sustainable mobility as applied to the great city contexts, in Italy we have the duty to be the hallmark of this vision, in the first place by applying it to the city and widespread communities; in the second place, by valorising distinct assets of the country like the historical and cultural patrimony and finally, by valorising models of social cohesion."* [12]

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A dynamic integral of software to support the ideational thought

Giacinto TAIBI, Massimo D'AIELLO, Giuseppa MANISCALCO
 DARC, Facoltà di Architettura, Università degli Studi di Catania, Siracusa, Italia
E-mail giacinto.taibi@gmail.com, max.daiello@gmail.com, giusima81@hotmail.it

Abstract

The productive activities of the cerebral hemispheres, the moment they manifest themselves, whether they involve a path of material construction of the idea, a reading process of the thought that supports the form, or a procedure of environmental and architectural survey, need adequate systems for an appropriate and targeted graphic representation.

Cartography, useful means by which is possible to record the changes of the city or of a single urban area, is the heart of planning or conservative interventions. The structured supporting systems, related to the computer logics of GIS, make possible the decoding of complexity whether urban or architectural.

All these elements allow an orthodox survey that meets the condition of scientific rigor in the phase of acquisition of geo-referenced data through the use of topographic techniques.

Today the available hardware is underutilized and the software is often closed and not post implementable, whereby various applications must be used for simple operations. The new frontier lies in the ability to write targeted plug-ins using visual editors, thanks to open-source technologies that allow to manage the graphic representation in a more simple and rational way, following the example of Grasshopper, visual editor of generative algorithms, that doesn't require the know-how of a computer programmer.

Keywords: creativity, freedom, place, hardware, software

1. Freedom of expression in heuristic manifestations of cerebral hemispheres (G. Taibi)

Today, by far, the concept of freedom is the most evolved form of inner well-being of human beings.

There is and there can be no progress, broadly speaking, without freedom, even tacit or overt.

Freedom to exercise decision making powers with the aim of achieving a goal. Freedom to act independently, with the support of the baggage of past experiences.

Freedom to fly through the mind on an ethereal plane, full of insights and imagination.

Freedom to change preconceived reality, according to new scenarios and more articulated structure of requirements.

Freedom to shape, with their own hands and cultural insight, new products and new forms of everyday life.

It is evident that the deeper meaning of free will and freedom of expression, within the productive activities of making architecture, lives, obviously, in close connection with creative skills and conception, intended as potential production of human race.

Creativity, actually, is a very broad and sophisticated concept which, in very simple words, can be condensed into a multifaceted and eclectic activity, aimed at thinking and producing in the direction of progress and innovation.

"*Creativity consists in the ability to produce new, original, appropriate ideas and objects to which is attributed a value that can be social, spiritual, aesthetic, scientific, technological.*" [1]

A propulsive activity, whatever may be its incipit, intention and purpose, is inevitably a prelude to a process of introspective ability, also referred to the temporal dimension, that is essential to focus on all issues related to it.

Procedures inherent in the fertile proliferation of artistic production, the peculiarity of creative process is identified in succeeding in highlighting and tackling, simultaneously, a plurality of needs and requirements that are an integral part of desiderata, evident expression of daily life outcomes.

All this, however, must satisfy the need to consider, in the same time, all parties and their differences as well as to be able to define typological aspects of spaces and determine their dynamics, seen in a possible time sequence.

The support provided by computer systems turns out decisive, because they can develop simulation models of reality, regardless of graphic process, and, sometimes, even of the Euclidean geometry, which can represent, reductively, only a small variety of shapes and that, therefore, could contract and reduce the knowledge of those space reality defined by a specifically complex morphology.

By acting in this way and arranging special rendering typologies, thinking in terms of totality of a complexity and addenda of a composite whole is no longer an utopia. They, in their value of quantitative and comparative assessment tools, satisfy the need to reconstruct, in a general framework, parts and fragments into a sort of representative forms, capable of simulating sensations and visual perceptions.

It is important to reconstruct sequences so as to be able to combine, into a single graphics performance, the requirement of accuracy, completeness and adequacy in the simulation of reality as well as the possibility to include into the type of representation, the time function.

This function, which can normally be understood as a continuous succession of identical empty, or a series of containers to be filled of activities, can be considered as a discrete or indeterminate set of smaller parts, consisting of fractals of the time continuum.

These are *fractus* elements that find raison for being, at first, in moments, very short space of time, and then in seconds, in what is going to happen, in what is going to be created, in what can cause new blood and new propulsion.

But all this takes place, constantly, every moment, where *momentum* is to be considered a contraction of *movimentum*. And every moment is to be understood as an impulse in its meaning of *impellere*, or to push forward.

But then we are in the presence of a continuous movement, a continuous process.

It is, in other words, that fraction of time in which we expect something to happen.

It's that time *fractus* in which our creative process can have an intense activity and all our requests have one or more solutions, in accordance with the apparatus of needs within the context.

The mass of ideas' production should be set just there. Getting inspired from the baggage of the imaginary of signs, it aims to produce a range of possible solutions, which must be compatible with parametric setting concerning basic binding issues.

Ideas, formulated in the cerebral hemisphere, originate from external stimuli, experiences, pre-existences find within places. Ideas that, in their formulation, are clear manifestations of mental productions, free from constraints, facts and feelings of limiting closures.

Unfortunately, the specific human behavior, related to behavior pattern of daily routine, inevitably leads to a reduction of vitality that materializes when daily life dulls and paralyzes ideas' production.

In other words, ideas are creative processes that lead to a process of representation and a full freedom of expression and movement.

"*Albert Einstein gave particular importance to the intuitive mode of thought, understood as a sympathetic understanding of experience, well differentiated by cold and logical observational attitudes. Compared to Poincaré, he gives us a deeper examination by allowing us to describe the succession of mental operations that precede and prepare the intuition: moving from first perception, up to visual memorization and till the formation of a reservoir of images that can be recalled and used repeatedly and in various forms, up to the opportunity to freely play with concepts and see intuitively functional relationships between concepts and new sensory experiences.*" [1]

Generally, when we speak about representation, we make reference to known situations and also to inner facts of our psychology that, although articulated in a complex form, of course, even with difficulty, can be part of our representative ability.

"*Design is treated in pedagogical terms, mostly in reference to J. Dewey's and W.H. Kilpatrick's theories and also to planning, understood as the tendency or inclination to design, ideas' production, programming etc.., as referred in psychology.*

In philosophical terms, we can even say, in general, that the design is primarily aimed toward an anticipation of possibilities: any prevision, prediction, planning, ordering, predetermination.

In this sense the design - not necessarily related to data or events - becomes a way of being of the human condition and precede, or should precede, any action, whether individual or collective:
Martin Heidegger, in Sein und Zeit, introduced the notion, pointing out what he calls the ontological-existential constitution of the project: planning his life the man realizes its real possibility, its potential to exist". [2]
"It is unanimously thought that paths of knowledge, interpretation, ideation and representation will materialize into a cultural and artistic moment, in which converge the whole wealth of knowledge and also that the full awareness of the goodness' philosophical content of what it was thought, understood as primeval but mature idea, takes determination on the basis of the relationship with the phenomenal apparatus of the real and events'panorama".[3]

The concrete, in some way, oriented towards the formulation of ideas, suggests that we must think in terms of more sophisticated products, able to take into account the structure of needs and therefore a production aimed at the development of appropriate expressive systems and flexible and implementable custom software.

On the other hand, it should be expedient to activate processes of recognition and identification of logical deductive procedures, capable of making explicit cultural experiences that have supported the project. These procedures, conducted in the opposite direction to the generative process of ideas, are very important to trace the reasons of the project, the whole collection of conceptual reasoning that, on the basis of analyses conducted on dynamics of territorial expansion, on the evolution of aggregate forms, on parametric aspects they have in common and on those that determine a differentiation and even on the basis of the attention paid to the cultural, economic, political and social setting, that was its background, allow to highlight issues relating to the reconstruction of the ideative process, which have always been the object of deep reflections.

It has to understand, chiefly, relationships and connectives that are established among the parties, rebuilding and reactivating the tangle of relationships between nature, man and building, to find a sense of belonging in places' identity and also understand, finally, what signs can define its image.

1: Simulation of Complexity. Herzog & de Meuron, *Epicentro Prada*, Tokio, Giappone.

Fig. 2: Gianfranco Pugliese, *Snapshots of the complexity*, result obtained with software Ultrafractal.

2. Composite Software to investigate the geometry of place (G. Maniscalco)

One of the fundamental problems, so typical of our inner drive, is linked to our impulsive temperament to succeed in exploring in depth, with plenty of information, the cognitive process of what constitutes our specialist field, the object of the study.

The survey, a specific field for knowledge, with its performances, implies the acquisition of a wealth of data on the situation of architecture and also a faithful schematization of the place, to be able to understand and analyze it.

"*Undertaking the survey of an object, of a territory, whose geometry is particularly complex, means knowing its dimensions, its forms and the relationships between them; this allows analysing it quantitatively and qualitatively, starting from objective data, and to build a graphic document that, projected on a particular plane, is its image reduced to a certain scale*". [4]

In a territorial context, the cartographic support is decisive. It may be considered a kind of measurement of the landscape, a very complex element that cannot merely be broken down into a reality of addends, but must be seen and framed in a puzzle of interrelations between parts.

The territory is a sovereign field, it is the inspiring force of our design-concept abilities, it is the spur to define the guidelines of the project.

"*The problem of knowledge on a built territorial context (…) can be faced, regarding some historical periods that are closer to us, making use of a valid aid, namely that of ancient cartography.*" [5]

It is well known that there can be no project without an understanding of the territory, of the place. By the same yardstick, the preliminary operations for the use of the territory must focus on all the problematics of the knowledge factory of the complexity of the environmental system that is made up of fields ranging from geomorphology, the protection of natural resources to the safeguarding of water resources and agro-forestry problems.

Interpreting the physical-territorial, historical-cultural, settlement components and the transformation of the landscape, constitutes the process of regeneration that is useful toward elaborating a coherent description of the identity of the place.

In this sense, analyses of the nature of the *topos* are useful tools for targeted projects, examining the natural conditions of the territory, deriving from the study of the elements of geology, topography and climatic aspects.
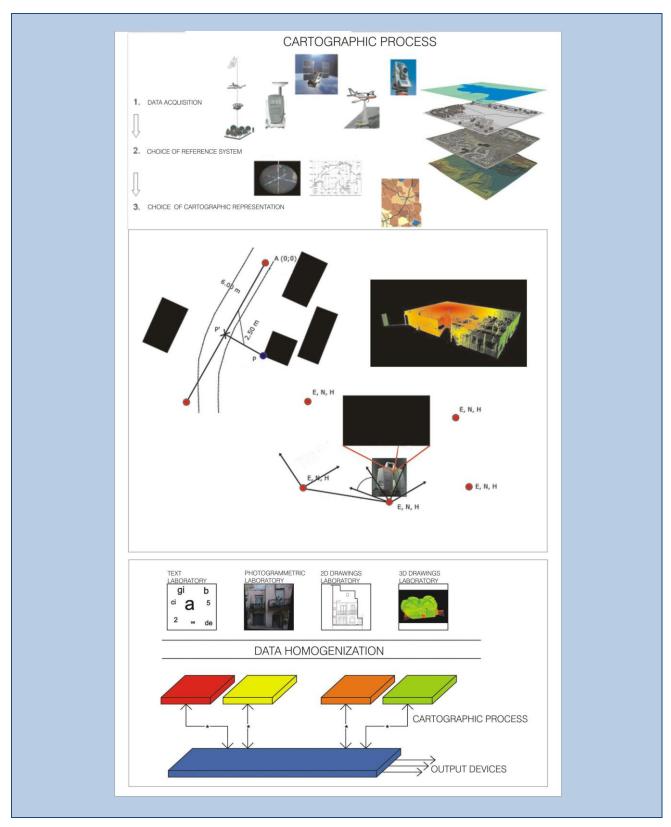
Fig. 3: Procedures and elaborations of the complexity of the cartographic process.

All this induces a full awareness of the need to set up an organization of the information, able to implement a series of interactive procedures between phenomena and requirements, making recourse to an information system of data. Interpreting modern cartography as the locus responsible for the analytical description of the territory, we must strive toward giving emphasis to some interpretative elements, in an attempt to render them above all communicative, through a representation system that we may call critical-analytical.

It is appropriate to start up an entire operating system that has the faculty to fully appropriate, memorise, analyze and manage all the kinds of geographic information of reference and that, through suitable IT aids, may speed up the recording, cataloguing and management of data through software, able to organize and combine remarkable amounts of information, whether acquired in graphic or alphanumeric form, establishing, sometimes, relationships referring to images of spatial or photographic origin, making recourse to symbology and characteristic data of the language of computer graphics.

We are referring to the GIS that, clearly as a computerized information system, allows acquiring, recording, analysing, visualizing and restituting information deriving from geographic data (geo-referenced).

The GIS, which should not solely be considered a container and visual display of data, but chiefly a dynamic centre of elaboration and verification of historical hypotheses, aims at supplying new information, which cannot be acquired with other means. Indeed, the new techniques, based on the use of technologies and information technology procedures, prove useful in the structured systemic sets on the cognitive documentation of complex architectonic organisms.

In the first instance, in the context of a survey, we may pinpoint and recognize the fundamental kinds of computer science treatment of acquiring and elaborating texts, images and graphic-numerical data.

The ensemble of these applications leads to the formation of an information model, usable under various profiles, as a store of raster or vectorial images, as a container of written texts in relation to images and graphics, as databanks and calculation tools for the most complex problems of topography and structural analysis and as a tool to be connected to peripheral devices of various kinds for written or graphic document production. The scientific research and all the activities carried out in the Laboratory of Representation of the Faculty of Architecture of Siracusa use some experiments of digital photogrammetry, treatment of three-dimensional data and elaborations of virtual reality, both to elaborate synthesis images, as well as construct information systems for the management of the architectonic heritage.

The acquisition and elaboration of data, analysed in the Laboratory, take into consideration the characteristics of every technique related to the single extrinsic capacities, such as precision, accuracy and format of data, inserting them into a database that is useful for multiple applications, among which documentation, diffusion and in-depth analytical-geometric studies.

3. An evolutionary process of software and hardware (M. D'Aiello)

"The historical centers, monuments, even the degraded landscapes are the raw material of our investigation, the hardware, on which the thinking and the integration of skills act as a software to define a repertoire of appropriate solutions to return those area to the community through an action to regenerative protection". [6]

Although, we have today large resources of processing, we use software that, not always, are able to exploit these resources in the best way as happens in issues related to the activity of the "*knowledge factory*", understood in its broadest sense.

We use powerful computers, with several giga of ram and SSD, just to surf to the web, when the same operations were carried out for some time, with the first "home computer".

In fact, the software, although reliable quality, understood as a refinement of detail and backward compatibility to the bitter end, it's not unable to stand the overflowing development of hardware while the system requirements are primarily for trivial frylls.

Indeed, today, is establishing a new type of software "distributed", which comes from small "*software houses*", where a part generalist, you can add independent sub-services that implement the ability through specially designed modules and scripts.

Today, 75% of transactions conducted through the classic cad tools are the same as you were making 10 years ago, and implementations, 3d, modern layout, etc., have not undergone the same development of the related hardware.
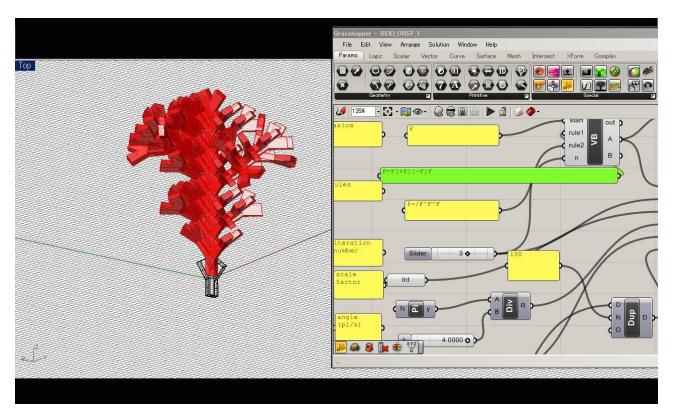
Fig. 4: A processing system of complex shapes.

To meet the growing need, today, we prefer to resort to more advanced programs, which rely on open source plug-in. In fact, these design software do not require knowledge of programming languages, but allow you to build forms using an graphical interface, with nodes and links, to keep the concept open to future changes. Which is of considerable importance and full support for those research that address issues directed to the definition of images in the specific field of ideational manifestation, of the complex and varied activity of the composing and the intense deepening oriented to the factory of knowledge and the finding of the matrices of reading.

But other events in the field of the digital evolution have made the resounding success of the tools "easy" who were born on the internet and making use of large support community. This 3d programs, developed for the web and that have their strength in the simplicity, the learning curve, and the sharp reduction in costs. All this, explains the significative windward taken by tools "easy" compared to traditional software, taking account of their great simplicity, according to a revolution that comes from below, by performing the effect mp3, where a limit, becomes a resource.

Erroneously, at first, were not taken into account the benefits arising from size, much smaller, in relation to digitalization, web resources and relative connection speed and the diffusion on Internet. Later this system, as well as in the case of disruptive technologies, managed to establish itself resolutely reaching levels of power and sophistication such as to overshadow the old systems.

Christensen explains, often enter at the bottom of the market, where they are ignored by established players. These technologies then grow in power and sophistication to the point where they eclipse the old systems.

In fact, going out from seeded and moving within in music, with the format mp3 we have given a new meaning of quality, which is not a quality in an absolute sense, but the quality in terms of response to specific needs.

The computing landscape today is moving toward "cloud computing", that set of technologies that, through a "web based" system, "provider-client" , allowing you to store, store and process data (via CPU or software) under utilization of resources hardware / software distributed and virtualized on network.

And this becomes advantageous in that, using the technology of this new computer system, users, connected to a "cloud providers", can perform all operations, including through a simple browser, and use applications even if not physically reside on their hard drives. It follows, therefore, that, at a distance, can be

used in remote systems for processing or for storage, creating, in the latter case, suitably, an automatic and multiple backup.

The innovation and success of "cloud computing" is that, beyond the advantageous reduction of the financial commitments, determined by the contraction of investment and support costs, for effect of intelligence of the technologies, which form the basis, are easily configurable and accessible via the network. For more you can have access to services at all times and in each spacial scope, being able to view and work on documents via the web, from any place and on any device.

All this portends that the near future could take place in software development of "web-based" on "cloud", that is platform independent, allowing the management of a project distributed easily scalable, open-source and possibly with a support community, which promotes growth and making changes, on the examples already cited, so as to be always available, is not subject to cross-licensing and is free from the hardware, at least as regards consultation.

All our problems, including that associated with the virtual modeling, lead us to reflect on the hardware and software necessary and appropriate to meet the needs related to the complexity of the issues addressed. In this sense it seems appropriate to turn our attention to the systemic potentiality, in permitting the complete management of the process, related to the complexity of the issues facing to the knowledge factory, viewed in its entirety, until it comes to virtual representation, are released from platforms and allow a different data management.

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Energy consumption management using CAFM and BIM applications

Andrea ACQUAVIVA[2], Laura BLASO[3], Daniele DALMASSO[1], Matteo DEL GIUDICE[1], Giovanni Vincenzo FRACASTORO[3], Valerio R.M. LO VERSO[3], Enrico MACII[2], Anna OSELLO[1], Edoardo PATTI[2], Anna PELLEGRINO[3], Paolo PIUMATTI[1].
[1] DISEG - Department of Structural, Geotechnical and Building Engineering Politecnico di Torino, Italy
E-mail: daniele.dalmasso@polito.it, matteo.delgiudice@studenti.polito.it, anna.osello@polito.it, paolo.piumatti@polito.it
[2] DAUIN - Department of Control and Computer Engineering, Politecnico di Torino, Italy
E-mail: andrea.acquaviva@polito.it, enrico.macii@polito.it, edoardo.patti@polito.it,
[3] DENERG – Department of Energy, Politecnico di Torino, Italy
E-mail: laura.blaso@polito.it, giovanni.fracastoro@polito.it, valerio.loverso@polito.it, anna.pellegrino@polito.it

Abstract

Normally end users are passive users who do not participate in managing their energy consumption. International literature is demonstrating that involvement and awareness in facility management can help energy saving. For this reason, it is necessary that the subject becomes active and able to fit inside the energy management information.
From this point of view, the Smart Energy Efficient Middleware for Public Spaces (SEEMPubS), a Seventh Framework Programme project, aims to reduce energy consumption in historic and modern public buildings through low economic impact construction works and an efficient ICT network for monitoring, detecting and managing consumption.
At the end of this project, consumption data, which were collected within a number of the test rooms, will be available to end users through a Facility Management application (Archibus) that will allow users to see energy consumption data visible in real time, and to perform a different kind of medium and long term analysis and consequently to plan construction works, when necessary.
At the same time, collected data, are used to study the methodology through interoperability among parametric software, both architectural (Revit Architecture), energetic (Daysim, Radiance and TRNSYS) and Facility Management (Archibus FM).
Therefore, SEEMPubS will be able to transform "users" into "informed-user" involving them in the global energy process.

Key-words: Archibus, SEEMPubS, Revit, Facility Management, Interoperability.

1. Introduction

When we talk about end users we refer to subjects at the end of the process. Generally, this process ends when users performs their actions and tasks and receive a benefit. As just described these subjects are known as Passive Users as do not interact directly with the process, but are limited to suffer the consequences. On the contrary, Active Users are defined as subjects, that in response of a proper information, interact with the system productively synergistically; when operating in this way the subject plays a major rather than a secondary role.

Distinction between Active and Passive Users becomes of basic importance when we talk about energy efficiency and saving.

Since 2000, with the introduction of the European Climate Change Programme (ECCP), and subsequent amendments and additions, the European Union (EU) has pushed and encouraged the introduction of national policies for energy saving and reduction of greenhouse gases.

Alongside with the actions that National Governments have enacted with the aim of pursuing the objectives of the Program 20/20/20 (Directive 2009/28/EC), one of the indirect goals is just to increase information, about energy saving, and transform users in active users able to act in practical ways to reduce consumption.

The advent of Building Automation or rather the concept of Smart Buildings, in which different types of systems are managed in an integrated way, has allowed the involved users to increase their awareness and control about energy saving and energy management. However, this type of building management system was limited to commercial buildings.

The extension of this concept to the majority of people came with the introduction of Home Automation, which is the science that deals with the study of technologies to improve and optimize the use of home places.

Dissemination of these two applications is, in both cases, strongly connected with a strong diffusion of the concept of energy saving and user interaction. The awareness of a single person, who understands that his role, however small, can lead to significant savings in energy terms, is the basis of current policies that are implemented with increasing force, at all organizational levels. It is in fact understood that the monitoring of the role played by rooms occupants is essential to control the total consumption of a building.

The Politecnico di Torino is an institution more sensitive to the energy saving and for several years has been engaged in initiatives and projects related to this topic.

All these projects always consider the active presence of end users and their interaction with the process; for example, it is possible to mention the initiative called "M'illumino di meno" which took place on February 17th, 2012: all Politecnico's employees were asked to do energy-saving actions paying particular attention to power consumption and to switch off all energy consuming equipments (e.g. printers, computers, etc.) when they are not used, as well as to close windows and lower thermostats.

The monitoring of consumption, combined with user information campaign and to the implementation of the suggested actions, resulted in a saving of over 6.000 kWh (around 15% of total). Although about half of this was due to antifreeze pumps switching off, the remaining part may actually be attributed to individual energy savings measures.

Fig. 1: Representation of the ordinary and effectives consumption on February 17th, 2012, for the Main Campus of Politecnico di Torino [taken from web site: http://smartgreenbuilding.polito.it/]

This is just one initiative where users are involved directly, there are also research projects developed with national and international contributions, involving the study and analysis of scientific methodologies for monitoring and reducing consumption, such as the European project SEEMPubS.

2. SEEMPubS

The European project SEEMPubS (Smart Energy Efficient Middleware for Public Spaces) is a project of the 7th Framework Programme; it specifically addresses reduction in energy usage and CO_2 footprint in existing Public buildings and Spaces without significant construction works, by an intelligent ICT-based service monitoring and managing the energy consumption. The project bestows special attention to historical building in order to avoid damage by extensive retrofitting.

The project focus start considering that in most public buildings the system management is performed in independent and not integrated way, as a result it is difficult to obtain an optimal management of different type of consumption.

Specifically, the project includes use and implementation of a system based on "LinkSmart" (also called Hydra), a middleware service, developed in other European project (Jahn et all., 2009) (Lardies et all., 2009). The "LinkSmart" is designed to support the development of embedded systems networks, simplifying the interconnection between devices, which are often heterogeneous, and principally communicate with different protocols for data exchange. Therefore, SEEMPubS platform allow to monitor and control, in an integrated way, different type of system (such as lighting and HVAC) and its consumption.

All collected data will be constantly compared with the external climatic condition in order to crate the best interior comfort.

The middleware implementation provides development of an ICT network able to detect consumption data resulting from different type of wireless sensors connected to the system and subsystem and consequently allow to analyse them.

Additionally, all data about energy consumption and energy saving will be made available in a web-site being implemented in order to increase awareness of energy saving and efficiency in public buildings by the users.

The project goals can be summarized as follow:
- Developing an integrated electronic system to monitor different building models, technical building services, electronic devices and operations in order to optimize and integrate all maintenance functions.
- Implementing an interoperable web-based software solution for real-time energy performance monitoring and control of lighting, heating, ventilation and air conditioning services through wireless sensor networks in existing buildings and open public spaces.
- Raising people's awareness for energy efficiency in public spaces.
- Providing multi-dimensional visualization of parameters of building operations and data sharing from technical systems.
- Validating the developed monitoring system through an iterative methodology.
- Translating the most significant research results achieved within the project into a model for existing buildings and public spaces in Europe.
- Disseminating and exploiting the project results according to a strategy based on several awareness-creation means and to the specific business and market targets of the individual partners.

3. Case Studies

The first activity, necessary for data acquisition, was the selection of the rooms. Particularly, 6 pairs of rooms were selected, each one is formed by a test room and a reference room (where Building Management System (BMS) will be implemented for lighting, heating/cooling and electric appliances control and monitoring). The 6 pairs of rooms have a lot of different features between them while the differences within the pair are almost nil.

In this way, we can work with rooms for which it will be possible to make not significant construction works and evaluate energy savings (test rooms), at the same time we are being able to compare these values with the state of the similar environment (reference rooms). The selected rooms are located in the Valentino's Castle, in the Main Campus of Corso Duca degli Abruzzi and in the Cittadella Politecnica. The choice of these three different types of buildings is connected, as mentioned, to the desire of having buildings with different constructive characteristics and different periods of construction.
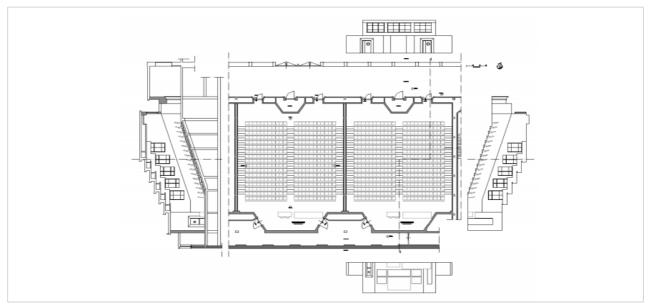
Fig. 2: Classrooms used as case study: test room (on the right) and reference room (on the left).

4. Interoperability to assess performances for different control strategies

A detailed relief of architectural features of each case-study (geometry, furniture and equipment, surface reflection/transmission properties, lighting/HVAC systems etc.) was carried out so as to create accurate 3D models of the selected rooms. The models were used to run energy simulations (TRNSYS for thermal analyses and Radiance and Daysim for lighting analyses), which were validated through monitored data and then used to estimate the building energy demand for different control strategies. As far as lighting simulations is concerned, Radiance was used to validate the models, comparing the simulated illuminance distribution to the illuminance values measured in the corresponding rooms, while Daysim was used to estimate the lighting energy demand and the savings obtained with the specific control strategies proposed for each case-study. Daysim in fact allows running annual simulation for a site, accounting for the specific dynamic climate conditions.

Before starting the simulations, the use of BIM for architectural, HVAC and lighting systems modeling, as methodology to test the interoperability for energy efficiency simulations, was investigated. The BIM approach started with the creation of 3D models of each case-study, including their external environments, through Autodesk applications. In particular Revit Architecture was used for architectural modeling and Revit MEP for the modeling of heating and lighting systems.

In order to run the lighting simulations, it was not possible to import the parametric model from Revit into Radiance/Daysim directly. The software Ecotect was hence used as interface to launch Radiance/Daysim. As a result, the import from Revit into Ecotect was addressed: the first trial adopted the traditional approach based on the exportation in IFC (Industry Foundation Classes) format, but it did not succeed because some elements were not exported or were displaced. The second trial was based on the exportation from Revit by a gbXML file, but some geometrical discrepancies in the surfaces generated from the solid elements made the model unsuitable for the lighting simulation. The third procedure eventually succeeded: using 3D Studio Max as an intermediate software (to convert the .fbx file exported from Revit in a .3ds file to imported into Ecotect) good results in terms of geometrical consistency of the exported model were obtained.

At the end of the interoperability process, lighting simulations were run to validate the models and to use them to evaluate the potential energy savings concerned with the proposed control strategies.

The validation phase with Radiance showed a difference between measured and simulated illuminances ranging from -12% to +30%, depending on the considered sky conditions (clear or overcast sky) and on the position of the verification point within the room. This discrepancy might be attributed to the interaction of the different aspects which are involved in the simulation process: 1) the correspondence of the sky model generated by Radiance starting from the measured outdoor illuminances (direct and diffuse horizontal illuminances) with the real sky condition; 2) the optical characterization of room opaque and transparent surfaces; 3) the accuracy of the instruments which were used; 4) the accuracy of the geometrical model, with particular attention to the modeling of the glass surfaces.

According to the characteristics of the selected rooms, a first series of monitoring and control strategies was proposed. In particular as for lighting new control strategies were proposed (IESNA 2000) (Acquaviva et al. 2011): for spaces with high daylight availability and medium/high users absence probability, a combination of daylight harvesting and occupancy control was proposed; for spaces with low daylight availability, a lighting control based on occupancy sensors was proposed, while a peculiar solution was defined for large classrooms with no daylight: students absence probability during the day is very low, but the classroom area could be only partly occupied when a small number of students attend the lectures. In this case, it was planned to use several occupancy sensors to dim to a minimum the lights corresponding to the unoccupied classroom areas. Anyway, in all cases users were provided with the possibility to override the automatic control via manual command. Based on these assumptions, some recurrent combinations of lighting control strategies were initially proposed for the selected rooms:

- time switching, occupancy detection for personal light and manual control: this mix of control strategies was proposed for the Student Offices where daylight availability is very low and the general lighting is provided by means of High Pressure Metal Halide lamps, which cannot be switched on and off instantaneously and cannot be dimmed

- daylight harvesting, occupancy detection and manual control: this combination of control strategies was proposed for DIST offices, Administrative offices and DAUIN private offices. In these cases the automatic dimming of lights based on a daylight harvesting control strategy could be applied successfully thanks to the high daylight availability and it could be useful to control lights on the basis of room's occupancy too, as a medium absence probability could be truthfully assumed for these offices

- occupancy detection and manual control: these control strategies were proposed for classrooms 1&3 and for the DAUIN open-plan offices as daylight is not allowed to enter the rooms (in classrooms) or is quite low due to the glazing characteristics and the external obstructions produced by the structure of the double façade in the DAUIN offices

- shading device control based on outdoor illuminance or solar radiation: this control strategy was proposed for DIST offices, where motorized blinds are installed on the roof lights, to control overheating and glare due to solar radiation.

For each room, the initially defined control strategies were simulated in Daysim and the corresponding energy demand for lighting and the potential savings were estimated, comparing the energy demand for the new strategy to the demand for the currently installed control system.

The obtained results outlined that, in most cases, the initially proposed control strategies would not provide the expected energy savings (from 5% to 30%). This might be due to the fact that the automatic on and off implies the switching on of lights whenever someone enters the room, independently of the indoor lighting conditions that might be determined based on daylight. Once switched on, lights are kept on, in standby mode, even if daylight is sufficient to fulfill the lighting requirement. Based on this, it seemed fairly probable that energy savings could be increased by using the occupancy sensors only to switch the light off when users leave the rooms, while leaving the occupant the task to switch them on if the lighting level is perceived too low. Increasing user information and awareness is one of the key goals of the SEEMPubS project. This should reduce the number of hours the lights are on, or in standby mode. Based on this, new improved strategies ('updated strategies) were defined and analyzed through new sets of simulations: it was then found that the most effective control solution for some of the analyzed case studies was a mix of manual and automatic control instead of a fully automatic control as initially proposed. The best results were obtained assuming that users have an active behavior in controlling blinds and lights, thus increasing the potential energy savings (range 13% ÷ 39% for an equal mixed passive/active behavior and between 14% ÷ 71% for the active behavior, where passive and active users are based on two different stochastic models implemented in Daysim) (Reinhart 2004).

5. Intelligent Control System

The strategy for smart building management and control leverages upon an ICT infrastructure made of heterogeneous monitoring and actuation devices, such as Wireless Sensor Network (WSN). An innovative web service oriented software infrastructure has been developed to manage heterogeneous and commercial wireless sensor nodes belonging to different WSN. The LinkSmart middleware (Jahn M. et al. 2009), (Lardies F.M. et al. 2009) has been adopted to provide interoperability between heterogeneous devices and networks, both existing and to be deployed. Moreover, the proposed infrastructure allows easy extension to third-party software, such as Archibus, and to other networks, thus representing a contribution to the opening of a market for ICT-based customized solutions integrating numerous products from different vendors. The system manages energy efficiency through the WSN, which is preferred in order to simplify the integration of

new sensors into the system and to avoid the overload of cabling in old buildings. The software infrastructure provides the following main functionalities:

- It enables the interfacing to the application layer by means of web services, through which sensor data can be read and used for visualization or to feed energy management policies;
- It collects sensor data in a local database, in such a way they can be accessed in an asynchronous way and preserved from network failures;
- It allows the remote reconfiguration of sensor node parameters such the sampling rate of physical quantities to be monitored;
- It enables interoperability among heterogeneous networks, characterized by different microcontrollers and sensors.
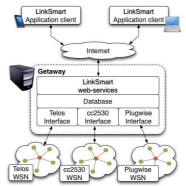
Fig. 3 Software infrastructure scheme to handle heterogeneous Wireless Sensor Networks.

As shown in Figure 3, our software runs in a PC-Gateway (GW) and communicates directly with the heterogeneous networks. The dedicated *Interface* represents the lowest layer of our proposed stack, and receives all the information coming from the WSNs, regardless of the adopted communication protocols, hardware or the network topology. Hence, each WSN needs a specific software *Interface,* which interprets the data and stores them in an integrated database (DB), in order to make the whole infrastructure flexible and reliable with respect to back-bone network problems, since data are locally stored.

The web-service layer, implemented using LinkSmart, interfaces the WSNs to the web, making easy a remote management and control. Moreover it exports to the application client layer, the last in our stack, all the environmental data stored in the DB and collected by the wireless sensor nodes. At this layer, the information is available to the end-user and ready to be shown via computers or smartphones or to be integrated with the data coming from Archibus.

Particular emphasis was given to the possibility to reconfigure each node, changing, for instance, some parameters about power management. In this scenario, the end-user sends the new configuration via web-services to the GW and stores it in the DB. Then, the new settings will be automatically sent to the receiver mote, when it will wake up from the sleeping period, through the specific WSN software *Interface.* The configurable parameters change depending on the hardware and the Operating System running on the end-node. However, using this software infrastructure, the user can choose only the right settings ignoring the real physical hardware related to the virtual device.

In a nutshell, the proposed web-based infrastructure is a software that makes transparent to the end-user the underlying WSNs, abstracting all the information about hardware, protocol stack and embedded operating system. Furthermore, by the use of web-services, it makes easy the interoperability with third-party software.

6. Data management using CAFM application

The best way for manage a large number of data is to use one or more databases, implemented and customized so as to receive, contain and store data that is decided to manage. Very often the database's structures are the basis of more complex applications whose task is to provide an IT support for the management.

Among the numerous families of applications available today, there is one called CAFM abbreviation of Computer Aided Facility Management. This family of applications has been developed to provide appropriate tools for managing facilities. Therefore the Computer Aided Facility Management are a computer products that are able to give access to a range of information related to capital assets of a company through an integrated alphanumeric and graphic database. Many of the aspects, to be managed inside a business organization, have strong ties with the space in which they are held, such as the management of the rooms,

management of employees or management of equipment and energy data connected to it; accordingly management software, as well as operate through tables and graphs must be able to interact with aided or parametric design software. Politecnico di Torino has adopted one year ago a CAFM application called Archibus FM, and is currently using for space management, maintenance on demand management and fire asset management.

This software, like many other similar products, consists of modules, each of which is responsible to contain and manage data on a particular aspect of business such as management and inventory of assets, employees or space management. Each module exists as an autonomous entity and contains within it all the features and all the tables, related to the database, that allow at facility managers to do their job.

One such instrument remain the professional responsibility of having to make choices about the content, but it is only a tool to infer information and perform analysis about a particular aspect of a organization business, after having examined data concerning it.

This product is currently on the point to be open at all users of the Politecnico, in this way the management of spaces, employees, or equipment, is not achieved in a centralized way but instead are the individual Departments, the individual Division, and in some cases the individual users to edit data and manage them.

The idea of collecting data about energy consumption of the rooms and make them available to users is one of the final stages of the project SEEMPubS and thus, a natural tool through which to make available these data, will be Archibus.

Archibus application, adopted by the Politecnico, has developed with client-server structure, a client side where it is possible to manage graphics tools and a server side that containing the alphanumeric information, then through a web interface, users can see graphical information and alphanumeric information linked together.
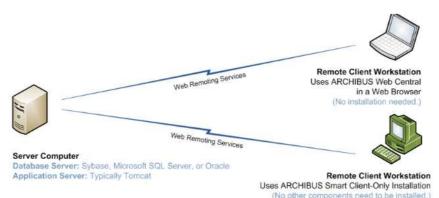
Fig. 4: Client-Server structure of Archibus FM application

Archibus, as described above, bases its operation on the link between graphic information and alphanumeric information; in particular the management of the spaces represent the support on which will be developed subsequent management actions, for example the placement of an object or a employee or rentals management is strongly connected with spaces identified and catalogued.

As just described, the graphical basis for the development and customization of Archibus is made using CAD maps, however, were performed tests in order to use BIM models realized using Revit Architecture.

Omitting the way whereby it is possible to connect graphical data with alphanumerical information using CAD file (.dwg) we can explain how to connect that information using Revit Architecture (.rvt).

First of all, it is absolutely essential that the parametric model has executed in a correct and complete way, at least as regards the architectural part, while it will be possible, at any time, add new information.

Another essential feature, in order to connect the graphical data (contained in Revit) with the numerical data (contained in Archibus), is the fact that each room created in Revit, and therefore enclosed by walls and floors, is also been catalogued using an appropriate Revit's entities called "Room".

This entity allows to catalogue every single space assigning it a identifier name and entering information, related to the room, on the local schedule in Revit.

Fig. 5: Revit's interface with "Room" entity and Archibus menu, used to connect graphical data with numeric data.

When the previous operation is done it is possible to proceed connecting Revit data with Archibus data. About this operation it is possible follow two paths, the first is to load in a massive way all identifiers of local (this is the official codes adopted by Politecnico di Torino to identify rooms, for example a single room may be identified by the following code TO_CEN03_XP01_B005 where it is possible to recognize site, building, floor and room), if we work in this way, when we decide to connect the room graphic data with the numeric data contained in the Archibus database, will be possible to speed up the connection operations.

The second way allow to work step by step; each time we link a room we have to populate Archibus table with the correct information about the room such as structure, type of room, capacity, etc.: however any additional information about room can be loaded into the database in following steps.

Regarding energy data management collected for the different rooms it is possible to carry out the management and the subsequent visualization, by a procedure similar to that described above.

Regarding data in Revit Architecture model, connected with the indications of SEEMPubS project, the following features are been implemented:

- vertical walls (insulation, orientation, inertia, performance (value of U, disorders),
- low floors (insulation, orientation, inertia, performance (value of U, disorders),
- roofs (insulation, orientation, inertia, performance (value of U, disorders),
- windows (frame, glass, orientation and mask, performance (value of Uw, surfaces).
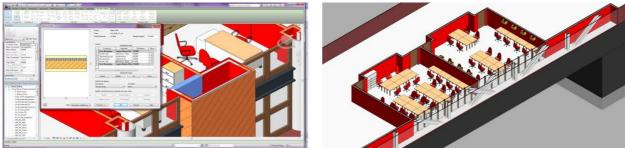
Fig. 6: Revit's model concerning the offices and laboratories case studies of the Cittadella Politecnica

Regarding systems modelling, it is possible insert in Revit MEP model information about heating, cooling, ventilation and lighting system.
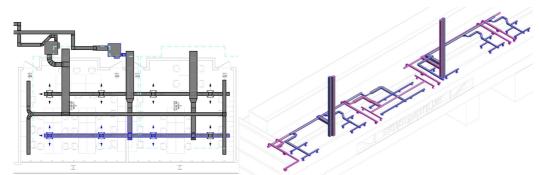
Fig. 7: Detail of the Revit's MEP model, concerning a piece of the HVAC system of the Cittadella Politecnica

This information can be displayed and managed inside Revit Architecture or Revit MEP, in the schedules that are created during the creation of the elements.

As regards data that we can insert in Archibus we can manage:

Characteristics of sites:
- geographical location,
- year of construction,
- constraints / assets of the site,
- orientation of the construction,
- definition of surfaces and heated volumes.

Characteristics of system:
- Lighting system (type of lighting: direct/indirect; type of lamp: fluorescent etc.; presence of emergency lighting lamp, type of control system)
- Shading system (type with shading system and type of shading control system)
- Heating, cooling, ventilation system (type of heating and cooling system, type of ventilation system, air temperature value, CO_2 concentration, type of control system).

Regarding monitored parameters it will be possible insert the following:
- Environmental and occupancy parameters (indoor air temperature and relative humidity, illuminances, presence/absence detection),
- Outdoor parameters (outdoor air temperature and global radiation),
- Energy parameters (fan velocity and supply air temperature of fancoils to calculate thermal energy consumption, electric power for lighting and appliances' loads.)

Regarding management of these features and dissemination of information to users will be developed a procedure characterized by the following operations. The data recorded by sensor, placed in various rooms, are organized into a database specifically created and that will keep the data as they are collected; then, through the interchange and alignment procedures, these data will be caught and dumped into specific tables inside Archibus database.

Through the Archibus's interface customization, that will be special views where, for each local, users can take vision, in real time, of the data mentioned above such as the internal temperature of the room, CO_2 concentration, etc., furthermore it is possible get an overview of the historical data for rooms and consequently have a vision for the medium or long period.

Users will be able to see their consumption data and consequently may make changes to control systems such as lowering the temperature or increase the air exchanges.

Another advantage will be to make available an additional tool for the Politecnico to undertake energy saving actions.

Fig. 8: Archibus's graphical user interface of Archibus for the Politecnico di Torino

7. Conclusion

Through research projects and initiatives involving energy efficiency will be possible to involve end users doing so that they become an active part in the process of energy saving. The SEEMPubS project has already seen active participation of the concerned users since its departure. One of the most interesting activity is about the study of the interoperability between software in particular before starting the simulations to assess energy savings, the use of BIM for architectural, HVAC and lighting systems modeling, as methodology to test the interoperability for energy efficiency simulations, was investigated.

BIM technology for buildings modeling has proved to be very useful as far as transmission of information and editing items are concerned. The model must still be implemented in a balanced way or rather must contain

exactly the information necessary to those who use it. This is useful to avoid having models that are too heavy and unmanageable. However there is also the possibility to implement the model with other type of information. In this case, though, some aspects remain to be investigated especially with regard to some interoperability errors that are still being analyzed and studied.

With regard to lighting simulations, the results outlined that the initially proposed control strategies would not provide the expected energy savings. For this reason, new improved strategies ('updated strategies) were defined and analyzed through new sets of simulations: it was then found that the most effective control solution for the presented case studies was a mix of manual and automatic control instead of a fully automatic control as initially proposed. The best results were obtained assuming that users have an active behavior in controlling blinds and lights, thus increasing the potential energy savings. Rising people awareness is one of the key goals of the SEEMPubS project.

Next steps will involve the implementation of procedures for entering energy collected data within Archibus through the personalization of the graphical interface; at the present Archibus is used by Politecnico di Torino's users regarding display of the spaces and the related features and for on demand maintenance, consequently the possibility to make available energy data collected can only make users more aware.

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[16] LIVING LAB OF THE POLITECNICO official web site: http://smartgreenbuilding.polito.it/

Roshān vs. Jāli

Dr. Faredah Al-MURAHHEM[1,] **Prof. Vibhari JANI**[2]
[1]Interior Design, Umm al-Qura University, Makkah, Saudi Arabia
fmurahhem@hotmail.com
[2] Department of Interior Architecture and product design, College of Architecture Planning and Design,
Kansas State University, Manhattan, Kansas, USA
vjani@ksu.edu

Abstract

In this paper, the authors shed light on *roshān* **[Figure 1]** and *jāli:* **[Figure 2]** two traditional architectural spatial devices that served essentially as *hijab* (veil) in Islamic dwellings of Saudi Arabia and India. The authors will discuss its concept, etymology, historic background, construction materials and techniques and provide comparative analysis of how these forms were utilized in dwellings of Saudi Arabia and India as a spatial device for: 1) separation of spaces; 2) to provide privacy and security; 3) to control and filter light; and 4) to control micro climate of the dwellings. The authors thus show how these two architectural forms are not just decorative elements for aesthetic beauty, but serve various spatial, social, cultural, religious and climatic functions. In conclusion; the authors will provide suggestions as to how these traditional architectural forms can be useful in developing sustainable design solutions for the 21st century architecture. The authors utilized two qualitative research methods, including literature review and case studies to collect the data for this research. Grounded theory was utilized to analyze the data. Conclusions were drawn based on authors' findings.

Keywords: *roshān, jāli*, Islamic architecture, screens, Muslim houses

1. Introduction

Roshān is the projected wooden window in large cities in the Hijaz region of Saudi Arabia, Sudan and Egypt. It is an old term for this kind of projected windows being used in most of the Muslim traditional architecture. It was also documented as *"roshān"* in planning and building regulation documents of the Islamic cities at the Mamluk era (1248-1516). This is the era in Cairo when the *roshān* was flourishing in Islamic architecture. The Mamluk controlled the trade between India and Venice for more than 200 years [23: p.101]. The trade route was the domain between these two civilizations, Egypt and the Indian subcontinent, where experiences between artisans may have been exchanged as well.

Jāli is an Indian term for a perforated stone screen, usually with an ornamental pattern [25: p.131]. *Jālis* have been used to cover verandas, balconies and separate interiors in Indian architecture since they were introduced by the Mughals [4: p.113]. Tillotson claims that *jāli* appear in the *zenana* (women's quarters) where the condition of *purdah* or *hijab (vail)* dictated the presence of *jāli* or screens across the windows [4: p. 207]. The need for privacy in the Muslim house is crucial, especially in the *harim* (women's quarters). As the *roshān* with its extra lattices envelops windows in such interiors, the *jāli* does the same in the Muslim Indian house.

The *roshāns* and *jālis* have been extensively used in religious to residential buildings in the Middle East and India. However; the construction materials, techniques, its treatment and applications differ. In this paper the authors will focus on the use of these two forms in residential environments and discuss the similarities and

differences between the two to show that both serve larger purpose then just providing aesthetic beauty. Through a comparative analysis between these two forms, the author will highlight its importance in conserving energy, providing privacy, controlling light and micro climate of the buildings. The authors hope that this information will assist the 21st century architects and designers in understanding the concept behind these architectural forms and inspire them to utilize it in providing aesthetically pleasing, sustainable building solutions.

1.1 The Architectural Concept of *Roshān and Jāli*

The *hijab* (veil) [Figure 3] is the inspiration behind the concept of the *roshān*, and this is the main reason for the existence of this architectural feature wherever and whenever Islam has existed. These screens work as an architectural veil, where it controls the intrusion of an outsider in a transparent setting like a women's *hijab*. Moreover, both the *hijab* and the *roshān* fulfill the notion of intimacy and seclusion, where curious male viewers have little chance to see what happens behind the screen [4: p. 27]. The privacy and the security for women are the two significant factors responsible for the development of the *hijab* (veil) and the *roshān* as well as the *jāli*. The *hijab* as a concept governs the daily-life of women in Islam; whereas the *roshān and jāli* as the enclosures serve as a screen, masking the openings of the house. These screened windows are like the eyes of the house; having the windows screened protects the interiors and thereby respects the residents' privacy. Nevertheless, the veiling of women is just one form of a broader range of understanding of its implications. The word *hijab*, as a noun, comes from the Arabic verb *hajaba*, which means 'to hide from view or conceal'. It can also mean "to screen" or "draw a curtain" or a barrier of any kind. It is essential to have the windows open during the daytime in the hot climate of Saudi Arabia and India, but it is also essential not to jeopardize the privacy of the inhabitants, especially in the Muslim households. Thus these screens not only fulfill the demands of the *hijab* concept wholly, but also provide other benefits such as opportunities for observation of the exterior environment from within and for cross- ventilation. In Muslim households in India, these pierced walls or openings were treated more as an enclosure, offering privacy and security to fulfil Islamic religious dicta, but Hindu homes also adapted this device for the same purpose. However; in India, the use of *jāli* is not restricted to covering windows, it also covers doors, verandas, balconies and are utilized to separate interiors in Indian architecture since they were introduced by the Mughals. Besides the windows and room dividers, these pierced screens are used extensively in Indian architecture around the thrones, platforms, terraces and balconies.

1.2 Etymology: *Roshān and Jālī*

In majority of the references; the term *roshan* is used, whereas the term *roshān* is found in some Arabic dictionaries and used locally in Makkah and the Ḥijāz region of Saudi Arabia until today. Sources vary in their explanation of the origin of the term and its root meaning. A Farsi (Persian) origin is supported by the Farsi dictionary, which includes the word *roshan*' under *roshandān*'. *Roshan* means 'illuminating', 'shining', 'clear', 'evident', 'vivid', 'a place that shines with light' and *roshān* has similar meanings It is also suggested that *roshan* derives from *rauzana* and means a small window in the sense of 'light', or a shelf or balcony [6: p. 54]. The translation of the Hindi term is written as *raushan*, *roshan, adj,* whereas *roshan-dān* is a hole for admitting light or a skylight. However, the reference also highlights two other interesting aspects: the first is that of the Persian term *roshanā*, means light, splendor. The second is that of *raushnī* or *roshnī* and it means light, brightness, splendor; illumination or clearness (of vision), sight (of the eye); a lamp kept burning at a Moḥammadan tomb or shrine [24, p. 0606].

Arabic dictionaries suggest that *roshan* or *rashan*, under the root *r-sh-n* 'ن-ش-ر' or *r-w-sh* 'ش-و-ر', has the sense of a small window, *roshan* the sense of a shelf, and also *roshan* or *roshān* is a Persian word [3: 228, 6: 315]. Furthermore, in a comment on the root *r-sh-n* or the term *roshan,* Arabic dictionaries maintain that the Arabic verb *rashan* has the sense of stretching out the neck, as in 'the dog *rashan*', that is to say, it puts its head into something, the action of extending the neck, or craning the neck. Also from the root *r-sh-n* comes the adjective '*rāshin-* راشن' that is described as 'established man' but can also be applied to an intrusive person. The linguist Muhammad Labib Al-Batnūnī mentions that the people of Makkah used many Turkish and Persian words, such as *roshan* for 'window' [2, p. 43]. In fact, the word *roshan* or *roshān* was absorbed into Arabic long ago [4: p. 55].

The term *roshān* is still in use in Sawākin in Sudan and Rashīd and Quseir in Egypt. These cities are on the Red Sea and on the route of the Ḥajj. Trading plays a significant role in the movement of the *rawāshin* across the Islamic world. The popularity of the term among craftsmen goes back to this area, as the makers of these *rawāshīns* were from Bukhara who lived and settled in Jeddah for several generations [27, 132]. Persian

trade with Jeddah as a significant harbour in the region is so old, where some wealthy Persian merchant families abandoned Siraf, on the Gulf, and migrated to Jeddah in the tenth century. It happened when Fatimid-ruled Cairo eclipsed Abbasid Baghdad, and the Indian traders followed the shift in regional power from the Gulf to the Red Sea [14: 13]. Thus it is clear that most of the sources support the Farsi (Persian) origin of the word, though they differ over its root meaning. This is the most convincing opinion, and is supported by the fact that Persian culture is strong and ancient and had a linguistic influence on neighbouring cultures. In fact, the presence of the Persian word was even earlier than Islam [21: 34–41], especially in the area of the Ḥijāz – and Makkah in particular – because of the two Pre-Islamic trade journeys in the winter and summer [27: 273–283]. These trade journeys were to Yemen in the winter and the region of *Al-Shām* (Syria and the north of Arabia) in the summer to exchange trade with the silk route.

A *jāli* is an architectural device, a perforated screen of stone, wood, brick or other material that protects the interior of a building from direct sunlight while allowing an essential cooling breeze to enter. *Jāli* confers a measure of security; to deter thieves, as the openings are never larger than the size of a fist [13: 470]. McGregor defines the term *Jālī* (*jālikā*) is defined as network, netting, crisscross; a net muzzle. A material of open weave: muslin, gauze; lace, a lattice, trellis, grating; or a screen. [p. 370]. *Jāl* (*Jāal*) is a Hindi term that means a net, a lattice grating; lattice window, and a network, mesh or a web. Whereas *Jāla-dār* (Persian adj.), means consisting of mesh, network; a cloth or garment having network embroidery. Another dictionary defines *jālī* as a Hindi term for network; a net (for holding grass, straw); an ox-muzzle; a lattice; a grating; trelliswork, lace, bobbinet; the integument in which a foetus is enveloped; a coil; the pellicle or coating of a fruit-seed as that of mango. [24: 0372]. The first dictionary highlights the link between the netting, lattice and the embroidery of the garment in the Persian adjective '*Jāla-dār*' that could be linked to the analysis of the *roshān* and the *ḥijāb*. In other sense, enveloping and protection is tangible, such as the coat of the fruit seed and the ox-muzzle device to prevent the animal from opening its mouth. The description of lace and trelliswork is another dimension that gives an exact definition of the nature of this device in the notion of concealment and protection. However, the link, of the *jāli* as a screen in architecture and the notion of protection and the cover as a garment is not direct in this sense. Dictionary of Islamic Architecture defines *jāli* as an Indian term for a perforated stone screen, usually with an ornamental pattern [25: 131]. According to Gunther, *jāli* is also a stone lattice or pierced screen or a perforated marble screen with an ornamental design [11, 220]. One reference claims that *jāli* is a Sanskrit term for lattice work or netting.

The exchanging of vocabularies between Arabic and Hindi is old and interwoven, due to the trade between Middle East and India through the Indian Ocean since the Pre-Islamic time. The Indian ports were often visited by Arab ships, and the Arabs reported to have established colonies in Ceylon (Sri Lanka), Malabar and the Karomandal coast of India as early as the mid-seventh century [22: 32].

1.3 Historical Background of The *Roshān* and *Jālī*

The word *roshan* or *roshān* in Arabic was used in the context of building and construction and was known to mean a wooden structure that projected from the wall of a house into the street without touching any other opposite wall. If it was supported from the street side by pillars, it was known as *jināḥ* and, if not, as *roshan*. It is also referred to by religious scholars in the 1500s in building and planning when it comes to how to define the *roshan*. The four *madhāhib* [1] came into existence in the period between the Umayyads [2] and the Abbasids [3]. (Murahhem, 60).This precision in the legal definitions by the traditionalists of the 'Four Schools of Law' enable us to deduce that the *roshan* or *roshān* has been used for a long time in construction and building across the Islamic World. This is evidenced from the term's universal use, insofar as all four schools of law had a clear understanding of the definition and meaning of *roshan* and, even if it acquired a variety of forms and descriptions from one area to another, its origin and definition are basically one. Similarly, each of the well-known law schools had their own area of influence in the Islamic world. The fact is that some areas continued to use the term until recent times, which may indicate that it was a well-known and well used term in the Islamic world.

Jāli became a significant feature in Indian architecture after the impact of the *Mughal* Empire so it is beneficial to highlight the historical background of this feature in this part of the Islamic world. Baker [4] points out, that *jāli* is one of the very early features of Indian structural design. These screens were familiar to the master-builders of the 'Mohammedan's India' says Bunt who notes that it latter developed notably at Ahmedabad into an art as exquisite, as it was wonderful [p.14 – 15]. Finely carved examples of *jali* appear in the houses among specific Muslim families, mosques, tombs and other building types of Gujarat and in the South, in the curved wood balconies of the houses and Hindu temples. [13: 470]. In fact, there is no evidence that proves

that *jāli* is not an Islamic feature introduced to Indian architecture. The development of Indo-Islamic culture began with the arrival of Arab armies in Sind in the years 711–712. The first phase of conquest absorbed the area roughly corresponding to Pakistan, where Arabic was the court language and Baghdad and Damascus were the mine-springs of culture and commercial life. Arab communities settled at important centres along the major trade routes to China and in the principal ports along the coast as far as the Bay of Bengal. [16: 454].

Over the course of several centuries, Islamic architecture transformed North Indian architecture. Islamic decorative traditions in carved and pierced stone-often inlaid with mirrors or coloured glass – and delicate miniature paintings were not only embraced by Indian craftsmen but developed into even more elaborate and detailed design. [30: 42]. The principle of transferring textile designs into the techniques of architectural ornamentation was a regular feature of the Mughal architecture, as it is more or less universal in the Islamic world. Certain sculpted stone grills decorating the windows of Lahore Fort resemble embroidered veil [11: 209]. Screens are customarily used in tombs to give shade while admitting air. In fact, the relation to *hūrma,* a concept that implies holiness, sacredness and respect in tombs is high in Islam. Therefore *jāli;* as a feature being used in tombs, was introduced by the Mughal's to the architecture of the Indian subcontinent to preserve *hūrma*. It was also used widely in houses or mausoleums alike in Muslims and non-Muslim buildings. Muslim architecture in the North-Western regions of the subcontinent: Sind, Multan, Punjab and the North West Frontier, had developed it as an extension of the Turko-Persian cultures to the West [22: 32, 38]. Dhameja also claimed that the technique of applying timber-bonding to brickwork or stone, as in Gujarat, was widely prevalent in ancient Syria and Anatolia as far back as 2300 BC. (P. 101).

1.4 The Construction Materials and Techniques of the *Roshān* and Jāli
In Saudi Arabia, the *rawāshīns* are placed in the protruding sides of the ground-floor door posts and form a kind of enclosed balcony, projecting out about 71 cm and screened by rows of woven shutters that can be raised and lowered. The *roshān* is made up of a group of large wooden apertures, projecting out of the sides of the buildings and are made of teak. It is built upon a wooden frame projecting out from the wall which is fitted onto the openings after being assembled and decorated as required. The wood may be left in its natural color, or it may be painted or sometimes dyed. In this, it resembles the *rawāshīn* of the region of Ḥijāz, such as Al-Tā'if, Al-Madina, Yanbu and some cities in the northern stretch of the Ḥijāz coastline.

The traditional *roshān* is assembled from identical parts and units known locally, so that the side panels of the *roshān* have one standard height, which also applies to the front panel with slight variations, not in the construction, but in small details. The variation may occur as a result of the joints between one panel and another and in order to achieve a satisfactory general appearance of the *roshān* as a whole, 'with the proviso that generally the width of the side panel should be equal to the distance between the uprights that divide the panels of the *roshān*'. The interior division of the upright panel also has to be appropriately coordinated. The *roshān* is divided into a number of upright sections so that the horizontal aspect of the *roshān* should be symmetrical, while its vertical aspect need not be symmetrical because of the variations in the component parts and their use. Thus, if the *roshāns* were made up of a vertical unit (X) which is repeated, we would find that the unit (X) would be a unit of, 50–70 cm and the *roshān* would then be made up of several **units [Figure 4].**

The internal divisions of the unit can be considered as horizontal units connected in sequence from bottom to top. If the standard upright unit is 'X', on the inside it would be bottom X, upper X and middle X considered as separate parts. Consequently, the inside of the standard upright unit would be a unit with a horizontal measurement repeated for each of the (X) sections. There are also additional trimmings and extras to join the parts of the traditional *roshān* as a whole into one fixture. Then the various decorative and imaginative items appear inside each unit and its parts, in the plain and empty areas and the hollowed out and projecting parts

In India, the construction techniques of *jāli* varied from region to region depending on the availability of construction materials. In the northern and north-western part of India, stone *jālis* dominated **[Figure 5]**; however, Ganapathy nots that the stone lattices were later replaced by iron rods and thick timber lattices [p. 470]. Wood prevailed in the Southern part of the country. Surprisingly; despite the shortage of wood in Gujarat, majority of the residential *jāli* work utilized wood, as the wealthy merchants preferred it. **[Figure 6].** Wooden interlocked screens and iron interlocked *jālis* as grills were specific innovations using the materials and technology available during the medieval period in Gujarat. [10: 34]. Brick and Bamboo was also used, however, the use of Bamboo was limited to tribal areas and in the North-East region of the country.

The motifs and patterns used in *jālis* differed between communities and disclosed religious identities of the residents: figural carvings were absent in Muslim residences as Islam discourages it, while Hindu households celebrated it. Parrots, peacocks and many other motifs were common occurrences in Hindu *jālis.* Chauhan and Bose also note that there was lesser affinity towards geometric patterns even in the Muslim residences (in Ahmedabad), possibly because the craftsmen and their skills preferences did not vary between communities. [p. 34]. The *jāli* materials also indicated the social status of the occupants: in palaces; stone was extensively used, while the population of the upper and middle class of the society utilized wood. Material selection also depended on the urban vs rural areas: urban residential dwellings utilized wood, stone, brick and iron whereas mud and bamboo were the two main materials used in rural areas of India.

Like the *roshāns in Makkah*, Saudi Arabia, the wooden *jālis* in the state of Gujarat in India, were carved from Teak or Sisam wood. But the similarity of these two forms stops there. Their proportion, scale and construction techniques depended on the function and location of these *jālis* within the doors, windows or balconies. For example, the *jālis* were predominantly used on the first and second floor windows, doors and balconies in Gujarati homes and utilized wood and iron grills as a combination at times. In *pols* (inner city neighbourhoods) of Ahmedabad, the first floor window size sometimes matched the size of the doors. The window frames were made of wood, while the full-length iron grills served as the perforated screens to provide protection, and ventilation. The wooden shutters were attached on the exterior side of the *frame*, giving the residents an ability to completely shun the sun and keep the heat at bay in the afternoon.

Chauhan & Bose observe that along the facade, the windows began from the floor level while the outwardly inclined balustrade was often in solid wood and (were) richly carved externally but plain towards the interior.....Windows were also divided into three parts, with the upper portion functionally serving as a ventilator whereas the lower two parts were operable depending on the seating height of the user. (P. 34). The upper floor windows were sometimes divided in two parts, the bottom part of the window may repeat the same iron grill work as the first floor *jāli*, while the upper half of the window did not have any incretion, and was left open to allow air-circulation in the room. Again, the exterior window shutters provided much needed respite from the harsh sun. Chauhan & Bose indicated that the brick walls on the upper floors gave way to thin partitions of half-timbering while the carvings became sparse. (P. 32). The r*aveshis* or *zahrookhas* (balconies) seen in many *havelis* (mansions) of Gujarat can be compared with the *rawāshīns* of Saudi Arabia*,* as they too protrude in the street from the first floor, and use wooden *jālis* as carved infill panels and bands along the sill and lintel levels*. Jālis* were also used for the railing of the staircases and parapet walls and utilized the same construction techniques.

Unlike Saudi Arabian *roshān,* the stone *jālis* of northern and north-western India were finely carved either from a large sheet of fine marble or other stones; or made of various small stone blocks. Generally small, square stone blocks of the same size was carved first, and these blocks were assembled together using stone ties on site. The number of the blocks utilized in the *jāli* depended on the desired length and width of the *device* **[Figure 7]**. *Havelis* (mansions) of Rajasthan located in the North-West part of India are famous, world over for their stone carved *zharookhas* (balconies) Like the *rawāshīns* of Soudi Arabia, the *zharookhas* protrude out in the streets; but utilize stone carved *jālis* to provide privacy and protection for the residents. Jain & Jain observe that stone *zharookhas* are pre-carved with a very sophisticated and predetermined assembly system. It is structured on the facade with the use of geometric articulation along with the other elements. The whole external facade of the *zharookha* is articulated and decorated using finely carved stone *jālis.* The size is beautifully related to the human scale. This can be well appreciated by the fact that the size of a *zharookha* does not change much as the size of a house changes from a small one to a large *haveli*. (P.165) This space gets integrated with the interior space and becomes an extension of it - serving as furniture, for seating or in some cases, sleeping.

In some parts of Gujarat and Rajasthan even mud structures imitated the *jāli* by introducing small perforated enclosures. Because of the characteristic structural weakness, the openings in the mud dwellings remain small, but the exterior facades are adorned with painted decorations. However, it should be noted that despite the impact of neighbouring Islamic regions, such as Iran, Afghanistan and Turkistan (Asia minor), on the Mughal architecture, some materials cannot be found in India, this shows that there are limitations when attempting to imitate a neighbours' architecture. For instance, neighbours' architecture rely on bricks and mud bricks, with plenty of glazed tiles and faience mosaic for ornamentation, while India at the time used stone as a main building material. What is possible in stone may not suit bricks and mud-bricks: as a result, the Islamic architecture in India is similar to the far regions of the Islamic world, such as Syria, Egypt and Anatolia. They

rely more on stone, plaster and marble as materials and on piercing and inlaying as techniques, but Indian examples are more elaborate. This is why various materials apart from wood that is commonly known in the Arab world were used in India for *jali* construction.

1.5 The Roshān *and Jāli* Within the Interiors

Since ancient times, the traditional *roshāns* and *jālis* fulfilled various desirable aims and purposes because of its strength (of construction) and its continuity over many centuries with its wooden and stone tracery. From a practical point of view, the *roshān* is a window that looks out on the outside world with a screen veiling the light of the strongly blazing sun. While *jāli* is a perforated screen that can be inserted in windows **[Figure 8],** doors **[Figure 9],** railings, parapet wall **[Figure 10],** or can be used as screen walls/partitions to dived spaces and provide privacy. Both serve as a basic part of the building's air conditioning and ventilation system and can serve as the furnishing of the home. In some cases it is even an extension to some of the upper level rooms as seen in *rawāshīns* of Saudi Arabia **[Figure 11]** or *raveshis and zahrookhas of Gujarat and* Rajasthan. The *roshāns and jālis* benefit the interiors in achieving: 1) Islamic rules and social norms; 2) Flexibility of air-flow and circulation within the interior, 3) Control of a desirable temperature and light, 4) Providing more room within the interior.

1.5.1. How the *Roshān* and *Jāli* Assist in Achieving Islamic Rules and Social Norms:

A comparative study of *roshāns and rawāshīns* of Saudi Arabia and *zahrookhas of* Rajasthan here will provide clear understanding of how these devices facilitate the above mentioned benefits. Both provide a privacy feature that protects the residents from the gaze of passers-by in the street while giving them the opportunity to follow what is happening outside without allowing passers-by to see inside the house, either via small openings between the units of turned wood *rawāshīn*, or through the narrow gaps and the openings in the geometrical designs of the *roshāns and jālis.* The fact that it is darker inside than outside also helps to achieve this aim. It also gives a woman in her private apartment inside the house ability to see life going on in the street outside without being seen, so that both these *devices* provide an advantage to her. If she wants to look outside through the shutters or *rawāshīn or through the perforated stone panels of jāli*, she can see without being seen. This is achieved by controlling the field of vision through the louvers when the screens are closed is about 90 degrees. By moving the louvers up or down, this device provides great flexibility to the field of vision. The louvers at the same time break the line of vision and prevent whoever is inside from being seen. The *roshān* and *jāli* allows the residents of the house to use their senses (hearing, sight and smell) to find out which activities and interactions and local events are taking place around the house simply and easily and without impediment. Tillotson states that *jāli* appears in *the zenana* (women's quarters), where the condition of *purdah / ḥijāb (vail*) dictated the presence of *jāli* or screens across the windows. These are finely-carved stone lattices through which the residents of the *zenana* could glimpse into the outside world or events in the courtyard of the palace without being seen. [31: 5]. Such analysis reflects an association between these screens and women's quarters in the Islamic house. In brief, the existence of the *jāli* alongside with women's section demonstrates the impact of Islam on the architecture of the region through the impact of the *Mughal* Empire. Thus, both these devices protect the inhabitants of the house from outside intrusion and adheres to the religious requirement of modesty, privacy and protection for the women dictated by Islam and also meets the societal needs for gender segregation in these parts of the world.

1.5.2 How *Roshān* and *Jāli* Provide Flexibility of Air-Circulation and Flow Within the Interior

The *rawāshīns* are spread out as box-like units projecting into spaces outside, staggered both horizontally and vertically so that they cast their shadows on the façade of the building. These extensions increase with height, so they act as shades for the spaces outside and the lanes around the building. The airflow in the interior spaces is governed by the openings and apertures in the various kinds of *rawāshīn*, as well as the *shīsh* – where it exists – in such a way that these parts act as layers of filters for both the air and the dust. The openings in the *roshān and jāli* also allow the air to enter and be sucked into the interior, thereby reaching the various parts of the house. The broad exposed area of the *roshān and jāli*, with the shade in the upper end, makes the air move very slowly as it enters so that it carries little dust. In openings were sliding panels with louvers are used, the flow and amount of air is controlled because the variations in the way the louvers can be moved makes it easy to govern the direction in which the air flows downwards into the room or upwards, as the resident wishes. Similarly, the amount of air can be controlled by opening the appropriate number of louvers in the sliding shutter; and each shutter can be considered a separate unit that can be controlled independently. This is not possible with *jāli,* as the construction of it is very different. However, the finely carved stone or wooden panels in fully covered *zahrookhas* fulfil the need for air and dust control. When the air enters the inner space, the alcove of the *roshān and zahrookha* creates an area where air can

be transferred or distributed. That is, taking the air in from the outside to distribute it inside across the adjacent area in which one sits. Therefore the air, after being purified and filtered through the previous layers, reaches this area, which is the coolest area in the inner space because it is hollowed out in the wall, the surrounding walls are very thick and the breeze comes in through the openings in the *roshān* or *zahrookha*. This constant entry of the outside air currents and their speed forces a quantity of air inwards and into the inner space as a whole. The direction of the flow makes it easy for the air to enter but difficult for it to get out, which keeps the inner space cool. This is a special benefit because the air circulates round this area and may collide if there are internal currents caused, for example, by a door which helps to cool the area further. Also, the force of the air current coming from outside is not matched by any internal current, and so the airflow is concentrated within.

1.5.3 How the *Roshāns* and *Jālis* Assist in Controlling Temperature and Light:

Wood as a natural insulator prevents the burning rays of the sun reaching the building, except via the walls or through the openings and apertures. The staggered or regular projection of the *rawāshīns* and *zahrookhas* throw shadow onto the façade of the building and thereby limit the penetration of direct sunlight and the rays of the sun reflected from the surfaces facing it. This helps the building to withstand heat from the outside, especially if the surfaces of the buildings facing each other are similar so that the two façades absorb the heat and insulate the area from the heat. The bases of the *rawāshīn* and *zahrookhas* with *jāli panels* are designed to attract shade onto the building to keep the temperature down within the interiors. The other parts of the *roshān* and *zahrookhas* and its decorative extensions and trimmings also contribute to creating shadows and breaking the concentration of the direct rays of the sun, which are dispersed by striking these angles, cavities and irregular surfaces. At night, the interior temperature remain comfortable because the cool air penetrates side from the *roshāns* and perforated panels of the *zahrookhas*, but the thick walls of the traditional houses that retained heat during the daytime, release it slowly. This phenomena can also be observed in the lower areas of the buildings that manage to retain their coolness through their proximity to the lower empty spaces which are comparatively cool because they are not greatly exposed to the sun's rays relative to the spaces on the upper floors.

The *rawāshīn* and *jālis* act not only as air filters but also as light filters since they regulate the entry of light and brightness into the interior spaces and solve the problem of glare. This is even more controlled within the interior space if there are supplementary lattice screens and *shīsh* in front of the shutter. In spite of the great quantity of woodwork in the *rawāshīn* or stone or wood work in *zahrookhas* that extends outside, the amount of light that penetrates into the interior may be considered to be under control because the various parts of these *devices* are sufficient to limit the strong natural light penetrating into the interior and so protect the residents from the problem of glare. If the shutters have louvers, the strong summer sun can create glare when the *roshān* is fully open. Therefore, the louvers are used to limit the glare so that the contrast between light and shade is acceptable and not a strain on the naked eye. During the day, the reflection of *jāli* patterns moving across the floor would double the pleasure because of their intricate geometry. [6]. Such a scene reflects the same benefits of the *rawāshīn* and the beauty of the interiors which demonstrates the dramatic view of the game of light and shadow from within.

1.5.4 How the *Roshān* and *Jāli* Provide More Room within the Interior and Change the Environment

It seems that the purpose in building *rawāshīn* and *ravashi* and *zahrookhas* is also to increase the floor area of the upper storeys and thereby expanding the size of the room. This affects the general size and form of the interior space. The extension outwards may be of balanced proportions, or it may be more one side than the other and this has an effect, both inside and outside. From inside, this extra area has a liberating effect as it makes it possible to accommodate many domestic activities, such as eating, sitting and even sleeping. . **[Figure 12]**.

1.6 How 21st Century Architects and Designers can adapt the Concept of *Roshān* and *Jali?*

"Less is more" is not just a slogan, but a necessity today because of the environmental, economical and social challenges we face today, these includes the energy conservation to sustainability of the planet. Besides these major environmental challenges, we also have to deal with form and function of the buildings, and social, cultural, religious and climatic needs of our clients. The proper understanding and adaption of the concept of the *roshān* and *jāli* can assist the 21st century architects and designers in fulfilling all of the above needs. The authors do not promote the blind imitation of these architectural devices, nor expect the designers to adapt the traditional decorative motifs and patterns in their design. But a new interpretation and articulation strategy may prove to be the most effective sustainable solution for some of the issues outlined above. For

example, the buildings in the hot climatic zone in the Western hemisphere can benefit from introduction of these devises. In the past Architects like Hasan Fathi and Laurie Baker . **[Figure 13],** and the contemporary architects like B. V. Doshi **[Figer 14]** and Charles Correa have successfully adapted these devices in their design. Mr. Baker actually adapted the concept of *jāli* in his brick buildings, where his beautifully designed perforated brick walls served the same function of the *jāli*. Mr. Correa and Doshi have mastered the play of light, shade and shadow in their buildings through the interpretation of this age old concept. For the artistically inclined, the new technology can provide a furtive ground for exploration and experimentation: may that be through the software calculations for heat loss and gain, air conditioning and light control and design of a new system based on this model, or make their dreams come true of achieving artistry of the past in their new fenestration design through CNC fabrication. CNC also provides the ability to customization achieve precision. A careful understanding of this concept and execution of it in the planning and design process from the beginning can truly beneficial in developing 21st century sustainable solutions.

1.7 Conclusions

It is clear that the appearance of the *roshān* and *jāli* do matter, but this beauty is not just skin deep: these devices have a number of qualities: 1). it provides unifying character that gives an aesthetic touch and a particular beauty to exterior and interior facades of the houses and thereby provide distinctive character to the particular neighbourhood. 2) Although the design of the *rawāshīn* and *jāli panels of the zahrookhas* differ from building to building; they all exude the same spirit and concept giving the urban environment its unity and identical character. 3). The materials used in making these *devices* aid in the creation of a particular kind of beauty, unity and harmony. The strength and durability of wood, stone or iron grills and its adaptability to decoration plays a decisive part in the external character of the *roshān*, and *jāli*. The use of any material over large surfaces creates unity and harmony despite wide variations in measurements and details and decorations. 4). The general distribution of the *rawāshīn or jāli panels* and the artistry of their component parts naturally vary in kind and extent according to the means and taste of the owner. The amount of decoration, the richness of the patterns together with the exotic style of *these devices* their size, the kind of carving and embellishment used – the general appearance of the house, including doors, windows and façades – reflect the economic and social class of the owners. 5). Besides the embellishments, these devices are designed to provide: privacy and protection for the residents *and thereby* reflect the main point of the Islamic architecture, where the unity is reflected in the function and the role of screening and a means of *ḥijab* in achieving privacy. 6). Serve as a great example for the 21st century sustainable solutions for passive cooling as well as light control.

Notes

[1] The four *Madhāhib* The schools of law of the four Imams - Shāfiᶜī, Hanbalī, Mālikī and Hanafī
[2] The dynasty in Damascus 661–750; and the one in Spain (Cordoba) 756–1031
[3] A dynasty is based on Baghdad, as a capital, in 750–1258 and stretched to Syria and Egypt
[4] Herbert Baker was the architect of the buildings of the Imperial Secretariat in New Delhi.
[5] The Metropolitan Museum of Art (New York), *Islamic Art Collection*: Works of Art, work No: 37– describing a *jali*. http://www.metmuseum.org/worksofart/viewone.asp?dep=14&viewmode=0&item=1993.67.2 (Accessed October 12, 2005).
[6] These trade routes still exists; there are districts of India, Pakistan and Afghanistan which has great link to Islam and Makkah in particular. In the *Ḥijāz* region some big families are rooted back to these regions, such as Al-Sindi, Al-Milibari and Al-afghani. Some families are still famous merchants in textiles, spices and scents such as Al-Surati, which could be from Surat.

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Images

Fig. 1 Roshan, Makkah Saudi Arabia

Fig. 2. Jali, Rajasthan, India.

Fig. 3. Hijab (Vail) http://www.thehijab shop.com/press/ index.php

Fig. 4. The *roshān* construction parts. Makkah 1980s

All photos here in are taken by the authors unless otherwise noted.

Fig. 5: Stone Jali in Zahrookhas of Jaisalmer Palace, Rajasthan

Fig. 6: Wooden screens and shutters.

Fig. 7: Number of carved Stone blocks used in jali depends on desired Length and width.

Fig. 8. Stone jali covering the window and and window.

Fig. 9. Jali above the door serve as Ventilator.

Fig. 10. Jali as a parapet wall, Rajasthan, India.

Fig. 11. Rawashin of Saudi Arabia

Fig. 12. Interior view of roshan.

Fig. 13. Laurie Baker's Brick Jali. http://lauriebaker.net/work/work/pictures-of-buildings.html

Fig. 13. Laurie Baker's the Center for Development studies. http://lauriebaker.net/work/work/pictures-of-buildings.html

Fig. 14. Radhika Villa by B. V. Doshi.

Architecture, Ruins and the Landscape

Anelinda DI MUZIO[1]
[1] Facoltà di Architettura, Sapienza Università di Roma, Italy
dimuzio.arc@libero.it

Abstract

Due to its inherent articulation of space architecture develops a tie with the landscape in which it is inserted. Particularly delicate is the construction of a new work of architecture within an archaeological context, within which it is called upon to resolve a twofold connection: with ruins that, in general, have lost their original form, and with the surrounding environment. Often these ruins are also inseparably tied to the environment, producing an 'aesthetic of return', considered to possess a value of its own to be conserved and conveyed.
It is thus inevitable that those called upon to design in such a context must consider this tie and seek to maintain the aura of the ruin and the surrounding landscape. Is it then perhaps best to build less and leave more space to that which already exists? Or is it possible to create new works of architecture that dialogue with ruins, egregiously inserted within the landscape through accurate formal choices, the selection of materials, the use of colour, through the search for architectural quality? A quality that is now measured also based on the use of materials and systems according to criteria of sustainability and renewability. The text will critically analyse both national and international realisations within which an informed design, based on the understanding of the specific values of a given site, ensures the conservation of archaeological structures in addition to respecting and safeguarding the landscape.

Keywords: ruins, architecture, landscape, eco-sustainability

1. Premise

The insertion of a new work of architecture within an archaeological context is a highly delicate and difficult operation. In fact, excavated archaeological sites are located in diverse contexts that, to varying degrees, may constitute the elements of an aesthetic 'of return' resulting from the relationship between a ruin and its surroundings.
At the level of perception, the structures revealed through archaeological excavation can be considered mutilated elements that we are able to mentally reconfigure as complete forms only with difficulty. The mutilated work exists to a greater degree in symbiosis with its context, a symbiosis both perceived and appreciated by observers. In the context of a natural landscape, where natural forms develop in turn around the ruin, but also in the urban environment, where the excavation naturally assumes its own identity in relation to its built surroundings. Hence the value of the concept that nothing is more fascinating than the ruin that remains untouched [Carmassi 2006, p. 69], though new architecture, which may often be required for reasons of conservation and/or to proceed with the musealisation of a site, must be correctly verified in relation to the twofold presence of the ruin, and the context in which it exists.
This is often not the case, and there are many examples of self-referential works of architecture, entirely detached from the existing ruin and the context of its surroundings. They are mere architectural exercises that, however, more or less consciously cause significant damage to the archaeological site, irremediably violating the aura that connotes it and renders it unique and unrepeatable.

2. Relationships between Architecture and Ruins
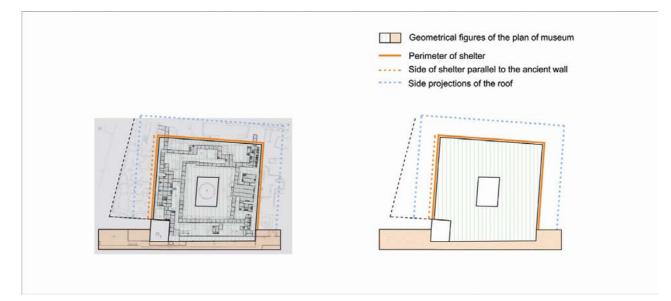
Fig. 1: Périgueux, *domus* de Vésone, diagrams relative to the articulation of the new architectural elements in plan.

New architecture realised in an archaeological context, when configured as a protective structure, constitutes a sort of preventive restoration designed to conserve and transmit the ruins of the past to the future, but also to valorise and render them accessible. The primarily conservative aspects that the covering structure must ensure thus become fundamental, though we must not under evaluate the role played by architecture in the relationship between 'old and new', inevitably created by the new addition.

This new element may relate in a variety of ways with the pre-existing elements, presenting itself in assonance or in sharp dissonance or opposition. These relationships may involve the articulation in plan or in elevation, the structure, the presence, or lack thereof, of paths providing access: all elements and parts of a new work of architecture that inevitably dialogue with the pre-existing elements, placed alongside or atop them.

One example is to be found in the *domus* de Vésone (Périgueux, France) (constructed some time in the mid-first century AD, as proven by the wall paintings discovered here; in the mid-second century the house was buried beneath a meter of earth and reworked to a consistent degree. Thus, the excavations allow for the identification of the first and second *domus*, and the various phases of its history) protected by a structure designed by the architect Jean Nouvel. Throughout the various phases of its construction the *domus* is characterised by the presence of a central garden, around which the spaces of the home are articulated. The centre of the structure features a circular artificial pool, with two peristyles to the north (Fig. 2) (the discovery of the wall paintings led to the site being classified a historic monument in 1963; an architectural competition was held to design a project to protect the ruins, manage public access and create a museum dedicated to the ancient city). The plan of the new construction is defined by an irregular parallelogram, almost a rectangle, at whose centre lies the architectural element of the peristyle (Fig. 1).

Of the four sides of the new geometric figure, seen in plan, only one runs parallel to the ancient wall of the *domus*, while the other three, orthogonal to one another, are rotated by a few degrees: the result is a geometric figure that orderly embraces a consistent portion of the ruins of the *domus*, while another portion of the excavations lies outside the internal space, though adjacent to it and sheltered by the projections of the new roof (Fig. 1).

The functional spaces of the museum are located along one side of this figure, inside a more regular geometric element: the reception hall, the patio and the *lapidarium*.
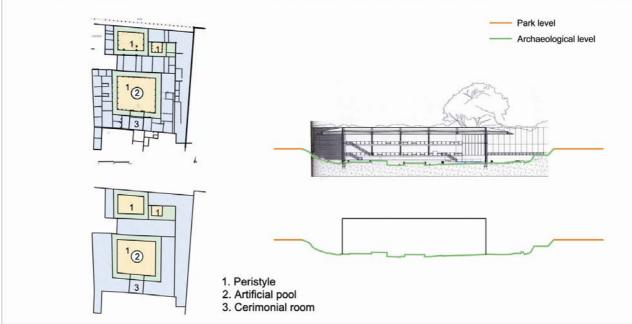
Fig. 2: Périgueux, *domus* de Vésone, diagrams for a reading the ancient structure and the elevation of the new museum.

The three-dimensionality of the new construction, while not conditioned by nearby buildings, tends to privilege the horizontality of the plan, which tracks that of the *domus*, over the vertical of the elevation: this is partially due to the position of the archaeological site, set lower than the park surrounding it (Fig. 2).

The design of the structures of these new work of architecture can also be considered in relation to the existing; for example, precisely for the *domus* de Vésone the decision was made to ensure that the ruins remained the unique protagonists of the covered space; an objective achieved by placing the vertical steel elements of the structure along the perimeter, in correspondence with the mullions of the glass curtain wall, while the large beams of the roof are concealed in a false ceiling on the interior, visible only on the exterior as components of the underside of the roof structure. The structure of the Gallo-Roman Museum is realised in exposed reinforced concrete columns and beams; it houses the *lapidarium*, directly linked to the archaeological area (Fig. 3).

Fig. 3: Périgueux, *domus* de Vésone, diagrams of the structure and the paths inside the new protective structure.

This work of architecture features transparent perimeter walls wrapping the *domus* and creating a visual permeability between interior and exterior. It is often the case that works of architecture constructed atop

existing ruins, created not only to conserve these ancient structures, but also to favour their fruition, require the insertion of walkways. In the case of the *domus* de Vésone they surround the court-garden of the *domus*, allowing for a reading of this ancient architectural space in its correct configuration and function. Other walkways branch off from this central route in rings, allowing the public to visit the spaces surrounding the court. In the majority of cases these platforms assume the geometric plan of the space into which they are inserted (Fig. 3).

A very different example is that of the roof structure constructed atop the *domus* of *Fregellae* (Ceprano-Frosinone) (the ancient city of *Fregellae* was founded by the Romans in 328 BC and the various *domus* are from diverse phases that can be dated from the end of the 4th century to the early 2nd century BC). These structures are rectangular in plan and, while sharing a party wall, are set orthogonally to the *Decumanus Maximus*; in this manner the *domus* and the baths are perceived as a single entity (Fig. 4). The new structure not only re-proposes the rectangular plan of the *domus*, but also the parallelism with the edge of the excavations; the orthogonal relationships with the *Decumanus* are programmatically maintained by the new structure, which represents a co-extension of the ancient architecture (Fig. 4). With regards, instead, to the three-dimensional nature of the composition, the pavilions were designed to evoke the ancient urban structure by suggesting the heights of the original volumes, as a consequence also re-creating the principal element they overlooked: the street. This is a portion of the *Decumanus* I reconfigured as the main route when visiting the site and providing access to the spaces of the Museum. The proportions between the development in plan and the third dimension are the result of a study of the ancient building 'type'. In those cases where the elements necessary to define the heights of the ancient constructions are lacking, as in the baths, the architects opted for a sinuous roofline that constitutes an element of distinction, once again aligned with the axis of the street (Fig. 5).

The structure is comprised of a system of steel columns, with a spacing that appears constant though it is in reality modulated to match the widths of the ancient spaces, set along the longitudinal walls in correspondence with 'void' elements, such as spaces without paving and gardens, in some cases aligned with walls protruding from the excavations. These columns support laminated wood beams that cross the excavations from side to side, in one single bay. It must also be noted that the columns are positioned along the external perimeter of the excavation and at no point do they invade the spaces of the ancient structure (Fig. 6).

Vertical enclosures are present only along the long sides of the *domus*, with the intention of re-evoking the solid nature of the walls that were once shared between two *domus* (Fig. 4).

To ensure the cultural fruition and valorisation of the site, the project also includes proposals for didactic reconstructions, developed in collaboration with the archaeologist, and with the intent of explaining the construction system (from foundations to finishes) by realising a 1:1 scale model of a section through a corner of the one of the spaces.
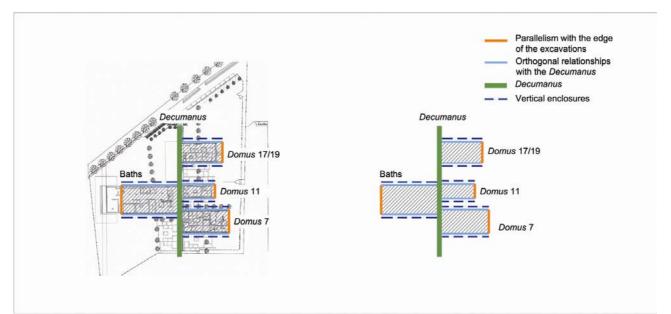
Fig. 4: *Fregellae*, *domus* and baths, plan diagrams of the new structures in relation to the excavated areas.

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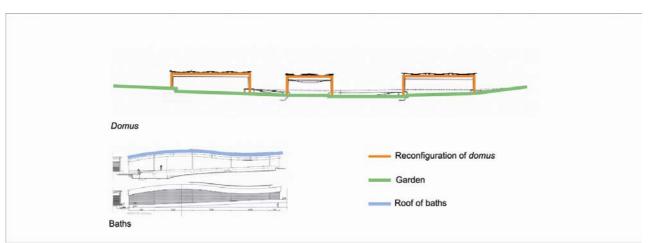
Fig. 5: *Fregellae*, *domus* and baths, elevation diagrams of the new protective structures.

The fruition of this site is also favoured by the creation of paths that develop along the perimeter, together with a central route, realised in steel grating, set parallel, where possible, with the ancient walls, thus consenting a correct vision of the spaces being crossed and offering bearing points in the existing voids between the walls protruding from the excavation (Fig. 6). The architects, furthermore, re-proposed a number of elements of the ancient architecture to recreate an atmosphere otherwise lost: in the *domus* n.11 the atrium was reconstructed together with its roof system, the *compluvium*, with applied pairs of terracotta elements realised based on a study of elements found in situ.

There are other examples in with the articulation of the protecting structure may fulfil a didactic and evocative function. For example, the roof of the *domus* of the *Coiedii* in Suasa (Ancona) is used to suggest the original spatial conditions of the site through the use of different materials: open spaces are covered with transparent skylights while opaque roofing is used above spaces that were once enclosed. There is also the example of Cosenza, where the architectural composition of the roof over the Piazza Toscano site, independent of the archaeology below, communicates the anxiety and drama of the explosion that struck this area.
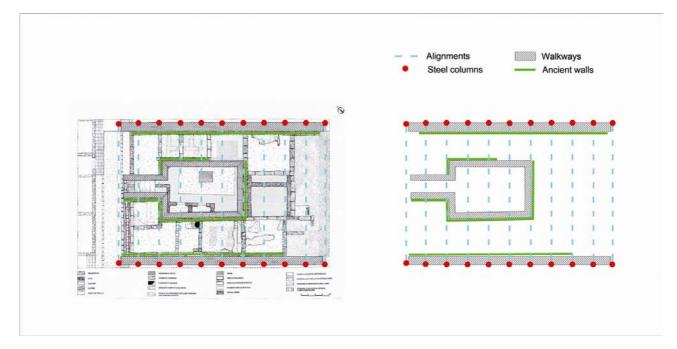
Fig. 6: *Fregellae*, *domus* and baths, diagrams of the structure and the paths of the new work of architecture.

3. Relationships between Architecture and Landscape

Fig. 7, 8: Périgueux, *domus* de Vésone, partial internal and external view of the protective structure.

As mentioned, new works of architecture inevitably create relations with the surrounding landscape. In the case of the *domus* De Vésone a significant level of respect marks the relationship between the protective structure and its surroundings. This new work is egregiously integrated within the park, assisted by the reflections of the landscape in the glass walls wrapping its perimeter (Figs. 7 & 8).

Also in the case of the *domus* and baths in *Fregellae*, the architects chose to pursue a condition of permeability with the landscape, obtained by opening up the short sides of the roof structure (Fig. 9). Furthermore, the materials utilised, wood for the structures and enclosures on the long sides and composite steel roofing panels for the roof, together with the forms, in particular the sinuous structure above the baths, refer to materials present on the site and the conformations of the hills of the surrounding landscape (Fig. 10).

Also in the case of the roof of the *domus* of the Cryptoporticus in Vulci, the form, reminiscent of a sail filled by the wind, recalls the lines of the slightly undulating landscape. Vice versa the roof of the *domus* of the *Coiedii* in Suasa, inserted at the bottom of a sparsely inhabited valley, was designed with a primarily horizontal appearance, in order to ensure the most discrete interference with the surrounding landscape. What is more, the choice to clad the roof in copper, which will oxidise over time, contributes to creating a colouration that adapts to its green natural setting.

In the case of underground discoveries, for example the Tombs at Vergina (Macedonia), the relationship with context is much easier to resolve, given that the level of intervention is far below that of grade. Nonetheless, in this specific case it is interesting to note how the creation of a tumulus above grade, smaller than the original, marks and re-proposes an element of the situation prior to the excavations, laterally absorbing the ramps down to the underground level and resolving the relationship with the surrounding environment in an exemplary manner.

Fig. 9, 10: *Fregellae*, *domus* and baths, the short sides are left open, and the roof of the baths features a sinuous form.

Fig. 11, 12: Brescia, *domus* dell'Ortaglia, view of the main elevation and aerial view of the protective structure connected with the Museum of Santa Giulia [Castagnara Codeluppi 2005, p. 118].

Even the architecture that contains the *domus* of Ortaglia at the Museum of Santa Giulia in Brescia, at least the portion above grade, is largely closed, rendered in some way lighter by the use of colour: the uniform and light grey of Sarnico stone (Fig. 11). Furthermore, seen from above the realisation of the roof garden, whose grass covering melds with the plantings at grade (while the plan of the *domus* traced in stone slabs permits a reading, once again from above, of the relationship with the *viridaria*), resolves the relationship with its surroundings (Fig. 12). The height of the new volume permits an uninterrupted reading of the convent behind, to which the new work of architecture is connected, as an important and emerging element within the urban context.

Also of interest is the protective structure over Piazza Ferrari in Rimini, covering the spaces of the *Domus of the Surgeon*, in the heart of the city. In this case the assonance of the new work of architecture with its context is determined the choice of materials: masonry and glass for the walls (Fig. 13). In particular, the masonry recalls the brick façades of the church of S. Francesco Saverio behind, or the Suffragio, while the glass consents a condition of permeability between interior and exterior. It is interesting to note the method adopted to resolve the relationship with the surrounding gardens in the realisation of a roof, partially covered with a garden; the protective structure becomes an integral part of the square and the plantings that connote it (Fig. 14). Also in the urban environment, as is the case of the roof structure covering the baths of Treviri, the relations with the surrounding constructions are resolved through the creation of a glass cube, an essential geometry that recalls the parallelepipeds present in the immediate surroundings, in both plan and elevation. Its glazed walls, subdivided by mullions into modular elements, re-evoke the 'rationalist' quality of the adjacent façades. What is more, seen from above, it is possible to note how the glass cube becomes an integral part of the square to the point that the paving pattern is re-proposed atop the opaque roof of the cube itself.

Fig. 13, 14: Rimini, *domus* of the surgeon, partial view of the protective structure and general view of the planted roof garden.

4. Criteria of Sustainability and Renewability for New Works of Architecture in the Field of Archaeology

Fig. 15, 16: Stabia, Villa di Arianna, general view of the roof covering the spaces of the H-O-R-S-T-U and detail of the system of fins wrapping the space.

A new challenge in the field of restoration may be represented by the realisation of works of architecture in the field of archaeology, designed in accordance with criteria of eco-sustainability and renewability. Realisations in Italy include the protective structure over the Villa di Arianna in Stabia (H-O-R-S-T-U space) (Fig. 16), which employs a modern reworking of a traditional material: laminated wood. The structure can thus be considered biocompatible, non-toxic to humans and the natural world and eco-sustainable, that is, it does not cause an impoverishment of the environment, given that nature is capable of reproducing at least the same quantity consumed. Furthermore, the roof structure also employs natural systems and 'bioarchitecture' to naturally ventilate the covered area, creating an ideal and controlled microclimate, avoiding sudden shifts in temperature between summer and winter, and ensuring a proper level of natural illumination in the space beneath the roof structure.

Also of interest is the project to cover the Minoan site of Akrotiri in Santorini (Fig. 17). This roof structure is an example of sustainable architecture: it protects against the sun's rays, reduces thermal excursions, and offers protection against the atmospheric agents, in particular rainwater; collected and channelled into cisterns located at the sides of the complex it is utilised for the sanitary services in the small visitors centre at the entrance to the site. These are choices of materials and systems that are non-polluting and can be configured as renewable energies, ensuring the total respect of the existing structures by creating a microclimate suitable to its conservation, and that of the surrounding environment.

Fig. 17: Santorini, Akrotiri, sections through the protective structure, highlighting the systems of natural ventilation and illumination [De Matteis 2002, p. 92].

5. Conclusions

In light of the cases described above, it is possible to ask the following questions: is it perhaps better to build less and leave more space to pre-existing elements? Or is it possible to create works of architecture that dialogue with the ruins and are egregiously inserted within the landscape in the wake of accurate formal decisions, the careful selection of materials and colours and the pursuit of architectural quality? This presentation of works of architecture in the field of archaeology generates a reflection on the relationships between conservation, restoration and architectural design, which must be substantially integrated in order to ensure the achievement of an admissible and suitable result in response to the needs of safeguarding and valorisation. What is more, it is necessary to ensure that these realizations are not configured as autonomous entities. In fact, the conservation of ancient materials represents the primary objective; restoration intended as a methodology for the study and knowledge of the past, assists with its 'revealing' through a recovery of meaning; the design of architecture represents, in the end, an attempt to capture the supreme synthesis of an act of interpretation that respects the ancient evidence and the archaeological context. With this awareness it is possible to build in archaeological contexts, what is more considering the new acquisitions made in the fields of renewable energies and eco-sustainability.

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Geometric and constructive study of the Mediterranean Gothic Architecture with virtual models: Church of San Francisco in Morella

Manuel CABEZA GONZÁLEZ, Alba SOLER ESTRELA, M.ª Jesús MÁÑEZ PITARCH, Beatriz SÁEZ RIQUELME, José T. GARFELLA RUBIO, Ángel M. PITARCH ROIG
School of Technology and Experimental Sciences, Universitat Jaume I, Castellón. Spain
cabeza@esid.uji.es, estrela@esid.uji.es, manez@esid.uji.es, bsaez@esid.uji.es, garfella@esid.uji.es, pitarcha@emc.uji.es

Abstract

In the final years of the 13th century and throughout the 14th and 15th centuries, Gothic architecture became increasingly present in southern Europe, including northern regions of Valencia. This type of architecture is known as Mediterranean Gothic, where buildings show the heritage of Romanesque architecture and a profound interest in developing new plans based on complex geometries. An example dating back to this period in Spanish architecture is located in Morella, where the Church of San Francisco was built attached to the convent of the same name. Historical figures such as Benedict XIII stayed there in the early 15th century, when the Western Schism was resolved. Thanks to modern data collection methodologies, such as laser scanning or photogrammetry, it is possible to produce a highly accurate and faithful three-dimensional model, which can be used to carry out geometric analyses on these constructions, as well as on the development of the construction processes employed in this type of Gothic architecture. Complete graphic documentation of each of the elements that make up the church discussed are developed throughout this comprehensive study along with similar examples, which form part of a virtual archive of architectural heritage built in Mediterranean areas in the Gothic period.

Keywords: 3D scanner, Point cloud, Architectural survey, Gothic.

1. Introduction

The privileged location of Morella, situated between the river Ebro valley and the Mediterranean sea and linking Catalonia, Aragon and Valencia, has made the town a witness to major historical events. Its importance as a strategic position is illustrated by the fact that from the years of the *Reconquista*, in the mid-13th century, it was held as royal property. This was not the case of the neighbouring territories, which were conceded to the different military orders: of the Temple, of the Hospital and of Montesa. [1]

As a result, its defensive walls surround some of the finest examples of medieval architecture, the Royal Convent of San Francisco. Founded on 17th May 1272, with the permission of Jaime I[2] , its chambers provided shelter in 1414 to Pope Benedict XIII, during the talks with King Fernando I of Aragon and San Vicente Ferrer, when they attempted to end the Western Schism.

Located on the castle grounds, close to the historic Archiprestal Church of Santa María la Mayor, this convent was initially just composed of the church and cloister. A century later, the capitular chamber, designed by Andreu Tarrasco was added between 1427 and 1442[3].

The church of the convent is the largest Valencian single-nave church, with diaphragm arches, a wooden roof, five bays and is 13m wide. It includes side chapels with buttresses on either side; the rib vaulting of the impressive polygonal apse finishes off the church head (fig 1). The master builder was possibly

Domingo Pruñonosa, who worked on the Cathedral of Tortosa between 1346 and 1347, on the church of Santa Maria de Morella in 1353 and on the Archiprestal Church of Sant Mateu from 1379 to1385**[4].**
Construction on the present building began in 1300 and was consecrated by Don Hugo, Bishop of Tortosa, on the second Sunday in July 1390 [5]. The coats of arms inside are proof of the funding of those noble families from Morella for the construction of the chapels between 1325 and 1386. Since 1700 the inside of the church has been coated with a neoclassical facing in the Doric style [6]. The monks abandoned the convent in 1840. From 1909 it was used as a military headquarter and later fell into disuse. For over 30 years it has been under restoration and from 2004 [7] work has been carried out on it to convert it into a National Parador.
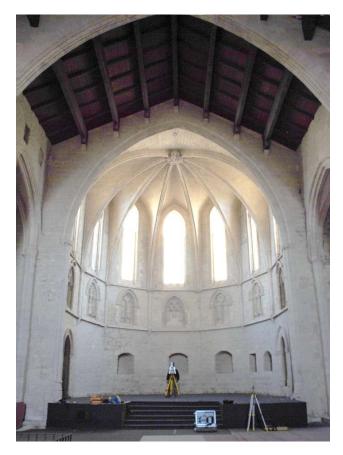
Fig. 1: General view of the apse of the Church of San Francisco

2. Methodology

Collecting Data was carried out combining direct and indirect measurement systems. Measurements of elements such as pilaster sections on ground level and floor measurements have been obtained using traditional measuring systems, such as pocket measuring tapes and conventional laser distance meters. However, it was necessary to use indirect systems to obtain data for the highest points of the church, especially vaults covering the church.

A Topcon GLS-1500 Laser was used as an indirect measuring system. This ground-based Laser Scanner, with an invisible, Class 1, eye-safe laser, covers a long range and integrates pulse-based time of flight and phase-based technologies to achieve accuracy and clean scan data. It provides 4 mm accuracy throughout the 1m to 150 m range with 6" horizontal and vertical angular accuracy (2.0mgon). It has a built-in 2.0 megapixel digital camera which is aligned coaxially.

A Total Image Station was also used in addition to Laser Scanner. This station has two built-in digital cameras with a panoramic apparent resolution equivalent to 4.8 Mp, and a Topcon reflectorless measurement IS-203 model with a ± 3"angular accuracy. This equipment was used for small sweeps and as a topographic support system.

This scanner data have been supplemented with digital photography. We used a 10.2 Mp Nikon D80 camera, with an 18-135 mm sensor and focal length f/3.5-5.6. The photographs were used to support the direct reading of the different constructed elements and the process for application in photogrammetry.

Most of the data were obtained with laser scanning technology. This high definition technology, High-Definition Survey (HDS) is a non-invasive measurement method that makes it possible to capture quick, detailed and accurate information from a surface or volume quickly and precisely thanks to a recording tool based on laser scanning technology, known as Terrestrial laser scanning (TLS).

Several expanded sweeps of the interior surface of the building were made using this laser scanner, according to a default step mesh based on the distance and the density of the points to be scanned. The limit for this equipment is about 30,000 points per second, meaning it was possible to obtain several point clouds with high density as final result. Each of them was composed by the hundreds of thousands points of the individual measurements expressed in a three-dimensional coordinate system (x, y, z), representing a set of virtual models of the registered objects (fig 2). This is the result of each point reflecting the colour of the scanned surface and thanks to the built-in high resolution camera of the scanner to combine each measured point with the colour of its corresponding pixel in the reference photograph.
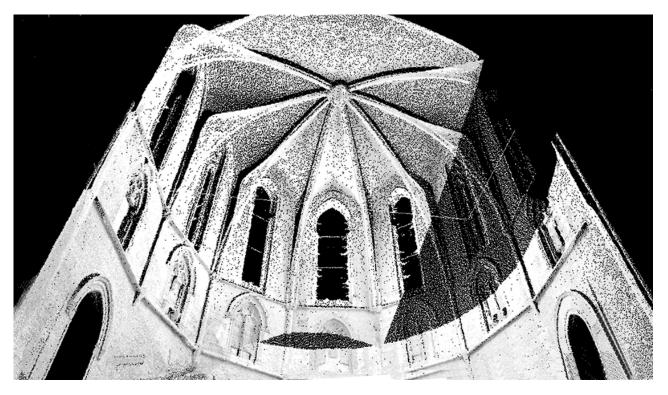
Fig. 2: View of the point cloud

The collected data were processed to establish the right connection between the different point clouds, using retroreflective targets and the fixed points identified earlier. This allowed to obtain a single point cloud for all the building vaults. Moreover, it was possible to minimize the presence of shadows in the final result since the scans were taken from different positions.

This process was executed once using the software of the laser scanning equipment. One of these programs is Topcon ScanMaster, which allows to display, measure and edit an initial three-dimensional data model directly from the point clouds.

All this information, obtained with the Laser Scanner, together with data recorded in Total Image Station and photographs taken with the external camera, were merged using another Topcon software, Image-Master, to process the surfaces as a Triangulated Irregular Network (TIN). Thus, it is possible to complete a whole three-dimensional model of the building, as the inevitable shadows caused by the laser scanning system can be filled in with the information from the photographs, although a second processing will be necessary to obtain a stereoscopic or a 3D model that can be used to start working to calculate dimensions, orthoimages, isolines, cross-sections, etc.

This postprocessing work is completed with the treatment of the photographs with specific photogrammetry software, such as Asrix and PhotoModeler. Thus, we can get some additional 3D models of single built elements. As with the laser scanning technology, cameras were calibrated before taking the photographs. The photogrammetry programs are able to calibrate by themselves, but another program is needed for the laser scanner system, in this case, Image Topcon Master Calib.

Finally, the results are exported in several formats for data processing programs, such as DXF, JPEG, LAS, VRML, and OBJ. These are compatible with several programs which allow us to carry out representation and graphical analysis and a better treatment of the polygonal meshes which are finished with photograph textures to obtain a 3D graphic model and the necessary orthoimages to help us to draw all of the traditional planimetric drawings: plans, elevations and sections.

The study included in this paper is limited to the interesting rib vault of the apse of the Church.

3. Geometric traces

Regarding this process it must be noted that when the master builder carried out the construction, he based his work method on the *geometria fabrorum,* simple geometric concepts which made it possible to generate the church plans [7], keeping in mind that cut-stone architecture is conceived and built following the principles and techniques of stereotomy.

The aim of this research process is to determine the geometric laws and perfect traces that guided this construction.

In order to establish the geometric plans for building the apse, it is important to carry out a good selection from all the information of the point cloud. The idea is to follow the same process as in construction (from the base of the walls to the top of the vault) in order to understand the problems and deformities affecting the perfect geometry.

3.1 Horizontal plan

The first step of the construction process was the ashlar walls. By selecting this part of the building in the enormous point cloud, the regular polygon of the floor plan could be established. The resulting layout shows a half decagon, with the addition of two walls, parallel to the nave, the length of which is established by prolonging the diagonals (fig 3a). A nave with diaphragm arches linked these walls with the transverse arch connected to the original church. The length of the decagon diagonal is about 11m, which is equivalent to 48 Valencian palms.

The ribs rise up from pilasters built into the walls, interrupted by narrow sculpted capitals, where the ribs spring and rise to meet the keystone.

The next step of the analysis is the position of the capitals, where the ribs spring, following their rise to the keystone situated in the centre of the decagon.

3.2 Elevations

To work in an orderly manner, it is important to identify all the arches and classify them according to different types. These belong to three groups: diagonal, transverse and former, depending on their position in the church.

The apse was generated using 17 arches. Considering their span, height and radius, these can be separated into 6 different curvatures:

A: Diagonal: I2C0, I3C0, I4C0, D4C0, D3C0, D2C0
B: Diagonal: I1C0, D1C0
C: Former: I2I3, I3I4, 14D4, D4D3, D3D2
D: Former: I1I2, D2D1
E: Former: I1D1
F: Transverse: I1D1
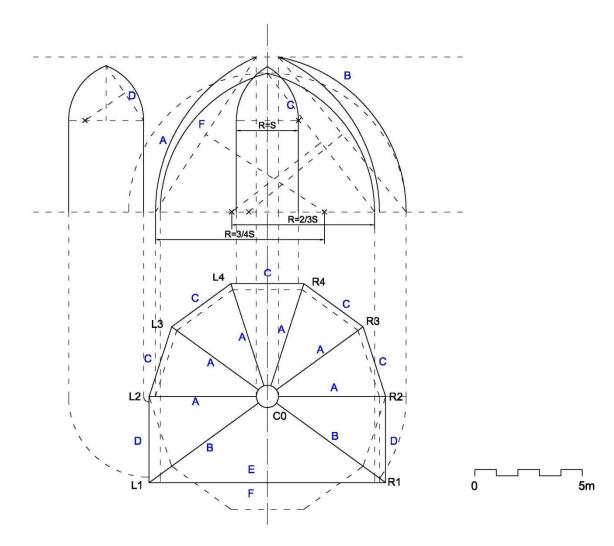
Fig. 3a and 3b: Geometry and traces of the apse. Floor plan and Elevation

The decagonal plan was considered to determine the geometry of the elevation. The floor plan of the *intrados* can be defined taking into account the size and shape of the rib section. In addition, the point cloud made it possible to obtain the height of the springing, and the height of the keystone.

Allowances are made for the master builder's way of thinking. For technical and conceptual reasons, the line of the arch is circular, and the level of the centre coincides with that of the springers. These considerations and the width of the floor plan made it possible to determine the radius.

The results are different kinds of pointed arches:

It is interesting to note that the main arches of the apse follow the basic theoretical shapes of Gothic arches perfectly (fig 3b).

One of the most recognisable is the equilateral form, where the radius is exactly the width of the opening and the centre of each arch coincides with the point from which the opposite arch springs (Radius=Span). These can be found in the C-type of former.

Another theoretical shape establishes the centre of the arches by dividing the span into several parts. In fact, the so-called *tiers point* has been applied to specific proportions [8], and one of these, the radius corresponding with two thirds of the span (Radius=2/3 Span), has been used in the transverse F. Moreover, in the A diagonals, another geometric proportion can be found, as the radius corresponds with three quarters of the span (Radius=¾; span = 36 Valencian palms).

The curvature of the rest of the arches, which are fewer in number and situation, depends on that of the other arches. Former E is parallel to the transverse. Former D keeps the same radius as C by changing its centre, and diagonal B is slightly pointed, to reach the level of the keystone.

The wooden boards used to build the vaults had to adapt to the different curvatures. Taking the radius into account, it can be assumed that the same voussoirs, with some variations in their joints, may have been used in the different arches.

3.3 Moulding
Three types of moulding have been identified corresponding with three rib types: diagonal, transverse and former. The shape has been drawn with the aid of information from the point cloud and photographs (fig 4).
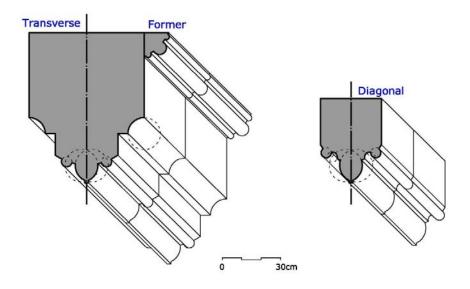
Fig. 4: Moulding of the ribs

3.4 Vaulting web
The vault is covered with masonry elements forming flat rows which rise from the springing of each compartment to the keystone. In a horizontal view we can see how these rows are orthogonal to the perimeter walls, so that the intrados of the vaulting web can be considered to be formed by ruled surfaces (fig 5).
In this way, each of the seven compartments is wrapped by two of these surfaces which can be separated into four different surfaces, according to the arches that generate them:

I: Generated from transverse arch E and diagonal arch B.
II: Generated from former arch C and diagonal arch A.
III: Generated from diagonal arch B and former arch D.
III: Generated from diagonal arch A and former arch D.

It is interesting to note that all web ridges go down slightly from the keystone with a similar slope. This is because transverse arch and former arches are lower than the keystone, and the length of each web ridge is according with the level of the arch where it rests.
The construction of these surfaces as masonry webs is developed from the springing, with a first row made with a single stone. It is due to the proximity of the ribs where they rest. The length between these ribs increases with the height as does the number of stones. The end row has a wedge shape and is used to resolve the differences in the meeting of the surfaces of each compartment. This kind of row is also used in middle of the panels to absorb the length difference between diagonal arches and perimeter arches. [9]
The lower portion of the masonry compartments generated through the former arches is really a flat wall resting upon the ribs [10]. This is because the springing of former arches is four meters over the impost line to reach the necessary level. This would have helped in the construction of the vault because, once the ribs were finished, the use of auxiliary resting elements would only be necessary to make upper rows.

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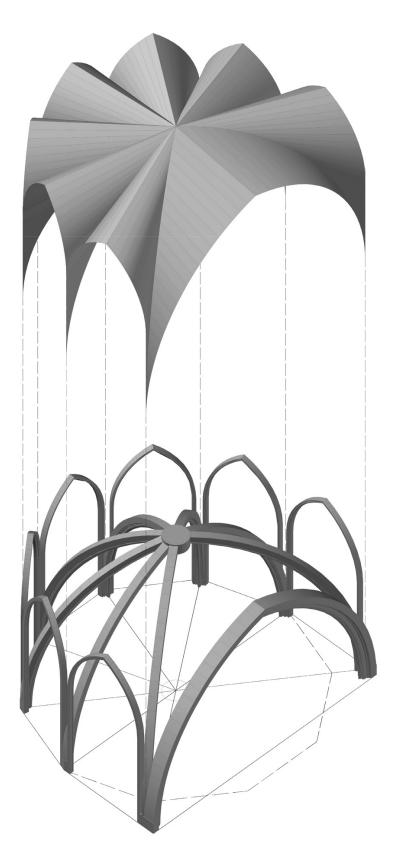
Fig 5. Volume reconstruction of the apse.

4. The real geometry

The geometric plans are the patterns establishing the design of the nerves. Although the construction was based on perfect geometry, in fact the apse is affected by some deformities.

Beginning with the floor plan, the half decagonal walls are quite exact, but the keystone is displaced to the left (about 20cm). This affects all the diagonal ribs that have to adapt to this situation, so that their widths are not exactly the same. The reason for this may be found in the relation with the transverse, because its axis does not correspond with that of the decagon, as the displacement to the left is the same length as that of the keystone, which is not in the centre of the decagon but in the centre of the transverse.

It is interesting to follow the path of the ribs from the springing to the keystone, since their horizontal projection is not always straight. As an example, arch L4C0 starts in the direction of the geometrical centre of the decagonal and later changes direction towards the real location of the keystone.

As regards elevations, although the real curvature is close to the theoretical one, these must adapt to the displacement of the keystone.

5. Conclusions

Laser scanner is an important tool for architectural heritage research, but it should be noted that the interpretation of point clouds must be carried out using knowledge of architecture, geometry and constructive processes, in this case the principles and techniques of stereotomy and cutstone.

The research has provided information on the geometry and construction of the apse of the Church of San Francisco. As regards the results, the lines of the pointed arches correspond extraordinarily to the ideal ones: equilateral, 2/3, 3/4, showing the mastery of builders who were guided by clear patterns in construction. The most remarkable feature of the real construction is the displacement of the keystone, which must be related to some deformities in the nave of the church.

The Church of San Francisco in Morella is recognised as a monument of great historic and architectural value, representative of the Valencian Gothic period. The research carried out provides scientific knowledge that contributes to the global overview of Gothic architecture. The master builder was most probably Domingo Pruñonosa, who was cited as master church-builder in other major churches. It is useful to compare the plans obtained with other examples of 14th-century Gothic architecture [11].

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The Theory of Linear Shadows and Chiaro-scuro.
(Reappraisal of the text : La teoria delle Ombre e del Chiaro-scuro- D.Tessari 1880)

The *fundamentals of drawing* illustrated with *computer modelling* for a contribution in the context of the *renewal* of Descriptive Geometry.

Antonio MOLLICONE
 Department of Architecture and Urban design, Faculty for the built environment, University of Malta, Msida, Malta
E-mail	antonio.mollicone@um.edu.mt

Abstract   (i.nº 070)

The theory of shadows and chiaro-scuro is one of the "***Applications of Descriptive Geometry***".

Re-reviewing the "Theory of Shadows and Chiaro-scuro" (Tessari 1880) the connection-integration between the scientific fundamentals of drawing and computer modelling were confirmed in the context of the move for the renewal of the heritage of the knowledge of **Descriptive Geometry** acquired up to now.

The study tackles the scientific-disciplinary contents expected for the discipline ICAR/17-Drawing.

To avoid a thoughtless work, every problem was re-evaluated, with a computer tool, taking care to:

verify the results predicted by theory;

study the formal shapes of bodies with the study of the behaviour of light on them (search for the separatrix or "apparent contour", level of light intensity or chiaro-scuro), exploiting the potential of the computer medium (accuracy, easy of producing views);

treat the fundamental and/or considerable, anyway possible to solve independently with the various methods, with the construction-visualization (drawing in the space) of the linear shadows, applying all the "operations and elements" of representation (projection, intersection);

deepen the basic notions useful for the visual and practical experience (real life drawing); the knowledge of theory (descriptive geometry); the use of classical representation (technical/artistic drawing); the practice of computer modelling;

The accuracy of the software and the virtual manipulation of the model, have enabled, for some problems, the development of alternative solutions that are proposed as original contribution.

Keywords: Applications of Descriptive Geometry; Chiaro-scuro; Rendering; Modelling; Shadows.
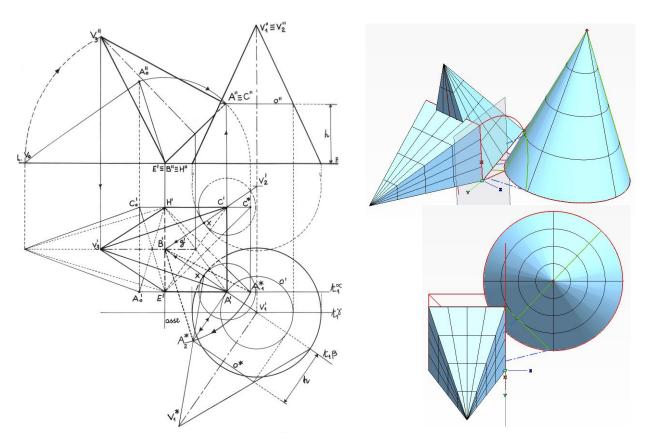
Fig. 1: Classical representation   Fig. 2: 3D modelling

1. Graphic model , computer model.

The operational advantages of computer modelling (accuracy, the possibility to draw in space, the library of geometrical entities, and the possibility to obtain in real time dynamic images, interactive, having chiaro-scuro) reduce the execution times and make it preferable over the exercise of drawing as a representation medium: the ability of "making by signs" (far = making, di segno = by sign, i.e. disegno = drawing) does not seem to be fundamental any more.

The computer model seems to produce convincing "effects" with minimum effort whilst the graphical model gives a static and relatively reliable idea.

In generating both the computer and graphical models the procedure is essentially the same.

The aim is to represent three-dimensional solutions.

To solve/develop/modify a volume in the complexity of space Descriptive Geometry does not rely on formulae: it is a continuous reference and application fundamental geometrical concepts … always the same … with rigor … for the "pleasure" of a final verification.

If the practice of representation "…c'est un moyen de rechercher la verité..." computer modelling accomplishes this task as a tool to organize the geometrical entities in the construction of models making it possible to evaluate, in real time, the effectiveness and utility of the same representation and facilitating the control of the formal solution in the pre-representation stage.

It is hence possible to dive and think in space: with the software for metric and perceptive checking of shapes (…de réprésenter avec exactitude...) and with the Science of Representation for the conscious/critical use of the same (shapes) considering both procedures in their entirety, integrated and complimentary with the aim to contribute to the renewal "of a vast heritage of knowledge and of a noble and ancient tradition".

To solve the notable classical problems the two procedures can be integrated: a) construction of the computer model following the rules of Descriptive Geometry; b) verification, with the software's commands, of the effective reciprocal belongings/relationships etc … (accuracy). Once the entity object of study is defined the geometrical characteristics are controlled.

The solution of metric problems or the search for particular geometrical quantities has a practical aspect in the design stage. Roof's slopes, ramps … require checks at the various levels to avoid "intersections" with the paths of users.

In the exercises of Figures 1 and 2 the graphical and computer procedures are compared for the solution of a measuring problem.
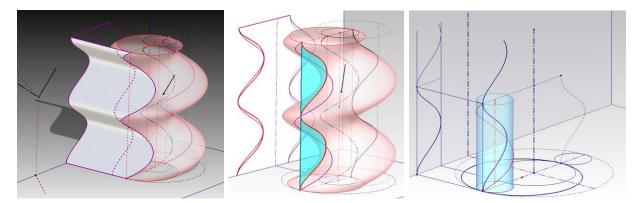
Fig. 3: Twisted column

2. Shadow boundary and apparent contour.

The parallel directions of light rays, prerequisite in the study of linear shadows, if tangent to the surface, determine the curve shadow contour between the illuminated and shadow areas.

Said curve coincides with the boundary that appears to the observer in the direction of the light rays.

If the direction is perpendicular to the projection plane, projecting the shadow contour there will be an orthogonal projection of the object, in other cases a parallel projection (oblique isometric) coinciding with the shadow of the same object.

With the possibility of the software to automatically determine the apparent boundaries (isophotes) the theoretical predicted results can be verified as in the case of the "twisted column" (Fig. 3) where the apparent boundary in second orthogonal projection coincides with the projection of the cylindrical helix constructed on the cylinder with base diameter equal to the difference, in plan, between the imprint of the surface (circle) and the generating circumference.

In the computer model the difference between the apparent boundary and the principal meridian section of the surface with the vertical frontal plane belonging to the axis of the surface can be appreciated.
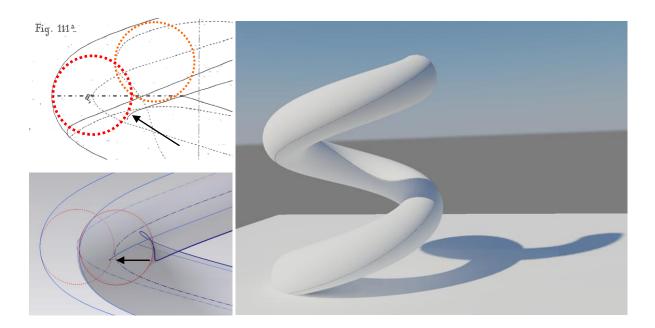
Fig. 4: Serpentine

In *fig. 111a* of Tessari's text a branch of the apparent boundary in second projection, ends tangent to the vertical axial section of the surface, but, helped by the computer visualization, that branch should end at the cuspid point of the apparent boundary, in second projection, considered as shadow of the shadow contour generated by the light rays perpendicular to the vertical projection planes (Fig. 4).
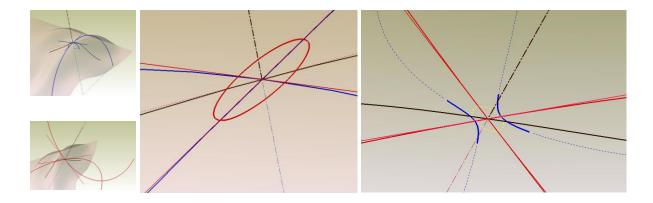
Fig. 5: Indicator curve

3. Accuracy

 The possibility to section a surface with a plane parallel to the tangent plane, in one of its points, at a distance of 0.0085 mm. , visualizing the generated curves, enables to graphical prove their conical characteristic (De La Gournerie) (Fig. 5).
If said tangency point is a point of the shadow contour, it is verifiable, graphical, that, considered the light ray through that point (centre of the conical / section), the direction joined to it is the tangent to the same shade contour (Carlo Dupin).
The versatility of the computer medium enables to treat the fundamental and/or remarkable problems, applying the theoretical notions and in the case in question the behaviour of the shade contours of a body bounded by portions of two surfaces geometrical different can be understood.
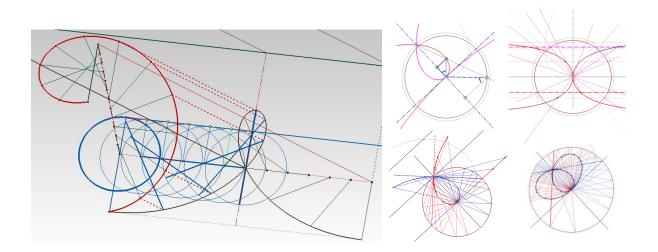
Fig. 6: Triple points and cycloids

4. Verification

Through descriptive geometry we solve problems of representation and measurement that are the basis of the creative design process.
In the various applications, thanks to the automatic creation of projections, we re-discover the original bond with geometry verifying geometrical properties of families of curves generated in the projecting process.
In Fig. 6 the case of cycloids as shadow of the cylindrical helix due to the different inclinations of the light ray.
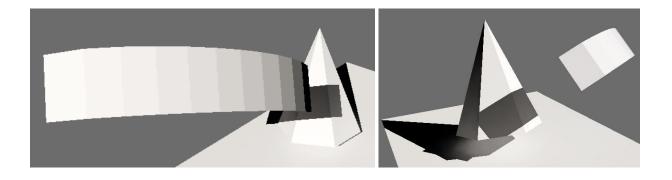
Fig. 7: Light intensity

5. Applications : chiaro-scuro or rendering

The angle that the light ray forms with the surface determines the effect of tones on illuminated bodies (Lambert's law-1728/1777).

In general the problem lies in determining the lines, on the surface, formed by the points at which the light ray forms the same angles with the tangent and normal to the surface: isophotes.

The study of the behaviour of the light on bodies, through the application of descriptive geometry, bring to a "intimate" understanding of the formal structures of these for the checking in the composition stage of the design idea.

Form the geometrical, physical and finally quantistic point of view the development of the software provided a more and more realistic automatic tool for the visualization of the chiaro-scuro/rendering effect: Flat shading (1965) ; Phong (1972) ; Univ. Utah (teapot 1975) ; Univ. Cornell (box 1986) ; H.D.R.I. . For the solution of the problem in Fig. 8, in the three-dimensional scene provided by the software, it is possible to dive in and think in space for the metric and perceptive checking of the procedure considering both models (graphical and computer) in their entirety, integrated and complimentary.
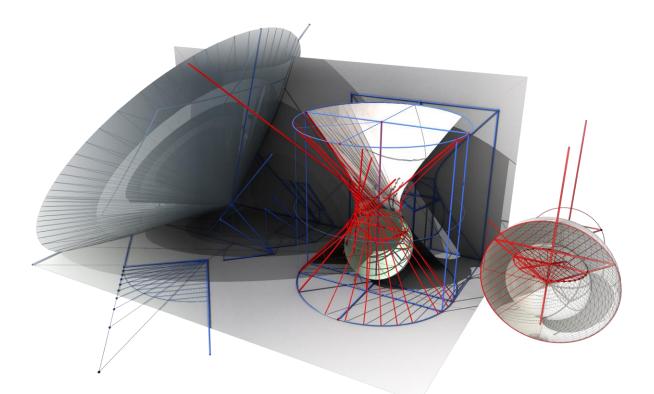
Fig. 8: Equally illuminated lines in the hyperboloid of revolution
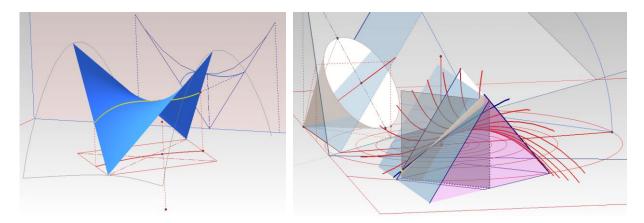
Fig. 9: Hyperbolic paraboloid...

6. Architecture as geometrical exercise

In Elements of Maths-Axioms, or first principles (Odoardo Corsini-Venezia 1765) the fifth axiom reads: "Those continuous measurements, that adapt when over imposed, are equal".

An apparently superfluous statement but that implies a manual operation that in traditional representation translates with the introduction of values/symbols or explicit notes.

The design idea is communicated with a graphical model that has to be re-read / understood / accepted / at least without being able to manipulate the characters with which it is written.

In the professional practice the final product is presented with the warning not to "scale" (manual operation) directly the drawing: in an elevation windows all appear with the same dimensions and evenly spaced for the satisfaction of the client, or else in a geometrical construction two lines that in the end must coincide at a point are "helped" by the imperceptible rotation of the wrist for the correct execution of the exercise.

In the computer model that manual operation is possible both physically in the illusionary dragging of one entity on another and, definitely, with the option to "ask", information about the entities to compare.

To solve the classical remarkable problems the two procedures can be integrated: a) construction of the computer model following the rules of descriptive geometry; b) verification, with the software's commands, of the effective belongings / relationships etc … (accuracy). Once the entity object of the study is identified the geometrical characteristics are checked.

The possibility to make use of infinite views, in the computer model, enables us to simulate the use of a designed space and verify the objective predicted in theory.
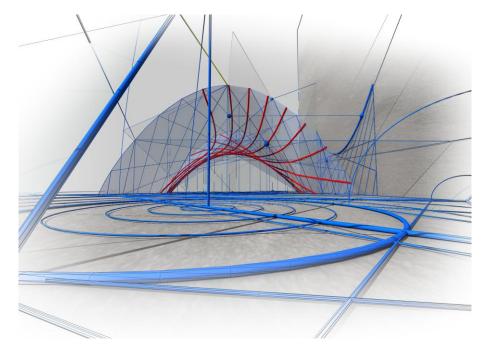
Fig. 10: ... inside a humped surface
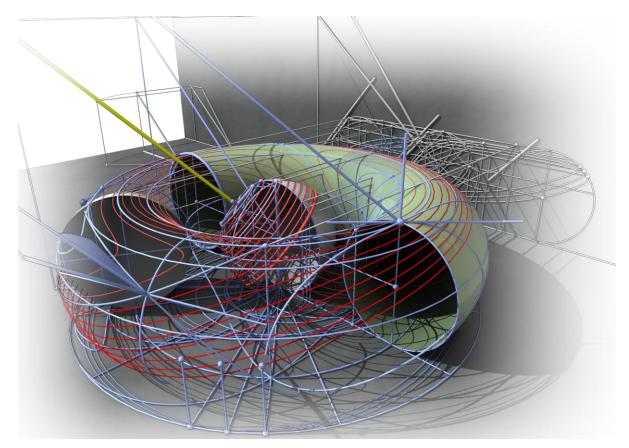
Fig. 11: Construction of the torus' isophotes

7. The implications on training

In the practice of teaching, the physical models have a great importance to make the solution of a problem understandable.

With the computer model, having overcome problems of realization, the same model can be disassembled, in parts, according to logical steps, contributing to the enrichment of scientific illustration.
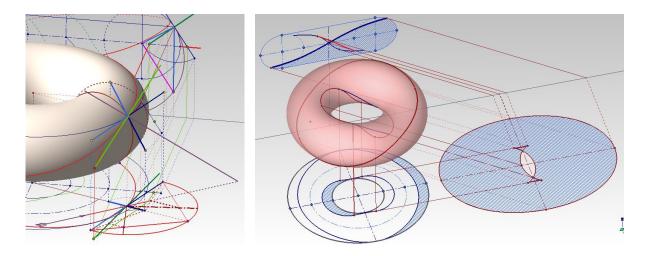
Fig. 12: Shade contours and shadow of the torus
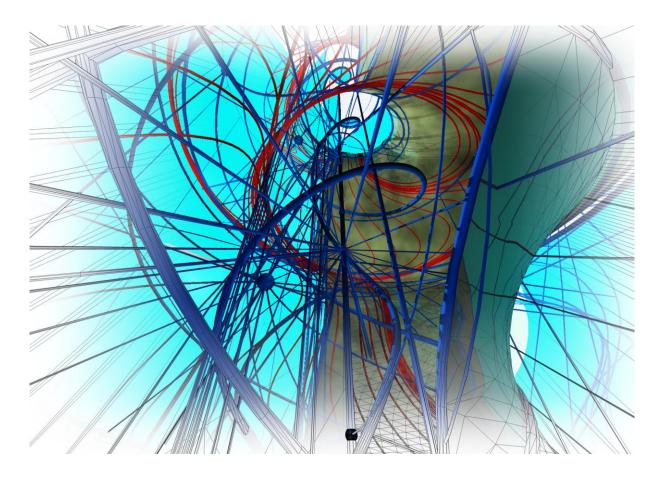
Fig. 13: Inside the twisted column

8. Geometrical vs. abstract

The procedure for the solution of a problem, its rigorous and logical structure translates, in the classical representation, in regular images, precise but essential in number.

The possibility, thanks to the software, to produce infinite views, both programmed and casual and/or experimental, gives us a variety of images that are difficult to link to a rational organization but appealing for their apparent abstraction (Fig. 13).

Artistic movements tackled the representation, with the graphical tool, of abstract subject and/or concepts, generating images that, at the same time, have a rigorous base and an image-result detached from contemporary standards (Fig. 14).

Fig. 14: Balla (crakweb.it) ; Picasso woman face (Google)
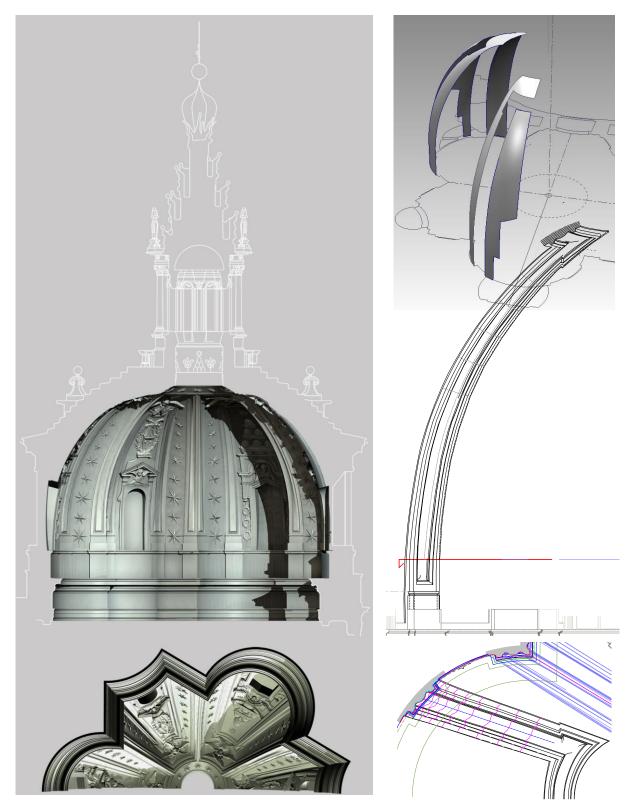
Fig. 15: Sant' Ivo alla Sapienza (Computer model)

Fig. 16: Sant' Ivo (Graphical model)

9. More....less....

The computer model of the vault of S. Ivo, through the geometrical reduction of mathematical models, seems to completely represent the object of survey (Fig. 15).
Some architectural elements were generated directly with automatic operations, whilst for other, before the automatic process, it was necessary to define generating sections and relative directrix.

If the details are to be illustrated completely, i.e. to get to know their real shape, the planimetric position, the nature of surfaces, the wire frame orthogonal views can be used, which however, showing the intersections of surfaces and not the apparent boundary, must be interpreted, cleaned and completed.

The potential of the software was exploited, without making use of photo-realistic effects, but placing classical projections with the aim to understand the design intentions and all the artifices that Borromini used for the management of the composition (Fig. 16).

Hence, in the context of the integration between the graphical and computer models, ...*plus* the use of the computer tool to obtain the graphical model, in my opinion a scientific basis,...... *less* rendering effects.

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The ruled surfaces in stone architecture

Federico FALLAVOLLITA[1], Marta SALVATORE[2]
[1] Dipartimento di Architettura e Pianificazione Territoriale (DAPT), Faculty of Architecture, "Alma Mater Studiorum" University of Bologna, Italy
federico.fallavollita@unibo.it
[2] Dipartimento di Storia, Disegno e Restauro dell'Architettura, Faculty of Architecture, "Sapienza" University of Roma, Italy
marta.salvatore@uniroma1.it

Abstract

The stereotomic architecture is composed of ashlars made off-site and laid dry. The choice of the masonry depends on the geometrical, structural, aesthetic aspects and the mechanical properties of the material used. The fragility of the stone prevents the production of thin and sharp angles, which might break. Therefore, the angles formed by planes tangent to adjacent surfaces should tend, if possible, to a right angle. The search for the perpendicularity between the surfaces of the ashlars has brought, in stereotomy, to the widespread use of ruled surfaces (better if developable), used as a facing surfaces, but even more as junction surfaces. The choice of such surfaces is due to the fact that they could be reproduced accurately in the workshop of the stone-cutter through the movement of an auction. Although the story of the stereotomy evidences a recurring use of ruled surfaces, it is with the school of Monge that studies on these surfaces start taking shape. Among the applications of the students of Mezière some cases, brilliantly solved thanks to the properties of these surfaces, stand out.

Re-examining now part of this repertoire and transposing it into a digital environment has a dual purpose: to study and represent through the methods of mathematical representation some properties inquired to date only from the point of view of mathematical analysis; to propose, with the digital tools of design and material processing, building systems that are still highly topical.

Keywords: stereotomy, stone-cutting, descriptive geometry, ruled surfaces, developable surfaces.

1. Introduction

Stereotomy is the science that studies the cutting of solids, and has as object the construction in wood or stone cutting. Stereotomy and descriptive geometry are two deeply related sciences, since the scientific foundations of the first reside in the second one. In stereotomy knowledge of geometric entities and their properties is essential to the entire design process, and it is in the composition of the wall devices that surfaces and their properties are used.

At the end of the eighteenth century, when Monge organizes the descriptive-geometrical knowledge of the time, some geometric theories were already known, and others would be elaborated from his school or in the years to follow. The road to a synthetic theory of surfaces (studied from the point of view of pure geometry) was drawn before the Monge's theory of descriptive geometry [9] (as deduced from the pages of *Traité de stéréotomie* written by Amédée François Frézier in the first half the eighteenth century [4]), but it is with Gaspard Monge and his school that the theory of surfaces takes the completed structure and the nomenclature that we know today.

The refining of the surface's theory has significant implications in stereotomy. The progress of knowledge in this way allowed more and more sophisticated experiments, as deduced from the numerous devices

published in those years by the students of Monge. The control of ruled skewed surfaces and developable in particular, that were normally used in stereotomy since antiquity, allowed refined embodiments of apparatus from time to time more sophisticated.

The extent of the impact of the progress of geometry in architecture legitimizes the need of a theory that underlies the project design. In recent years, research in the field of descriptive geometry seems to be devoted to the refinement of the methods of graphic representation. So it seems having lost that original vocation, which, until the last century, made this science an indispensable tool for understanding the properties of geometric figures in space. Today, the evolution of construction techniques, the use of materials with innovative features and, last but not least, the digital tools to delegate part of the workings and operations of representation, encourages the use of complex shapes in architecture. The need for strict control of such geometries, and the capacity to imagine those, is today an occasion to rediscover the heuristic value of descriptive geometry and revisiting the tools. Today the graphical methods of representation are full flanked by digital methods, which allow to describe lines and surfaces directly in the space, in a continuous manner, with high levels of accuracy. Directly represent problems of descriptive geometry in the space, which until now were solved in the plan, allows to verify properties of lines and surfaces, and sometimes, to derive new [7].

The re-reading of the classical heritage of stone's stereotomy is addressed according to these general instances of renewal. Through the illustration of some of the relationships that ties stereotomy to descriptive geometry, we want to go through a design process that makes the knowledge of the surfaces and their properties its strength. This design practice still preserves today all its modernity, both in terms of methodological rigor, but in terms of content. The revisiting of the apparatus of classical stereotomy with the contemporary computer instrumentation has two different purposes: to trace in stereotomy the fundamentals of descriptive geometry; to revisit constructive models that, in solving complex conditions, still maintain their relevance today.

2. Ruled and developable surfaces in the school of Monge

Today we define *ruled* the surfaces generated by the movement of a straight line in space. These owe their name to the remarkable feature of admitting always the possibility of supporting on them, in all its length, a row; in geometric terms, therefore, one can always find on them a family of straight lines. This feature has been, in the past, very useful in the modeling work of ashlar stone for the vaults since their first roughing was done with the help of straight incisions.

The ruled surfaces were known for some time, as the *surfaces gauches*, before Jean Nicolas Pierre Hachette gave them their present name (The term *gauche* in French has a pejorative meaning of deformed, it seemed desirable to find Hachette a name more suited to the aesthetics of these beautiful surfaces) [6]. Hachette is the one who has first studied these surfaces extensively and has given a classification still valid today. Hachette teaches that there are two different types of surfaces generated by a straight line: *the developable surfaces which have the property of being able to be developed on a plane and ruled surfaces that are not developable*.

To understand the difference between these two great families of surfaces is necessary to clarify certain definitions and geometric properties [2]. In descriptive geometry we consider a surface as the locus of a movable curve where the constant or variable form is given in each instant, the law of motion of this curve determines the shape and position of the surface: we call this curve the *generatrix* of the surface. The generatrix may, in its motion, lean on to one or more curves called *directrix* lines. A surface is defined when, for each point of it, we can assign the generatrix line, constant or variable in shape, passing through this point.

A developable surface is the locus of tangents to a skewed directrix curve, that we name *edge of regression* of the surface; two consecutive tangents correspond to two successive positions of the straight line mobile generatrix of the surface (fig. 1). The edge of regression divides the surface into two equal and symmetrical parts. The cones and cylinders, for example, are developable surfaces where the edge of regression is a point. This point is the vertex of the cone, while in the cylinder is a point at infinity, that is a direction. The conical surface is generated by a movable generatrix line subjects to pass through a fixed point, and when the generatrix line is always parallel to itself, the conical surface becomes a cylinder.

Two subsequent lines of a developable surface include a flat element of this surface. Two successive elements are separated by a straight line of the surface and the second element can rotate with the surface around this straight line until it coincides with the plane of the first element and so on. All the elements together on the same plane form what is called the *development of the surface*. It 's evident that the development of all oblique or plane curves plotted on the developable surface, and that cut the directrices lines of this surface under certain angles, are transformed on the development plane in other curves which cut the directrices lines of the developable surface on this plane under the same angles. Moreover the development preserves the measures of the lines.

The developable surfaces are the only ones having this property of being able to be developed on a plane *without cracks or overlaps*: those plan elements have an unlimited size along the direction of the straight
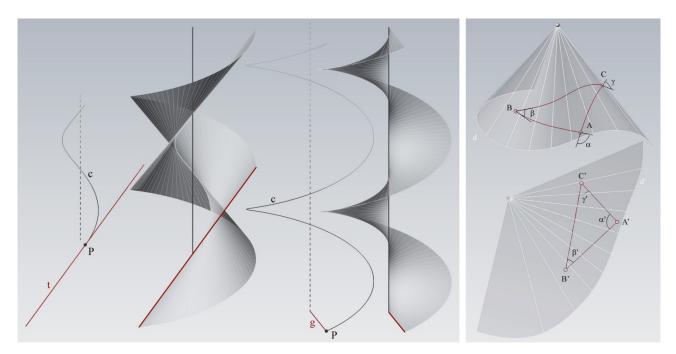
Fig. 1: From left to right; developable helical and ruled helical, genesis in comparison and properties of developable applied to the case of a generic cone.

generatrices of the surface (for the bijection, between the developed surface on the plane and developable surface in space, we need to define the surface portion to developed; in general, in fact, the surface in the development tends to overlap itself). The extensions of these elements in all directions of space, form the tangent planes of the surface. In whatever way a plan is moving in the space, the envelope of the space that runs it is a developable surface. This surface is the locus of lines, successive intersections of the moving plane.

In a ruled surface, two consecutive lines, whatever their small distance, never meet and the element between these two straight lines is not a plan; is a curved element that has an unlimited in the direction of the straight lines which include: its shape is that of an oblique plane, and for this reason have been called *skewed surfaces*. The generic ruled surface, as taught by Monge, is generated by a straight movable line (generatrix) rests on three curves dates (directrices).

The distinction between skew ruled surfaces and developable becomes even more evident in the differential classification given by Carl Friedrich Gauss (1777-1855). It is possible to classify the surfaces according to the *Gaussian curvature* (defined as the product of principal curvatures, property that belongs to the individual points of the surface). The developable ruled surfaces are those surfaces that have zero total Gaussian curvature; in other words, for differential geometry, a plane and a developable surface are part of the same class of surfaces, ie the surfaces formed by parabolic points. Instead, the skew ruled surfaces have negative Gaussian curvature and are members of another class of surfaces, ie surfaces with hyperbolic points [5].

The behavior of a tangent plane of a generic point of a ruled surface is an ultimate confirmation of the profound difference between the two types of ruled surfaces. In a skewed ruled surface the tangent plane at a point will be secant the surface along all the other points of the movable generatrix line passing through that point of contact. Instead in the developable the tangent plane of a point on the surface will be tangent to the surface along all points of the movable generatrix line passing through that point of contact. It is also said that the envelope of a developable surface can be generated by the movement of a plane in space, while the envelope of a ruled surface is given by the movement of a ruled hyperboloid in space.

For all these reasons it is natural that, in the history of descriptive geometry, the ruled surfaces formed two deeply separate chapters: the skew ruled surfaces and the developable ruled surfaces that, in summary, we define ruled and developable [1].

3. Descriptive geometric principles behind the stereotomic design

The works in cut-stone are made of ashlars out of work designed and properly laid dry on each other. The design of these prefabricated architectures are articulated around three main stages [3]:

1. the choice of the apparatus;
2. the construction of graphical or digital models of the apparatus;
3. the choice of optimal cutting methods for the realization of the ashlars.

The choice of the masonry depends on considerations of geometric-formal, structural and mechanical characteristics of the material to be used. In this regard the stereotomic design requires knowledge of the surface's theory which make up the bodies, their property, the curves that result from their respective intersections. It also requires knowledge of methods of representation appropriate to the representation of surfaces and lines in the plane or in space. The set of this stereotomic knowledge is the science that anticipates contemporary theory and tools of descriptive geometry.

Before the advent of the computer age and therefore the spread in construction of numerical control machines, stone processing was done by hand in the stonecutter's shop. The complexity of the implementation of some surfaces influenced the choice; so the design of the surfaces, of which the ashlars were composed, was subject to their workability. Where possible were adoperate flat surfaces, alternatively, between the curved surfaces, were preferred developable, finally, the ruled.

The geometric genesis of both surfaces was simply reproducible in the workshop of the stone-cutter through the movement of a shaft in the space, to use as mould to guide the cutting operations. Unlike the ruled, however, the developable permitted the realization of *panneaux*, developments planes of the surfaces, which were made of lead or other ductile material and finally applied on the stone to guide the stonecutter in the processing. The properties of both surfaces guaranteed high accuracy in processing, with significant effects for the entire construction process. Just think of the realization of joint surfaces, that have to adhere at best with those of adjacent ashlar, required considerable rigor in the execution. Although the stereotomic construction systems are known for the dry laying of the blocks, it is frequent to encounter the use of the binders. Their sole function is to smooth the roughness of the surfaces of junction optimizing the contact surface in order to avoid phenomena of cracking caused from a bad structure.

The widespread use of ruled and developable surfaces in stone's stereotomy is due also to the research of the perpendicularity between the joint surfaces and the facing surfaces of the ashlar. The stone is a fragile material, and this feature prevents the realization of particularly acute angles and too thin thicknesses because it would risk to break during installation even before or during processing. Furthermore if the joining surfaces of contiguous ashlars formed, with the respective facing surfaces, corners visibly disproportionate, these resist in a different manner to the stresses, and the angle more acute would tend to break compromising the stability of the structure.

The repertoire of traditional stereotomy is rich in cases in which the perpendicularity between the junction surfaces and facing surfaces is obtained by making use of ruled or developable surfaces.

4. Wall's apparatus and ruled surfaces: the case of oblique vaults

The works that have reached us, and treatises about it, witness the widespread use of ruled and developable surfaces in stone architecture from antiquity. In particular there are different applications between the apparatus of spherical vaults, between those of the spiral staircases, among those of the splayed vaults, among those of the cylindrical oblique vaults (fig. 2) [10].
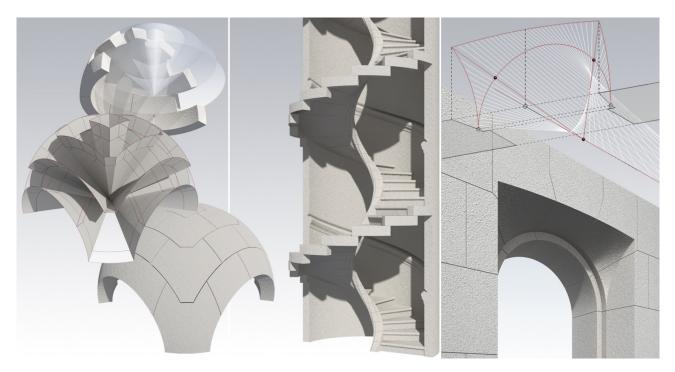
Fig.2: Developable and ruled applied to the case of spherical vaults, the spiral staircases, splayed vaults.

In the spherical vaults cases, which are among the older models, all joint surfaces are plane and developable, both in archaic apparatus and both in the more complex Renaissance. In both cases, the joining surfaces belong to quadratic cones having the center in the center of the sphere. These are maintained constantly perpendicular to the facing surface of the vault, because all normal's surface of a sphere pass through its center. In the charming cases of spiral staircases, as the name suggests, the soffit is a ruled surface, in particular a right helicoidal, open or closed. In this kind of apparatus the step is the generating element of the form and it is a complex ashlar, consisting of surfaces of different type, flat, cylindrical, ruled. The common junction surface to two adjacent steps is a ruled helicoidal. There are also applications of ruled in a particular type of oblique vault, which takes the name of *arrière de-voussure Marseille*, generally used to cover openings of doors and windows, shaped in such a way as to ensure the opening of a door or of a frame. The surface of splayed soffit is a refined ruled surface, composed of three distinct surfaces arranged between them in continuity of tangency.

The use of ruled and developable surfaces in stereotomy finally finds a significant feedback in applications relating to a particular family of vaults, the oblique cylindrical vaults, which demonstrate the efficiency of the properties of these surfaces applied to the stone's architecture. The cylindrical oblique vaults lie between the more complex cases of stone's stereotomy. The interest derived in particular from structural and formal-geometrical problems that occur in conditions of pronounced obliquity. Usually, in straight vaults, the joining surfaces of the ashlars are flat and belong to the curvature lines of the cylinder intrados of the vault, ie to its generatrices and its straight sections. If you fit the same apparatus to the oblique vault case, the head ashlars will suffer from oblique forces not countered and the stability of the structure will be compromised.

In addition to the limitations of structural nature, in the design of the oblique vaults we must take account of a series of constraints related to flat sections of the hollow cylinder, which are the two elliptical frontal arches of the vault; the equal distribution of the two front arches is a geometrical-aesthetic problem difficult to solve.

These few considerations suggest the kind of problems that concern the complex geometric nature of the oblique vault case study. The history of stereotomy returns many devices that attempt to generalize and solve the issue. Some devices approximate the solution, others are particularly complex because they are composed of ashlars all different from each other that make it very difficult to process and assembly the work. Around the middle of the nineteenth century, spreads a model that is called "helicoidal apparatus". This device, due to the properties of developable and ruled, solves the problem of the oblique vault in all its generality, regardless of the geometrical shape of the vault, with geometric rigor and respect for the stereotomic principle of ashlar's seriality.

5. Hhelicoidal apparatus

As already explained, the helical device is normally used in the case of the oblique vault: cylindrical vaults in which the axis is inclined with respect to the frontal planes, which generally are elliptical arches.
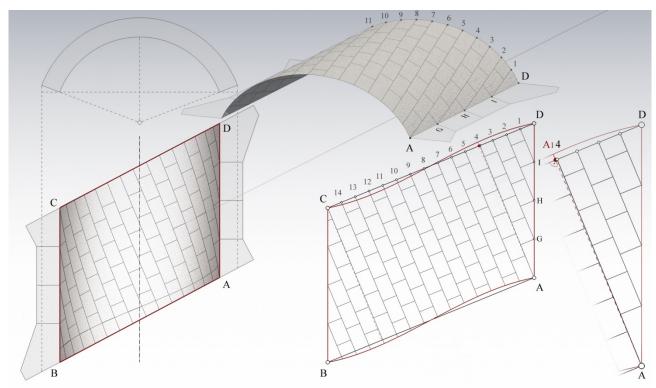
Fig.3: Development of the cylindrical surface of the intrados and construction of the junction edges of the device.

The design principle from which derives the helical device provides that the surfaces of the ashlars are all perpendicular to each other (unless very small approximations) and that the ashlars that make up the vault are all the same, condition that offers considerable savings in time during processing and assembly of the work. The apparatus which takes shape from these conditions of constraint is formed by ashlars all equal (less than the frontal ashlars and those of the impost) consisting of two cylindrical surfaces (developable), one of the intrados and one extrados, and by four helical ruled surfaces of junction, in particular from four straight helicoids (with director plan). The helices generating these helicoids, edge junction continuous and discontinuous, have the same axis of the cylindrical intrados of the vault.

The following construction, reworked in computer environment, is taken from the lessons of descriptive geometry held in 1931 by Gino Fano at the Politecnico di Torino, culminating in an essay devoted entirely to stereotomy [3].

To control this kind of device, is of great use to build the development plane of the cylindrical surface of the soffit's vault and, in the plane, to draw the desired texture. The development plane of a oblique cylindrical surface returns a quadrilateral composed of two straight parallel lines (**AD** and **BC**) and two sinusoids (**AB** e **CD**), developments of the elliptical profiles of the arc's face of the cylinder.

The continuous and discontinuous junction edges of ashlars are cylindrical helices, since the cylindrical helix is a geodesic curve in its development becomes a straight line (please note that the geodesic is the shortest distance between points of a surface).

The mathematical modelers allow you to automatically construct the development plan of a developable surface. Then, once you get the **ABCD** mixtilinear quadrilateral, you must determine the number of the ashlars you desire on the front of the vault: we can divide the **AB** chord into an odd number of parts, for example **15** (fig. 3).

The joining continuous edges, in the development, are the lines passing through these partition points and perpendicular to the **AB** chord. The ashlars must allocate the surface in an exact number, so the edge belonging to the junction point **A** (and point **C**) must necessarily pass through one of the partition points of the straight line **CD** (**AB** as regards **C**).

You draw the **A**-**A1** perpendicular to the segment **CD** and choose a point, the **4** point in figure, among the partition's points of **CD** which is as close to **A1**. The straight line **A-4** gives the direction in the development of the continuous junction edges of the intrados.

It is a slight approximation that allows to keep the junction continues helices as much as possible perpendicular to the arches of the forehead. The edges of discontinuous junction are parallel to the chord **CD** and their arrangement is determined, ensuring the alternation, by the passage through the points **G**, **H**, **I**, intersection of the edges of continues junction with the impost edges **AD** and **BC**.

Once obtained the design of the intrados is sufficient to fold it on the surface so as to have the edges of junction in space (fig.4).
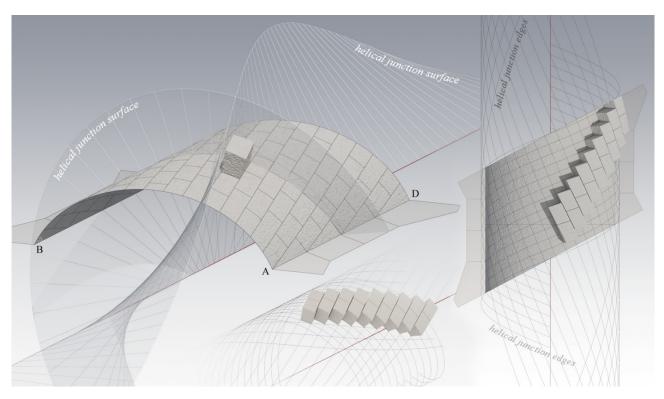
Fig. 4: The helical's serial texture is achieved through a rototranslatory movement of an ashlar type.
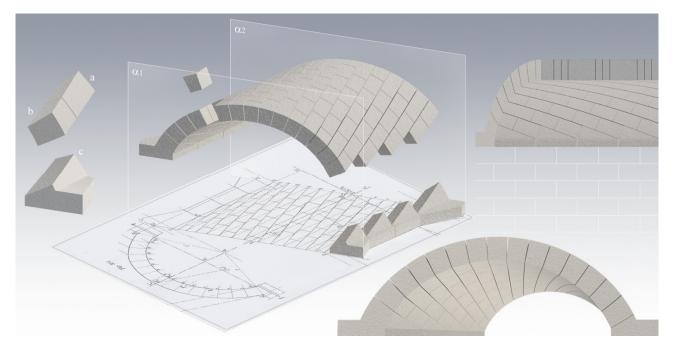
Fig. 5: Construction of the three types of ashlars that make up the apparatus.

The helical surfaces belonging to these edges and orthogonal to the cylinder of intrados dissect the extrados according to other helices. So edges and surfaces of all joints are all determined To determine the straight helicoid passing through an assigned helix, it is convenient to take, as a director of the helix and as generatrices, the two straight lines perpendicular to the surface of the intrados at the two ends of the helix.

In helical vault there are three types of different ashlars: the *interior ashlars* (type **a** in figure 5) which are the internal ones at the vault and they are all equal to each other; the *front* or *head ashlars* (type **b**), similar to those internal, but abnormal because cut along the **α** planes of the vault; the *impost ashlars* (type **c**) which rest on the piers, consisting of a horizontal base that allows a coherent insertion of the vault in the masonry and that allows to avoid the acute angle into the base. The interior impost ashlar is formed by a right prism with pentagonal section and by a further piece consists of two cylindrical triangular faces, which are those of intrados and extrados of the vault, and two straight helical surfaces (all over the ashlar is constituted by ten faces). The head ashlars are different depending on whether they are in the acute or obtuse corner of the vault over the pier.

In the acute angles the final ashlar of the vault is joined to the impost ashlar, while in the obtuse angle this can be independent. Finally it should be noted that it is always preferable that the impost ashlars have the outer surfaces perpendicular to the planes of the facade in such a way as to facilitate the connection of the vault with the wall apparatus.

6. Stereotomy principles and information technologies

The buildings of cut stone are almost completely disappeared from the shipyards of architecture for at least one hundred years (it is only used in the decorations). The abandonment of such buildings is mainly due to the introduction of reinforced concrete in construction, cheaper and more easily processable than stone. Stereotomical systems design, although no longer in use for years, retain, however, their modernity, both in solution as in the methodological rigor. Rethinking stereotomy in a contemporary way means to modernize the geometric-constructive system of ancient stereotomy through contemporary technologies. Both the technologies for the geometrical control of the shapes, as those for the automatic process of materials, contribute to the economy management of the design and construction process, and promote interesting opportunities for experimentation. The mathematical modeling, capable of describing directly in the space complex shapes in a continuous way, enables the construction of accurate digital models directly readable by the numerical control machines for cutting or, more generally, for the processing of the material. The accuracy in processing complex surfaces, characteristic of CNC machines, allows experimentation in new forms of geometry; in addition the different characteristics of this type of machines allow achievements in alternative materials to stone. The domain of experimentation and the verification is completed with the possibility of realizing rapid and low cost physical models. These prototypes, generally made in resin (can also be made of stone, wood or other material) are useful to verify the morphological and mechanical behavior of the apparatus and its parts.

With these objectives has been made the 3D printing of the helical apparatus described in the previous paragraph (the stereolithographic 3D ABS model has been printed with the Dimension Elite printer at the
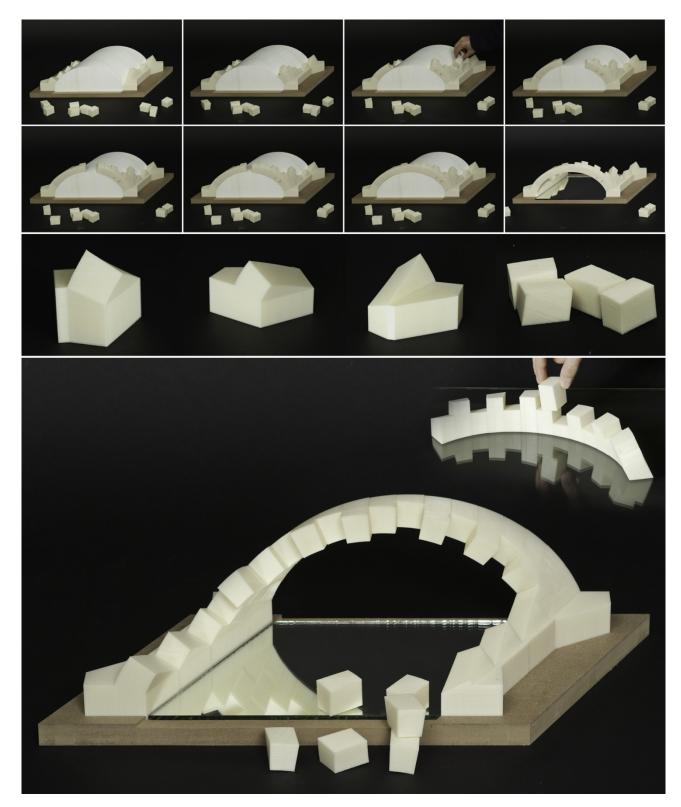
Fig. 6: Print stereolithographic 3D of the helical apparatus and relative phases of assembly.

computer lab of the Faculty of Architecture "Aldo Rossi" in Cesena, University of Bologna). In 1:50 scale, the prototype allows to verify through a physical simulation the mechanical characteristics of the vault and also verify that the individual ashlars are coherent with the apparatus in its entirety (figg.6-7). Although technological advances simplify and speed up some processes, their implementation cannot occur without a theory. The experimentation of complex forms and their realizability requires the knowledge's theory of surfaces, their properties and methods of representation capable of representing complex shapes in space. All of this knowledge is necessary to process the apparatus from time to time more complex, designed combining modern technology and geometric-constructive principles of ancient stereotomy.
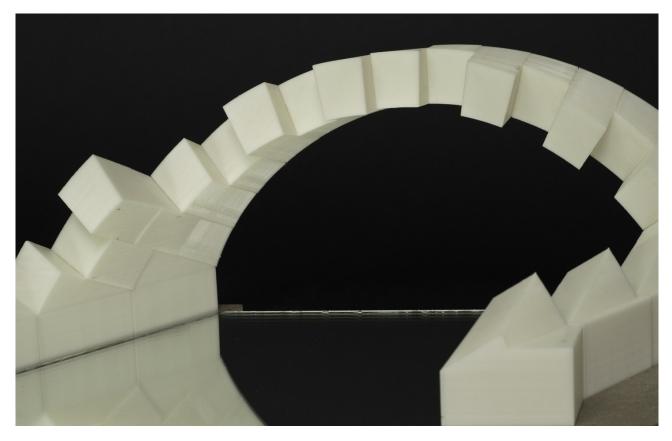
Fig. 7: Print stereolithography 3D of the helical apparatus.

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LEARNING FROM HISTORIC WOODEN STRUCTURES:

SUSTAINABLE PERFORMANCE SINCE 18TH CENTURY IN THE TROPICS

Diana LUNA

Architect

San Juan, Puerto Rico

dianalunaserbia@aol.com

Abstract

Puerto Rico is an island in the Caribbean with a tropical climate all year round.   Natural and economical resources are precious and land use is valuable.   Today most wood buildings from 18th and 19th centuries are still standing due to good construction processes, design and quality of materials.   Original architectural design and construction methods were simple and based in actual sustainable concepts, which helped these structures to perform and survive regardless of the climate and human impact through centuries.

In the historic wood buildings the basic themes of: water management, energy conservation, agriculture, safety, waste disposal, construction materials, and other needs were addressed efficiently, minimizing impact in nature.

As an architect for 24 years and owner of an 1882 wood historic house in an urban center, I have lived the process of restoration, understand and respect how the house necessities were addressed originally.   I dedicate that knowledge to the restoration, reuse and retrofit of historic wood structures based on the process of my own house.

Learning from the past is essential to get into the present and future economy of sustainable restoration. It is not optional is a moral responsibility.

Keywords: Preservation, Restoration, Conservation, Building Materials, Sustainable Development

1. Introduction

Puerto Rico is an island surrounded by the Atlantic Ocean and the Caribbean Sea, located in the tropics. The island has an area of 3,500 square miles and population is approximately 4 million. Discovered in 1493 by Christopher Columbus, the island has developed into 78 municipalities in which San Juan is the Capital City.

Since the 15th century, structures in Puerto Rico have been constructed in wood, brick and stone. Through the small towns in the island wood houses are still standing as a living witness of our native architecture.

Figure 1: "Montantes", "Soles Truncos" or transoms, Casa Luna. Picture by D. Luna

The discussion of topics as materials, energy and water conservation, cross ventilation, construction details, structural details, maintenance, restoration, reuse, retrofitting and human knowledge and sensibility, is very important for actual sustainable processes and economy.

The original materials and methods of construction in wooden historic structures that are still standing through the island and are naturally adapted to tropical climate should be constantly documented. Every component of the structure was designed and built for a purpose. At the same time that efficiency was important; beauty and detail were relevant to human occupation and social status. The natural interior lighting prevails in many ways through particular elements such as "montantes" or transoms, fig. 1.
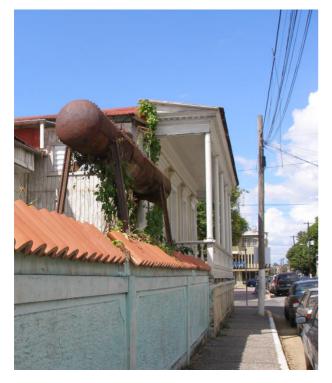
Figure 2: Water metal cistern, Casa Cardona. Picture by D. Luna

2. Typology of wood structures in Puerto Rico

Since their foundation between the 17th, 18th, and 19th centuries most of the towns in Puerto Rico built their structures mainly in wood. It was the most abundant material in the island. Being a tropical island, forests are the dominant vegetation in the center of the mountains. Hard woods came from old trees as "caoba", "ausubo" or "moralón" and "capá". These woods were very hard and strong and they could resist force, weight, humidity and fire. The pieces had a lot of resin which made them really strong. So strong that today some of those woods are still standing and is very difficult to insert nails and screws in them.

These historic structures were the creation of the master builders. There is no architect named in the design and construction of the majority of those structures. My grandfather was one of those master builders and my father recollected the stories and the methods of construction from my grandfather. His work tools were my father's inheritance.

The architectural style that we call "Criollo Vernaculo" is the one for the structures built between 1850 and 1925 in every town in the island. The "Criollo" style is the Puerto Rican version of a mix of English, Spanish, French and North American influences adapted to the tropical climate. The "Criollo" style was mainly used in houses and its main characteristics are considered sustainable in terms of location, materials, water and energy.

Location is the first characteristic of a sustainable property. Since early 17th century in Puerto Rico the houses were located in the urban centers. Those urban centers offered all the facilities for public and private services. A house located in the city offers the experience of walking and gathered all your needs still today.

Almost every house had a semi public space called balcony that offered a transition between the street and the interior or private space. Balconies were used for many purposes. Mainly were used for protecting the interior from the sun and the rain, but also to offer privacy for the front door and for social gathering.

The floors, walls and roofs in a "Criollo" house were built in wood. The foundations were tree trunks which were supporting the beams for the floor. Woods were native and trunks were literally from the trees. This subject was also a sustainable process. Originally the floor of the balcony was in wood also but many of them disappeared as the status and progress were associated with cement and metal. Simple and minimum elements formed the structure of the house, most beautiful woods used in details and others used in structure and foundations.

The roof structure was built in wood trusses and covered in the outside with wood shingles or corrugated metal. The form of the roof was in two or four slopes in order to resist winds and direct the water recollection to the cistern.

Water from rain was collected from the roof through a channel system that directed it to the cistern, fig.2. The cistern was the deposit for all the water used in the house including the garden. The cistern usually had a natural stone filter in order to make the water suitable for drinking. The cistern was located in the backyard close to the kitchen and bathroom and usually was an independent structure. On some houses the cistern was elevated and distributed the water to the bathrooms and kitchen directly after filtering. Water management was simple and efficient.

In terms of energy consumption, natural light was the main source of lighting during the day in the houses. Special openings in walls, roofs, doors and windows were designed and built to use natural light. During the night, candles were used to provide illumination. The hours of the day were used with efficiency; people woke up earlier and went to bed earlier too. In the kitchen, wood was the source for the fire. Daily living and energy conservation were perfectly arranged in a sustainable way.

The natural cross ventilation was one of the main purposes of the design. The interior spaces fluctuated between 12 and 16 feet high. The windows and doors provided all the ways to allow that cross ventilation. The house was located in order to receive the winds from the east and let them go by the west side. The windows and doors were located on opposite sides of the structure to facilitate the cross ventilation. Openings over windows and doors called "soles truncos" or "montantes" were located to help the cross ventilation.

The houses had a double roof, sometimes an attic, depending on the economic status of the owners and the square footage of the structure. The sloped metal or shingle roof was the outside part. The space of the attic allowed cross ventilation and the hot air that was at the top of the interior space moved to the outside and also separated the interior space from direct sun light.

Figure 3: Casa Luna. Picture by D. Luna

The windows and doors were specially designed to serve several purposes. They could be open in full to let people and light in. They could open half of it vertically in order to keep some privacy. They could have the shutters open in order to control light and air. They could be all closed including the shutters in order to keep the interiors dark and get total privacy.   The "aleros" are the pieces over the windows and doors that protect the interior spaces from direct sun, rain and wind.

3. Casa Luna

Since I was born the house of my family is called *Casa Luna*. It is a wood structure built in 1882 in the historic urban center of Guayama, very close to the main Plaza. The town was founded in 1736 in the south coast of Puerto Rico.

Casa Luna has all the characteristic of a "Criollo Vernacular" house in Puerto Rico. It has a balcony along the north façade that face the street, fig. 3. The living room is centered in the main structure with two private rooms at each

side. The gallery is an open hallway that connects the main living room with the kitchen, bathroom, and the rest of the house. At one side of the gallery is the patio. The structure is raised 24 inches from the ground in order to let cross ventilation underneath and ventilate the wood floor.

Figure 4: Exterior gallery and patio, Casa Luna. Picture by D. Luna

Cross ventilation in *Casa Luna* has been respected preserving the openings, reproducing original louvered windows and doors, leaving the openings underneath the floor, leaving the openings in the attic. Natural light has been respected respecting the original space plan in which the spaces achieved cross ventilation through windows and openings in opposite sides. The main gallery or outside hall, fig. 4, has been opened as the original, protecting the interior spaces from the sun and rain in the patio. Original wood in floor, walls, ceiling and roof were respected and treated with preservation liquids. Original paint colors were exposed and reproduced, fig. 5.

Casa Luna received some alterations over the years but in 1993 when I graduated from the School of Architecture, I decided to initiate a restoration process in order to have the experience first hand. The restoration took almost one year, some metal windows and doors that were removed during its lifetime were reproduced as the original ones. The front façade was restored to the original of 1882. The wood floors were restored; historic paint in the interiors was recovered and restored.   The gallery and the patio were also restored and recovered. The original trees trunks at the foundations were restored cleaned and relocated in the same place since the house had suffered a leveling condition. After a detailed historic study of archives and other resources all the alterations in the structure were

documented and restoration was completed. Most of the original wood was preserved in order to comply with real conservation of the original material.

In 1993 the restoration process for "*Casa Luna*" was submitted to the National Trust for Historic Preservation Awards in the interiors restoration category. The house won the second place. Since then other houses had been saved by the example of "Casa Luna".

Living in the tropics and dealing with earth movements daily and hurricanes and other tropical disturbances. The way the historic wood structures solved all these issues is quick and efficient way to start the solution. The simple way these structures dealt with complex issues such as hurricanes and earthquakes that could destroy, shatter and destroy lives, make it imperative to take a closer look at the scene.

It is necessary to say that preserving the existing wood or reusing existing wood is imperative in order to make it sustainable. Deforestation is not an alternative any more in Puerto Rico. In order to preserve the wood structure it is necessary to reuse the same wood or preserve it with current techniques. Saving the material and not using new one, is part of the process of sustainability. Learning from the managing of the waters and energy conservation through the structure, is a concept that can be reproduced easily today. Installing solar panels into the exterior roof could easily make the structure completely sustainable.

Figure 5: Interior original colors, Casa Luna. Picture by D. Luna

The home garden was a concept developed that attended the need of food for our ancestors. Every kind of vegetables and fruits were grown in small spaces like the urban ones. At the same time medicinal plants were cultivated also in a part of the garden. Home medicine was the first alternative in a time of need. Another concept was the aromatherapy that on ancient times was part also of the garden. Flowers and medicinal plants were separated by concepts and smells. Today still the patio of Casa Luna is invaded by the smell of a tree called "Ilan-Ilan".

4. Conclusions

Learning from the past is essential to get into the present and future of sustainable restoration. It is not optional it is a moral responsibility because we have to carry our legacy and our history into the future generations. A simple structural and architectural solution adapted to the tropical climate has been done since the 18th century and it has survived every kind of distress including human lack of knowledge. The process of learning from previous skills, educate the present generation and develop a sense of responsibility is part of the research commitment.

Recognizing our architectural history could help to protect our past, our essence, our story. Climate crisis is a reality and it is being affecting every country in the world. It is an opportunity and a matter of conscience that we need to attend in our field of work every day.

It is with great hope we reclaim that preserving our architectural historic structures we are also attending our climate crisis in an efficient and economical way. This is the way less is more. Not having the resources to develop and demolish, we are taking the time to reuse and retrofit, and learn from the past.   Simple solutions were developed then that are updated in the present. In that same spirit our culture and our history could be saved for the future.

[1] The content is the personal experience of the author.

Huang Cheng Xiang Fu looking for development

FangJi MA[1]
[1] Honorary Professor of Henan Institute of Engineering, Zhengzhou, P.R.China
859127015@qq.com

Abstract
Put the attention at the cultural heritage in the vision of the complex relationship between the shapes and the materials of the places and the still life of the peoples which live there is today fundamentally to preserve the architectural and environmental patrimony to insure a sustainable development. The knowledge of the history and the control of the transformation's dynamics are a warranty of a right procedure of preservation and valorization of identity of the territory as culture landscape . The respect of social and cultural identity of the peoples which preserve their self the cultural heritage is the start point for the protection, conservation and valorization of that. So if peoples are informed, involved and can to take part actively in the transformation process with increased knowledge they will be actors of the better safeguard of the cultural heritage. So with the contribute "Huang Cheng Xiang Fu looking for development" the author want to affront the discussion about the Landscape Culture which is preserved in the Chinese Castles and in the architecture which are inside or around the Castles. The several faces which have the Culture Landscape with key element the East Castle as architecture of the Castle, special human habitat, environment as a castle, the tourism industry and the historical culture circle, and how to preserve the culture landscape include the historical architecture restoration.

Keywords: Architecture, Castle, Conservation, Cultural Property, World Heritage

1. Cultural Landscape in Shanxi Province, P.R.China

Shanxi is one of the provinces rich in natural resources such as coal continues to be mined but is also gradually evolving through the development of High Tech and the application of new technologies in the agricultural sector. Shanxi is a mountainous region where the earth, whose predominant color is red, is rich in mineral resources. Pillow mountain near the water, mountains and built magnificent walls, battlements buildings, many ancestral houses, row upon row, a group with characteristics of the ancient buildings. There are also close to those natural resources are the testimonies of ancient Chinese culture and especially of what was the relationship between those who administered the state and the population. In that area the architecture is particularly interesting with the castle and some vernacular architecture. In fact, fortunately, Shanxi province owns a collection of ancient castles but only a minority of them has been developed and protected. The Provincial and Local government are interested to introduce strategic investors to increase the investment in the development and construction of ancient castles and ancient villages. That will be another excellent tourism environment, extend the industrial chain, and for tourists to eat, live, online, travel, shopping, entertainment . Optimizing market resources, and enter the modern concepts of marketing, to give the castles a deeper cultural connotations and characteristics, to facilitate the penetration of the Castle of culture and tourism industry, at the same time to increase promotional efforts, take the initiative to leave the advertising to sell their tourist and cultural resources, and then define a brand slogan ancient castle of tourism, and strive to change the cultural resources on industrial advantages, and promote the development and prosperity of the industries tourist and cultural city.

I have visited some castles and in particular the Castle which was the residence of the minister of the Emperor Kangxi. The building is located in a mountain landscape and its location was chosen according to the dictates of Chinese geomancy (feng shui) for which there are three sides of the mountain peaks while the fourth side there was the river. Entering through the narrow streets of the castle can still hear the footsteps of the ancient occupant and see glimpses of rare beauty that especially in this period are covered with a color that is constantly changing as the sky covered by clouds that sometimes they drop the flakes snow, which reveals the full rays of the sun's blue sky and sunlight. Every corner recalls a moment in the life of the castle, from the places reserved for the family Cheng those of servitude and a lot of people who worked inside the castle. The building consists of two parts, the uppermost, and that is the real core of the complex, one located at the bottom and surrounded by a second sort of walling in which ordinary people lived and where the entrance 'building of the man who controlled those who entered and emerged from the castle.

1.1 Huang Cheng Xiang Fu – The House of Prime Minister of Kangxi Emperior
Huang Cheng Xiang Fu is a castle locate in Shanxi Province (山西省), Yangcheng County (阳城县), Beiliui Town (北留镇), Huangcheng Village(皇城村) owned by Chen family. The most famous man in this family was Chen Tingjing, the teacher of Kangxi Emperor in Qing dynasty. The Castle is a kind of rare ancient architecture in China, it has special history, culture and nature condition. After the Cultural Revolution destruction of the Imperial Xiangfu many original buildings have withered collapsed, and many cultural relics lost. Huangcheng Xiangfu precious cultural spend 30 million yuan since 1998, the spirit of "The whole principle of the old as to maintain the original appearance of" Huangcheng Xiangfu protective repair is now the Imperial CityXiangfu area has long been a Jincheng first and only national 5A level scenic spots. This castle is not a rarity in this part of southern Shanxi, but as you can see today it is a sacrament in which the best preserved and sound management to enable their use for tourism with a high quality of services offered. Huang Cheng Xiang Fu will looking for some European Castle's owners or managers to collaboration on development of the protection of site. The research introduce in to the management of the Castle the best practice and the concept of sustainability to develop and preserve the knowledge of past time and help the local community for future generations. The Huangcheng has had a rich history of people who have stood with the emperor and who had the glory for their services rendered. There are many who have studied the Confucian classics and have prepared their minds to successfully confront the imperial examinations. Include a significant number of people who, having passed these tests were able to emerge the dependencies of the Empire. So a deep history that virtually isolated from one place and therefore relatively preserved has found its origins and today he attracted the attention of China as a development model in which the entire community is involved. The Huangcheng is therefore the symbol of a positive act, where as the concept of sustainable development is taking place and where the importance of the place is again placing itself at the top of an emerging system that means even more to deal with other realities, especially from Western which intends to acquire the know-how is still missing. But the conditions we are all in this case because the basic element, which defines the driving force behind the whole operation, is the architectural heritage that is the focus of interest. Redeveloping it and reporting it, though sometimes in a somewhat 'paradoxical, functions and forms of the past, have an extremely educational. So then a study that implements what has already been done and the present day which brings the system on a sound methodology that is respectful of international fees is essential for growth and the future from this type of image that sets you expect to arrive. At the same time, the building process of the Imperial financial official regulation and local traditions as a whole, both the unique architectural style, but also show a strong local process characteristics. Huangcheng Xiangfu on architectural forms and art practices are all strictly follow the system of feudal social hierarchy of feudal ceremony. Vernacular Architecture, traditional courtyard and simple decoration, the courtiers mansion was front sleep system. The Huang Cheng Xiang Fu is located south of the village is divided into inner city and outer city, the peak of the construction began in, Xuande four years, until the Qing Emperor Kangxi 53 years, almost Imperial Chan the rise and fall of the family always. The inner city is the former residence of the Ming and Qing dynasties Chen family. Its building is rectangular in shape, and mountains on the potential and the building, east to the west, the majestic and impressive, a distance of 71.5 meters, a distance of 161.75 meters from north to south, located five Western Wall, two normally open, the rest for construction material transport channel, after the completion of fill real cementing. Over the wall set up forts, important parts Fortifications House, and in the northeast, southeast corner of the highest point of construction of Wenchang Pavilion and Spring and Autumn Pavilion, in order to gods Jingwei protecting. Weeks within the walls of a dense Cangbing hole total of more than 130 wartime retainers stack husband hiding leisure. The northern part of the inner city to build a tall fort floor, it is called "rivers and mountains floor, long thirty feet four feet, wide nijo four feet high feet. Floor, seven points, wall stairway or wooden ladder connected between layers, layer the bottom deep underground, equipped with living facilities such as wells, mills,

wartime tribe to avoid the enemy hideout. The end of construction sub-shrines in the inner city, residential areas and courtiers Di three types of different styles, Chen Ancestral Hall, Temple Building, houses the world Germany ranks Shuter Habitat and Kirin hospital the courtiers private Darongshan Public House and censor government and other. Outside the city for the Rhythm of the Fifth of Sidi. Its construction closely follows the inner city west of the city was built, the basic square, slightly shorter than the inner city, 106 meters wide from east to west and 100 meters long from north to south, the city wall with battlements and watchtowers, four, Simon is normally open, and the remaining locked. The city's main building for Chen Tingjing mansion --- scholar, the supporting architectural study, garden. Starting in 1995, the Imperial City, the people under the leadership of the Party Branch group of people, firmly grasp the structural adjustment on the main line, vigorously implement the "Industrial Village, Tourism Village, strong scientific and technological village" strategy, initially out of a sustained economic development, farmers continued to increase the road of scientific development. Brand backed by a coal industry, the tourism industry, biopharmaceutical high-tech industries and development of trans-regional, cross-sector and wide-ranging and diversified industrial structure in the Imperial City has basically formed a total assets of 500 million yuan, employs 3700 people of the village of large enterprise groups rise up in this small village, the small village of only more than 700 people has thus become a more than 4500 people in the small towns.

Fig. 1: Huang Cheng Xiang Fu. The house of Chancellor in Huang Cheng. He Shan Lou. (Photo 2012, Author)

Fig. 2,3: Huang Cheng Xiang Fu. The house of Chancellor in Huang Cheng. He Shan Lou. (Photo 2012, Author)

Fig. 4,5: Huang Cheng Xiang Fu. The house of Chancellor in Huang Cheng. He Shan Lou. (Photo 2012, Author)

Fig. 6,7: Huang Cheng Xiang Fu. The house of Chancellor in Huang Cheng. Roofs. (Photo 2012, Author)
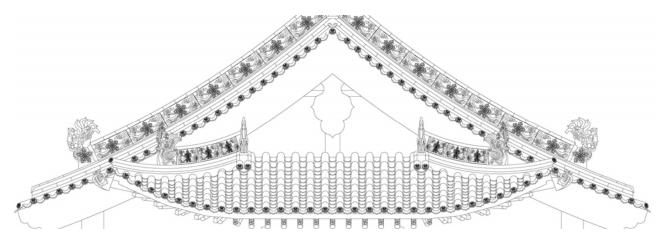
Fig. 8: Huang Cheng Xiang Fu. The house of Chancellor in Huang Cheng. He Shan Lou. (Survey 2012, Author)
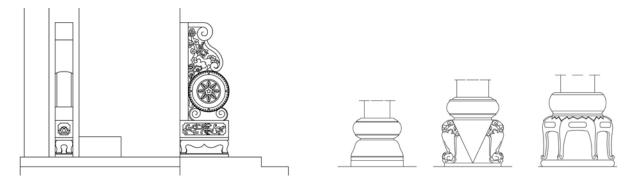
Fig. 9,10: Huang Cheng Xiang Fu, Rongshan's House (left). Column's basis (right). (Survey 2012, Author).

The village of farmers per capita net income reached 11,500 yuan in 2006, while per capita enjoy a variety of social security and welfare of more than 6000 yuan. The village a total of over a hundred cars, 80% of households using the Internet, 90% of the villagers live on the garden-style villas, and 100 percent of the workforce to achieve stable employment; outside the village of more than 3,300 foreign farmers in the Imperial Xiangfu Group work. The villagers were not only enjoying the city people the same social security and welfare, living and city people are basically the same wonderful life and civilization, but also enjoy and city people, infrastructure and construction. Village collective has been awarded "China Top Ten well-off village," China's famous historical and cultural village ", the national agricultural tourism demonstration sites, the" National Green advanced unit "," national civilized towns advanced collective ", the" new rural star village "," China's top ten most beautiful towns and villages "," Charming Country "and" China Top Ten Features Village "; the village Party branch in the 2006" July "was named" the national advanced grassroots party organizations. September 9, 2006, Hu Jintao, Vice President Zeng Qinghong in the Imperial City inspections, new rural construction on the Imperial City and all work to give full recognition and spoke highly of. The Huang Cheng village is a highest quality of life village. The peoples of Huang Cheng village live in a villa apartments and the 60 % of they have a car and computer. All cost for children school as tuition and all pensions for aged over 60 and disease hospitalization are paid for the village. Huang Cheng village Primary School is a demonstration primary school Jincheng 's the only one and Peking University, the school to distance learning point Imperial Village in Shanxi province's first and only "China Top Ten well-off village". Imperial Village is the new gold province in rural areas first and only outdoor soil latrine all become flush automated induction toilet rural areas, even if it is also rare in the country. Imperial Village Chinese historical and cultural village, Imperial Village was named the national agricultural tourism demonstration sites.
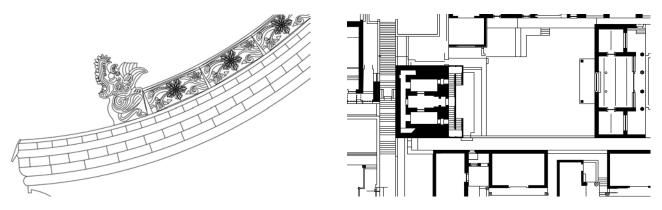
Fig. 11,12: Huang Cheng Xiang Fu, Roof's detail (left). Map of area around the He Shan Lou (Survey 2012, Author).

1.2 Ancient city of Dǐ Jì Chéng (砥洎城)

The city of Di Ji Cheng have the old wall just on the river and it is possible to see this from the Highway which pass not many far from here. This part of the city is the oldest and was used in the last war as a good military defense of Chinese army. Today the space is used to store the aliments for the animals as the sheep. Not is simple to walking on the wall because the road is very small and dangerous. The protect city is rich of ancient architectural elements and it is possible to see a live glossary of vernacular architecture of China in Ming and Qing Dynasty.

Fig. 15,16: Dǐ Jì chéng (Photo 2012, Author)

1.3 GuoYu Town (郭峪古城 Guō Yù Gǔ Chéng)

The city wall have a height of 12 meters and a width around the 5 meters. The total perimeter of the battlemented wall measure 1500 meters. The wall was opened in three gates. The vernacular built inside the town are of the period of Ming Dynasty. In the center of GuoYu town there is a seven storey building. This construction made with bricks to protect against soldier and bandits from attacking and robbing.

Fig. 13,14: Guo Yu ancient town. The corner defence turret of city's wall (Left) and the Yù Lóu 豫楼 (right). (Photo 2012, Author)

1.4 An ancient temple in Beiliu (北留)

Locate on the top of hill in the scenic area where is possible to see the river and high mountain around. The place is very hard to climb and is protect just for the difficulties to find it. It is necessary to walk for many minutes in the land trough the cultivate private land. At end the vision of the surround area is a absolutely exceptional. The temple was saved for the human destruction for many years but recently the absence of maintenance cause the ruin. The roof is partially broken and the fresco inside are serious damaged.

Fig. 19,20: An ancient temple in Beiliu and the scenic area around. (Photo 2012, Author)

1.5 Ancient castle of XiāngYù gǔchéngbǎo (湘峪古城堡)

The ancient castle of Xiang Yu is very big and at arrival in front of this seem to stay in another country as Franch or east Europe for the impression of the power express from the wall and from the bit tower locate on the main entrance. There isn't not so much new elements but substantially some of those are effectively not correct. As example of this there is the bridge which cross the river. That construction is build recently and not have corresponding with the ancient connection between the castle and the land around. Inside the castle have a lot of building which are expression of mixer of folk architecture and prestigious architectural decorations. In the last periods there is a special program to repair the castle and to promote it in the cultural itinerary. In this case the planning want to develop the management of the place with attention at the original character with a scientific approach.
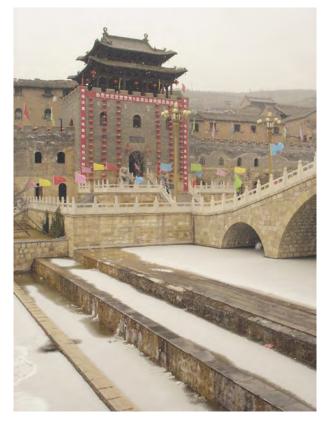
Fig. 17,18: ancient castle of Xiang Yu (Photo 2012, Author)

1.6 The burial site of BaiHe Xuan (白鹤轩).

Fig. 21,22: The burial site of BaiHe Xuan. External (left) and internal (right) view with stone animals (Photo 2012, Author)

Short dictionary

汉语	PinYin	English
堡垒	bǎolěi	Fortress
城堡	chéngbǎo	Castle
堡子	bǎo zǐ	Walled village

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The ancient estate of Conca at the edge of the pontine marshes, between the views, surveys and historical maps.

Maria MARTONE
Faculty of Architecture, University Sapienza of Rome, Italy
e-mail: maria.martone@uniroma1.it

Abstract

In territory corresponding to the ancient estate of Conca that stretches from Le Ferriere to Tower Astura, coexist elements of strong environmental and social degradation, as a solid waste landfill and the site of a ex nuclear power plant, and natural elements such as the river Astura already Conca, an ancient fluvial corridor that connected the landscapes of the valley of Conca and the coast in a kind of organic relationship between the natural and urban environments.
This area has ancient origins and collects emergencies significant archaeological, architectural and environmental, whose knowledge and appreciation could redevelop and recover highly degraded area and make the valley a product attractive to the architectural scale and of the landscape.
On the basis of an ongoing study that is part of a research on basin of the river Astura [1], in this paper we present a reading of the territory of ancient Conca, highlighting the methodology used to perform graphic investigations, iconographic, literary and instrumental on architectural, archaeological and nature episodes more important, also aimed at the formation of a land information system.

Parole chiave: documentation, representation, knowledge, protection, enhancement

1. Objectives

The territory of the ancient estate of Conca, characterized by the presence of prehistoric and historic and rich forests, was situated between the Via Appia and the sea, at the center of the valley of Astura, in an area on the edge of the Pontine marshes; crossed by numerous water courses, extended mainly on the left side of the river Astura to the banks of the river Moscatello, that will become during the integral reclamation Channel High Water. Among Casal Nuovo and Le Ferriere the estate exceeded the river, growing up to reach the lands of Campomorto; towards the coast, the channel Mastro Pietro separated the estate of Conca from Valmontorio and Tower of Astura, while to the north the fund extended to the territory of Cisterna, owned by the family of the Caetani (fig. 1).
Belonging from always to Rome, and only for a few years to Neptune, now the territory of the ancient estate of Conca, turned and modified in its look natural and urban, is part of the town of Latina with the Borgo Montello (already Conca) Borgo Le Ferriere, Borgo Bainsizza Borgo Santa Maria and Casale Nuovo (fig. 2).
Currently, in this area impends over the presence of a landfill of waste that has contaminated the environment and especially the river Astura, defined by experts highly polluted. Also over the years there have been several interventions that have further altered the landscape of this area as, for example, the construction of nuclear power plant of Borgo Sabotino, built in the late fifties by SIMEA and later purchased
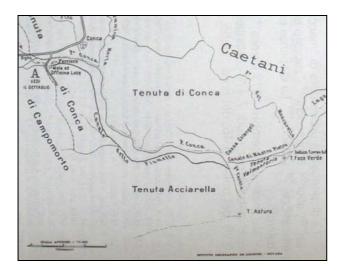
Fig. 1: Part of "Plant Demonstration of the localities Conca, Campomorto, Sea and Lakes pontine" performed by Attilio Mazzoleni in 1911.

Fig. 2: Territorial framework of the estate of Conca performed on the plan of PTPR of Lazio in 2007, table B35, 400 sheet.

by ENEL. It 's visible still a big metal ball that should have formed the core of an experimental atomic station, abandoned before being completed. The comparison between a cartographic map of 1927 and a satellite view shows how were altered the elements making up the area (figs. 3 and 4). Starting from this state of degradation the paper aims to increase knowledge of places, in order to propose models and criteria for revaluation, directed to the protection and preservation of what constitutes evidence and memory of civilization. Remember that a few recent initiatives, included in programs also european, were performed on the area by municipal and provincial authorities with the aim of protecting cultural heritage and of a tourist development sustainable of the territory [2].

Aimed at the knowledge is the documentation of the processes of transformation that can be read through bibliographic surveys, archival and through examples of historical maps, views and findings. It is believed, finally, note that within the knowledge of a place, the datum of the landscape is, together and in close liaison with the data archaeological, architectural and literary, an important historical document that should be privileged as synthesis of the transformations and of the evolutions of a place both in terms of anthropogenic and natural.

Based on these assumptions we propose a reading of the ancient estate of Conca trying to retrieve also the memory of a relationship that over time man has managed to establish their own land.

Fig. 3: Part of sheet K2 - IGM, 1:5.000, 1927.

Fig. 4: Satellite view on the nuclear power plant of Borgo Sabotino.

2. The territory of Conca. The origins.

Documentary sources attest to the presence of prehistoric populations near the Borgo Le Ferriere, in Torre del Giglio, in which were found numerous stone tools dating to epigravettian period of the upper Palaeolithic [3]. In the estate of Conca, of the same period belong some discoveries of archeological relicts at La Rosa, near the Borgo Santa Maria [4], while stable settlements and frequentations of the first half of the Iron Age had developed near the borders of the estate of Valmontorio, at the coast [5].

An important archaeological site is present near Borgo Montello, already Conca. It's the case of the ancient city of Satricum, considered one of the largest centers of "Latium vetus" in archaic age [6]. Located near the river Astura, the city of volscian origin, was the site of an important shrine dedicated to the goddess Mater Matuta, unearthed in 1896 by the french archaeologist Hector Graillot [7]. The deity, known as the mother of the morning, of the sunrise, of the life that begins and as the protectress of pregnant women and of life itself, has represented the core of the city both from a spiritual point of view that social and cultural. The excavations on the Acropolis continued until 1898 under the guidance of italian searchers. In recent years were found numerous archeological finds preserved in the Museum of Villa Giulia in Rome and it was made a first survey by the engineer Raniero Mengarelli, Felice Barnabei, founder of the Museum of Villa Giulia in Rome and director of the excavations of antiquities and by Adolfo Cozza, expert of classics and designer [8] (fig. 5).

The archaeological site of Satricum is a real city, formed around the temple, as is clear from the excavations conducted in 1975 by dutch archaeologists that have unearthed a large area, still today subject of study by part of the University of Amsterdam [9].

Afterwards Satrico was burned by the Latins and then definitively destroyed by the Romans in 346 b. C., date that marked the slow decline of the city that will become only a place of pilgrimage.

During the roman empire were built numerous villas and villas country, the latters in addition to the function of residence were related to the exercise of agricultural works and productive that allowed the maintenance and management of the fund. At Borgo Le Ferriere by a team of dutch archaeologists have unearthed the remains of a domus type house with three central courtyards, one of which was characterized by a impluvium (fig. 6). Have been found below a floor ruins of hypocaustum, heating system of the rooms characterized by passage of vapor in the interspaces [10].

The territory of ancient Satricum was part of the diocese of Anzio that developed between the territories of the Tres Tabernae (today Cisterna) Lavinium and Ardea. In the seventh century the territory of the diocese anziatina was united with that of Albano, after the defeat suffered by the seaside town by the Saracens.

The Pope Zaccaria (741-752) became interested in the reclamation and cultivation of the Roman countryside including the urban area of Conca in an agricultural organization to gain a livelihood for the city of Rome, that because of the continuous raids of the barbarians, could not freely trade with the countries of the Mediterranean. Were founded for this purpose some domus cultae, small fortified towns, built in the countryside, where farmers worked the land be safe, even in times of danger [11].

Fig. 5: Survey of the acropolis of Satricum
(R. Mengarelli, F. Bernabei and A. Cozza).
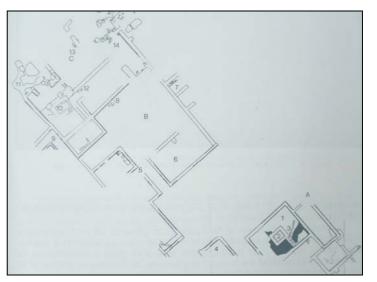
Fig. 6: Townhouse at Le Ferriere. Plant.

3. The monks of Grottaferrata.

The domus cultae developed also with the Benedictine monks of Grottaferrata, whose presence on the territory is documented from 1116, when at the slopes of the acropolis of Satricum performed the extraction of iron ore, founding Le Ferriere and using the hydraulic structure of Satricum. Being the monastery under the jurisdiction of the Holy See, the abbot elected by the Benedictine monks had to be confirmed by the Pope and his name had to exercise his spiritual authority and civil citizens who owed him obedience. Important document was the bull of Honorius III in 1217 that confirmed the property to the monastery, including that of the castle Conkae.

At the time of the Abbey of Grottaferrata was built, near the town of Conca, San Pietro in Formis (now Campoverde), which was also it a rich industrial center.

Conca soon became an extensive estate of the Roman Campagna. Due to its geographical location became an important road junction between the hinterland and the sea. In the medieval town were forged hatchets and were built the churches of S. John, S. Gregory, S. Peter in Turri "et a Grecorum", officiated by monks directly. Of the last two churches, later one took the name of a S. Lucia, while the other was probably destroyed as it is not mentioned in Regestum of Cardinal Bessarion in 1462 [12]. The church gave its name to the country of S. Lucia, where it developed a grange, a farm consisting of houses and locals processing of agricultural products, managed by monaco granciere.

The ancient church gave its name to the immense stain that extended from Ferriere of Conca to the coast, where the wood was taken by the Genoese for the construction of their ships, which unloaded iron ore of the island of Elba to be worked in Ferriere of Conca [13].

The products of the estate were transported from land to sea by means of wagons drawn by oxen or buffaloes, or across the river Astura with special flat-bottomed boats, to be brought to the port of Astura, an important commercial center.

The life of Conca took place along the banks of the river and around the castle, built on "pagus" of Satricum and fortified by Malabranca in the thirteenth century. For its strategic position between the hinterland and the sea, for the Castle, for the riches of the territory, for the industries, the city of Conca soon entered the orbit of Rome. Conca, today Borgo Montello, once Concharum Castrum (fig. 7), developed in the Forest of Cisterna. A beautiful arch leads to a low-medieval urban layout system on a plateau of tufo, a place where the robbers to grant Lateran could claim asylum until 1680 (fig. 8)

The estate of Conca, rich in waters and wetlands, was the ideal place for crops of hemp and flax from the Middle Ages up to twentieth century have had an important role in the economy of southern Lazio. In this period also developed the viticulture and silk processing. Famine in the fourteenth century, due to malaria epidemics, and to the continuous incursion of robbers, struck Conca and the territory of the Roman Campagna.

It remembers that the major works of the Benedictine monks, who administered the property with the consent
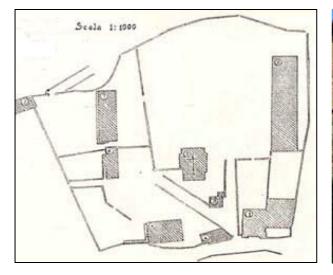
Fig. 7: Plan of Casale di Conca from a drawing of ONC, 1930.

Fig. 8: Arc entrance to the medieval town of Conca.
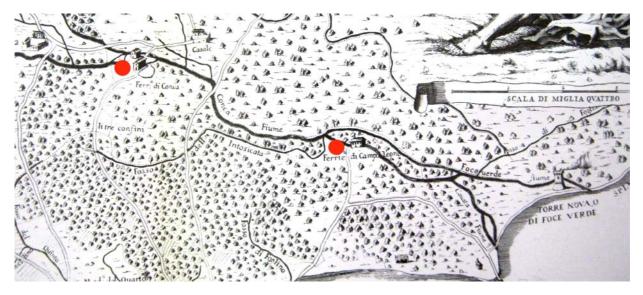
Fig. 9: Giovan Battista Cingolani della Porta, 1692. A part of the map. In red ironworks of Conca and Campo Leone.

of the Chapter of the Abbey and had to be accountable to the pope, were the industrialization of the area, the increase of agriculture, to have made the soil more productive through a constant and assiduous work in the countryside and to have improved the living conditions of farmers.

4. The estate of Conca of the Holy Office. The officinae ferrariae.

The Benedictine monks of the Abbey of Grottaferrata in the territory of Conca remained until 1564, when the city was admitted to the Apostolic Chamber. Pope Pius V in 1566 gave the estate of Conca, consisting of a vast area of about six thousand acres, to the congregation of cardinals of Holy Office, as a private jurisdiction. Many were the privileges they enjoyed the estate, including the exemption from taxes and of the forum, being the congregation the supreme judge of the civil and criminal cases in the territory of Conca.

With the congregation of cardinals, developed in a short time, thanks also to the work done by his predecessors, the officinae ferrariae, who became in the seventeenth and eighteenth centuries the most important of Lazio. The purpose of Pope Sixtus V was to create new production facilities in the countryside pontino in order to reclaim an area unhealthy and exposed to risk of malaria.

In 1578 was born in Le Ferriere Conca industrial site on the production and manufacture of iron, linked by the
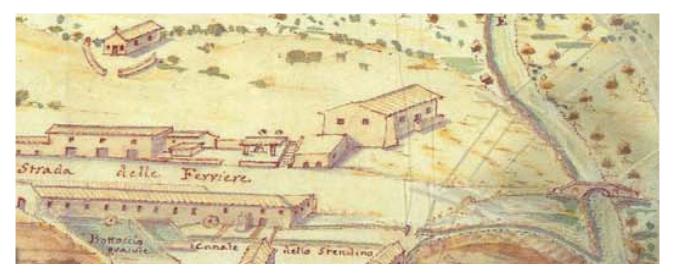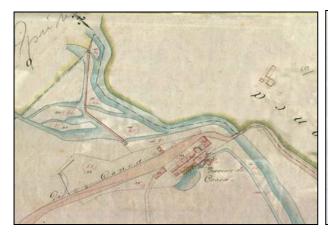
Fig. 10: Ironworks of Conca, 1585 -1870. Archive of the Congregation for the Doctrine of the Faith.
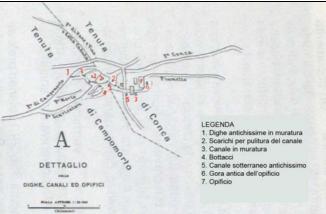
Fig. 11: Plumbings of Ironworks of Conca. 1819. Cadastre Gregorian.

Fig. 12: Details of plumbings performed by Attilio Mazzoleni in 1911, reported on the plant of Fig. 2.

river Astura, through the artificial channel of Fiumetto, to the plant in Campo Leone, founded in 1568 outside the boundaries of the estate, in proximity of the center of Acciarella (figg. 9 and 10). The iron ore imported from the island of Elba was loaded on barozze pulled by buffali that went up the Astura, coming directly to the smelter. The processed product was used mostly from Rome and was then exported in the Grand Duchy of Tuscany and the kingdom of Naples. The skilled and skilled workers came from Tuscany and Lombardy. In the ironworks of Conca were built 5 rims that were used for the restoration of the dome of St. Peter's made by Vanvitelli in 1743 [14].

The two ironworks extracted them source of motive energy from the water of the river Astura that were specially channeled through walls, dams, cataracts resulting in massive hydraulic works. The two industrial sites were united by an organic relationship with the river and then sprang a common interest linked to a proper hydrologic balance. A series of surveys between 1700 and 1861 describes the river and its hydraulic structure about the operation of two ironworks of Campo Leone and Conca.

Dams and locks were built to channel water inside the building and use its power (figg. 11 and 12). The estate of Conca, although it was in an area near the marsh, where there was a high risk of malaria, was developed as a major agricultural and industrial center, preserving the heredity of the organization of the domus cultae [15]. Unlike other estates in the area, which were at the service of a few families, that of Conca included besides the church, both rural and manor houses, warehouses, barns, stables, barns, handouts and everything needed to perform the work in camps and workshops. The water was taken from an ancient tunnel that was used for water drainage.

The farmhouses represented an important structure for the operation of large estates and among the many that were built during this time, remember that of S. Antonio, near the present village of St. Maria, a small

Fig. 13: Farmhouse S. Antonio, at Borgo S. Maria.

Fig. 14: Farmhouse Conca, near Borgo Montello in a historic photo.
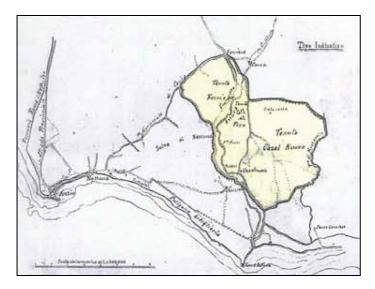
Fig. 15: The estate of properties of Gustavo Dominici, 1920. Fig. 16: The Lake St. Antonio. IGM, 1927.

building with three rooms lined up on the ground floor: a kitchen and two bedrooms, and many rooms on the upper storey and that of Conca, near the present Borgo Montello, which became the home of S. Maria Goretti and that had the same distribution characteristics and formal than that of S. Antonio (figg. 13 and 14). Were built the churches Annunziata of Conca, S. Peter in Formis and St. Antonio Abate, the latter built in front of the foundry, not being longer sufficient the ancient grange of St. Lucia.

To operate the ironworks there were the Carbonari, the Fossaroli, the Falegnami, the Facocchi, which were also interested in the maintenance of the many wooden bridges in the estate of Conca. Great interventions of reclamation and regimentation of water, examples of hydraulic engineering at the time, were performed by the Holy Office.

Despite the many wars the foundry never ceased its activities to obtain supplies of iron from the island of Elba. The processed product was sold mainly in Rome where St. Office had a store that provided the ironworkers of the city.

In 1798, the ironworks plant suffered severe damage, resulting in a reduction of work of up to 1809-1810.

Since 1817, according to the skill of Dominic Morichini of January 15, on the "Opinion on the manufacture of potassa in the Papal States" [16] it is known that ironworks regained its full effectiveness of past centuries until al1865, when the factory iron activity ceases to be converted in the early twentieth century in a paper factory.

4.1 The forest in the estate of Conca.

The management of the industries of iron also paralleled that of the forests by the Holy Office. Castrum Concharum was surrounded, in fact, by a copious forest called Cisterna Neronis. The most common vegetative species were made of bay-oaks that reached up to 30 meters in height, from the oaks, native trees of ancient origin dating back to the Quaternary, the maples, the ash trees, elms, alders, and a rich undergrowth. Particular attention was therefore given to the administration of this immense patrimony that supplied the coal needed for the functioning of the ironworks. Were avoided any waste, which is why the tenants of the estate could cut trees marked only with the mark of the Holy Office. The conservation of the forest was also linked to the belief that tall trees could work as a sort of screen to the spread of malaria which was rampant in the area around the estate, to the coastal lakes.

5. The changes of ownership until the twentieth century. Change the characteristics of the place.

Following the expropriation of church property, in 1874 the estate of Conca was assigned by public auction to the Count Achilles Gori Mazzoleni who was the owner until 1910, when the estate was sold to the Duke Leone Caetani, to be sold later in the the early twenties of the twentieth century the knight Gustavo Dominici (fig. 15). In February 1933 the O. N. C. (National Opera Fighters) becomes the owner of Conca in the programs of land reclamation.

In the early years of the 900 work began on processing and conversion of the ancient ironwork in paper mill. The factory turned the straw of wheat produced in large quantities in the farm of Conca, into paper. The plant family Dominici remained active until 1979, the year of its closure.

Following the rules established by the Royal Decrees, cav. Gustavo Dominici began the work of reclamation, with address naturalistic in its ownership of the estate of Conca. In this period the activity of fish farming was enhanced with the creation of Lake St. Anthony (fig. 16).

Follow the work of reclamation that alter, for the most part, the environmental characteristics of the place. The farmhouse of Conca Mazzoleni family passes to ONC on the basis of a transformation program of the ancient estate in lands. It implements a new organization hydraulic River Basin Astura and it's executed the processing and regulation of the river Moscatello that will be called High Water Channel.

The estate, following a program that included a new extensive cereal cultivation, was almost entirely deprived of the rich forest cover, which for centuries had covered his land. After all possibility of exploitation to cultivation, the lands were abandoned and left to pasture [17].

6. Conclusions.

The history of this area assumes particular characteristics that must be definitely pointed out and increased the value in a recovery program for the whole valley of Astura.

The knowledge of the places is essential in order to plan any work relating to the safeguard and conservation. Knowledge and awareness, of what the place has been, consent to consider the territory as an asset that belongs to the life of each one of us, and whose memory cannot be canceled by no intervention not even by the most infamous. Therefore, especially in areas most at risk, where there is a sharp decay is even more necessary to know, document and communicate the consistency of cultural heritage present in order to overcome the neglect and to give a input to growth directed to adequate development and sustainable.

Therefore it is necessary to divulge the result of research by producing documentaries archives for cataloging of the captured material and also for allow an implementation of the knowledge over time.

For this purpose, as already experienced in previous studies [18], in this research will be used a standard format of card, in which the goods investigated will be described in the main aspects and characteristic. The data collected will be handled in a informatic way and will be fed into a geographic information system.

Based on a thorough understanding of the cultural resources of the site will be designed cultural initiatives, sporting and play that could stimulate use of the goods that make up and characterize the environment.

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Digital Representation of Archaeological Sites. Recent Excavation at Alba Fucens.

Leonardo PARIS [1], Daniela LIBERATORE [2], Wissam WAHBEH [3]
[1] Facoltà di Architettura, Università degli Studi Sapienza di Roma, Italia
[2] Facoltà di Lettere e Filosofia, Università degli Studi di Foggia, Italia
[3] Facoltà di Architettura, Università degli Studi Sapienza di Roma, Italia
 leonardo.paris@uniroma1.it, daniela.liberatore@libero.it, wissamwahbeh@gmail.com

Absctract

The use of digital technologies in the survey of archaeological sites arises some interesting methodological questions. This contribution aims to make analysis based on experience in performing in Alba Fucens, Latin colony of the fourth century BC, founded near the ancient lake Fucino for control important routes in the peninsula.

The activity of documentation and analysis that the research center of Rieti Sapienza of Rome "Critevat" is in accordance with the Department of Human Sciences University of Foggia, concerns old and new excavations.

The growing use of digital techniques, such as 3D laser scanner and photogrammetry, has as main consequence the tendency to objectify the data acquisition phase, shifting forward the time of interpretation and analysis.

In the archaeological field, perhaps more than in other areas, this dichotomy is most accentuated. The representation makes more use of rendered three-dimensional models but are often difficult to manage, because they are still not standardized by the professionals or by the people who needs to acquire information for dissemination.

The three-dimensional models often do not have the selection as a goal, but the "simple" repetition of a reality. The questions are: Are these models really objective? Is there a selection in the processing phase?

The quality of a points-cloud where the real space is discretized into a number of discrete points depends on different resolutions, on the presence of voids, on photographic renderings which in turn depends on focus or exposure.

We still think the automatic processes of continuous numerical surfaces and then of the mathematical (NURBS), which often use filters to reduce the "noise", based on algorithms developed for other applications.

The paper plans to clarify the problems encountered in the experience of Alba Fucens and proposed some ideas arising from the comparison between surveyor and archaeologist.

Keywords
Digital reprentation, Archeological site, Alba Fucens, Survey, Scanner laser 3d, Photogrammetry

1. Introduction
The use of survey techniques and digital representation for the documentation of archaeological sites is certainly a very topical issue which can be an important means of optimizing economic resources for the preservation and development of a multitude of small sites known to archaeologists and superintendents, but most often invisible to the community and then out of the local tourist circuits.

Digital technology has an enormous potential, even if we can find some contradictions in its use perhaps due to the cultural differences between specialists and mutual distrust.

The survey and representation in archaeology are disciplines consolidated in the last century that are based on rigorous methodological integration between the topographical instrumental survey and direct survey, then it returned into the various final draft [1]. Rarely, if not for the most important and famous archaeological sites, was used to photogrammetry has always been considered a technique of survey very specialized and expensive.

The digital age has opened new scenarios that are also growing increasingly investing in archaeology [2] [3] [4] [5], with different weights, all intervention phases: prior investigations, planning and documentation phases of excavation, analysis of findings, and management by superintendence, and activities of musealization, scientific publication and enjoyment by the community.

Digital technology, however, implies some contradictions: on one hand it makes the task easier, especially if you think for example of the enormous scope of information dissemination, the other produces strong specializations that sometimes do not communicate with each other. That happens usually when digital technologies are based on different platforms and standards, such as geographic information systems, software modeling three-dimensional or non-invasive diagnostics (for example GPR or modal analysis).

The research center of Rieti Sapienza of Rome "Critevat", for some years carrying out research in the field of diagnostics and monitoring in many areas from the environmental to the architectural and archaeological heritage. In particular, a group of researchers have started some experiments on the use of survey techniques and digital representation for the documentation of archaeological sites [6] that are often abandoned or little-known such as the Terme di Vespasiano in Castel Sant'Angelo, the Roman amphitheater of Trebula Mutuesca in Monteleone Sabino, recent excavations in the Populonia Etruscan site. A recent agreement with the Department of Human Sciences, University of Foggia allowed to start an interesting collaboration between archaeologists and surveyors in Alba Fucens.

The examples described below relates to a particular area of excavation, that of the south-east of the Forum, where survey were conducted in two stages: the first in late 2010 and the second in the summer of 2011.

2. Alba fucens: the archeological site and the area of intervention

The excavation teaching (fig. 2) that the University of Foggia has been leading since 2007 in the southern sector of the Forum of Alba Fucens, Latin colony founded in the late fourth century BC as a military stronghold in fair territory [7], involves an area only partially affected by past Belgian research in the years 1949-1979 [8].

This is a sector that plays a nodal role in the urban, located as it is at the point of 'intersection of the axes of internal roads, - the way of the Pillars and its continuation to the north crossing the way of the Elephant - the point at which converge the political-administrative functions and the economy-trade of the ancient city.

The excavation involving the square and some buildings that flank the eastern side, in particular: a) a *taberna* from the long and narrow plant, in front of the colonnade and divided internally into compartments and different levels, overlooking the back on a elevated main road [9] b) almost half of a sizable monumental public building, articulated on different levels, whose intended character of worship must be confirmed by future surveys [10].

Fig. 1: Alba Fucens archeological site
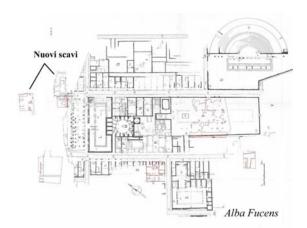
Fig. 2: General plan with indication of the excavation

The conservation status of the structures elevation is quite exceptional: the bounding walls of the rooms are kept to a height of about two meters, although they were affected, we would say in ancient times, by structural failure.

Compared to the latest discoveries (such as the redefinition of the widths of the square than now appears less offset from the plan road) the analysis of the area and the plans derived from the survey carried out important contributions to the chronological information, either in relation to the first monumentalization of the forum, whose pavement was to be later than previously thought, dating to Giulio-Claudia's age, or in relationship to the later phases of city life, when the area is affected by a series of story building that appear linked, in part, to the destructive action of an earthquake and whose stratification is found in her structural characteristics of masonry

3. The integrated digital survey

The main changes introduced by recent developments in digital technology are basically two: digital photogrammetry and three-dimensional modeling [11].

The first makes it possible to perform, beyond the technicalities and the related costs of excessive analytical photogrammetry implemented until some twenty years ago, survey operations which add up effectively to the pure metric data several additional information that only photography can give back such as for example the most minute textures of the masonry, the stratigraphic differences, the state of preservation [12]. Through digital photography it is also possible, with the commonly used software today, to prefigure project solutions in a very realistic.

Three-dimensional modeling, increasingly widespread, overcomes the scheme, at times too hard, for traditional graphical models such as double orthogonal or axonometric projections because it is unable to return multiple views and, through movement, to propose a new perceptive dimension of the object represented in a virtual simulation of great communicative value.

The combination of the two technologies, namely the photographic texturing of 3D mathematical or numeric models, not yet in common use today, is without doubt the best result that can be obtained as the product of an integrated digital survey conducted with the most modern technologies.

What is the element that unites these two technologies and represents an important discontinuity from the survey, so to say "traditional"?

In the operation of survey, you can always recognize two phases: a metric acquisition as objective as possible and a processing of the data, transcription selective metric information of the second predetermined codes and therefore is essentially subjective, interpretive. In truth they are the classic two sides of the same coin, or at least they were until the computer revolution.

The increasing use of digital acquisition techniques, such as 3D laser scanner and photogrammetry [13], has the main consequence of the tendency for objectification of the acquisition phase of the data, shifting forward, if not delegating to other professionals, the phase of interpretation and analysis of data acquired. In the field of archaeology, perhaps more than elsewhere, this dichotomy is most conspicuous, in the representation, for example, becomes more and more use of textured three-dimensional models do not yet fully standardized and is therefore difficult to manage either by experts or by who need to acquire information for dissemination purposes. Three-dimensional models often do not have as its goal the selection, but the "simple" repetition of a reality as faithful as possible to reality.

One has to ask first how much these models are actually objective or are the result of elaborations that, as such, are selective. Consider, for example, the quality of a points cloud in which the space continuous, real, is discretized into a number of points with different resolutions, with the presence of voids, with photographic renderings which in turn may contain factors inhomogeneity in the focusing or exposition.

We still think the "automatic" processes in numerical continuous surfaces (mesh) or math (NURBS) which are frequently used in filters to reduce the "noise", based on algorithms developed for other applications. One has to ask even if the three-dimensional models cover all the survey objectives or whether, must always use the traditional graphical models (although digital), there is a real integration and interaction between the data acquired with the new technologies.

These are the main questions that the research unit of Critevat was placed on experiments in Alba Fucens, where it became clear how important it is also being acquired as well as the continuous development and constant dialogue with archaeologists and with the supervisors of cultural heritage. One of the interesting aspects of the experience, still in progress, and that the activity of digital survey did not rule out a parallel survey in accordance with procedures of "traditional" made detection of topographic points for reading elevations, levelling for the identification of different stratigraphy, an impressive photographic documentation able to fix the various phases of the excavation and identification of archaeological finds to be placed elsewhere.
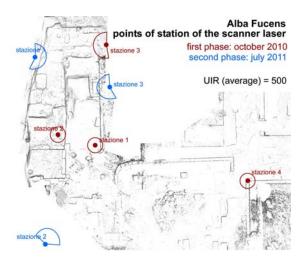
Fig. 3: Plan with points of station of the scanner

3.1 The data acquisition

The acquisition of the digital data of *taberna* of Alba Fucens was done in two stages corresponding to the two phases of excavation described above. A first acquisition was made in October of 2010 to complete the excavation of the tavern itself, the second between July and September 2011, as documentation of the subsequent campaign of excavations, adjacent to the previous one and that has brought to light some interesting remains of a public building in the north area of *tabernae*.

Were performed on both occasions scans with a 3D laser scanner, the Leica HDS3000 and photographic images were acquired using the internal machine and an external machine. Were also made many photographs not related to scanning with a digital camera equipped with a properly calibrated for the target software compensation of distortions.

Figure 3 shows the points of stations with the scanner related to the two different days.

The first day we identified four shooting stations, the first three refer to the area of excavation and the fourth, more distant, useful for a correct position on the archaeological site generally.

The second station was located on land that was later carved into the second excavation. In July 2011, when it had almost completed the first part of excavation of the public building in the area next to the *taberna*, has made a new acquisition with three other stations.

One of the main problems in the acquisition digitally using the 3D laser scanner is linked to the correct positioning of the stations on the context to be detected. The choice of the stations is determinative of a good quality of the discrete model constituted by the so-called point-clouds, from which they can subsequently derive the majority of the metric information, graphic traditional models and the polygonal three-dimensional models.

Each archaeological site presents the specificities although some aspects are applied quite frequently. The elevated structures are usually contained in height although, in contrast, "internal"environments are very small. The area to survey is often located below the horizontal plane of reference, the one which crossed the center of the instrument; should, where possible, to try to integrate the shooting low, ie, those made on the plane of the excavation, with the shoot from stations located as high as possible. The other factor that often affects the project intake is related to the field of view of the instrument that has a shadow on the bottom, with the support stand. Instrument located much higher than the area of survey on the one hand increases the visibility of structures in elevation, but at the same time also increases the shadow under the instrument.

Alba Fucens the shooting was in part facilitated by the topography of the area; station 1 positioned inside the room has been integrated with two other stations located at the top through which we were able to get a very good visual coverage altogether. Station 4 was identified as a docking station for future times that will cover the entire archaeological area and some of which have already been, meanwhile, carried.

The scannings of the second day, made in July 2011, focused on the part of the public building, with again three stations quite high compared to the area of excavations that have allowed a good level of coverage.

The registrations, that is the assembly in a single point-clouds, has been made with two separate procedures: the point-clouds refer to the same working day were recorded by the application in the field of automatic recognition with a target value tolerance of about 1 mm; the overall union of the two days instead was performed with a recognition procedure manual made possible by the many homologous points identified with a very high precision.
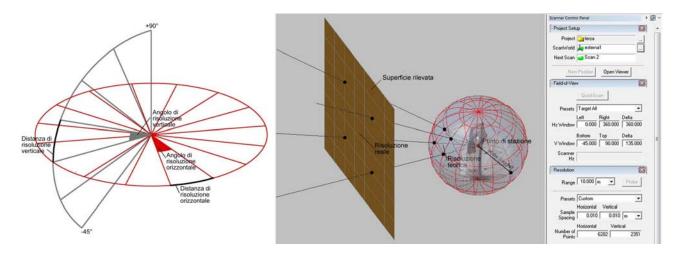
Fig. 4: Instrumental resolution and real resolution

It was determined throughout the setting phase of the shootings project the continuous exchange of information between the surveyor and the archaeologist, allowing to optimize all the phase of acquisition of digital data.

An element of concern highlighted by the archaeologists and the Superintendent has covered the wall in large stone blocks of north-west at the time of the discovery had a strong deformation in the central part, a sign of distress is due to natural causes but also to a static condition blocks of stone no longer optimal.

The second season of excavation has allowed much to lighten the burden imposed on the vertical structure even if problems of a static nature remain.

The digital detection was possible to verify, by comparing the scans made at a distance of 9 months the progression of the instability which was fortunately very contained in the order of a few millimeters.

The quality of the shooting done with a laser scanner as well as the careful selection of those stations also depends on a number of instrumental settings can not always be in the reports that describe the activity. One of these is the instrumental resolution, i.e. the amount of points in the unit of spherical sector, which is something different from the real resolution, i.e. the one obtained by the intersection of the laser beams with the object to be detected (fig. 4).

We can define the unitary instrumental resolution UIR (RSU in Italian), i.e. the one referred to a sphere of radius 1, which is obtained from the product $UIR = d \cdot r$ where d is the amount of points per meter, horizontal and vertical (generally equal) and r is the value of the range, ie the radius of the sphere. If, for example, setting an instrumental resolution of 2 cm with a radius of 10 meters, it follows that d is equal to 50, for which the value of UIR is 500. The knowledge of the UIR is important when it wants to estimate beforehand the setting time and the amount of information gained [14].

The real resolution but is never homogeneous and varies greatly depending on the shape of the surfaces and the distance to the station resumed. This has two important consequences in the setting of the project setting: choosing points of station to obtain a resolution as possible homogeneous parts found; choose multiple stations in order to compensate for excessive differences in the real resolution. And again, choose different resolutions, a lower over coating general, and other partial denser according to the specific formal characteristics of the object to be detected.

We already mentioned that all the shots were integrated with panoramic photographs taken with both the internal machine is the instrument with an external machine. Thanks to a special kit supplied, we can place the center of the lens of the camera coincides exactly with the center of projection of the laser beam, thus allowing a perfect match and interchangeability between photos "internal" is often not of good quality, and photos "outside" is best for resolution or for exposure[15].

3.2 The restitution through models

After the acquisition of digital data is followed a first phase of restitution in which a deciding factor was the continuous comparison between the different professional in the field.

If, as we said in the introduction, the phase of data acquisition by means of digital instruments feature tends to be objective, that is not selective (even if, as we saw in the previous paragraph, the quality of shooting is influenced by operational decisions is often not easy), the phase of restitution of the data through modeling necessarily involves a subjective interpretation.
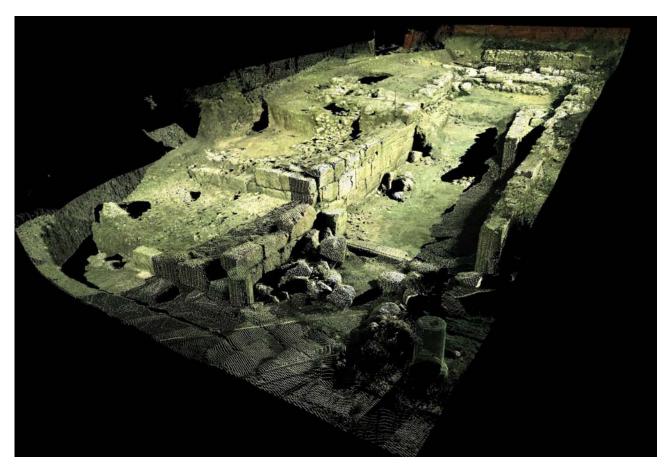
Fig. 5: Render view of points-cloud

The experiments under way at Alba Fucens not replaced the survey techniques and "traditional" restitution that remain in many ways necessary for the documentation of the actions in progress of excavation and finds. This gave way for archaeologists to compare the information is to assess both the reliability and above all the different communicative potential.

One of the most innovative on the digital survey using laser scanner integrated with photography is to have a three-dimensional model consisting of discrete point-clouds which can be associated with the color value derived from the image photo. This new model, available immediately, can be understood as a real three-dimensional photography. The model management is still the preserve of specialists because the need for dedicated software difficult to use and very expensive. But digital technology progresses exponentially is already available software "easier" through which they could use the model "raw" (fig. 5).

Another new feature is the ability to obtain "traditional" graphical models, all digital, but easier and immediate reading, that is, for example, plants at various levels, sections, elevations, possibly supplemented with information such as photos.

The passage is not automatic and refers to the codes of representation consolidated so that no three-dimensional model, as elaborated, will be able to replace. The development of the plan of figure 6 is an example.

We tried to get a planimetric image synthesis can better represent the complexity of the archaeological site where they were still recognizable emergencies that characterize the shape. The development of the point-clouds takes advantage of some of the many views that can be obtained by varying parameters such as for example, the background color, the color map, the point cloud rendering, the density of points viewable.

Nevertheless, it is still necessary to integrate the development made by overwriting certain information necessary for the representation, information that the surveyor was able to highlight only thanks to the determinant of the archaeologist.
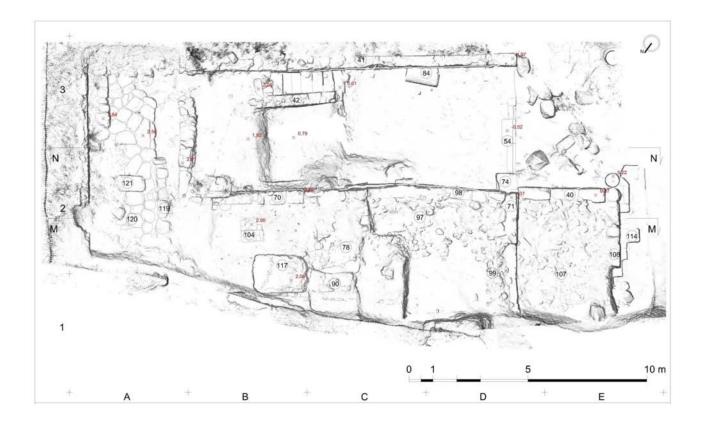
Fig. 6: Plan of the excavation area

Fig. 7: overlap of plans
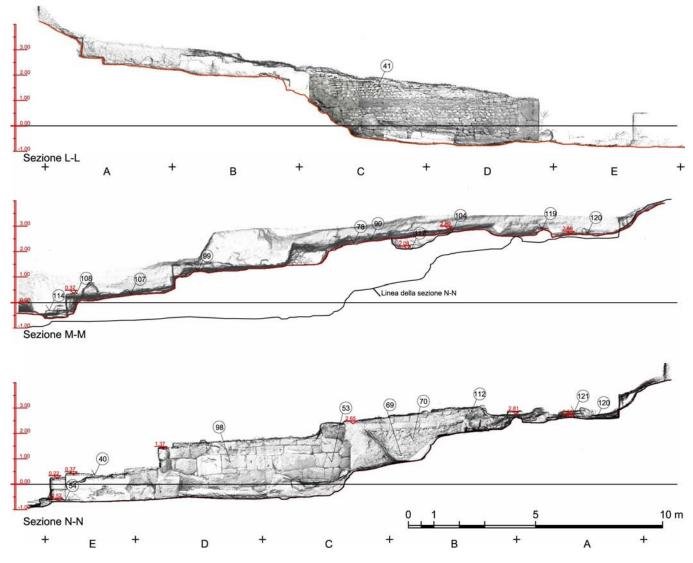
Fig. 8: sections of excavations area

The floor plan was compared with another plan prepared according to procedures previously "traditional" (fig. 7). In comparing the differences are obvious topographical, fairly small, but above all the different graphics made, based on the continuity between the artificial and natural elements of the former over the latter.

The steps identified for the development of the plan was also used for the preparation of sections, some of which were then integrated with the processing of photographic images scaled appropriately according to the corresponding orthographic views (fig. 8).

Research has therefore focused on two distinct ways of representation. The first revival of "traditional" graphical models characterized by an evident desire of interpretation, however, based on objective data as it is, those derived from the three-dimensional digital model of the point-clouds, so in essence the transition from 3D to 2D. The other processing of the same three-dimensional model in a different model 3D of the continuous type, based on polymesh modeling. In the latter case it is necessary to carefully evaluate the operations of filtering of the data "raw" for a controlled reduction of points (the cloud processed in two days and about 7 million and a half points), and noise. The main intention is that for which you want to make three-dimensional model, with a huge capacity that is representative evidently well beyond the 2D models, as much as possible "navigable" experimenting with the conversion of the continuous model in standard communication platforms like such as 3D PDF files.

Fig. 9: 3D surface model

As part of these files in common use is also possible to implement the same files 2D acting on different layers to which associate possible interactive actions, such as for instance the comparison between sections at different heights or levels of activating or deactivating thematic analysis as for example the stratigraphic study or analysis of the degradation.

4. Conclusion

The experiments under way at Alba Fucens has highlighted some interesting issues which through a close collaboration between specialists have tried to give an initial response. The management of digital models that can be obtained from the use of new techniques for survey and representation can be varied according to different levels of usability. There is a first level, on the field, which covers the documentation of the excavation activity, where the processing is necessary to integrate the traditional with the first three-dimensional digital processing. There is a second level for the consumption of the scientific community in which the representation is true instrument of knowledge and verification of the first assumptions made in the field. The model must be able to display all its topographical objectivity but must also be able to return a first level of interpretation. It must be fully supported in order to be implemented through the historical considerations and first assessment of conservation. Finally, there is a third level of usability, the one to use and consumption of the community, in which the model of restitution must necessarily be more easily understood and manageable also and especially by means of disclosure of mass, and for example the web [16], through which give visibility to an immense fortune scattered and for this too often left to his fate. Being able to set a suitable and qualified network of interchange between the different levels is the foundation for the construction of the Knowledge Factory is able to activate virtuous processes not only cultural but also economic in common territory.

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Generative Architecture as a methodology of optimisation. Spanish examples.

Angélica FERNÁNDEZ, Zaira PEINADO, Luis AGUSTIN
Area of Architectural Graphics, Escuela de Ingenieria y Arquitectura, University of Zaragoza, Zaragoza, Spain
E-mail: af@unizar.es, zpeinado@unizar.es, lagustin@unizar.es

Abstract
At the present time, with the help of software (Grasshopper, GC or RhinoScript), architecture has undergone a change of design. The use of algorithms makes it possible to solve geometry problems using curves and freeform surfaces, enabling the generation of previously unthinkable fluid spaces and skins. This generative architecture can not only be innovative from a visual point of view, but also sustainable and economical.
To reduce installations, waste, energy consumption or materials may be some of the advantages of these architectures of complex geometry, apparently less functional.
In Spain, a trend has risen in this direction. Examples would be the Barcelona Media-Tic Building by Ruiz-Geli, whose façade is a moving sunscreen that facilitates the control of light and heat; the Villa NURBS coated by ceramic pieces that regulate the intensity of light; the Space Metropol in Seville designed by Jürgen Mayer based on a bioclimatic operation scheme or the project for the National Energy Museum by Cero9 team.

Keywords: Generative Architecture, Parametric design, Algorithms, Optimisation.

1. Introduction

Nowadays, the way of making architecture is changing with the advent of the digital age and automated software processes, which make it possible to create forms previously impossible due to the lack of appropriate tools. Not long ago an architectural project was done, its efficiency was proved and almost never any corrections were made, because they were costly in time and in media resources. Now, new technologies allow to do the project through parametric modeling, a tool that offers the advantage of making any corrections instantly and effortlessly, changing the geometric operations in real time, thereby increasing our expectations compared with the use of an analogical technology.

2. Generative architecture. Concept and technologies

The concept of generative architecture or parametric design means that, through geometry and parameters, a form definition is allowed by applying user-driven relationships, where we can change their properties obtaining different results, getting a great flexibility in designing. This is one way of using generative algorithms.
An algorithm is defined as a list of instructions for solving an abstract problem, i.e. a finite number of steps that convert data from a problem (input) into different solutions (output). A generative algorithm is associated with the steps defined for geometry problems in the design process and the selection of the best variable. They must be seen as a design tool that provides new ways.
The commercial software used is Rhinoceros with Grasshopper plug-in (GH), RhinoScript and Generative Components (GC). The firms define their products as follows:

GC is integrated with Building Information Modelling (BIM), analysis, and simulation software, providing feedback on building materials, assemblies, systems performance, and environmental conditions. This integration also ensures that intent becomes reality by enabling designs to accurately and efficiently flow through to detailed production and fabrication. (BENTLEY SYSTEMS) [1]

RhinoScript is a scripting tool based on Microsoft's VBScript language. With RhinoScript, you can quickly add functionality to Rhino, or automate repetitive tasks. (McNEEL) [2]

Fig. 1: Quad Meshes in Architecture by Benjamin Schneider (TU-Wien) created using Generative Components. [3]

Fig 2: Part of the project "Blurring Structures" by Prof. Grohmann (University of Kassel, Faculty of Architecture, Departement of structural design). The generating script is based on Aristid Lindenmeyer's L-System. In order to dimension the structure automatically, a RhinoScript-RSTAB-Interface was developed. [4]

Grasshopper® is a graphical algorithm editor tightly integrated with Rhino's 3-D modeling tools. Unlike RhinoScript, Grasshopper requires no knowledge of programming or scripting, but still allows designers to build form generators from the simple to the awe-inspiring. (GRASSHOPPER 3D) [5]
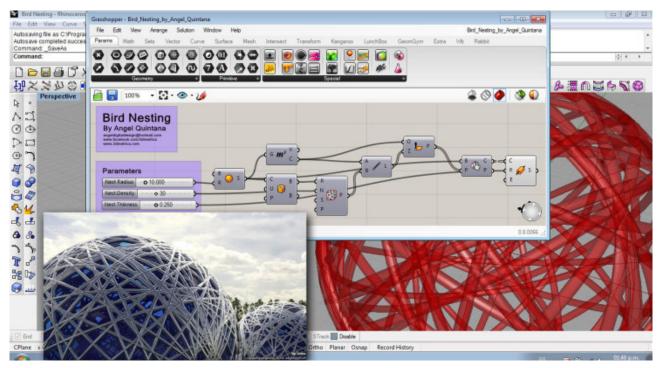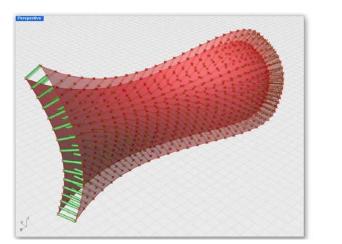
Fig. 3: Bird Nesting Definition by Angel Quintana created using Grasshopper. [6]

Parametric modeling uses manipulative codes that allow the introduction of interacting variables and get a higher level of complexity. We have to familiarise ourselves with a number of concepts: independent variable (or user-defined numeric input) and dependent (output, whose value changes, result), constraints (delimit the

range of variations, rank, series, intervals, sentences), parameter (contains data stored), component (contains action, does things), curves and polysurface NURBS (Non Uniform Rational B-Splines) and finally recorded data flows, data lists and operating functions. [7]
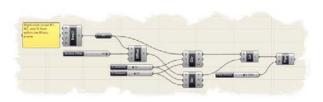
Fig. 4. Example of NURBS forms and Grasshopper code [8]

The use of algorithms makes it possible to solve geometry problems using freeform curves and surfaces, spatial distributions generated by mathematical formulas such as the triangulation of Delaunay or the diagram of Voronoi. Using algorithmic methods, we have a range of computational geometric possibilities while we can manage a large amount of data and numbers. We don't have to limit the project to predefined experiments. We must exploit the potential of algorithms and their numerous possibilities. [9]

Finally we should define the design and computer aided manufacturing (CAD / CAM). It is a discipline that studies the use of computer systems as a support tool in all the processes involved in the design and manufacture of any product, covering disciplines of graphic design, database management for the design and manufacturing, numerical control machines, robotics and computer vision.

CAD (Computer Aided Design) consists of using computers to perform tasks of creation, edition, analysis (FEM or Finite Element Method) and design optimization. CAM (Computer Aided Manufacturing) is the use of computer systems for planning, management and control of the operations of a manufacturing fabrication using the interface directly or indirectly between the computer system and production resources. [10]

Thus, combining architectural CAD / CAM manufacturing and digital laboratories, FabLab has emerged, where numerical control machines are used to make models of objects. Its uniqueness lies in its size and its strong links with society. The Fab Lab concept appears at the beginning of 2000 at the Center for Bits and Atoms (CBA) at the Massachusetts Institute of Technology (MIT). An example is the FabLab house designed by the Institute for Advanced Architecture of Catalonia (IAAC), MIT's CBA and FabLab Barcelona. Fab Lab won the Solar Decathlon Europe competition. This solar house combines parametric design and CAD / CAM. Its climate passive structure uses water, sun and wind to create a microclimate and integrates flexible solar panels. [11]

Fig. 5,6: FabLab House. [12]

3. Optimisation as an ecological challenge

Having arrived at this point, we should emphasise that parametricism is a method – a tool serving the designer. As Robert Aish says, "The abstract concept of parametric design, like other methods, is neutral. Buildings and urban masterplans designed parametrically may have attractive visual properties and other positive advantages partially facilitated by parametric design tools, but a particular methodology or tool set cannot be used as a way of justifying the resulting style" [13].

Software should be therefore open or abstract enough to avoid standard or predefined solutions, that could turn into conventions. *Tools should challenge the designer* [14], instead of substituting him.

One of the architects' challenges, that can drive them to use the mentioned tools, is optimisation. With a first extended use in 19th-century biology, the term 'optimal' refers to "the best conditions of, let us say, light, temperature, altitude for an organism to prosper. (…)The process of optimisation describes the synthetic search for this best state within a model, whether of a biological system or architectural or structural system, usually under a set of restrictions, implied or expressed" [15].

Depending on the mathematical model used, optimisation methods differ. There are stochastic methods, with a random or probabilistic basis; deterministic methods, where values are assumed to be precise and no randomness are in play; and hybrid methods, which combine stochastic and deterministic steps.

On the other hand, the designer has to decide whether constraint rules or purpose rules have to be applied, depending on his objectives.

Through optimisation, important savings can be achieved in the construction phase and during the life of a building. Especially material and energy savings are important, not only because of its economic advantages, but also because of the ecological ones. Ecology has become in the last decade an essential factor to consider in the project. This has encouraged the search for new solutions, and the invalidation of old and accepted models. The integration of parametric design tools in architecture gives a great potential for new spatial possibilities, not only formal, but linked to processes of energy flows, taking into account the concept of sustainability, resource management needs and the relationship with the medium.

Important architecture firms have created their own research offices, that work on developing those new solutions and incorporating them into their architecture projects, as well as offering consulting services to other firms. One example is Aedas R&D, an office in London whose main areas of research are: computational design, advanced modelling and sustainable design. This cross-pollination of interests has led the practice to develop innovative approaches, exemplified by the design for Al Bahr towers, the Abu Dhabi Investment Council Headquarters and the Digital Masterplanning (DIGMA) tool. [16] Another example is SMG (Specialist Modelling Group) at Foster + Partners. They provide expertise in complex geometry, computer programming, parametric design and rapid prototyping and environmental simulation, aiming to provide directed specialist support whenever required. [17]

Fig 7 Al Bahr towers (by Aedas) [18]. The façade employs an adaptative kinetic shading screen.
Fig 8 Masdar City (by Foster + Partners) [19]. It is poised to become world's most sustainable city.

The structure of a building can be optimised with the help of calculation tools, with the aim of a lower impact on the environment. A plug-in for Rhinoceros-Grasshopper is Scan&Solve™. It is *a plugin from Intact Solutions that completely automates basic structural simulation of Rhino solids. Unlike other analysis tools, no preprocessing (meshing, simplification, healing, translating, etc.) is needed. It allows integrating finite element analysis directly in the graphical programming of parametric design.* [20]

Light and energy savings during the life of the building are another of the objectives of the application of optimisation methods. For that purpose, it is important to know first the specific conditions of the building: the occupancy and uses, the time variations during the day, or the seasonal variables, for example. A greater energy efficiency can be achieved if the trajectory of the sun is taken into account. Tools have been developed for it, such as the ECOTECT software, and the GECO plug-in for GH. They allow variations and dynamic models, where solar incidence can be added in order to generate more efficient and precise settings, and thus simulate, analyse and design strategies for solar control and harnessing.

One of the biggest advantages of parametric design is the interdisciplinarity, giving the possiblility to involve social or structural criteria, flow simulations, etc... in which a process, and not a specific result, is designed.
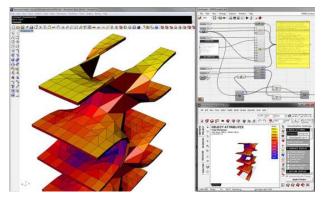
Fig. 9: Geco: component for Grasshopper created by [u t o] (Ursula Frick & Thomas Grabner) [21]

4. Spanish Examples

4.1 Media-Tic Building
Cloud9 (Enric Ruiz-Geli)
Barcelona. Spain. 2006-2009
The building is located within the 22@Barcelona and the ICT and Media cluster. The Media-TIC is an emblem of the digital world headquarters and a meeting place for companies and institutions in the world of ICT technologies. The building was designed and built through CAD-CAM processes and was designed to be a large generator and to optimise its use.

It has a cubic shape (40x40x40m) and its structure consists of four rigid bioluminescent frames braced separated fourteen meters to each other, that produces open and flexible spaces through parametric processes that allow an optimal configuration for the central courtyard and the two vertical communication cores.

Following issues were optimised:
- the evacuation distances in case of fire
- the area with natural lighting
- the flexibility of the floor distribution
- the ratio of sq metres of vertical communication over programmed sq metres (with a loss of 8.5% compared to normal 15%).

With the building energy simulation, heating and cooling demands have been adjusted, minimising the dimensioning of the facilities.

The building envelope consists of ETFE (Ethilene Tetrafluor Ethilene). It is a transparent plastic coating of three membranes, oriented to the south and functioning as a variable sunscreen. They open in winter to harness solar energy, closing in summer to protect themselves, activated by autonomous lux sensors to provide more transparency or opacity. The western facade is filled with a Nitrogen mist inside and with a great sunscreening factor, which protects users without sacrificing natural light. They also use sensors for temperature and power consumption, so that energy saving is very high. [22]

Fig. 10: Media-TIC by Cloud 9, architect Enric Ruiz-Geli. Photography by Luis Ros. [23]
Fig. 11: Metropol Parasol, photo by David Franck. [24]

4.2 Metropol Parasol
Jürgen Mayer
Sevilla. Spain. 2006-2009

The Metropol Parasol project is located in the Plaza de la Encarnación, in the historic centre of Seville. The Parasol with its giant structure unifies the different levels of space, such as the ruins which rise from the subsoil or a market located in the square with a long tradition, and incorporate new spaces on an elevated plaza. It has become a contemporary new urban centre. It is designed using parametric tools, as a lightweight, hundred feet high wooden structure, which offers daytime shade and light input channels of the setting sun, creating a pleasant microclimate.

The structure is one of the largest in the world and consists of 3000 pieces of wood and forms six fungal parasols. It is approximately 150 meters long, 75 m wide and 28 m high, introduced into an orthogonal grid of 1.5 x 1.5 meters. For structural calculation an iterative calculation program was developed with the 3D model to determine the thickness of the wood elements in each of the joints of the structure suitable for optimization.

Metropol Parasol structure provides a shaded area to the intense sun of southern Spain. The hatch covers the public square as the roof of the market. The plaza level becomes the attraction of public space, while the level of the market means a reduction of cooling loads for air conditioning.

With the use of parametric design a continuous and permeable structure is created, allowing light to enter the square and avoiding a screen effect, and also permiting to remove the hot air generated in the square lowering the temperature in the hot months, thanks to the shading. It has therefore been prioritised in the study of the generation of shades in the square in the months of March, June and December in four different times (9:00 a.m., 24:00, 15.00h and 18.00h) of solar incidence.

The microclimate of the Plaza is improved through the wooden structure of the Parasol. Timber hardly stores heat and therefore does not radiate heat generated in the square. The shade prevents heating too. Furthermore a free cooling system is provided through fountains, reducing the sensation of heat. [25]

Fig. 12: Function diagram Metropol Parasol bioclimatic, initial project. [26]

4.3. Villa Nurbs
Cloud9 (Enric Ruiz-Geli) + Jordi Fernández

Empuriabrava (Girona). Spain. 2003-2008

The villa is a private house located in Empuriabrava, a coastal village in Catalonia developed touristically as a place of weekend retreats and second homes.

The building is completely closed to its environment, by contrast opening itself to a private central courtyard. The house consists of a ground floor of curved concrete walls, that turn into a cantilever slab, and a first floor, also with curved geometries, with spaces arranged around the courtyard and the pool. The façades are made of different materials, some parts are translucent and other opaque, coated with original hand-painted ceramic pieces. The roof consists of ETFE cushions, which swell and deflate mechanically.

As can be read in the website of the architect's studio [27] the project was developed following a series of process "rules" set by the designers themselves. Here go some of them referring to the optimisation ideas and tools used:

4   measure and construct the 3D landscape as a TOPOGRAPHY
6   the geometry is COMPLEX
7   the goal and benchmark will be a NURBS
9   optimize resources building construction using CADCAM processes
11   invited industrial designers work from the skin of the Nurbs to the skin of the inhabitants, looking for a CELULAR, chemical approximation of materiality
12   the design is always PARTICIPATORY with the customer
13   definition of ATMOSPHERES into the skin
15   skin is reactive and manages ENERGIES

Fig. 13: Villa Nurbs. Aerial view [28]
Fig. 14: Detail of the roof 'pillows', showing ducts that regulate solar penetration by inflation and deflation. [29]

Mark and Jane Blurry describe villa Nurbs stressing its properties as a NURBS project and its efforts for optimization [30]:

"(...) at Villa Nurbs a performative quality has been introduced by allowing the pillows to control the degree of solar penetration, simply by varying the degree of inflation. This was achieved by screenprinting an image on

one wall of the pillow, with its negative on the opposite wall. When the pillows are highly inflated, more sunlight can find a path through them than when they are deflated (when the positive and negative images align more closely, effectively occluding more of the sun's entry than when inflated).

It is the project's name – Villa Nurbs - that reveals its main conceit. It is as if a CAD project has been directly translated from computer-generated non-uniform rational B-spline surfaces (NURBS) directly to built object, which is of course what has happened - hence the description of the house in its suburban context as 'uncompromising'. (...)"

4.4 National Energy Museum
Cero9 (Cristina Díaz Moreno + Efrén García Grinda)
Ponferrada (León). Spain. 2009 (concurso)-

The idea of the museum starts from the dismantlement of all the machinery at the Compostilla Power station, leaving two large, roughly built pavilions. They shall be used for housing the museum contents, together with a new volume which is connected with the existing pavilions underground.

The new building contains several exhibition rooms superimposed vertically. The ground level is occupied by an inmense atrium, a sort of greenhouse with large vegetal specimens that acts as a climatic hall, receiving warm air from underground conduits. Most striking is the complex geometry of the ceiling, designed considering air flows and its thermal behaviour. This is how the architects describe that geometry in El Croquis magazine:

"The roof of the atrium is shaped to accelerate the air rising from the underground galleries. The solid volume is eroded virtually by upwelling flows -produced by air instead of water- generating an inverted geology which feeds the air into the large lateral apertures and the various intermediate chambers on each floor. The interior domes act as massive chimneys, their pressure difference triggering kinetic suction. The roof is a set of two large central pools of air, two smaller lateral units set alongside the facade, three large outward facing funnels which also feed light into the building, and three inverted domes which channel air into the rest of the rooms and shape the space of the large interior." [31]
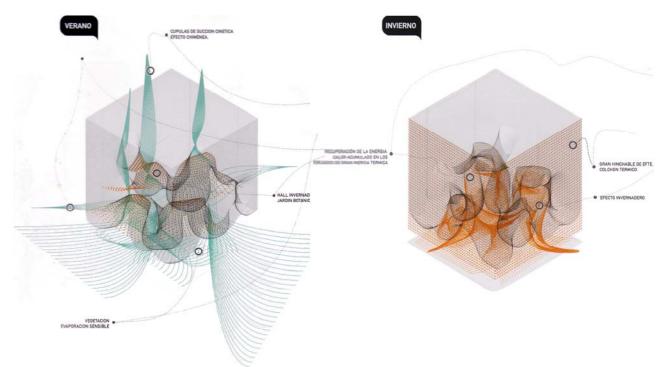
Fig. 15: Air flows and solar incidence in summer and in winter. [32]

The façade of the volume is also designed considering thermal criteria and experimenting with materials, just like Enric Ruiz-Geli. The architects refer to the façade as a "black inflatable jacket", that "acts as a thermal blanket which reflects the position of the interior domes in the geometric pattern generated by the necessary fragmentation of the surface. This discontinuous chamber, subject to overpressure, consists of two successive silicon skins reinforced with bulk-tinted fibreglass and pattern of transparent apertures, with outer

skin made from a composite fluoride film which at the same time insulates and closes off the interior rooms."
[33]

Fig. 16: General view showing the inflatable façade. [34]

5. Conclusions

What one can see through the examples above is that new geometries are not just applied into special projects, or into exclusively academic or theoretic researches. They respond to normal assignments, providing more benefits that a traditional solution. Computational design and parametric tools can in fact be combined with other, more traditional, working methods, giving answers to a specific matter or part of the project.

These tools are nowadays not very widespread, but the use of them becomes increasingly frequent, as more software is developed, more powerful and user-friendly.

In regard to the ecological optimisation, the use of those tools is quite recent and their results have not been broadly proven yet. It would be necessary to keep track of those architectures designed with parametric tools, and to see if its performance is actually better than that of other architectures developed with traditional solutions. This will tell us if the starting conditions and the rules set forth are correct, or if on the contrary, they must be improved. This will allow an increasingly better use of the tool by architects and designers.

It is also important to study comparatively the construction costs of those architectures (due to their complex geometries or materials) with other solutions, given the current technologies available, as well as their ease of use and maintenance.

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More or Less… "Drawings" (as Heritage Preservation)

Pedro António JANEIRO,[1] Ivo COVANEIRO[2]
[1] Department of Drawing and Visual Communication, Faculty of Architecture, Technical University of Lisbon (FA/UTL), Lisbon, Portugal; CIAUD – Centro de Investigação em Arquitectura Urbanismo e Design (FA/UTL) – Research Project *Imagined-Architectures: Architectonical Graphical Representation and "Other-Images".*
pajaneiro@gmail.com
[2] ivocovaneiro@gmail.com

Abstract

The present paper aims to present a new point of view about what "a drawing" for architecture can be. Invented from a true story: the story of a child that in the dining room at the home of his grandmother, with rows of colored wool, tied the door handle to the lamp, and from the lamp he tied the leg of the table, and from there until the nail that hangs a blue watercolor; and from there to another point and so on…, this project we now present is a metaphor for looking at a place (in the present case, an Italian city: Narni) in a new way. With this new approach on Drawing – 3 dimensional drawings done with colored "lines" of wool –,through simple (artistic?) interventions, signal (in order to call people's attention) the necessity to preserve that city architectural Heritage. As this child, using lines of wool, were built artistic interventions in the architectural heritage in the historic center of a small town.

This installation with lines, with a signaling function, woke up the space and aroused the objects of their quotidian heritage; giving them another sense: from anonymous to main protagonists. From *forgotten*-objects to *visible*-objects that need care and preservation. The purpose of this (art-)work was to intervene effectively in the Heritage of this city, valuing it and putting it in evidence and at the same time giving them other possibilities to be read from new aesthetic experience.

Keywords: Architecture, Drawing, Preservation, Heritage, Intervention.

Paper

My father, when I was a kid drew like anyone: my first contact with this "thing" that is remove from reality, or create from (invisible-)imagination, other-"thing"-similar-like-"it" was through him; he invented landscapes, explained things to me, drew donkeys (still my favorite animal), flowers made of hearts, Speedy Gonzalez, all through drawings.

When I was a child I used to go to my father's studio, and there, he gave me sheets of paper; in those times I could not even read and I didn't know the weight of words.

He gave me paper and I drew. I was trying to repeat my father's drawings.

I was drawing, just drawing: things.

Drawing is good but it has a price. It is true that I was trying to repeat my father's drawings, but what I really liked to draw was my hand.

With my hand over the A4 sheet and with a graphite pencil I was making the line travel around the periphery of my left hand.

Only much time later I met Lascaux. Only much time later I met *The Life of Forms*, followed by the *Praise of the Hand* by Henri Focillon, first published in 1943. Hands, he says: "They are almost alive beings. Are they slaves?"

The hands, I remind you the text: "[…] in the back light of one witness of the great *Resurrection of Lazarus*, the working and academic hand of Dr. Tulp, holding with a clamp a bundle of arteries in the *Anatomy Lesson*, Rembrandt's hand drawing, the amazing hand of St. Matthew writing the Bible dictated by an angel, the hands of the old cripple in *Coin of One Hundred Florins*, duplicated by the big and naive gloves hanging from his waist." My own hands on a draw, those I made when I was a child, I don't have even one copy today.

The hands are slaves of the Spirit.

(Before continuing I need to say one thing. In fact, several things.

Point one: I consider more *the Human* than erudition, more who-speaks than what-is-speaking-the-speaker.

Point two: I consider more important to talk about what is needful to speak in first person than exhaust ourselves in quotes, bibliographies, and authors, and, above all, that I reject, with all my cells, the (academic?) fear to say what we really think about the things of the world using, instead of the majestically typical plural of scientific discourses, the word *myself.*

Only one more point, please, point three: that I am fully aware, on the one hand, that the speech-about-something is replacing that something; and, on the other hand, I don't have, as human, legitimacy to speak about something that I don't know.

And more, point four: that the Truth in Science is a relative value, therefore a paradox, upgradeable; that the only Discipline where Truth is not is a "continuous movement" is for Theology (which, interestingly, is the study of God); to finish, point five: I am, as the way that Heidegger describe things, *Mortal on Earth* and I can make mistakes and/or review my positions on things.)

It amazes me Lascaux: the silhouette of a man's hand before me on the wall of a cave saying him, saying to me: "I am here and I was here." Here, really here: where he was with his feet in the same place where I am, where he – assuming his verticality – had been with his own two feet supporting his body.

Here, architecture. He and me: men.

Drawing is, among other things, a will of the body. Who draws knows that is the body who wants another draw: one more fixed instant, even if it is the last one.

Marie Antoinette Habsburg-Lorraine, it is said, asked the man who pulled the rope – which was also a line – the guillotine on 16 October 1793: "Just one more minute."

Just one more minute (to see again), a second look, a new look.

One minute to see. To see the world for the last time.

We live concentrated in draws as a product. Finished, if they could speak, they would tell us the world, but the drawings do not speak, they don't say nothing, they are silent, they do not delight us like the words enchant us, they don't deceive us, they don't cheat us, they don't lie to us, the drawings are always true, even those of Escher, and they are always "this", even the *Ceci* from *"Ceci n'est pas une pipe"*; the drawings are the world and from the world itself.

The draws are always *Ceci*, This. They live from This, they replace This (*This* is always the world) I mean: they, as a product, are a vestige of a human moment in the world.

I am fascinated with this idea: that the drawing is a kind of robbery. A drawing *al vif,* among other things, is a kind of fragment that I cut and steal to reality.

Drawing is a permissible robbery: because what one draw steal, gives it back in double or more, to the stolen world. When I say that some draw is good then the world is richer because, as a product, that draw is one more object in the world. I steal but I give it back: what-I-steal don't stay because the movement of the world is continuous, but what I give – this instant of world turned into a thing – replace it.

I say that I steal, but I know that I give it back.

If I draw on a portable support (a sheet of paper, for example) I steal and I bring the stolen world under my arm; if I draw on a surface that I cannot carry with me (on a wall, on the floor, on the glass of one window, for example) I leave a trace of my crime at the scene of the crime; If I draw on the dirty surface of a car with my finger, then my drawing will travel; in this is evolved my body who wants it.

When it was presented to me the concept of "intentionality" – by Husserl and Merleau-Ponty, my guides, through their written word – not only changed my life as I began to see a draw as, like all things that the body produces, a practical posture of one theoretical and philosophical proposal; an effectively encased of the body with the world, a combination of the *body-that-is-world* with the *world-*

itself, a split of consciousness through, not what is surrounding me – because, in fact, nothing is around me – but through feeling the body-that-draws, while is drawing, world.

If I draw on my skin on the palm of my hand or on my neck for example, then the problem is deeper. Who draws knows that while the drawing takes place on a surface we can feel, in the fingers and in the hand that holds a pencil or a pen or a brush, the line; there is a tact that involves the hand that is drawing; we feel the hand seducing the leaf or the wall with points, lines or spots until the world be the world, until the world, anamorphic and labyrinthic, turns into *a form*.

Although even if is not the hand that touches the sheet, we can feel the sheet in the hand. If I draw on my skin then I feel the skin on the hand that is drawing and the skin being drawn: it is one, actually, *interface*, the line is not from the hand nether is from the skin, but, paradoxically, is from both of them.

The function of the pencil is, while I am using it, drop a line. The graphite cylinder that is inside of the dark of my pencil made wood, in molecule, is a diamond (a carbon in its purest state), its function is, through me, my body, feel the glow that flows by the contours of things that make what-I-call world. The graphite inside my pencil, or the cubic centimeters of ink from my pen, can, potentially, build a line with thousands of meters.

From the tip of my pencil or my pen, if pressed against a surface, came out from the *disordered world*, *the world seen* by me: a world reconstructed by lines saying borders between figures and backgrounds, if the lines are intertwined we get clear and darkness, starting points and ending points finishing a draw, finishing sentences if I used them to write.

I do *This* with my hand.

Points, centimeters, meters, and miles of line. A line sleeping inside my pencil, chaotic, meaningless in the cylinder, and because of the will of my body, through the line, decides to wake the things of the world.

Just one more minute.

I also remember how, as a child, I disembarrassed a skein of wool line that my grandmother opened with her arms until being built a sphere, a ball. From the incredibly strange skein of wool, anamorphic and senseless, embarrassed and full of nudes of wool, ran a line.

From the open arms of my grandmother to my right hand that rolled over my left hand a harmony, I remember the time (which took the wool ball). I learned only after the *Metaphysics* and the eleven concentric spheres of Aristotle made of an unchanging *fifth element*, a perfectly transparent substance known as "ether", one immediately beyond the blue, a blue in transcendence, a blue in coma.

I didn't know, at that time, about Eudoxus and Callipus.

Even now for me to draw is this: we are solving the nodes of the skein, catching the end of a line and put it in order (my order) the violent *chaos* of the world. And, perhaps, this is why the drawing interests me more as *process* than as a *product*: I am more interested to run the line than the ball ready, the process than the product.

I am more interested in the gesture of the hand, how many times it stop, the speed the line travels from the skein to the ball of wool than the ball or the skein; I am interested, especially about, the time. Every drawer knows that while he is drawing the time seems to stop: a kind of putting parentheses in the world while we see the line turning into a thing, an *epoché*, a kind of *ek-stasis.*

Ready the wool balls my grandmother built sweaters (it was therefore also in power in the disorder of the thread, through the use of line, the temperature); and I, with these lines of colored wool: tied the door handle (of the little room where we had lunch) to the lamp, and from the lamp, with the line stretched, I tied the leg of the table, and from the table leg, I stretched it well, until the nail that hangs a blue watercolor of the Swiss artist Fred Kradolfer (an underwater landscape); and from there, from that steel nail which is still there today, I stretched the line carefully to the shade of the lamp that was on top of a small table next to the couch, and from there to the key (made of yellow metal with cute letters saying OLAIO) of the closet door where was kept the white porcelain and cobalt, and from there to another point, and from that point to another; point by point I traveled the line of wool, until, after a few hours of creative work, like inside of a web, I stopped amazed, just to see it. Just to see how that room, through my own *intervention* (artistic?), had won other senses. At the time I didn't know, but I built three-dimensional drawings.

After all, the line that comes out from the anonymous cylinder of a graphite pencil or the container that holds the ink inside a pen, is not so different from the line coming out of a ball of wool: in "intentionality", the line is exactly the same, in the will of body and in use, the pencil line and the line of a woolen ball, are the same; the same line that Pseudo-Apollodoro tells us, the line of Ariadne and Theseus in the labyrinth of Daedalus, in the *Library*.

Actually, I just realized what I did with the line that came out of the chaotic skein, labyrinthine, was a drawing (a three-dimensional drawing) a few months ago (22-29 July, 2011) in an exercise of drawing with lines of wool in a workshop called *The Time and the Happening: Drawings as Artistic Interventions* that I coordinated in Narni, Italy, at the 9th International Seminary of Architectural Design: *"Architecture Town Territory in Transformation, Tradition, Contemporaneity, Sustainability, Project Reflections on Recovery of Historic Towns"*.

We are so used to flat surfaces to draw that when we can mark (in) the air with a line of wool, for example, we almost forget that we don't need to stick to the idea of the plan.

With the line I linked everything to everything like a fractal or a mathematical 'curve stitch' by Mary Everest Boole in the late nineteenth century.

My (artistic) "installation" meant that certain aspects of the room were more popular, more noticeable. The line that I used, were pointed certain aspects that, probably, would be forever unnoticed by the inhabitants of the space. This is because the eyes follow the line.

In addition to the aesthetic aspects of the installation, seems that the line had almost a signaling function removing from anonymity certain objects or certain characteristics that without it, without the installation of colored threads of wool, nobody, because of habit of using that space, have seen. My installation, my 3D drawing, woke up the space and aroused the objects of our quotidian heritage; giving them another sense: the passage from *anonymous* to main *protagonists*; they could be seen: in fact, a spatial experimentation at a scale of 1:1.

Anyway: if we draw on a sheet of paper or on a wall, on the glass or on the skin, drawing is always something-between.

Between what and what?

Between whom and whom?

Between whom and what?

Between what and whom?

From drawing and the draw interests me especially the time, I am interested in the meantime that the draw saves. Almada Negreiros said: "A drawing is our understanding to grab a moment."

It is true.

Time, that great sculptor. Time without the tyranny of Chronos, the time invisible, intangible, sensitive: sensitive, means, because I feel it happening; a Kairos, "the right time," "timely," *καιρός*, "mine".

The time that I care about, is because of that, a drawing, is the time of the happening of the draw and not so much the product of that happening. If the Time born from the relation between *me* and the *things(-in-myself)*, then I can tell you, is because this time is (or exists) inherent to that (or in) my relationship. A draw is the remnant, is what remains from this relationship, and drawing this own relationship. That's why I said that drawing is putting in practice the notion of "intentionality" very well described from the Discipline of Phenomenology and Existentialism.

In this sense - the sense that I can admit the existence of a correlation between *the act of drawing that aims to achieve* (the intentionality) and the *target object* - the object is not only a pretext for the construction of a synthesis of subjective identity through which I can become aware of myself; it - the object if drew it – is, primarily, *a unit of meaning* - "[the object] is not, then, more than a face-to-face (*Gegenstand*), and my consciousness the place where those face-to-face exist; more: to tell the truth, those face-to-faces are the only way I know I have something named as conscious; even more: consciousness is not conscious of herself. She always needs an object.

It is through this relationship that I draw things and, is in this process, in this face-to-face, that, in a certain point of view, things are not for me just an excuse to build a synthesis of my identity, necessarily subjective, through which I can I learn about myself.

The things for me, while I am drawing them, are, above all, "possibilities", "timely moments", "right moments" of time, chances to inscribe me in the time (in the present, in fact here being for myself), without which (my) own experience of things would not be possible. If so, if time comes from my relationship with the object and, therefore, in this birth I assist to the constitution of an imminent temporality (where my experiences are inscribed or incorporate), then as a man, I depend entirely from that constitutive possibility of things.

Drawing for me is the happy opportunity to find me with things and with the others; a draw is what stays: paradoxical witness of the relationship between two systems: Me and the World (which has features of both; an *interface*).

"Paradoxical" because me and the World are one and the same thing, especially while drawing.

Fig. 1, 2: Workshop *The Time and the Happening: Drawings as Artistic Interventions*, Narni, Italy, 2011 (Intervention: Pedro António Janeiro (coord.), Jorge Cruz Pinto, Silvia Escamilla Amarillo, Marigrazia Leonardi, Hector Sanchez, Ivo Covaneiro (tutors); José Ferreira Crespo, Margarida Monteiro, Mariana Sempiterno, Mariana Rodrigues, Marta Dias, Inês Félix (Architecture students).
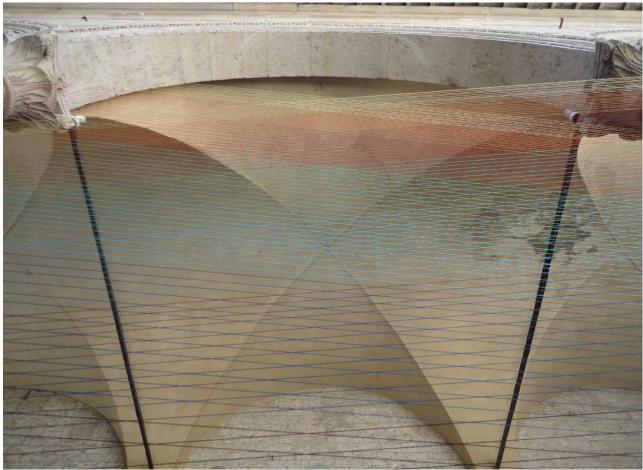
Fig. 3: Workshop *The Time and the Happening: Drawings as Artistic Interventions*, Narni, Italy, 2011. (Intervention: Pedro António Janeiro (coord.), Jorge Cruz Pinto, Silvia Escamilla Amarillo, Marigrazia Leonardi, Hector Sanchez, Ivo Covaneiro (tutors); José Ferreira Crespo, Margarida Monteiro, Mariana Sempiterno, Mariana Rodrigues, Marta Dias, Inês Félix (Architecture students).

Fig. 4, 5: Workshop *The Time and the Happening: Drawings as Artistic Interventions*, Narni, Italy, 2011. (Intervention: Pedro António Janeiro).

Fig. 6: Workshop *The Time and the Happening: Drawings as Artistic Interventions*, Narni, Italy, 2011. (Intervention: Pedro António Janeiro (coord.), Jorge Cruz Pinto, Silvia Escamilla Amarillo, Marigrazia Leonardi, Hector Sanchez, Ivo Covaneiro (tutors); José Ferreira Crespo, Margarida Monteiro, Mariana Sempiterno, Mariana Rodrigues, Marta Dias, Inês Félix (Architecture students).

Fig. 7: Workshop *The Time and the Happening: Drawings as Artistic Interventions*, Narni, Italy, 2011. (Intervention: Ivo Covaneiro).

Fig. 8, 9: Workshop *The Time and the Happening: Drawings as Artistic Interventions*, Narni, Italy, 2011. (Intervention: Inês Félix).

Fig. 10: Workshop *The Time and the Happening: Drawings as Artistic Interventions*, Narni, Italy, 2011. (Intervention: José Ferreira Crespo).

Fig. 11: Workshop *The Time and the Happening: Drawings as Artistic Interventions*, Narni, Italy, 2011. (Intervention: José Ferreira Crespo).

Fig. 12: Workshop *The Time and the Happening: Drawings as Artistic Interventions*, Narni, Italy, 2011. (Intervention: José Ferreira Crespo).
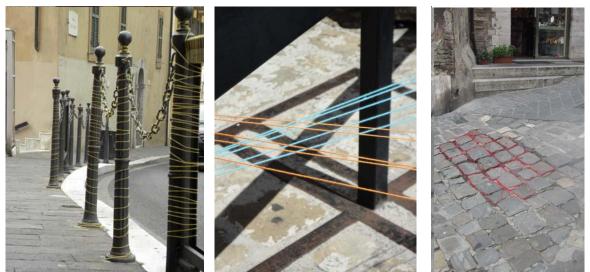
Fig. 13, 14: Workshop *The Time and the Happening: Drawings as Artistic Interventions*, Narni, Italy, 2011. (Interventions: Marta Dias; Mariana Sempiterno and Mariana Rodrigues; Margarida Monteiro).

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Utopias of the Radical movement as 'process' for the analysis and design of public contemporary space

Mónica VAL,[1] Marina PUYUELO[2]
[1] [2] ETSID Escuela Técnica Superior de Ingeniería del Diseño, Universitat Politècnica de València, Spain
movalfie@ega.upv.es, mapuca@ega.upv.es

Abstract

The value of representation in communicating and the developing ideal social representations is unlimited. Similary, the development of architecture and design use this value as something that is determinant and intrinsic to the project itself.

The radical architecture movement arose during the 60s and 70s, as a consequence of the crisis of the postulates of modern architecture, influenced directly by artistic innovations. These architects contributed new concepts of city, marking the opposition between models and Utopian processes. Firstly, by proposing imaginary and perfectly structured and organized places. And secondly, by creating places with the intention of incorporating contingency and complexity as central parameters of the project; Utopia understood as a "good place", is a dreamed place but not a perfect place. In this regard the Greek architect Doxiadis indicated: "Here is the reality and here is our ideal. Why they do not lead me to any site?. Because both things are not connected. Because reality and ideal move in different levels, in different proportions and at different speeds".

Utopias and visions of the radical architectural movement, have contributed to the definition of a collective conscience that has outlined a progressive and critical front in culture and urban planning. In their conscious constant of urban development they created a particular image of the city and of the collective sites of major significance at present.

Keywords: Radical architecture, Drawn Cities, Ideals, Urban Models, Utopias

1. The possibilities of the represented city

Graphic representation of projects that are not necessarily going to be constructed reflects future projects and intentions with fewer determining factors and enables the adoption of any resource or mechanism for expressing ideas. Similarly, the technology, format and mode of representation together with an analysis of the socio-political and cultural context, help to define the author's intention, represent the desires and criticisms of the period and are the consequence and reflection of a given moment in time. These issues, in the case of the architects that concern us here, acquire particular importance if we take into account the fact that all the projects we are going to study never got beyond the paper stage.

The sixties and early seventies are characterised by major innovation and constant and significant experimentation. The incipient social and ecological crisis and the exhaustion of functionalist urbanism generated an entire range of alternatives to established theories that modified the perception of city and its public space.

In this environment, as a consequence of the questioning of the postulates of modern architecture, a series of studies emerged with a focus on hitherto ignored social aspects and an emphasis on the public space and the new redefinition of cities. These projects, influenced by new artistic trends that embraced utopian representations of architecture were, however, ephemeral and soon forgotten in the midst of a new period of extreme formalism and mercantilism.

These authors found a reliable ally in the graphic medium for their inspiration and speculation. The pioneers of planned cities were *Sforzinda* drawn in the 15th Century by Antonio Averlino Filarete, the 15th and 16th Centuries with Thomas Moore, Bacon and Campanella; the 19th Century with French utopian socialists, Charles Fourier, Victor Considérant and Eugene Cabet, and the English socialist Robert Owen, among others. In the 20th Centuries, futurist cities appeared from the megastructures of Buckmister Fuller, Paul Soleri, the Japanese Metabolists, Yone Friedman, etc. The city has been represented from all perspectives. Thinking and representing constitute a single discourse in which new formulas and ways of making require new philosophies.

Drawing, considered from a purely cultural conception and production, defines a world free of any economic and political prejudice and completely free of any institution. Drawing can decide what reality or vision it wishes to represent, it can design cities that never have and never will exist, building impossible structures or spaces not created in daily reality and designing projects with no type of economic, legislative or social opinion limitation[1]. Thus, only when the intention is to convert the drawing into a built "artifact", does it have to be transformed into a practical, objective and feasible representation. Only then will it become conditioned by regulations, limited by a budget and made to fit a particular political and social context.
Thus, representations come one after another and organise schemes and formats that can give rise to deep studies and theories on the urban and social issue.
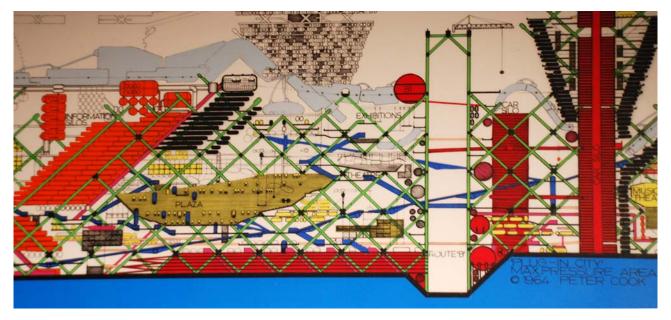
Fig. 1: Detail of 'Plug-in city', 1964 Peter Cook, Archigram archives. The image was taken at the exhibition 'Megaestructure Reloaded' in 2008, Berlin, by Mónica Val Fiel

2. Utopia, idealism and futurism as the starting point

The entire discourse of architectural and urban philosophy is illustrated and recorded as graphic documentation, "conceptual architecture" that has remained on paper. The documents reflecting this period are an example of a critical and revolutionary architecture. They contain visions of utopian approaches to the city that attempt to break away from those that already exist and in some cases focus their attention on aspects they consider to be inadequate. These aspects include obsolescence and flexibility introduced by Cedric Price in his discourses and which he illustrates in his *Fun Place* and *Potteries Thinkbelt*. In other aspects, by way of dystopias, unwanted issues are exaggerated, like the proposals that challenge the

megastructure as an apocalyptic scenario, among which we include *The Planet as Festival* by Ettore Sottsass.

On another note, are the reminiscences of idealism identified in the projects developed in the early 20th Century as ideal models. The most representative of such proposals are those by Ebenezer Howard and his *Garden City*, Frank Lloyd Wright and *Broadacre* and Le Corbusier and his *Ville Radieuse* which were developed between 1890 and 1930. Their cities were never designed as real models but as "ideals". All three attempt to understand the logic of the 20th Century city and to determine their inherent structure and their most efficient form, *"they attempted to look beyond the distortions that an inhumane social order had imposed upon the cities of their time, and to envision a city based on social justice and equality"*[2]

There is of course also a futurist approach influenced by exponential population growth whose proposals were not made with the intention of improving conditions in the surrounding environment but as a way of thinking about and investigating urban evolution, with the intention of observing what the future might bring and new approaches to urban development. Some of these paradigmatic examples are the proposals of Japanese metabolists which gave rise to the plan for Tokyo Bay.

Fig. 2, 3: Ville Spatiale, 1959 Yona Friedman. Collection Fonds Régional d'Art Contemporain du Centre, Orleans. The image were taken at the exhibition 'Megaestructure Reloaded' in 2008, Berlin, by Mónica Val Fiel

But approaches to architecture were not the only ones to mobilise and react; art also rejected the approaches of the initial vanguards and redirected its approaches to new discourses. It must be remembered that since the sixties, the crisis of the object and the dematerialisation of art introduced artistic production outside the traditional circuits (museums, markets, institutions...). In those years art began to show a growing interest in investigating the environment and space leading to the study and understanding of physical and theoretical territories which not only situate it in the urban space and landscape but in interaction with its context. Likewise, the approaches that challenged the mercantilisation of art led to its dematerialisation.

Thus, we find an art that moves from objectual to conceptual where, in contrast to the definitive formal result, greater importance is attached to ideas and how they are expressed. Similarly, architecture moved from objectual approaches, model cities, to a "conceptual architecture" where processes that define new concepts of city became paramount.

In architecture, on the one hand is the issue of exponential population growth together with the appearance of new needs; and on the other the dissatisfaction and exhaustion of criteria which have organised the parameters of modern urbanism into the conceptualisation and construction of the city according to stable, unchangeable definitions. All of this was accompanied by a radical cultural change which generated an entire series of ideas that materialised on paper but which had no further impact beyond the graphic and the manifesto.

3. The radical movement in the context of History and Criticism of Architecture, Design and Urbanism

In Italy, particularly in Florence and at the same time as Vienna and in the legacy of English and American proposals, there was a revolutionary phenomenon, classified as "Radical Architecture", a consequence of the cultural debate in the early 1960s. Other antecedents can be found in the British scene with the seeds of Pop Art and criticism from Team X and the Archigram group, the Austrian scene with the development of Viennese Actionism and figures such as Hans Hollein and Walter Pichler and groups like Coop Himmelb(l)au and Haus-Rucker-Co. Finally Radical Architecture developed in the Italian scene with Arte Povera which led to a more widespread Conceptual art. Outstanding figures include Ettore Sottas as pioneer, the subsequent development of groups like Superstudio and Archizoom and people like Ugo la Pietra and Gianni Pettena, to name just a few.

Andrea Branzi, one of the founders of Archizoom Associati, notes that *"Radical architecture may be considered part of the more general movement for the liberation of man from culture, meaning by individual liberation from culture the removal of all formal and moral parameters which create inhibitory structures (inhibitory because not self-engendered) and prevent the individual from fully realizing himself."*[3]

Navone and Orlandoni[4] identify conceptual architecture as a range of avant-garde architectural experiences from 1968, stemming from art criticism. According to Navone and Orlandoni *"radical"* and *"conceptual"* immediately became frequent terms for numerous critics in the world of architecture (Celant, Branzi, Mendini, Higgins, Burns, Eisenman, Haggart, Natalini) and others in the world of art.

Fig. 4: Vita, 1971 Superstudio. The image was taken at the exhibition 'Environments and Counter Experimental Media in Italy: The New Domestic Landscape' in 2010, Barcelona, by Mónica Val Fiel

4. Exhibitions as ideological-cultural development and projection of the radical movement. New historical research practices

Since the early 21st Century there has been growing sensitivity to the experimental proposals of the period. This has been noticeable in the boom in exhibitions of graphic production for architectural proposals from the second half of the 20th Century, characterised by a strong component of utopia and forward-looking projects.

In the United States such exhibitions include those organised by the MOMA department of architecture and design and exhibitions like: "Perfect Acts of Architecture", during 2001-2002. And also the 2002 exhibition entitled "The changing of the avantgarde: visionary architectural drawings from the Howard Gilman Collection", that celebrated the donation to MOMA of two hundred and five drawings from the Howard Gilman Foundation. There was also a monographic exhibition focused on Italy that supplemented the above visions : "Environments and Counter Experimental Media in Italy: The New Domestic Landscape – MoMA 1972", which recreated the 1972 anthological exhibition in MoMA; and "Italy: The New Domestic Landscape", curated by Emilio Ambasz which began in New York in 2009, spent 2010 at Disseny Hub Barcelona (DHUB) and the Swiss Architecture Museum in Basle (Switzerland) and 2011 at the Arkitekturmuseet (Museum of Architecture) in Stockholm.

In Europe, thematic exhibitions focused on different aspects "Arquitectura Radical" was curated by Francisco Jarauta, Jean Louis Maubant and Fredéric Migayrou and was inaugurated at the Museum of Illustration and Modernity, Valencia (Muvim) in 2001. In 2002, the exhibition went to the Andalusia Centre of Contemporary Art (CAAC) and ended in 2003 at the Institute of Modern Art in Villeurbane of Lyon and the Georges Pompidou Centre in Paris.

Exhibitions with a broader perspective are "Fantasy Architecture: 1500-2036", which took place between 2004-2005 and was organised by the Hayward Gallery (under the London for Arts Council England); "Megaestructure Reloaded; Visionary Architecture and urban design of the sixties reflected by contemporary artist", in 2008, in Berlin; "Future City: Experiment and Utopia in Architecture", in 2006, and in 2009, "Radical Nature. Art and Architecture for a Changing Planet 1969-2009" at the Barbican Centre, London. And there have also been exhibitions focused on specific groups or trends, for example "The Austrian Phenomenon Concepts Experiments Viena-Graz 1958-1973.", at the Architekturzentrum of Vienna (Austria), in 2004.

This outbreak of exhibitions in the last decade accompanied by the publishing of catalogues has generated genuine research and a real written record of projects from the period. Of particular interest in this regard is the collection, exhibitions and corresponding publications by FRAC (Centre de Orléans, France) where the excellent work of its director (Marie-Ange Brayer) and her predecessor (Fredéric Migayrou) has led to a long series of monographs with versions in English and French published by HYX. Some of these monographs include: "Gianni Pettena", 2002; "Architectures experimentales 1950-2000", 2003, "No-stop city. Archizoom Associati", 2006, "Ettore Sottsass Jr. 60'-70'", 2006, "Ugo la Pietra, Habiter la ville", 2009 and "Nevers, Architecture Principe", 2010.

5. Conclusions and perspectives

By 1975 Conceptual Art was already widespread and even seemed antiquated. In the early 1980s painting and sculpture became fashionable again and the formalist spirit and old traditions were recovered with the intention of ensuring an audience for whom social revolution was meaningless. It was therefore postmodern art, with no clear definition as to its beginnings, characterised by eclecticism, fragmentation and the loss of moral values which gave priority to increasingly consolidated mercantilism.

However, **the art of the period had introduced into the field of architecture concepts such as perception, transience, image and practice**. Conceptual art, absorbed all the influences of the preceding movements and established its own guidelines, introducing variable architectures which, until then, had not been taken into account in proposals for defining city and public space.

According to Andrea Branzi what was classified as "radical architecture" reflects at international level all the experimentation known individually as: contra-design, conceptual architecture, povera technique,

eclecticism, iconoclast behaviour, neo-dadaism, nomadism… *"a period marked by the absence of any strategic unity as well as by a permanent state of uncertainty, a period characterized by the advent of mass production (and design), in which architecture also starts to change status, becoming an intermediate reality between an enzymatic energy and an inhabitable design product, operating inside a city that is no longer a city but a mere local market in the world market of merchandise"*[5]. Branzi finds a large number of current representatives of architecture who recognise their debt to the radical movement, an influence that emerges in the way of perceiving links between city and architecture, between the project and the discipline, or as inspiration for their way of doing (or not doing) architecture, including Frank O. Gehry, Hans Hollein, Daniel Libeskind, Arata Isozaki, Toyo Ito, Rem Koolhaas, Bernard Tschumi and others. (Branzi's text was published in 2005 in the catalogue for the exhibition "ARCHILAB. New Experiments in Architecture, Art, and the City, 1950-2005')

Throughout history, art, architecture and design have gone hand in hand on numerous occasions, but it is worth noting that in the period we refer to, art had a significant influence on the other fields. This influence, in the case of architecture, and in one aspect can be seen as the appropriation of codes. Representation is thus considered as an end in itself, as the expression of codes, whose only and ultimate purpose is to communicate a message. Ideas which are the product of experience or imagination, which do not attempt to transcend reality of paper or have materialisation as their objective. In this regard, drawing and graphic in themselves are regarded as the maximum representation of ideals, where the built form is not part of the discourse.

The appearance of concepts such as 'the ephemeral', 'flexibility' and 'obsolescence' introduced by Cedric Price, directly related to the advance of consumerist society and culture, emerge and develop to question the very nature of an art, an architecture and a design that were clearly overwhelmed; or, as Archigram noted, **conviction of the need to combine architecture with other languages and instruments and the transformation of architecture into image.** This idea underlies the virtual developments in many current laboratories of architectural graphic expression.

As noted above, most of the visionary architectures that were designed in that period, given the dissatisfaction with existing realities, **constitute critical proactive documents**. They carry an implicit intention of change and even, according to Lewis Mumford[6], they propose, to a greater or lesser extent and in relation to their proximity, a real materialisation, utopias of evasion or reconstruction. They are forward-looking visions that design the human environment of the future and, in contrast to the static ideal models of early 20th Century utopians, propose dynamic processes adapted to the contingency and generate new concepts of city, some of which are still valid today.

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Architectural 3D modeling in historical buildings knowledge and restoration processes

Mario CENTOFANTI [1]**, Stefano BRUSAPORCI** [2]
Dipartimento di Architettura e Urbanistica, Facoltà di Ingegneria, Università degli Studi dell'Aquila, L'Aquila, Italy
[1] mario.centofanti@univaq.it
[2] stefano.brusaporci@univaq.it

Abstract

The validation processes of restoration projects in all institutions are still based on communication and training requisites which continue to influence choices during the preparation of projects, and not only in purely formal terms, but also with respect to content.

These requisites are paper documents and digital media, i.e. reproductions of paper documents in PDF format.

Furthermore, project representation and communication are substantially established in two-dimensional form (plans, elevations, sections) with rare inroads into three-dimensional formats for explicative and integrative purposes (axonometric and/or perspective images), with the usual separateness, which is also logical and conceptual, between graphic representation and documentation, during the surveying and analysis phase and during the design phase.

Even considering recent experiences related to the management of the reconstruction phase in the historical centres affected by the earthquake in L'Aquila on 6 April 2009, the intrinsic possibilities of using of architectural 3D modelling is to be examined, with the purpose of building an information system dedicated to architectural specificities, and to building the project proposal, fully directing its communicative complexity to the synthetic and interactive support of 3D modelling.

Key words: Architecture, 3D modeling, Restoration, 3D GIS.
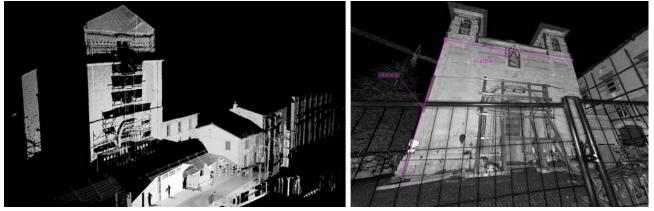
Fig. 1: L'Aquila. Software for visualization, surfing and measurement of point clouds.

1. Relationship between survey drawing and project design in architectural restoration

The theoretical precondition for restoration projects is the inevitable relationship with the existing reality.

In this sense, the close interdependence between the survey and the project is particularly significant, as it still represents a general value of the project. However, in the field of restoration, it acquires its own poignant meaning.

The restoration graphical model is a complex system which, for each phase is founded on assembly drawings and part and detail drawings, where, at every stage, there should be systematic specularity between the survey drawing and the project drawing.

Four significant moments in the conservation-restoration process can be identified. Phase 1: preliminary and final plans aimed at controlling architectural and spatial restoration and possible re-utilisation of the building. This is based on an essentially geometric-dimensional survey. Phase 2: project ready for execution-building with all its content including technological features. This is related to first-level surveying of the construction and the state of deterioration, carried out through inspections, sampling, surveys and non-destructive testing. Phase 3: monitoring during construction. This again involves second level surveying of the construction and the state of deterioration, this time in full view. In response to the site monitoring survey, the working project is constantly updated in accordance with the specific contexts. Phase 4: at the end of the works, a
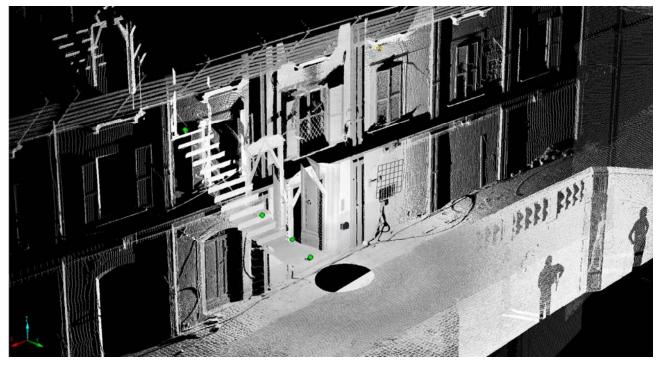
Fig. 2, 3, 4: L'Aquila. Point clouds integrated with measurable true view image based models .

graphical model should be created of the building altered by the restoration work. This final post-works graphical model, together with the products of the previous phases, is the documentation needed for the database, the support for subsequent monitoring of the building and for planning any future conservation work based on certain knowledge. But above all, for comparison and contrast with the pre-works restoration model, it must provide the necessary support for formulating of a judgement on the overall quality of the restoration work.

It is quite clear that, in disciplinary terms, the issue stems from identification of the characteristics for building the restoration graphical model, which intrinsically should be concise, analytical, iconic, interpretive but also dynamic, capable of supporting and sustaining continuous updating of the surveying process. It should nevertheless remain intelligible as the information it holds increases. For all stages it should be comparable, represented clearly in part drawings and other useful forms, it should be included in the relationships between assembly drawings and detail drawings. It should be systematically specular to the project design at every stage.

2. Specularity between the restoration model and the design model as an invariant

Specularity between the restoration model and the design model is an invariant in the surveying-planning process for architectural conservation. This invariance, usually occurring in traditional 2D restoration models, should have full confirmation in architectural 3D modelling.

In terms of surveys done using digital technology, which focuses the process on 3D models, the concept of specularity should be proposed on different and appropriate bases. Different purposes require the 3D model to be capable of meeting multiple demands: it should allow a varied body of information to be collected and, at the same time, be processable and modifiable by the many professionals involved; it should be available for consultation by the competent bodies for approving the project, and browsable, queriable, measurable but not editable; it should ensure high quality, photorealistic viewing for communication of design choices.

These are many aspects of the same digital media, and in order to meet these demands, they should have appropriate characteristics, not only metrical but also constitutive and qualitative. In this sense, the issue of defining standards and formats for modelling is inescapable.
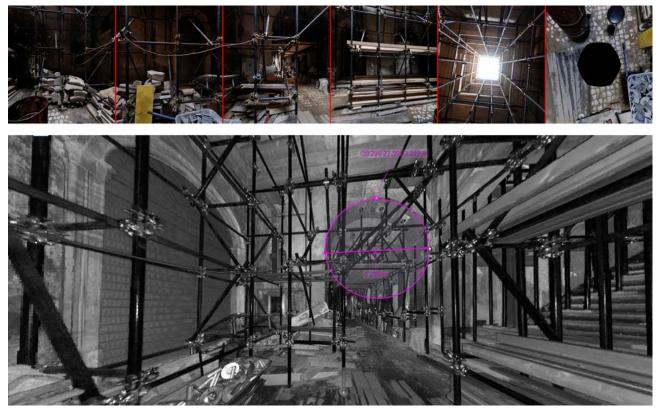
Fig. 5, 6: L'Aquila. Cubic projections of photographic images related to point clouds.

Current practice shows that, in faced with a wealth of metric and photographic information provided by laser scanning and photogrammetry, returns are mostly made using 2D vectors and rasters: point clouds are sectioned and projected orthogonally for layouts, elevations and sections; meshes are made for elevation views, so they can be textured to produce orthophotos; in many cases elevation images are obtained simply by displaying the points in the cloud with RGB colours.

The only concessions to 3D are measurable, image-based models (e.g. true-view systems by FARO Technologies Group), or point cloud viewers (like the one by Leica Geosystems), free and easy-to-use interfaces, primarily aimed at providing designers with metric data without involving them in the processing of point clouds, and thus marking the separation between measurers/surveyors and restorers.

3D is limited to the metric data of point clouds, thereby being influenced by 2D data. In the same way, the project goes back to traditional surveying means: tables of macroscopic surface deterioration, damage and lesions, interventions.
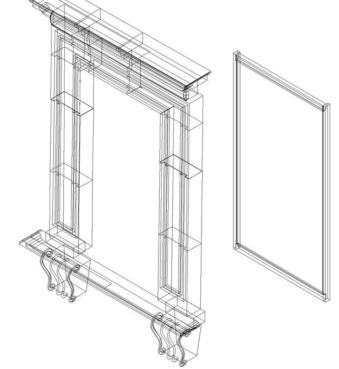
The situation is similar for information systems, used for tried and tested 2D applications, mostly on the urban scale, and therefore unaffected by the most recent acquisitions and developments in architecture - with particular reference to 3D GIS for architecture.

Notwithstanding the usefulness of point clouds for rigorous 2D drawings, their intrinsic potential is not exploited, to favour the creation of 3D models for surveying architectural structures and planning restoration projects. There are rare excursions into the virtual field, but mostly for publicity purposes.

Conversely, the wealth of information knowledge, the importance and uniqueness of the scope provided by L'Aquila's historical town centre and those in the earthquake zone, should allow development and testing of a procedure that would place the 3D model at the centre of the surveying process and the restoration project.

In terms of the purpose of restoration, it is useful to refer to photorealistic 3D models that are also defined on the scale of the construction. This second aspect does not refer so much to the issue of information systems at the so-called LOD (Level of Detail) regarding the number of polygons used to approximate a surface - but rather to the issue of the number of models to be used to describe the building system.

This leads to the issue of managing architectural models that are laborious in computational terms, on commonly used software platforms. A simpler solution would be to organise models in a 'cascade' system, i.e. linking together increasingly defined models.
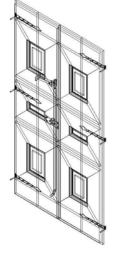
Fig. 7: Historical window's surveying 3D model.

Fig. 8: 3D Model of a building in L'Aquila historical centre. (modeling: Francesca Cerasoli).

Fig. 9: 3D model for the restoration project of *Aquilanum Collegium*.

There is a wide series of tools available to surveyors for 3D images. The most common programs - often available with point cloud management programs - enable extraction from 2D-processed point clouds - sections and orthogonal views of the clouds themselves - as well as synthesis of MESH or NURBS surfaces, or even models built on 3D primitives to be arranged using Boolean operations, to be defined semantically in terms of their architectural significance.

By analogy, reference can be made to the approach provided by BIM software, an acronym with two definitions applying to the model and to the creation and management of related information, the second of which is more common: Building Information Model and Building Information Modelling.

BIMs place 3D models at the centre of the entire process, on the basis of the idea of building the model as a tool for project development, a common and interoperable interface between the various professionals involved, such as architects, structural engineers and plant engineers. Unlike other types of software, developed for architectural applications from reverse engineering applications - specific to mechanical engineering and design - BIMs are devised specifically for architectural projects.

The concept of information is central in that it involves reference models consisting of objects semantically defined as components of the construction. Therefore, these digital elements are in themselves an expression of the structural components of the building, with regards to its metrical characteristics and in relation to materials and their structural and energy characteristics, etc. Nevertheless, ignoring general basic objects - lines, splines, surfaces, volumes created through Boolean operations, etc. – and referring to components such as vertical or horizontal closures, doors, windows, etc., requires definition of these elements in libraries, i.e. these components must be standardised.

This aspect is difficult to reconcile with the specific needs of surveying historic architecture, where each element has its own historical and architectural value.

The very reasons for the emergence and development of BIM is due to the search for software suitable for developing architectural designs and managing information about the entire life cycle of the building, from its inception to its construction then maintenance, with particular emphasis on economic aspects - measurements and timing. The goal is to optimise the cost-time benefits of the planning process based on the industrialisation, prefabrication and standardisation of commercial components.

These requisites do not coincide with the demands of the process of careful listening and dialogue between the surveyor/restorer and the historic building, based on a system of knowledge that is always open and constantly evolving - e.g. the specifications of a restoration site.

Notwithstanding, BIM can offer interesting elements. In particular, the main types of software on the market are Autodesk Revit, Archicad / Allplan, Bentley Systems, Digital Project. The first two, and the most popular, have parametric modelling limitations, while the latter two allow integration with complex 3D modelling.

The emphasis is on interoperability, i.e. the possibility for the 3D model to be the project's common development interface, which can be processed in different applications depending on different professional needs. This concept, dear to the BIM software houses, is not only limited to these types of programs, since even 3D models constructed with traditional modellers can be usefully employed in architecture and, say, structural calculation.

More generally, 3D models provide the option of being a support and interface for *architectural information systems.* In fact, for the surveying process, the model enables the collection, correlation and systematisation of the large and heterogeneous mass of information concerning surveying and historical-documentary analysis. The 3D model contains metric, geometric, architectural and construction information, as well as information on materials, colour, deterioration, etc. By its very nature, the 3D model offers a spatially structured interface allowing intuitive navigation and querying, in order to facilitate analysis of historical architecture. Hence, a model defined in terms of the construction features of the building may be linked to a database that is editable and implementable in time, thus enabling definition of an architectural information system. In this sense, the 3D model can be seen as a support for a process of involving the 3D re-cataloguing of surveying and historical-archive documentation

Notwithstanding the issues involved in importing 3D models into a GIS environment, which have previously been studied and partly resolved by using proprietary software (see Centofanti *et al,* 2011).

Whereas BIM already offers an opportunity to focus on the model as a useful design tool, nevertheless, the validation and authorisation phases are still centred on 2D representations, where digital features (raster or PDF) are merely simpler means of disseminating and reproducing drawings. This consideration suggests a broadening of horizons, whereby the 3D model might also become the instrument/interface for communicating analyses and the project at all stages.

Interoperability (as a possibility for several operators developing and modifying the model) and use of the model as an interface for communication (so the model is a queriable but not modifiable document) are the focuses of what can be considered two prominent issues: definition of model formats and construction standards and the syntactic composition and exchange of the model itself.

For example, in order to communicate the restoration project to the monitoring bodies, a queriable model could be exported in a searchable format such as PDF or VRML, linked to an open source webGIS system.

Fig. 10: Surveying 3D model of a roof. The model is defined in all constructive components.

Fig. 11: 3D model for equipment and lighting planning.

Lastly, we look at the issue of defining standards for 3D architectural surveying models, i.e. not only the characteristics of metric accuracy, but also the level of definition and the number of constituent components, with numbers and characteristics that describe both the architectural configuration and the construction configuration of the building. In this sense, the following would be appropriate: definition of standards for 3D models in terms of describing the geometric-dimensional morphological-figurative, technical and construction characteristics of the constructions on an architectural scale; establishing standards for 3D models of historic centres, which are suitable for describing the complexity of the spatial, historical and environmental relationships within clusters of buildings; studying multi-scale relationships between 3D models of historic centres, buildings, architectural details, optimised for use on a software platform for normal operation.

In conclusion, some issues remain regarding the effectiveness of the 3D model for restoration projects. First are the definition, validation and dissemination of shared standards relating to the configuration of the 3D model. Secondly, identification of standards, formats and procedures for the exchange, modification and processing of 3D models in various fields of interest (architectural, structural, installations, etc.). Finally, investigation into methodologies linking 3D models in a proprietary or open-source GIS environment
For the development of technical and operational specifications, it would be useful to implement the same cultural change in restoration projects as is already seen in the architectural concept with reverse modelling.
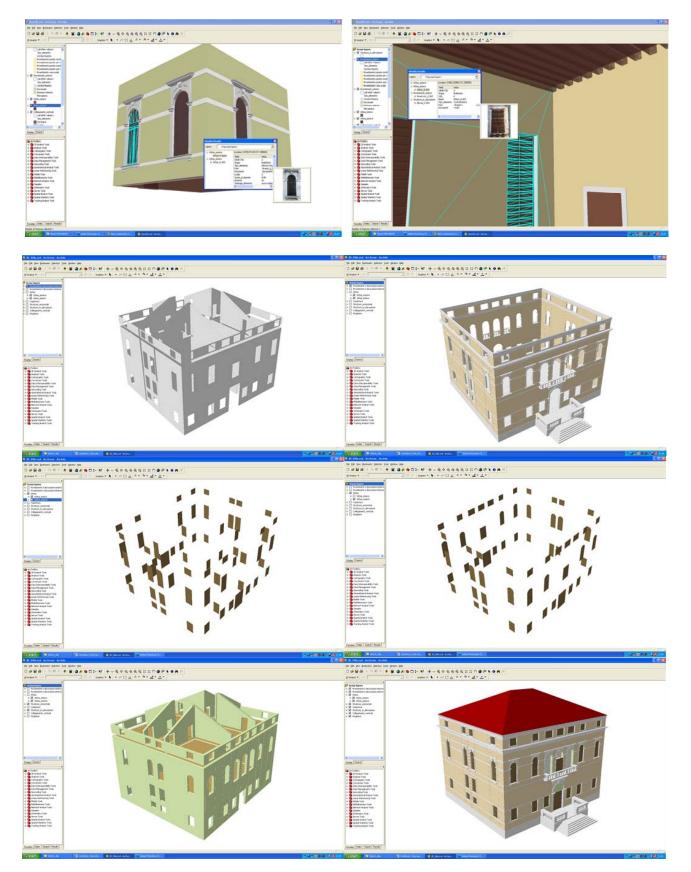
Fig. 12, 13: Architectural Informative System of Correr-Dolfin villa made by the integration between 3D models and ESRI GIS (SIArch-Univaq Sistema Informativo Architettonico Università dell'Aquila, cfr. Centofanti *et alii*, 2011).

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SURVEYING SIMPLE TECHNIQUE

Antonio ÁLVARO TORDESILLAS[1]
[1] Escuela Técnica Superior de Arquitectura. Universidad de Valladolid. España
tordesillas@arq.uva.es

Abstract

The graphic surveying of works of art can be seen as a research method per se because their results allow us to deepen the knowledge of our heritage, which is the indispensable basis for its conservation.

In this paper we want to show what and how new low-cost techniques of surveying are capable to do, in a very simple manner, without losing precision and fidelity; applied to the non previous drawn sculpture. In this way we are documenting them for the first time and creating a repository of three-dimensional works, as well as allowing an immediate and wider dissemination via Internet, all serve to safeguard them against any possible fatality.

This technique experiments with the stereovision in two ways: first by the two parallel photos restitution and second, with the single photo made by a two lenses camera, which simplify even more the process.

Keywords: surveying, photography, photogrammetry, photomodeler, low-cost.

1. Surveying simple technique by digital photography

The following paper does not intend to repeat anything already written in many articles in refereed journals, or conference communications about graphic surveying of art works through laser technologies that on today, are well known and whose evolution has achieved in a surprising way to simplify both data collection and in its handling. The reason that moves us to make such surveys usually is related mainly to its conservation, so it is necessary to deepen their formal knowledge in a comprehensive manner.

There is no need to lead how metric photogrammetry tries to get two and three-dimensional metric information from photographic images. In recent days metric photogrammetry is responsible for generating distortion and projection corrected images suitable for multiple uses, mapping or not, as multimedia, animation photorealistic, environmental studies, surveys architectural, archaeological, etc.

However, in a parallel way, and almost dazzling and overwhelming, scanning systems of three-dimensional space using laser beams in a fan, have greatly simplified the process, converting metric photogrammetry in something whose basis is hardly necessary to know. The job has become a mere routine work and almost handcrafted, cleaning and debugging the millions of points (x, y, z), with its colour component (R, G, B), are located in space in an almost magical and immediate. To put the laser in the place to restore brings us more than half an hour, for instance, compared to the three days which means developing the final point cloud. Coloured cloud from a photograph taken by the laser device itself, with a resolution and quality, usually mediocre or dressing it by matching points with another taken from a more appropriate perspective. Three-

dimensional models of objects registered, as such sets of points without further processing, are models that operate only visually.

The laser scanner is today a common tool in architecture and engineering projects that has been transferred successfully to the field of Cultural Heritage. However, even today, involves two major drawbacks: its high price and awkward in some cases, such as its elevation over the ground. There are perhaps, other problems with the laser, as has been the case in this the Research Project, which depends substantially on the surfaces to be swept, both in texture and colour.

And it is in these cases when the projective geometry, the foundation of metric photogrammetry, rises from the ashes deposited by the laser in its incendiary appearance. Obviously, the time is also elapsed for her, and is no longer necessary to have a team of restitution in pairs, both instrumental and human. The developments of computers and software have replaced those and in just a few mouse clicks we can emulate, more accurately still, that laborious work.

The development of photography with his leap to digital and its dizzying technological evolution and economic recession, which have made it accessible to anyone with a capacity of accurate documentation once unthinkable, has been the accomplice of the software to get put a dangerous trip to laser.

The economic question, that voice has become so important in these times of crisis, it is almost indisputable front of some equipment that divides their costs by ten. The first one that comes to mind is if accuracy is acceptable. The answer is of course subjective, as is everything we do in surveying works. The separation of points provided by a laser is much less than that gives us the size of a pixel of a digital picture, for a same distance. However, either method, the accuracy is decided by the surveying author in the taking of some preliminary decisions, and not the machine. Both the laser and the photo can approach both the object as you want, so it does not seem to be being valued by the decision of why choose, when one of the variables is economic decision-making.

Regarding the economic issue, a new phenomenon is emerging and developing also thanks to the rapid change in Internet networks on speed and capacity. Although different commercial software that have appeared are already economically accessible enough to buying a laser, lately there are companies and universities that make it for free. The control over precision and errors of the models are more difficult to assess, but, according to which cases, feasible in the majority. Among the first we have evaluated some programs such as *PhotoModeler Scanner*, of EOS System, while among the seconds we can easily find on the internet others as Autodesk *123d*, *ARC 3D Webservice* or *My3dscanner.com* team.

Furthermore, we find what concerning the instability of the laser against some situations where it is necessary, either raise, or put it in places of difficult access. What anyone who has handled a laser scanner will know how extremely important the stability of the instrument, for which you invest a large preparatory time. It shall be ensure that the laser does not move during the minutes that is sweeping the area. If the object to raise the elevation will require several meters over the floor of the scanner (high weight and fragility), or becomes in motion, this required stability cannot be done except for very bulky and expensive auxiliary resources, which may not always be achievable.

The survey and construction of a three-dimensional point cloud by means of photography and the software that processes, solves these drawbacks of the laser in an almost immediate. Any elevation of the camera, much lighter and less fragile, can be solved, for example, through a telescopic aluminium pole, as we have already done with colleagues at the *Università degli Studi di Salerno*, in Italy. The stability is resolved with a high shutter speed shot of a simple photo. The number of pictures to make, in addition to being fast and independent, is unique and can be easily sweep the entire area to cover and a bonus in the different distances in order to allow up to work with different grades of detail, as mentioned, and allow to approach those holes where a laser and an operator would never more or less skilful invention should be filled in a phase of polishing. And we talk of telescopic poles, to quote the cheapest, because we can complicate as much as we want: balloons, microdones, etc.

The more complex work, in a striking, is to make good pictures. However, it is so basic and so systematized that is not a major difficulty. We know that the confluence of a series of photographs, inwardly and outwardly oriented, i.e. with knowledge of the data defining the conical reference system, are able to locate in the

space as many points as desired, provided they appear in two or more pictures. So taking pictures have to adapt to these conditions of projective geometry: we know the focal length, for which it is necessary that the focus does not move in each cloud to be processed, always will point to a centre or original most always imaginary, and try to make our route, either along, or around the object to be lifted, the distance between photos (base) is related to the distance in order to restore conditions to turn in stereographic pairs, both horizontally and vertically. As a general rule we adopt such a relation (base/distance) is close to 0,15. And of course, it is essential that the images are perfectly focused so that the software can easily and certainly recognize the pixels in each pair related (Fig. 1, 2).
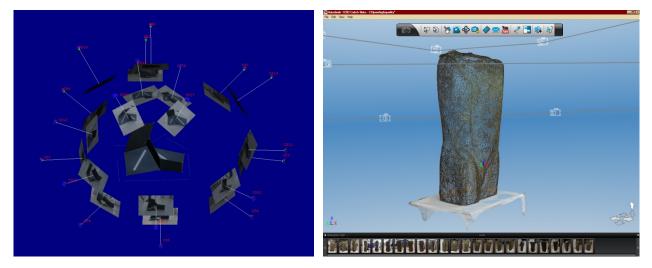
Fig. 1, 2: Position of the photographs on textured 3d model built with *PhotoModeler Scanner* of EOS System; and view of the mesh calculated by *123d* of Autodesk and position of some photographs. In both, we see how the pictures surround the sculpture in two parallel rings separated in height each other the corresponding base for the relationship base/distance of 0,15.

The application objects with which we have tested this new technology have been some sculptures raised by features that were able to test it. Aspects such as size or different textures do not have meant much problem, except for those whose skin is of a uniform colour, especially black, or reflective or bright as some pieces of alabaster or glass. To be decided to work with sculptures rather than larger architectural pieces responds to various reasons:

- They allow us to check as closely as possible margins of error and can compare the original measures taken by the traditional method, with results obtained by the laser scanner, or by reimbursement photo.
- More and more is being applied photogrammetric restitution for the study and documentation of sculptures of artistic and historical value. But to date, it has not been applied with the same intensity on modern sculptures.
- The sculptures, unlike architecture, have never had a graphical specification prior to its execution, so it lacks precise graphical information that would allow its return for research and documentation, including for damage of these parts, given the risk to many of them being in public places. His graphic documentation, through virtual models manipulated by computers, would become an insurance against any adversity, thus gaining more interest. It seems inevitable that this precaution taken ends up in all those works of recognized artistic value.

In Research Project we have conducted the data collection of the sculptures with two different lasers (*Faro Focus 3D* and other portable *ARTEC-ABACUS*) and by digital photography with *Canon 1000D SLR* camera and *Sigma* 28mm fixed lens. The results are very similar, if we disregard, as we have clarified, the subjetibilidad the accuracy of the work. Similar in both simple geometry and texture pieces, as those most intricate (Fig. 3).
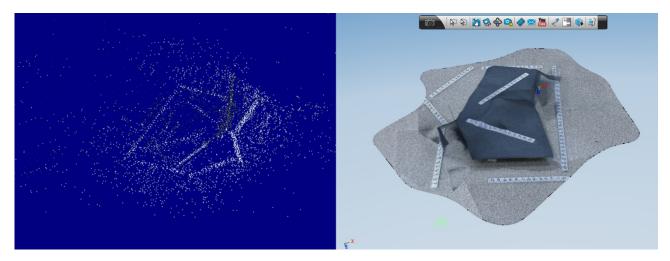
Fig. 3: These images show how the flat black color is a serious problem for the algorithms of calculation of any software, by not recognizing the corresponding homologous points. The images refer to *PhotoModeler Scanner* and *123d* of Autodesk, but have also been tested and *ARC 3D Webservice* and *My3dscanner*. The laser scanner is not able to resolve a point cloud right in these cases.

Parts made of welded sheet metal and painted flat black have been impossible to build using the *Faro Laser* and photography, something better with the *Artec*. The recognition of black surfaces for the laser is, as we all know, a problem, until today, impossible to solve. *Artec* laser could provide these better results based on their movement and other possible reference points near, but outside the scanning surface itself. The picture is also unable to survey a cloud of points from an automatic mode given the impossibility of recognize different pixels in an area where everyone is equal. However, the metric photogrammetry *PhotoModeler Scanner* software is able to operate gives us the possibility to manually locate points in space, by referencing each on pictures (Fig. 4). The software is able to evaluate the error in this manual entry by two values: the Root Mean Square (RMS) of the coordinates of all points introduced and higher residual value that occurs at a point (Largest Residual pixels) with an option to correct, according to its or our discretion. The latter is close to one and the other to 0.5 pixels, represent model accuracy considerably good; consider the equivalent size of the pixel in a universal measurement unit.
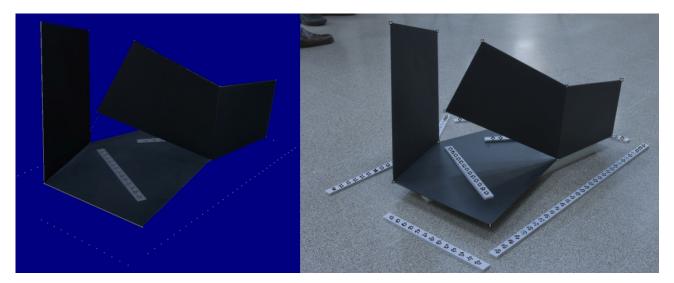
Fig. 4: Model constructed manually by assigning control points in all photographs. These are both coded targets that were placed to facilitate the orientation of the cameras, as the vertices that define the geometry of the sculpture.

So only the software and photography are able to provide us with the necessary and sufficient to build the sculpture in 3d, and therefore in any of the dihedral 2d projections we want. This has proven to be done in a very economical, simple and accessible to everyone.

However, we tested other possibilities such as the projection of conveniently defined mesh point's images on flat and black surfaces, so the software recognition algorithms can find a way to associate these points in the space of an automatic way and are, therefore able to build points clouds avoiding the problem. Obviously this involves making double issue of photos, and then it would be necessary to replace them with those projected by the original texture.

In a final phase of the research project, is proceeding to build a website that shows the results easily and intuitively, as if it were a virtual museum where anyone can access and walk among them. All this is being done easily from open source VRML environments, such as *Blender*, from Stitching Blender Foundation, or by viewing videos uploaded in *YouTube* or similar.

We believe that the artwork's surveying by this new photographic technique, will become, in all likelihood, a reference method; and this is one of the first trials and research made in Spain, and to works of this magnitude.

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Retrofit of Casale Castello through the evaluation of the seismic safety of its masonry building types

Ingrid TITOMANLIO[1], Giuseppe FAELLA[2],
Design Knowledge Department, Faculty of Architecture, Second University of Naples, Aversa, Italy
[1] ingrid.titomanlio@unina2.it
[2] giuseppe.faella@unina2.it

Abstract

Several micro urban agglomerations grew in Irpinia and mainly in the Forino valley during barbarian, post-Samnite, Punic and Germanic invasions. They joined together on rises under ethnic and linguistic ties and military needs. In this way several new towns arose with specific toponymic naming, and among these the "Casale Castello" village is an outstanding example. Historical treatises, archive images and on-site researches prove that houses initially were small one-story stonework buildings. Since the year one thousand, an upper floor was built and the wall coursing pattern was improved. Buildings had small rooms and thatches, not including balconies. Air and sunlight filtered through small holes without glasses. Houses were built along narrow and winding paths and were leaned each other. The building passed from the entrenchment around castles to homes located in distant areas and then to country-seats. The territorial joining only arose in twelfth century under the feudal bond, as shown by historical literature. The Roman traces kept their fixed outlines on, affecting the medieval orthogonal layout. Subsequently, enhanced social condition and larger public safety outlined new building practices based on line drawings and rectangular meshes. These ones were dictated by new life requirements and places, and produced a wide variety of building shapes outside the historical town walls. This paper concerns the seismic safety of Casale Castello, based on its urban building development. It derives from a careful morphological analysis of masonry veneer and structural walls and is aimed at highlighting the need to face up to the seismic safety of the neglected medieval villages to give them a new life through tourist marketing.

Key words: cultural heritage, masonry buildings, seismic safety

1. Needs for the seismic safety evaluation of urban agglomerations

Urban agglomerations usually are the result of a complex historic aggregation of buildings due to several reasons (historic events, urban development over time, local uses, construction sequence, material and exigency change, etc.). The seismic vulnerability analysis of buildings that form aggregates requires taking into account the interaction due to the structural contiguity among buildings either connected or bonded to. Though the structural unit to be investigated has to be identified for performing the structural analysis, preliminarily the entire aggregate must be considered in order to identify the main spatial connections, with particular attention on context and mechanisms of superimposition. The preliminary step of such an analysis could be the reconstruction of the historical events that led to the origin and growth of the agglomeration. In fact, this allows better knowing characteristics, repetitiveness and homogeneity in structural behavior of each building unit under static and seismic loads, and then designing retrofit solutions congruent with the original structural configuration.

To this end, as stated in the Italian national seismic code, the process should gather several information as: (i) relation between processes of aggregation of buildings and evolution of the street system; (ii) morphology

Fig. 1: Casale Castello - Sight of building types damaged by earthquake

of the streets (course, width, deviations in plan, misaligned facades); (iii) main events that influenced the morphological aspects of the historical construction; (iv) layout and hierarchy of courtyards and location of the external stairs; (v) alignment of masonry walls (checking orthogonality with respect to the streets, extensions, intersections and sliding of wall axes); (vi) spatial relations among masonry units, as well as proportions of regularity, repetitiveness, modularity of building floors; (vii) geometry and location of openings within the façade walls (axis, symmetry, repetitiveness); (viii) misalignment and tapering of walls, staggering in height of contiguous floors.

All the above data allow identifying the level of building connection, distinguishing the original units from those added successively, and revealing modifications over time. This helps to determine the weak zones and interpret the potential failure mechanisms, identifying sources of possible damage due to vertical and seismic loads.

2. Casale Castello and the development of medieval villages

The castle was the own and distinctive element of medieval architecture, hence the name "Casale Castello" of the village studied in this paper (Figure 1). Architectural and structural development of the castle and the neighboring village is not well documented, but its knowledge is necessary to better assess the structural behavior of buildings under earthquake. At present an accurate survey of the castle plan is not possible, even as the ruins are completely covered by vegetation, and only small parts of the perimeter walls and the quadrangular basement of the formless stones tower are visible. A historical reconstruction has been also difficult to be performed, since the medieval urbanism was rather neglected until few decades ago [1]. Furthermore, the study of small and newly built centers was overlooked respect to large cities planning, despite the small urban centers built in that period were numerous.

As far as possible, the main characteristic and functionality of the castle allowed tracing back to its main development over time. It is sure that expansion and strengthening of the castle, which was built as simple fortress, were made during the Normans domination. Its location had great strategic and defensive importance, because of its dominant place and its inclusion in the defensive system of other castles in the Forino area. Sure data are also the ones concerning damage due to the earthquake of 1627 and the Vesuvio eruption and aftershocks of 1631, as well as its abandonment period, around the 16th century, when the Princes Caracciolo left the castle. In the following centuries the castle underwent ravages of time and men carelessness. Its stones contributed to build the Bourbon prison of Avellino. Nevertheless, the different building types of the neighboring village (tower houses, townhouses, courtyard houses), arising from its urban historical stratification, remained intact and still visible. However, many buildings outside the village's historic medieval core are from the early 19th century, since the village underwent significant damage during the earthquake of 1805.

Therefore, the study of the historic events of "Casale Castello" village has prompted to refer to the building

Fig. 2: Casale Castello - Analysis and cataloguing of defense building types

development in the Middle Ages, since its main period of expansion begins with Lombards and comes up to the advent of Normans and Swabians and then to Angevin and Aragonese coming. But treat medieval urbanism for identifying how building types evolved in the Mediterranean area is a chronological difficult process. This is due to multiple causes, from the problem of why urban settlements were born, to the historical development and distinctiveness of each village. With regard to the city planning, on the one hand there is an insufficiency - not always numerical or qualitative - of reference studies, on the other hand there are studies classifying generic data because of the multiplicity of manifestations [2]. Medieval towns and villages are, indeed, the expression of ten centuries of history that had different origin and development - and therefore forms - from region to region, and in many cases from town to town.

Piccinato through his statement on origin, development and classification of building types in the Middle Ages proposed a new critical approach to study the medieval town planning, assuming it as collective expression of artistic, historical, social and economic values [1]. However, the distinction between "planned" and "spontaneous" urban development is still not totally unmistakable. During the Middle Ages, neither building quickness nor plan regularity allow absolutely distinguishing the intentionality in town planning. There are towns that have irregular plan geometry as result of a defined design, as well as towns with regular building plan determined by the topography of the place only. Furthermore, some researchers challenged the expression of "spontaneous" growth for explaining the complex and random structure of

Fig. 3: Casale Castello - Defense building types: the tower-houses

some medieval urban centers, assuming that the "chaotic" appearance of many towns is only the result of historic stratifications [3].

The difficulty to chronologically fix typical types of the medieval urbanism has been repeatedly affirmed. However, two major periods can, briefly, distinguished. The first dates back to the collapse of the Roman Empire and to the barbarian invasions, which led to concentration of population in the most important and better sheltered towns or in small centers about rural parishes, founding monasteries and castles. In the second period, approximately in 11th century, a civil reorganization and new centers rise - sometimes fortified - in areas more easily defensible, and often far from the main transit roads.

Subsequently, numerous castles together with villages and courts rose under Goths and Lombards. Until the 12th century, castles were isolated, in dominant place and often on pre-roman acropolises or roman castra. After the 12th century, castles also arose within towns and villages, and produced townships, as Casale Castello [4]. According to several authors, centres originated from castles can be divided in townships built on hills, spurs or at the confluence of rivers (where the castle occupies the most exposed place), townships built on sides or at the foot of hills (on which the castle stands) and townships placed in plain [5]. This probably also influenced the types of construction.

The progressive spreading of cities led to the well-known phenomenon of the Communes, and many new civil and religious buildings were built. These had different types and construction typologies than in the past, and defined the characteristic look of many cities. Contemporaneously, the main walls were consolidated and strengthened to include the population settled in the townships [6]. But, in addition to the expansion of cities, many small towns and villages developed [7].

In the case of Casale Castello (Figure 1), the architecture of new civil and religious buildings, the enveloping widening technique, rather than "budding", and the morphology of schemes produced its consistent city planning. However, it is difficult to assess if the village arose spontaneously or grew according to a pre-conceived plan, since only remains can be at the present examined [8]. Anyhow, the irregular shape of buildings arrangement is not seen as symptomatic of strict observance of orographic ground structure, but it seems to rise from the medieval defensive strategies. The Middle Ages city plans were characterized by both linear forms (one road with normal routes or a bundle of roads parallel to the main axis, supplemented by minor cross-roads) and concentric ring-fingers (with access roads connected by ring roads). In that period, the simple linear arrangement was more widespread in the Forino Valley, sometimes with the main street widened at the town's church or within the built-up area, giving rise a spindle-shaped square. Casale Castello has only one longitudinal street, connecting the two main gates, and several minor orthogonal

streets. At a certain point the main road forks, including the oldest part of the village as an island. The castle also is partially enveloped by the only main road below.

3. Casale Castello and the medieval building types

From the point of view of the urban regulatory policy, the Middle Ages lacks consistency. However, anywhere the public administration cared for security, decoration, hygiene, services, and housing regulation issues.

The fundamental factor of the town's security was the town-wall, which became the main defensive system, where the towers, generally square plan, constituted the key element. But the town-wall, either of Roman foundation or due to enlargement [9,10], is one of the characteristics of the Middle Ages not only for defensive function, but also for administrative function. Specific regulations determining duties and rights of who were admitted or excluded from the city body were, indeed, in force since the tenth century [11,12]. Another constant care of the Middle Ages was also the defense of the village against fire. The mandatory use of lobbies among houses, already widely held in Roman epoch, became common when the urban migration grew to be intensive [13,14].

The typological analysis of Casale Castle helped to reconstruct the main characteristics of its building types (Figure 2), outcome of urban layering gone over several centuries. The formal features of buildings identify building functions mainly related to defensive vocation, as expected. There are at least three buildings definable tower-houses (Figures 3 and 4), several townhouses (Figure 5), some courtyard houses (often the court was developed in the middle of several aggregate houses) and, finally, some mansions built as property speculation during the first settlement. The townhouses can be dated back to the first settlement, whereas the tower-houses were subsequently located at strategic points, probably to guard some town gates. The color used for representing the largest buildings in Figure 6 shows that they are sited outside the core of the Castle, except for the large building group along Bruno Alley, which is the result of the acquisition of areas where, probably, many small houses were previously located.

Also type and stonework of masonry buildings can be particularly useful for both reconstructing the historic evolution of Casale Castello and performing evaluations on its seismic vulnerability. However, it must be considered that in the medieval constructions type and stonework vary depending on the physical nature of materials and technical features closely linked to local materials and worker knowledge. In fact, walls in use in western Europe during the Middle Ages include several stone masonries, both ashlar and rubble masonry,
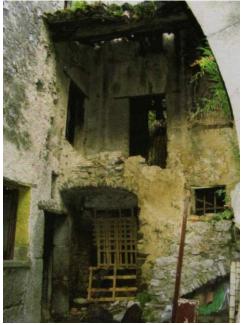
Fig. 4: Casale Castello - Defense building types: interior of the tower-houses

Fig. 5: Casale Castello - Defense building types: tapered masonry and blind alley

with different block sizes and coursing patterns. Walls were made in random ashlar masonry (cut stones in rectangular shapes without continuous vertical and horizontal joints), coursed ashlar masonry (rectangular-cut stones of equal height laid in courses), random rubble masonry (stones of irregular size and shape) or coursed rubble masonry (stones of irregular size and shape laid approximate horizontal courses).

Whatever may be the stonework, a main role in masonry strength is due to mortars. But few information and sure notes on medieval mixture are currently known. Only some enterprise accounting of building yards or some rare books on specific buildings provide useful information concerning the composition and preparation of mortars. Anyhow, it is known that most mortars prepared in the Middle Ages consisted of a mixture of slaked lime, sand and water. Additionally, the medieval mortars often feature for larger amount of silica sand rather than clay that was typical of antiquity. However, although most chemical processes were based on empirical rules, the medieval workers manufactured good quality of mortar using special kilns, today almost all destroyed.

Finally, the constructive standard of foundations of medieval buildings remains virtually the same as those used in ancient time, regardless of the masonry stonework. It is very rare to find foundations constituted by masonry bed, covering all the surface of the building. This foundation type, indeed, was seldom used and on very soft or low strength grounds only. The medieval builders sometimes utilized dressed blocks to build foundations, sometimes deep, but mostly made by debris mixed with baked clay and stones of different quality. Builders of the eleventh and twelfth centuries, instead, often overlooked foundation quality since could not make use of Romans organizational structure and human resources help.

In Casale Castello four types of stonework have been at the moment identified [15]: (i) dressed stone masonry using large blocks, (ii) limestone masonry using different size blocks, untidily arranged and blended with pieces of baked clay, (iii) stone masonry using different size blocks, with rows of clay tiles, (iv) stone masonry using similar size blocks, more or less tidily arranged. Therefore, there are walls built using several coursing patterns, both one-wythe throughout the whole thickness of the wall and multiple-wythe with almost independent external leaves, as well random or coursed ashlar walls and random or coursed rubble masonry. But major problem arose from the consideration that form and consistency of what is now visible strongly contrasts with what was in the past. For example, the large building in the upper area, near the castle, is later than the masonry walls on which rests; likewise, several buildings of the village replaced previous homes of lesser extent.

4. Seismic safety of the medieval structures of Casale Castello

The seismic vulnerability of buildings in Casale Castello is mainly due to the possible out-of-plane failure of masonry walls, as in most historical centers. In fact, this is the widespread proneness to damage in townhouses, since other damage mechanisms (due to in-plane failure) should not be normally allowed. Out-of-plane failure occurs owing to seismic forces acting perpendicular on walls, above all in absence of suitable ties or connection with transverse walls, and prevalently involving "not-bearing" walls. Independently on floor typology, the collapse can affect masonry portions having several geometry and dimension. These can either fall away from floors or buckle between floors and roof. Furthermore, in multiple-wythe masonry walls composed of not-interlocked wythes, out-of-plane failure can be induced by instability of a single wythe under compression, and masonry is either bulged outward or inward. Finally, roof thrust can produce or increase damage in out-of-plane masonry walls, especially if the mass of the roof squeezes or compresses the rafters supporting it.

Other main sources of masonry failure are the lack of structural integrity, that is due to lack of 'through' stones, absence of bonding between cross walls, or absence of diaphragm action of roofs. Some walls of Casale Castello are formed by random rubble masonry or by unconnected multiple-wythe masonry, that is ashlar-work faces bound by rubble infilling. As in many medieval buildings, the ashlar work probably is of a good quality and well-dressed masonry, but the infilling normally consists of low quality and strength masonry rubble. Statistics show that most seismic damage concerns buildings with rough-hewn stones,

Fig. 6: Casale Castello - Analysis and cataloguing of building types

where failures due to crumbling and disaggregation are possible. This is more frequent in rubble masonry or in multiple-wythe masonry if the outer wythe is not tied with the inner core. The falling away of half the wall thickness on the bulged side is common feature, since the detachment of the outer wythe can occur.

For what concerns materials and techniques for increasing structural safety, nowadays there is both a revitalization of the traditional ones and a wide spreading of more or less innovative materials, such as the composite ones. Therefore, the matter is how these retrofitting materials and techniques can ensure compliance with the restoration requirements, i.e. preservation of the original static behavior, minimum intervention and maximum reversibility, in a context where the seismic issue is constantly enhanced.

As only just described, the main structural problems to be addressed in Casale Castello are due to possible out-of-plane failures of walls and to low resistance of masonry. In some cases it is also possible to foresee collapse of structures due to the absence of effective connection among different parts of the construction.

Therefore, one target of interventions on such structures is improving the wall connection, in order to ensure the so-called "box-behavior". This can be achieved inserting tie-rods (preferably in titanium) in both principal directions of the building, for jointing the walls allowing a reduction of out-of-plane effects. Furthermore, tie-rods introduced in walls with opening can improve the in-plane behavior of spandrel beams, changing the collapsing mechanisms.

In addition to the revitalization of traditional materials, several new materials can now be used in retrofitting masonry structures: these must have got chemical, physical and mechanical properties similar to the original ones. In fact, the target in retrofit is to ensure uniform suitable strength to masonry and recover the original stiffness of the structural elements.

Increases in masonry strength and restraints against out-of-plane failures can be achieved through the application of composite materials. Their use is widely recognized as one of the most successful technique, since guarantee high degrees of improvement, despite the careful and thorough design required by the application.

The composite materials based on glass or aramid fibers are the most traditional. The former are frequently applied in the strengthening of masonry structures because their high mechanical performance are well exploited, together with lightness and thinness that allow easy and fast installation, even in hard conditions. The latter are used because of lower elastic modulus, which is closest to the masonry one, larger capacity to withstand deformations, and less "fragility" than the one typical of composite materials based on carbon fibers only.

But the composite materials are undergoing a constant development of production, accompanied by a sustainable vision. Among these, the ones based on the use of natural fibers, as basalt, flax or hemp, are beginning to notably spread. Interest in bio-composites is growing since they combine good mechanical properties and high recyclability with minimal energy production and low carbon dioxide emission during the manufacturing process. They are also particularly suitable for retrofitting "poor" structural materials, such as masonry and wood, that do not require the use of materials with large strength and elastic modulus. Between bio-fibers, the basalt ones come from the melting of volcanic rocks composed of silicate of alumina, titanium and calcium oxide. They combine the toughness and strength of aramid fibers with durability, fire resistance and low susceptibility to hydrolysis phenomena typical of glass fibers. Of interest are also the fibers of flax and hemp, especially suitable for retrofitting historic structures. As all vegetable fibers, they have complex molecular structure (consisting of several bio-polymers, as cellulose, lignin, pectin, etc.) and nano-structured architecture that give them attractive mechanical properties.

Fiber reinforced polymers are sold in a wide range of products: textiles, nets with tiny flexural stiffness, bars, cables and connectors. Can be used in combination with both inorganic and organic matrix, and this makes them particularly attractive in retrofit and strengthening historic buildings and monuments, although characteristics and technology are different from those of traditional materials and construction techniques. Therefore, at least in the current state of knowledge, composite materials seem to ensure enough compliance with the restoration requirements, not least the possibility to completely remove the strengthening.

5. Conclusive remarks

Casale Castello is currently almost deserted but it is a place of great fascination, witnessing one of the most interesting periods of history of Southern Italy. The village could be considered as an open-air laboratory, a manual of practical design of stone masonry buildings, where apply the most recent knowledge concerning

seismic prevention and retrofit techniques. To this end, this research is aimed at increasing knowledge and awareness of seismic risks affecting its historic building heritage. The existing building types have been treated by a careful diagnosis of the damage and vulnerability, in order to recognize retrofit material and techniques more appropriate for preserving the historical urban structure and identity.

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Le Vie dei Mercanti | X Forum Internazionale di Studi

+ less
more
architecture
design
landscape

LESS ENERGY, MORE QUALITY.
FROM LEIPZIG CHARTA TO EPBD RECAST

Maria Teresa LUCARELLI[1], Antonella VIOLANO[2]

[1] Faculty of Architecture, Mediterranean University of Reggio Calabria, Italy
e-mail: matiluc@alice.it
[2] Faculty of Architecture, The Second University of Naples, Italy
e-mail: antonella.violano@unina2.it

Abstract
Town is the modern man's habitat and its design must be oriented to guarantee comfort and wellness conditions, to minimize environmental impacts, protect, restore and enhance the natural features and environmental quality of the site. If we use the design as an "action of research" to interpret the phenomena and/or problems related to the human habitat and grasp the links between cause and effect in order to make decisions, through this creative act we can have a catalogue of solutions, especially responsive to the needs and adapted to the environmental conditions which must become the "rules of the game". The Leipzig Charter offers itself as a platform to establish these "rules"; so that strategies become signs, actions, habitats ... "appropriate technologies"!
In fact, our cities possess unique cultural and architectural qualities, strong forces of social cohesion and an exceptional potential for economic development; they are centers of knowledge and sources of growth and innovation, but fail to fulfill their function as social progress engines and economic growth (as described in the Lisbon Strategy) unless they can keep in balance the pressures of the social sphere (which requires fairness and legality), environmental sphere (which requires the protection and enhancement) and economic sphere (which currently governs improperly all systems and it should be reduced at the efficiency management). Among the Leipzig Charter's strategies "Creating and ensuring high quality public spaces" is considered a priority action to attract industrial investment with high know-how, skilled human and creative resources tending towards a "Baukultur".
However, Technology is all geared to "Zero Energy Building " (in accordance with the EPBD Recast: 2010/31/UE Directive) acting especially on the envelope: less energy and other resources' needs and more use of eco-friendly materials, in order to guarantee appropriate performances (without energy sacrifice!) for heating, domestic hot water, cooling, natural ventilation and lighting. All that because: "Europe needs cities where life is good!"
This contribute illustrates a design experience begun during the "Archisostenibile 2010" Workshop organized by the Mediterranean University of Reggio Calabria (urban design phase) and completed at the SUN (building design phase).

Key words: Sustainable Technology, Energy Efficiency, Eco-friendly Design, High-Quality Public Spaces, Innovative Component

1. Design: an "action of research"[1]

The growing urban energy and environmental decay, that now appears to homologate our cities's aspect from center to periphery, is not only one of many consequences of the objective difficulty to govern the existing buildings and construction processes for new buildings, but also the contemporary statement of the inability to find the ancient relationship between nature and built that was the prerequisite to found a city.
Town is the modern man's habitat and its design must be oriented to guarantee comfort and wellness conditions, to minimize environmental impacts, protect, restore and enhance the natural features and environmental quality of the site.
Design Quality is an attribute both formal and concrete, the expression of a value judgment that is not always measurable in its complexity with standard techniques, but detectable and measurable in terms of surplus value and perceptive/adaptive comfort.

Today more than yesterday, the construction of the building focuses towards eco-friendly behaviour and high performance energy technology and continually strive to design choices that can efficiently manage all the resources (*passive house*, *zero waste*, *zero energy*, *carbon zero*, ...). This conditions have got a strong tendency to innovation, in which the impact factor of knowledge has a high added value. Designing the innovation requires "knowing how to choose" and the complex mechanisms of development of project ideas have to respond to a question in the meantime evolved / renewed towards ever higher standards of performance.

If we use the design as an "action of research" to interpret the phenomena and/or problems related to the human habitat and grasp the links between cause and effect in order to make decisions, through this creative act we can have a catalogue of solutions, especially responsive to the needs and adapted to the environmental conditions.

New models of design production redefine the powers of the technology industry for innovation. There are necessary in some cases, creativity and courage, in other cases, awareness and sensitivity, but in both cases there cannot be technological innovation without innovation of mind: this is a renewed approach to interdisciplinary project with a range of conceptual lines on which basing methodology and practice. But procedure of the innovation has any intermediate stops; one of these is certainly the ideas generation: the "concept design". In this direction a renewed design awareness , that combines the compositional instances of architectural culture with the techniques instances of the traditional building construction culture (sustainable in itself), involves the use of biophysical and bioclimatic factors to qualify and guide the design choices through definition of a conscious glazing ratios, the orientation of the fronts, the selection of technologies for improved energy performance and the use of integrated passive and active solar systems.

An innovative design approach cannot be deterministic in the use of environmental variables anyway! The biophysical and bioclimatic components must be transformed into "elements of the architecture design". Only in this way, it can become a creative opportunity to mediate between knowledge construction and design culture. The relationship between architectural form and the energy-environmental performance in this way gains the meaning of a link of cause and effect; its aware management is a requirement to obtain an architecture that is not only beautiful and functional, yet comfortable and energy efficient. Therefore, the architect will change shape, colour and orientation in relation to the needs dictated by the stresses of the external environment (climate and environment surroundings), in accordance with the 2010/31/UE Directive(well known as the "EPBD Recast").

In fact, Technology is all geared to "Zero Energy Building " acting especially on the envelope: less energy and other resources' needs and more use of eco-friendly materials, in order to guarantee appropriate performances (without energy sacrifice!) for heating, domestic hot water, cooling, natural ventilation and lighting. In fact, "Europe needs cities where life is good!"

The proposed design experience was conducted with these aims and the integration of biophysical and bio-climatic factors have been the added value that substantiates design choices, articulated into shares for the design and site planning activities for the building.

2. The "rules of the game" of Leipzig Charta[2]

In May 2007, the Leipzig Charter on Sustainable Urban Development is approved; its main objectives are to strengthen the principles of integrated urban development policy with the creation and guarantee of public spaces' quality, modernizing infrastructure networks, improving energy efficiency, promoting training and innovation especially in deprived neighborhoods.

The Leipzig Charter offers itself as a platform to establish these "rules"; so that strategies become signs, actions, habitats ... "Appropriate Technologies"!

In fact, our cities possess unique cultural and architectural qualities, strong forces of social cohesion and an exceptional potential for economic development; they are centers of knowledge and sources of growth and innovation, but fail to fulfill their function as social progress engines and economic growth (as described in the Lisbon Strategy) unless they can keep in balance the pressures of the social sphere (which requires fairness and legality), environmental sphere (which requires the protection and enhancement) and economic sphere (which currently governs improperly all systems and it should be reduced at the efficiency management).

If these assumptions are transformed into concrete actions (plans / design), they are able to ensure cultural diversity and high quality (immediately translated in terms of livability) in fields such as urban design, architecture and environment.

Among the Leipzig Charter's strategies "Creating and ensuring high-quality public spaces" is considered a priority action to attract industrial investment with high know-how, skilled human and creative resources tending towards a "Baukultur".

The "Baukultur" aims to create open spaces that are attractive and oriented to direct, indirect, potential, and why not future users (in the perspective of the intergenerational equity's principle), but with actions to preserve and enhance the historic and architectural heritage, with a high environmental

standard of the proposed solutions. The infrastructure networks must be modernized through sustainable mobility systems that manage traffic through the integrated mode of transport (bicycle lanes, pedestrian areas, ...), coordinating and mediating the diverse needs of residences, offices, business and entertainment.

City is also a place where everyone can create and disseminate knowledge, for example through school Shipyards, Workshops and permanent networks between industry, business and scientific communities. This promotes the spread of ideas and innovation not only technological but also cultural, both in the way of making architecture and in the way to live it, in line with the statement made by Winston Churchill: "we shape our buildings, but since then they shape us."

The Leipzig Charter calls for a safe city in which the social integration reduces the inequalities and prevents the social exclusion. An integrated urban development and the quality of the physical environment, associated with the social quality, provides useful services for citizens.

3. The design experience of "Archisostenibile 2010" Workshop[2]

The culture of the built environment's high quality is an essential part of integrated urban development, pursued through the integration of social, environmental and economic aspect, actively involving the "key players" of the process, both in planning and in assessment of urban development programs and their implementation.

According to these premises and especially to the content and requirements identified by the Leipzig Charta, it is founded the National Workshop of Design "Archisostenibile: Design Ideas for the new quality of the contemporary city", an implementation of the Leipzig Charter on sustainable European Cities in Reggio Calabria, proposed by the Commission for Environmental Quality and sustainability of the Faculty of Architecture of Reggio Calabria[3], with the support of the Mediterranean University of Reggio Calabria, Public Administration, Public and Private Organizations.

The workshop aims to define, in accordance with the guidelines and requirements identified by the Leipzig Charter, project ideas on the theme of urban sustainability applied to the city of Reggio Calabria; particularly, on an area located in the southern outskirts of the city it was identified an urban sector that can be considered representative of the objectives of the Charter.
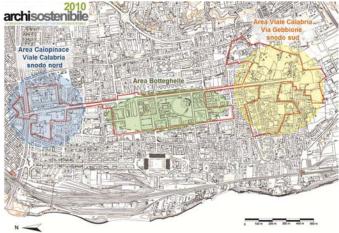
The project area is identified by the urban fabric that extends along the road of Corso Calabria, which currently has the characteristics of "critical" environment, limited to the North by the stream Calopinace and to the South by Gebbione road, near the stream of St. Agata.

Some urban particularly interesting urban areas can be identified along and perpendicular to this north-south axis in order to re-design both urban open spaces and building. Let's analyze them:

- The area of Calopinace includes to the north the disusing General Market (on the left of the stream of Calopinace), the Foro Boario, some disused factories for the processing of frozen foods, offices and Municipal Transport Company (Atam, whose office is being transferred to new premises), a botanical garden with a small building of the Citrus Experiment Station (disused), the Police Station and a school district;

- The Botteghelle is an important multifunctional area where there are the Sports Hall, the new headquarters of the Municipal transport with the new bus station, a city park, a school building, a large parking area used for temporary market area, sports facilities, a covered market and green areas;

- The South area, between Calabria and Gebbione road, includes mainly commercial and residential buildings, as the Area 167, a clear example of urban sector with poor architectural quality, social gaps and degraded space.

Pic. 1: Areas of study.

During "Archisostenibile 2010" Workshop, the design proposed by the working group of the SUN, which approaches the design as an "action of research", point of balance between ends and means, between formal culture and technological culture, provides the functional rehabilitation of Area Calopinace; the project was completed at Sun, where an L-shaped building (destined to tourist information center) and the technology components were designed.

4. The building design experience of SUN work team[1]

With specific reference to the contents of the various Manifestos about the Sustainability and Urban Quality (Agenda 21, the Aalborg Charter, the Meeting of Toledo, the Leipzig Charter, etc..), the strengths of the design are:
- Quality of environmental receptors (Water, Air, Land);
- Improving the overall quality and performance requirements of the buildings that characterize urban space;
- "Reinterpretation and Reconfiguration" of the functional relationships between the open spaces that determine the urban fabric, with particular attention to accessibility;
- Outdoor comfort of study' areas,
- Overall Energy / environmental performance,
- Bioclimatic strategies and low environmental impact technical solutions.

The area of Calopinace is strategically interesting, because it is an axis of connection between the central zone of the station and the more peripheral one of the airport. No less important is its location next to the waterfront, the strength of tourism in Reggio Calabria.

The approach of the "design as an action of research" led to the individualization of criticities and potentialities of the area, from which it has been possible to deduce the main strategies and planning actions to be adopted.

The area of the ex-bus station Atam is characterized by an urban space that, adequately free from the presence of disused structures, has the opportunity to be turned into a new aggregating space, of which this part of the city completely lacks.

In fact the design foresees an equipped square with both elements of street furniture (benches, waste containers, street light) and small and large-sized green space; the large square is separated from the road thanks to an "L-shaped" building that determines its borders in the north and in the east, while the other two borders are marked by the green space. The urban space has been designed as if it were an open room under the sky, characterized by horizontal (celestial sphere, roof and parterre) and vertical (façades of the overlooking buildings) limits.

Dependently on the different functional and control needs of the sunlight, different materials have been used and the role of the green space was important for the bioclimatic comfort.

The parterre is the horizontal limit represented by the ground. The presence of hot surfaces near the project space makes the thermal radiation increase; contrarily the presence in the same area of cool surfaces produces a thermo-hygrometric exchange that favours comfort.

Pic. 2: Urban Design of SUN's work team[4].

Pic. 3: Masterplan of the area of Calopinace of SUN's work team.

The cooling techniques aim at reducing the superficial temperature, through the use of systems (roofs, pergolas, canopies, …) intercepting the radiation in order to prevent it from reaching the ground. A remarkable factor is the typology and treatment of the surfaces.

The preliminary study of both summer and winter prevailing winds and shades influenced the building design and the square arrangement. It is possible to enter the square through two entries; one of them is endowed with a pergola with (both a horizontal and a vertical) vegetation cover that leads to the green lung of the square that plays an important role not only for the solar protection but also for the acoustic, visual and streams of air protection. The pergola links three "boxes" turned into small activities: a newsagent's, an ice-cream shop and a coffeehouse. So the pergola becomes an equipped structured path. The square is endowed with green spaces of various dimensions, that increase gradually up to create the large green space situated in the west that is the physical border of the project space. The design of the building, that borders the square to the north and east, is born architecturally through the spatial evolution of a simple volume, modified and rotated according to the sunlight and ventilation; the operations of addition, subtraction and rotation could achieve the architectural lines with the best performance from bioclimatic point of view.
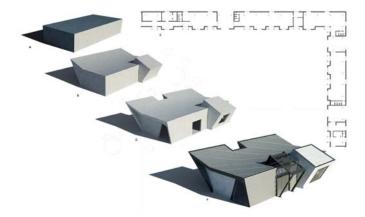
The building entertains different functions: a tourist information centre for the city of Reggio Calabria, a coffeehouse with a refreshment area, a reading room and an Internet point. In order to assure the comfort, the shape of the building itself allows a crossed natural ventilation, thanks to both the aid of openings on opposite façades and the solar thermal accumulation in the wintertime (through the direct sunlight) and the solar shield in the summertime (when the direct sunlight creates discomfort).

For buildings situated in the Mediterranean area, it is not enough to verify the winter dispersions and, therefore, determine the level of isolation of the envelope through the thermal transmittance of the components. In fact, it is essential to analyse the control mechanisms of both heat conduction in a dynamic regime and heat flow due to the solar radiation, which means to verify, for the opaque components, both the coefficients of reduction and lag of the heat wave, and the radiation characteristics of the outdoor surface finish, and to verify for the transparent components the presence and eventually the effectiveness of screening systems.
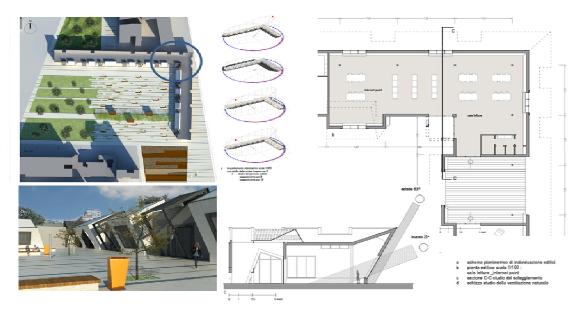
That's possible thanks to the façades inclined of about 63°, that represents the maximum azimuthal angle of the sun in the summer; in this way the summer radiation results tangential to the façades that are so shielded only thanks to their geometry.

Another part of the building houses artistic laboratories; particularly it is endowed with spaces equipped for painting and ceramics and a musical laboratory, with a small recording studio and an exhibition space, that can be eventually used for conferences on social and cultural issues.
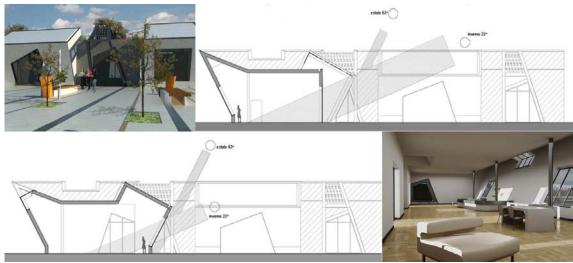
The real designer of this building is, therefore, the building envelope: the frontier between the interiors and the external environment through which checking and monitoring in and out gateway of material and energy. So renewing the concept of building envelope means to present it as a joint product of different approaches: planning, technological, plant, as contemporarily it must answer to compositional and structural, technological and energy, plant and functional requirements.
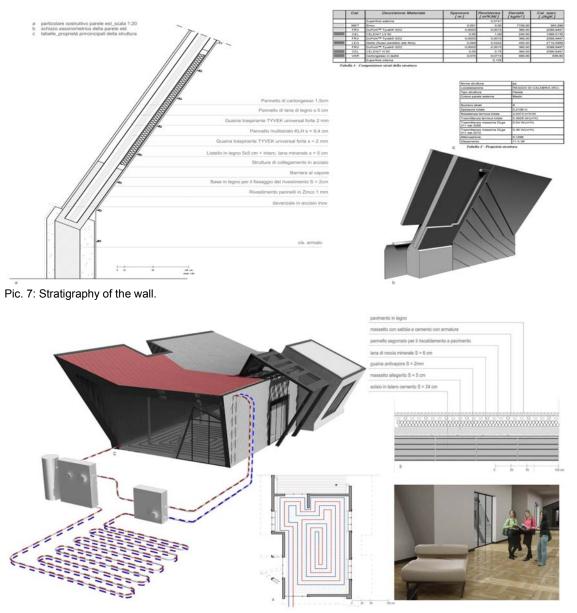
Pic. 4: The building as a spatial evolution of a simple volume.

Pic. 5: Façades inclined of about 63°.

Pic. 6: The summer radiation results tangential to the façades that are so shielded only thanks to their geometry.

a   particolare costruttivo parete est_scala 1:20
b   schizzo assonometrico della parete est
c   tabelle_proprietà principali della struttura

Pannello di cartongesso 1,5cm
Pannello di lana di legno s 5 cm
Guaina traspirante TYVEK universal forte 2 mm
Pannello multistrato KLH s = 9,4 cm
Guaina traspirante TYVEK universal forte s = 2 mm
Listello in legno 5x5 cm + interc. lana minerale s = 5 cm
Struttura di collegamento in acciaio
Barriera al vapore
Base in legno per il fissaggio del rivestimento S = 2cm
Rivestimento pannelli in Zinco 1 mm
davanzale in acciaio inox

cls. armato

Pic. 7: Stratigraphy of the wall.

pavimento in legno
massetto con sabbia e cemento con armatura
pannello sagomato per il riscaldamento a pavimento
lana di roccia minerale S = 6 cm
guaina antivapore S = 2mm
massetto allegerito S = 5 cm
solaio in latero cemento S = 24 cm

Pic. 8: Solar heating system.

The structure has been carried out using eco-friendly materials. The structure is made of pre-fabricated plywood panels: being the wall inclined of 63°, some steel supporting structures have been used to avoid the breakdown of wood-concrete node. The walls are sheathed with plasterboard with a layer of thermal insulator of wood wool and externally they are covered by zinc sheets isolated with mineral wool. The energy correctness of stratigraphy of the wall has been verified with the computer software "JTempest", that has highlighted a value of trasmittance of 0.39 W/m^{2}K, suitable to the minimum requirements required by 311/06 legislative Decree (0.48 W/ m^{2}K for the B climatic zone), an attenuation equal to 0.126 and a bewilderment equal to almost 13 hours.

Glass walls with double insulated glass have been provided; this allows to increase the thermal isolation avoiding the heat loss. Particularly, the glass walls set in the tallest part of the façade can be opened through the aid of an automated system, guaranteeing the natural ventilation of the interiors. This kind of opening is protected, besides, by the summer direct sunlight through a fixed shield.

About the roof, an innovative system has been designed to produce sanitary hot water that, contrarily to the thermal solar panels commonly sold on the market, doesn't work with the principle of the greenhouse effect, but it uses the direct sunlight accrued by the zinc sheets to heat the floating water in the pipes. In order to avoid the overheating of the interiors in the summertime, besides the isolation with mineral wool, also a double cavity wall, ventilated when needed, has been provided.

Solar heating system is combined with a geothermal energy collector and a heat pump: so in the summertime the heat pump keeps the building cool downloading the heat in the ground that acts as an environmental sink. The geothermal heat pump uses either the soil or the water that can be found in the soil as a source or as a heat sink; it can work in cooling also in a passive way, extracting heat from the building pumping the cold water in the system without the action of the real heat pump. An air-conditioning system under the floor controls heating and cooling.

For the recovery of rain water, a collecting system has been provided through a gutter fixed to the roof so that it cannot be seen from the bottom. Through a pipeline system, meteoric water reaches the earth and, passing through a filter of purification, it is stored in special reservoirs buried in front of the building, but with the possibility to be inspected in case of maintenance. In this way the reuse of meteoric waters is possible for discharging the toilet and irrigation.

A conclusive consideration: it is necessary to aim at a "Possible Quality" for the public building heritage where the technological solutions adopted for the improvement of the energy-environmental performances result to be the mean and not the goal.

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[1] This paragraph is written by Antonella Violano
[2] This paragraph is written by Maria Teresa Lucarelli
[3] The Commission: Maria Teresa Lucarelli (President), Antonella Sarlo, Alessandro Villari, Martino Milardi, Stefano Aragona; with the Workshop work team: Elena La Spada, Marina Arena, Francesco Bagnato, Alberto De Capua, Carmine Quistelli, Antonio Taccone.
[4] The Urban Design (product during the Archisostenibile 2010 Workshop) is by Margherita Giglio, Federica Elettra Pedà and Alfonso Picozzi. The Building Design (product at SUN) is by Alfonso Picozzi with the coordination of Antonella Violano

From complexity of architecture to geometrical rule. The case study of the dome of San Carlino alle Quattro Fontane in Rome.

Marco CANCIANI[1], Corrado FALCOLINI[2], Giovanna SPADAFORA[1]
[1] Dipartimento di Progettazione e studio dell'architettura, Facoltà di Architettura, Università degli Studi Roma Tre, Roma, Italia mcancian@uniroma3.it, g.spadafora@uniroma3.it
[2] Dipartimento di Matematica, Facoltà di Architettura, Università degli Studi Roma Tre, Roma, Italia, falco@mat.uniroma3.it

Abstract
This study, started by a collaboration of representation and mathematic researchers, intends to verify the correspondence between the geometrical and the built shape of the dome of San Carlino in Rome, designed by Francesco Borromini. The transition from a geometrical model to its construction, in fact, is also influenced by factors related to the building yard practice, which can also lead to significant changes over the initial idea. For this reason a new survey has been conducted, which analyzed the vault in detail, especially in the sequence of panels which characterize the soffit. The comparison between the model derived from instrumental survey and a mathematical-analytic model, based on parametric curves and arithmetic progressions, has allowed us to understand the transition from geometrical form, measured on the impost of the vault, and his space development; at the same time, the comparison between design drawings and the survey model has allowed us to formulate some new hypotheses about the relationship between Borromini's design and constructive method.

Keywords: Survey, three-dimensional model, mathematical model, Borromini, San Carlino.

1. The dome, project and building. Preliminary remarks.
This paper shows the first results of the research, which is currently being carried out, whose subject is the study of the vault of the *Church of San Carlino alle Quattro Fontane* (Fig. 1) in Rome, built by Francesco Borromini, inserted in the conventual complex of the Trinitarian Order. The church was built in stages from 1634 and was completed in 1680 after the death of Borromini in 1667 [1].
Our aim is to make, through the data obtained from the survey and the resulting three-dimensional model of the dome, a mathematical model which, on the one hand, identify a possible rule in the dimensional sequence of the symbolic elements of the dome and which, on the other hand, may help to understand the shape of the surface.
Defining the role that the geometric drawings played in the Borromini design is not simple. It is generally agreed now that the series of autographic geometric drawings made for the *San Carlino* was done after the building, in preparation for the publication of the *Opus Architectonicum*, and that the creative phase, probably, started from the plastic models [2, 3].
In relation to the possibility that mathematics can have served as a support for the project – it is necessary not to forget that mathematic knowledge and drawing have always been deeply related in architecture – it is important to highlight that even if the cultural background within which Borromini worked was the one of the 17th century Scientific Revolution, his building technique was still deeply linked to the Renaissance tradition [4].

The mathematical ferment which had characterized the previous century would lead, during the 17th century, to differential calculus and its applications together with the general solutions of polynomial equations of fourth degree and an explicit use of geometrical curves defined by kinematic rules.

However, in Borromini, stimuli towards a design which can gain its own "scientific reliability" look more like a "form of thought" [5] than like the basic tool of an ideal prefiguration.

The classics were a reliable source of inspiration and comparison on which he directly drew, detecting and noting down, in ancient monuments, structural and formal solutions which didn't always correspond to what the treatises had passed down.

It is necessary to consider that, generally, the operating practice was the most direct way to find answers and solutions to any design idea and, in this context, the use of models constitutes a fundamental way of planning and checking.

Issues linked to the design, to its conception and prefiguration through scientific-mathematical methods, materialize in the need to give instructions to the skilled workers. The operating practice leads to thinking about *how to do* and it is just to this question that the new survey and the consequent mathematical model try to give a possible answer.

In relation to what has been said so far, the creation of a mathematical model doesn't aim, according to our intensions, to hypothesize that the design of the dome be the result of a mathematical thought, as far as the creation of the impost curve, the arrangement and deformation of the decorated coffers and the setting up of the entire surface are concerned.

The issue is that if the geometric rule which Borromini seems to have used can be related to a mathematical model and if that can be useful to understand the building procedures.

It being understood that the *building* represents a further design moment, during which what is realized not necessarily correspond to what has been previously thought.

An example can be the perspective adjustments located "at the top of the vertical arm of the crosses on the dome impost, where a portion of mortar was added later, in order to optically correct the height size from the bottom", according to what emerged from the latest, recent restorations [6, 7].

Geometry, therefore, establishes itself as a design background whose rules can be infringed because of the more pressing perceptive rules, as it happens in the coffered part of the niches about which Borromini explains, through a caption in the drawing Alb. N. 208, that "*Li sfondati non devono andare al Centro perché quelli più vicini a detto centro resterebbero troppo piccoli. Saranno numero nove li sfondati senza quello che occupa l'aggetto della Cornice*".

1.1 Geometry

In the Alb. Az. Rom 169 drawing the projection of the oval impost of the dome is drawn through two opposing equilateral triangles sharing one common side, whose base vertices are the centres of the curves that joint the two shortest circular arcs, drawn on the barycentre of the triangles (Fig. 2). This is in line with the *modus operandi* of Borromini who, also to obtain complex geometries, used curves which could be obtained through simple circular arcs. This geometric construction is called "canonical oval" and it is characterized by the possibility of being divided into equal parts. However, as already mentioned, the drawing may be subsequent to the realization of the dome and probably "made for mainly symbolic and not formal purposes", since this drawing (constituted by triangles and circles) is not necessary to trace the oval, but it is used to include the Trinitarian symbology, largely evoked in the building, also in the plan [4]. To build the oval Borromini proceeds from Serlio's suggestions, with the two triangles disposed transversely.

One of the interesting data on which we focused was the information emerged from the surveys carried out within the restoration works, from which it emerged that the geometric tracing relative to a canonic oval would be "only at the first row of coffers, about one meter above the plane of the impost" [8, 9]. Another datum resulted from studies aiming at restoration works which highlighted that, "up to the level of the platbands of the windows it is possible to notice a pseudo-horizontal course of bricks" [10] and that "the curvature [of the vault] stands out against the octagonal windows" [7].

Taking these considerations into account, we put forward, starting from our survey, some hypothesis about the impost geometry and the development of the vaulted surface, which will be described in the paragraph 2.1.

1.2 The building

Between the drawn form and the built one there are the building yard practice, rethinkings along the way, needs and hitches which can occur. There are also static aspects to take into account to which Borromini finds a solution according to the tradition: the calotte of the "dome is partially united to a thick ovate tiburium" [3].

Static aspects could also have determined the deformation of the oval figure which appears more flattened than in the drawings: the study of the strains along the connection points among the four curves which draw the calotte impost could explain the adjustments made to the shape of the canonic oval.

Drawings and models, useful also during the operating phase for planning the construction of the centrings, were probably used to design the dome. As a result of the studies made during the restoration works, it emerged that "frames and coffers bottoms are made of bricks and are an integral part of the masonry" [9], so it looks plausible to us that the dome be built through some centrings, whose shape had to be very precise and reproduce in the negative the drawing of the coffers.

2. The new survey of the dome of the *San Carlino*

The idea of carrying out a new survey of the dome/dome of the *Chiesa di San Carlino*, therefore an already accurately studied and surveyed building, aims to be a further research and analysis occasion/opportunity linked to the willingness to deal with the subject concerning the link between geometric form, project/design and construction/building.

Survey works focused on the check on the geometric layout, relative to the dome impost, which was in some drawings kept in the Albertina's Archive in Vienna, and on the hypothetical geometric-spatial shapes of the dome, within three domains:

1) The determination of one or more generatrix forms of the plan;
2) The drawing of the octagonal and cross-shaped coffers, which characterizes the dome intrados, useful for determining the geometries that regulate the sequence of the coffers;
3) The drawing of the horizontal and vertical sections, which helps to determine the spatial development.

On the basis of that a new survey was carried out following an integrated method, using topographic measurements obtained through points/dots (about 1000 points) surveyed by two stations inside the church, complemented by photogrammetric measurements made through the use of about 30 photographic images and a multiple images photogrammetric rendering software (about 600 rendered points). The use of this software made it possible to overlap, in virtual 3D, the archive drawings and the images of the dome intrados with the spatial model obtained through the survey.

2.1 The planimetric shape of the dome

As far as the determination of the planimetric shape is concerned, we tried to determine, with a sufficient approximation, the geometric form relative to the curve of the tambour frame, the ones relative to the horizontal alignments of the coffers at the several levels and the base one of the small lantern.

The analysis of the surveyed points and of the overlapping of the different geometrical constructions showed two significant aspects: the curve, relative to the tambour corresponding to an oval, is centred compared to the rectangle described, in the plan/layout, by the lateral apsidal domes and the couples of twin columns arranged diagonally; the ovals passing through the characteristic points of the crosses and of the octagons of the four levels, as well as the ones of the base ring of the small lantern, are, instead, related to the development of the dome. Since this series of ovals built by dividing the longest axis into three parts (Fig. 3), originates from the intersections between the continuous surface of the dome intrados and the horizontal plane of the various levels of the coffers, these ovals are similar figures, i.e. characterized by the same shape, but layered dimensions following a geometric progression.

The system of the tambour, linked to the layout/plan geometry, and the one of the dome are different and aren't aligned with each other (Fig. 4). The variable space between the tambour corona and the dome impost, clearly visible in Fig. 5, is hidden by the overhanging tambour corona decorated with palms and flowers.

Comparing the projection of the oval in the drawing Alb. Az. Rom 169 with the series of ovals that describes the tambour and with the ones that describe the dome, it is necessary to highlight that only the first series is similar to the construction of the canonic oval.

Moreover, the overlapping of the project/design with the survey of the alignments of the couples of columns supporting the correctly oriented pendentives is signaled.

2.2 The coffer drawing

There isn't any information about the coffers which characterize the dome in the archive drawings. It is possible to suppose that Borromini used, besides a series of scale models, orthogonal projection drawing of the coffers, accurately deformed along the single *tessella* in which the base form had been divided, in order to have the possibility of replicating precisely the alignments of the coffers, not only horizontally, following the

different levels, but also in elevation (only to then make corrections for a better perspective perception, where he thought it was necessary, cf. par. 1). Some information can be deduced from both survey data processing and the analysis of the mathematical model, from which it is possible to infer that the ribs are oriented following five centres, arranged on the longitudinal axis: one in the centre, for the coffers arranged on the transverse and longitudinal axis, two, apart from the centre, relative to the elements disposed on the diagonal lines and two others in which the intermediate/halfway gores converge (Fig.6).

As far as the project of the coffers in elevation is concerned, the only document preserved is the Alb. Az. Rom 224 (Fig.7) in which the notes that Borromini writes down in the margin, are very helpful to understand the drawing. As a matter of fact he often shows his willingness to divide the dome into eight alternate crosses and octagons, following four horizontal series, whose dimensions are reduced from the lower to the upper level. Each level is divided into 16 *tessella*, which split the surface, following predetermined dimensions, written down in the drawing (6 palms horizontally and vertically for the first and second coffer levels, 5 for the plain impost band. Horizontal dimensions were modified, during the construction, by the introduction of the different convergence centres of the ribs, which determine angular magnitudes from 21° on the longest axis to 25° on the shortest one.

It is interesting to note that the complexity of the coffers final drawing is the product of geometry and proportion simple rules, adapted to the building practice (Fig.8); consequently, if Borromini had decided to use formworks to make the coffers, he would have to make only those formworks which repeated several times, considering that the coffers are symmetric two by so they are equal on the transverse and longitudinal axes, on the two diagonals and on the intermediate gores; as a consequence of that there would have been five types of formworks, multiplied by the four levels, so twenty out of sixty-four in all.

2.3 The surface geometric model

It is difficult to understand the spatial structure of the dome, which has given rise to different interpretations. Certanly, as it has already been surveyed, the surface is not a rotation surface, since a series of curvilinear generatrices, which vary from the shortest one on the transverse axis to the longest one on the longitudinal axis, correspond to a directrix determined through the construction of the horizontal polycentric curves. The total height and the heights of the different levels of coffers are, obviously, constant, and the symmetry is bivalent for the axes and tetravalent for the diagonals.

It has been noticed that in the longitudinal section the section correspond to a quarter of a circumference, whose radius is equal to half the longest axis, cut on the top hand by the impost plane of the small lantern. The fundamental elements to be considered, in order to make a both mathematical and digital model of the dome relative to the construction hypotheses, are determined by the impost elevation and by the main sections: transverse, longitudinal and diagonal. The new survey showed that the surface curvature, starting from the ring of the small lantern, goes on, with a lightly curvilinear, almost vertical movement, up to the first level of coffers, aligning with the vertical plain band (Fig. 5). The oval of contact between the two surfaces, located at a 16,27m elevation, is the impost curve of the dome. This assumption is supported by the fact that the limit of the application of the finish stucco, noticed during the analyses aiming at restoration [7], is just located at that elevation and that putlog holes are located at 15,20m lower quote, by the band decorated with palms and flowers. Besides, analyzing the vertical development of the vault on the basis of the unit of measurement of that time, i.e. Roman palms (22,3cm.), it is possible to notice that: the vault is 8,02m (36 Roman palms) on the shortest axis, 11,37m (51 palms) on the longest axis and 5,13m (23 palms) on height, the tambour band is 2,23m (10 palms) and the small lantern ring is 0,22m (1 palm).

3. Mathematical model of the dome surface

In order to understand the geometrical model of the vault it has already been proposed [11, 12] a general mathematical model which depends from a generic planar parametric curve. This model has been used to study both the surface shape and the geometrical structure of the tassels sequence. With the new survey, the abstract model is integrated with the coordinates of surveyed points to obtain a new mathematical model which make use of the data from the survey and keep questioning it to get new and more specific answers.

3.1 The abstract model

The model depends on a general parametric curve γ(t) which represent the base of the vault.

Such a curve has been extensively studied with respect to its construction and regularity properties: the oval suggested by the project design or its similarity with an ellipse, together with models of the surface shape, has been tested in recent papers [11, 12] were a new type of curve, similar to the oval and closer to the observed realized curve, is suggested.

Here we derive and use a model with the same type of curve,

$$\gamma(t)=(6\cos u+\frac{1}{3}\cos 3\,u,\frac{9}{2}\sin u+\frac{1}{3}sen\,3\mathrm{u})$$

which has the same regularity of an ellipse (in particular it has a continuous second derivative) although more studying is necessary to have a better fit with the three-dimensional relief.

Starting from the basis of the vault $\gamma(t)$ the model of the surface is constructed assuming an ellipsoidal shape, in parametric coordinates:

$$S(u,v)=((6\cos u+\frac{1}{3}\cos 3\,u)\sin v,(\frac{9}{2}\sin u+\frac{1}{3}sen\,3\mathrm{u})\sin v,\frac{25}{6}\cos v)$$

A model for the position of the lacunars can be derived (see [11,12]) starting from the selected surface, using arcs of "parallels" and "meridians" in a regular pattern: alternating crosses and regular octagons on increasing levels seems to rescale towards the top of the vault.

Given the nth vertical level and the number N of lacunars for any level (N=16 in our case) we can define position and size of a tassel of the surface by the spherical coordinates of its centre (u_0,v_0) and the angular "radius" in horizontal (u_r) and vertical (v_r) direction:

$$u_0=\frac{2\pi}{N}\qquad v_0^n=(\frac{2\pi}{N})2\,b^n(1+b)\qquad u_r^n=u_r^0=\frac{\pi}{N}\qquad v_r^n=\frac{\pi}{4}b^n(1-b)$$

where *b* is the ratio between vertical radii of two successive tassels, that is

$$b=\frac{v_r^{n+1}}{v_r^n}$$

In order to fix the value of *b* and of the vertical size of the first tassel we make the hypothesis that it would be possible to fit an infinite number of successive tassels of constant ratio which ends up at the pole (the same description can be applied with more than one pole) and which looks like squares with some accuracy.
The first hypothesis implies that the sum of the vertical size of the infinite tassels in angular coordinates would be exactly $\pi/2$, which gives the condition:

$$\frac{\pi}{2}=\sum_{k=0}^{\infty}2v_r^k=\sum_{k=0}^{\infty}2v_r^0b^k=2v_r^0\sum_{k=0}^{\infty}b^k=2v_r^0\frac{1}{1-b}$$

that is

$$v_r^0=\frac{\pi}{4}(1-b)$$

The condition of tassels of similar size on both vertical and horizontal direction, in a spherical approximation of the surface, can be fixed by the condition (which depends on the vertical position of the tassel):

$$\sin(\frac{\pi}{4}b^n(1+b))=4b^n(1-b)$$

In the proposed model we applied such condition fixing b=0.75 and checked the levels from the second up to the fourth one: the first level is particular and also the model of a full simple ellipsoidal surface is good with respect to its mean distance from the points of the relief (which is around 5 cm) but the position of the lacunars seems not to be perfectly aligned (Fig. 9).

3.1 The mathematical model and the survey
A different model, closer to the new survey, is constructed which leaves the same geometrical description for the position of the lacunars but change the shape of the surface of the vault.
Starting from the baricentral points of crosses and octagons of the last three levels: we note (Fig. 10) that the vertical projection of these points are almost aligned and they meet in a symmetrical and uniform way.

The point of intersection are different from the centers of the arcs forming the oval shapes but are center of symmetry for the construction of the corresponding part of the vault surface.

The model is then constructed as a three-dimensional version of an oval: we take for each of the four symmetrical part a vertical axis through the point of intersection of the converging lines and construct the four parts of the vault as the surface of revolution along the base curve with an elliptic profile.

The beauty of such model is in the simple regularity of the merging vertical curves (Fig. 11).

Conclusions

Research is still ongoing but, starting from these first data it is possible to make two hypotheses about the methods used to build the dome, both of them are based on the idea that centrings were used for the general conformation of the surface described by the coffers ribs [7]. Centrings could have been built following a vertical sequence, corresponding to the transverse, longitudinal and diagonal guide sections, and a horizontal sequence which, starting from the impost oval, replicates and layers the initial figure following a progression determined by the vertical guide sections. The shape of each centring is constituted by circular arcs, in particular the longitudinal centring is made from a semicircle with radius equal to half the longest axis.

The first hypothesis is based on the use of standard formworks (in all, twenty, as stated in par. 2.2) placed on the centrings structure (or made at the construction site [7].

The second hypothesis, drawn from the mathematical model, would suggest the idea that a scaffolding with wooden beams which describes the surface determined by the curvature of horizontal and vertical centrings. On this scaffolding it would have been possible to place some formworks shaped on the basis of the single *tessella*, adaptable to the change in curvature and dimension. It would make the alignment of ribs, following the centres shown in plan proiection (Fig.12) and after positioned on dome surface. Further analyses and details are expected from following research.

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Iconographic references

The images of the drawings Alb. Az. Rom 169, Alb. Az. Rom 224 were taken from [1]

Fig. 1: Photo of the dome (C. Falcolini) and overlay of the photogrammetric restitution and geometric construction of the "canonical oval"
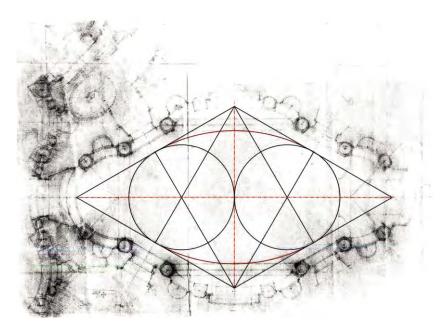
Fig. 2: Alb. Az. Rom 169 and overlay of the geometric construction of the "canonical oval"
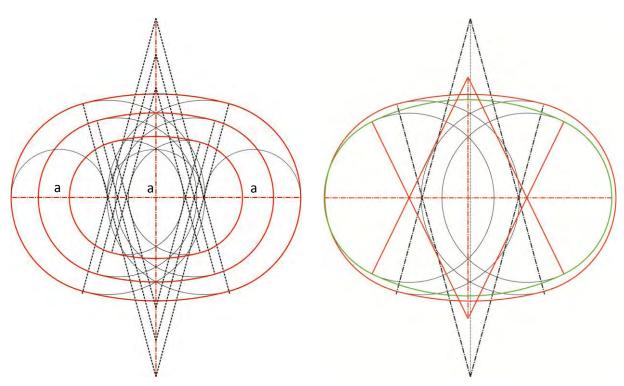
Fig. 3: Geometric construction of the dome ovals traced by horizontal planes

Fig. 4: Comparison between the construction of the oval of the drum (green) and the first level oval of the dome (red)
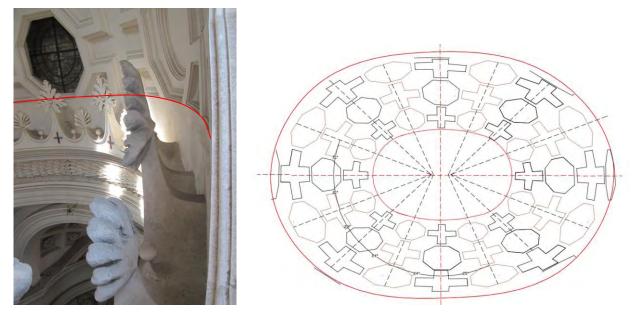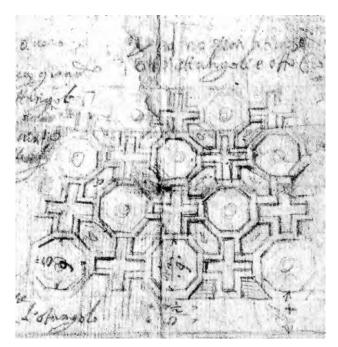
Fig. 5: Drum cornice and impost oval (red) (C. Falcolini)

Fig. 6: Plan drawing where coffers alignments are highlighted following 5 centres
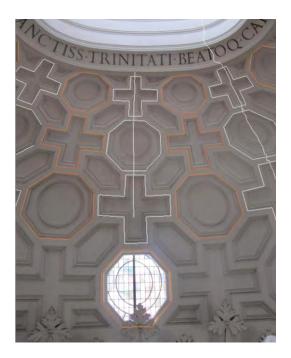
Fig. 7: Alb. Az. Rom 224

Fig. 8 Photo which show the octagonal and cross coffers and overlay of photogrammetric survey
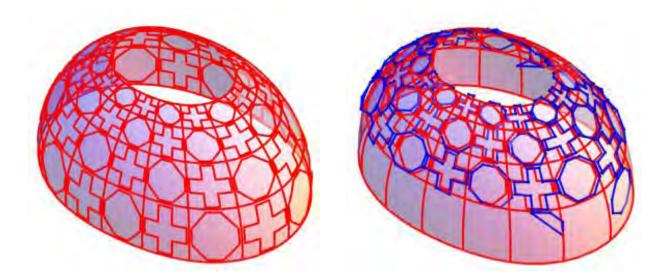
Fig. 9: Three-dimensional model: the shape of the surface is an ellipsoid constructed on the base curve. The average distance of such a model surface from the measured points is around 5 cm.
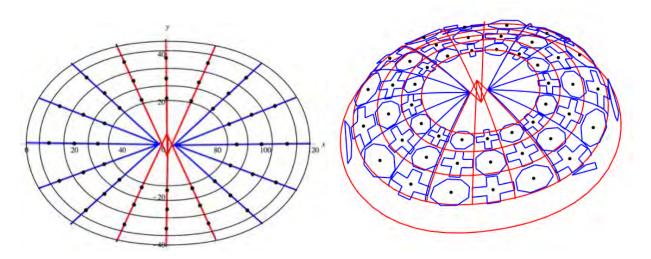
Fig. 10: Plane projection of the baricentral points of crosses and octagons in the new survey for the last three levels. In each sector, these points are almost aligned and have different mutual distance; the lines meet at different points if continued by the same proportion (5/6) for the blue lines and its square (25/36) for the red lines. Red and blue lines have, respectively, the same angular distance.

Fig.11: Three-dimensional model: the four parts (pairly symmetrical in blue and red vertical curves respectively) are constructed starting from the planar projection of fig.9. The tassels are clearly surrounding the crosses and octagons of the relief.
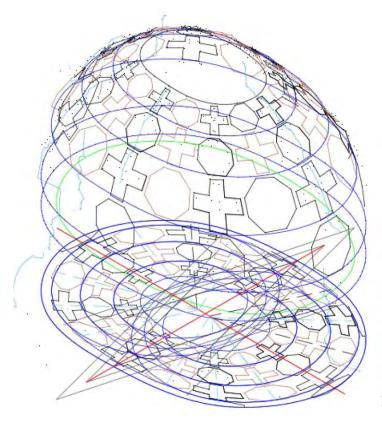
Fig. 12: Plan projection and overlay of axonometric view of the dome

THE INTERIOR AS AN EXTERIOR.
Precedents for the addition of a new hall
in the old Gymnasium Neapolis, Crete.

Nikolaos SKOUTÉLIS
Faculty of Architectural Engineering, Technical University of Crete, Greece.
nskoutelis@isc.tuc.gr

ABSTRACT

Designing interiors as exteriors has always been a great challenge in architectural design. As a compositional principle this method highlights the capacity of the architect in combining scales and as a final result, it enriches the character of the buildings as *containers of life*.

The current proposal is concerned with two interventions for the construction of halls in the towns of Chaniá and Neapolis in Crete. The design approach should be that of the proposal of the external space qualities in these halls that should demonstrate a rich atmosphere made by the minimal architectural effort. The study of precedents has offered several ideas, in order to improve continuity and the severe control of our decisions.

In Chaniá the design of the internal walls combines row wood strips and photographs, trying to create the compact image of reed, moving by the wind. In Neapolis, the existing courtyard space is imagined as being covered by a large tent which curves downward, toward its centre and is pulled back by its four corners creating tension.

This method, where it can be applied, gives more welfare using less architecture. For the interventions in existing historical buildings it can offer the idea of the natural elements with which time involves buildings and creates the *patina*. The interiors designed as exteriors can offer a deeper architectural thought beyond buildings as a kind of a primitive euphoria, as life in the inbuilt.

Keywords: Interior design, Council Hall, Tent, Reed.

Fig.1: The frescoes from the "House of Livia", Museo Nazionale Archeologico Romano.

Introduction

The inner purpose for architecture is to treat and configure the relation between the external and the internal spaces, the definition of the limits and the relations these passages creates when people move from outside inside, from one place to another. The immense of the natural countryside, then the continuous of the open air spaces in the urban settings, usually conducts into a covered, concluded interior, public or private.

For Piranesi the external spaces must be "*severe*" but the interiors must be "*gentle*". For Loos the exteriors should have the character of the "*provocative*" but the interiors that of "*reassurance*". Architecture has created its world explaining the autonomy and all the poseible relations between these polarities. When the criteria of the external space, as size correlations, images, light and color are combined in the construction of an interior, architecture arrives to the description of the real world.

Examples as the Pantheon in Rome, Ayia Sofia in Istanbul and the Berlin Neue Nationalgalerie by Mies van der Rohe, try to include as a continuous, inside, working on and with the walls, the qualities of the open air urban landscape. In our first example, making rain and cold to come inside an interiorl which is composed by the repetition of facades, in the second, filtering light in, as in a covered public square and in the third, using the surroundings as permanent scenario in the interior, as walls. Designing interiors, architects have the opportunity to improve different materials and treatments and are able to incorporate in a fixed structure levels, themes borrowed from the visual arts. More or less murals have created the internal atmosphere in the greco-roman antiquity and then, between renaissance and neoclassicism. Gobelins and asian carpets are the fixed scene in the medieval domestic interiors.

For historic architecture, the composition of a space capable to incorporate the purpose of other arts has been considered as its highest goal, and in this kind of creations that of the total art. In our contemporary world we have changed the names of these basic intentions but the themes are unchanged. We don't paint murals and we don't cover by golden mosaics our walls. We focus on transparency because it is the solution for the introduction of a filtered image of the real life outside our buildings. Otherwise, we stamp leaves and row textures on plaster and glass, in reference to the natural and the time's dimension. Our "murals" are emanations of photography, and secondarily of the cinema. We desire architectural space as creation of a total art.

In Crete, Minoan architecture proposes interiors as outdoor areas with murals presenting scenes from country or marine landscapes. The painted walls in the house of Livia in Rome (Figure 1). and the "Camera degli Sposi" in Mantova by Andrea Mantegna, introduces moments of that inner happiness of life in the countryside, under the open sky, for private rooms in the city. The gothic cathedrals recompose all day's moments outside into a total natural light experience out of time, each time.

Contemporary architecture after the history's lesson of the eighties, confused by the promises of the digital era, introduced more and more nature in the design of the external public spaces in terms of landscape, thinking sustainability and environmental criteria as new substance and ethics in its workmanship. In the same moment, working with the elements of this lost naturalness in the internals donates to architecture the sense of lightness and porosity to its natural limits, the walls. Staying inside becomes easily a walk to spaces of the fantasy and immensity of the open air space. In these terms, an interior could become as the most expansive exterior. [4] This experience of the built could be combined with human inclination for freedom, delight and profane entertainment.

Fig.2: Erik Gunnar Asplund, cinema Skandia, Stockholm, Perspective design for the interior.

Fig. 3: Mies van der Rohe Neue Nationalgalerie, Berlin, view of the interior.

2. Modern precedents

The need for examples, structured on this subject in more recent times has given the instruments for further verification of the initial hypothesis. Asplund's cinema Skandia in Stockholm, (1924), has been designed on a nostalgic mediterranean reality: feast in a small italian square, by night. Low balconies and rows of chairs appears in a dark interior, where hanging lamps replace the stars. (Figure 2).

Alvar Aalto in his Concert Hall in Helsinki, (1962-71), follows the ceiling's movement on the lateral walls by a decorative pattern evocative of a dense reed bed or the wood around his villa Mairea. It is a typical example of many of Aalto's hallmarks and motifs. [7] Generally, in Aalto's interiors, large asymmetrical movements, lighting and the use of wood transfer the outside, into the finish landscape.

Mies van der Rohe, in his Neue Nationalgalerie in Berlin (1962-68) doesn.t need to create an interior space. His captured images of the surrounding urban landscape, replace the walls of this gallery. Architecture becomes a flat roof, flying on the earth, somewhere in Berlin (Figure 3). This last solution had several applications and we can say that the modernist persistence for transparency and immateriality has been approved in several solutions, specially the last ten years. The most evocative of all could be appear the Onichi Civic center by Kazuyo Sejima and Ryue Nishizawa, (2009). Here interior and exterior penetrate completely one into the other giving a sense of life in the open air.

This short excursus shows that composing interiors with the elements of exteriors, creating a light atmosphere of pleasure, has always been a great challenge in modern architectural design. As a compositional principle this method highlights the capacity of the architect: First, in proposing ironically, as a literary transfer, a double sense in his rooms. Second, in combining scales of different working criteria from the city to the individual object and third, it gives the instruments for the incorporation of the so-called decoration in the final solution.

Examples like those presented above, as final results, enrich the character of the buildings as *containers of life*, in the same way that the public space functions, giving continuous opportunities for the collective expression. These thoughts composed the mosaic of the intentions in the two proposals in Crete.

3. Designing two halls in Crete

The Skoutelis & Zanon architectural studio in the 2006 had the opportunity to intervene in the abandoned Horticultural Market twelve kilometers southwest of the town of Chaniá, western Crete, with a project for the restoration of the whole complex into the Region's new administrative center. The given structures should be used totally, so new outdoor corridors, as transition areas have been proposed for the communication between the parts. The solution employed the introduction of a Council Hall in the ground floor, in an internal part of 180 m2, which cannot receive natural light.

The ideas for the interior of this hall has been originated from the very present groups of reed in the surrounding area, closed the lake Ayiá. The plan's shape of the hall led to a movement between the existing walls and the new sound absorption panels. These panels are two kind of structures: most of them are made by strips of iroko in different dimensions, leaving a void of 2 mm between them. The rest are webs by gypsum plaster, where photographs of the real reed and trees are involved on the walls. The new layer of Iroko wood panels reaches up to 2.20 meters while the rest of the room's height (totaling at 3.80 meters) is completed by a zone of semi transparent sheets of glass concealing the artificial lights. They fuction as substitutes of windows, bringing natural life inside. This stable lighting creates an atmosphere composed by green and blue color while the direct working lights are positioned on the ceiling. (Figure 5).

The second opportunity for the design of an internal hall has been given in 2010, by the Municipality of Neapolis, eastern Crete. In the historical gymnasium, converted into a cultural center, a hall should be added, for the unification of the rooms quoted in series. This late times monument consists of three ground floor wings forming a Π, which enclose a courtyard open to the east. The building is located south of the cathedral of the Assumption, in the most central point of the large urban area comprising the public buildings, east of the elongated central square. The two lateral wings, north and south, bridge the difference in level from the square towards the east, while the smaller central wing makes up the main elevation towards the town.

The existing building's total area is approximately 788 sq.m. and the courtyard 590 sq.meters. The building's architectural merit is limited to its robustness; its presence as part of the monument complex of the garden beside the church of the Assumption; and its uniformity to the other buildings of its time (the Courthouses, the Prison, latter mid-war residences) The value of the authenticity of materials which could have led to argue for the building's conservation is almost lost due to the restorative works (2000-02) which presented a freshly rendered and freshly painted building with new floors and roofs. The building's historic value is rather more significant. Here studied youths from the prefecture of Lasithi who came to be bright scholars and politicians, capable of elevating Neapolis to an important intellectual center for the island. The community's deeply rooted sense for the building's historical value led to its declaration as a preservable monument.

In 2009 Neapolis is integrated within the framework of the new Municipality of Mirabello, with Agios Nikolaos as its capital city. It could be stated that owing to the cultural activities and the overall dynamic which is developing; though especially due to the number of public buildings and the unique character of the central garden, Neapolis could serve as the region's cultural center; especially when considering the absence of such places in Agios Nikolaos and other regional settlements. This is a means by which Neapolis will reclaim its lost prestige.

In the meanwhile, the inhabitants appreciate their old Gymnasium as it has been the first formal educational institution in Crete in the modern times. Most of the people involved have expressed their hesitations and gave different conditions in order to agree with the project. Designing in these conditions seemed to give more restrictions to the architect's intentions, but by the end this new interior should appear as an outdoor area. The existing courtyard space has been imagined as being covered by a large tent which curves downward toward its centre and is pulled back by its four corners creating tension, much like when trying to fold a sheet of fabric. Staying inside should create the idea of an exterior space like in a bazaar or an Asian ceremonial tent.

Around this roof there runs a continuous band of wide blinds 1.73m tall sub-divided into strips of blinds 27cm wide;, so that when the blinds are open, during most of the year, the courtyard space becomes semi open and the whole structural system serves as a shelter (Figure 6). Staying inside should create the idea of an exterior space like in a bazaar or an Asian ceremonial tent.

During the winter months the blinds shut and the courtyard space, supported by mechanical ventilation, may support any activity. The curved volume of the roof is pierced by five cone-like light wells, which let in and disperse the natural light; another means to render the space light and airy, recalling the openness of the school's courtyard.

The technological solution of the double roofing rewards the architectural invention, by the creation of two separate structures: one is the iron external structure elevated 7,50 meters high by eight iron beams composed pillars. The second is the so called "sheet", made by gypsum plaster panels, suspended between 4,80 to 6,90 m over the hall. A marquee divides it from the band of wide aluminum horizontal blinds giving the sense of an independent piece which takes part of the internal.
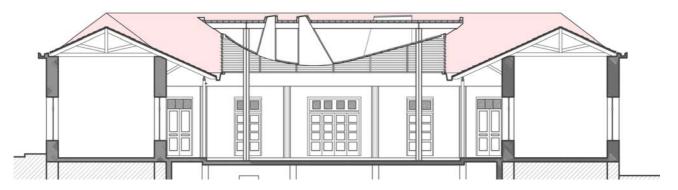
Fig. 4: Skoutelis& Zanon, The new Hall in the Gymnasium of Neapolis, section.

Fig.5 - 6: Skoutelis& Zanon, Internal views of the new Hall in the Gymnasium in Neapolis and the conference room in Chaniá.

3. Conclusions: towards a method

In this opportunity a theoretical approach can emerge as result of our attentiveness in the study of historical examples. We tried to give the instruments of a method which consists into:

A. Searching a pretext from the surroundings, in order to propose an ironic, double sense of an interior, as an open air space.

B. The combination of different architectural scales in the interior's design.

C. Working in this field conducts to the incorporation of the so-called decoration in the solutions of the several parts and the internal facades of the construction.

D. One could add one more compositional principle as a new contemporary approach in this theme: The interior rooms as continuous undulation of one only surface or material, as happens in the so called *diagrammatic* process. Also in this context the fusion between interior and exteiorl is guaranteed, as the traditional, modern or classical examples have highlighted previously.

The instruments for such a procedure vary from the mimetism of the dominate elements of the natural or the urban landscape outside, to the real presence of those through glass walls, inside. The interaction between the design's scales as another carrier of irony provokes the users mind in a kind of entertainment and an expectable astonishment. The redesign of the external elements as direct transfer and as metaphor for the needs of the internal function, in this process, contains automatically the production of decorative elements or surfaces as complete works of art.

This method, wherever it can be applied, gives more wellbeing to the users, building "less architecture" in a metaphoric sense, as it proceeds combining existing images and forms, leaving light to come inside, creating a kind of suggestion of continuity. For the interventions in existing historical buildings it could find even further applications. It offers the idea of the natural elements with which time involves buildings creating the so called "value of age", on architecture's materials [6].

If we try to redefine again our method, transferring these principles into restoration projects, they it collaborate in this, by:

A. Proposing continuity between the natural elements and the aged architecture reconsidering John Ruskin's theories on buildings' life.

B. Suggesting higher scales of intervention in the interior's design could help into a major revitalization of the existing for the collective life.

C. Incorporating natural elements in the so-called decoration in the solutions, could replace the re composition of lost or partly destroyed historic elements.

Composing interiors as exteriors could emerge as that congenital method which contains the instruments for the stress of relation with the time dimension, enhancing the *atmosphere* values given by the presence of nature's action and the so called "patina" on the aged surfaces. The metaphor of fragments from the natural environment inside, emphasizes the presence of all the conditions of aging and the duality between the built and the unbuilt. One more time thoughts coming out this method, brings to the conclusion that the effort for the production of *less architecture* could add more substance into our creations.

The transmission in the future of the works of architecture, time by time becomes more pressing and the most of the times we are guided to apply contemporary values in the existing. That happens not only because of the commands of the international congresses and charters on monuments' restoration but also because of the less possibilities that are given for totally new constructions. Working on the existing is the near future, not only in countries with a huge stock of historic buildings but in all countries. In later or very old buildings these interiors could become the intermediates between the time of construction and the long time of the building's life, presenting values of our way of acting today. One of these is the landscaping process and then the design as a folding of continuous surfaces as experienced in the natural terrain.

We tried to analyze and to reconsider the nature of the external spaces as instrument for the interior design, because of the variety and the conditions they offer to real life and collective expression. Introducing the natural into the internal space could guide the users to unexplored results for their behavior. Interiors designed as exteriors can offer a deeper architectural thought beyond buildings as a kind of a primitive euphoria, as life in the inbuilt.

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Palazzo de 'Mayo, multi-purpose and cultural center for the town of Chieti.

Pasquale TUNZI
Dipartimento di Architettura, Facoltà di Architettura, Università degli Studi "g. d'Annunzio", Chieti-Pescara, Italia
tunzi@unich.it

Abstract

In the old town of Chieti, at largo dei Martiri della Libertà and corso Marrucino, stands the palace of the eighteenth-century belonging to counts Mayo, located between the church of S. Dominic and the Provincial Government Building.

Its recent restoration is a tangible urban redevelopment by the "Fondazione Cassa di Risparmio della Provincia di Chieti", and acts as a boost for the cultural, social and economic community.

The monumental building, really precious in architecture, shows some important collections of the Foundation's permanent exhibition, an art-library opened to children, rooms dedicated to temporary exhibitions, an auditorium, a garden for concerts and actings, an underground archaeological area, rooms for workshops and two cultural centers international. In Palazzo de 'Mayo, a location of FAI's day of spring, there was the placement of Mozart's salons, homonymous subject of the annual music festival of Chieti.

The size and the feature of the building have joined with the large architectural spaces, intellectual inputs useful to a modern renaissance of cultural activity. For these reasons, the program of work, initiated in 2004, has conducted with the objective of enableing a new social role of the building in the town and boost the historical heritage from the old town in a contemporary dimension.

Parole chiave: recovery, building, Chieti, cultural center

1. An aristocratic palace transformed in its function

Architecture is communication, in that it transmits images, at times emotions, and satisfies at the same time precise demands, alienating mere formalism. In some cases, architecture acquires the ability to interconnect, when it is able to hold together operativeness and several functions. It becomes the fulcrum of productive activities, a melting pot of thoughts and actions directed towards courtesy and the citizen, namely to improve the quality of life and promote new professional competence. Therefore, architecture is a medium which is capable of expressing itself but it is also vectorial. This is what is found in Palazzo de' Mayo in Chieti, an ancient aristocratic building heralding changes that keep pace with the times.

More and more frequently, critical-preservative restoration allows the functional upgrading of a historical building, confirming the modification of the conditions of a location and, consequently, of the behaviour of its inhabitants. The restitution of one of the most meaningful examples of baroque architecture to the city of Chieti – after more than thirty years' work – has become the occasion for the renewal of a state of wellbeing for the province and the whole of Abruzzo. Palazzo de' Mayo, with its 6,800 s.m. of surface, rises in the historic centre of the city, between the Provincial Palace and S. Domenico degli Scolopi's church, and the belvedere with three spires above has been the symbol of middle-class Chieti life since the nineteenth century.

In an ancient city like Chieti, in which the different types of architecture testify to an interesting historical-cultural stratification, the constant work of preservation and recovery of the architectonic patrimony restores its identity to the community. The pre-existent Roman remains, the religious buildings of the Middle Ages, the seventeenth-eighteenth-century churches and palaces and the nineteenth-twentieth-century transformations are a tangible, meaningful testimony to a recognizable identity of great value.

The President of the Fondazione Cassa di Risparmio of the Province of Chieti, the architect Mario Di Nisio, has been supporting the aim of protecting such an identity for years with great self-abnegation. In line with the philanthropic aims of the Cassa di Risparmio Marrucina, founded on 6th July 1862, the Foundation has pursued goals of development of the cultural, scientific and social patrimony of the provincial territory since the beginning of the 1990s.

In 2004, the Foundation acquired Palazzo de' Mayo, an ancient building belonging to the Valignani barons, sold in 1788 to the brothers Saverio and Severino Costanzo, rich Chieti traders active in Naples, Trieste and Marseilles. After restructuring and extending in the seven years before 1795, the building shows a classical character of a late baroque style, unique to Chieti and in the whole province. More than being a palace, it is a building complex substantially composed of two buildings of three storeys arranged in the form of an L containing three courtyards and a large garden open towards the eastern panorama. The Costanzo brothers rented most of the palace, assigning for their own use a residential quarter on the second floor overlooking the garden, with the rooms hung with prized silk with painted faces on. Because of a controversy which arose in 1808 between Saverio Costanzo and Celidonio Farina, a business partner, half of the property passed to the latter, who very soon sold it because assailed by debts. Ten years after the death of Severino Costanzo, in 1821, the heirs, who found themselves in straitened circumstances, transferred the remaining part of the building to Count Levino Mayo, the General Collector of the Abruzzo Citeriore Province, who undertook to recover the whole property and improve it. He realized an unusual covered roof-terrace with pagoda-like roofing, an elegant Italian-style garden in which he placed rare essences, and he had the vaults of some of the rooms overlooking the main street decorated and polychromatic concrete floors carried out in Venetian-style.

Besides being a civic residence, in 1827 the building was used as an office by the reunited Financial Department of the Abruzzo Citeriore Province and, from 1907 to 1946, it has hosted military Headquarters.

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Fig. 1: Chieti, Building de' Mayo on the course Marrucino and square Martiri della Libertà.

At that time, it was placed under protection and declared a national monument in 1934, under law No. 364 of 1909. In the postwar years, many rooms were the seats of cultural and philanthropic associations, some run by the archbishopric.

In 1977, the last descendent of the Mayo family, Countess Laura, sold the whole complex to the Cassa di Risparmio of the Chieti Province which, two years later, began a notable intervention of restructuring, restoration and reinforcement of the foundations, walls and vaults, and restoration of the roofing and plaster. In 2004, with the passing of the property over to the Fondazione Carichieti the restoration work carried on, reaching its completion for a new multipurpose use for not only the city's community. The works carried out constitute a tangible testimony to the cultural operation effected on the historical building by the banking Body, which has established its new operational office inside, considered right from the start in an interactive relationship with the city projected towards stimulating a new social role in the territorial context.

The aim of the Foundation was clear right from the start: to carry out a series of works so as to transform the palace into a cultural centre which would function not as a mere container, but rather as a social rendezvous and diversified cultural production. A strongly attractive centre capable of contributing to the revitalization and upgrading of the whole historic centre. The dimensions and multipurpose character of the well-organized organism straightaway revealed the opportunity to join intellectual input to the wide architectonic areas, useful for a modern rebirth of the prestigious eighteenth-century structure.
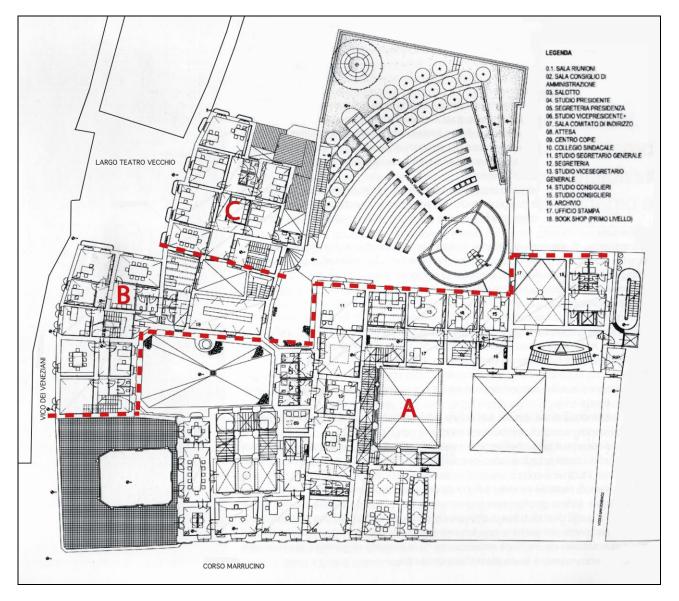
Fig. 2: Chieti, first plane of the de' Mayo building project, with the intended use, orig. scale 1:50.

The opportunity allows for the activation of a mechanism which is able to offer a range of activities and ideas directed to reviving the patrimony inherited by the ancient city in a contemporary dimension, brought to fulfilment in a cultural centre which, by means of the Foundation's support, proposes to promote the development of Chieti and its territory, reviving them through opportune cultural initiatives, from the point of view of sustainable progress.

1.1 A brief description of the building.

The volumetric organization of the building can be divided into three main blocks, identifiable in distinct building units which, for clarity, we will indicate by the letters A, B, C. The most sizeable and representative part of the palace is block A, an element of great value of eighteenth-century features, with a stone entrance onto the little Martiri della Libertà square, initially the San Domenico church square. It develops laterally onto Corso Marrucino with three floors out of the ground and a low-angled volume in which there is the entrance to the court, whose role is to link up with block B situated in the Veneziani alley.

The façade on the main street welcomes the most prestigious areas of the Palace by means of an elegant score punctuated vertically by eight fanciful breves defined on the ground floor by a high base strip marked by ashlar-work parastas. Above, the façade alignment includes both floors of the building, marked horizontally by a series of gabled windows, curved on the first level and triangular on the second. The openings are interspersed by a double series of smooth parastas placed on an axis with the ashlar-work ones underneath. The façade also hosts an entrance corresponding to the entrance of the original residence, still set out just next to the patio where a mannerist-style portal is situated. Its scenic façade led into the first residential complex of the Renaissance period, by means of steps with opposite flights. The original covered roof-terrace concludes block A, an elongated volume covered by three pagoda-style roofs.

Fig. 3: Chieti, de' Mayo building, Eighteenth-century staircase furnished with classical statues.

The stone entrance onto the small square leads to a short entrance hall open on to an elongated, octagonal-shaped court, and from here one can reach the grand, monumental staircase and laterally the great court onto which the stables overlook and the entrance onto the large back garden. The octagonal court, in its blunted corners, houses four recesses mounted by frames which, together with the parastas, alternated on the lateral walls, punctuate the external surfaces, repeating the design of the external strip. The vestibular area welcomes the visitor, directing him frontally towards the main wing of the palace which dominates it, leading to the elegant flight of stairs.

Block B, elevated over two floors, is situated in the Veneziani alley which leads to the ancient eighteenth-century Theatre, and does not present marked architectonic qualities. On the east side, it closes the great court with a series of rooms once intended for the servants and services. On the side and a little behind, block C rises over three floors, from the sober, seventeenth-century style architectonic score facing onto the Theatre square, and on the opposite side it benefits from the garden.

The restoration, which was concluded in 2010, was carried out according to the usability and function demands of the Foundation's operational office, without neglecting the historical-architectonic importance which required specific intervention of a preservation nature, diversified for the several building units which make up the historical structure extended in the entire town sector.

The main block of the palace on Corso Marrucino, in the basement, houses an auditorium set up in a big room facing the internal garden. From here it is possible to visit a small, hypogean archaeological area consisting in a portion of the "via tecta" in opus mixtum of the Roman epoch. The three higher levels are connected by a state flight of stairs in metal and wood, purposely planned according to elliptical geometry which, by joining up with the posterior rooms, at the back of the San Domenico alley, solves the distribution of a part of the building by dividing up its access.

The spaces on the ground floor are devoted to the library, which faces onto the garden, organized in such a way as to satisfy the users and the management with several rooms reserved for the files, book deposit, video library, multimedia room and reading room. It is a library specialized in art publications and it contains a special section dedicated to children. At the back, the garden of about 700 s.m., besides the usual decorative functions, contains a cavea complete with terraces predisposed to host concert and theatrical shows in the summer season.

Fig. 4: Chieti, de' Mayo building after restoration; stateroom used as a conference room.

The first floor houses the administrative and managerial offices, and a series of rooms for temporary displays e workshops. The second level contains a picture gallery of contemporary works, which one can access from the eighteenth-century grand staircase of honour, and a conference hall set up in the state hall. Finally, the higher covered roof-terrace is a charming, panoramic belvedere on the city and territory and contains a bar-refreshment room connected to the underlying picture gallery.

Also, inside the palace the Centro Studi Abruzzese di Studi Manzoniani and the Centro Internazionale Alessandro Valignani have their seat, which are bodies organized through the initiative of the same Foundation Carichieti in collaboration with institutions of absolute, international importance.

The desire of citizens to visit the palace at the conclusion of the restoration works was answered through the organization of a great cultural event, the exhibition called "Mimmo Paladino and the new Warrior. Sculpture as cosmogony" inaugurated on 26th January 2011. The extraordinary works of the Campania artist animated the halls for five months because of the temporary exhibitions and the internal courts of the Palace, and constituted the first step pending the opening of the entire structure, making the registration of the number of people present really meaningful and winning the approval of the national press.

During this initiative, the Palace was included in the circuit of the Italian National Trust Fund days in spring, with guided tours. Subsequently, it housed the exhibition of one of the greatest Italian photographers, Pepi Merisio, and was the stage for one of the Mozart salons set up during the ninth musical festival which Chieti dedicates to the genius from Salzburg every year.

Therefore, expectations were certainly not disregarded and the very numerous testimonials of esteem received for the work done testifies to it.

The palace thus becomes the support of every modification and, at the same time, subject to modifications. The necessity to make known its active presence in the regional territory and in national territory was satisfied first through a report which took place during the yearly event, "Urban promo, city, transformations, investments" held in Bologna in the first half of the month of November 2011. For the occasion, the corporate image was promoted by means of a video realized by us in which, in just a few minutes, we gave an overall picture of the whole matter of the palace and the Foundation's activity. From the survey drawings to the planning drawings, from the condition before the works to the final situation after the restoration, together with historical data and programmes to illustrate a route orientated towards the improvement of knowledge and delightful activity.

The Foundation was presented through a series of selected images, centred on the concept of a productive industry of goods and services. The visual cuts of various frames were studied and pre-established by means of a storyboard and on the basis of the instructions imparted by our client body. We realized the editing and visualization in HD 1280 x 720 size, considering the place of projection: a transit area, often crowded, set up by various monitors on which the film clips would go in a loop, with the sound not too audible (or not audible at all). We weighed up the type of visual formatting model, having in mind simple, direct communication, devoid of effects, that shows, at all times, the subject and the client of the film clip.

The cultural event of Urban promo, regarding the themes of town regeneration and town and territorial marketing, was a moment of reference for the exchange of qualified knowledge and updating of experiences carried out by the civil service and private citizens, organized for the purpose of promoting innovation in the administration of the territory.

At the end of the event, our film clip was inserted in the Foundation's web page, an aim which was foreseen technically at the time of the realization in mov H 264. The communicative activity is unceasing, satisfies a useful and indispensable process for a case such as ours, in which the building and the whole city live on the active participation of the citizens and tourists.

Thus, the meaning of the term 'communication' is reinforced and is often linked to that of development and growth, implicating job, exchange, knowledge and property relationships, relationships between individuals, groups, bodies, institutions. The basic component of communication is still the regulative system with which management of the relationships of a main centre with subordinate centres is made possible, and the first type of regulation is information, popular knowledge suitable for diminishing the distance with the unknown.

The system of forts of Rome

Mariella LA MANTIA,[1] Fabio LANFRANCHI[2]
[1] [2] Dipartimento di Storia, Disegno e Restauro dell'Architettura, Facoltà di Architettura, "Sapienza" Università di Roma, Roma, Italia
Email: mariella.lamantia@uniroma1.it; fabio.lanfranchi@uniroma1.it

Abstract

With the sesquicentennial anniversary of the unification, we believe it may be of interest to focus on the choices and strategies made in the field of defense by the newborn Italian.
Among the possible sites considered by a committee as "sensitive", the choice fell on Rome, the new capital of the Kingdom of Italy. The construction of the Roman fortress system was then started in 1877 to end in 1891.
Once completed the building of the defense system, it resulted anachronistic undergoing in time a series of adjustments and transformations, operated by the army, which still retained the property until a few years ago. As most of the artifacts is now in charge of municipal administration, the lack of funds still does not allow the possibility of conversion to the use of citizenship.
There are no suitable documentation of the complex system, still preliminary to any type of recovery or reuse. We think that this fort architecture could be considered emblematic of the treated area, the Roman one, and at the same time, of the building military art at the half of the nineteenth century.
Given the size and architectural characteristics of the sites, we value as fundamental a targeted intervention aimed at understanding the documentation as well as at future opportunities for intervention by outlining a possible line of inquiry learning

Keywords: Fortress, Heritage, Survey.

1. More or less military architecture

The reading of the transformation of an area from rural to the urban condition is an activity that finds in multidisciplinary its only possible decryption key.
The phenomena of evolution or sometimes of involution, can not prescind from economic, political, and social filters.
The reasons of a territorial transformation in fact, still find, before the technical or more properly city planning, their motives in will depending on strategies, needs and interests.
In principle, every mark on the man-land is therefore an outcome decision, in other words we could then define a local map as a book of memory from which to extract concepts, aspirations, decisions. The physical reality and therefore perceptible, tangible, is accompanied by the passage of time, that has always been a vital means of evaluating the choices, strategies and guidelines.

1.1 The post unity defense system**

With the sesquicentennial anniversary of the unification, we believe it may be of interest to focus on the choices and strategies made in the field of defense by the newborn Italian.
Choices whose impact on the territory are, in most cases, still visible today; choices that identified, in an articulated system of fortification works strategically spread throughout the country, the response to possible

actions of invasion by foreign states or, as publicly less acceptable, but perhaps the most historically plausible, from possible internal unrest.

As the defense system interested as mentioned, the whole country, a number of strategic points were however identified, within which the organization of the defense was not limited to specific interventions, but in real embedded systems. This is the case, just to name a few examples of interventions implemented in the Verona area, of those relating the defense of the Straits of Messina, and of those relating to Rome, the new capital of the kingdom, territorial areas of strategic, or perhaps only symbolic, importance.

1.2 The "Entrenched camp of Rome"**

The causes that pushed the Permanent Commission for the general defense of the state in 1871 to the calculation of providing the capital city of an integrated defense system-defined as "the entrenched camp of Rome" - can be identified in the fear, then probably felt, "*to cover and defend the capital of the kingdom from a coup that an enemy, most powerful of our on the sea, could attempt by a landing on one of the many defenseless and easy landing points of the Tyrrhenian coast.* "[1].

The enemy, perhaps only a pretext, was represented by the French or even better by the memory of their invasion of little more than twenty years before. Their landing at Civitavecchia, the subsequent attack from the West, convinced the government to allocate, in 1875, an initial sum of 10 million lire to encircle Rome with a first series of Forts to be implemented as quickly as possible on direct routes to the Tyrrhenian . [fig.1]

In 1877, a Royal Decree declared as public interest the construction of fortifications, roads, warehouses and other buildings connected with them in defense of the capital: "*So in a span of just five years and cost around 23 million, it has been built around Rome a ring of permanent works, consisting of 15 detached forts, which will put the capital under cover of a bombardment, and with a small garrison, mostly composed of mobile and territorial militias, will oppose attempts that an enemy, landed in the near shore, could do to seize the city, at least until the arrival of a rescue army. And now here they are the forts, severe in their simplicity and intrinsic strength, which turn the face to the enemy from any direction it comes, vigilant and faithful guardian of the capital of Italy.* "[1].

In fact, the completion of construction of the last element of fortification, called "Forte Antenne", saw its work completed in 1891, about 14 years after laying the first stone of the first post-unification Roman Fort. [fig.2]

In the same year France subscribed with Russia the first phase of the Dual Alliance; the aims of an invasion of the capital of the new Italian state by the French appeared perhaps overcome, as well as the sense and defensive capability of the Roman fortified camp appeared anachronistic and outdated within a few years, even under coeval ballistic progress.

2. The Roman Forts: from defense system to a possible urban system through the survey **

A territorial system thus defined as a military strategy for defense against possible dangers from landing on the coast near the capital or from possible uprisings of domestic origin. An integrated system of fortifications, batteries, roads, warehouses and other related buildings that, located annularly at an average distance of 3/4 miles from the Aurelian and Vatican city walls - then in the first peripheral cincture of the late nineteenth century - are nowadays fully incorporated but, in some cases, not exactly integrated in the meshes of the city now established.

Military compendia that in recent years, in a framework of national interest facing the alienation and enhancement of buildings of the Ministry of Defense, have made possible, in particular, the acquisition by the City of Rome, of a further series of forts including the Boccea, Pietralata, Tiburtino and Trionfale forts.

2.1 Towards the protection and enhancement**

With the Memorandum of Understanding signed June 4, 2010 between Defence and the Municipality of Rome, you have the "Plan of transfers and improvements of military buildings of the city of Rome" with the consequent allocation of a new urban destination for affected areas, as a variation in the Master Plan approved in 2008. The fortificaton system is now - if you exclude some structures still in use by the Ministry of Defense - almost at all belonging to the built heritage of Roma Capitale. A fundamental "handover" even if still insufficient if framed in objective reality - effectively described by Prof. Carmine Gambardella in the *call for papers* of this meeting - of "*... an era, like the one we are living, in which the economies of Western countries are aimed at readjusting their operating budgets of expenditure cuts, rather than to invest its assets to create wealth and jobs.*"

A reality that has long led: "*... in relation to the claim of mere conservation of a heritage so large compared to the small resources available, both in the inability or unwillingness to define a destination and a business model ... to follow the development of the problem in a sporadic and bounding way, up to condemn the forts*

and the resource they represent to a sort of degenerative embalming, as unlikely as improvident, whose results are evident."[4]

In analogy to what has happened with other similar architectural realities distributed within the Peninsula – as example we refer to a part of the fortress of the Strait of Messina – also in the case of Roman heritage, the momentum to the protection and enhancement is born from spontaneous associations, among whose intents is clear the desire to spread the awareness of these assets through environmental, social, artistic and cultural initiatives, aimed at raising awareness and enjoyment of their own.

The patient work made over the years by experts and citizens now joins the help of FAI - Italian Environmental Fund, with initiatives aimed at promoting a culture of respect for nature, art, history and traditions in the optical of heritage protection to be considered as a fundamental part of the roots and identity - among which we mention the round table set for the month of April 2012 at the Library of the Senate "Giovanni Spadolini" entitled: "*A wealth buried in neglect and rediscovery: the forts of Rome*."

Among the initiatives aimed at the enhancement of the Roman fortress are included, in addition, several publications and studies conducted jointly by institutional structures, such as the Department of Interior Architecture of Sapienza University and professionals founders of Campotrincerato Association of Rome.

The results arising from the joint study open to possible design addresses of feasibility, which we define as indicative guidelines shaped both on the basis of individual architectural reality, [fig] and on hypothesis of coordinated conversion between the different fortification units. The studies, conducted largely on the basis of archive documents and on the basis of locally acquired surveys, made a first evidence about the peculiarities of the Roman defense structures, characterized, as a whole, by the distinct distribution and fairly complex function, considering the peculiarities that characterize usually the underground architecture.

Architecture and at the same time urban planning structures in which the design of the general planimetric, although in some cases it appears to be significantly restructured by changes depending on neglect or - as we shall see later – on changed functional requirements, still manages to survive by virtue of spontaneous tree equipment that, adapting to the original architectural features of incorporation, have essentially modeled their margins and then the planimetric trends. [figg.3-4]

2.2 Toward a hypothesis of survey, analysis of the architectural and building features of the system of Roman fortress **

With regard to today and then actual state of the artifacts, we believe it is essential – in a disciplinary perspective more properly applicable to the survey intended as a synonym for knowledge – to reflect and consider that: "*While the military and its impassability has in some cases resulted in a greater level of conservation of structure and appurtenant areas, most often the demands inherent to military use have resulted in substantial modifications of the original implant, even by very invasive interventions and uncoordinated with the natural organs of competence.*"[5]

In fact, the various laws regulating the works for the Defense, have taken away in time much of the same to the appropriate verification of urban and architectural aspects, the results of what has just given situations ranging from construction essentially unchanged from what was originally built up, to cases characterized by complete transformation.

A wealth then, that as made available by the recent laws, can be considered partially known and documented, a part of a complex system now demilitarized and thus available, which is at the same time abandoned when not illegally occupied. The entrenched camp in Rome, the existence of which is just beginning to be known to the citizens, 120 years after the construction, needs prior to any desirable care, a prompt and thorough set of analyzes aimed at understanding and documentation. In the end, it needs a series of operations, capable of expressing the spent and current state in the fundamental characteristics of the Vitruvian *firmitas*, *utilitas* and *venustas*.

The military architecture of the late nineteenth century is characterized by a series of architectural and functional works of a defensive nature, that were created in early 1800 by the engineer of the French military engineering Nicolas Carnot, and were widely used both in new buildings and in the defensive improvement of existing forts, in particular within the Austrian school of military architecture.

The set of walls in the Carnot style, with numerous loopholes for riflemen, and caponiers - structures similar to bunkers with different weapons depending on the strategic function - are elements actually external to the central nuclei of the various garrisons.

The caponiers finding normally their place at the top of the Carnot style walls, in the most advanced points of the front of fire as well as protection of the only entrance to the fort, can be defined as recurring elements and then characterizing the whole panorama of the Roman fortress. [Figure]

To characterize the elements described above and, more generally, the individual architectural episodes contribute - like building materials used as typical of the Roman area as tufa, brick, travertine, basalt, iron -

also the construction methods and, no less important, the stylistics characters that find in access portals, for example, the strongest expressive moment drawing inspiration from the architectural styles of the Renaissance repertoire [fig.5-6].

The *military building art* of the Roman fortress system is, in effect, albeit within the limits of territorial and functional specificity, an interesting textbook example of construction techniques not free of technological fascination.

The minimalist functionalism unifying the different fortress structures, emphasizing the character of the state of abandonment and consequent degradation offers, in areas where interventions of conversion were carried out, an interesting case study on construction methods. Real technological slices related to walls, vaulted systems and general details, architectural and stylistic elements, all united by the evidence of compositional rigor resulting both from evident careful planning and design and from an executive ability made possible by customary operation of competent workers.

The present-day configuration of Roman forts is, as already stated, the result of changing operations related to various military needs; the facilities created for the defense were in fact in some cases, since their completion, immediately converted to different uses.

Of the entire system only a few elements preserve today the original characters, including the Portuense Fort - one of the less extensive and among the first to be made – which is perhaps the complex which has undergone minor changes over time.

About this fortress – which, we repeat, however complies with the other - the walls of the border against the ground as well as in general elevation ones such as caponiers, corner mumps, powder kegs, etc.., are made of squared blocks of tufa with well defined elements of style spaced, close to ground connections, by individual lines of bricks. The bricks also become the recurrent material element in the definition of padding architraves and lintels of doors and openings. The laying of the bricks - which is coplanar to the line of the facades - in padding is elegantly hooked to tufaceous segments.

In some cases, slabs of architraves – generally low arch or flat arches - are made of travertine, as well as travertine are the bases, capitals and friezes of brick pilasters placed as frames to the access gates to forts. [fig.7]

Among the recurring stylistic features, we also point out the gorges with overhanging bulls placed to finish elevations of nuclei, - like caponiers, powder kegs and containment walls in general - the top of which are normally protected. [fig.8]

The Roman fortress system is then a fascinating mosaic, whose "cards" so far treated, have the ability to restore the physical image as well as well the slow passage of time. But an objective analysis of the complex cannot absolutely prescind, both from the technical-constructive point of view and more generally from the structure point of view, by the system of horizontal structures, almost exclusively composed of vaults.

The constructive ability, as already mentioned, the work of craftsmen who built the various complexes, finds in the vault structures interposed between the various levels and systems of coverage, perhaps the most obvious example. The tuff that, as already written, characterizes the image of the building elevation, leaves into the environments, the place to tile roofing systems. These same environments, that are almost exclusively underground, never exceed the heights of the keystones, over 400 cm. The types of vault used range from simple barrels, or lunettes, up to rampant vaults mainly used in the vertical distribution spaces. [figg.9-10]

The exact geometry constituting the same vaulted systems and the accuracy of laying the bricks and the relative elements of style, characterize, jointly with the intensity procured by marked natural "light blades", the same environments with formal rigor. A system of vaults to be understood as an element of self-crowning, as regards the type of material used, but at the same time perfectly integrated with the functional and composition logic of the elevation walls. Design choices appropriate to the functional requirements which meet the criteria for speed of construction, ease of use, affordability and availability of materials on site.

The methodology of the survey operations of this type of architecture cannot but take into account the considerations expressed above: the extension of the sites, their technical and structural peculiarities and the special geometry characterizing the large-scale plants are factors that we believe should address the organization of work on three distinct yet osmotic levels of survey and documentation: the general survey, the survey of the architectural elements, the critically-thematic survey.

2.3 Integration of instrumental techniques for the detection of urban scale and architectural documentation of the Roman fortress system *

Since it has not yet realized no procedure to detect, model, and communicate this type of architecture, it is proposed here to program the most suitable approach in terms of both feasibility and reliability of potential results obtainable, which provides the integrated use of different detection techniques. The quality of the

results is closely related to the technical performance of different sensors and their proper use revealed through the recognition of their more appropriate scope. A significant amount of experience in the detection of complex architectural systems together with good knowledge of the techniques in terms of advantages and limitations inherent in each technology are just some conditions that guarantee the successful completion of device discovery. The use of different techniques with the integrated use of multiple sensors, active and passive, as total stations, laser scanners, photogrammetry, and modeling by Image-Based Modeling (PhotoModeler, ImageModeler, Google SketchUp, etc. ..) must be carefully planned and contemplated on the basis of several factors. First among these are considered the morphological shape of architectures that are being measured in terms of size, geometry and material, together with their setting logistics: in our case we are examining fortress architectures of defensive nature with the relative difficulty of accessibility and suitability of sites for the acquisition of images or scans. Complexity, occlusions, a variety of structures and sometimes inaccessible locations represent a range of obstacles to capture all the geometric details of these structures. For example, to inaccessible areas such as roofing, the solution is to use images taken from a hallway at low altitude. The images produced in combination with detection, laser scanning and existing plans, will provide all the necessary elements to elaborate even a complex architecture.

Secondly, it is to be considered the target of detection both in terms of scale of restitution (urban, architectural and detail) that of expendable resources to direct the best use of the different 3D measurement techniques. This leads us to consider technologies with a high level of automation and the use of procedures that permit the integration of 3D models created independently from different data sets by eliminating overlaps and filling any gaps in order to develop a valid model for documentation and visualization, as well as possible visualization tools of the produced elaborations. We wish to recall that representation, even in the field of survey, assumes an important role as it aims to communicate effectively to the reader the knowledge acquired and deemed necessary for the understanding and documentation of the work. The modeling is the most significant and functional processing for excellence. From prior knowledge given by inspection and retrieval of existing infographics documentation, we pass to survey and collection of measures so that we finally have a graphic restitution of the work with processed items that make up a comprehensive system of representation, which shows, in analytical and synthetic terms, the set of results derived from the various thematic investigations conducted.

So, from the acquisition of direct and indirect metrics (with the integrated use of different measurement techniques), you get two-dimensional and three-dimensional graphics processing, ie the most reliable morphological and material registration of the product. In particular, this technique operates in the field of architecture with a variety of purposes including the documentation, representation, materials and degradation diagnostic, enhancement, preservation of the property, etc. .. The individual 3D modeling that can be derived both from real life (photogrammetry, topography, laser scanning) and from graphics processing resulting from the conversion of existing 2D drawings (by measures and techniques for direct detection) will necessarily be integrated to each other and georeferenced. Consequently, we highlight the opportunity to consider establishing a repertoire of three-dimensional digital models of the architectural elements preserved also in order to explore the possibilities, when required, of a virtual reconstruction.

This necessitates the collection of large amounts of data from various positions which then must be accurately recorded and integrated together. Although each of the forts is a different challenge, we should develop a general approach that can be applied to this kind of architecture and architectural complex systems in general. The results will consist of complete and highly detailed models that can adapt to a variety of purposes, ranging from documentation to the conservation and reutilization and conversion.

Do not forget also the various layers recorded over the years and the numerous works of change. Some of these buildings were completely destroyed or in ruins with a high degree of difficulty for collecting and processing data. From the foregoing it is clear that the geometric survey of the building will require to be integrated with knowledge both of the transformations undergone (and, to this end, we can be aided also by historical and archival sources) and the composition of its supporting structures.

2.4 The two-dimensional representation and three-dimensional modeling of point clouds from photographs *

Photography has always been considered an ideal solution for recording reality, I would say essential for the documentation of built heritage. Over the last few centuries, photogrammetric techniques, based on the principles of stereo-photography, have established a close relationship between the space of photography and that of representation. The space of representation becomes definitely three-dimensional while photography represents one of the possible points of view of this space.

So, if the geometric model of an image is known, you can learn the projection of a point in the scene, starting from the optical center of the camera and its projecting through infinity. But, if one has two images of the

same scene, 3D coordinates can be retrieved by the intersection of the projections of the two homologous points on selected images.

We must point out, now, at first the possibility, with the use of specific software, to reconstruct the perspective beam that gave rise to the single frame and secondly that, having pairs of images which relate to the same object (ie, that reproduce partially the same part), by the search and comparison of homologous points (ie, different images of the same point belonging to the two real images), allows to define pairs of points that can be considered images of the same real points.

These purely mathematical processes - they overcome, then, the conditions that the photogrammetric technique had to respect in deference to the physiology of the human eye - are based on criteria aimed at measuring and comparing RGB values at the points considered, and in their immediate surroundings. The process ends with the reconstruction of the virtual model of the object photographed in the form of a cloud of points comparable to that obtained with the electronic scanning.

From the cloud of points we pass to the definition of a surface composed of a triangular mesh that connects all points between them. The process of transformation and union is governed by algorithms, different for each program, able to connect the corresponding vertices for the realization of edges and faces. Then, with the application of certain modeling software (automatic and not), it is possible to reconstruct a 3D surface and consequently obtain a two-dimensional representation starting from a set of vertices in three dimensional space.

The potential of this technique are varied with a good compatibility, in both metric results and representative instructions, with needs of architectural detection in monumental and detail scale.

For most of the fortresses, methods of image-based applications are the ideal choice. The images can be taken faster with a greater and easier degree of viability than the laser scanners that are more cumbersome and slow. However, considering the complex kind of architecture, surrounded by narrow spaces, it is difficult to take pictures from ground points of view that may cover the entire surface. Therefore, we appeal as aforesaid to images captured from a lowflying helicopter.

The time to collect data is estimated in about a week for each fortress while it takes on average a couple of months for data processing and modeling.

The architectural modeling from photographs can be a useful cognitive exercise based on a combination of panoramic images and laser scans. The methodology to be adopted for the accurate and detailed modeling of these complex architectures will use active and passive sensors in order to exploit the advantages inherent to each technique. The following points summarize some help for a correct approach to detect them.

1 Use of existing documents to be digitized and/or digitized as a basis for further processing;

2. Surveying and georeferentiation of individual models (total station and GPS)

3. Accurate calibration of digital cameras in the lab for all the different settings used in the field;

4. Using images from a helicopter for the realization of a comprehensive model of building exteriors, walls, courtyards and main courses. This model will integrate the other models generated with different techniques

5. Take pictures on the ground for the parts of the model not visible from aerial photographs;

6. Use rectified ground images to derive high-resolution details of windows, doors or other important elements of architectural interest.

7. Use average radius (1m-50m) laser scanner to capture the details of selected internals that are less suitable for modeling with Image Based technique;

8. Assemble and integrate all models between them.

3. Conclusions

If only rarely may it is possible to frame with absolute certainty and immediacy the salient features of historical monuments, we can easily imagine how, in the case of the entrenched camp of Rome, only a thorough knowledge could, and with many difficulties, return its relevant and current consistency.

The near future of the system of Roman forts is not yet clear today; if on one side the conditions of the buildings do not seem to allow a general framework for action aimed at the easy recovery of the remains, if aimed at an effective functional reuse, on the other side it seems in some respects incorrect and simplistic a future use as a mere "archaeological" site.

The only certainty is currently represented by the views perceived from afar, that the various complexes offer today: a series of non material images, due to non-availability of the complexes, and unfortunately "dangerously" similar to the images returned by electronic records.

This contribution comes from the organic collaboration of both authors at each end have agreed to assign, respectively, the points marked by asterisks, (*Mariella La Mantia, **Fabio Lanfranchi).
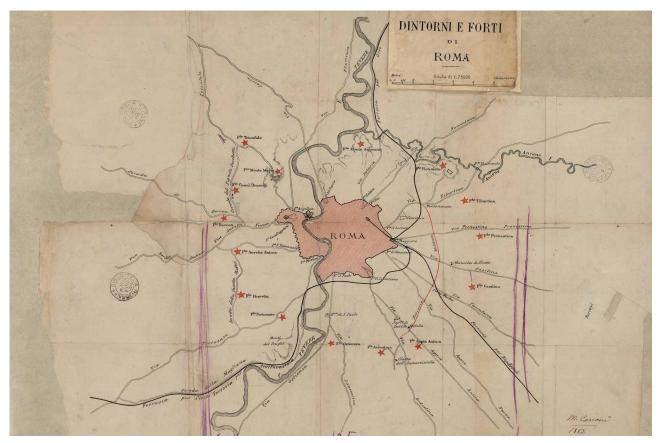
Fig.1: Map of Rome and its surroundings with an indication of the fort. Chromolithography. Roma, 1883. Source: Archivio Storico Capitolino, fondo Tomassetti.

	NAME	CONSTRUCTION PERIOD	COST OF CONSTRUCTION INCLUDING THE COSTS OF EXPROPRIATION (LIRE)	EXTENSION IN HECTARES
1	FORTE MONTE ANTENNE	1882-1891		2,5
2	FORTE PIETRALATA	1881-1885	1.592.854	25,4
3	FORTE TIBURTINA	1880-1884	1.347.999	23,8
4	FORTE PRENESTINO	1880-1884	1.293.400	13,4
5	FORTE CASILINO	1881-1882	1.281.070	3,8
6	FORTE APPIA ANTICA	1877-1880	1.041.413	16,5
7	FORTE ARDEATINA	1879-1882	1.032.444	
8	FORTE OSTIENSE	1882-1884	1.444.657	8,8
9	FORTE PORTUENSE	1877-1881	733.000	5,2
10	FORTE BRAVETTA	1877-1883	1.076.813	
11	FORTE AURELIA ANTICA	1877-1881	857.475	5,7
12	FORTE BOCCEA	1877-1881	860.000	7,3
13	FORTE BRASCHI	1877-1881		8,2
14	FORTE TRIONFALE	1882-1888	2.494.000	21
15	FORTE MONTE MARIO	1877-1882	1.376.740	8,4
16	BATTERIA APPIA PIGNATELLI	1883-1888	577.162	
17	BATTERIA PORTA FURBA	1883-1886	686.511	
18	BATTERIA NOMENTANA	1884-1890	831.158	

Fig.2: Overview of the Roman fortress system (development arch. Fabio Lanfranchi).

Fig.3: Top view of Forte Prenestino.
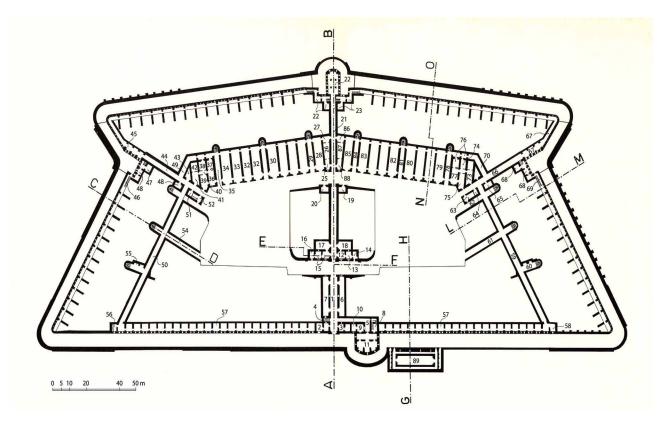
Fig.4: Forte Prenestino plant
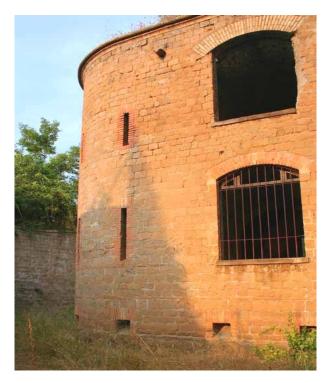
Fig.5: Forte Portuense, the caponier.

Fig.6: Forte Portuense, caponier and entrance.

Fig.7: Entrance to Forte Portuense.

Fig.8: Forte Portuense, details of a window.

Fig.9: Forte Portuense, vaulted ceiling.

Fig.10: Forte Portuense, vertical distribution (detail).

N.B. All the photographs of Forte Portuense were made by Antonello Anappo, Arvaliastoria.it.

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An integrated survey to digitally reconstruct the courtyard of villa Rufolo in Ravello: from *less* to *more*

Barbara MESSINA[1], Pierpaolo D'AGOSTINO[2], Maria Rosaria CUNDARI[3]
Department of Civil Engineering, Faculty of Engineering, University of Salerno, Italy
bmessina@unisa.it, pdagosti@unisa.it, mcundari@unisa.it

Abstract

New electronic survey technologies generate points clouds by recording multiple points on the surface to be surveyed; when manipulated by suitable software these points clouds can, by themselves, anticipate the shape of the surveyed architecture thanks to their greater or lesser density. The first automatic treatment of points clouds (mesh) helps to enhance comprehension of the spatial shape of the architecture and provides the observer with a viable reconstruction of the surfaces concerned. In both cases this involves automatic mathematical operations rather than actual architectural representations since there is no critical interpretation and discretisation by the operator. However these operations are the starting point for any scientific study which aims to reconstruct very complex architectural forms and how they have changed over the years.

This paper will present the intermediate results of an ongoing study on Villa Rufolo in Ravello, an excellent example of the Arab influence on architecture in Southern Italy. In particular, the paper will illustrate the study of the small courtyard with its colonnade of small, slender and graceful coupled columns supporting the intertwined arches clearly inspired by Islam. There's reason to believe that the courtyard was rebuilt after it was destroyed during the wars in the last century. Integrated survey and digital modelling techniques will be used to perform an in-depth analysis of the courtyard as it stands and also propose a figurative reconstruction of the elements in the courtyards, adding (+) – where only fragments remain – what is no longer visible (-).

Key works: Amalfi coast, 3D laser scanning, digital anastylosis, Islamic influences, geometric composition

1. Villa Rufolo: forms and geometries of a Mediterranean architecture between East and West[1]

If it's true, generally speaking, that architecture modifies nature by interacting and dialoguing with the context, 'built space' along the Amalfi Coast is an excellent example of the delicate relationship between man and the territory where he lives, where natural and anthropic space merges to create harmonious beauty. In actual fact it's a 'one of its kind' location with its own distinctive characteristics and features – in some cases recurrent, in others unique; together they help to create the identity of this part of the world. The Amalfi Coast is a cultural resource that should be protected and promoted in terms of knowledge, first and foremost formal knowledge and geometric configuration. Only then will we be able to enhance and disseminate information about our heritage as part of a gradual but crucial process of awareness and appropriation by the community which often lives with this heritage without understanding its deeper meaning. This is why it seems logical to identify its compositional rules through specific graphic studies of typical and therefore symbolic forms in order to understand the pure, invariant and recognisable essence of its geometric and structural genesis (quite apart from the configurative complexity of each form) and interpret them correctly.

The study presented here focuses on one of the most famous and important architectures along the Amalfi Coast – villa Rufolo in Ravello; an emblematic example of merger between architecture and landscape. If villas and their gardens normally reveal man's desire to rationally orchestrate and anthropise the landscape, this becomes even more obvious in villa Rufolo: the reciprocal harmonising effect created by the villa and gardens shows how an architectural concept can be turned into geometric measurements and forms. A stylish architecture with elegant geometries which together become extremely interesting, a design influenced by the landscape and the historical, social and artistic period in which it was designed and built.

During the Middle Ages Ravello became famous thanks to the Rufolo family's input into the shipping industry. At that time, the entire Mediterranean basin was in the throws of a cultural and commercial rebirth due to the presence of so many different civilisations – Latin, Greek, Hebrew and Muslim. The Arabs were particularly instrumental: the advance of Islamic populations from the East to north Africa and the lower reaches of western Europe changed the social composition of these occupied territories. The Arabs imposed their own religion and political and administrative set-up on these regions and imported completely new customs and traditions. However, the lack of rigid aesthetic and formal rules in the field of art and architecture allowed Islam to remain versatile and free to adapt to the diverse requests of local patrons. In fact the Arabs had no figurative codes of their own, so they absorbed those of the lands they conquered; this created an art which, albeit based on uniform principles and programmes, was imbued with local expertise and know-how. This social and cultural mix allowed very different artistic traditions to find common fertile ground, destined to further enhance the magnificent Islamic civilisation. The Moors were particularly adept at using several different forms, skilfully merge them and give them new expressive force.

Although the Arab presence in the Mediterranean, especially in southern Italy, was temporary and not as long-lasting as in other geographical areas, it did leave an enduring mark. In fact, the different artistic styles absorbed by the Arabs proves how their flexibility became a powerful source of expression. Never before had the arts of conquered populations so influenced the conquerors; by imposing no cultural dictates the Arabs succeeded in creating a universally accepted style that everyone could identify with.

The Arabs' influence on western culture naturally spilled over into the world of art and architecture. In Italy, as in almost all the rest of Europe, Moorish art wasn't limited to a single architectural complex, instead it spread far and wide, incorporated into architectural elements which often blended so perfectly with local

Fig. 1: Ravello, villa Rufolo. The dome of the entry tower shows various Islamic influences

cultures it was often difficult to consider them as foreign and not part of the local repertoire. This artistic heritage includes objects produced either in Arab-dominated Europe or imported from other countries, or forms invented thanks to a profound knowledge of Islam, in other words unconsciously interpreted by local craftsmen. In fact, in the regions occupied by the Arabs architectures were embellished with typical Islamic decorative and constructive elements. Elements that remained even when they were absorbed by western architectural styles: intertwined arches, ribbed vaults, mosaics and marble capitals with fretwork or stone grilles to embellish windows are merely the more obvious signs of an architectural style influenced by the Arabs; they are all, however, based on the geometrisation of forms inspired by specific religious ideologies rather than aesthetic research as an end in itself.

The construction of villa Rufolo coincided with this cultural historic period, a period towards the mid-thirteenth century - the heyday of trade and cultural exchanges between the Rufolo family and the Arab world and Mediterranean in general. Villa Rufolo is a superb example of medieval, Campania-style, Norman-Arab architecture: this perfect merger of western and eastern forms is truly amazing and breathtaking.

The villa is surrounded by a masonry wall and defended by two towers, one of which acts as the entrance. This is a typical architectural solution adopted by the Arab-Norman world, probably invented in Sicily but quickly adopted by local craftsmen in the Campania region. The towers, however, were far from being used merely for defence purposes; their formal and decorative embellishments were created using simple geometries and contrasting colours – grey tuff blocks, some shaped other regular - inserted into the bare masonry wall. Even the entrance hall of the villa, a square room open only on two sides, shows obvious traces of the style and culture of Moorish architecture: the two side walls are embellished with elegant grey tuff arches resting on twisted coupled marble columns, the first are pointed the others lobated. The arch pattern is repeated on the drum below the dome, with a nearly identical system: the small coupled columns, this time cylindrical, support a double system of superimposed and intertwined grey tuff ogee arches. Grey tuff is also used to emphasise several horizontal sections of the vaulted system when the decoration changes significantly: a cylindrical ring marks the impost of the dome, a sort of 'umbrella' where the decorative embellishments of the surface are created by chromatic as well as formal variations: yellow, red and grey sections alternate in a rhythmic sequence that induces the eye to roam.

Fig. 2: Ravello, villa Rufolo. The dome of the "Arab bath", conceptually similar to that of the entry tower

The unique spatial design of the dome above the hall is an absolutely novel design concept: instead of the more or less complex vaulted structures found in private buildings along the Coast – all ascribable to typical Italian architectural forms – here the formal solution tends towards a decidedly geometric approach: geometry is used not only for the structural elements but also for the aesthetics of the designed forms. In fact the dome is geometrically similar to a solid of revolution, but with a sculpted intrados and it is this sculpted intrados with its natural forms that expresses a spatial logic and absolutely inflexible compositional rules. Nature used as inspiration, nature that provides endless methodological and formal solutions which in turn inspire the genesis and beauty of those forms based on specific geometric principles. In fact the dome is visually comparable to a discontinuous shell; its surfaces are generated by the homothetic variation of the equatorial horizontal section, a thirty-two point star, according to the law imposed by the curve of the dome.

A similar system is proposed, albeit on a smaller scale, for the dome of the so-called "Arab bath" in villa Rufolo; however the decorative elegance and workmanship are slightly less striking. In fact, while the dome of the hall marked the entrance to the villa and was therefore a public area, the Arab bath was a private, family area that didn't need to be so lavish because no-one but the family would have used it. The small rectangular room, approximately 4.20 x 3.20m is completely sealed off except for a small door and two embrasures along the south side. The interior is very bare: there are no intertwined arches on the walls which instead in the hall continue up to the dome. However the dome of the Arab bath is designed using the same morphological criteria; it rests on a horizontal section similar to a thirty-two point star, albeit slightly smaller, and has small but important differences compared to the one in the hall. Here, for example, the discontinuous sections are red and yellow and, as interpreted by Caskey, reveal a slight rotation, almost as if they were twisted around the axis of the surface [2]. This theory isn't entirely convincing; an on-site inspection revealed that the movement of the lines of the dividers at the intrados of the dome appear to be the result of an imperfect finishing of the surfaces. However it's interesting to note that the two domes, even when compared to similar domes found in the nearby town of Scala, are not an identical replica of a stereotype. All the domes are different, even in the same building: the proportions, the surface of the intrados, the materials and colours – everything is different. These differences were used not only to characterise each house according to the owner's rank and social position, but also to characterise each room in the house. Varying the ornamentation was a way to design a house as an ensemble of different spaces which often played a very specific role.
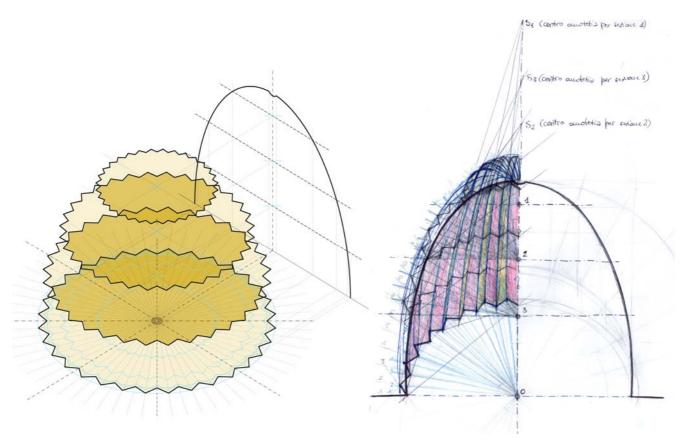
Fig. 3: Axonometrical projection of horizontal sections and sketch of its sculptural intrados

Another exquisite element testifying to the influence of Islam is the courtyard of the villa. In fact despite the many changes it underwent in later centuries it has maintained the amazing configurative and ornamental elegance created by the merger of different cultures. The grey tuff arches of the upper order resting on slender marble columns are intertwined like delicate lace; below, ten columns support the lower order of pointed arches. The natural motifs embellishing the intertwined arches clearly recall the different styles of the Islamic repertoire, as do the graceful movement of the lines of the decoration. The upward thrust of the arches of the loggia are interrupted by a horizontal grey tuff strip supporting the slender terracotta twisted columns which in turn support another order of small arches with natural motifs.

Everything in villa Rufolo, from the vaulted surfaces to the simple flat ornamental decorations, betrays a natural penchant for an eclectic style which we should consider the artistic embodiment of the ethnic and cultural diversity of the Amalfi Coast: a world suspended between the West and the East in which geometry is physically expressed in a unique style – literally a Mediterranean style – with dynamic, outstanding decorations based on the formal beauty of strict generative geometry rather than expressive figuration. For all the above-mentioned reasons, the use of geometry - from the geometry governing volumes to the flat geometry that inspires decorative design - has become the leitmotiv of this presentation which will focus on the most representative parts of villa Rufolo to try and reveal the pure essence of such a complex architecture. Based on the digital acquisition of metric data - suitably interpreted and reciprocally integrated with other kinds of information - and the reconstruction of the geometry and composition of the structures using digital modelling, we intend to propose a figurative reconstruction of the now fragmented spaces by recreating its original spatiality using infographic representation.

2. The digital survey of the courtyard of villa Rufolo: our experience[3]

In the past few decades electronics and computer technology have helped to gradually develop new measuring techniques in the field of architectural survey. To be precise, electronics and computer science have not only helped to improve topographic and photogrammetric techniques, they have also assisted in developing new tools – such as laser scanners – and in fact today we talk of electronic survey. As a result, we now combine traditional techniques and measuring procedures (direct, topographic and photogrammetric methods) with electronic surveys, in particular scansions. Each technique has its own specific features and procedures; very seldom will just one of these techniques fulfil the multiple requirements intrinsic in the geometric measurement of a building. For example, photogrammetry has to deal with the problem of "gaps" (i.e., the parts the camera doesn't see), a problem common also to electronic scanners (parts not touched by the electromagnetic waves emitted by the sensor). These and other problems associated with survey can be solved by combining all the techniques and procedures associated with each technique; one excellent example is photographic rectification compared to photogrammetric restitution.

Based on these preliminary considerations a study is currently underway to establish the possible criteria and procedures required to combine all these architectural survey and study techniques, for example in the case in question: the courtyard of Villa Rufolo in Ravello. We will report here on progress which has so far focused primarily on experimentation with the most innovative technique: electronic survey.

No matter which technique is adopted, reliable measurements have always been a problem during survey. Clearly, the problem is even more important when indirect measurement tools are used, for example photogrammetry: we are all aware of the interpretative nature of any photograph taken during photogrammetry (and the effects caused by materials and the light). This "filter" has been studied for years and has helped to gradually improve the photographic technique and the way it's used. In fact, nowadays we have almost complete control over this technique and therefore obtain reliable measurements. No similar studies have been carried out on electronic survey, at least on the applications used in the field of architecture and, as far as we know, no information has been published in specialised literature. We consider that this is still an experimental field in which many reliable and committed initiatives are undertaken, but one in which misunderstandings often arise between *surveying* (taking measurements) and *survey* (critical restitution of the measurement), between measurement and critical interpretation. Almost as if to imply – incorrectly – that survey is still merely measurement, in other words an updated technological version of measurement using electronic scansion and visualisation of the ensuing points cloud. We shouldn't forget that the points cloud is not the real survey of the scanned object: what we see are just forms because the points cloud still has to be elaborated, and the problems associated with the first readings must be considered during the survey and measurement stage.

In this paper we will examine the various electronic survey stages carried out using a 3D scanner in Villa Rufolo. We will start with the preparation which considered three specific aspects: the *position of the station*, the *resolution of the points*, the *shadow areas*.
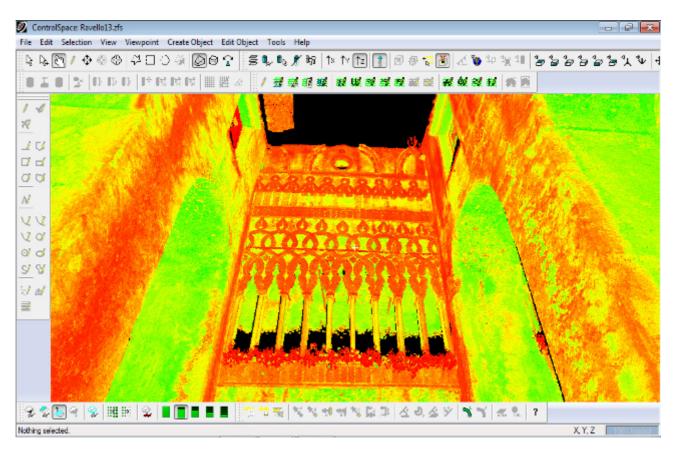
Fig. 4: View of the scansion, station shooting inside the cloister

When *positioning the instrument* we have to remember that a scanner exploits the principle of polar measurement; the direction of the beam (for the motorisation of the instrument) varies on both the horizontal and vertical plane; if we consider the instrument as the centre of a (theoretical) sphere, the beam will create a grid of meridians and parallels on the spherical surface; the extent of the grid will usually range between a -45° angle compared to the horizon and its zenith. Clearly the grid on the spherical surface will be more or less dense depending on the density (or resolution) of the beams; furthermore, considering that in the real world the instrument records surfaces that are very different from the hypothetical sphere, it's obvious that the instrument has to be positioned correctly. Depending on the laser scanner, the emitting cell either rotates and changes the direction of the beam, or the latter is steered by a moveable mirror; in both cases, we can consider that the lateral oscillation of the beam remains constant, while its direction varies on the horizontal plane from -45° to the zenith. It's clear that the closer we get to the upper limit, the denser the points. In this case we had to consider the reduced work space because the courtyard has more than one floor.

The *density* (or resolution) of the points varies according to the distance between the surface and the point where the beams are emitted; in most cases, the ensuing grid on the theoretical spherical surface twists and adheres to the examined surface.

Of course it's possible to calculate how many points will be recorded based on the density/resolution chosen and the angles of the explored field (on the horizontal and vertical plane); the reason why it's possible and not certain depends on the fact that the instrument emits a certain number of impulses corresponding to the envisaged density, but not all impulses provide the same answer; the impulses hit the nearest surfaces and generate a points cloud; there will be no response, for example from the impulses emitted skywards. In Villa Rufolo we used a ZF 5006 image laser scanner with a medium-intensity density and high acquisition of points.

The third aspect to consider are the *shadow areas* or *gaps*; they can occur for two reasons: strong contrast in the light or other objects located along the scansion trajectory. Regarding the former, electronic scansions are best performed with diffuse light (cloudy sky) so that the "response" of the materials is as comparable as possible; with regard to the latter, it's possible that another object (a tree, a person) is located between the scanner and the surface to be surveyed, or that something sticking out from the object hides the part next to it. In both cases the points cloud will have gaps which will have to be filled by taking more scansions or using as

Fig. 5: Recognition which points in the points cloud corresponded to the same points in the topographic network

mentioned earlier, an architectural survey is rarely based on just one scansion; since multiple scansions are almost always required, we need to organise a network of points (recognisable in the scansions) that can be topographically measured and used to recreate the different clouds. For the courtyard we used a network of topographic points which was later used as a basis to unite the points cloud and fill the gaps using dedicated software that recognised which points in the points cloud corresponded to the same points in the topographic network. This stage is still ongoing.

In fact in some cases it's possible to identify the same elements in different scansions and reassemble them. Instead, the scansion of smooth plastered surfaces requires *targets* to be applied in advance. As far as architectural survey is concerned, this technique still presents three major problems which have yet to be properly researched and solved:

a – the effects produced by the type of response provided by the intercepted point according to the density of the material;

b – the distortion caused by the forms (corners, acute angles and rolling surfaces);

c – critical reduction of the number of signals recorded.

Let's take the first problem. We know that architectural surfaces are made of many different kinds of material – more or less compact stone, plaster, face brick, marble cladding, etc. – and that these surfaces can be treated in various ways (extremely smooth and polished, coarse, rough or uneven); the reaction of a rough stone surface will differ from that of a well-polished or plastered surface. Different surfaces provide different responses and create natural dissimilarities. Official literature doesn't seem to have studied this aspect sufficiently, so although it's true that these are novel problems within the field of architectural survey and that technological research will certainly contribute to minimising the problem, the key issue still remains: these instruments require new professional skills. However, we must bear in mind that one scansion is often not enough to record the overall model of the surveyed object: several scansions will have to be taken in different directions in order to cover all the surfaces and acquire uniform resolution; multiple scansions are a problem that should be solved during the preliminary project (for example in photogrammetry). Other issues (as mentioned earlier) include:

- measurement and correlation of the points from which the shots are taken;

- topographic measurement of a sufficient number of points on the scanned surfaces in order to successfully link the different clouds.
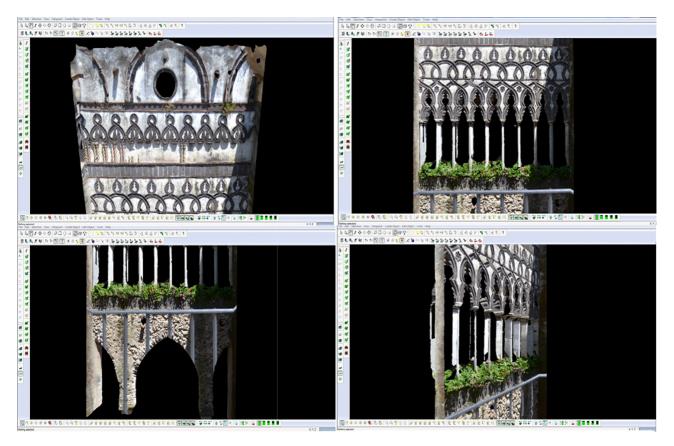
Fig. 6: Views of the photograpic image applied to the cloud of points – mesh

It's true, however, that we can directly link several points (at least five) if they are accurately identified in each area where the two clouds overlap; nevertheless, it's best to have a network of control points (measured topographically) regardless of the electronically recorded clouds.

Laser scanners are currently produced with internal devices that survey points similar to the ones recorded by a total station and, as a result, are also capable of recording single points.

However, although the topographic measurement of a network of control points makes it possible to direct and correctly assemble more than one cloud, it's also possible that one or more of the measured points are illegible in the decimated clouds. Vice versa, laser scanners with accurate gauges do present risks: if the instrument is not properly calibrated this will affect the recording of the cloud and each point.

Many laser scanners allow the operator to photographically record the scanned surfaces at the same time; this helps in the analysis of the points cloud.

We shouldn't forget that it's very difficult to repeat a scansion. In fact, a scansion is a bundle of beams emitted by a source whose position in space has to be accurately prepared. It also depends on the initial direction of the instrument (very difficult to repeat) and the density of the scansion. Nor can we solve the problem by applying *targets* to the surface to be scanned, they will be useful when we merge the two points clouds, but they can't guarantee that the beams hit the same points in both scansions. So we have to conclude that each scansion is an *unicum* with its own "genetic heritage" based first and foremost on the effects of the density used in the scansion.

This is the starting point we must use to try and find a procedure that can unite all the information required to fully understand the object in question and compare the results of more than one kind of survey technique. This comparison is successful when the results produced, for example, using the photogrammetric technique, are perfectly in line and correspond to the results of the electronic scansion. As mentioned earlier, during the study of the courtyard in Ravello we combined the digitally surveyed points cloud with the results of a direct and topographic survey as well as with the superimposition of the photographic image on the suitably elaborated points cloud (not to be considered as texturing).

Once we obtained the digital scansions of the courtyard of Villa Rufolo, we worked on the points cloud; since they were very dense we asked ourselves which was the best way to proceed: either to break the cloud up into several parts and elaborate each part separately, or proceed to "decimate" the cloud. The latter can be performed either using the criteria provided by the operator (perhaps based on a comparison with the

photographic documents to avoid eliminating points that correspond to important elements of the scanned surface) or using software that performs the same operation automatically.

A decision was taken to use automatic decimation to elaborate the scansion, apply the photographic image and obtain an initial result: this allowed us to focus only on the decorated part of the courtyard. Decimating the cloud produced a grid, albeit not very dense, which we used to define the mesh surface to which we then applied the photographic image we had obtained separately using the laser scanner (high resolution image). Similar points were identified without using targets but simply by letting the software recognise the RGB points nearest to the point chosen on the photograph and then again on the points cloud. The first results, albeit partial and therefore not conclusive, are however already very satisfactory. Experimentation is now focusing on the geometric forms used for the small coupled columns (once the gaps have been filled) in order to create a three-dimensional model similar to the real one, if not exactly the same. These experiments are part of an attempt to propose the figurative reconstruction of the elements in the courtyard, adding (+) – where only fragments remain – what is no longer visible (-).

3. Toward a total digital fruition of architectural heritage[2]

Cultural heritage, as we all know, is nothing new. However, not long ago architectural or cultural heritage in general could be enjoyed only by visiting the site itself; only then was it possible to see it firsthand and learn more about it. When people began to appreciate the diversity and beauty present in the world, they also realised how difficult it was to access these sites. This inspired change: the visitor no longer went to the site, the site came to him. To satisfy peoples' desire to "see" what the world had to offer in places far away from their own cultural and geographical borders, paintings, topographical surveys, architectural surveys and written descriptions began to be produced and circulated far and wide; it was a way to convey the impressions of those who were lucky enough to have travelled there. The trend that started in the eighteenth century with the advent of the Grand Tour is still ongoing. These paintings, surveys and reports were nothing but an *ante litteram* database of heritage information for those who wanted to know more. Whether it was either for entertainment or scientific purposes, the data played a key role in scientific research: technically and architecturally speaking it led to improvements in the reproduction of the asset and its forms, in other words in the objective acquisition of its geometries, tectonic and material characteristics and, as a result, building techniques – all elements crucial to the survey of buildings and the landscape.

Exhibition material and cultural information has always been part of a visit to an artistic or architectural site. People's desire to learn about cultural heritage has grown over the years; in the twentieth century not only has our approach to a cultural asset evolved enormously, so has its presentation. There are many different ways and methods to present information, for example about architectural heritage. Apart from the purpose for which they are used, these methods depend on the final user's level of culture as well as on the power of the tools available. Each one (heritage photographs, elaboration of graphic models to provide a gradually more discreet and symbolic description) has its own intrinsic difficulties associated either with the support needed to represent it, or the experience required to interpret the information provided.

I will focus here on the presentation of heritage information after a well-designed and executed survey. Technology used in the field of Cultural Heritage, specifically in the study of cultural and architectural heritage, has established and is establishing scientific research paradigms; it requires the constant use of several instrumental methodologies and the conceptual sharing of the procedures involved. This gradual stabilisation of the elaboration stages is not, however, slavishly followed by the presentation and public fruition of the results. In practice, we are still waiting for convergence (to be more precise, "standardisation") between the material/information produce by Cultural Heritage and the chance to use it.

Today several models can be used, improved and turned into applications. First and foremost, immersive photography: this is the most immediate tool and represents the natural evolution of the visual impact of an architectural heritage or landscape when reproduced by a camera. What we did for decades, i.e., show the heritage we wanted to study or visit, can now be enhanced by the dynamism of panoramic visualisation. Spherical projection of an anthropic or natural environment allows us to involve the user who can virtually experience a heritage, even if it's very far away; this also allows him to avoid the intellectual effort which is sometimes necessary to recreate a single shot (not always a positive experience!).

Immersive photography is a relatively simple technique that can be digitally enjoyed; it's become a perfect alternative to different kinds of virtual or mixed reality. Although the latter play a role in culturally conveying heritage, they still remain marginal due to the computational burden and economics associated with the use of physical devices. Furthermore, as regards mixed realities, where georeferenced virtual models are made to interact in real contexts, the problems associated with the above-mentioned limits of use are compounded by the possibility of digitally exploiting three-dimensional models. Using 3D models to represent built heritage has always helped to formally convey architectural works, their current state and past configurations.

However, apart from very special cases, interaction is not moving in the direction of digital sharing; this is due to problems involving the reduction required by models as well as their material rigidity.

Although digital mediums are used to convey three-dimensional models (even though the latter are also the result of a survey), in the digital world there are not enough platforms capable of generating an interface suited to these representations. This is the reason for the delay in exhibiting the graphic results of orthogonal projections – more flexible in forms of multimedia sharing and less burdensome from a graphic and computational point of view. Only recently have digital three-dimensional models and elaborations become more widespread, however very rarely is the definition of detail in line with the restitution scale considered to be the most suitable. In most cases these models remain part of specific projects and sometimes only involve part of a bigger object that cannot be fully represented. This hampers one's understanding of the heritage in question because it's increasingly difficult for people to understand the information provided when the representation becomes more and more abstract – from photorealism to the graphic and then conceptual model. Information about cultural heritage differs depending on the target audience. Now, as in the past, each user, with his own level of culture and diverse intents, will interpret a heritage differently. However, if in the past different presentations and elaborations were used for different users, large-scale computer technology is slowly changing this penchant for differentiation. The current trend involves proposing one way in which users can view and enjoy cultural heritage. Although it's wrong to talk of simplification, we mustn't underestimate the fact that some computer technologies are still in the pioneering stage, so much so we can't really consider them fully-fledged methodological tools ready for widespread use, but merely young chicks about to hatch.

Apart from the computational difficulties involved in representing geometries and related information, the way in which we will be able to enjoy cultural heritage in the future depends on interaction between the heritage and the information provided; in turn this depends on the dynamic use of representation. Conceptually speaking, the ensuing semantic distortion is enormous. If in the past there were specific, differentiated moments (and know-how) that provided different in-depth information about the heritage, this limit will soon be history. On the one hand, interacting with the heritage and related information involves having a container in which every semantic element (textual, technographic, photographic, photorealistic, etc.) is simultaneously present and can be enjoyed either alone or with others; on the other, it means that the precision we hope will be used to build the digital graphic project will not use traditional graphic supports and therefore eliminate their spatial and temporal limits. Furthermore, every element or part of the heritage could represent a container in a bigger, open, flexible and multi-scalar database

Hopefully this convergence will one day be achieved; we will then be able to talk of digital fruition of architectural or artistic heritage. It will be a successful promotional tool especially for morphologically complex and culturally varied systems, for example for the heritage described in this paper: the Amalfi Coast - a crucible of culture and workshop of multimedia infographic experimentation. The many ways in which we can use a digital (and also virtual) environment to describe and improve the fruition of cultural heritage and its management means we will soon be able to talk about "culturally smart cities", new worlds and new ways to use cultural objects by creating real, virtual and immersive environments in which the cognisant components of each element are expressed using the tools and platform provided by the world of ICT. By exploiting communication infrastructures that use state-of-the-art advanced digital technologies, we will be able to view graphic and digital models of architectures on mobile and portable devices and combine them with avant-garde services and applications.

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Water-ways from Naples to Miseno

Maria Ines PASCARIELLO,[1] **Maria Rosaria TRINCONE**[2]
[1] Faculty of Engineering, University of Naples, Naples, Italy
mipascar@unina.it
[2] ITI Marie Curie, Naples, Italy
trincone@tin.it

Abstract
Over time, the water-ways that lead from Naples to Miseno have mapped out the area and changed the lines of its appearance. They have shaped the landscape and developed intertwining networks across it, both above and below ground. At times these are visible, at times submerged. Here they are natural; there they are the result of human intervention. They are the signs of long-term phenomena, of large environmental and territorial transformations which have characterised the different interaction between man and landscape. In this perspective it is evident that integration of knowledge and an interdisciplinary approach to actions is all the more necessary.
Analysis and reconstruction of the water-ways that lead from Naples to Miseno, a special section of our urban landscape, are the subject of research work that aims to identify and develop the qualitative relationship with the places where we live, woven into history and technique and unavoidably linked to the sea. The investigation route follows the traces of these ways from the city to the surrounding areas, filling in gaps and making hypotheses where traces have been lost. It focuses on defined architectural and archaeological points (such as springs and reservoirs), on the network elements, the aqueducts, and goes up the coast to the ports of Baia and Miseno, and the seabed.
At the same time, analysis conducted on representative artifacts of archaeological sites in the Phlegraean area and on sunken tracks (both underground and under the sea) can be identified as parametric and, as a result of media mapping and thematic and dynamic support, representations of the region's archaeological potential take shape that allow us to understand and plan for intervention work and land transformation.

Keywords: water-ways, survey, representation, database

1. The region (Maria Ines PASCARIELLO)

Water, an indicator of life. A resource to be found in the most remote corners of the earth. "Humile et pretiosa et casta" water.
It has always been the subject of poetry, music and literature.
Throughout the ages it has played a leading role in architecture, which it is closely linked to for functional and aesthetic reasons. It has been a key figure in defining the region and changing its linear appearance. It has shaped the landscape and developed an intertwining network across this, which runs both above and below ground, is sometimes visible and sometimes submerged, sometimes natural and sometimes the work of man.
Eternal, deep, and essential – the bond between water and the region contains and, at times, manifests the deepest reasons behind settlements, urbanisation, the economy and life.
The subject of ongoing research work carried out in the region, the analysis and reconstruction of the water-ways that cross Naples and branch out into the region of the Phlegraean Fields (mapping out an important
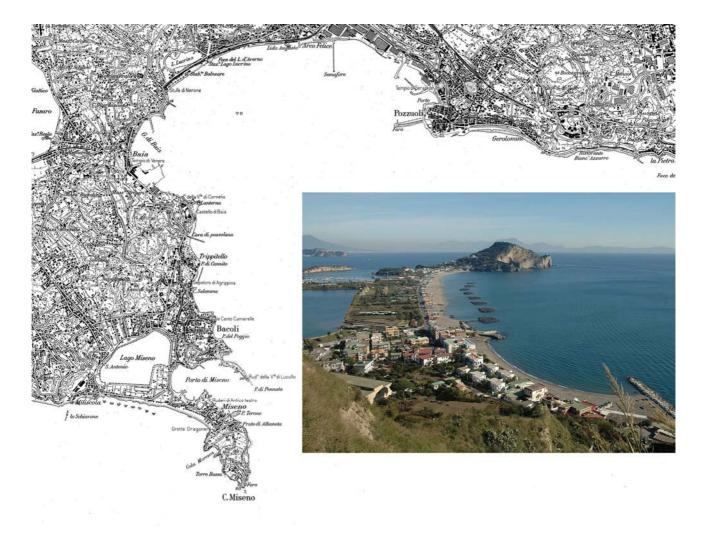
stretch of our urban landscape) aim to highlight the qualitative relationship with the places where we live, which are interwoven with history and technique.

Water-ways can be traced in the subsoil, but the signs and tracks are also signposted above the urban surface. Architecture and sculpture define and map out water points with fountains, which dot the entire urban area and form junctions for water-ways. Using these water points, it is therefore possible to trace the underground route of the water-way to the springs and the reservoirs, with a meta-temporal path that connects the urban centre with the Phlegraean area and Baia, Bacoli and Miseno, where historical eras intertwine and overlap, taking us back to the origins and foundation of the city.

What the investigation reveals is a sample area in the Mediterranean basin which represents the local culture of Magna Graecia and is of great archaeological and architectural potential. A symbol and type of Mediterranean cities (those directly created out of the Greek and Roman Civilisation, with their unique form of rationality and with aesthetic values that over time have become ideals shared by Western culture) the architectural features represent a permanency, a constant in an ever-changing context that subjects the architectural features of every city to a progressive change.

Pict. 1: Example of tracking of the region object of study (the bay of Pozzuoli).
The software we are experiencing, allows to connect to any plan data relating with photos, drawings, numerical information, etc. (In the picture, for example, the plan was attached an image).

1.1 Lines, networks and points

In a multi-centric, network-based vision of the space surrounding us (where individual identities constitute an amazing resource for learning about the region), surveying and drafting enable us to describe an urban landscape that, crossed by water, is often unable to see continuity between full and empty, between under and above, between inside and outside. Architecture becomes a vessel for water and the water, in turn, brings it to life. The engineer becomes the technician and the water becomes the governing fabric of the region.

In a reading of the urban area, differences emerge in habitats and in the ways we live in a region; different ecologies map out a network of urban and social geographies with specific macro and micro scale identities. An "established" city exists, or rather the historical city that continues to persist in the layout, architecture and shapes. The "sea" town exists, the "linear" town made up of crossing paths, connecting lines, borders, profiles and edges.

A reading of the Neapolitan region, as a collection of specific identities, has involved the micro-scale in this work. The micro-scale is to be seen as the local neighbourhood (a centre of life and expression of the society that calls for the reconfiguration of urban liveability) and also small-scale architecture, the architectural detail, which makes the difference in the identification of quality. Study and survey data collection aims to understand the city and outline its cultural and social identities, according to the rationale of belonging to a place and the recognition of a precise urban centrality.

The region around Naples is complex and the multiple parts that compose it and describe its essence manifest this complexity; the interior of the city, meanwhile, seems to be made up of multiple, distinct potentialities. This approach, which seeks to combine concrete experience (or rather reality) with vision, finds its synthesis in the creation of a possible observation of the city, in the translation of that which, in the making, should be or we would like to be our city. The privileged object of this vision is architecture, which is represented through images and designs that convey the essence of the city without having to draw the whole every time, in every fragment. With design, the context can be understood and situations can be communicated. We are able to make a critical reflection on the things that came before use. Using survey we are able to face things with *modus*: what arises is a way of being in reality with moderation, expressing the need to give shape to a complex spatiality according to a linguistic code that studies the substance of architecture.

Of course, the representation space still remains forever an artificial space that overshadows but does not entirely embrace reality. Points, lines and planes are abstract entities of space that, through geometric language, are transferred in formal units commonly known by the name of pictures. Yet right in the space instantly stopped by drafting, points, lines and planes are released from their positional value and acquire relational value and - investigated in their reciprocal relations, evaluated in their dynamic equilibrium and used in the proper degree of belonging to the visual system - are reorganised in a new and original image: the water-way.
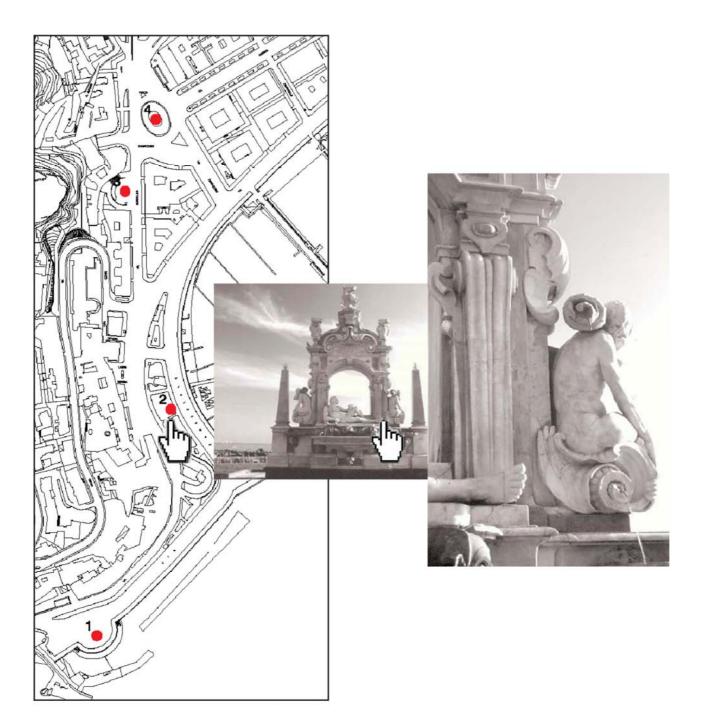
2. Water tracks (Maria Rosaria TRINCONE)

«Places have a meaning for us as they are tied to sensations and images that bring them to life and that are 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 essential sentiment, takes control. Puddles, ruins, fragments of the world, places that are not necessarily noble are the sense of being.» [1]

Everyone can identify with a place established in terms of elementary organizational patterns of topological type, which enables us to read and reread certain spaces of reference according to the concept of figuration. Everything that is objectively concrete has that property, determined by the "shape, colour or disposition that facilitate the formation of vividly identified, powerfully structured and highly functional environmental images. It could be called readability or perhaps visibility in a wider sense where objects can not only be seen but are also acutely and intensely presented to the senses". [3] retracing past events in the memory, simply because they acknowledged both the practical and emotional meaning of an architectural object and its function within the "existential space". [2]

In this way, a structure is The city therefore becomes the appointed place for this sensory experience, rendering tangible its 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 the recognition of those meanings which are potentially present in the structure of the urban environment.
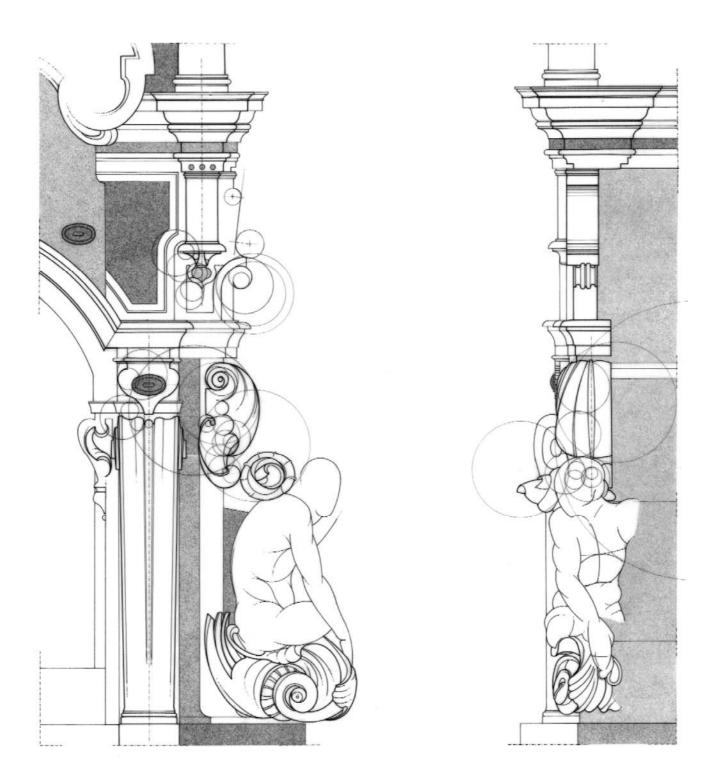
Pict. 2: Database example: by clicking on a placeholder, the image appears on the artifact concerned, then again by clicking on a portion of the image will open a zoom to detail. (The tab, shown in picture 2, of the database was developed by Maria Rosaria Trincone).

Location of water tracks (Layer 1 – Water tracks: the fountains in the center of Naples):
1. *Fontana Fonseca or del Sebeto*, Cosimo and Carlo Fanzago, Salomone Rapi, 1635;
2. *Fontana del Marinaretto*, (or *del Pescatoriello*), Raffaele Marino, XX sec.;
3. *Fontana del Mergoglino*, *del Leone*, unknown author, XVIII sec.;
4. *Fontana della Sirena*, Onofrio Buccino, XIX sec.

Pict. 3: Finally, the next step allows to connect to each element, selected while browsing through the database, designs and drawings produced by the survey of each objects under study. (The survey and the drawings have been performed by Maria Rosaria Trincone).

The streets, squares, urban voids (which can be recognised by the wealth of their symbolic values, activities or functions) relate qualitatively with the constructed in a bi-unique manner, despite having have constructive and formal characters, independent from the shape, type and characteristics of the buildings that define them. The square, which by its spatial connotation meets the community's need to have a place in which public and private activities can be carried out, is the place where events and architecture face each other in a very strong manner. More than any other urban space, the void-square qualifies as a place of excellence because it relates to everything through a representative image in which the monuments and civil and religious buildings have determined its image "soaked with memories and meanings". [3] Unfortunately and ruthlessly, the variable of time modifies the signs of shape. Squares, building and streets become fragments of different tales. It is as if the relationship between architectural space and space of existence which the city has had since the act of its foundation is lost. [4] With its geometric centres of mass and symbolic fulcrums as archetypal and psychological references fundamental to man, the matrix of the ancient city fades with the passing of time, eliminating those elements that render it recognisable.

The perception of the existential space, seen as a sequence of images from the same narrative, is however unrelated to the variable of time. Its memory cannot be lost because even the critical reading of urban fragments (like a public fountain, a façade, a part of a street) reminds us of it. It is possible to grasp its configurative complexity by interpreting the fact in itself, crossing the material limit of the object itself to build a conceptual reference grid where each characteristic element of the place can be inserted. A conceptual operation which, only by observing the phenomenon and "the places where conflict hides", [5] is it possible to reconstruct the system that helps us understand the architectural object. Measure and design are necessary aspects in the re-appropriation of the meaning of place as a space for time stratifications, flowing ruthlessly and determining the fragility of things. Withdrawing time from representation, recovering the corresponding image of the historic memory through the passage of lines and surfaces in the dimension of design, is not the nostalgic vision of past reality, but the true perception of the sense of being part of time.

In this way it is possible to take possession of the city by exploring it in the dimensions of the drawing. Through the logical consequence of geometric-descriptive methods, it gives the image of the space the ability to evoke perceptual relationships that settle between the observer and the observed. Graphical drafting becomes the dialogue between the parts in this relationship which, through the symbolic code of graphic signs, builds the concrete structure of the architectural spaces. The design, therefore, will no longer be seen as intellectual opportunity, but the opportunity to preserve the memory of places, with hypothetical forms that develop the ability to distinguish those spatial configurations erased by time and transformed into fragments.

3. Considerations and aims (Maria Ines PASCARIELLO)

Research ideas concern the problems connected to the acquisition and processing of data in drafting the region and the environment. Morphology, in particular, is investigated through architectural and archaeological emergencies following survey practices and methods, including photogrammetry, laser scanning, remote sensing (including under water), digital and thematic mapping, and the development of graphical models.

Furthermore, if the aim of analysis and development work is the respect of local identities, guaranteeing a better quality of life, this needs to be directed not only at the emergency issues but also towards less well-known buildings, those which perhaps are more at *risk* and which have undoubtedly maintained a closer relationship with the original social and cultural context. This can be facilitated by direct involvement by local people and the cultural associations which have a socially active part in the project.

A special role will therefore be given to awareness raising among all social strata of the population, to promote the fact that conservation and development of archaeological heritage helps enrich everybody's existence. This will be followed up with field documentary work which collects and summarises results from the research work and spreads the content in scientific terms.

The need for analysis that is designed to provide a sharable system of knowledge is to be carried out through targeted observation of the architectural and archaeological heritage, the result of the need to preserve the cultural heritage by proposing a precise monitoring methodology.

One possible line of direction is to work in accordance with the one individual rationale that, at the same time, considers the typical approach of the surveyor, with urban and environmental analysis, and those who decide and those who carry out the work in sync.

This way, the data collector becomes the interpreter of a tool and the populariser of a methodology which does not exclusively aim to describe and represent the actual conservation state of the analysed environment, but aims to bring out the priorities of the work in a general programme for regional planning and redevelopment.

Starting with an analysis of the individual architectural property, and reaching the region, the aim is to propose an investigative approach which makes it possible to carry out instrumental analysis and data collection, which can be updated over time compared to coded assessments. The tool aims to define a classification system with which to monitor the state of preservation and vulnerability; both the factors responsible for the deterioration of property and the hazard and risk areas. The investigative approach will aim to provide themed documentation in which to present an area, as a physical entity, morphologically defined in relation to its social and economic essence.

Creating an alpha-numerical language with which data becomes code, and code becomes graphical sign, will therefore respond to the aim of providing the necessary data for defining the values that characterise the property under analysis.

It is hoped that the research activity carried out by the unit will lead (through a completed study of a sample area) to the creation of a disciplinary methodology, structured on its own methods of investigation and clear aims, which can define the renewal of field intervention procedures in the area of protection and development. Archaeological emergencies, therefore, seen as structural elements of the landscape, will be studied and analysed in architectural, archaeological, geophysical and touristic terms, which together contribute to the planning of regional development, its transformation, use and development.

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Study of efficiency for heritage documentation from image and range-based information. Case study: San Martín Church, Segovia[1].

Juan José FERNÁNDEZ[1], Jesús SAN JOSÉ, José MARTINEZ, Luis Antonio GARCÍA, David MARCOS, Jorge GARCÍA.

[1]Laboratory of Architectural Photogrammetry, H.T. College of Architecture, University of Valladolid, Spain[2]. E-mails: juanjo@ega.uva.es, jesussanjose@telefonica.net, jmr@ega.uva.es, toniarts@gmail.com, davmarcos.vll@gmail.com, jorge.garcia.fernandez@uva.es

Abstract

The study of efficiency to document Cultural Heritage aims to develop a management strategy where new technologies and current dissemination strategies melt unequivocally, with maximum performance.
The plurality of emerging techniques for documenting tangible heritage sometimes mistakes their proper selection, so this comparison is articulated in three blocks. The first one refers to **Data Capture** from different technique and technologies:

1. Terrestrial Photogrammetry Documentation form HD cameras using Dense Stereo Matching algorithms (image based information)
2. Terrestrial Laser Scanner captures. Equipment: Faro Photon80 (range based information)

Second and third block deal with **Data Processing** (1), obtaining a dense point cloud and a mesh with and without color, and the **Geometric Comparison Process** (2), taking into account economic costs and investment of time for each product.

The efficiency evaluation of the "Dense Stereo Matching" photogrammetric technique will result in it being considered a feasible and competitive alternative for studying and documenting Architectural Heritage in Urban spaces. The evaluation also aims to check the capacity of this technique to substitute or complement other non-contact digitalization techniques like Laser Scanner.

This paper pretend evaluate the efficiency of the "*Dense Stereo Matching*" photogrammetric technique to document Architectural Heritage in Urban space, with the next specific aims:

1. Set the conceptual and methodological basis of the "Dense Stereo Matching" photogrammetric documentation technique as opposed to those of the 3D Laser Scanner.
2. Compare the data obtained from the "*Dense Stereo Matching*" photogrammetric technique with that from the 3D Laser Scanner.
3. Evaluate the efficiency of the "*Dense Stereo Matching*" technique.

Keywords: Photogrammetry, Cultural Heritage, Sensors, Dense Stereo Matching, Virtual Reconstruction.

1. Introduction

The tangible cultural heritage documentation has two main objectives: setting a documentary basis for Architectural/Urban intervention and as a spreading tool for heritage (also as a conservation tool).

The intervention process of a building or a building ensemble with heritage value must be carried out very carefully. The process is hard not only when the building is a declared monument, but also when it has inherent values related to the historical memory of the region or special typological features that are worth taking into account.

The spreading process is one of the most useful ways to protect and preserve Architectural Heritage in Urban space. The process helps people having a better knowledge of what surrounds them and developing an attitude of respect towards familiar heritage. The loss of identity regarding the past and the heritage elements has highlighted the role of diffusion in our society. Diffusion is "the act that enables people to be in touch with their Heritage and to acquire interpretation mechanisms to help them understand the facts and the objects."[3] Both technical documentation and cultural heritage diffusion undergo an analysis of the data capturing process and the data processing in order to obtain high-quality products.

Currently, the proliferation of techniques and technologies for architectural heritage documentation offer a wide range of possibilities. The diversity and heterogeneity might, however, affect the adjustment between demand and results. The current paper is engaged with a thorough study of two ways of carrying out the three-dimensional documentation process of objects: through image correspondence and through 3D Laser Scanner. Both the geometric quality of the final product and the investment costs of time and software and hardware equipment have been taken into account for the study.

2. Fundamentals of documentation through Laser Scanner and Photogrammetric Technique (Image correspondence)

The use of **Laser Scanner** or **3D Scanner** for Heritage documentation is quite recent. The possibility of getting a point cloud with pinpoint accuracy of both small and big surfaces has turned this device into a great tool to document Cultural Heritage, specially the Architectonic-Urban one.

The laser mechanism (Light Amplification by the Stimulated mission of Radiation) consists of the stimulated emission of a light signal and the optical feedback. According to the definition given by the Architectural Photogrammetry Laboratory of the University of Valladolid: "A laser consists of an amplifier in which stimulated emission happens and also of a set of mirrors that make the light beam go through the amplifier again and again."[4] The raw product of laser scanners is the point cloud. The cloud shapes both the surface of the object being documented by means of the laser beam and the setting of the spatial coordinates of each point according to the different operations.

In view of the high costs of laser scanners and its dependence on hardware, automation of three-dimensional reconstruction of a setting using **photogrammetric techniques** (currently digital images) has long been one of the greatest challenges for photogrammetry and computational view. Automation consists of taking two or more pictures with different cameras at the same time (stereo) or with the same camera at different times (motion). Reconstruction of geometry and point cloud creation includes three main parts:

2.1. Obtaining Internal Orientation parameters:

The process consists of reconstructing the perspective beam shape, i.e., reconstructing the camera's internal parameters, as well as the distortion caused by the lens flaws and the lack of alignment of optical parts. In order to obtain the vector between the point of view and its projection on the photogram, several calibration systems for non-metric cameras are used. The process is then carried out under different algorithms. In this project the Photomodeler Scanner 6 was used to achieve calibration through the "test field" method.

The system consists of taking pictures of a set of characteristic features located on fixed positions. The identification and measuring of these control points, designed in accordance with a fixed parameter, allows us to calculate the parameters of the geometry of the camera (focal and main point) and the distortion of the lens system (radial and tangential distortion.)

Regarding analog photogrammetry, the camera being calibrated was placed on a specific position from the control point grating. The development of position and direction calculation thanks to pictures taken from different points of view has enabled simultaneous calculation of internal orientation parameters.

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2.2. Obtaining the Relative Orientation parameters

The aim of this process is to direct both beams of a model in a way that all the equivalent beams converge. The result is a 3D model of the object within the chosen reference system.

From a photogrammetric point of view, there is no difference between calculating analytical relative orientation in an analog machine and calculating that of a digital one. The process of analytical restitution consists of obtaining a set of coordinate pairs both in the left and the right picture of a number of points. The operator will then recognize those points as equivalents. Once points are measured, relative orientation parameters can be calculated using two methods based on collinearity and coplanarity conditions respectively. The advantage of digital restitution is the possibility of identifying equivalent images through statistical methods, which allows measuring without visual intervention.

2.3. Dense Pixel Correspondence: Stereo-Matching Algorithms

Several algorithms have been suggested with a view to solving the problem of point correspondence between two images of a stereo-pair. According to L. Nalpantindis[5], algorithms can be grouped depending on whether the outcome is sparse or dense; being the latter classified in local (based on area) and global (based on characteristics). It is necessary to know speed, accuracy, scope, time consumption and disparity range parameters in order to evaluate algorithms. There is a third classification based on symbols referred to methods that compare the symbolic description of images instead of comparing the resembling geometric features. The current study does not deal with this method or the sparse outcome one.

The Photomodeler Scanner 6 software has been chosen to carry out the correspondence in this study. The application permits the matching of various geometries, both the basic one, i.e., the point, as well as lines, curves, silhouettes and more complex ones.

3. Case study: San Martín Church in Segovia (Castile and León, Spain)

San Martín Church was originally Pre-Romanesque. At first, it had a small temple with three naves and three sections, which were extended according to the Romanesque style of the 12th century. The renovation led to a three-nave ground plan with an equal number of semicircular apses, a transept and a brickwork tower. The gallery, which was originally surrounding the whole building but the east end, was built in the following

century and has many craved capitals. Afterwards, the central apse was replaced by a rectangular ground plan apse which, in addition to the damaged apses that flank the central one, contributed towards the loss of interest in that part of the building. The Romanesque-Mudejar brickwork tower with small semi-circular arch windows has a great base width and a shale end.

The great architectural complexity of this heritage work is due to the uneven land where it stands and the constant renovations and building phases. Diversity in materials, geometric and radiometric patterns, and context facilities to obtain angles of view and different distances to test several configurations, made it possible to choose San Martin Church for this study.

Figure 1: San Martin Church in Segovia, Spain.

4. Reconstruction of the object surface through Laser Scanner

The documentation process of San Martín Church was carried out with the Faro Photon 80 scanner. This scanner uses phase shift between the emitted and reflected wave to calculate the time-of-flight and, therefore, the distance to the object. The laser emits a periodical, constant and moderate sign. Measurement accuracy depends on frequency and wavelength. For this reason, the scanner operates with multi frequency ranging, using the highest frequency to calculate the distance to the point and the lowest to solve

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[5] Nalpantindis, L. *et al:* Review of Stereo matching algorithms for 3D vision, 16th International Symposium on Measurement and Control in Robotic-part 1, Brussels, Belgium, 2007.

measurement ambiguity. Radiometric information is then added to the point cloud through high resolution pictures taken with a reflex digital camera incorporated into the scanner.

In order to document the church, a 1/4 resolution was set with the highest point quantity available. The studied areas and the scanning positions have produced resolutions (gaps between points) of 6 mm every 10 meters. The repetition frequency for this resolution is 12 Hz and pulse duration is 0,00190 sec. The point clouds of the captures in which the scanner was closer to the object are denser.

To carry out the comparison, a surface mesh was obtained from the point clouds of the laser scanner. The clouds were then exported to PoliWork-IMAlign, where the surface was reconstructed under high reliability levels, at the risk of losing data of some parts of the setting. No smoothing, tolerance or reduction was applied to the clouds. The mesh created with IMInspect was entered as a "Reference Object", which lead to an automatic georeferenciation thanks to the inherent information in the scanner.

5. Reconstruction of the object surface through Dense Stereo Matching

The reconstruction of dense point surfaces from images has been developed as an alternative to point cloud generation through laser scanner. The Photomodeler Scanner 6 software was used to carry out the comparison, as it allows a much easier data management and it includes many quality control tools. The software also offers a wide format and product range that allows browsing and creating.

The dense pixel correspondence project entailed taking stereo-pair pictures with a quite significant base relation (gap between captures)/ distance (between the base line and the object). Thus, a 1/3 relation is considered quite distant from the usual stereo configuration of 1/5 and 1/10. Increasing the relation means a considerable loss of overlapping surface, which can be solved by selecting a slightly convergent configuration. The area within the overlapping section is the surface of the setting that contains the point cloud product.

The camera always had a similar orientation in order to obtain a quality capture of the stereo-pair. No significant changes were made regarding distance, and convergence or lack of parallelism between capture axes was not excessive. Although quality is almost assured, there might be some errors related to capture conditions when these are too distant from the ideal situation.

5.1. Internal orientation

Camera calibration was required for every configuration used in the project. For this purpose, the team used a calibration grating to take pictures of the object. Thus, every time a section was documented with different parameters, calibration shots were obtained.

In order to get an optimum calibration, the team took 13 pictures of the grating: 1 horizontal and 2 vertical every 90º (12 pictures in all) and 1 upside down. For every capture the calibration grating width was adjusted to the sides of the image. The calibration pictures were taken in broad daylight, which allows using high f numbers (minimum aperture) and high shutter speeds. This way, the field of focus is maximum and images are clear even when the model stands closer than the object. This allows using the highest shutter speed in order to avoid out of focus images. In the current project the team took 4 sets of calibration pictures for each of the 4 typical configurations depending on shooting conditions.

5.2. Relative Orientation

The modules "Automated Coded Target Project" and "Point-Based Project" were used to obtain captures with and without coded targets. In both cases equivalent points were set within the stereo-pair. Those pairs with coded targets are automatically detected and allow a stronger correspondence.
Coded targets were previously created with the same software. Their size and diversity depend on the parameters selected for the project. The design of the targets takes place in the "Create Code Target" section. The team designed 10-bits targets for an estimated distance of 7 meters to the camera. The targets are then distributed in a balanced way all over the area being documented.
Once the orientation process begins and reaches an acceptable range, the rest of the points are set according to the visualization of the epipolar line over the target image. It is much easier to set the point over that line, as just the definition of a spatial component is required.
The correspondence and deviation assessment of the equivalent points is crucial to know how accurate *Stereo-Matching* is. The equivalent points from the object features that were entered manually show deviations between 0,50 and 0,01. When deviation is less than 1,0, correspondence is correct. Rotation and

scale can also be set at this stage. The rotation of the model is set from two point pairs that frame two of the three reference axes. Scale needs to be corrected depending on the initial distance between the targets, except for those cases in which coded targets are defined in the automatic recognition process. For this reason, the team decided to get the measurements from the point clouds of the laser scanner. However, it is vital to bear in mind that a margin of error exists, as the scanner accuracy and the establishment of a dimension from discrete points is the foundation of the process.

5.3. Dense Pixel Correspondence: Dense Stereo Matching

Dense pixel correspondence was carried out with the *Dense Surface* module of the Photomodeler Scanner 6 application. Once Internal and Relative Orientation has been calculated, the only thing left is to start the process of matching the pixels of the stereo-pair. The application also allows adding different parameters to control the product (point cloud) according to the nature of the scene and the object.

The sampling rate of the cloud is defined by the cloud density requirements as well as by the size of the GSD. By calculating the pixel track it is possible to know the maximum resolution possible in the correspondence. The data for the current project is as follows:
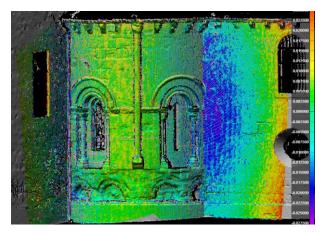
1. Camera's sensor size: 4/3" diagonal 22.50 mm; width 18.00mm; height 13.50 mm.
2. Focal length: 14mm and 30mm (Telephoto lens for the belfry)
3. Image size: 3648 x 2736 pixels
4. Distance to the object: Variable depending on the shot[6].

Every image has a pixel size in the CCD of 0.004934mm, although the track changed depending on the focus and the distance to the object. In order to match the pixel distribution of the camera, Bayer filter was used, where color data is stored in each of the 4-pixels modules. The team chose a configuration in which at least one point of the cloud was representative of 4 pixels of the image. For this purpose, the minimum enlargement distance is $2\sqrt{2}$ (diagonal distance of the square within the unit side). In the project, the value entered in the Sampling Rate was the track size enlarged 3 times.

6. Comparison of laser data with photogrammetry

The modules IMAlign and IMInspect of the PoliWork application (10.1 32-bits version) were used to compare the data from the Photomodeler Scanner 6 with that of the Faro 80. The data obtained from the laser was turned into a high-accuracy mesh, from which deviation vectors were calculated in relation to the cloud created from the stereo-pairs. In the process, the data from the Photomodeler Scanner 6 was included, gathered together with the Apse and the Belfry projects. The scale was corrected manually and the data was aligned using the "N-Point Pair" and "Best-fit-Alignment" options.

Case 1: Northeastern Apse + Facade:

- GSD: 2.41 mm
- Sampling Rate parameter: 7.23
- Number of points: 110,235
- Residual Quality: 0.26
- RMS: 0.06
- Sampling Rate: 1 point every 7.23 mm
- Depth Range: 1,000 mm
- Matching Region Radius: 6
- Texture Type: 1

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[6] The estimated GSD matches with a single point of the object, taken on the most favorable point or on the scene center. This leads to "optimistic" values of the GSD for the rest of the object. For this reason, a 3X or higher amplification makes sense in that it avoids higher cloud densities than those of the CCD. The maximum density could be limited more precisely if the real GSD was sampled from different distances to restored points within the worst parts of the scene once Relative Orientation and model scale is solved.

Figure 2: Displacement ratio (apse-facade)

125,844 points of the 130,376 were compared at a range of ±35mm, for 96.524% of the points within the comparison range. The average was 0.052 mm with a standard deviation of 10.189 mm, while all the points converge within 3 times the Std.Dev.

Case 2: Northeastern apse detail:

- GSD: 0.70 mm
- Sampling Rate parameter: 2.10
- Number of points: 998,017
- Residual Quality: 0.11
- RMS: 0.03

- B/H relation: 0.30
- Sampling Rate: 1 point every 2.10 mm
- Depth Range: 230 mm
- Matching Region Radius: 6
- Texture Type: 2
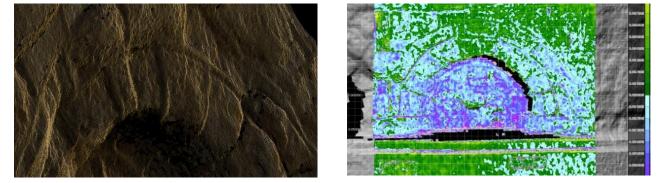
Figure 3, 4: Photogrammetric point cloud detail and Displacement ratio (apse detail)

863,034 points of the 876,809 were compared at a range of ±15mm, for 98.43% of the points within the comparison range. The average was -0.061 mm with a standard deviation of 3.01 mm, while all the points converge within 5 times the Std.Dev.

Case 3: Northern section of the belfry
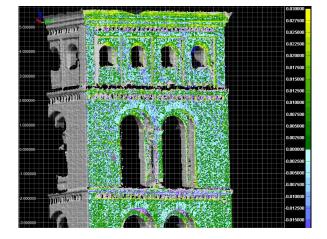
- GSD: 10.57 mm
- Sampling Rate parameter: 31.71
- Number of points: 98 734
- Residual Quality: 0.23
- RMS: 0.08

- B/H relation: 0.32
- Sampling Rate: 1 point every 31.71 mm
- Depth Range: 500 mm
- Matching Region Radius: 4
- Texture Type: 1

Figure 5, 6: Tower image and Displacement ratio (belfry)

94,271 points of the 98,733 were compared at a range of ±20mm, for 95.48% of the points within the comparison range. The average was 0.170 mm with a standard deviation of 18.09 mm, while all the points converge within 4 times the Std.Dev.

7. Results: Efficiency in obtaining 3D products

Efficiency always depends on the application context. What is efficient under certain circumstances might not be efficient under others. In general terms efficiency is defined by "the rational use of the existing resources to reach a specific goal." In order to evaluate efficiency, the data produced by the Scanner Faro 80 regarding clouds generated by *Dense Stereo Matching* have been taken as a reference and collated: economic cost, time cost and cloud quality cost.

7.1. Economic cost

The process to obtain a cloud through stereo-pair correspondence includes the cost of the camera and the lens, as well as the license of the software to manage photograms to create the product with *Dense Stereo Matching*.

- Olympus E-3 camera: €1,400.
- Olympus Zuiko Digital 14-54 and 45-150 lens: €1,000.
- Photomodeler Scanner 6 Software: €1,530.
- Total: 3,530 Euros.

The equipment and software used in the project to obtain the cloud was:

- Laser Scanner FARO Photon 80 + Réflex Nikon Digital Camera + Point Cloud Management Software: €75,000.

The difference on hardware costs is significant (20 times more expensive). However, the rent price of the Laser Scanner (€1,200 per day) is important to carry out a correct comparison. The rent fare would allow a lower investment for individual or isolated projects.

7.2. Time cost

Time cost depends on the project's magnitude and complexity. The total time spent in creating the 5 point clouds was similar, as just one stereo-pair was used for each example. The allotted time was as follows (for one of the case studies):

- Generation and printout of coded targets: 30 min.
- Photographic pair capture and calibration shots: 30 min. (once in the location).
- White balance and distortion correction on RAW files: 20 min.
- Camera calibration with Photomodeler Scanner 6: 30 min.
- Generation of point cloud (Internal and External Orientation, and Dense Pixel Correspondence): 45 min.
- Total time: 2 h. y 35 min.

With Faro 80 Laser Scanner (for a single shot at 1/4):

- Object scanning: 15 min.
- Picture taking: 10 min.
- Total time: 25 min.

The difference in time costs also depends on the size of the project. Laser Scanner is more adequate for bigger projects. Besides, it is not necessary to calibrate the scanner for every data capturing configuration, but just once in a while. It is important to take into account the time spent in transporting the equipment. In this regard, using the camera is preferable to using a big and heavy laser scanner equipment.

7.3. Cloud quality cost

Cloud quality assessment has been the central comparison aim of the project. From a radiometric point of view, point clouds are similar. The data obtained from *Dense Stereo Matching* always present chromatic accuracy, as the points of the cloud are pixels with correspondence on the stereo-pair. The pixels include the radiometric information. There are certain scanners, which do not allow to include color information in point

clouds or in which color information is not completely correct. This happens when the scanner operates with non-visible light waves. However, it is always possible to color the point cloud during the post-process using pictures taken from the same position.

The Faro Photon 80 scanner includes a high-resolution camera, which provides reliable radiometric information. However, the quality of the image registration on the point cloud depends on a process which is not entirely automatic. The process is normally less accurate than the photogrammetric solution. It is necessary to work out the camera's forced centering towards the scanning source and the calibration mechanically. It is also essential to reverse optical distortion as well as to decide the axis orientation of the pictures with regard to the point cloud through the identification of equivalent 3D (from the cloud) and 2D (from the picture) pixel pairs.

Point clouds created by *Dense Stereo Matching* are more efficient when the economic cost is more important than the time and quality cost. Efficiency will depend on the user's needs, the project aim and the available economic resources.

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less
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architecture
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TEMPORARY ARCHITECTURES

Daniela DE CRESCENZO
Faculty of Architecture, University of Naples, Italy
e-mail: daniela_de_crescenzo@hotmail.com

Abstract
In a society where economic problems and the continuous transformation of the environment make unthinkable built huge and long term projects, is coming out a new way of conceiving architecture: beautifully designed structures, projected to last for a short time, replacing traditional architectures, which become multifunctional containers able to accommodate concerts and shows, expositions and museums but also transportable residences with dynamic design which are able to appear and disappear within a week or less.
Temporary architectures have not many of the constraints which weigh on traditional buildings and so architects can act with more creativity, playing with different materials and structures that often cross the boundary between architecture and art.
Remaining in a constant balance between *less* - quick construction and quick dismantling of the structure, small size and low cost - and *more* - careful choice of materials, wide range of uses and highly innovative - the temporary architectures, with their forms, are expression of the actual time, unstable and constantly changing, assuming the features of attractors of the contemporaneity.

 Keywords: temporary, quick, innovative

1. Temporary architectures

In a society where economic problems and the continuous transformation of the environment make unthinkable built huge and long term projects, is coming out a new way of conceiving architecture: beautifully designed structures, projected to last for a short time, replacing traditional architectures, which become multifunctional containers able to accommodate concerts and shows, expositions and museums but also transportable residences with dynamic design which are able to appear and disappear within a week or less.
By definition, architecture is something temporary and its ephemeral component is closely tied to the quality of the construction elements but also the time factor plays a key role in major cities, constantly subject to trasformation that challenge even the most architectures consolidated.

1.1 Pavilions
Great protagonists of contemporary architecture become the exhibition pavilions which in most cases already have a date of demolition but may also exist some exceptions proving the different meanings of the term "temporary" in architecture. The Eifel Tower is the most prominent example of how structures basically "useless" can become a symbol of the city hosting them: built as the gateway for Expo 1889, although at first it was planned to keep it up only twenty years, today is the most visited monument in the world.

The architectures designed for large international events such as the **Expo 2010 of Shanghai**, China, is an important driver for the design and construction of ambitious temporary buildings, as demonstrated by the **Spanish Pavilion**, designed by **Benedetta Tagliabue** (Miralles Tagliabue EMBT), a steel structure that uses a complex three-dimensional grid of tubular elements created with computer technology, the most visible

element of which is a cloud of wicker, which makes the pavilion an irregular and movement structure. Selected as a typical example of Spanish handicraft, architects have placed the wicker so as to form Chinese ideograms alluding to the friendship between Spain and China. The solidity of the other pavilions here is replaced by a temporary appearance, suitable for an event like the Expo 2010, where folklore, national pride and strong modern are combined.

Another notable contemporary structure, built in 2010, is the pavilion **21 Mini Opera Space**, designed by **Coop Himmelb(l)au**, installed in Marstallplatz of Monaco, Germany. Through forms obtained with the computer, the pavilion 21 has the classic pointed shape easily recognizable in the work of Coop Himmelb(l)au. This remarkable explosion has allowed to experiment a touch of contemporary architecture that probably would not have been accepted so willingly if it was permanent.

The stone house, designed by **John Pawson** at the Salone Internazionale del Mobile 2010 in Milan, for the Think Tank Interior, on land within the University of Milan, gave a good impression of minimalist solidity despite its ephemeral character. The project also highlights another advantage of contemporary architecture: to build the structure, in fact, has been used the Lithoverde, an innovative recycled material consisting for the 99% from waste of the stone and for the 1% from natural resin. Located in an architectural context in which modernity could not be the easiest choice, the look hard, almost funereal of the stone house made her look older of the surrounding buildings.

Solidity is not the watchword in the case of many contemporary pavilions. **Rendez-Vous** (Tokyo, Japan), a structure of 52mq designed by studio **Atelier Bow-Wow**, Tokyo, was an installation mostly made of bamboo that was at odds with the rigidity of the near National Museum of Modern Art by Yoshiro Taniguchi. The young Japanese architects said they would "mitigate the feeling of austerity, while maintaining the respectability of the place but at the same time lightening the atmosphere, to make it a nicer place." Thanks to the flexibility of the bamboo, Atelier Bow-Wow has wanted to push his idea to the extreme, imagining a giant animal that runs through the woods of the Imperial Palace. This playful way to deal the temporary architecture also represents a contrast with the dense urban fabric of the surrounding city.

Another lightweight structure is the research pavilion of the **ICD/ ITKE**, designed in 2010 by the **Institute for Computational Design** (ICD) and the **Institute of Constructive Elements and Structural Design** (ITKE), both managed by the University of Stuttgart. Built entirely with strips of birch plywood bent, the building consisted of at least 500 different items designed by robots and products in the establishment robotic's of University.

Fig. 1: Miralles Tagliabue EMBT, Spanish Pavilion, Expo 2010, Shanghai, Cina, 2010.

Fig. 2: Coop Himmelb(l)au, Pavilion 21 Mini Opera Space, Munich, Germany, 2008-10.

Fig. 3: ICD/ITKE, ICD/ITKE Research Pavilion, Stuttgart, Germany, 2010.

1.2 Container

Many architects have realized that the containers, symbol of a globalized economy, can easily turn into a home or shops. Curiously, in this case, objects that are designed to be moved may instead be anchored to the ground, where they can prove to be more solid and durable of the traditional architectures. A container classic is made of galvanized steel and corrugated and may be long or 6 or 12 m. Generally it is possible to stack up to a maximum of seven units by means of hooks standard. A steel box is not the most appropriate structure for a house or other building, and yet in the early eighties the ISO containers began to be used precisely for this purpose.

Phillip Clark, owner of a company Miami's in 1989 obtained a patent for a "method for transforming one or more containers steel in a house inside of a building site or as a product of the yard". But previously, in 1985, the Australian architect **Sean Godsell** informed that he had started working at the hut of the Future, "a home-transferable, mass-produced for use as emergency housing. The container recycled acts as the main volume of the dwelling while a canopy is introduced inside the container. When it is mounted, the canopy will shade to the container, reducing the thermal load. By the container will come out the support columns, to be able to place without having to make excavations in rugged terrain" [1].

The American architect **Adam Kalkin** has specialized in architectures based on container. He is the creator of a system, called **Quik House**, a kit consisting of a prefabricated house designed by the same Kalkin using recycled containers. The house consists of three bedrooms and two bathrooms and a toilet. The architect says: "The outer casing can be mounted in one day, you will get a completely enclosed building. From start to finish it should take no more than three months to finish the house". Can be stacked on each other four or five or more containers with orange or natural rust finish, within five months from the time they are ordered at a cost that can range from $ 76,000 up, including shipping costs. His house **Illy Push Botton**, exhibited at the Venice Biennale in 2007, is just to show how to transform in a few minutes a simple container in a real house with hydraulic systems and an intelligent design [2].

The **COP 15** pavilion of the study of architecture **MAPT**, located in the northern port of Copenhagen (Denmark, 2009-2010), using used containers and other recycled materials will fit in the efforts made by cities to encourage sustainable urban development. Underlining aspects such as the reduced price and sustainability, MAPT is noted that the containers are deemed so devoid of economic value that sometimes the transport company estimate that is more convenient to abandon them that bring empty to their point of origin. After exposure, the city will use two containers as a venue for cultural events and local meetings.

The Italian study **tamassociati** has created **Emergency NGO housing** at the Salam Centre for Cardiac Surgery (Soba, Khartoum, Sudan, 2009), with 95 containers of 6 m intended for housing and other seven 12 m used as a café. Obviously the steel transmits the cold or warm, almost instantly, which is one of the disadvantages of the container when they are used as housing. The architects have solved the problem by means of insulating panels of 5 cm inside the structure and by a system of sunscreens in bamboo which avoids the direct irradiation of the steel. It was tested an innovative conditioning system with a solar panel and a refrigerating machine which will allow to considerably reduce energy consumption. The solar panels also provide hot water to the entire complex.

Fig. 4: Adam Kalkin, Quik House, Tewksbury, New Jersey, USA, 2008.

Fig. 5: MAPT, COP 15 Pavilion, Nordhavn, Copenhagen, Denmark, 2009-10.

1.3 Stand

By a long time now, the exhibition stands are an area of experimentation in contemporary architecture. Since these structures do not usually have to bear heavy weights or perform the traditional functions in architecture, can explore new lands or neglecting certain rules of construction. It also aren't exclusive competence of architects, because in this area are also present designers, sometimes specialized.

The architects of Madrid **Camila Aybar** and **Juan José Mateos** design stands for the glass manufacturer **Vitro** to the IFEMA fairgrounds in Madrid since 2006. That of 2006 was constructed with at least 170 tonnes of glass from 25,000 pieces recovered by the remnants of the cuts of larger sheets of glass. The mounting technique employed by architects had created effects compared to the works of artists like Bill Viola and James Turrell. If it comes to visual effects this type of stand suggests more a work of art that an architectural element in the traditional sense. Surely this is one of the reasons that makes this industry so interesting for architects. Aybar and Mateos have used the glass as a malleable material and variable because, if on the one hand is able to create an artistic effect, on the other decants the virtues of the products of the customer.

The draft by **Ammar Eloueini** for exposure of 2008 **"The Tramway"** in the Pavilion de l'Arsenal in Paris examined the new tram lines in Paris, that should be turn around the city along the Boulevard de Maréchaux. Installed on the upper level of the pavilion, which has a large empty space with a bridge, the show used a polycarbonate "skin" suspended in the middle of this space by dividing it. The use of this type of light materials, present also in the retail sale, exemplifies the ability of the architect to take space in a manner similar to that who are looking the artists, occupying it and turning it, while maintaining, at least in this case, just a reminder of their intervention at the conclusion of the show.
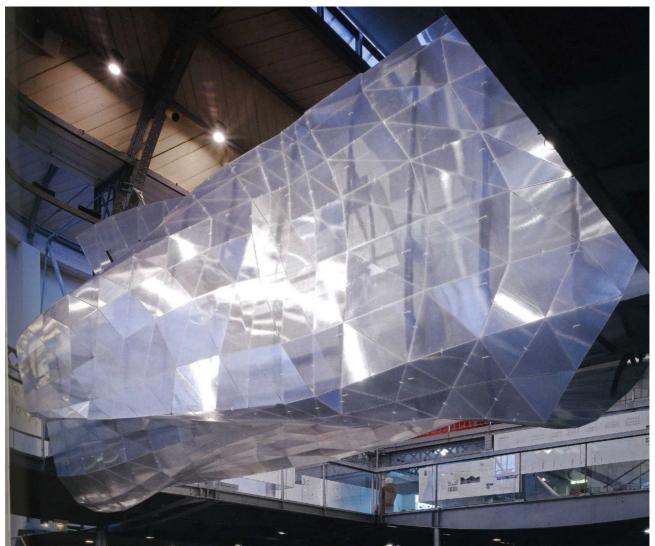
Fig. 6: Ammar Eloueini, "Le Tramway", Paviillon de l'Arsenal, Paris, France, 2008.

1.4 Shows

The term "ephemeral" in its original meaning ("that lasts only one day") could easily apply to architecture for events such as concerts: are significant in this area the shows of the major rock bands, that does not skimp on resources and on size. The British architect **Mark Fisher** has designed the sets most publicized of the Rolling Stones, U2 and Pink Floyd. Among his most important projects, the sets for the world tour of 2005 by Rolling Stone, "**A Bigger Bang**" that combined the idea of "decadent fantasies and colorful decorations of the great opera houses of the nineteenth century" with a high resolution screens and an innovative arrangement of seats, which had to remember the stages of opera. The fundamental structure, which required 30 hours of assembly, was composed mainly of standard components for rent.

For next performances were needed three sets of basic structures. Only panels, video screens, stage and other technical components travelling show by show, were installed in the last 24 hours prior to the show and were removed immediately after for being transported to the next town.

The laptop upper structure weighing 180 tons, designed by Fisher for the U2 world tour, "**360 °**" (2009-2011) not only surrounds the stage, which resembles a spider, but also several thousand spectators, and at the same time also serves to support 200 tonnes of technical equipment. As the name of the tour, the structure is made so that viewers can see the band from all angles.

Mark Fisher is the author of one of the most amazing opening ceremony of the Beijing 2008 Olympic Games, the "**Dream Sphere**," a globe of 19 m, consisting of nine latitudinal rings, hanging from a tree capable of supporting 60 people during the show. The surprising spherical structure, combined with lighting and the acrobatic performances of the participants, give to this project an unreal and fantastic.

An example a little less extreme of spectacular architecture is the **Massimiliano** and **Doriana Fuksas** setting for **Medea and Oedipus at Colonus** of greek theater of Syracuse (Italy, 2009). Based on the concept of catharsis and on the idea of the lost horizon of the first representations of these ancient tragedies of Euripides and Sophocles, the architects envisioned a "concave blade" that acts as a mirror to the action stage and involves the audience, inviting to reflection. This reduction to simple and pure forms is in perfect harmony with the power of the plays represented on stage. Once again, freed from constraints such as weight or functionality, Fuksas architects are able to prove that they are able to break the shape and to reframe the issue of space.
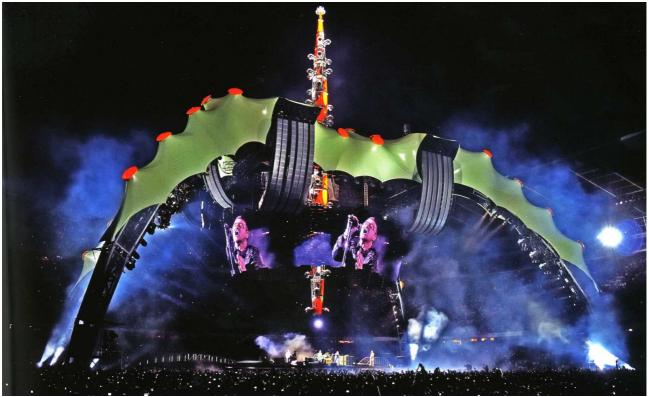
Fig. 7: Mark Fisher, U2, 360°World Tour, 2009-11.

1.5 Temporary additions

If at times the temporary architecture is ideal to create architectural innovations away from traditional patterns, in other occasions it is necessary to pay great attention to its functional aspect, especially in cases where it is used for expansions of existing structures.

The inventive studio of New York **Diller Scofidio + Renfro**, who in the past had built a structure shaped like a cloud (the Blur building for Expo '02, Yverdon - le Bains, Switzerland, 2000-2002), proposed a "**Bubble**" for the temporary expansion of Hirshhorn Museum in Washington. This pneumatic membrane, designed to accommodate up to 1,000 people will be mounted twice a year, in spring and autumn, and pushed out of the central courtyard of the modern structure without touching the internal surfaces. The idea of an elastic space, in the context of a strictly modern building, is something very contemporary and the inflatable structure is one of the most obvious manifestations of ephemeral architecture.

In a completely different style, the French multimedia artist **Laurent Grasso** and his brother, the architect **Pascal Grasso**, have created a small restaurant temporarily mounted on the roof of the Palais de Tokyo in Paris between April and June 2009. Call "**Nomiya**", this 18 m long structure was built in two parts in a shipyard and consists of a glass booth with a perforated metal screen that covers the central cooking area, between the metal coating of the glass structure and the heart were introduced LED lights.

Working in turn with obvious practical limitations, the dutch architects **Ira Koers** and **Roelof Mulder** had accepted the daunting task of creating a temporary structure for the **library of the University of Amsterdam**. Although this was an area of 2,300 square meters and 235 workstations, the budget for this project was quite modest. Koers and Mulder were able to associate bright colours (1,105 red boxes to hold the books) to a abstract feature, that offering ample spaces for reflection, which earned the project The Great Indoors Award 2009.

Although some interesting temporary projects can escape the limitations of traditional architecture, both brothers Grasso that the duo Koers/ Mulder are managed to give life to ephemeral environments that have been successful because of their looks but also for the efficiency solutions which they have been able to solve practical problems relating to their duties.

Fig. 8: Laurent & Pascal Grasso, Nomiya, Palais de Tokyo, Paris, France, 2009.

1.6 Houses

For the temporary architecture, as well as for the permanent, one of the most significant is to stay the human being. Modernity has brought increasingly to the fore the transient solutions. We have already discussed the use of containers to create homes to be transported easily, but there are other categories of temporary accommodation.

The German designer **Werner Aisslinger**, inventor of Loftcube, a temporary home to use as an installation on a roof (2003), has created more recently **Fincube**, a "modular home, sustainable, portable and by low power consumption" (2010). The fact that the site preparation is minimized, and the use of recyclable and durable materials, such as larch, are the most noteworthy aspects of this project, which provides answers to many questions on housing, such as the nomadic lifestyle coveted by certain populations, including developed countries.

At last, the New York architecture firm **OBRA** created a prototype house emergency (**Red + Housing**) for exhibition in China set up a year after the devastating earthquake in Sichuan province in May 2008. Using red cloth for parachutes and plywood, OBRA was demonstrating that "in terms of planning, the emergency accommodation is no more than an extreme form of architecture." With a surface area of 45 square meters and an estimated cost of $ 5,000, this type of housing, made from renewable materials and prefabricated, was thought to be cheap, portable and easy to assemble.

Finally, there is no doubt that the whole architecture is temporary, although some structures are created to last longer than others, the interest by ephemeral architecture lies primarily in its design process: temporary architectures have not many of the constraints which weigh on traditional buildings and so architects can act with more creativity, playing with different materials and structures that often cross the boundary between architecture and art.

Remaining in a constant balance between *less* - quick construction and quick dismantling of the structure, small size and low cost - and *more* - careful choice of materials, wide range of uses and highly innovative - the temporary architectures, with their forms, are expression of the actual time, unstable and constantly changing, assuming the features of attractors of the contemporaneity.
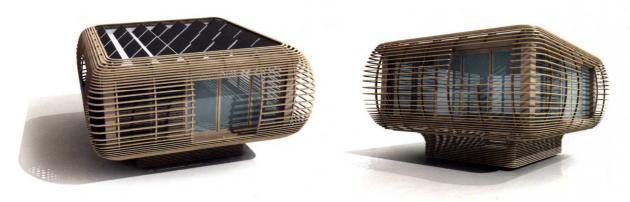
Fig. 9: Werner Aisslinger, Fincube, Winterinn, Ritten, South Tyrol, Italy, 2010.

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The energy-environmental behavior of the pre-industrial basic building: learning approach and applications

Marina D'APRILE,[1] **Margaret BICCO**[2]

[1] Dipartimento di restauro e costruzione dell'architettura e dell'ambiente, Facoltà di Architettura "Luigi Vanvitelli", Seconda Università degli Studi di Napoli, Aversa (CE), Italia
marina.daprile@unina2.it
[2] margaretbicco@virgilio.it

Abstract
Eco-efficiency for the historic environment is decisive for energy-conservation, especially in the case of the Italian "traditional" urban heritage. The complexity and the heterogeneity of "the traditional dwelling" force to define the specific analytic tools and procedures to survey its Energy-behavior. The latest applications on rating the energy-environmental performance of historic buildings, such as Project A.T.T.E.S.S., US LEED, and GBC LEED have represented the reference points of this paper. The understanding of the specific Energy-environmental performances as well as the energy-lacks and losses, and the reasons why they bred, would be essential to set compatibly up a consistent conservation strategy for these fabrics today. The rehabilitation, the reuse, the updated development of the features and the configurations that the traditional dwelling has taken throughout its history within its surroundings, creating a *local material culture* based on the bioclimatic criterions, represents a proper strategy to achieve the suggested goals. Defining how these buildings have historically found the practical solutions for the bioclimatic-environmental peculiarities and how these features have been altered during the time, this work tries to suggest a procedure for a specific rehabilitation compatibly with the conservation of the building. The study has been applied to survey a "traditional" block in the old town of Sarno (SA) erected between the eighteenth and the early twentieth century. With the support of the building-stratigraphy and of digital ortho-photography and thermograph IRT surveys an articulate comparison has been developed among several structures that have been differently altered and changed in the course of time, considering some possible and sustainable ways for their energy-improvement.

Parole chiave: *traditional* building, energy efficiency improvement, thermograph IRT

1. The building heritage energy-environmental improvement [1]

Eco-efficiency for the historic environment is decisive to elaborate proper territory planning policies, as it entails sustainable consumptions and the best energy-environmental performances. As a matter of fact the sustainability – which involves a reduction of the ecological footprint as produced by each organism to maintain its functioning – represents a typical prerogative of an historic architecture, only if the coherent and continuous building functioning has not been altered and compromised, introducing frames and systems that have interrupted this organic working. Especially in the second part of the twentieth century, the outcomes of many building restructurings and renovations have often unwittingly and deeply compromised the main qualities of the traditional architectonic production, by removing and modifying authentic components and frames. The substitution of materials, elements and frameworks (as stones, plasters, floors and pavements, facings, casings, systems, vaults, wooden roofs and floors), which represent the material attestations of a traditional regional culture with products and arrangements that have shown themselves incompatible from a physical-chemical viewpoint, the building increase at height, the blocking up of inner courtyards and common external areas, as well as the balconies, terraces and verandas bricking up, these all are indeed actions that basically modify the energy-environmental historic buildings behavior, as well as they can influence the complex of relations that each fabric establishes with the next structures thanks to different bond aggregation typologies. Indeed the way whereby buildings aggregate to themselves forming an urban

block influences this behavior too. The alteration of the proper historical building resources, especially the bioclimatic ones, has increased the energy-consumptions causing by the heating and air-conditioning systems installation, with the environmental pollution outcomes that we all know well.

The understanding and the qualitative-quantitative rating of the energy-environmental historical building behavior are decisive to define instruments and procedures for reducing consumptions and eco-footprints. The more, trough the accurate comprehension and recording of fabric operating modes in the course of history it's possible to reach the "energy efficiency enhancement" adopting criterions and proceedings compatibly with a real conservation of the cultural heritage [2]. This must be a priority for the contemporary energy issue, above all within a context as the Italian one so much characterized by a wide presence of this kind of handworks.

A realistic rating of energy-environmental historical building behavior firstly entails the understanding of its dynamics as the environmental and temporal specific conditions change. Several researches have recently tried to respond to the reported demands. Waiting for the MiBac "Guidelines for the energy efficiency for the cultural heritage" coming on, because of which some well-know representatives of the architectural restoration and of the technological research have collaborated to the preparatory studies, in Italy the A.T.T.E.S.S. Project distinguishes itself particularly. The whole program comes from the partnership among "Bio-building Meta-district of Veneto", "Cultural Environment Meta-district of Veneto" and "Cultural and Landscape Environment Regional Direction of Veneto", with the involvement of IUAV and the University of Udine, among other corporations and bodies [3]. The "Guidelines for environmental sustainability in historic buildings" therein developed suggest a rating methodology of the energy-environmental, historical, building, behavior, fusing together the environmental design principles with the fabric investigation methods derived from architectural restoration and technological research. Basing on an analytic, *in situ* fabric survey on the typological, morphological, functional, environmental and building factors that can influence this behavior, actually the research has overcome limits and deficiencies presented by the ITACA Protocol applied to historic fabrics [3]. Thanks to dedicated software, A.T.T.E.S.S. method allows also a dynamic, eco-consumptions, building reading as the specific environmental parameters change. However, it's important also to underline that the potential, fabric, energy contributions emerge through *in situ*, building investigation. According to the principles of sustainable conservation culture these "proper resources" could be above all exploited through a more appropriate use of the specific, massive, masonry behavior, as well as through the rehabilitation and the updated development of features and configurations, which have allowed to better use local, environment qualities historically.

A critical understanding and interpretation process representing the typical conservation approach is decisive to identify building materials and techniques, as well as typological, functional, morphological and historical, building aspects of a cultural asset and then its patterns of operations and working modes. As a result diseases and their roots can be dealt with designing compatible "exploiting"
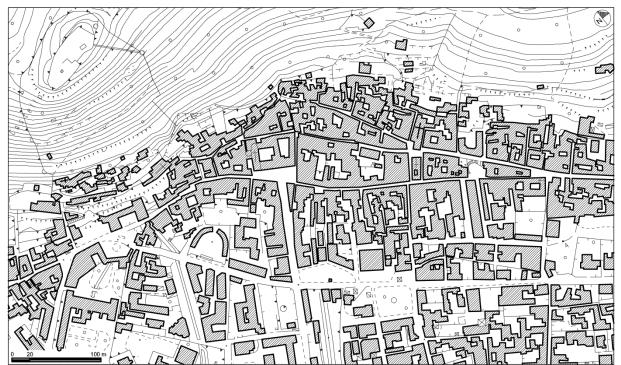
Fig. 1: Sarno (SA), map of the city, abstract. Above left are the city *castrum* medieval ruins and walls and the ancient built-up area of *Terravecchia* below.

Fig. 2: Sarno (SA), inner-city. Still today it's ordinary to substitute "traditional" building components with incompatible materials and features.

operation plans. That means project plan must take historical building to its optimal performance levels by protecting authentic material assessments too. From a quantitative viewpoint these goals achievement can be difficulty standardized and *a priori* graded, because historical, building, performance levels are consequences of specific fabric arrangements and local conditions too, as they have evolved with time. Thereby default, performance levels cannot be achieved by standard, operating, constructive procedures, in particular if planning actions are "invasive" as, for instance, when using exterior insulation and finishing system (EIFS) called "thermal coating", usually recommended in case of fabric on which it works is not a listed one.

2. The traditional heritage and its energy-environmental improvement

The so-called *traditional* heritage is a substantial part of building estate because it represents the whole unlisted, historical, architectural production, Its energy consumption and eco-footprint rationalization and reduction represent a priority, provided these aims fulfillment does not contrast the protection of *cultural meanings* materially stratified in local building tradition. Knowledge, information and memory so stratified are not less significant than what masterpieces and famous building can stand for. They all are *cultural assessments* and to be protected. Consequently according to restoration methodological unity principle, the same conservation design approaches reserved to the main sights are to be reserved to traditional heritage too, as developed by regional constructive cultures. Even if urban restoration building designs sometimes caused conflicting outcomes right on conservation viewpoint, without having official landmark status and specific urban restoration planning policies, old town traditional heritage was left to property speculation arrogance and to the most reckless unauthorized building particularly, never actually prevented by development planning public policies. Moreover the removal of traditional building materials, components and frames, which widely affected traditional heritage during later 50-70 years, was further encouraged by architects' substantial misunderstanding of traditional constructive culture patterns of operations and working modes. So it was for wooden floors and roofs, masonry vaults, pavements, plasters and facings, frames and casings and so on. Only after their removal the incompatible physical-chemical reactions of new materials and building procedures were recorded. To avoid these mistakes it's necessary a careful "fabric learning program" to detect building prerogatives, resources and crucial matters, which are the main elements of an appropriate conservation plan. The restoration methodology just focus on these aims, so it could be profitably used for solving energy-environmental matters. The critical learning process by which the conservation architect detects historical handworks focus on building deterioration pathologies and then on factors and reasons leading to them, establishing actual building
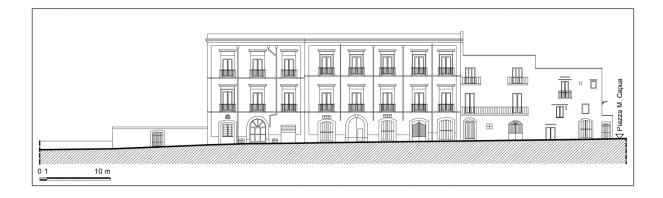
conditions. These are the conservation plan requirements to remove pathology phenomena without compromising cultural assessments safeguard, rather enhanced thanks to new compatible building materials and features. By a close rigorous building survey, also supported by specific methodological tools as, for instance, the masonry-stratigraphy, it's possible to record building and bearing-wall discontinuities, so favouring specifically proper crucial matters and pathologies recognition and solution. The use of the mentioned learning building process represents therefore the focus role as to this paper targets, detecting building factors and behaviors, which jeopardized building working modes in the course of time, causing the worsening building performances. In particular, this methodological approach involves also the record of the bioclimatic building prerogatives removed or abused by recent past renovation works. The rehabilitation, the updated development of features and configuration the traditional dwelling has taken throughout its history within its surroundings, meeting its specific environment requirements, can represent a sustainable strategy to decrease energy-environmental matters, especially if the building working context widely altered by above mentioned renovation works.

3. Learning approach and applications

To elaborate a methodological proposal replying in a practical experience the above mentioned concerns, a traditional urban block in the old town of Sarno (SA) has been chosen for operating on. The sample building block is particularly representative, including different altered configurations and features by the 20th century second part renovation works, favouring more careful considerations about their influences on the energy-environmental matters. This urban block transforming building dynamics recorded throughout its history thanks to archives documentary survey, iconography and historical, contemporary cartography collection, in comparison with the *in situ* building analysis data-gathering. The building census involved each fabric including in the sample block, concerning its material, technical, typological, morphological, functional and environmental qualities, recording building-up and shapes as well as actual deterioration phenomena, especially the ones influence the specific thermal-hygrometric behavior. Building survey concerned walls - with special focus on the external ones as well as on skirting, tops and eaves - floors, roofing, plasters and pavements. Considering building facing walls the morphological, typological and room layouts analysis focused on basements, ground-floors, hall-ways, inner courtyards, common external spaces, staircases, verandas, balconies, terraces and attics, also recording the actual distances among facades, facing streets and external spaces, often altered by recent building renovation works substantially.

Fig. 3: Sarno (SA), piazza M. Capua. On left is "palazzo Ungaro", one of the most interesting fabric of 18th century.
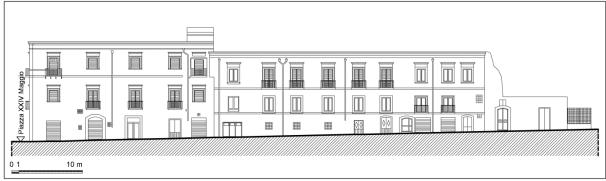
Fig. 4: Sarno (SA), via Cavour, sample block, Est front. (designer M. Bicco). Above is the northern part, below the southern one.

Technological and systems survey concerned frames, gutters, downspouts, heating and air-conditioning systems, as well as ancient wells and cisterns, useless fireplaces, brick ovens and chimneypots. Thanks to masonry-stratigraphy and thermography IR surveys the *in situ* data-gathering recording enabled to detect main building discontinuities, as well as the organic fabric behavior lacks and losses. Traditional buildings materials and features removals by the reinforced concrete elements introduction (as floors, frames, roofs, cantilever floor slab, etc.), the walls breaking through because of wider or new-opened windows and doors, these all "masonry walls-box" renovation works deeply altered the masonry massive behavior and so the related performances. But these building discontinuities represent precious clues to understand each fabric historical transforming dynamics in the light of the building block changing in the course of time, detecting the previous features and configurations, whose rehabilitation and updated development can be useful for dealing with the energy-environmental matters.

4. The historical context and the environment qualities

The town of Sarno's is one the main center of the homonymous river Valley, the heart of Latins' *Campania Felix*, called *Royal Valley* under the *Angiò's* dynasty in the late Middle Age. Placed among the districts Salerno, Avellino and Napoli, in ancient times this valley had been characterized by frequent inhabitations, being crossed by a stretch of the Roman *Popilian Way*, which linked Capua to Reggio, along the Nola-Palma-Sarno-Nocera itinerary [4].

But the geological characteristics of this side have always jeopardized the environmental development. The plain consists of alluviums and volcanic melted deposits. Behind Sarno's inner city the mountainsides cover with different deposits, which made them seriously shifting [5]. Historically, landslides often disrupted the built-up area, as the latest event on 5th May 1998.

Sarno's inner city urban framework is a NW-SE bounded spindle-shaped at the foot of the mountainsides, bordering Nola's Plain northwards and Lattari's Mountains southwards. Depending on the layout of Nola-Palma-Sarno-Nocera ancient road, the historical urban spindle-shaped development lengthways shaped-up by sloping belts. This distinctive feature of the Sarno's old town framework "made it exemplar within the national urban survey" [6].

The more ancient built-up area (*Cibitate veteri*) is placed at the foot of Saro's Monte about in the 11th century. The *castrum* was founded in the Middle Ages, although its ruins, as the urban-walls ones, can be dated between the end of the 12th and the 13th centuries, with developments and renovation works can be dated back to the Angiò's and Aragona's ages (Fig. 1). The more ancient built-up area called *Terravecchia* was walled between the end of the 12th and the mid-thirteenth centuries, widening the *castrum* fortified circuit. Between the 16th and the 17th centuries the ancient centre developed

westwards, ensuing from the earliest factories economy and population increase. Thanks to the mills they produced flax, flours and paper. Since the 18th century, in the second fifty years above all, the urban area spread over the next sloping belt, beginning to build along the inner side of ancient Nola-Palma-Sarno-Nocera's road [7]. This urban development historical phase ended within the end of the 19th and the early 20th centuries, when the industrial revolution reached its peak thanks to spinning particularly [8]. Only by the 20th century, second fifty years, property speculation the building development blocked up the plain area, until then visibly left free because of the above mentioned geological qualities.

The sample urban block stretched trapezium-shaped occupies the southern side of the 18th-19th centuries urban sloping belt (Fig. 7). The NW building block head overlooks to M. Capua's Square, the ancient *Capo dell'Orto* place, where two important eighteenth century fabrics front onto: *Immacolata's* Church built in 1752 with a precious Nocera's tuff stone portal, and *Ungaro's* Palace, which still maintains the original granary attic, even if heavy transformed by the latest renovation works.

The sample block building use began below, in the west side on the Nola-Palma-Sarno-Nocera's way inner portion (via R. Laudisio). Except the northern portion, as we said, just urbanized, most of the east side was built during the late 18th and the early 20th centuries (via Cavour), as the smaller block head and its surrounding fronted onto XXIV Maggio Square. A second world war air raid hardly strake down the sample block about in the middle. Still today few ruins are maintained with interesting assessments on via Cavour, while a flight of terraces clears the height difference between the two main streets (about 3 m).

5. Learning approach and outcomes

Comparing today properties distribution with the first cadastral map (1877) and others archive data, some proper architecture qualities pointed out interesting analysis factors [9]. The map shows minute cadastral parceling out with the exception of only two large properties (Fig. 8). As in coeval urban belt the sample block prevailing building typology is so-called *casa palazziata*, an eighteenth century urban gentry dwelling from Napoli, in which the owner's apartment was on the foreground, while other two floors rented. With inner courtyard open on a garden just opposite the entrance this fabric was roofed as well as covered terrace. In the sample block this building typology first occupied the west side, while gardens were lied to east. The 3-storey fabric, sometimes with an attic too, has the main body on the street with *botteghe* and a vaulted masonry entrance with local stone portal. At opposite ends of the courtyard were service rooms, warehouse and cellar. Sometimes these dwellings had a well (Fig. 8: nn. 3601 and 4510). Above all it were widely attested fireplaces and walled chimneypots [10].
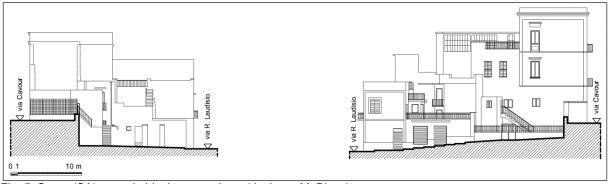
Fig. 5. Sarno (SA), sample block, cross-views (designer M. Bicco)

Figg. 6-7: Sarno (SA), sample block, West front and plan (designer M. Bicco).

Respect of *Strada di Sotto* (today via R. Laudisio) the *Strada Sopra Capo dell'Orto* way (today via Cavour) was a secondary one, maybe because more opened to flood risks. From the top, where was *Slargo di Capo dell'Orto*, the homonymous way slopes to south-east, stopping at XXIV Maggio Piazza. The building use of this side of the sample block is dated between the late 18th and the early 20th centuries as other *case palazziate* attest today. This building operation probably occurred together with the way widening and rectification work, as its morphology suggests.

The other historical building typology characterizes the sample block is represented by more modest *casa privata* [11]. In the 18th century these dwellings had two floors and sometimes the second one was shared in two different small apartments. The main body was a block with external staircase. More similar building bodies joined around common small inner courts during the course of time, in particular on the block NW side and middle portion. Since the end of the 18th century a gradual building development of these typologies occupied every free space, but only in the second part of the 20th century this increase blocked up courtyards as small inner courts.

5.1. Building materials and procedures

The traditional masonry is built with *pietra di Sarno*, a local type of limestone that normally appears very unhomogeneous and stratified, is slightly manufactured to the horizontal layers and assembled in periodical horizontal courses. At the ground floor level the thickness of the masonry is about 1.50 mt. The basements and vestibules normally present vaulted roofs with the exception of a single wooden ceiling supported by chestnut rounded beams, according to the supposed traditional predominant ceiling shape. At present the original ceilings have been generally replaced with modern concrete
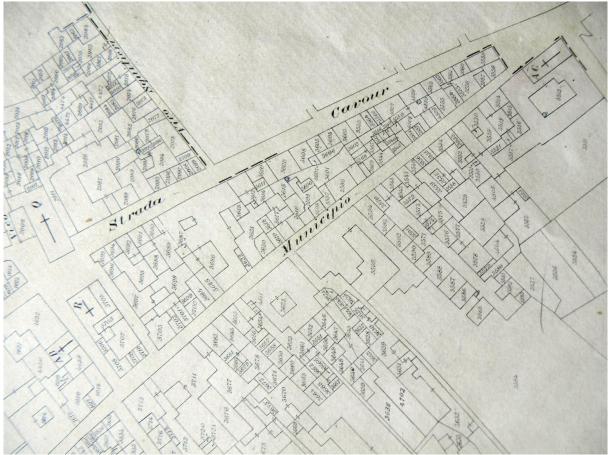
Fig. 8: Sarno, "Mappa urbana desunta dalla mappa originale rilevata nell'anno 1877 ed aggiornata nel 1903", foglio XX, allegato D, scala 1:1000.

structures. Similarly the original roofing – which presumably presented a pitched structure with the attic used as granary similar to the above mentioned *Palazzo Ungaro* – has been generally replaced with terrace roofing built with modern materials (bricks/concrete) and covered by a waterproof bituminous surface. The coating and stucco didn't have a better luck. The original lime plaster has been often replaced with cement plaster, this is confirmed by the evidences of decay on the facades. The external pavings – made either in beaten lapillus or in vesuvian stone (*pietrarsa*) slabs – still present original evidences worth of interest. Yet the original timber door and windows frames, with the exception of a few houses that retain the early 20th century frames, have been replaced with anodized aluminium frames. Fortunately the original carved stone features, such as portals and balcony slabs made in local gray sandstone (*tufo grigio di Nocera*), are still *in situ*.

The greater alterations, which are the main topic of the present paper, mainly occurred in the second half of the 20th Century and increased the intense construction activity that had started at the end of the 19th Century filling all the available urban void. Besides the traditional materials and features being generally replaced with modern elements and construction systems which were not compatible with the physics and chemistry of the historic fabrics, the open public and private spaces were considerable reduced. To the internal small courtyards (*vanelle*), with no consideration of the limited available surface, full height building extensions were carried out, the openings of balconies were sealed with glazing surfaces or built up with bricks and cement blocks. The external/opened staircases, which were important common areas, were built up too. These alterations led to a major heavy reduction of both natural lighting and air ingress to the interior areas.

Not compatible material use to facing and covering pavements and floors increased damp and moisture deterioration phenomena, as on the east side widely attacked by biological deterioration events. Missing gutters and downspouts maintenance work these problems recently worsted.

With the support of digital ortho-photography and thermography IRT surveys – thanks to Phd "Conservation of architectural heritage" Arch. Luca Ferri (BECON s.c.a.r.l.) – the building block analysis underlined lacks and malfunctions caused by contemporary renovation works. Especially it recorded energy losses provoked by not compatible material and procedure use (modern concrete structures, brick/concrete ceilings, chimneypots removal, not transpiring plasters, etc.), as well as damp, moisture, biology deterioration wall phenomena. Moreover thermography IRT survey detected building discontinuities, supporting historical development building understanding (Fig. 9).

Fig. 9: Sarno (SA), sample block, inner southern front. The thermography IRT proves the masonry stratigraphy.

6. Conclusions

Although as abstract of an outgoing research to elaborate methodologically the operation aspects of the traditional heritage energy efficiency improvement, this first part of the study focuses on proving how these aims are consequences of the removal of the deterioration effects provoked by recent building materials and procedure not compatible uses. Contrary to the energy behavior adjustment operations fixed to a standard performance, the energy efficiency improvement focus on proper building qualities compatible exploitation. From the energy viewpoint that means massive masonry behavior and bioclimatic functions exploitation, reducing consumptions. According to sustainable conservation the rest of these consumptions can be satisfied by energy renewable sources, using common central systems as well as the newest photovoltaic devices on films and woven. According to the same principles building eco-footprints can be reduced too, defining settings and perspectives without further on compromising historical heritage and environment.

Fig. 10: Sarno (SA), sample block, small inner court view.

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Measuring and Representing the city: past and present in Giovanni Antonio Dosio's map of Rome (1561)

Antonella MARCIANO
E-mail a.marciano@unina.it

Abstract

In 1561 Bartolomeo Faleti published Giovanni Antonio Dosio's map of Rome, just ten years after Leonardo Bufalini's plan (1551), the first printed map of the city. If Bufalini's plan reveals an antiquarian and conceptual vision, by including many ancient monuments depicted as complete even if they were only ruins or totally disappeared, Dosio's map is a step towards a new objectivity, it is a clear synthesis of past and present: contemporary architectures appear with their real aspect, such as St. Peter's dome under construction. The aim of this work is to focus on the method Dosio used to make the map, a landmark example of his strategy in measuring, drawing and representing the ancient and contemporary city. Furthermore, other specific topic is his ability to synthesize single volumes drawing few signs and giving a lot of informations with less. This will be shown through some examples from his great graphic corpus and by reconsidering his tecnique in the cultural context of late sixteenth – century Rome, suspended between antiquarian tension and the beginning of technical and scientific survey.

Key words: Dosio plan Rome topography

Ancient Rome inspired researchers, artists, authors, and as it's known, it's in the Renaissance that an increasing attention on the rules that drive the classical architecture was manifested, and the interest in the ancient city is at its maximum curiosity. At the end of the fifteenth century even the urban survey is again considered to be an essential discipline to understand the city and the territory, expecially for military purpose. At the same time there is an evolution of the direct and indirect measurement systems, and begins to take place the treatises of the subject. Regarding this we can remember Leon Battista Alberti's *Descriptio Urbis Romae* of the 1450, of which the related drawing, no more available, included the perimeter of the city consisting of the Aurelian Walls, and some architectural landmarks, while we have the scripts accompanying the map, where the working methods and surveying systems are explained. The instruments used were principally a protractor fitted with magnetic needles for land surveying, a graduated mobile radius, a rod target and a plumb bob [1]. As far as we know, the plan's scheme was based on a virtual circle that lays out surrounding the city so that all points within Aurelian Walls can be referenced by the circle's coordinates. Leonardo Da Vinci's map of Imola, designed for Cesare Borgia in 1502 can be considered the first modern plan of an italian town, but for its uniqueness it has remained an "*unicum*" example for centuries, not only for choosing the orthogonal view, also for the precision with which the individual buildings were shown, the differently coloured yards of each block, and the most important buildings of which the plan is also delineated. This map anticipates nearly two centuries the eighteenth cadastral mapping of property. During the XVI and XVII century, the development of surveying instruments and the possibility of measuring precisely the distances between buildings for plotting them on a map, favored numerous publications whose audience was made up by antiquarians and scholars who exchanged information on the ancient Rome, by the pilgrims flocking to the capital of the christian world, to those who admired the magnificent modern architecture of the "*Roma Risorta*". Since 1551 to 1650 many new city maps were published, the production increased especially in the Holy Years (1575,1600,1625) [2]. Many of these maps went lost, others are literally around the world because were sought after by many collectors and some of them became also unavailable. Among the authors of

the plans there is the young architect Giovanni Antonio Dosio (San Gimignano 1533 - Caserta 1611) [3] that left his native town San Gimignano, not far from Florence, to go to Rome, where he first worked for Raffaello Montelupo, his first mentor, then under the protective wings of his first clients and patrons, Torquato Conti, Annibal Caro, Ippolito d'Este, devoting himself to antiquity and to contemporary architectures. His presence is documented by the most important roman sites as St. Peter, the Campidoglio, and Del Monte's Chapel. We also can find him designing and setting up the garden with ancient statues at Villa Giulia and at the casino of the Boschetto in Vaticano. In this period there were available polymeters, surveying magnetic compasses and primitive theodolites, and Dosio was a skilled surveyor. In 1561 he drew for the presses of the publisher Bartolomeo Faletti [4] a perspective map of Rome, engraved by Sebastiano Del Re, with a north-south orientation, the south on the top, where appears the written "*Meridie*". The map is an engraving with etching and measures 42X 55,5 cm [5]. At lower left there is the inscription: "*GAB. PALAEOTIO PONTIFICO STLITIB IUDICANDIS DUODECIMVIRO INTEGERRIMO. Expressi iandudum mi Reuer. Dne meis aeneis tabellis Io. Antonii / Dosii floren. manu delineatis Urbem Romam Urbium, ac Terraru,/ gentiumq, omnium, Reginam qualis qualis his temporibus apparet,/ et, ut ea in lucem prodiret audentius, tuo nomini dicata exit, quod hu-/ iusce Urbis te amantissimum fuisse semper accepi: proinde editam / tibi, do, dicoq, ac trado. Vale Barptolaemei Phaletii tui nominis semp / obseruantissimi memor. Romae Calendis Ianuarii MDLXI. Sebastianus a Regibus Clodiensis in aere incidebat*". Dosio's map represents Rome around the 1555, period in which Giulio III (1550-1555), born Giovanni Maria Ciocchi del Monte, died after a short but intense pontificate, spent in excesses and complicated by hard health problems: *«22 marzo: alle ore 19 di detto dì morì Papa Giulio III nel Vaticano, e sparato vogliono dire che morisse per le troppe medicine che usava pigliare*+[6].Giovanni Antonio Dosio's bird's-eye view shows an original orientation of the map, which tends to put in a nearly equivalent position Villa Giulia [7] and the Vatican, both in the foreground at the edges of the table, the first on the left and the second on right. A short foreground cortege is represented while moving to the villa. Villa Giulia and its monuments were illustrated by chalcographs during the second half of the sixteenth century. Dosio's one was defined by Rodolfo Lanciani "*the best perspective map*+[8] for the precision with which the Villa is shown, followed by the map of the casino with the garden published by Antonio Lafreri. The Villa, whose current appearance is similar to the one of the XVI century, except for the two wings added afterwords, was built on two floors, a block that dominates a big portion of land cut off from the path that led to Via Flaminia. It appears for the first time in Leonardo Bufalini's map of the 1551. This and Bartolomeo Marliani's map have in common the orientation, on the left at the top there is placed the north and at the lower end the west and the Vatican. Villa Giulia has a strong urban characterization.
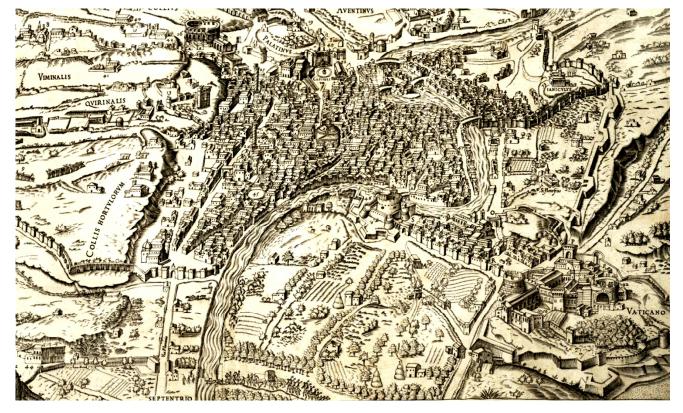
Fig. 1: Giovanni Antonio Dosio's map of Rome, 1561. Detail

As an araldic tribute to the owner "del Monte", it stands on a small hill that is depicted in the frescoes of the Villa on the main floor, like a hill from which you could enjoy a wide view around [9]. Its scenical function, the physical connection and the visual dialogue between the places of the religious and secular power of the contemporary Rome, are enhanced by the rotation of Dosio's map. Dosio's choice tends to appreciate the importance of the papacy and the figure of Giulio III. According to some generally accepted assumptions the map would set a date and a particular moment, the death of the Pope. In this hypothesis, the bottom figures who go towards the villa would represent the funeral cortege. But this hypothesis raises some concerns, in fact we wonder why Dosio, according to his attempts to be part of a high society environment, had to make such admirations towards a defunct Pope, much criticized by his contemporaries. To my mind the cortege could simply represent a moment of Giulio III's life. He had the habit of tracing the river from the Castle to Albero Bello until Porticino. He used to cross the river on a boat driven by the faithful Andrea Schiavone. He also ruled the Papal barges, used for the transport of many art works, such as marble tables which decorated the Villa, some of which were elaborated by Raffaello da Montelupo. When the papal cortege got on the left bank of the Villa, after climbing a short flight of steps, it found a shelter under a shaded bower that was linked to the portal on Via Flaminia, which Giulio III had to cross to find his property. The bower is clearly legible in Dosio's map and also in Venetian cartographer Giovanni Francesco Camocio's map, later in 1969.The days when the Pope visited the works directed by Vignola and supervised by Baronino, were days of celebration, in fact memorable meals and festivals were held in the Villa, documented by the records of the expenses of the Apostolic Chamber. So many expenses, that a few months after his death, even though his brother Baldovino del Monte on September 16th in 1555, was proclaiming his natural son Fabiano as the heir, in August 1556,during the pontificate of Paul IV, the Apostolic Chamber seized everything "*pel motivo che i beni ereditarii erano stati acquistati e migliorati con danaro sottratto al pubblico erario* [10]. The cortege designed by Dosio, shows a kind of spanish sedan chair with two horses, one of which is in the front and one in the back, followed by guards armed with spears. The boat of the faithful Schiavone is waiting. Another interesting feature is the parallel of the fresco on the main floor of the Villa, which represents the view of the same building, as used in that period, attributed to Taddeo Zuccari. In this fresco, which certainly captured Dosio's attention, the building is shown in the background, the papal sedan in the foreground followed by the guards armed with spears. Practically the same type of cortege depicted by Dosio. So the date of March 23rd 1555, the year of the death of the Pope, can't be used as the exact date of the inspiration of the view of the city, furthermore, the nature is clearly shown in a moment of full summer bloom. Probably the choice of the orientation of the map and the celebration of Pope Giulio III, in addition to Dosio's will, who also went often to the Villa Giulia, must be connected to Gabriele Paleotti's dedication, appointed as legal secretary by Giulio III.

Gabriele Paleotti in 1550 [11], the year during which he was nominated, edited the volume *"De nothis spuriisque filiis liber in quo omnia quae ad hanc materiam pertinet copiosissime tractantur".* The first pages are filled with generous dedications to Pope Giulio III and to Alessandro Farnese. He came from Bologna, and had studied there. At the age of twenty one, he supported a legal dispute in the Basilica of San Petronio dedicating it to Cardinal Alessandro Farnese, Pope Paul III's nephew. Witnesses tell how the event was followed by a particular audience. Pope Paul III himself took part in the ceremony as he was going to Bologna to meet the Emperor Charles V at Busseto. The Pope was accompanied along his trip by his nephews Alexander, vice-chancellor of the Roman Curia, who to the theses were dedicated, and by Ottavio and his cousin Guido Ascanio Sforza. The three young men had studied in Bologna at the Ancaran College.

Fig. 2 – 3: Giovanni Antonio Dosio's map of Rome, detail with Villa Giulia, compared with Taddeo Zuccari's fresco

Also Gabriele, with his brothers, had been admitted to attend the same boarding school where the Farnese cousins used to study. With the dedication to Cardinal Farnese, he pointed the old fellow student.The occasion for him to highlight the close link with Pope's nephews was again then presented four years after the dispute, when, having completed his legal studies, at the time of pronouncing the public findings in order to obtain the enabling to read at the City gymnasium, Gabriele reproposed the same dedication addressed a few years before to Cardinal Farnese: the relationship established between Farnese and Paleotti during the years of training, offered Gabriele the opportunity to create a valuable partnership for the benefit of his future career [12]. In March 1565 Alessandro Farnese favoured Gabriele Paleotti in obtaining the rank of Cardinal. Years before, the young Alessandro Farnese was the promoter of the application of Del Monte, during the suffering conclave that elected him as Giulio III. He had been a filo-Bolognese Pope for his whole brief pontificate. This gives a clearer idea of the eventual links between Paleotti and Julius III. Pope Giulio III's pontificate (1550-1555) was remarkable for the occasions that the Pope had been able to give to the artists of that time. Proclaimed on february 7th in 1550, he immediately began the works for Del Monte's chapel in San Pietro in Montorio on the Gianicolo, headed by Giorgio Vasari and Bartolomeo Ammanati. The great Michelangelo was the "*garante fiduciario della committenza*" [13]. Maybe because Raffaello da Montelupo was initially involved in the project as a sculptor before the coming of Ammanati, also Dosio managed to be present. One of his well-known drawings tells about a construction phase. So, the young Dosio frequented the construction sites of Giulio III during his early Roman years of apprenticeship, but it is not known whether alone or accompanied by Raffaele da Montelupo. Certain is that the gallery of statues and antique pieces of Giulio III remains memorable and returns in Dosio's sketchbooks [14]. Since then Dosio, despite the solid reputation as an architect designer, didn't miss not even the opportunity to engage the restoration of antiques and trading marble for his new customers, as evidenced in the correspondence with the florentine Giovanni Niccolini in the occasion of the project of the homonymous chapel in Santa Croce [15]. In any case, Rome's map was prepared before its publication and during the pontificate of Giulio III. About the graphic details, the bird's-eye view is inserted in the vein of the renewed interest for the description of the city. The orthographic map of Rome published by Bufalini in 1551 [16] who died just a year later, is the first modern map of Rome prepared on the basis of a campaign of surveying. It shows an horizontal ground plan with all elements shown to scale. Contrary to measured appearances, the map presents a specifically antiquarian vision of Rome. It is an ichnographic map [17] that included the plans of ancient monuments, in some cases completed and modified by the imaginative effort of the author. A map, although almost simultaneous to Dosio's one, designed in a completely different way, different for the technique of representation and for the results. In 1553, Pirro Ligorio [18] published a perspective map or better a pseudo-perspective map, which facilitated the reading of the urban structure with a plastic emersion of the architectural volumes between the urban walls, green areas and road network.
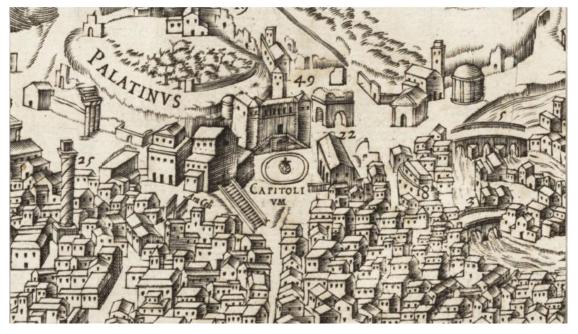
Fig. 4: Giovanni Antonio Dosio's map of Rome, detail with Campidoglio

As noted by Christian Hülsen, Bufalini influenced Pirro Ligorio, however it turned out too imaginative because of the incredible amount of temples and antiquity contained within the circle of the Aurelian Walls. Is also very interesting the bird's eye view plan, designed by Ugo Pinardo and published by Antonio Lafreri, where many buildings are represented with remarkable fidelity. No wonder then if the work of Pinardo were often imitated and copied. Dosio's bird's eye view, was independent from that of Bufalini, and was more accurate than that of Ligorio's, but perhaps because of its unusual angle in favour of Villa Giulia it has remained isolated and without followers [19]. Instead, a critical source which Dosio drew on was Bartolomeo Marliani's map of Imperial Rome , included in the 1554 edition of his topography, a prototype and a source of inspiration.To understand the reasons for Dosio's map we need to consider the professional experience of the author, his intellectual ambitions, the cultural climate of 16th century Rome and its converging spheres of interest, the knowledge of the ancient city and the celebration of the contemporary city. The classical monuments are represented as ruins, with a logic of truth that can be overlaid on the findings and views of the collection already called by Hülsen "*libro della antichità*". "Book" because all the views could logically be part of a sketchbook, composed from the arrival of Dosio in Rome until the time when he took other commissions and commitments, leaves his studies and the surveys of the antiquities to express himself through the architecture designed and built. But which were Dosio's skills during the drafting of the plan, potential clients and patrons, his knowledge in the field of surveying and his knowledge of the city, its monuments and its constructions? Dosio completes a work in his early twenties, which requires a high degree of technical competence as a surveyor and data collector. According to contemporary sources, he was engaged in military works of architecture working on the fortifications of Castel Sant'Angelo and at the service of Torquato Conti. We must also imagine that while working on the fortifications of Castel Sant'Angelo he learnt the art of measurement and thus gaining a significant and direct knowledge, at least in part, of the defensive circuit of the urban area and certainly the major urban transformations. These architectural and urban renewal campaigns were often accompanied by the notion that modern Rome had equaled ancient Rome, which the educated elite recognized its greatness now. A principle undoubtedly shared by Dosio who had filled his sketchbooks of important ancient and contemporary architecture in equal measure. In his map, Dosio shows the construction of the dome of Saint Peter, with double columns laid. We know that the construction of the drum was started in 1554 with the supply of stones of Fiano [20]. We find Campidoglio square, the walls and fortifications, thermal baths, churches and major buildings of the city, with special attention given to the surveys of the most famous buildings he has directly already measured. Probably He made direct measurements of portions of defensive perimeter, in any case, there were available many accurate plans that recorded the walls for military use. Certainly, He had to fix the position of the most important landmarks, by using a primitive theodolite with a protactor, determining the bearing from point to point, by means of several station points and then connecting the results using the well - known triangulation system. The mutual distances between the monuments attests the accuracy of the topographic measurements made upstream, while the architectural volumes, seen in perspective and elevation, are oversized and are highlighted with a more pronounced light and shade effects. The ancient monuments individually detected by Dosio are present on the map as isolated and highlighted. For example, on the south of the Campidoglio, less than 500 meters, we find the *boario forum* with the monopter temple of Portuno, that for the relative proximity Dosio draws almost adjacent to the Campidoglio, without interposing any obstacle, neither constructions nor orographic obstacles, as that the Roman forum and the Boario Forum are separated only by the great emergence of the Campidoglio, with the Michelangelesco oval already marked and the equestrian statue in the center, the stairs in Palazzo Senatorio's facade. At the boario forum we find the four-faced arch of Giano also designed by Dosio, still conserved by the church of San Giorgio al Velabro.

Like many maps of the time this is characterized by the strong sign of the Tiber river. The civil construction is not strongly characterized, only with the view engraved by Antonio Tempesta (1593) we have a first urban map that depicts the minor buildings with a certain attendibility. The Roman countryside is plotted in the most characteristic elements. A few years later he worked at the Palazzo Conti di Poli (1563), whose client, Torquato Conti, is a collector of antiquities involved in the excavations of the *Forma Urbis Romae* [21]. This consists in a marble plan sized 18.10 in width and 13 meters in height, composed of individual slabs applied on a wall of the *Forum della Pace* adjacent to the Basilica of Saints Cosma and Damiano, dating back to the Severian era and at a later time in 203, date of the construction of the Septizodium, which appears in one of the fragments, and prior to 211, the year of death of Septimius Severus. The presence of Dosio, which makes copy of *Forma Urbis*, is echoed by Gamucci in the *Libri quattro dell'antichità di Roma* who warns about the *Forma Urbis*: %*sè ritrovato nè tempi nostri per M. Giovanni Antonio Dosi da San Gimignano*+ [22] This discovery will be crucial for the evolution of later roman topography and cartography, and it was important even for Dosio's career. The search for success in the field of architecture remained a constant inspiration, as evidenced not only by early recognition of the Gamucci and early patrons, but also by eloquent dedication to Cosimo I of *Urbis Romae aedificiorum illustrium quae supersunt reliquae*, an elegant repertoire of Roman antiquities drawn for the engraver Giovanni Battista de'

Cavalieri. That Dosio had expanded his career from a sculptor to a designer and architect well before the seventies is now certain. Borghini, his biographer explained that he entered at the service of Torquato Conti: *"...è lavoro ad un suo Castello molte cose di stucco, di marmo, e servì detto Signore per Architetto sopra la Fortezza d'Anagni; perciochè egli delle cose d'architettura intende molto, e fece arme di marmo e altri lavori per detta fortificazione"* [23]. It is Certain that between 1565 and 1566 Dosio signed financial documents as *"Io Gio. Anto. o Dosio architetto di detta fabbrica."* In a letter dated July 22, 1564, Annibal Caro answered Torquato Conti in Anagni" *Quando questa mattina ricevei la lettera di V.S.I.M., Giovanni Antonio architetto era di già partito alla volta sua, e penso che a l'arrivo di questo sarà capitato. E con questa occasione ne le raccomando, essendo molto mio amico, e molto più suo servitore. Se V.S. ha modo di fargli alcun bene, certo sarà ben allogato, essendo un virtuoso, e da ben giovene+Di Roma, alli 22 di Luglio 1564* [24]. Annibal Caro, as is well known, will dictate the iconographic decoration of Caprarola, Poli, the Palazzo Orsini in Bomarzo. We point out the existence of later plan, dated 1562, attributed to Dosio. This plan, entitled *"La città di Roma deliniata nel ponteficato di Pio IV. L'anno MCLXII 1562.+*is the size of 40x54cm in which putting the north on the right, the Vatican is in the background at the top right side, Villa Giulia is cut off from the plan, the Aurelian walls stand out, reflecting the interest shown by Pio IV in strengthening the fortifications. In fact he was devoted to strengthening the defense system of the Vatican even having new doors built. Dosio's map of Rome with its realistic view, its original orientation, fixes a physical and conceptual path of experience of Dosio as a designer of the ancient and modern. Although this has not had a great spread, it was successful in launching the artist towards new commissions and new opportunities, demonstrating his skills as a draftsman and his technical abilities. It also demonstrates his sensitivity to the urban space, that he is able to read and express with few strokes, highlighting the main charateristics, capturing the essential aspects. Dosio communicates a lot with less: a city in which some elements and architectural aspects served as optical milestones for the next city-planning of the Baroque era, when these targets will be enhanced by the axes no longer virtual but real.
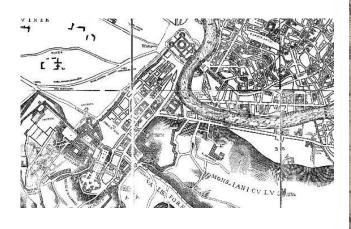
Fig. 5: Leonardo Bufalini's map of Rome, 1551

Fig. 6: Reprint of a prototype engraved by Ambrogio Brambilla and published by Claudio Duchetti in 1590

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To KNOW so as to RE-COGNISE and NOT FORGET

Cristiana BEDONI
Dipartimento di Progettazione e Studio dell'Architettura, Facoltà di Architettura, Università degli Studi Roma Tre, Roma, Italia
bedoni@uniroma3.it

Abstract
The current historical moment necessitates a reflection on the integration of knowledge for the purpose of identifying strategies to improve human life, the environment, and the memory of man's wealth for the future. The integration of scientific and humanistic knowledge, in the acquisition of data from the building to the territory, may allow a greater awareness on what, why and how to preserve, modify, demolish, and protect. But is this integration, accompanied by direct investigation, and research in the archives, and a rigorous analysis of the data collected, always sufficient for an awareness and knowledge of the real ways of becoming of history, of the form and the meaning of Architecture in the past, present, future? We know that this is not so obvious. The knowledge that one thing *is* does not mean knowing *why it is* and why it *is* precisely as it appears. Since "*form in the strict sense is nothing more than the delimitation of one surface by* the other" (Kandinsky), we cannot really know why similar cubic meters of matter can have so many different meanings; or why don't buildings which have the same historical dating, geographical location, stylistic choice, formal and functional type, have to the expected extent a similar artistic and semantic quality. But perhaps it is precisely this, or at least this too, that we have to seek and understand: what is it that makes the differences not a only a matter of chance? Why is it exactly there, precisely with that shape, on that stratification?

Key words: knowledge, memory, importance of history

1. To know to understand the existing reality

Fig. 1: Didymes, Temple of Apollo, 325 b.C.

The present moment, now in a severe crisis of degradation which cannot be easily overcome in the short period, obliges all of us to think deeply on the general sense of current human activity for the present and for the near future and in our field of work on the specific meaning, goal and way of intervening in architecture, cities, and territory seen as entities and places which will have to host and sustain our human future. "Modern" technology has certainly shortened, and will continue to shorten, the amount of time needed to transmit and integrate knowledge coming both from different technical and subject sectors, and from different geographic and mental places.
But perhaps even now man isn't yet – and certainly all individuals now operating still aren't - sufficiently prepared to perform the correct (and useful) reading, interpretation, connection and choice of intervention among the many different pieces of knowledge to decide the right operative strategies for his species, country and future; to decide the right operative strategies for a focused improvement of man's life, environment, memory, and memory's wealth for the future; strategies able to restart or strengthen processes of "social" growth and re-enforcement of guiding principles which have permitted man, up to now, to live, grow and improve through the centuries of his existence and in the territories he inhabits (though not all with the same quality and standard of democracy). In our specific field of operation, too - architecture, city and territory – we must, without taking anything for granted,

Fig. 2: Metaponto, Table of Palatine,
VI cent a.C.

Fig. 3: O. Schlemmer, The two
epic figures, 1927

Fig. 4: Efeso, II cent. b.C.

continue to ask ourselves about the meaning, the ways and the goals of our doings. It is true that the integration of both scientific and historical knowledge for the acquisition of data on the building, the city and the territory allows more awareness on the what the how and the why to intervene, preserve, modify, destroy, reconstruct, and protect but…

But we must always ask ourselves if (and how much) a close analysis of an existing reality done through direct investigation and archival research, (and rigorous analysis of the data gathered) gives us enough information to be aware of the concrete ways of the material becoming of architectural history, form and meaning and therefore to know the value and the quality of "that" architecture or city studied, and to know the deep meaning of its conservation, transformation, demolition, integration…

We must also ask ourselves if the data gathered can give us enough information to decide case by case the specific interventions – new building, restoration, urban development - to achieve the pre-fixed goal of that
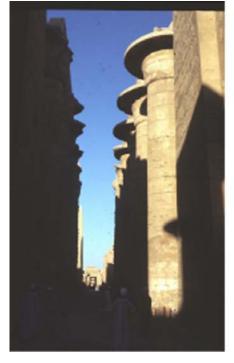
Fig. 5: Luxor, Colonnade of Ameno-
phis III, about 1400 b.C.

Fig. 6: Hentze and Richter, Chicago
Tribune's competition, 1922

Fig. 7: London, industrial archaeology
in urban area, XIX cent
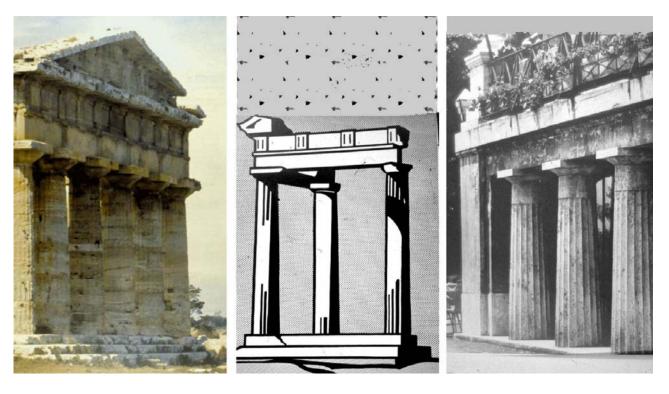
Fig. 8: Pestum, Temple of Poseidon, 450 b.C.

Fig. 9: R. Lichtenstein, Temple of Apollo, 1965 ca.

Fig. 10: Rome, G. Valadier, Casino of Pincio, 1816-37

intervention on that "architecture" or city…but also to achieve the protection to the future of the value that generated, maintained or transformed that architecture.

But we know this isn't easy. We know that the knowledge that something *is* does not mean knowing *why* it *is* and why it *is* precisely as it seems.

Since "*form in the strict sense is nothing more than the delimitation of a surface by the other one*" [1] we cannot really know why analogous cubic meters of matter can have such different meanings; or why do buildings that have the same historical dating, geographical location, stylistic choice, formal and functional type, not have necessarily the same artistic and semantic quality?

But perhaps it is this, or at least also this, that we need to investigate and understand: what makes chance not just chance? Why is it exactly there, with that exact form, with that stratification?

Fig. 11: Rome, A. Brasini, frontespiece to Con- ciliazione's street, 1940

Fig.12: C.Moore, Memory and Architecture, 1977

Fig. 13: Piacenza, A.Palladio, Co- gollo House, 1562
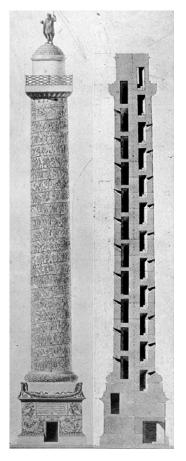
Fig. 14: C. Percier, lithography of Traiano's Column , 1790
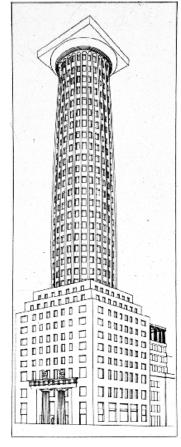
Fig. 16: A. Loos, Chicago Tribune's competition, 1922

The images that accompany the text are a visual explication of this essay's questions.

What "value" of architecture must not be lost? Must we save the historical prototype in the material reality of its origins?

Or must we save its being, or having been - the idea-model - in the evolutionof critical thought and of human knowledge?

1.1 Knowledge and memory for the *project of transformations*

The question again is: are surveys, archival research, "diagnostic inve-stigations", sufficient instruments of knowledge for the project of inter-vention on what exists?

Of course the scientific instruments of knowledge for a project of ar-chitectural restoration or transfor-mation are determinable or perhaps already determined, though they can obviously be perfected.

But does this type of analysis always tell us the reaeason for the existence of the architecture under examination? Does it tell us the meaning of its having that form? Does it tell us why we are trying to maintain it and therefore how it is being restored? Is architecture's being that linearlly given by what is seen there?

And is its knowledge so deterministically defined by what is shown there? It's not so simple. Knowing its exact name and knowing the exact measurements and characteristics of its meters tells us little about why its form is exactly that one and not another one of the forms that was there possible.

Simple and linear knowledge is too easy.   "Knowing" is not really understanding why similar cubic meters of matter manipulated by man   can have such   different historical and   aesthetic value, or understanding why buildings built even in the same place, historical period with the same stylistic choices and formal and functional typology don't necessarily have the same artistic and semantic quality: "Doubt" cannot be eliminated, also because we know from history itself that "*the city is a whole in which many pieces can be changed without anything happening*"*,* or at least without the city itself dying. *"This has been the case, century after century, up to now"* [2].

So the first question is how to choose what to preserve. This must be done before deciding "how" to restore. This is because the deep meaning of the work on which we want to intervene and its cultural importance   cannot   linearly   be deduced through patient archival

Fig. 15: Lubiane, J. Plecnik, street lamp, 1926

Fig. 17: Rome, A. Brasini, Flaminio bridge, 1938-51

Fig. 18: C.N. Ledoux, Bour-
neville Park, 1785

Fig. 19: Nicolas De Lermessin, The
Arcimbold, 1695
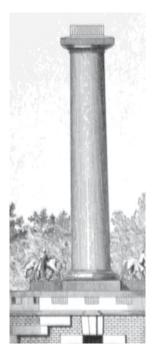
Fig. 20: Rome, A. Brasini, INAIL Palace,
1929

research, careful analysis of the material, and serious diagnostic tests.

The material, temporal and spatial beingness of an existing piece of architecture, the fact that we can list and quantify what it is made of (matter, technique, style, typology, function, dimension…) are of course real data.

They are necessary and objective parts to its beingness, to how it appears, and therefore to our aware way of intervening. We need these data to fulfil our desire of knowing and to intervene to preserve materially that piece of architecture.

But these data are not enough to tell us why we need to preserve that very piece of architecture among the many that exist. And these data cannot tell us what of that building we should preserve/restore of its whole history which through the centuries of its existence has over time marked and modified it.

The data just mentioned are similar to those we need (would need) to understand (and restore) a bee-hive, an ant's nest, or a coral reef.

These dwelling elements are similar to those of other animals and to their way of living together. These are products of the work activity of the different animal species; this activity modifies the naturalness of the environment in which these animals live to produce an objective improvement for their living together. These dwelling structures have also been passed on from one generation to the next through history and inform us

Fig. 21: R. Bofil, residential complex
Les Colonnes, Paris, 1984

Fig. 22: Villa Adriana, Nympheos
of Island, Tivoli,118-125

Fig. 23: A. Brasini, INAIL Palace, Rome
1929

Fig. 24: Milan, D. Bramante, Rectory of S. Ambrogio, 1492- 1499
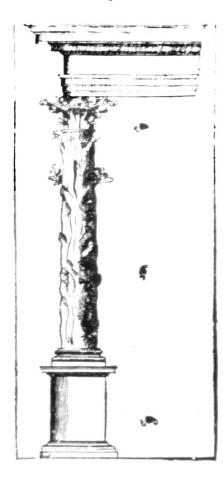
Fig. 25: P. de l'Orme, Naturalistic Order, from *Premier Tome de l'Architecture,* 1568

humans about "their" way of living in groups.

Every living species, with more or less awareness, transmits to itself the goals and ways of its inhabiting both in the case that it stays over centuries in its original place, even if it can continually modify the dimensions of its primitive nucleus, and in the case of migration and founding new nuclei in different geographic and climatic places.

However, despite these and the many other possible parallelism with human activity, these constructions are not the same things as our cities.

At least not for us human beings, not for the meaning we assign to our being and operating on Earth: our human architecture exists in its *ways* of being because there is a meaning, or a will to meaning, in its production, transformation or conservation; "*among the meanings of the word tradition there is also the one coming from the Latin tradere : 'to take further'. In other words tradition also means looking ahead, but starting from the past*"[3].

This goes much beyond the primordial necessity to survive and to defend our species. This is what, more than its specific forms, distinguishes man's house and his architectural settlements from the many other *dens,* and their agglomerations that every animal species builds on our planet*.*

What is essential in man's buildings lies in the speculative value of the formal models; it lies in the stable correspondences, which need to be defined and verified each time, between the ways of taking *form* through *matter* of (man's) architecture and the *meaning* that it expresses through that "form and matter".

It's to the ethic and aesthetic values of architectural *things* and to their correspondence to the material data that these values bear that we humans entrust our message. And it is in this that we recognize our historical on-goingness.

It is in the interlinking of thought and action, imagination and work, meaning and goal that *homo faber* is completed by *homo sapiens* and that his learning becomes knowledge and his knowing becomes recognizing and memorizing: now he attributes meaning and sense to his work which goes beyond the indispensable solution of contingent problems (surviving, residing, working, defending…) and permits the re-cognition, if and when it is there, of the ethic value and of the aesthetic quality in the human constructions that precede him and/or are contemporary to him.

These constructions were consciously wanted and produced and it is among these that he (homo sapiens and faber) moves and acts.

For all men "*a place is never only 'that' place: we are also a little bit that place. Somehow without knowing it we had that place inside us and one day, by chance we got there*" [4]. But it is for this reason that the architect *must* become aware and therefore able to know, re-cognize, and consciously operate in the different *places***.**

Therefore we need *"Matter, Form and Technique"* alongside *"History, Style and Type"*, for the building of knowledge about architecture, its construction, preservation and restoration.

But then what?

Is the relationship between on the one hand the abstraction and imagination of architectural project principles – and of the aesthetic / formal premises of architecture – and, on the other, the concreteness of its material beingness – and of how it is in the gravitational heaviness of its materials and in the correspondence of the techniques that form it to the strict laws of statics – linear and univocal or is there something else? Is there something else which is able to give meaning to what is seen there to who sees it?

Is there something else which can give significance, not only a functional one in a strict sense, over and beyond simply a reason, for its being there in that precise geographic and urban place and in that precise historical moment, with those forms and not others, with those particular dimensions and those precise materials?

Fig. 26: J.Soane, Barn à la Poestum
Warwickshire, 1912

Fig.27: J.C. Escher, *Doric Column*, 1945

These are of course all necessary and objectively describable and measurable elements. They concur to define the material, metric, and visual characteristics of what exists there, of what exists everywhere, of the temporal and spatial uniqueness of what exists.

But the architectural response to the primary necessity which determined the demand, and its building organization, even if always related to the technological knowledge of its historical moment, have deeper implications, less linear meanings, and solutions which are never univocal or aprioristic with respect to the infinite number of other possible forms, materials and dimensions which could have analogously responded to what there was asked for and to what there was experienced and is being experienced.

But maybe it's not a coincidence that they didn't do one of the alternatives and that there isn't one of them there. Maybe this is exactly what, or what we also, must investigate and comprehend: what is it that makes chance not pure chance? Why is it right there, with that exact form, that colour, that material?

Maybe it's in this investigation of the relationships between the existence of the meaning (abstract) and of the way (concrete) through which man builds his space and perpetuates his memory that we will be able to reach an understanding, even a rational one, of why one architecture is better than another. Why is one of these architectures, more than others which also exist (or have existed) more representative of a historical, political, ethic, or aesthetic moment even when these moments have lost some of their relevance?

Why do they continue to exist and to function in the urban context while other buildings which have analogous characteristics of formal, dimensional and constructive appearance get destroyed, or forgotten or transformed both in their meaning and in their matter?

Architecture is undoubtedly concrete matter, real measurements, objective tri-dimensional forms which get combined and are therefore unique.

But not only. Architecture is a measured and direct response to the physical and biological necessities of man, which can be resolved again and again in time. But this still isn't all.

Architecture is culture, history, testimony of man's being on Earth. In this it can be objectively recorded. But it still isn't only this if it is considered as an objective temporal sequence of happenings.

Architecture is also something else. Something less linear and univocal than the more or less elementary equations of form-function-history or matter / dimension / technique, which certainly are
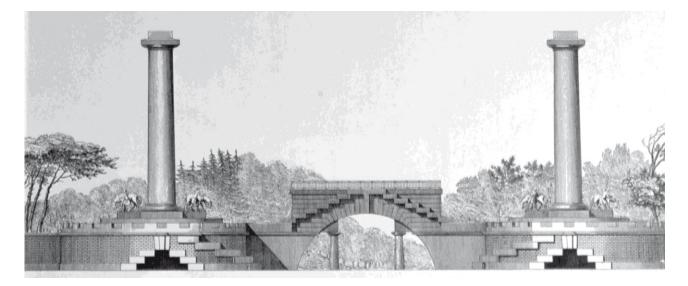
Fig. 28: C. N. Ledoux, Bourneville Park Gate, 1785

Fig. 29: J. Bowring, Freemasonry Initiation, 1819

Fig. 30: Jerash, Oval Piazza, end I century

relevant. Architecture as form, matter, use and meaning, and the geographic, historical and mental places which host this architecture and which are characterized by this architecture are also something else.

They are perhaps less linear and absolute than the modern rational certainties.

They are something else and probably more complex and variable than the univocal and repeatable answers that are allowed by the careful but acritical respect of the rules for "good building" of the academy and tradition.

It is something else that is always and no matter what in dialogue (even if the how and outcome of this dialogue are not always foreseeable) with the collective historical memory, with the individual subconscious, with the perceptive laws, with the subjective aesthetic pleasure towards what there is seen, experienced, lived in, and passed through.

Therefore, without diminishing the fundamental importance for any project (whether to build something new or to preserve, or to restore) of individual responsibility and autonomy of choice, and of the seriousness of the gathering of the data needed for the project, we must never forget the principles through which man, as a human being, sees, perceives, memorizes, learns, thinks, elaborates, comprehends and transmits to himself and to others.

Since "we, human beings, never think alone and we never think without instruments"[5], our ability to recognize reality and therefore to organize our intervention in it is structured also by, and on, systems of signs – which are symbolic, mimetic and metaphoric – which "stand for", which "represent", the objective and the subjective of what surrounds us, of their meanings, of their apparently obvious positive or negative value, their value of beautiful or ugly, of continuity in tradition and in history or of rupture towards the future and the new.

The reading of reality, not only urban reality, just like our architectural thoughts, are tightly linked to our memory of other forms, the suggestions of other spaces, historical citations, or negation of the past, the reinterpretation of what already exists or the invention of what has never been seen before, faith in the becoming of appearances or the certainty in the stability of being.

And our architectural thoughts take their form from these. Perhaps they are our thoughts and our architectures.

This is so because, whatever our individual position, "*without memory man cannot trace any history, he cannot know his becoming in time,… Factual reality, images, memory, language and history are correlated along all of the Western tradition, within a single horizon of knowledge: what is real and factual is represented in the conscience, both individual and collective, in function of an understanding that occurs through permanency, in images and within the vast territory of memory, not only of what happened but also somehow of its 'being present'. Therefore what has once been is potentially always present, in image, in the individual and collective memory*" [6].

Therefore we can only take a position and make personal distinctions on signs and values recognized in, or attributed to, what, not only materially, exists; but it's on them and with them that our positions and distinctions are
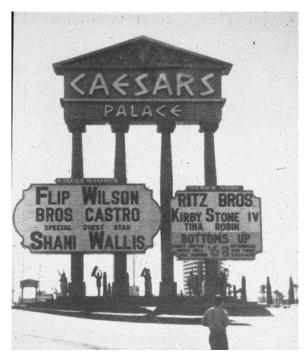
Fig. 31: Los Angeles, Caesar Palace Sight

formed and expressed.

This is so because our cognitive capacity and our activities to accomplish are profoundly structured, as value and behavioural judgements and as reactions against what lives and is seen there, by the whole network of institutions in which we grow up.

Our mental procedures are constantly articulated by the languages we speak and by the forms in which we grow up. These languages and forms are superior to our individual being and for a large part indifferent of our individual doing.

They speak to us of logical and organizational processes, of principles, judgements and selections which centuries of ethical and aesthetic history have perfected and privileged.

All of this is what we constantly find in existing architecture, independently of its form and of its historical period, of the style and of the building material through which it becomes concrete.

It is its "historical ways of being", both in meaning and in aim, which, perpetuating itself underground for centuries, or perhaps I should say under the exterior surface of buildings, tell us the whys and hows and the quality, and the value, and the meaning of each single piece of architecture independently from the specific "appearance of form" with which they are each time realized.

[1] KANDINSKIJ, Vasilij Vsilevič, 1912

[2] POZO MUNICIO, Josè Manuel, Survey as a way to build the future rather than preserve the past, in *DISEGNARE idee immagini / ideas images*, n.25, 2002; pp. 72/81 - ISSN 1123-9247

[3] POZO MUNICIO, Josè Manuel, op. cit.

[4] TABUCCHI, Antonio

[5] LÉVY, Pierre, *Il virtuale*, Milano 1997

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MORE **COMPLEXITY,** LESS **CONTRADICTIONS**
Concept Maps and Contemporaneity

Maurizio UNALI
Dipartimento di Architettura, Facoltà di Architettura, Università 'G. d'Annunzio' Chieti-Pescara, Italy
m.unali@mclink.net

Abstract
The dawn of the new century appears to be characterised by revolutionary transformations of scenarios that motivate the search for new visual media capable of 'broadening observation' to critically comprehend the complexity of reality and the *modus vivendi* of its inhabitants.
There is a clear necessity to seek out processes for representing phenomena capable of managing and positively re-elaborating that pervasive flow of information produced above all by globalisation and the net as 'knowledge'.
The fields of our interest – architecture and design – historically delineating an existential unicum with space, life and the 'objects' of time, exploring the complexity and contradictions of the contemporary scene at all levels and seeking adequate instruments of representation for elaborating a structured vision of knowledge. As known, the development of digital representation is producing epochal changes in this sector, from design to surveying. Experiments are being made with conceptual representations conceived as the visual synthesis of processes of classification or the critical comparison of complex and heterogeneous information, exploiting new technologies to the full, offering new categories for comprehending events, designing scenarios within which to manage specific contexts; relating facts and opinions; observing macro-themes 'at a first glance', focusing attention on details; accessing banks of data and references on the net, etc.
The principal objective of this essay is thus the identification of some of the most interesting works of research examining the theme of the concept map and experimenting with systems of visual representation capable of producing knowledge by uniting the traditional narration of information with sophisticated interactive systems of visualisation.

Keywords: representation, map, complexity, contemporaneity, interaction design.

1. Concept Maps and Contemporaneity

Contemporary culture appears to be crossed in an increasingly more pervasive manner by the idea of the *concept map*; a revolutionary actualisation – nurtured by globalisation and technological development – of the historical human understanding of geography-cartography, the archetypal representation of knowledge, in its space and its time.
The techniques of elaborating these maps and the expressive-communicative apparatus that characterises them are vast and diverse, embracing various professions and disciplines that, from 'traditional' *nomography*, arrive at the more general concept of 'Information Visualisation' (InfoVis).
This text considers above all digital concept maps; a kaleidoscopic universe that describes a stimulating interdisciplinary field of research oriented towards the study of and experimentation with systems of visual representation, capable of producing knowledge by uniting the traditional narration of information with sophisticated interactive systems of visualisation.

Though the reasons for this vast production of concept maps are many and can be defined with respect to the theme of study, the context and the discipline examined, I believe that common motivations may be identified above all in the collective necessity dictated by the contemporary *modus vivendi* (to quote Zygmunt Bauman) of elaborating and testing processes of transforming information into knowledge. A common interdisciplinary feeling has generated the progressively acceptance of the idea of developing methods and techniques of visualisation capable of managing and positively re-elaborating, as 'thematic knowledge', the pervasive and undifferentiated flow of data and information (increasingly overflowing and readily available) produced above all by globalisation and the net. As known, there are problems with the 'translation', interpretation, reading, de-codification and management of increasingly more complex, vast and broad data and information available to anyone. From the real to the imaginary, form the survey (i.e. the relations between the web and Territorial Information Systems, as in the case of the polyhedral interdisciplinary projects triggered by Google) to design (i.e. in the sector of semantic 3D models that can be shared online and, more in general, as part of the BIM - *Building Information Modeling*), we have ever more need for models of representation to 'see', to broaden our vision, to contain it and render it interactive, implementable. In a word, *representable*.

1.1 Representing Complexity and Contradictions

From architecture to design, from the visual arts to the landscape, representation – historically delineating an existential unicum with space, life and the 'objects' of time – explores the *Complexity* and the *Contradictions* – to quote Robert Venturi (*Complexity and Contradiction in Architecture*, 1966) – of the real and the virtual on all levels, seeking and testing suitable models of visualisation for a structured and thematic communication of knowledge.

Driven by the techno-cultural (digital) revolution, the development of representation is producing epochal shifts, many of which are positive, above all in the sphere of the interactive visualisation of knowledge, from the survey to design, from the general to the detailed, providing the actors in this process with the instruments of representation, while users are able to listen to, interrogate and analyse the diverse themes presented. There are many methods at our disposable for the representation of knowledge that stem from processes of cataloguing, classification and the critical comparison of complex and heterogeneous information. By exploiting new technologies to the full they offer additional instruments for observing, amplifying and comprehending phenomena, designing maps in which to be able to read specific contexts, relations between facts and opinions; observing macro-themes at 'first glance', accessing databases and references on the net, revealing infinite layers of information, etc.

This brings to mind, for example, these non-linear concept maps, somewhere between art and science, that allow for a reading of the new 'cartographies' of our planet, further investigating the projects and necessities of its inhabitants; we can represent and enter into new virtual worlds or manage the bursting flow of data and information produced by the media.

This brings to mind, for example, the latest frontiers of digital simulation: refined semantic architectural models, *n* dimensional and which can be shared online, *thesauruses* of scientific repertories or vast archives focused on classification and the automated or guided search for documents or typological forms connected to one another by reciprocal links, or using particular codes, or based on metaphors, affinities or hierarchical dependencies; the more general and professionally known BIM, or, that complex process of elaboration focused on the representation and management of a virtual model of architecture.

This brings to mind, for example, the relations between the web and various methods of surveying – in particular Territorial Information Systems (TIS) – which are generating representations of reality (from architecture to the city to the territory), so innovative as to open up, in this phase of the evolution of 'connective intelligence', fascinating conceptual scenarios, explorative and elaborative, as in the case of the polyhedral interdisciplinary projects triggered by Google. Representations similar to concept maps that surpass the decline of the two-dimensional urban-territorial drawing and favour the new reading of the real with a matrix that is no longer 'analogical', but semantic-digital.

2. Towards an Atlas of Concept Maps of Architecture and Design

The study presented here anticipates some of the results of an articulated work of research, on-going, examining the general theme of concept maps of architecture and design. The following pages outline a synthesis of the knowledge acquired to date concerning the theme, moving through successive examples drawn from the vast repertory available during this first decade of the twenty-first century. We are also aware that works of this type, for the vastness of the issue and its infinite deviations, are 'open' and to some degree 'incomplete', inevitably leaving certain things out and not paying enough attention to others. Studying the evolution of the idea of the concept map – observing the phenomenon also as the result of interdisciplinary

relations – moving through its incredibly vast iconographic production – but also literary, ideal, utopian, virtual, stereographic, etc. – signifies considering and accepting, from the outset, the characteristic of a 'work in progress' typical of this type of research: a thematic reading of 'a subject', structured on the themes of representation, which analyses a complex phenomenon atop which to trace a *fil rouge* that links events judged to be amongst the most significant, with the objective of designing scenarios, proposing paths, and highlighting links.

It is evident that we are dealing with a study that requires a project of communication.

The examples studied in the research presented - in addition to being thematically catalogued, classified and analysed in relation to the various critical elaborations made – were 'ordered' by a project-database of representation, whose results are synthesised in the interactive map known as the *Atlas of Concept Maps*, whose images accompany this text. Representation – to this day amplified and integrated as part of a working project somewhere between research and didactics – through the thematic selection of visible information, consents multiple investigations and perceptions that vary from the general to the particular, in relation to the interests of the reader. In a continuous link between the personal and the universal, between everyday reality and the imaginary world, in the oscillation between time and space, when looking at these maps it is possible to become lost in the details (infinite visual fragments, the tiles of a sort of free puzzle of the memory) designing a personal path-story, or seeking an gestalt vision that synthesises the various creativities proposed. Of these possible visualisations we present three, referred to the same number of fields of work, in turn composed of multiple sections, which constitute the general structure of understanding achieved by the research to date.

The first field of study surveys prior events and references to concept maps – cf. map 01 *References*.

The second presents and analyses some of the principal websites that thematise concept maps – cf. map 02 *Web Compilation*.

The third field of study brings together some of the authors of concept maps – cf. map 03 *Authors*

2.1. Prior Events and References

The first part of the research begins with the section *References*, used to investigate what appear to be the prevalent prior events and references (historic, modern and contemporary) of digital concept maps.

The history of architectural representation widely documents the invention and use of methods and techniques of visualisation that can be referred to the contemporary language of the concept map. There exists a vast scenario of examples in which the idea of the concept map is manifested as a design pulse, uninterrupted over time: a sort of spontaneous anthropological necessity to represent – between the real and the virtual – the spaces associated with life and to nurture the personal and intimate spaces of the mind.

Numerous testimonials of this laboriousness can be traced out, in which the idea of the map is among the fundamental elements of the representative process, nurturing thematic visual actions that, case-by-case, specify the semantic context, touching on almost all of the theoretical-operative declensions of architecture and design, to express, understand and manage the complexity of the real and the imaginary. We present a few examples.

In the field of historical references, I can imagine, for example, the first experiments of a geographical-cartographic nature in antiquity; from the invention of perspective to the model of the *Ideal City*; to the increasingly more precise representations of the globe elaborated during the modern era; to the pervasive contemporary visualisations of a particularly political-social dimension (which has to do with equalities, opportunities, emergences, rights, etc.) and a 'functional' support to the activities of mankind during his progressive evolution.

Among these prior events and references to contemporary concept maps three are mentioned here.
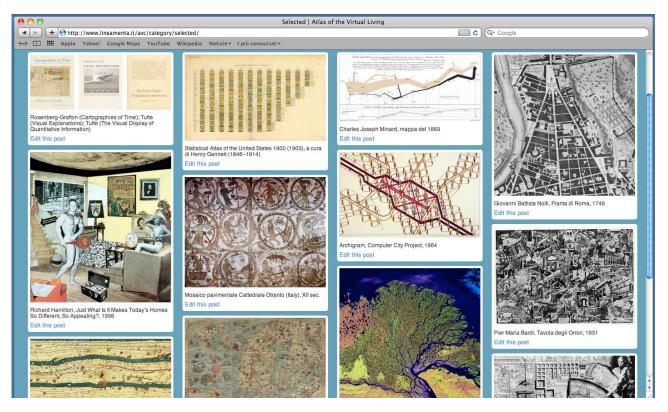
The first is the mosaic floor of the Cathedral of Otranto, realised between 1163 and 1165 by a group of artists under the direction of Pantaleone (mosaic artist, perhaps a monk of Greek origins). This exceptional visual-spatial work is among the cultured predecessors of the contemporary idea of the conceptual digital map. Using the visual language of the most fascinating late medieval culture, by employing enigmatic figurations the mosaic represented the human experience, from original sin to salvation, using scenes from the *Old Testament*, the *Apocrypha*, the *Carolingian Cycle* and the *Medieval Bestiary*, composed according to the development of the *Tree of Life*. Entering the cathedral, whose floor is entirely decorated in mosaic tiles, one has the sensation of being immersed in an enigmatic horizontal interface to be experienced through successive interpretations of visual links, rendered part of a system by the evident network of the *Tree of Life*. In other words, the mosaic represents an optimum prior event to what we now refer to as 'hypertextual communication projects', among the founding characteristics of digital concept maps.

The second reference is drawn from the 'pioneering' British Pop Art of the late 1950s: the famous collage by Richard Hamilton – *Just What Is It That Makes Today's Homes So Different, So Appealing?* – for the

exhibition *This is Tomorrow*, presented in London in 1956. This emblematic image anticipates, both at the level of aesthetics and that of communication, many of the pop themes that distinguish the conformation of many contemporary concept maps. This is evident above all in the dynamic approach of communication (the fruit of the pervasive role played by technologies and the media) that transforms information into a 'mass event' that belongs to everyday life. It is the beginning of mass representation; it is the birth of a pop space of communication.

In a historical continuity with the fertile and heterogeneous phenomenon of '*Disegno di Architettura*' – I can think, for example, of Nolli's *Plan of Rome* (1748), the *Campo Marzio* (1762) by Piranesi, the *Capricci Palladiani* (1756-1759) of Canaletto, and the *City of the Captive Globe* (1972) by Elia Zenghelis and Rem Koolhaas – the third reference is the *La città analoga*, a conceptual representation composed of beloved projects and memories, drawn in the 'ancient style' in 1976 by Aldo Rossi; a precious document that recalls how, in architecture in general, and in that of Rossi in particular, theoretical study is a necessity, a solid base atop which, together with historical memory, to found any conceptual process. Simplifying greatly, we can observe that *La città analoga*, between the real and the virtual, between survey and project, resembles a concept map, a space of elaboration in which to test processes of understanding and design.

As made evident by these reflections, there opens a vast and complex issue that, over the centuries, has interested the work of architects and artists, involving, suspended between science and art, human ingenuity; representations that generate a plurality of orientations and which visualise, as recalled many times, the idea of the multi-dimensional concept map. Understanding the cultural mix that emerges from the concepts introduced, studying the technical-evolutionary aspects of the theme, deciphering the expressive ingredients and analysing the significant multi-sensorial dimension of representation, allows us to enter into that poetic dimension of design that has generated epochal turning points, amplifying the languages and configuring the new 'hypotheses of space' that are the intended object of reflection here.

Map 01 *References*. From left to right: D. Rosenberg, A. Grafton, *Cartographies of Time* (2010); E. Tufte, *Visual Explanations* (1997), *The Visual Display of Quantitative Information* (1983); *Statistical Atlas of the United States 1900* (1903), prepared under the supervision of H. Gannett; C. J. Minard, map of mounting human losses during Napoleon's Russian campaign, published in 1869; Nolli's *Plan of Rome* (1748); R. Hamilton, *Just What Is It That Makes Today's Homes So Different, So Appealing?*, 1956; mosaic floor of the Cathedral of Otranto (1163-65); Archigram, *Computer City Project* (1964); P. M. Bardi, *Tavola degli orrori* (1931); *Tabula Peutingeriana* (part.); O. Magnus, *Carta Marina* (part.), 1539; Delta del fiume Lena (Siberia) ripreso nel febbraio 2000 dal satellite Landsat 7 (immagine NASA); Aldo Rossi, *La Città Analoga*, 1976.
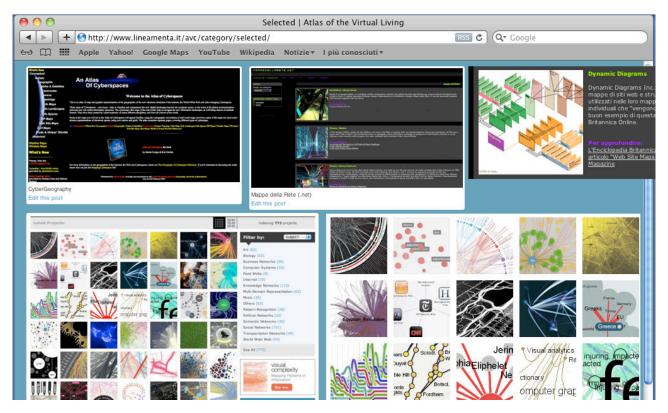
2.2. Web Compilation

During this phase of the research we studied a selection of websites that can be classified as concept maps, thus exposing understandings and themes useful to the issue of study. This panorama revealed some of the most interesting research elaborated in the field of the realisation of concept maps for architecture and design, in particular within the vaster territory of Information Visualisation (InfoVis).
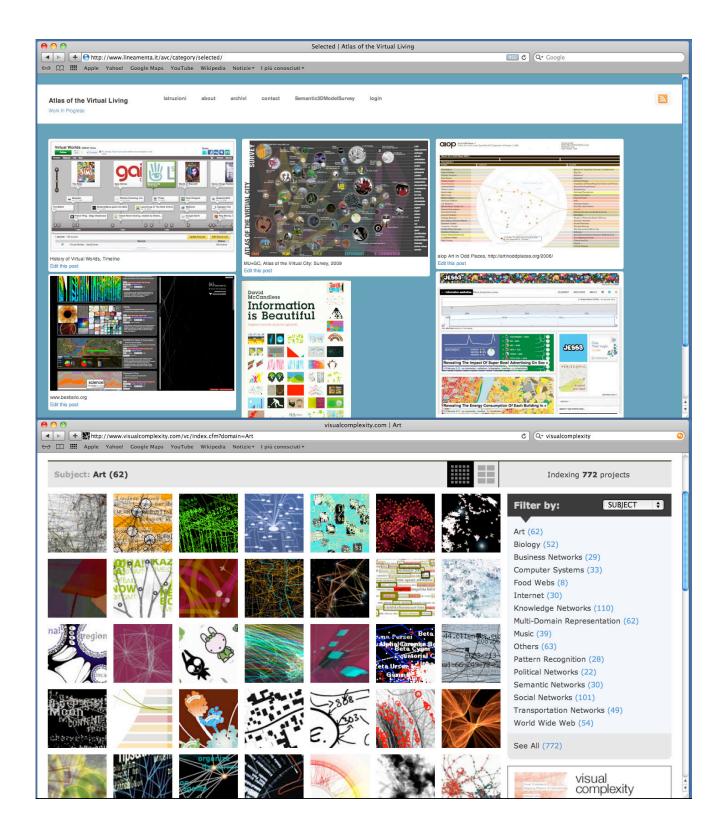
Of these online 'web compilations', synthetically described below, we will focus on two.

The first site is www.CyberGeography.org, the 'historic' cyberspace atlas curated by Martin Dodge, co-author of the book *Atlas of Cyberspace*, among the first publications that proposed to classify the representations that, over the past decades, have visually expressed the 'inexpressible' space-idea that is cyberspace. CyberGeography illustrates 15 categories of maps: Conceptual Maps of Cyberspaces; Artistic Representations of Cyberspace; Mapping Cyberspace Using Geographic Metaphors; Mapping fibre optic networks, submarine cables and telecommunications satellites; Tracing Paths Through the Internet; Census and Statistical Maps of Cyberspaces; Topology Maps of Elements of Cyberspace; Information Space Maps; Information Landscapes; Three-Dimensional Information Spaces; Maps of Internet Service Provider (ISP) and Internet Backbone Networks; Maps of Web Sites; Surf Maps Visualising Web Browsing; Multi-User Dimensions (MUDs) & Virtual Worlds; Historical Maps of Computer Networks. Merely reading these categories it is possible to understand the vastness of the issue: a kaleidoscope of new landscapes of net communication, cyber-maps (with a strong aesthetic value) that reveal the space beyond our computer screens, interfaces that represent impalpable things, such as the cables of global communications networks, online databases, etc.

The second 'web compilation' mentioned here is www.VisualComplexity.com, a site founded by Manuel Lima (a Portuguese researcher), which offers an extensive repertory of concept maps from the scientific and academic world. The examples selected are many (to date over 772 projects) and include all the various declensions of the theme, presented in a catalogue subdivided into 16 themes: Art; Biology; Business Networks; Computer Systems; Food Webs; Internet; Knowledge Networks; Multi-Domain Representation; Music; Others; Pattern Recognition; Political Networks; Semantic Networks; Social Networks; Transportation Networks; World Wide Web. This catalogue is accompanied by other possibilities of research in relation to: method; trend; year; top authors.

Map 02 *Web Compilation*. From left to right: hwww.cybergeography.org/; www.visualcomplexity.com/vc/

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Map 02 *Web Compilation*. From left to right: History of Virtual Worlds, Timeline
(http://www.dipity.com/WebHistoryProject/Virtual_Worlds/); MU+GC, *Atlas of the Virtual City: Survey*, 2009; aiop Art in
Odd Places, http://artinoddplaces.org/2006/; www.bestiario.org; McCANDLESS, David, *Information is beautiful*, ed.
Rizzoli, 2011; www.infosthetics.com; http://www.visualcomplexity.com/vc/index.cfm?domain=Art.

2.3. Authors
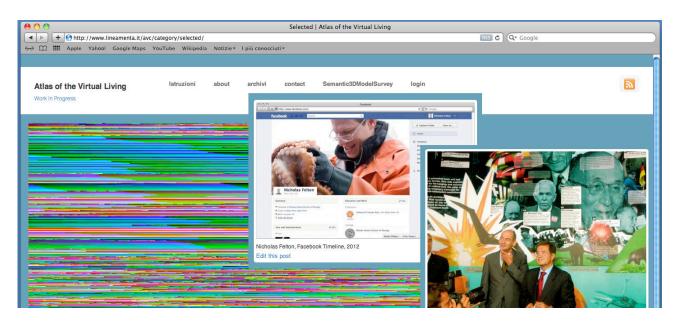
This part of the research studied the works of some of the most interesting authors of concept maps, both in terms of technique-methodology and at the level of creativity-aesthetics. The analysis was also extended to those who utilise the idea of the concept map in their work, even if they are not directly the authors. Upon a close examination of contemporary design, we can in fact note that particular works of architecture, art and design are, themselves, already 'concept maps'.

Of the many figures studied (artists, designers and architects), three are mentioned here.

The first is the author and artist Lisa Jevbratt, who has managed to unite art and technology, elaborating an interesting visual language of synthesis. This work is of interest to our studies above all for the original research into models of Internet visualisation; polychrome maps of the web generated through the punctiform association of a colour (or tonality) with an IP address, accessible (present, utilisable) at the click of a mouse. One good example is the project *1:1*. As the artist's website tells us: «1:1 was a project created in 1999 that consisted of a database that would eventually contain the address of every Web site in the world and interfaces through which to view and use the database. 1:1(2) is a continuation of the project including a second database of addresses generated in 2001 and 2002 and interfaces that show and compare the data from both databases» (cf. http://jevbratt.com/).

The second author selected for this brief examination is the designer Nicholas Felton – known above all in the field of interaction design, and as the author of the *Feltron Annual Report* (infographic yearbooks dedicated to different topics) and *Daytum* (a site that allows for the creation of personalised graphic reports) – one of the figures responsible for the future visualisation system to be used by Facebook, now partially deducible in the new *Timeline* (the new design of the profile page used by each citizen of this social network): a representation of life, a map of personal memory, visible by 'scrolling down' the web page. This simple action of vertically scrolling through a chronological list of infinite information (scriptographic, drawings, photographs, video, music, links) is the new simple idea for sharing one's life with friends online, metaphorically sharing our virtual culture.

The third author we propose is an architect, Rem Koolhaas, a figure who in more than one way defines (uses) the conformative potentialities typical of concept maps: in the elaboration of the idea and representation of design – I can think, for example, of the aforementioned drawings (with Zenghelis) for *The City of the Captive Globe* (1972), or the master plan for the *Parc de la Villette* in Paris (1982) – in communicating the mission of his office, OMA, to the public, be it a lecture, a printed document or a video project – for example the images projected during his lectures or the many concept maps in the books edited by Koolhaas and his office. As one example among many I mention the concept maps that describe the *Roadmap 2050* project, developed by AMO (the research and design office founded by Koolhaas in 1998 as the reflection of OMA) in 2010, those published in *Mutations* (2001) or in *S,M,L,XL* (1995).

Map 03 *Authors.* From left to right: Lisa Jevbratt, *1:1*, project 1999-2002; Nicholas Felton, Facebook Timeline, 2012; Rem Koolhaas (with Romano Prodi), *The image of Europe* (AMO), Bruxelles 2004.

3. Post Script

Even keeping to these limited considerations, it appears evident how the idea of the concept map offers a renewal of the more experimental dimension of architectural design, both at the technical-methodological level (the simultaneous ability to utilise multiple media in the same platform; diverse points of view, some moving; the online sharing of the same project, etc.), as well as at the aesthetic level. Within concept maps the theme of representation, variably defined both historically and thematically, confirms its profoundly design-oriented role; representation as a stimulus and exercise in creativity, an intellectual act that consents a broadening of vision and the tracing out new scenarios of interest. It is thus another occasion for investigating and testing the relations between drawing and design, between an idea of representation and how its outcomes conform to space.

It is also a theme that deals, to the same degree, with the so-called 'design of the real' and, more in general, with processes of architectural and urban surveying, the visual culture of photographic and video representation, leading all the way to the spectacular applications triggered by Google, which announce the dawning of a new era that we can define as one of 'generalised visualisation', of interest to a vast public of specialists and laymen.

Image © Perry Kulpe

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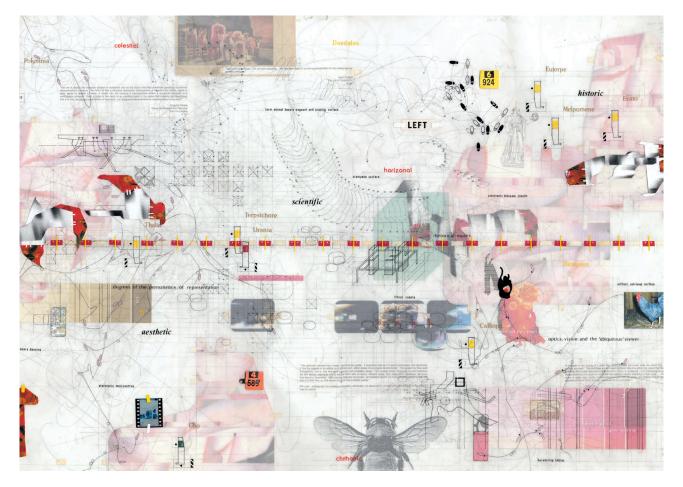
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Tridimensional modeling as an opportunity to express projects never implemented: the case of Palladio

Alessia MAIOLATESI
Dipartimento di Architettura, Facoltà di Architettura, Università degli Studi "G. D'Annunzio" di Chieti-Pescara,
Pescara, Italia
alessia.maiolatesi@gmail.com

Abstract

There are poems that have never found a "voice" of expression and architectural plans that will never materialize. The sole expression of the design lies in the value of the drawings and theoretical sources, the turning point for tridimensional evolution and the development of a digital model of architecture. These organisms exist only because they have found an appropriate form of representation, evolving into complex configurations of knowledge, structured as a web of information. The need for these interventions was created to give reconstructions the same value as what was actually built, so that they become products to be experienced digitally, involving the whole sensory system. What is of interest in the field of non-materialized architecture, in this case, that of Palladio, is the possibility of examining, enjoying and visualizing architectural prototypes in a three-D environment, implementing the information system with the addition of specific content on the subject. This digital information process opens up a new dialogue with the study of architecture and disseminates knowledge of cultural heritage.

Key words: digital model, architecture, Palladio, information

1. Three-dimensional modeling for architecture

One of the reasons that validated the approach using three-dimensional modeling, understood as an opportunity for architecture to find a new configuration within the contemporary landscape concerns the architectural heritage which was never translated into reality, and which did not find another form of representation apart from two-dimensional paper. The basic premise for addressing the topic concerns the importance of communication performed by architecture within its context, going from a simple means of dissemination of knowledge to a powerful tool, able to progressively change the approach to the subject. Before moving to the crux of the matter, one must provide some theoretical clarification about the different stages that led to the validation of the choice of a three-dimensional model as a new, effective criterion. In architecture the dissemination of the design thinking and composition theories is usually expressed through graphics processing: the first reflection that arises from this statement is the idea of the project as a model, relating to the original concept, and as a reference for subsequent reasoning. There are different forms of "model" seen as an instrument of knowledge and communication able to explain and support the representation of architecture, whether it's a physical, virtual or abstract model, with expressive force capable of interpreting architectural intentions through the different configurations which underpinned the communication and structure of the project. Here the attention focuses on the idea of a three-dimensional model seen as operation that provides an opportunity to examine continuously the results generated from accurate data that are taken into consideration. To tackle the reconstruction of the three-dimensional model

of an architectural object we start from a traditional analysis of floor plans, elevations and sections, but the next thing to do, is to go into the substance of the understanding of the internal structure of the elements, since a correct reading of their volumetric arrangement is necessary to understand their significance. The virtual model, in this case becomes the means of validating the analysis of architecture for educational, promotional and conservation purposes. One of the most significant aspects of the digital approach towards architecture is that through direct volumetric analysis you can conduct investigations that move from the internal structure of the architectural object to the outer skin, offering the possibility of a proper planned control of the design phase, planning necessary interventions and creating a system permitting an effective exchange of information. At this point you can begin to devise the digital model as a 3D object that goes from an instrument of knowledge to a valid means of design. This becomes decisive when dealing with architectural works that have not reached us for various reasons, ranging from failure to build them to very poor conservation over time. The opportunity of digital reconstruction becomes the means of expressing a simulated reality which would be barely possible otherwise. Architecture that is no longer part of our contemporary cultural heritage finds a dignity of expression through a new and legitimate form. One of the advantages of 3D modeling is the enhanced sensory perception of architectural space going from a material conception characteristic of built architecture to a dematerialized concept, constantly evolving in form and meaning. In the field of architecture, therefore, and the increasingly widespread use of advanced digital technologies, a specific case refers to the three-dimensional modeling that offers a new life to 3D objects, and which has considerably expanded the possibilities of doing research on these issues and encouraged the opening up of these systems, which usually operate and encode simple data, so that they can turn towards the production and analysis of the objects themselves. Going into the merits of the specific approach, one immediately understands the benefits that a deliberate use of synthetically generated 3D environments has on the range of projects which have remained on paper without ever achieving material structure. Following such an approach expressed in 3D modeling, you can reconfigure the architectural space, expressing its particular volumetric integrity. Such an approach also lends itself to further in-depth studies, ranging from architectural structure to compositional and geometric aspects that are the analytical basis. The advantage of digital representation of architecture works that were never built or no longer exist is that it provides interesting possibilities to architects or anyone interested in further study to immerse themselves in a particular virtual reality, which stimulates perception through the senses until total interaction with the object is achieved.

1.1 Possible models

The following case study given as an example, concerns the design of a system for reconstruction of a Palladian villa which was probably never even intended to be built (apart from a limited section): Villa Mocenigo on the Brenta. From historical information, construction of this villa is assumed to have started in Dolo in 1564-1565, but the information is probably dubious and cannot be proved. The proposed reconstruction system uses an evaluation procedure that makes it possible to analyse this architectural "structure" through semantic meanings so that it can be used as a model for interactive browsing. Thanks to the correlated information device that validates the virtual reconstruction of the villa in question, the hypothesis becomes possible, creating and managing a simulated ,reasoned use. The objective is thus to consider an actual reconstruction program which translates essentially into a two-dimensional drawing of a villa, taking into consideration the obvious difficulty of this type of working approach towards the study of the object created using three-dimensional modeling: obviously we analysed and studied a reasoned recomposition of the individual elements and of the structure as a whole. This model will involve a three-dimensional evaluation of Palladio's architectural language and rules that permit a solution with the shapes, proportions and construction of the architectural concept. We present the methodology used during the study of drawings to be compared to the "rebuilt" work, justifying and assessing the results. It is no coincidence that the subject studied using this type of analysis was the Villa Mocenigo, where Palladio's design language is particularly clear and explicit. This is developed and expressed in a more in-depth and interesting way than in the other projects for villas that were never built. In order to understand the question, it is essential to summarize and highlight the main issues in three-dimensional reconstruction: inconsistencies between the villas which were actually built and design projects of the same villas in *I Quattro Libri dell'Architettura*, a book written after construction; how to find and justify the design methods to use for interpretation and virtual reconstruction of the work which existed only on paper. The constructive approach suggests the use of digital technology to achieve a three-dimensional project and the use of virtual technology requires a new interpretation *of I Quattro Libri dell'Architettura*, a reinterpretation that offers different formal decisions to enrich and express the various design and reconstruction processes. In this case the reconstruction

procedure assumes an application of "standards" and the formation of a full prototype of all parts of the work for in-depth and comprehensive analysis. The creation of this example starts with the planimetry and elevation of the final project of the villas designed in *I Quattro Libri dell'Architettura*. The design of the work helps facilitate an understanding of the project on paper and its three-dimensional realization, using theoretical information and graphics already discussed and validated. Villa Mocenigo, whose physical construction was barely started and never completed, is the final illustration of the second of the four books. However, there is ample evidence that it was never built. Dealing with three-dimensional reconstruction of a villa of this magnitude was thus highly problematic. The difficulty lies in the transition from a two-dimensional model of villa, a drawing on paper, to a real draft outline; the intention is to give shape and volume to a drawing in order to allow a three-dimensional use. The analysis performed on the Palladian designs was a very interesting experience that led to the clarification of the various concepts learned through theoretical study and a comparison with measurements carried out on the existing Palladian heritage which has resolved many apparent graphical contradictions (wall size, proportions, height of walls, similar design solutions). Once these issues were resolved it was possible to redesign the correct plan of Villa Mocenigo based on consideration of arrangements described above. The next problem was to think about other elements available to the project in order to define the internal organisation of the villa and the plan of the second floor (remember that in drawings of Palladian villas in the second book, there are always an elevation and one plan although most projects involve at least two levels). Many difficulties arose during this phase and, taking into consideration the purpose of these operations (annotated three-dimensional reconstruction), we tried to find more relevant information to solve the problems. We should again note the continuous and exhaustive demonstration of how the integration of the traditional means of representation, implemented by innovative computing systems, facilitates the level of understanding of the rules used on paper by Palladio, resulting in an enhanced quality of the subsequent enjoyment of the heritage. Obviously in the study, the transformation of a two-dimensional to three-dimensional model is achieved through the use of modeling, detecting and identifying inconsistencies and issues hidden in the Palladian design rules outlined in the four books. The objective therefore is to detect and correct possible defects present in the paper design of the Villa Mocenigo, referring to the design in the text and then moving on to create a three-dimensional model. The ideal condition would exist if after these analyses we could have answers or create universal rules governing the transformation and reconstruction of a Palladian design in its three dimensional model. Unfortunately it is a far-fetched concept because the reconstruction process starts based on the reading and interpretation of the four books that are steeped in information about graphs that is often contradictory. Being fully aware of this difficulty, anyone who approaches these studies is led to formulate their principles and justify their assumptions; it is interesting however to draw attention to how often there are several possible solutions for a single problem that makes it almost impossible to develop a single system of solutions. This reconstruction methodology is not a reliable methodology, that is, a structural scientific method that you create and which is based on established rules before being tested and validated. It is on the contrary a procedure that is validated and empirically legitimized by rules that are framed and tested as the study of the model progresses. It is therefore by starting from Palladio's original designs that you can complete the reconstruction process. The indications from the process are therefore an updated re-reading of all the elements and current rules showing the real application and applicability of traditional Palladian rules, establishing and assigning volumes to elements of the construction (wall thickness, size of the bricks, size of the elevations, thickness of ceilings etc). In conclusion, summing up the concept and separating it into different "stages" we start from the analysis and study of Palladio's drawings on paper continuing with the suggestion of a new interpretation of the four books and the final phase consists of the implementation and evolution of the drawing in its corresponding three-dimensional form, that is in its visibly "physical" form. But the most interesting aspect that justifies the reconstruction of the Villa Mocenigo, is the possibility of carrying out an internal examination of the "place" focussing on the Palladian issue of enjoying the architectural heritage that was never completed.

Fig. 1: Three-dimensional reconstruction: Villa Mocenigo on the Brenta
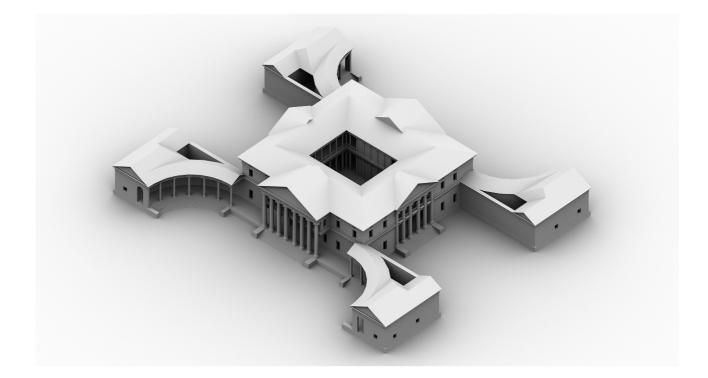
Fig. 2: Three-dimensional reconstruction: Villa Mocenigo on the Brenta

Fig. 3: Three-dimensional reconstruction: Villa Mocenigo on the Brenta

Fig. 4: Three-dimensional reconstruction: Villa Mocenigo on the Brenta

Fig. 5: Three-dimensional reconstruction: Villa Mocenigo on the Brenta (internal view)

Fig. 6: Three-dimensional reconstruction: Villa Mocenigo on the Brenta (internal view)
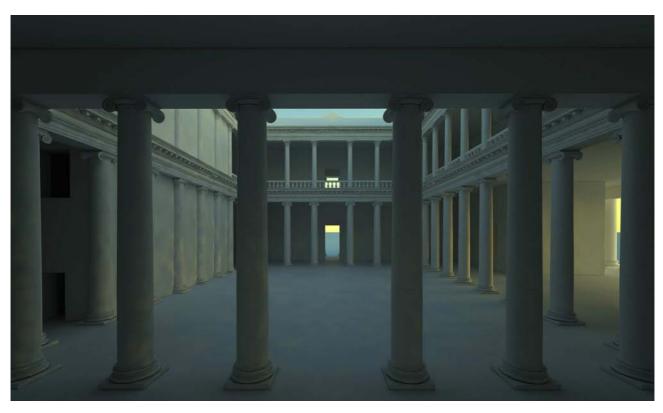
Fig. 7: Three-dimensional reconstruction: Villa Mocenigo on the Brenta (internal view)

Fig. 8: Three-dimensional reconstruction: Villa Mocenigo on the Brenta (internal view)
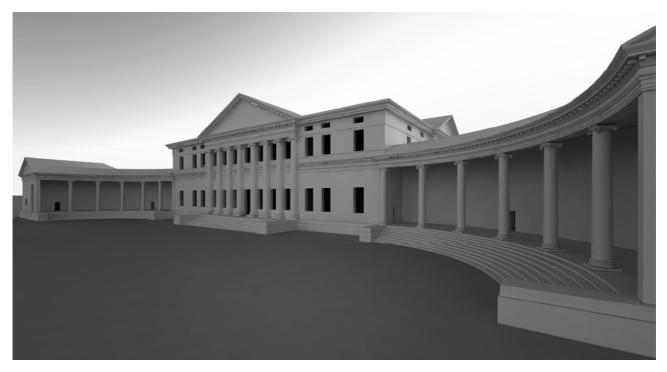
Fig. 9: Three-dimensional reconstruction: Villa Mocenigo on the Brenta

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more
architecture
design
landscape

Cooperating in the holy land: The study of the ancient mortars of the old city of Akko (Israel)

Renzo RAVAGNAN[1], Paolo MARIANI[2], Manuela SGOBBI[3], Paolo BENSI[4]
(1)Istituto Veneto per i Beni Culturali, Venezia, Italia
rravagnan@hotmail.com
(2)paolomarianicrema@libero.it
(3)manuela.sgobbi@istruzione.it
(4)Dipartimento di Scienze per l'Architettura, Università di Genova, Genova, Italia
paolo.bensi@libero.it

Abstract

The report is aimed at describing the study carried out since 2006 by the Istituto Veneto per i Beni Culturali on the old mortars of the Crusader citadel of Acre in Israel. The investigations have been conducted in collaboration with the Israel Department of Antiquities and it has been the occasion to train up some local operators in the field of restoration by specialistic lessons delivered by Italian and Israeli teachers. More than two hundred collected samples have been studied to identify and classify their constituent materials and their related processes of degradation. The diagnostic research, together with the technical comparison and the study of the sources, contributed to define the most suitable ways of intervention. Moreover this study permitted to understand better the history of the buildings and their typological-stratigraphic classifications in a chronological sequence from the Middle Age to the Ottoman period. By the investment optimization point of view, we tried to supply the instruments necessary to define and understand the old urban fabric and to give meaningful information to the planners and to the workers involved in the conservative projects. The knowledge that this study produced will be useful to the local operators and to all the institution interested in the conservation, restoration and exploitation of the "old citadel of Acre".

Keyword: Architecture

1. Introduction

Since ancient times, the city of Akko is a meeting point between East and West, a crossroads for different cultures. The center has developed on a small cape jutting over the sea, inside a fortified wall; many urban stratifications are still recognizable and they are all related to different rulers: Egyptian, Roman, Crusader, Ottoman, British. The urban structure, developed mainly in the Middle Age, is characterized by winding roads linking districts and a few public open spaces. The maps of the nineteenth century show a compact city, with some rectangular or square buildings with large internal courtyard, generally developed on two levels. Here there were often accommodations for pilgrims on their way to the Holy Land or the Far East. It was an important commercial port of call, and it was the favorite location of Genoese, Venetians and Pisans, that still have some bazaar. The short Crusader hegemony has left visible marks in the urban structure, partly remodeled under the Ottoman reign and "sealed" and, currently, not fully explored.

Figure 1. Tunnel of the Crusader period

The historical and cultural distinctions make it so unique, that studying it certainly has a strong impact on the advancement of knowledge of the materials and techniques used in ancient times and the changes that occurred during the different dominations. The duty to preserve a broad and diversified cultural heritage also raises problems of compatibility and durability of the materials to be used for the conservation of the architecture, particularly the durability, because of the environmental conditions, marked by humidity and marine aerosol. The plasters are not only bedding or protecting materials, but they also feature waterproofing or coating and decoration. In a not so far past, they have been considered easily expendable, they were frequently removed and replaced when broken down, by ordinary interventions of maintenance. Currently they are considered an important source of information for the history of the buildings and, wherever possible, preserved as architectural heritage. The materials used in past times (both Crusader and Ottoman) have demonstrated excellent resistance to the weather, so they have limited conservative problems. The plasters recently applied, during restoration, have not been able to match the characteristics of the ancients and they have broken up within a short time after installation. The examination of the composition and technique of the ancient mortars and plasters opens an important window on the knowledge of the applied materials and methods. Then, it is fundamental to understand how to make repairs to ensure the preservation of the architectural heritage. This report presents the results obtained by studying the characteristics of various plasters of Akko, belonging to both the Crusader and Ottoman periods. The samples were collected in different locations to monitor the materials and the performed techniques with a broad and diverse series of case studies. We therefore hope that the gained knowledge may provide guidelines for the maintenance and preservation of historic buildings also by local craftsmen. The work will restart with a trial of new mortar proposals for installation in Akko.

2. Historical background

The history of Akko began during the New Kingdom, when it was tributary of Egypt, called Aak, and known by Jews as Akka. Conquered by Alexander the Great, it became Antioch Ptolemais, and then Ptolemais thanks to Tolomeo Soter; later it was a Roman colony. In the

following centuries, its already troubled history became a series of sieges and occupations, from the Arab conquest of 638 AD. The decision taken in 1009 by the caliph Hakim to destroy many churches in Palestine, including the Holy Sepulchre of Jerusalem, was the beginning of a series of religious conflicts, that lead to the Crusades, a period of bloody upheaval throughout the region. The city was conquered by the Crusaders in 1104, who called it Saint John of Acre and made it their chief port in Palestine. The urban area was divided into several neighborhoods, communities assigned to Genoa (1104), Venice (1110), and Pisa (1168), as well as to the order of the Templars (1187). The destination of the different areas, individual neighborhoods and fortifications are in a recognizable representation of Akko in the Liber Secretorum Fidelium Crucis (Venice, XIV cent.) by Marino Sanudo di Torsello. Conquered by Saladin in 1187, two years later it was besieged by Guido di Lusignano and retaken by Richard of England. Become the capital of the Latin Kingdom of Jerusalem and then an outpost of the Hospitallers, it fell back after the bloody siege of the Mamelukes in 1291. It was finally conquered in 1517 by Ottomans, who rebuilt it on the ruins of the Crusader palaces, used as foundations for new buildings. Akko underwent a further siege in 1799 by Napoleon, who wanted to foment a revolt against the Turks, but the venture failed. Then it was besieged and destroyed in 1831 by the son of the governor of Egypt. The different dominations and his being a crossroads of cultures have made Akko a venue for cultural exchanges, where Middle Eastern and Mediterranean realities have influenced each other. A Florentine traveler of the eighteenth century, noting the Ottoman city, described the architecture and construction techniques, explain that they were based on Vitruvius: knowledge and technology circulated in the Mediterranean areas, united by peculiar climatic characteristics. The differences were related to the materials, generally selected on the base of the easier supply. The manifestations of European culture from the twelfth century, the Ottomans from the sixteenth and finally the traces of the projects of Napoleon and the British rule on the buildings are still evident today. The most widely used building material is a local stone, known as Kurkar, a calcareous sandstone base with silicate material inside, typical of the coastal area, generally resistant to wear, but seriously damaged by continuous leaching. The stratification of matter is closely related to the construction techniques of the period of installation: the remains of the Crusader city are characterized by large blocks of stone with intervals of elements of smaller size; the second layer, Arabic, is made of minute stones; the third, Ottoman, by blocks of stone with sharp similar and accurate edges. The same material was also used for the composition of mortars and plasters, object of this study.

3. Samples

The samples analyzed are 40, divided into two types: 25 of finishing plaster (even if composed by multiple layers) and 15 of filling plaster or entrapment. The sampled finishing plasters are four types: waterproof (tanks, gutters / pipes), inside residential buildings, outside residential building and outside public buildings. The bedding plaster belongs to public buildings, residential monumental buildings and residential ordinary buildings. The time span of the buildings is sampled on three periods: medieval buildings (most of the buildings between 1104-1291 are Crusaders, between 1291 and 1530 Mamelukes), early Ottoman buildings (1530-1750) and later Ottoman buildings (1750-1917).

4. Analytical techniques

Thin sections were made to be analyzed by petrography, conducted with a polarizing microscope in transmitted light to identify the mineralogical components of the material and its textural characteristics. Some NORMAL regulations have been used for the analysis of the samples and their descriptions.

-10/82 Petrographic description of natural stone materials. It defines the procedures to follow for the description of the characteristics that determine the behavior of chemical, physical

and mechanical stone material, also to any comparisons between different parts of an article at the conservation status of the installed material and the corresponding material in quarry.

-12/83 Chemical-mineralogical-petrographic-morphology description of artificial stone materials. Schematic description of artificial aggregates of clasts in a matrix non-clay: it is referred to non-clay mortar matrix.

-14/83 Chemical-mineralogical-petrographic-morphology of natural stone materials. It describes the technique (to be adopted for the preparation of useful sections for the examination under a microscope in transmitted and reflected polarized light), for the characterization of stone materials and the evaluation of the effects of conservative treatments.

- 23/86 Technical terminology: definition and description of the mortars. It contains the general criteria and definitions for the plastering mortar.

- 27/88 Characterization of a mortar. The document, which sets out the general criteria and methodologies for measuring the physical characterization, mineralogical, petrographic and chemical mortars in place, consists of three parts:

1.   list of parameters needed for the knowledge of a mortar;

2.   methodologies to be adopted for the determination of these parameters;

3.   diagram of the analytical sequence recommended for mineralogical and petrographic characterization of the mortar and its alteration products.

The estimation of the porosity of the samples was effected by image analysis in thin section.

5. Results

The summary results of the analysis of the samples of finishing and bedding plasters are listed in Table 1.

Typology	Period	Ratio binder / inert
Bedding plaster	Medieval	1/2-1/4
Bedding plaster	Ottoman	1/3-1/5
Regular finishing plaster	Medieval	½ - 1/5
Finishing hydraulic plaster	Medieval	1/1
Finishing exterior plaster	Ottoman	½ - 1/5
Finishing internal plaster	Ottoman	1/1 – 3/1

Finishing hydraulic plaster	Ottoman	2/1 – 2/5

Table 1. Relation inert-binder of the plasters sampled in Akko. The data are averaged on the data obtained with a set of 15 samples of bedding plaster and 25 of finishing plaster.

The medieval bedding plasters have a relation binder-inert different from the Ottoman one and they are more resistant than the latter even if their composition is rather similar in both types. Even in the case of finishing plasters, there is a relation binder-inert different for the medieval period and for the Ottoman period. Particularly, in the Ottoman period there is a differentiation depending on the applications of the material. Ottoman decorative plasters for important rooms have smaller quantities of inert to be coated in very thin layers. The results obtained by the characterization, made in connection with the conservation conditions, gave three sets of samples, inside of which bedding and finishing plasters of various ages were evenly distributed: 16 were in good conditions, 13 sufficient, 5 bad. The fact that the material in conditions of insufficient conservation is lesser extent than the other, is a sign of good durability of the mixes.

good conservation (16 samples)		
	Crusader period	Ottoman period
number of samples	9	7
porosity 30%	3	1
porosity between 20 and 30%	4	3
porosity less than 20%	2	3
internal position	6 (2 of excavation)	5 (2 of excavation)
external position	3	-
ratio aggregate / binder equal to 1/5	3	1
ratio aggregate / binder between 1/4 and 1/1	5	3
ratio aggregate / binder less than 1/1	1	3

Table 2. Results of the samples in good state of preservation.

sufficient conservation (13 samples)		
	Crusader period	Ottoman period
number of samples	6	7
porosity 30%	-	1
porosity between 20 and 30%	6	2
porosity less than 20%	-	4
internal position	4 (3 of excavation)	4
external position	2	3
ratio aggregate / binder equal to 1/5	2	-
ratio aggregate / binder between 1/4 and 1/1	3	5
ratio aggregate / binder less than 1/1	1	2

Table 3. Results of the samples in sufficient state of preservation.

bad conservation (5 samples)		
	Crusader period	Ottoman period
number of samples	2	3
porosity 30%	1	1
porosity between 20 and 30%	1	1
porosity of less than 20%	-	1
internal position	1 excavation	3
external position	1	-
ratio aggregate / binder equal to 1/5	-	1

ratio aggregate / binder between 1/4 and 1/1	1	2
ratio aggregate / binder of less than 1/1	1	-

Table 4. Results of the samples in bad state of conservation.

6. Discussion

The analysis of the mixtures have underlined that, despite starting from the same raw material, the techniques of realization were different during the two examined periods.

Figure 2. Sampling point 1: bedding plaster placed outside, Crusader period.

The medieval finishing and bedding plasters are generally stronger and more rigid, since the architecture of this period was much more massive, consisting of large blocks of stone. The palaces of the Knights Templar are powerful, fortresses that were to withstand sieges and assaults. Bedding plaster on outdoor walls has high porosity and grain size, and despite the strong carbonate component, generally has a good consistency. Plasters of the same type but with different location (for example, room with high humidity), have slightly different characteristics and lower porosity, and shows a medium-low state of conservation, underlining the weakness of the mixes in presence of high humidity. The city has stabilized relative humidity between 65 and 67%. Generally, amalgams placed in rooms with lower humidity are decayed, and plaster of similar type in the same environments, but situated at the top, shows a better preservation. The Crusader plaster has almost exclusively the function of protecting layer for the material below or sealing surfaces, it rarely has aesthetic purposes. The Ottoman mixtures have less rigidity and toughness, their more elastic nature should be considered in relation to the buildings on which they were placed: buildings of the Ottoman period included the increased use of elastic materials such as wood, and thinner walls than the previous period, it was therefore necessary to use less tenacious mortar.

Similarly, the plasters were often spread not only with the function of protecting layer but also with decorative aim, to embellish or cover the walls, above all inside. In this case they must have a finer granulometry to create a good basis for the decoration. The distinction between the Crusaders and the mixtures of the Ottoman period can not therefore be based on their chemical composition, but on their morphology and technique of realization. To prove the identity of the materials used in the different periods, there is the condition of preservation of the same materials that is in most cases good or sufficient. Only 5 samples show signs of deterioration such as to be judged in poor condition. Three of these are Ottomans and two Crusaders, further evidence that the two types differ only in morphology (who built them had different needs) and not for composition.

Figure 3. Sampling point 2: finishing plaster placed inside, Ottoman period.
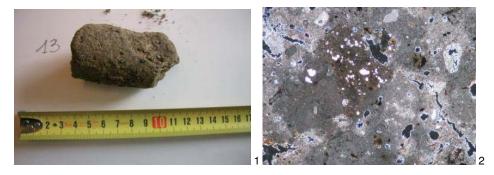
Figure 4. (1) Image of the sample 13 as it is: Crusader bedding plaster ; (2) thin section image of the same, 40x. The sample is in good condition.

Figure 5. (1) Image of the sample 24: Ottoman finishing plaster; (2) thin section image of the same, 40x. The sample is in a state of sufficient preservation .

Further investigations may help to understand the hydraulic component in the binder, but it is known that in both periods taken into account the natural hydraulic lime or pozzuolana was not in use, and so the brick dust.

7. Conclusions

The plaster of the medieval period are strong and rigid, while the plaster from the Ottoman period are weak and flexible. The application of the plaster was made on new or reused stones. No efflorescence or saline subflorescence are present, and it was significant in the coastal environment. The absence of macroscopic salts may be linked to the same type of mixture, being able to let pass, through the porosity, compounds that might otherwise create mechanical damage.

Figure 6. Room with colored finishing plaster of the Ottoman period.

The characteristics of the different types in the two periods were not due to alteration or degradation, but to different manufacturing technologies: the massive and rigid Templar architecture required strong and rigid compounds, the Ottoman buildings, with thinner walls and wooden parts, needed compounds able to accommodate the elasticity of the structures. These are the same raw materials used in different ways to achieve different final products. The identity of composition is also confirmed by the degradation of the (few) samples of both types, indoor and outdoor, suggesting that the deterioration was due to the peculiar conditions of maintenance of the sample itself. The conservation of a higher number of Crusader mixtures (and the subsequent analysis in this study) is not due to their different composition, but to their "sealing" during the Ottoman period, that have preserved them. The Ottoman plasters, however, have been in contact for a longer time with the environment and have been considered protective layers compared to the rest of the structure, and have undergone maintenance and replacement over time. The results achieved by the polarizing microscopic observation of thin sections, may in future be supported by other evidence for a deeper understanding of the morphology and characteristics of these compounds. The knowledge gained through this survey are useful not only to understand the material history of Akko, but also to its recovery. The obtained results, in fact, will be shared with local workers for the proper preservation of ancient plasters and will be useful as guidelines for the selection of suitable and compatible materials, to experience similar environmental conditions prior to application. The experiments on mortars must determine not only their durability, but also their resistance in a marine environment, where they will be exposed to moisture, rain and salt spray. Samples of plaster are in fact tested in Venice, the Mediterranean city similar to Akko. The results allow to construct the curves of the chosen parameters (and measured monthly), and suggest the best application technique for the installation.

8. Acknowledgements

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Vicinio of Carbonara in the land of Bari: stratigraphic tests and three-dimensional topology by scanning aimed at the recovery of a nineteenth-century building complex

Claudia BISCEGLIA[1], Williams TROIANO[2], Michele FUNGHI[3]
[1] Dipartimento di Architettura (DiAR), Facoltà di Architettura, Sapienza Università di Roma, Roma, Italia.
claudia.bisceglia@archiworld.it
[2] Dipartimento di storia, disegno e restauro dell'architettura (SDRA) Facoltà di Architettura, Sapienza Università di Roma, Roma, Italia.
williams.troiano@uniroma1.it, [3] michelefunghi@alice.it

Abstract

In the fraction of Carbonara di Bari, once an independent common and now southern urban fringe of chief town of Puglia, remain salient traces of the oldest nucleus subjected , from nineteenth onwards, to a strong extensive building. Some design characteristics of the land of Bari are common to Mediterranean traditional - form of the urban fabric of the historic center, construction type of elevated structures and vaulted structures, thickness of walls, size, location and number of windows, etc. - but others are peculiar to the places you're going to describe. Among these, the *vicinio* represents not only a type of architecture is found in Bari Vecchia, both in the historical centers of the province, but also a lifestyle of a people accustomed to living in a land of mild climate, with winters are not particularly rigid, summers hot and windy, and persistent solar radiation in all seasons.
In this scenery took the form of historical research and detection using three-dimensional laser scanning, both aimed to the definition of the relationship between the complex massing rediscovered, to the restoration and to the subsequent reuse of the architectural heritage in a sustainable. The study showed the presence of more periods of construction and made it possible to formulate various hypotheses regarding the phases of growth of the well. The proposed reuse of the property, in compliance with the building type in question, allows to exploit the techniques and local building traditions and rediscover a way of life tied to the distant memory of places.

Parole chiave: surveys, sustainable design, restoration, reuse

The research work for the valorisation of *vicinio* in question begins with a more general recovery of the area to public and private.The commission received by a private client who intends to restore and recover it by following the building traditions and cultural character of the land of Bari. Following the spot investigation, due to the complexity of the architecture and features of the complex, it became clear the need to proceed from one side to a depth historical research document, other side of a thorough architectural survey. Therefore, the survey has allowed three-dimensional laser scanner to report correctly the two plans and to understand the genesis of structures and equipment walls. The reconstruction of complex geometries required the definition of a topographical network that has been difficult for the positioning of a considerable number of stations and target. The result obtained has allowed an accurate reconstruction of both geometry and thickness of walls, both to deepen the assumptions already made on the construction phases of the building in order to propose a recovery that that respects the calling of the places and the story they tell.

1. Historical and town-planning framework of the urban municipality of Carbonara di Bari

The urban development of Carbonara di Bari[1] is largely tied to the city of Bari and the nearby villages of Ceglie del Campo and Loseto. The present structure of the urban sinking roots in earliest times and is connected to historical events that, directly or indirectly, have helped to establish the modern structure of the town converged on Piazza Umberto I. The square, in fact, has even acquired its current radial shape during the decade of regency France, was for many centuries the place where you have done most of the city events.

1.1 Short history about the fraction of Carbonara di Bari

At the end of the eighteenth century, the surrounding countryside of Carbonara di Bari, show a landscape marked by: olive, carob and almond trees, vineyards and orchards, sown lands and finally pastures. Only with the abolition of feudalism and reintegration in the State Property of the baronial jurisdictions, however, Carbonara is transformed into a free village assisted by nobles.

In April 1799, French troops burnt down the village in response to the siege it had imposed on the population in the surrounding countryside and in the near Modugno, where he was already hoisted the tree of liberty to support the fledgling Neapolitan Republic. Carbonara, showing his loyalty to Ferdinand IV of Bourbon and therefore adverse to the Jacobins, suffered considerable destruction of the houses surrounding the main church. In August 1808, Joachim Murat was crowned King of the Two Sicilies Kingdom: opens a season of reforms which, though short, not only determines the transformations that have a direct impact on the local economy - through the sale of national property with the benefit of extending the middle-class property - but also promote the development of agriculture and, following the introduction of economic companies, the beginning of industrial foreign installations; most part of the buildings in the area are restored; is applied a new building code and start a census of housing in a cadastre.

In September 1811, decreed the "restoration and formation of vicinal and byways" of the newly formed province of Bari, while between 1824 and '30s, this process of redefinition of the internal lines of traffic also affects the new tram-car connection between Bari and Carbonara. Local administrators who look often to urban building extra moenia, hope for Carbonara that improving economic conditions and housing that involves the transformation from scratch of Piazza Umberto I, developing the area used for the threshing and so called "Piazza dell'Aja" (Treshing-floor Square), to a trapezoidal square around which to develop the built according to building regulations of Murat (Fig. 1).

On the other hand still is Piazza Umberto I, which branch off the fifteen roads along which, according to a defined radial design, thickens the built-up area: among these is the main Corso Vittorio Emanuele, while maintaining a short distance the 'trends north-south, connects the modern square to the oldest Carbonara's buildings date back to the XIX century, bending towards the east at Piazza Garibaldi. Therefore, even though the Italian reality is deviated by the great contemporary transformations generated by the industrial revolution in France and England, in South Italy will arrive, however, step by step, the neoclassical definition of a policy that understands the importance of a systematic series of public works that can also contribute to political stability throughout the southern region. The political up and down, then, have precisely influence on artistic, particularly in architecture, split by two main currents: in the early decades of the nineteenth century classics models become the inspiration to make room, in the second half, those Neorenaissance. These are characterized by a meticulous character design that became quickly the symbol of the aspirations and the affirmation of new and emerging business classes of bourgeois decorum. To complete this scenario, there are also reasons related to economic development and population growth and therefore the expansion of old settlements that, through the demolition of the city walls, are built along existing or new roads, following a modular grid. This process makes an important and significant part of the representation of the entire South. The teachers involved in the Academy of Naples, innovative interpreters of taste from the Napoleonic Empire, transmit it to the young students, who are also involved in Puglia. Therefore, even for Carbonara, the central square becomes the center on which engage broad that branch off symmetrically distributed from it, or from the monument, a representation of convenience and functionality of the theory of the late-eighteenth century.

From an administrative standpoint, until February of 1928, Carbonara is an autonomous municipality, on this date, through a Royal Decree, the two municipalities of Carbonara and Ceglie are suppressed, becoming a single large fraction of Bari, while in 1953 a Ministerial Decree split again the villages and in 1970 Carbonara, Ceglie and Loseto become three of the seventeen districts in which Bari is structured and, finally, in 1979 the districts are grouped into the 9th Administrative District of the city of Bari and these three fractions, from then until today, belong to the 4th.

1.2. A short essay about the modern urban transformation of the province of Bari

Early indications for the programmatic expansion of Bari to the south, or beyond the break of the railway line, appear in 1911 with the town planning of Eng. Arrigo Veccia: starting from the Murat district, is planned a urban expansion along the radial axes of growth of the traditional city, where there are already civil and

Fig. 1: Carbonara: : Piazza Umberto I of the beginning of XX century; on the background Corso Vittorio Emanuele

productive settlements.

Between the XVIII and XIX centuries, Carbonara is a suburb close around to the present Piazza Umberto I (ex Piazza Garibaldi); its structure is clearly visible in the urban cadastral map that keeps track of the properties in the city at the end of 1800 (Fig. 3): the building facades along the square and along the main radial expansion streets are mostly completed and the areas that are most built are to the north in the direction of Bari and to the south-southeast around Corso Vittorio Emanuele.

But it is with the Master Plan of the Grande Bari in Fascist time (Fig. 2), commissioned in 1930 to Architect Concezio Petrucci, that is expected growth of the city both in the east and west directions, but also and especially to the south to integrate the suburbs Carbonara, Ceglie and Loseto. In the Petrucci's masterplan for the surroundings of Carbonara and Ceglie (Fig. 4), very close to each other territorially, there is provided a unitary project of the area that involves both the demolition of portions sometimes considerable, both the construction of a substantial amount of building extensive near the two urban centers, both the intensive construction in the free space between the two municipalities; these are joined without interruption by blocks built, parks and boulevards that are modeled without following the paths of agrarian property. For Carbonara is basically confirmed the development around the main square along the radial lines that are structured in the course of the previous century; are planned several demolitions with the dual aim both to reduce the densification of the urban fabric, to make straight the streets and to create open spaces, both to facilitate - particularly in the south - the creation of wide and straight roads linking Carbonara Ceglie.

The plan of Petrucci, despite never having reached the final approval, has served to regulate the expansion of the city even after the war and, anyway, until it is approved, in 1954, the town-planning of Piacentini-Calza Bini (Fig 2). Stimating a doubling of the population (500,000 units), the town-planning allocates extensive areas of land to the urban expantion: with the exception of the west area - not suitable for the residential use due to the presence of the cemetery and the industrial areas - the edification is planned substantially in all directions. The road system is centered on three main north-south axes and, in the south area of the railway, on three lines transverse. The Murat Centre still hosts directional and commercial structures, while the functions purely residential are located in the neighborhoods system of a crown around the city center. However, the realization of the project will be done through the systematic use of variation to the town planning scheme and of the license notwithstanding.

Fig. 2: Bari town planning: Petrucci Plan of 1938; Piacentini-Calza Bini Plan of 1954

Fig. 3: Carbonara di Bari: urban cadastral map at the end of 1800

In 1973 is adopted the town planning of Quaroni (Fig. 2), which formally can be considered a variation to the plan by Piacentini-Calza Bini, even if the city model proposed seeks to break the structure of the monocentric city in favor of a polycentric model that focuses on the reorganization and strengthening of the suburban villages, on the renewal of the nineteenth-century city center, as well as on creating a new centers of peripheral expansion. The supporting structure based on a communications system road that extends to a scale that exceeds the limits of the municipal area. Assumes particular importance the new north-south axis that, from the port, cuts the whole system of cross communications to connect Bari to its hinterland.

Fig. 4: Bari town planning – Town of Ceglie e Carbonara, architect C. Petrucci, 1938

2. Particular chacateristics of the civil architecture in the Land of Bari

As has already been able to detect Sylos, the Neoclassical period and the Neorenaissance in Bari are clearly distinguishable as "*al sesto tondo si sostituisce il sesto ribassato*", noting, however, that "*a nessuna di queste costruzioni, sia del primo che del secondo periodo, mancano mai la signorile correttezza dell'insieme, l'armonica euritmia della linea, la cura e la grazia dei particolari*"[2]. This critical position is also evident in Carbonara where, however, is also visible in the formal influence of what had been the first expansion of the nearby Bari: the buildings of the Murat Centre are on two floors or maximum on three floors including the ground floor. In particular, buildings with three floors represent the classic nineteenth-century house of Bari, with a prospect divided into three bays and about sixteen feet long, a balcony for every room and a simple but harmonious crowning cornice[3] (Fig. 5).

These building types are routinely taken in the territory; the use of *dolomia* stone for decorative and architectural elements makes its appearance even in smaller countries, including Carbonara, while the common limestone, with its various gradations, is used as coating of ordinary masonry, for the ashlars of angular stone, for balconies and gables of the windows. With regard to the engineering practice, the tuff called "*zuppigno*" is used for the structure of the vaults – usually, there are barrel vaults in the service rooms, while cross vault and pavilion with lunettes in residential rooms – and of the arches, for the coating of the inside of the stone walls and for the inner walls with a single row of bricks; the tuff called "*carparo*" is especially used instead for corner pieces, for the ribs of the vaults, for frames and shelves and for the outer covering more cheaper than those made of stone. The horizontal structures, until the early twentieth century, are barrel vaults, even with lunettes, pavilion and "*a schifo*" vaults, less frequently cross vault and "*a vela*" vaults and are made using squared blocks of tuff; in a second time we can find ceilings with beams of iron and tuff or bricks vaults, and finally, from the first World War, tile-lintel floor. The thrust of the vaults, with which are also covered the second floors, is supported by very thick walls made in squared tuff.

The facades are characterized by the constant presence of balconies and by a clear majority of the wall surfaces compared to windows. The windows on the upper floors have significantly vertical relationships and are always equipped with shutters, while on the ground floor you can find openings with different shapes and sizes: small and low entrances, even with steps near the threshold, for stores and workshops; entrances "alla mercantile" for the passage of carts or carriages they place in small interior patios; elegant entrances often adorned with frames, decorations and columns leading to the main house on the upper floor (Fig. 6). The color of the facades, always plastered, is rather uniform and usually ranges from ocher and *beige*.

In conclusion, the nineteenth-century architecture in Bari has its own particular character, is very tidy both for its exact proportions, both for the metric relations existing between the flat surfaces and the plastic and decorative elements; the same features are also found in the other cities of inland.

Fig. 5: Bari. The Murat Centre in a picture dating from the late nineteenth century.

Fig. 6: Bari. "*Bari Vecchia*": vaulted structures and entrance "*alla mercantile*".

3. Unfinished building nineteenth-century in Corso Vittorio Emanuele

Among the buildings located in the historic center Carbonara di Bari, stands along Corso Vittorio Emanuele - the section between the squares Umberto I and Giuseppe Garibaldi - the front of a building (Fig. 7) in the bourgeois house style of nineteenth-century and follows the classic model inspired by Neorenaissance style which is mentioned in the previous paragraph.

The real historical estate is developed on two levels including the ground floor; the sober front consists of a single span, which downstairs exhibition at the center an entrance "alla mercantile" that leads into an irregularly shaped room with a barrel vault, while the upper floor has a single window surmounted by a frieze and frame and a balcony - decorated with elaborate balustrade in cast-iron - both not aligned with ground floor access. The facade is covered with plaster and on the sides is framed by two bands that in top become embossed and end with a simple and harmonious decorated band, followed, in height, by a cornice with brackets.

Fig. 7: Carbonara. The small palace in Corso Vittorio Emanuele: the facade and a detail of this by laser scanning.

Fig. 8: Carbonara. The small palace in Corso Vittorio Emanuele: rooms and vaulted structures on the first floor

The rooms on the first floor are accessible by a ladder placed in the *vicinio* and accessed by the door at the left side of the facade above described. The rooms - five in total - showing different roof systems, a clear sign of their achievement in later times: the four rooms of the nineteenth century core are covered by three vaults "*a schifo*" (Fig. 8) and by a barrel vault, on the contrary, the room facing west - originally probably a terrace - has covering with tile-lintel floor. From this last room, through a staircase, you enter a room with a flat roof and from there to the terrace.

The *vicinio* (Figs. 9-12) is characterized by alternating covered areas - two barrel vaults and vault "*a vela*", coverage very rare in such spaces, made of squared blocks of tuff - and open spaces. The ground floor rooms open out on both sides of the *vicinio* - especially in the covered areas - and show an entrance surmounted by a small opening, which is needed, obviously, to ensure a minimum of ventilation for locals that have three blind sides (Fig 10); have different shapes and sizes and are very irregular, but always covered by barrel vaults.

3.1 Considerations about the peculiarities of the building

The instrumental survey executed and the subsequent development three-dimensional of the point clouds, along with research conducted at the State Archives of Bari have served to bring out some salient features of

Fig. 9: Carbonara. Building in Corso Vittorio Emanuele: vaulted structures on the ground floor by laser scanning
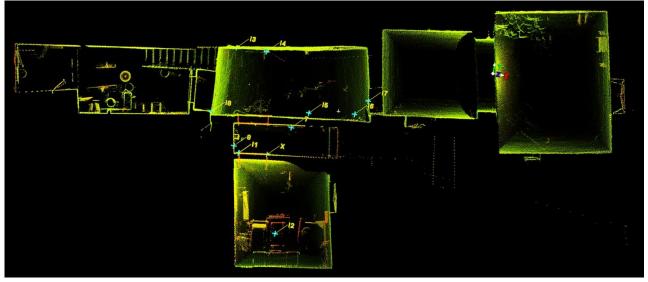
Fig. 10: Carbonara. The small palace in Corso Vittorio Emanuele: rooms on the first floor by laser scanning

the architectural and allowed to advance a different hypotheses about the genesis of elevation structures and the different steps of growth of the building.

The facade shows strong asymmetries that lead to make different assumptions about the construction phases that followed each other and those who probably have never been realized. The vertical decorative elements are all symmetrical to less than a vertical band on the left side that, in the manner of parastas, uninterrupted runs nearby to the band specified above, and that at the top has a larger overhang of the other (Fig. 7). The hypothesis advanced is that of a facade designed to be tripartite, that is set of three bays as nineteenth-century buildings in Bari, but was in fact incomplete. Singular also the lack of axiality between the two openings: the ground floor entrance is nearly centered on the width dimension of the facade, but not at the center compared to the inner room which gives access; a balcony and the upstairs window are decentralized both compared to the width of front both respect to the back room, but the window is aligned with the row of passages found in the rooms upstairs.

These considerations about the facade and the behind rooms, together the particular typological and structural conformation of the *vicinio* indicate that there was an older portion - difficult to date - made of ground floor rooms belonging to the same vicinio and rooms upstairs not exactly the same with those of existing nineteenth century building. Probably the *vicinio* was a place of passage but also a place to stop covered/uncovered that linked two parallel streets or that leading into a courtyard, as in the preceding and/or coeval examples you can find in the Bari Vecchia.

In fact, if we consider the traditional architecture of the old town of Bari, at the street level in correspondence with of the vaults a series of spaces appeared and the life went on seasonally there close, alternatively in or under adjacency of the shelter: in the hot season the vault offered meeting places away from sunlight, while, in the cold season it was possible to benefit of the direct irradiation placing oneself behind them. Later on the
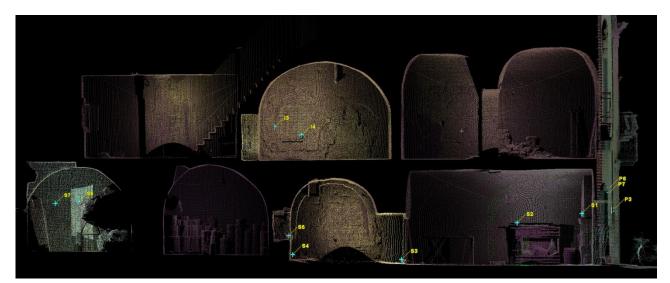
Fig. 11: Carbonara. Building in Corso Vittorio Emanuele: longitudinal section from laser scanning

Fig. 12: Carbonara. Building in Corso Vittorio Emanuele: the vaulted structures which characterize the *vicinio*

vicinio, because of its proximity with the main church, it was probably damaged or partially destroyed by the burning caused by the French in 1799. After, in the first decades of the XIX century, Carbonara there was a considerable work of reconstruction and these were the years when, probabily, the building was built on a pre-existent nucleus exploiting the powerful wall structures of the ground floor, which were not destroyed by the burning. The ground floor rooms became area services (deposits of tailings, shelters for animals, etc.). of the main house situated on the first floor. This historical reconstruction may be supported by a series of anomalies which it was possible to point out thanks to the three-dimensional reconstruction from laser scanner such as, for example: missed alignment and variations of thickness frequently noticed among the structures in elevation of the two floors, enlargement of one of the supports on the ground floor with a consequent reduction of the access door to the neighboring room, insertion of a flight of stairs inside a supporting structure, manholes found in some of the vaulted of the environments on the ground floor, etc.. he conditions of life happens between the two World Wars when there is an increases of the gap between the population and the number of rooms, that is because of natural events and / or natural disasters, the population impoverishes, the number of property owners stagnates but the number of tenants increases. As a consequence there is an overcrowding in some parts of the town and for some categories of users that leads to the downsizing of the housing and to the decrease of the number of rooms in it, with negative consequences of the hygienic conditions of the housing. The home becomes, in the worst cases, composed of one room on a area of only 30 square meters, with a single facing and frequently placed on the ground floor. This can be assumed for the environments placed on the ground floor of vicinio for two reasons: *in primis* the only plants found dated 1939 attributed to every environment category A5 (low class housing) instead of, for example, C2 (warehouse / storage) as we might suppose because of the type building; the second reason is that, within the only environment, there are toilets evident sign that the family who lived there – probably large as for tradition - was forced to live only in one room.

4. Possibility of reuse in the respect of the tradition

The *vicinio* on the ground floor and rooms on the upper floors offer different ideas for reflection to advance a proposal for reuse that values the orientation, the shape of rooms, weaving wall, the height of the rooms, etc. in the thickness of the massive walls were carved niches, fireplaces, steps that tell how the people utilized their in the past.

The draft refunctionalization is assumed that future use of the property must be compatible with the vocation of the place while respecting the rules of healthy hygiene in confined spaces (size of rooms, ability to perform proper ventilation, natural lighting requirements , etc.). Following this assumption, the vicinio becomes an extension of the residential property common to most homes - as indeed was done traditionally - and the
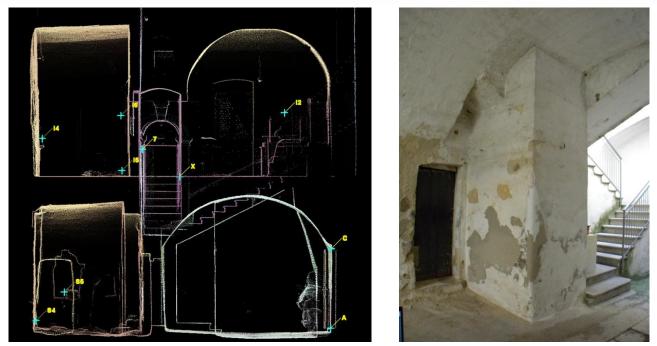
Fig. 13: Carbonara di Bari. Building in Corso Vittorio Emanuele: the vaulted structures which characterize the *vicinio*

ground floor rooms are joined in pairs to create small flats in which the division between living and sleeping areas not marked (Fig. 14). The number of partitions is reduced to a minimum: are used only to separate the toilet from the common area and have a height always less than the time to prevent conceal the complex geometry of the spaces. The walls are all plastered newly constructed, unlike existing ones will remain legible for which the wall-building in square blocks of tufa, which also shows no signs of injury or failure. The thickness of the wall is of fundamental importance to ensure the thermal inertia of seasonal and reduce power consumption for air conditioning.

Upstairs, the area of nineteenth time is valued in the same manner above described, and is scheduled reconstruction of the floor is brick and cement for structural reasons, is to ensure a better thermal insulation.
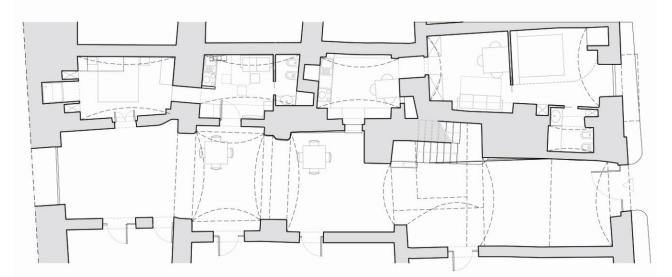
Fig. 14: Carbonara. Building in Corso Vittorio Emanuele: the project of restoration of the *vicinio* on the ground floor

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[1] On 30 July 1862, the Prefect of the Province of Bari ordered to add the name of the City of Carbonara a suffix that he could identify him and the city council decided unanimously to name it Carbonara di Bari Regarding the origin of the name,instead, mention is made of different hypotheses previously reported both in published sources that in the

literature, from the one advanced by historian Antonio Bari Beatillo that extends to the derivation from the Greek words Kar (mercenaries) and bon (peasants), or the position expressed from the historic Coleman Carbonara that would attract a "coal" or "furnaces" or, finally, that reported in Bari Diplomatic Code drafted in 1195 that Carbonarium - Carbonarum - Carvonarium mean "ditch" or "ditch".

[2] Cfr. S. SYLOS, *La Puglia Tecnica*, Bari 1901.
[3] To further study this matter see: D. DI BARI, *Bari: la formazione del quartiere Murat (1813-1945),* in "Rassegna Tecnica Pugliese-Continuità", n. 1-2, 1970, pp. 70-99.

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The "Fontana Rustica" in the gardens of the Quirinale. The three-dimensional laser scanning research for a overall framework non-invasive investigations.

Williams Troiano,[1]
[1] Dipartimento di storia, disegno e restauro dell'architettura (SDRA) Facoltà di architettura, Sapienza università di Roma, Roma, Italia.
williams.troiano@uniroma1.it

Abstract
Inside the Gardens of the Quirinal, in a rather secluded, a place is one of the oldest fountains that adorn the park, the so-called "rustic Fountain" commissioned by Ippolito d'Este in 1560 realized by Curzio Maccarone, fed now as then, Aquedotto Felice. On behalf of the office for the conservation of the artistic heritage Quirinale, a research has been structured with the aim of restoring the original form - now hidden - the monument, so they can better define the future restoration. Starting from the iconography has been possible to establish that the fountain has undergone several changes during the papacy of Paolo V - in the first decade of the seventeenth century - and Gregorio XV, which must add up the wafers produced by tartaree layers of limestone, mosses and different tree species. For these reasons the fountain shows an aspect of "organic" in stark contrast with the small tank molded on which it stands, as to make it a casus unique architectural. To meet the demands of the client has been called a "protocol" of instrumental tests such as laser scanning, thermography, digital sonic tests and endoscopy. The results of the first phase were merged within the three-dimensional model obtained by processing the scans in both the three-dimensional shape to a reduction in the skimmed "*finite elements*".

keywords: scanning laser, diagnostic, modelling, databases

1. Introduction
The knowledge needs to ascertain the state of preservation of historical artifacts according to the guidelines that govern the modern concept of conservation, as noted, require a variety of specialized analyzes. These investigations for the importance have long been the focus of intense scientific debate about the results, especially seen in the last decade, the innovative contributions provided by the electronics and informatics. This process of electro-computerization has in fact allowed to redefine the very concept of knowledge, given the current real test you can perform only theorized up until a few years earlier. In principle a framework that goes beyond the narrow scope of disciplinary architectural survey, investigations aimed at the knowledge of an artifact can be grouped within three main categories:

I)   Analysis of surface metrology (laser scanning, digital photogrammetry),
II)   Analysis of matter at shallow depth (infrared thermography, Multispectral analysis),
III)   Analysis of material-mechanical deep (sonic / impulse response, modal analysis).

Each of these investigations beyond that for which it is attached, serves the double purpose of providing a high degree of knowledge with a nearly zero rate of invasiveness may allow you to overcome many of the limitations imposed by the boundary conditions, often frequent, in sensitive scenario of investigation as to the subject of this paper.

2. The fountain of woods

In April 2011, commissioned by the Office for the conservation of artistic heritage of the Quirinale Palace, the laboratory of the Faculty of Engineering of the University of Rome CRITEVAT, has undertaken a series of investigations to determine the conservation status, and together, the "true form" of a building inside the Quirinale, in order to assist and support the preparation of the restoration project. The object of investigation, one of the oldest fountains in the garden, already mentioned in the mandates of payment for magisteria recognized by Ippolito d'Este in Curzio Maccarone in 1561, given its characteristics and nature of questions to response required a multidisciplinary approach. The research was initiated by the analysis of historical documents kept in the form of regesto by Dr. Francesco Colalucci, head of area historical research on the Quirinale Palace complex, but that does not provide a precise description of the original appearance of the building, reported several indications about the changes gradually over the centuries suffered from the fountain, thus providing the important information about the *pectus* research and clarify whether the current appearance (fig.1) corresponded to a precise determination of palimpsest the fountain in the form of a mass nature concretizia, or was the result of a superposition of layers of limestone masses of lichen.

The fountain has made two huge portions with the base a hemispherical bowl molded from which rise some elements also molded to dissipate rising to the top. These seem to be reflected with some descriptions of work performed in the middle of the eighteenth century, appear to be absorbed, rather intermeshed, by spongy masses covered with vegetation. The natural look is accentuated by the irregularity as well as also the high degree of many alveolus present. The dark gray is almost homogeneous and makes it easy to distinguish the different varieties of plants present up to the top. At the summit, where the two masses do not have discontinuities, is placed a small statue of Orus on a just sketched pedestal. An interesting aspect of the fountain is discernible in the slight shift in the axis of the artifact that leads from the prospectus of the garden in the Palace of Quirinale. In order to answer to these questions, a precise protocol of investigations has been set up, including at least one test in the major categories listed above with the aim to interpolate between them, which were in order: the laser scanner, high resolution mapping camera, thermal imaging and digital seismic tomography.

Fig. 1: Rustic fountain, the main prospect
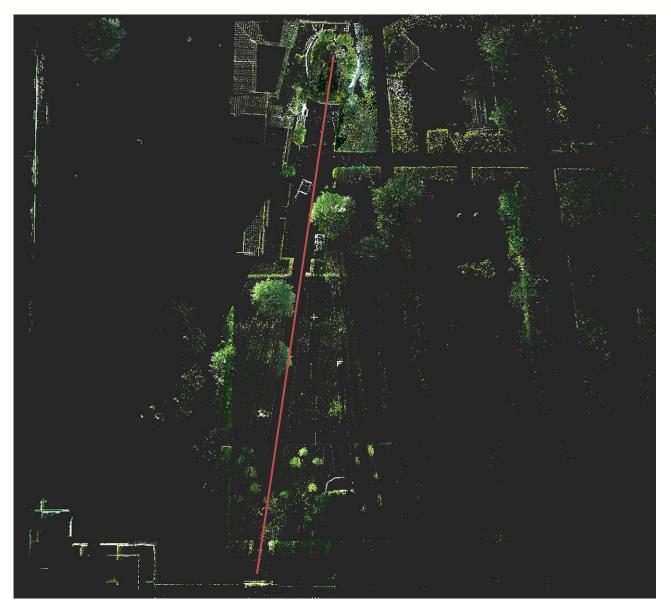
Fig. 2: Scanning laser collated; the elimination of tree species in the editing highlights the alignment of the fountain.

3. Definition of the complex model and topological fields

First of all should be pointed out that the investigations reported in this paper were intentionally disconnected from the hardware description that made them possible, because it would require a very different focus to examine it, the one on which there has instead focused more attention was the ' usability of the results obtained. Given the inherent complexity of this investigation, the concept of usability has seemed the ideal parameter to evaluate the effectiveness of the instrumental results, as the data collected for their diversity needed to exceed the scope of the architectural survey of the discipline to move within a wider range of skills. For these reasons, priority has been the appearance of "maximizing the benefits" that were at different stages in the use of collected data (round-up) management (storage) until further processing (editing). The fountain, to be fully restored and then be fully usable in its digital form, presenting as a heterogeneous collection of architectural and natural elements, must simultaneously satisfy the requirements listed above for more simplifying where possible. For this reason, the focus of research has become, beyond the data, their interpolation. In structuring this stage it is considered the work of collecting information from the linguistic point of view, suffering from the assumption that if the "understanding" is an expression of the cultural structure of the user, "usability" and "conservation" are dependent variables of component technology (hardware) that may change to benefits (or disadvantage) of the first factor. Once defined these assumptions, were determined the bounds of the object by circumscribing the purposes to which it had to fulfill, in order to be guaranteed the usability which was the track where there is never deviated. It was therefore necessary to define how to display the amount of data registered, taking into account that these

quantities were impressive. To meet this requirement, basic "topological districts" have been defined, each of which contains a specific set of data. Before those metrics, then all the rest one after the other.

Fig. 3: Mosaicing of the fountain with the elimination (virtual) of shrubbery and trees.
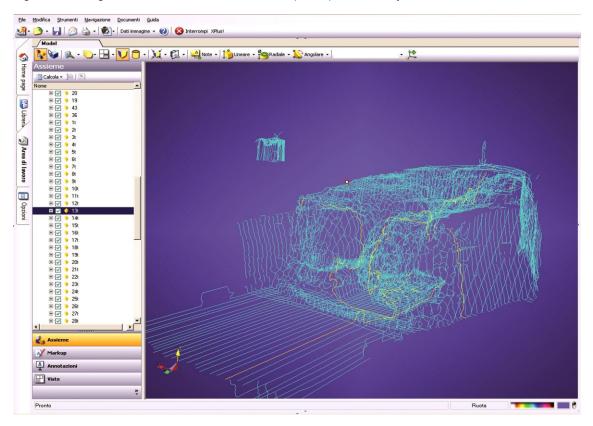
Fig. 4: Transformation of the fountain in the pseudo-finite elements, highlighting plans interested by the sonic tests.

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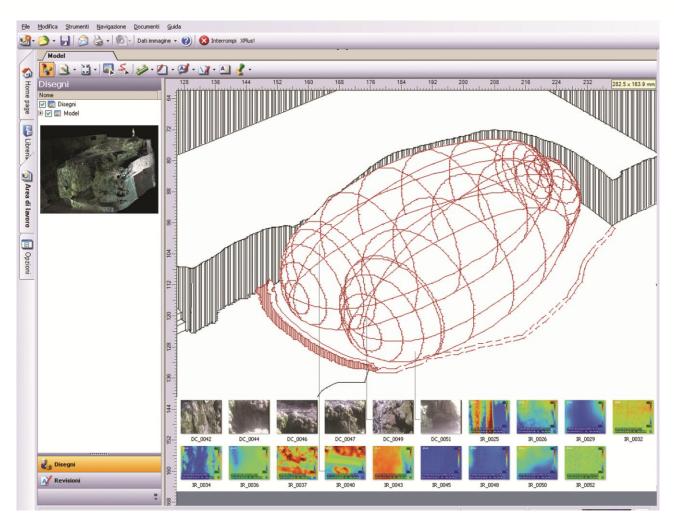
Fig. 5: Simplified model for the storage of data in three-dimensional shape with chains of thermal data.

4. Definition of Database

Once terminated the laser scanning session, made trying to avoid gray areas as much as possible, in order to eliminate any gap during the editing stage, which not infrequently take the form of anomalous surfaces, thermal mapping of the fountain was performed. The purpose of this phase was, through the understanding of the rate of release of moisture, to deeply understand the knowledge of some specific materials collected through micro-coring executed by EURESARTE company of Rome. To simplify the reading of the results, was previously calculated within predefined time intervals, the degree of exposure to the sun on the artefact, taking into account - at the time of the shooting - the solar lighting time and the portion of sky skimmed from the trees. Based on these preliminary considerations, we decided to focus the analysis in just one day, producing three separate shooting sessions, at the rate of one every three hours.

Analyzing the responses has been possible to assume a fair degree of homogeneity in thicknesses thus allowing a first approximation of mapping of limestone layers. Consecutively in this round of tests, when collated with the clouds of points, it was possible to draw the first elaborate descriptions in CAD (fig. 6.7), which have allowed us to plan accurately the sonic tests whose results are at the time of writing this paper, still under development. The maps have proved to be of great utility since it is necessary to place the sensors in a targeted manner along a direction. Given that the reverberation of the microseismic stresses produced the desired effects, it was necessary to define the precise positioning quota in order to produce an equal field superposition of effects.
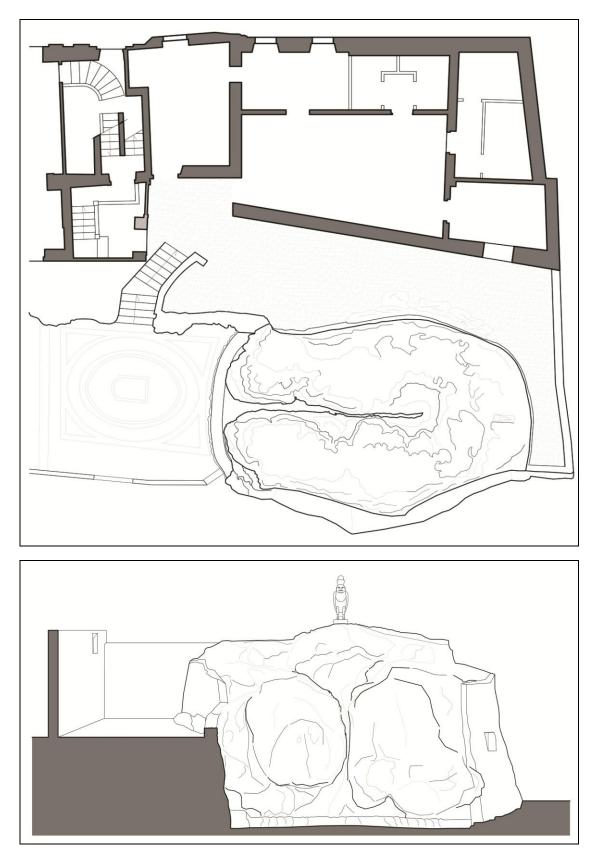
Fig: 6, 7: Plan and elevation derived from laser scanner simplified calculations for the scale of representation.

The sum of the data acquired at this stage clearly showed that to obtain satisfactory results it needed a high computational power and an equally significant amount of space for storage and management. For this reason it was essential to adopt a high-end computers that could handle this amount of data (specifically, a TESLA workstation with CUDA technology), without which it would be impossible to achieve a

complete reading of the article. This workflow has, however, also made it clear that, if it has to be forced to bind necessarily data just through these kind of performing computers, the prefixed usability of the project would have failed. For this reason it was decided to build a database that was able to more easily manage the data, placing them within specific subject areas. This project called VIMuS (Virtual Interactive Multimodal System), was conceived with the interface of a model structure (Fig. 5), which reproduces the three-dimensional object using overlapping layers, it constituted itself as the paradigm of complexity in an attempt, among others, to respond with new technologies, the testimonial value of the time. The goal of this operation has been, re-reading the contemporary principles of restoration, to imagine a modus operandi and a computer system, which could allow the understanding that "knowledge" of a cultural heritage has value if it is possible to distinguish the ensemble made of single parts, each element that component it. Only a perusal operation, conceived from the beginning along these guidelines, might be able to return analytically the monument in its highest sense.

Obviously the hindrance of this operation, just in early development (PRE_BETA), is the difficulty of integrating the results obtained using different digital techniques of investigation. The instrumentation indeed, if by one side makes it possible to learn more about form and substance as components of an artifact, the other shows the undoubted difficulties in the process of interpolative instrumental results mainly due to differences in computer languages with which the equipment operates. Though apparently it looks exquisitely a computer matter, the interaction between the results of instrumental testing is, and remains, in primis a semantic problem that requires updating the technical language of architecture refund.

The experience gained in recent years indicates that the obstacle does not occur during the digitization of what you are investigating - because the operation can be understood as a aliquid stat pro aliquo - but in the semiotic relations of computer languages. The difficulties arise when, after the acquisition workflow of the data using the different tools, you want to merge into the metamodel the results obtained by specific software for investigative purposes, or when you try to relate and create a dialogue between their data to obtain an organic result.

5. Protocol definition of metadata

Established guidelines of the model under the aspect of "semantic", the next step was the choice of computer language that can make the best of the data obtained from tests. While remaining interest in the design of a proprietary software, in this phase – even if we are not informatic experts - has been preferred to locate a "neutral" program, with a high degree of versatility and together capable of containing the proprietary extensions software used for investigations. The importance was that the program couldn't result too complex to manage both master (the participant) and client (the user) profiles. For this reason, following a series of tests, has been selected the software SPINFIRE of 10.0 'Actify, as the most corresponding to the requirements management requests and together with a powerful list of input data. The database structure has been simplified as much as possible by dividing the content into two main areas: iconic and data, from which, with a system of pull-down menu, select all other options. Currently this system is being tested on two different types of hardware – high and low – in order to test the possibility of management. For this reason, even investigations made on other kind of artifacts using different methods of diagnostic tests, are in the implementation phase on the system; the intent is to develop even more accurately, the protocols and interfaces, input and output data.

6. Conclusions

Summarazing the above it can be said that "integration" is certainly the key word in the near future for what it is about knowledge and documentation all the more so when they are aimed at safeguarding the artistic and monumental heritage. The possibilities offered by electronics and informatics, while giving way to reaching detailed knowledge, yet are currently deficit of those opportunities for interaction and integration that are the basis of any kind of diagnostic. The experience reported here, gained on the complexity of an original and wonderful artifact which is the "Fontana rustica of Quirinale", has shown that exists and it takes the path of hypermedia and especially of multimodality, so that we can achieve a collection protocol and visualization of data, both for experts and for the most simple fans, which is just as demanding a greater completeness in the information they access to. Thanks to the editors of the various branch of research, Prof. Leonardo Paris, Giuseppe Sappa, Ettore Cardarelli, Dr. Gerardina di Filippo, Marco Mangano and finally to Luca Carlorecchio and Ludovica Cerone for the data processing.
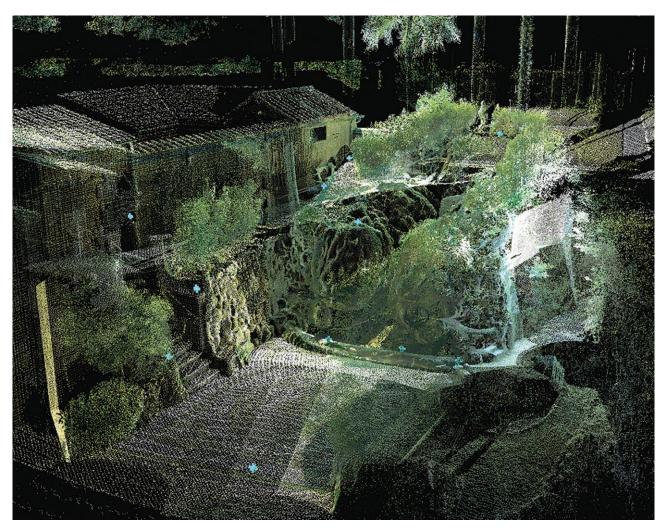
Fig. 8 perspective view of the fountain and the garden obtained by mosaicing the cloud of points.

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LESS WHITE, MORE WHITE

Giovanni Maria BAGORDO,[1] Rocco VARIPAPA[2]
Dipartimento di Storia, Disegno e Restauro dell'Architettura, Università di Roma "Sapienza", Italia
e-mail: [1] gianmariabagordo@gmail.com, [2] roccovaripapa@gmail.com

Abstract

It's little more than a century that architecture copes with white, the colour of the Modern Movement and of the International Style. White would seem the most natural choice for a kind of architecture that is free from decorations; it becomes a three-dimensional transposition of linear whiteness of the project: the white of the paper gains materiality and becomes frontage. But white is a colour – or would it be better to say a non-colour? – that boasts a very rooted and time-honored use in architecture. Conventional Mediterranean houses are white, whose achromatic stile isn't the result of particular graphical expression researches, but it merely fits with a practical need to limit the overheating caused by the exposition to the Southern sun. In this sense, white is *less* – absence of colour, achromaticity – and it is the colour that urges us to build a man-sized architecture, careful to man practical needs and to the cost limitation.
White is also the sum of all luminous radiations, white is polysemic, *more*, and it was often used for this reason – even in an improper way – to celebrate, to flaunt, to strike a sense of greatness or magnificence, becoming an *élite* colour. Is it really this one the Modern Movement lesson? Maybe the teaching of the masters of contemporary architecture should be completed with the easiness of white that unifies the Mediterranean banks, by the spontaneous recalling between towns on the hills of the islands and the waterfront of the coasts. It's only the union of resources and a shared management of goods that can guarantee to the Goods of being passed on the future generations.

Keyworlds: Colour, White, Modern Movement, Mediterranean Architetcuture

1. About white

Have already passed some centuries since Newton, with its famous experiment showed that white light is composed of the total of all light radiation, each of a specific color if taken individually.
The white is the sum of all the other colors. Claiming this, quite revolutionary, especially if, on the basis of common experience and centuries-old art of painting, he had always observed that the sum of many colors tends to black, which is precisely the opposite of what was stated by Newton.
Not by chance even in the first half of the nineteenth century, Goethe seems to be one of the fiercest opponents of Newton's theories and it took the equally famous experiments of Thomas Young to settle the issue and melt the chromatic world in the two sides of colored lights - the sum of the radiation produces white - and the pigments, those used by painters, who tend toward black mixed, or rather into an indistinct color next to a dark gray.
Since then, black and white - united by the oxymoron of achromatic colors - have risen as a symbol of the opposition of strong contrasts, so that Johannes Itten in his structural theory of color, sees in them the first and main generator of the color pair contrast of light and dark.
It is a total contrast, the one between black and white, which admits no middle way, which does not allow shades; any mixing them, in fact, produces no other whites or other blacks, but an almost infinite range of intermediate shades of gray light and shade - other achromatic color, considered neutral par excellence - that continuously connects the two extremes.

For thi s reason, the li ght/dark contrast gen erated by white and black be comes by exten sion contrasting light/shade, although it wo uld be more appropriate to speak of lig ht/no light, because any object in shadow does not appears black, but a darker tone of its own color.

However, the strength of this definition has led to the identification between white and light, and black a nd darkness is now immediate and definitive.

But this lea ds, again, the result of Newton's experiment: the light, as the sum of all radiation color, is white, so it should exist only one white.

But the common experience confirms that it is perceived many whites and so many attributes are associated with the term white in an attempt to identify a color resorting to common objects chromatically equivalent to it: "milky white", "creamy white", "white ice", "ivory". It even seems that the Eskim os have in th eir vocabulary, many different nouns to i ndicate the white; evidently in a place whe re the i ce is the ma ster – from the soft blanket of fre shly fallen snow to the thi ck slab - th e human visual sensitivity is successful to distinguish the color variations due, for example, in presence of impurities or air bubbles inside the structure of water frozen. What, then, among th ose mentione d a bove, the tru e white? T he "ivory" - warmer an d full of nuan ces of yellow - or the "ice", cold, surrounded by reflections in the range of blue and purple?

An example of the multiplication of the white comes from one of the gr eat masters of Italian painting. Th e *Veiled woman* Raffaello Sanzio is considered to be a masterpiece in its rendering of different shades of white used to differentiate the clothes, to emphasize the parts to light, to define the shadows, in a superposition of continuous tones of white on white[1].

2. The use of white in the Mediterranean tradition: *less white… *

And the portrait of Raphael opens the way for another important consideration: what is the relationship that is generated having to d epict a white object on a white support, like the canvas or the m ore common drawing pad? T he M odern Move ment and the International Style hav e accustomed us to the fact that archite cture devoid of o rnaments should be colo r-white, as if color and sim plified form s m ust n ecessarily coexi st. Th e white of the façades then becomes the three-dimensional transposition of linear whiteness of the project: the white of the paper acquires materiality and becomes the facade.

But is it a con scious chromatic choice, due to the elimination of any ornament, including color, in which case the ab sence of ch romaticity become s a value a dded that is enhanced by the simultaneous pre sence o f elements - in cluding colored el ements - p resent i n t he n eighborhood of the o bject ar chitecture? Or is it a surrender to an image that takes its value in the drawing and which is intended to preserve its design even in the spatial transposition? In short is it the same "blank page" terror tried by the writers, fro which, rather than choose to assign a specific color to the architecture, is left as it appea rs d efined only by the edge s of th e outline, those same which determines its pure form?

The white propo sed by th e Modern Movement is willing, therefore, a multiplicity of interpretations a nd takes on many meanings including semantics, just think of white as a symbol of purity, innocence, sincerity. Please bear in mind another use of white color in architecture, which has roots much deeper and far more humble.

This is the white of the Mediterranean tra dition b uildings, which i s not the re sult of a chromatic specific research graphic expression, but simply coincides with the practi cal need to reduce the overheating due to sun exp osure in the South, creating a game with white that you se e oppo site one an other acro ss the Mediterranean. In the mo dern archite ctural la nguage so there i s a ne w conflict that a rises, this time, n o longer by the contrast between color and no color, but directly within the sam e white. On the on e hand, the multiplicity of value s a ssigned by the Mod ern Mo vement a nd the Internatio nal Style ta kes a white that generate a wealth of val ences of me aning, a white who could be calle d *more*; othe r, the centu ries-old tradition of Mediterran ean people, off white supe rstructure to restores it to its first and prin cipal value colo r, back the *less* scope. It is p recisely this contrast between less white and more white is to be analyzed in this contribution that, necessarily, is written for four h ands to face, in an independent and di alectic manner, the two sides of the same topic.

3. White as the color of collective memory *

When in th e 60s of the twentieth centu ry, the Aga K han turned his attention to what was to become one of the most am bitious projects of land u se - the creation of the Co sta Smeralda - wa s born the need of having to define the type of archit ecture that could better describe the action - by integrating into the landscape and not overturning it – and, at the same time, make it unique and instantly recognizable.

Fig. 1: Stella Maris, Porto Cervo.

Fig. 2: View of Santorini.

For this reason, between the architects invited to participate with their own ideas - and later to realize a true city plan strictly limited regarding the use of forms, materials and colors – was included Michael Busiri Vici in addition to Luigi Vietti and Jacques Couelle. At that time Busiri Vici had already distinguished himself on the Pontine coast with some architectural work that ended to incorporate architectural elements of other Mediterranean countries such as Tunisia, Morocco, Spain and Greece: core housing compact box shaped with service areas, aggregated in clusters or online, but always oriented according to the orography of the land and giving priority to the southern exposure; control from the intense summer sunlight through shadowy spaces generated by narrow streets; masonry of stone or brick, plastered with clear or white limes, to decrease in surface temperatures of the external envelope; small and sporadic openings, in addition to the front door, through which, while ensuring the lighting of the interior in both seasons, the protection is ensured by the incidence of sunlight in summer. It was, therefore, outlined his own personal style that drew its strength from the typical " Mediterranean Architecture", broken down into its basic typological forms and reassembled according to the demands of a more modern life and, above all, an environment with touristic vocation.

Without entering into the issue of stylistic work of Busiri Vici, you want to highlight here that the color, and especially the white color represents the main element that are recognized as strong points of a type of architecture so prevalent on both sides of the Mediterranean sea to be considered as part of the landscape as well as its qualifying element.

Emblematic in this sense, is the church of Stella Maris, placed as sentinel at the entrance to Porto Cervo. Its clarity, that stands out against the blue sky, makes it immediately visible, but at the same time evokes more similar images in other places, from the Greek islands to the coasts of southern Italy: those of the rock church, the sanctuary, the votive chapel, but also the ruins of the temple, located on a hillside, above a cliff, or overhanging the sea.

It's a *déjà vu* that is created and that immediately links the modern rise to the ancient architectural tradition by placing it in its continuation. The color of Stella Maris is therefore a white wanted for its denial, its absence; it is a color that, while by imposing the image of architecture, do not give it more value than those related to its specific function, in memory of what happens in similar way, unchanged for centuries, and in many other places of worship built spontaneously. So the external white also penetrates into and becomes the main decoration with few other items, such as the bronze doors or a valuable painting of El Greco. But it is also an evocative white, used to retrieve images of a collective memory that, as people of the Mediterranean coasts, we possess from birth. «And because the flow of life is never lived in a vacuum, but in the materiality of places that serve as "theater" and that therefore contribute to the sense of the lived, we can deduce that the collective memory does not exist whitout our own imaginary landscape. (…) Outside of the scenes that make up the imaginary landscape of our memory we are unspeakable» [11].

Thus the landscape of the Costa Smeralda loses its characteristics of modernity - and if you will, in some cases, of artificiality linked to the lack of an historical support - to acquire the same values of universal visual towns of much older tradition that dot our coastline.

The white walls of the Hotel Romazzino, or those of the residential complex of Sa Conca, near the church of Stella Maris, is the same as any other typical Mediterranean built, located midway between the green vegetation and the intense color of sky.

Fig. 3: View of Gallipoli

Fig. 4: La Valletta, Malta

4. White as the color of the absence *

And about the power of the intense Mediterranean colors speaks Cesare Brandi when he is, "a pilgrim of Apulia", surrounded by the Salento countryside: «clods seem steeped in blood almost purple, as in Provence, and thick milk, white, blinding, curdles the pointy tops of the domes of the trulli, while the more acidic and bitter green of the vines and the dense, by cutting into slices, like a black pudding, carob trees, or opaque jade of figs, popping everywhere, in contrast, almost to extermination of the trulli»[2].

It is the domain of the sun and light, so of the white that, like milk, "curdles" and acquires its own materiality. Because, it must be remembered, without matter the architecture does not possess color, omitting, of course, the possibility of changing original colors by decorating with plaster. It is the choice of materials that determines the color of the architecture, because each material has its own color due to its chemical composition or the physical conformation of its components. So, in a poor soil, in a poor architecture, the white color is rough like stone or dense as lime.

But to dwell on the materiality of white generates a consideration: in the description of Cesare Brandi, though so rich in the palette of colors, is totally absent the blue, that deep color that characterizes summer days in the view of any area of southern Italy. An almost inexcusable absence if it was not just that white color curdled on the tip of the trulli implies the presence of a sky silhouetted against whom, and if the sky was not deep blue, white color would not be so strong.

It is clear, therefore once again, an element of absence generated from the white: the spontaneous architecture, which so much take effect from sunlight, conform in denial compared to their boundary, as if, in the landscape, they could not exist independently. So architecture becomes what is not ground - red, even purple - is not vegetation - green as vineyards or as figs, even black, like the carob trees - and is not blue like the sky and, on the coasts, like the sea.

Here then back to mind the image - at times even a little stereotype - of Greek islands, with white fishing villages densely barricaded somewhere between sky and sea, as if they were cut out shapes on a blue background. It does not matter if it's just straight Cycladic architecture - cube-shaped houses, one or two floors, densely developed alongside each other to adapt to the territory and resist high winds, where color is absent or restricted only to small details, such as doors and windows - or if it overlaps the memory of the similar Eolian architecture, also characterized by the cube as the basic modular unit, repeated for one or two floors, with an arched loggia or a pergola to the last level. It is the brightness of the colors, the white of the lime used to not overheat the rooms during the summer season, which requires the memory.

5. White as the a color of homogeneity *

So across the Mediterranean white town chase, appealed, overlap: what is the difference between the image of Gallipoli, "beautiful city" view from the sea and the entrance to the harbor of Valletta in Malta? The Mediterranean city have breathed the same history made of overlapping people and migratory flows. Cesare Brandi still observes: «Bari has its old town, and almost to the sea, fortunately remained on the sidelines, massed around the two solemn monuments which are the San Nicola and the Cathedral. At its threshold the Castle. And here you will immediately notice the contrast with the cities, as well as old, but born in the hinterland and proud to offer the space, the largest possible, in front of the cathedral or the town hall. The medieval Bari, as Molfetta, Giovinazzo, Bisceglie was born on the sea and clings the coast. From the sea is his life and his death, trade and pirate fleets of the Saracens. From this opening, at the same time a closing, it is born the barricaded character of the old city, the streets like tunnels and large dark vaults that bypass it. It seems that, before the streets, a building is made entirely of solid stone, and then drilled by strange, industrious lithophagous. Now, when I saw for the first time Bari, I could not understand this radical

Fig. 5: The Dome of the Rock and the white of Jerusalem.

Fig. 6: Jerusalem, the Souq.

dissimilarity with the cities that are supposed to resemble most: and I realized later, after visiting Jerusalem. All of a sudden in the old Jerusalem, I was in Bari»[2].

And Jerusalem, too, is a white city. White as t he desert that surrounds it and which seems to draw origin; white as the stone who built it, or perhaps, as noted by Brandi, where it was excavated. Because, indeed, old buildings and streets in Jerusalem seem to develop from each other, as if it were only the arrangement of the different plans to find the m: the vertical facades of the buildings, the horizontal roadways. This is a white color that takes away the individual characteristics of each element and conforms all. The absence of an architect from the dominant personality has made the city grow in a substantially uniform; as noted by Bruno Zevi: «[Architectural] prose is largely based on the popular language impersonality in the name of collective images, living tissue. (...) The architecture becomes elusive while urban and territorial structures emerge»[13]. Thus, while the town of Jerusalem is almost homogeneous in its whiteness, all that it overlaps - and that creates a contrast - is colorful, beginning with the Dome of the Rock, blue and gold above the Wailing Wall, to the Green Army's military presence in what should be the "Holy City". There's only one place where the color, even the colors are fully integrated: it is the Souq, very vibrant, which occupies the "streets like tunnels" overridden by the "large and dark vaults," where life throbs and teems in all its forms in the swarming of many businesses located in close contact with no apparent logic. It's as if White had been crushed and broken down into its many color components which, accurately, re-emerge all at once; from this point of view, the Souq is the only place able to compensate for the unabashed candor of the city.

6. …more white: towards the Modern Movement **

Historians seem to agree with the idea that historical process leading to the birth and subsequent growth, maturation and end of the Modern Movement is not to be easily identifiable, in contrast to the other architectural styles. However, historians identify a period that elapses between the end of the XIX and early XX centuries as the crossroads of a new idea of architecture in open break with previous tradition.

In essence, the spread of liberal ideals and the industrial revolution led to the consequential lack of confidence in Antiquity and the research of a spatial composition that is representative of that specific period. Therefore, the concept of Modern Architecture is the need to live the present time by abandoning oneself to the attempt to reproduce the forms of the past. At the same time, architects like Schinkel, Labrouste, Richardson were able to reinterpret the classic style for creating innovative products with both strong identity and unity. In this way, the duality between the past and the present was outdated in an attempt of reinterpreting the architectural principles of Antiquity in modern terms, outlining a precise guideline for the modern designer.

In this regard, according to Viollet-le-Duc, the medieval tradition was able to combine the art of building with materials and techniques of the time. Subsequently, Art Nouveau combined organic forms with new structural patterns, highlighting the perennial problem of ornament. Victor Horta was the forerunner of this new architectural idea, able to join up materials, structures and formal choices; the last ones were characterized by a dynamic supple, richly inspired by nature.

In 1895 Otto Wagner diverted from the architectural vision of Horta designing the Post Office Savings Bank in Vienna (1904-06). In order to report the presence of cladding facade, Wagner decided to emphasize the anchoring of the slabs using marble with aluminum screw caps. In this uncompromising approach, addressed pre-eminently to the exaltation of new building techniques and the new materials, Josef Hoffmann and Adolf Loos were involved. In fact, in their architectural idea, the relationship between form and function was strongly denounced especially with use of materials and building techniques.

Fig. 7: Stoclet Palace, Bruxelles 1905-1911

Fig. 8: Steiner House, Vienna 1910

6.1 In search of volumetric simplification: the divorce between decoration and function *

Hoffmann's attitude was focused primarily on an architectural vision with no symmetrical reference. A clear example of this effect is the Stoclet Palace in Brussels, 1905-11 (fig. 7).

The distribution of internal façade emerges through towers, bay windows and other formal solutions that highlight the relationship between the shape of the volume (enhanced with essential linear moldings) and its function. Loos's approach to new architecture is, indeed, more drastic than the one undertaken by Hoffmann. In the essay Ornament und Verbrechen (1908), he established the divorce between the ornament and function by identifying "the ornament with the primitive eroticism and, at least implicitly, the absence of ornament with the purity and chastity."

House Steiner (fig. 8) well represents this view: the project is submitted to rigorous geometric control and the symmetry is fully expressed in the accessing ramps. Moreover, the facade has a series of openings located in not linear way on the unadorned vertical surface.

Ernst Hans Josef Gombrich, referring to Loos' identification of the ornament with barbarism and murder, believed that «there really was something prophetic in this manifesto against ornamentation. (...) Not only the idea that ornamentation of houses, furniture and furnishings items was fundamentally distasteful became a point of faith, but also it can be admitted that the formal imagination, loosing its traditional expression, should be able to enjoy a new field of action»[8].

Therefore, the architect, leaving the decoration, was oriented towards pure research of formal elements, to their functional utility and to exaltation of the materials.

7. Modern Architecture in 900 and the Avanguardie **

The principles of abstract painting can be found in the modern world conception. By definition, the abstract art is the visual artistic non-figurative expression where the research for pure form happens through the use of colors and geometric shapes. The exponents of this avantgarde current were Wassily Kandinsky, Piet Mondrian and Josef Albers who influenced the development of the modern movement in the postwar period.

In essence, what determines the transition from protorationalism to rationalism is the influence of Cubist painting and the Neo-plasticism that laid the foundations of question about the planimetric rigidity of the Renaissance; at the same time, the Neo-plasticism implemented a process that broke with the past. This process was represented in cubist and expressionist paintings with the depiction of exotic cultures, while in architecture was represented with the exaltation of the function considered as an inspiring muse of the form. In addition, we owe to avantgarde movements (mainly the geometrical abstract art) a new architectural concept where there aren't main facades or privileged perspective views, but where the dialogue between inner and outer space is continued. In this sense, Siegfried Giedion defines architecture as the third conception of space: «Initially, architecture of the third conception of space is based on the principle of the flat surface. Cubists were the firsts who discovered them and were followed by Mondrian and Theo van Doesburg in the Netherlands (de Stijl), Le Corbusier and Ozenfant in France (Purism) of Malevich and El Lissitzky in Russia (Suprematism). It was the strong emphasis on the surfaces to push them towards architecture. In this way, the idea that motivated the first single-family homes came and after the first projects of Le Corbusier, the Schroeder House in Utrecht, as well as the large areas of glass of skyscrapers by Walter Gropius and Marcel Breur»[7].

Fig. 9: Ville Stein, Garches, 1927
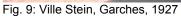
Fig. 10: Ville Savoye, Poissy, 1929

8. The question about the polychrome **

A considerable interest about the debate concerning the new conception of architectural space has to be added to the discussion about the use of color in architecture. Just a few decades before (in the mid XIX century) Quatremère de Quincy, in his reconstruction of the lost statues of Athena and Zeus, used bold colors dotted with gold and ivory, therefore in sharp contrast with the neo-classicists.

John Ruskin was an enthusiastic supporter of this theory (validated by archaeological discoveries); he infact defined the Greek temples "surrounded by a pale white as snow freezes at sunset", instead of shining of blue and purple. At the same time, the increasing confidence towards new building techniques had gradually led "new" architecture to abandon the polychrome, because it was guilty of falsifying materials and forms too.

9. In search of the simple form **

In 1918 Amedee Ozenfant and Charles-Edouard Jeanneret published the manifesto of the Après Cubisme, sanctioning the creation of Purism. Cubist-derived, the purists were meant to represent "objective compositions of simple elements, which are interwoven with the bottom in a unitary image without emergencies." Purism wanted to combine art with industrial production becoming itself the inspiring muse of painting.

Ozenfant, coming back to Paris after the First World War, found the ever increasing need to bring back the very existence of man in geometrical strictness and in spatial order. In October 1920, together with Le Corbusier founded the magazine "L'Esprit Nouveau" in order to spread the purist theory.

In support of the architectural purity, in an article published in the same journal Le Corbusier wrote: "The idea of form precedes the one of color. (...) The color depends entirely on the material form [...] The color is coordinated by the shape, but not the reverse".

Meanwhile, Bruno Taut became one of the most untiring supporters of color in architecture. In 1914 he built the Glaspavilion for the exhibition of the Deutscher Werkbund in Cologne, considered as a manifesto of the theory of materic concreteness. The pavilion had a circular plan with a reinforced concrete base topped by a dome defined by stained glass. The question of color was subsequently furthered by Theo van Doesburg, Piet Mondrian and Gerrit Rietveld through the use of intensive combinations of primary colors and an architectural language composed of geometric shapes, intersecting planes and straight lines arranged in order to form the grids.

9.1 "The white architecture" of Le Corbusier **

During the first postwar Charles-Edouard Jeanneret choosing the pseudonym Le Corbusier, addressed concretely to the profession of architect and urban planner. In the period of time defined Purist-modernist he deeply theorized the concept of the individual house, summarizing it a few years later, in the project of ville Stein to Garches, 1927 (fig. 3) and, subsequently, in the project of ville Savoye to Poissy, 1929 (fig.4). In the first project, Le Corbusier expressed a strict volume, where the geometric rule regulates the whole volume. In fact, the facade was designed according to the geometric principle of the golden section, and the composition was represented through white, because it was able to emphasize, through the high brightness, the vertical surface and the contours of the black casings. Le Corbusier 's decision of using white represented the sum of his purist design.

Which color makes visible, more than any other a volume invested by the rays of the sun, if not the white achromatic color resulting from the summation of full range of colors of the electromagnetic spectrum?

In fact, white, as an expression of purity, stands in sharp contrast to the falsification of forms.

Ville Savoye, however, isn't completel y white. In fact, the l ower portion i s dark green, while in the higher volumes we find a poly chromatic tre atment . Ville Sa voye, therefo re, tho ugh it is   still con sidered the manifesto of Mod ern Architecture,   can be considered, pa radoxically, as a n exp ression of a sobe r and rational polychrome.

Fig. 11: Gwathmey Residence d Studio, New York 1967

Fig. 12: House II, Hardwick , 1969-70

9.2 Le Corbusier's polychrome architecture **
In the path towa rds a ne w architecture, the relati onship betwe en Le Co rbusier and the color may app ear marked by contradi ctions strong. Even If the puris t phase see ms had found its hi ghest expression in villas Savoye (hence the term "White Architecture"), the 30s were characterized by various studies on color. Then, it's, pa radoxically, po ssible to a rgue th at there a re tw o Le Corbusier: the fi rst, that subordinates color t o under co nstruction of pi ctorial spa ce a nd co nsiders   the white as the only   color that ca n bring o ut the geometric compositions of its architecture, the second, which proclaims, in contrast, the need of polychromy for human survival, like water and fire.

Therefore, th e reflecti on on the color le ads Le Corb usier, in a de cade, to assume two po sitions cle arly at odds. Just i n the yea rs following the S econd World War he dedicated himself t o b rutalist phase so called. then, The pioneer of the "White Architecture" turned into a strong supporter of use color in architecture driven by the growing conviction into influence of color on the perception of space.

Just in 1937, Le Corbusier took a stand on the point, when he inserts a chapter titled Polychromy = Joy in a monograph. In orde r not to be rega rded a s a de fender of the deco ration i n architectu re, he call s the wallpaper "paint rolls" (an unusual term but with high impact at least for the industrial production!).

10. Chromatic architecture after World War II **
The key prin ciples of the Modern Mo vement, betwee n 194 5 and 19 65, b ecame the rules fo r buil ding architecture. Issues such as "naked truth" or "structural honesty" - which they obtained using white plaster and showing the true color of materials- represented the essence of modern architecture.

Despite the pervasive dogma of the modernist architects, Robert Venturi burst onto the scene in order to put an end to the simplistic vision of archite cture prevailing in Ame rica. Venturi changed the m otto of Mies v an der Rohe's "Less is More" in "Less is Bore" to highlight the boredom generated by the modern compositions. While the position of Venturi was an attempt to overcome the modernist boredom, after forty years, a g roup made by five archite cts (Peter Ei senman, Mi chael Graves, Ri chard Mei er, Charles Gwathmey, and John Heyduk (cal led "Ne w York Five" or "The White s") searched to recove ry the main eleme nts of the modern movement of the '20s: Schroder House, Ville Stein and the Casa del Fascio became the role models in order to let revive   forms an d colors (or the col or!) of New A rchitecture (b ased on ri gorous a nd geometricals compositions), sometimes in spite of function.

During the 70s the opposition between "Grays" (as Venturi and Moore) and "Whites" (as "New York Five") wagged the architectural debate about the everlasting search of a formal truth still far from being showed.

11. Architecture White or Colour?

Therefore, " White a rchitecture" -highly supp orted b y Le Co rbusier a s an ex pression of t he pri nciple of modernity in the 20s- wi th the passing d ecades, be came a totalizing co nception of t he a rchitectural composition up to the limit of historical falsification.

Indeed, a ccording to Le Corbu sier white wa s expression of f reshness of tho ught and e nthusiasm for t he New Architecture; it is worth in this regard, the exaltation that Le Corbusier expressed towards white facades of Gothic cathedrals; in fa ct, he en coded it as an a uthentic exp ression of the vitality and youthfulne ss of a new era in architecture. Then, for the first modern movement, the renewed conception of geometrical space - which was enhanced u nder th e influen ce of lig ht, particul arly with the use of n ew material s a nd, consequently, with the new constructive techniques- must be declared through white.

Here is the modernist innovation: white is the colo r that identifies the pro gressive turning point but also the renewed confidence in architecture.

During the d ecades after World War II, archite cture was ofte n whitewash ed in the name of a fake modernism, unable to express any concept if not purely a self-referential, dull and conformist one.

Le Corbusier's tea ching was substantially distorte d, sometimes to the p oint of creating fal se myths a s the consideration of white as the only color for new architecture.

Other times, according to Meier, white "modern" is pur e ex citement of fo rm it self, it b ecomes an essential part in order to understand the complex interplay of lights and shadows that are created on surfaces:

«Architecture -argue d Me ier- i s a continuum, ea ch gen eration inform s the following generations. Le Corbusier's, Borromini's, Bramante's works are essential for me in order to understand the structuring of the space. What I do is different from what has been done in previous periods, but there is always a relationship with the human dimension».

Maybe the teachi ng of the masters of contempo rary architecture s hould be completed with the easiness of white that uni fies the Me diterranean banks, by the spontaneous re calling between towns on the hills of the islands and the waterfront of the coasts. It's only the union of resources and a shared management of goods that can guarantee to the Goods of being passed on the future generations.

Fig. 13: House in Gadames, Libya

Fig. 14: Grotta House, New Jersey, 1983-89

This contribution comes from the organic collaboration of both authors at each end have agreed to assign, respectively, the points marked by asterisks, (*Giovanni Maria Bagordo, **Rocco Varipapa).

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The space *behind* geometry: didactics of Projective Geometry for Architecture

Andrea GIORDANO, [1] Luisa BIFULCO, [1]
Matteo BALLARIN, [2] Isabella FRISO, [1] Cosimo MONTELEONE [1]
[1] University of Padua, Italy. andrea.giordano@unipd.it, luisa.bifulco@unipd.it, isabella.friso@unipd.it, cosimo.monteleone@unipd.it
[2] IUAV, Venice, Italy. mballarin@iuav.it

Abstract

The massive presence of machines in everyday life make them a cultural symbol; the computer holds a special position within this frame: real and virtual perceptions are allowed to mingle each other, extending our material and immaterial horizons.

But is there still room for the discipline of Geometry and its creative and expressive potential in the computational era? Is the awareness of the nature and versatility of geometry still essential for the education of architects and engineers? Do its issues still concern architectural knowledge?

We believe that a geometric education tout court still implies not only a didactic of space but also the awareness of it, its prefiguration and feasibility.

These issues can be verified through the recent developments of computer as a drawing tool; however it is necessary to consider that its outputs -in spite of their realism- should differentiate themselves from reality, in order to conceive and understand it.

As a learning path to obtain less fascination for the digital tool and more efficiency in the building of architectural knowledge, we propose four training practices which allow students to understand and communicate the space by the tools of projective geometry.

Keywords: Projective geometry, representation, space prefiguration.

Introduction

Digital drawing and the consequent possibility of creating virtual realities have today replaced, almost entirely, any other kind of architectural representation, generating some paradoxical situations, where digital tools, thanks to their undeniable charm, overwhelm the final purpose, braking away from real architecture to be represented, and becoming almost a piece of art in itself. Inevitably, the "disappearance" of the manual drawing generates questions about the role of geometry, not only from a disciplinary point of view, but also from an educational one. We are of the opinion that it is still possible to reach the knowledge of the architectural space, studying geometry, and getting an effective communication of the same, through a correct representation. It is our deep conviction that the identification of the geometric genesis of an architectural space, made of complex, or simple, surfaces, can generate a clever and original representation; this leads us to believe extremely valid and still current the role of geometry as a fundamental discipline in the training of young architects and engineers. In this perspective, the digital tool becomes an instrument of the creative and expressive personal sensitivity, being just a tool and not a goal of the communication of the spacial representation. Therefore, the purpose of our paper is to outline a training process that, through the study of projective geometry – according to the needs of the perception and the representation – could allow to understand and communicate the architectural space as shown in the following four case sudies

1. The virtual space of the geometrical drawing: the perspective of the 's Gravesande circle.

It is important for a young engineer and architect to study deeply all the aspects of the projective geometry [1], to move closer to a discipline that is fundamental and foundational for his training. Indeed, according to Enriques:

"*La Geometria proiettiva può essere considerata come scienza astratta, e ricevere quindi interpretazioni diverse da quella intuitiva, fissando che gli elementi (punti, rette e piani) di essa, siano concetti comunque determinati, tra i quali intercedono le relazioni logiche espresse dai postulati*" [2] ,

we recognize in these words the potential of theory, useful from a training point of view; by the way, a different approach to this kind of studies can drive faster the students to new ability of understanding, creating and shaping the space – a general and substantial skill to design any kind architecture. Therefore, we propose, according to the needs of perception and representation, to teach how to understand the structures of space that lie behind a geometrical drawing. Furthermore, today the digital tools can easily reconstruct the real location of geometrical entities in a virtual three-dimensional space, refining then the ability to imagine and shape the world around us: in other words, the student is asked to reflect on images taken from the repertoire of treatises about projective geometry, reconstructing the real spatial position, matrix of a planar drawing, to relocate in a virtual space the main geometrical entities, with significant results toward a solution of spatial problems. History of geometry is rich of treatises whose images can be used for this purpose. Let's take for example the construction of the perspective of a circle, that we can find in *Essai de perspective* [3] of the Dutch Willem Jacob 's Gravesande [4], exercise that offers new and clever geometrical constructions to facilitate graphic and executive procedures, to refine this kind of representation.
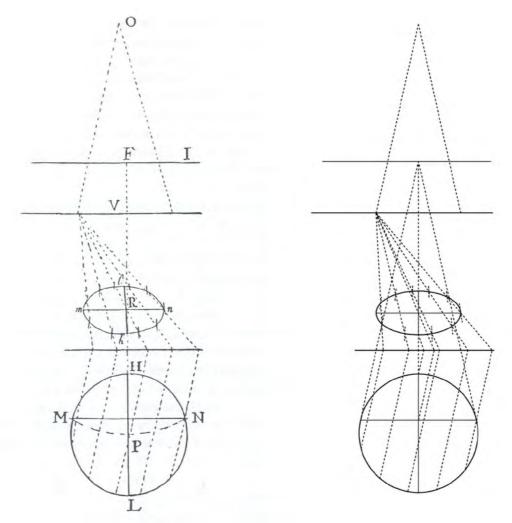
Fig. 1: 's Gravesande perspective of circle (left). Redrawing 's Gravesande perspective of circle (right)

Figure 1 shows this perspective [5], realized with what, today, would be called circle's homological transformation: intersecting with a set of parallel cords what we consider the overturned circle on the picture plane, and starting from the points in which these cords touch the ground line, some corresponding lines can be drawn, until they reach one point on the horizon line (image of the line at infinity of the plane which contains the circle), the vanishing point of those cords. The image of the contour of the ellipse is then identified joining the points in common between these cords and the former circle with the center O (overturned center of view and, in the same time, center of homology). Moreover, 's Gravesande adds also the construction of the axes of the ellips, image of this circle.
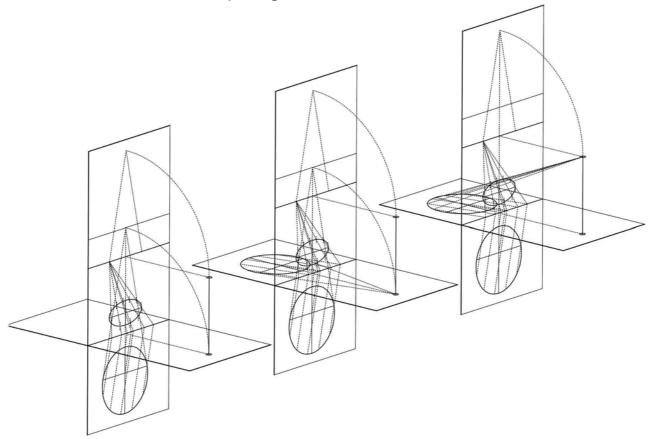
Fig. 2: Settling projective entities in the virtual 3D space

Then, figure 2 shows how the projective entities, which determine exactly on the plane that perspective, are settled in the space. The conscious use of projective geometry by the architect is thus a valuable tool and an useful act to infuse scientific and intellectual support to the art of building. For this reason it is especially desirable in the training phase of a designer to deal successfully with both theory and practical examples, possibly walking in the footsteps of the great architects and painters, first to understand their process of modeling the space and second to take a personal step towards an original design.

2. Building iconographic atlases: teaching research on projective geometry

A deep understanding of drawing tools, both physical and conceptual ones, has always been the compulsory counterpart of the construction of a design-based knowledge in architectural faculties. Today, still, this begins with surveys and re-drawings of relevant architectures; their drawn output intersects *more geometrico* different scales and degrees of abstraction: traditional architectural graphics isolate and describe different issues of the analyzed *exemplum*.

The awareness of continuous switches between representational geometrical tools is one of the mainly expected outcomes in teaching architectural practices; traditional digital drawing tools built their logic on projective systems in which isometric and perspective spaces underlie bi and tri-dimensional objects.

Didactics of geometry appears to be explicit; nevertheless, the digital drawing process -with its over-determined inertia and visual fascination- often diverts first years' students from a real understanding of the represented building, thus leading to professional practices disregarding architecture for its formal logics.

The pertinent economy of digital representational techniques in our experiences has shown interesting outputs: teaching staff decided to select a range of freeware CAAD softwares to be taught because of their quicker learning path and a multi-platform availability. First year's students were requested to build a personal atlas of given buildings (namely, the Art Pavilions in the Giardini di Castello, Venice) through photo-modeling digital processes. *SketchUp, BonZai3d, SharkFx* supply the students with matching-image tools, digital homological tools that allow bi-dimensional raster images to be projected onto solid and surfaces in a 3d space, thus obtaining different projective representations, notwithstanding their sort of naïve photogrammetrics.
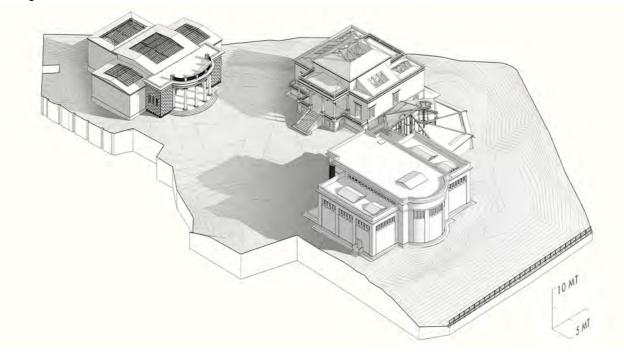
Fig. 3: Giardini di Castello, Venice: french, british, canadian and german pavilions. Territorial survey.

Chosen softwares offer a single-view 3-points perspective window, thus avoiding the multi-view logics of 3d modeling tools. An XYZ axis system can easily fit the virtual space subtended to the raster images showing the same building at different sides; the modeling process, expeditious during a first phase can be refined via scaling operation subtended to further on-site surveys.

A three-dimensional 1:1 model will lead at last to a single ISO A2 plate in which 3-d volumes are projected onto a virtual plan thus generating different plans, elevations and isometrics in a scaling range of 1:500-1:20. This last requirement push students to consider different scaling options according to different detailing degrees; to exploit the range of line weights to emphasize various issues in the architectural project; to include the physical objectivity of the paper bearing; to delineate layout issues.

These educational paths have proven to help the apprentice architect to focus on the peculiar issues of architectural disciplines, in order to build personal knowledge tools and drawn references functional to future and coherent professional practices. Moreover, students are encouraged to avoid the single-software parametric ideology in order to display a wider spectrum of architectural production.

This kind of draftsmanship obviously demanded different requirements: vector outputs, in order not to dwell upon the communicational issues underlain by each architectural image; a mensurable outcome, in which orthogonal projections derive from projective methods and perspective images, without the anamorphic processes of traditional virtual imagery; the possibility for the drawing to be reproduced, in different scales, projections and themes, in order to state and fulfill the central position of projective geometry in architectural, planning and engineering teaching. [6]
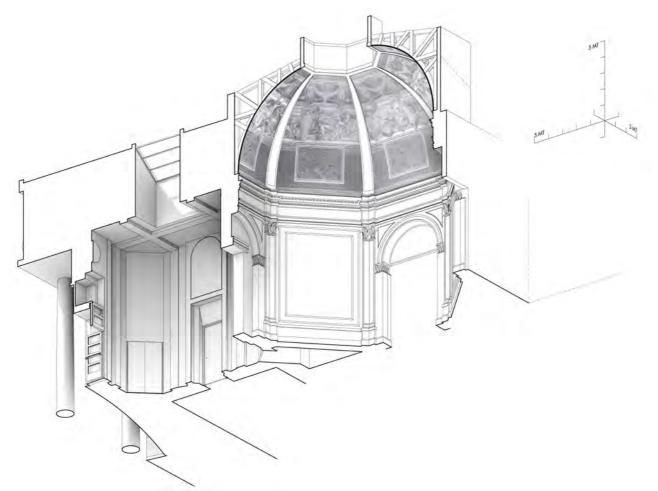
Fig. 4: Padiglione Italia, entrance hall and dome (G. Chini, 1909; G. Ponti, 1928; D. Torres, 1932)

The output metaphysic thus obtained via the over-mentioned softwares allow architectural students to get ahead of the photo-realistic issues of rendered images as well as to avoid engineering symbolism inherent in CAAD systems meant for mechanical industry. [7]

First years' apprentice architects can thus create drawing through a sort of analog fluidity; drawn outputs relate themselves to traditional architectural sketches, seen as the birthplace of morphological ideation, putting off executive refinements to a later bachelor year.

This teaching research through projective geometry strives thus for: 1- a compilation of surveys of given buildings and environments as a knowledge-producing tool; 2- an optimization of learning curves of digital representational tools that avoids misleading fascination for appealing perspective outputs; 3-the use of a wider range of representational techniques within architectural and planning practices, through gradients of literalness and abstraction.

3. Reverse procedure of the *perspectiva artificialis*: The Ovetari chapel frescoes.

The investigation of a scientific method for the representation and control of architectural space had practical applications not only in the architecture, but also in the art: the method is successfully applied not only in the most recent installations of contemporary artists, but also, and especially, in more ancient arts.

Through the analysis Andrea Mantegna's paintings (1431 -1506) [8], and in particular the study of Ovetari Chapel's cycle in Padua (1450), the students were able to reconstruct the "virtual world" represented by Mantegna in the frescos, using the inverse process of the *perspectiva artificialis*. The chapel, that was built certainly before 1372 [9], has a central room with arch and cross vault, a polygonal apse separated by the presence of another arch from the principal room, the structure is illuminated by four single-lancet windows that are located in the poligonal apse.

The testament of Antonio Biagio Ovetari, that was written on January 5, 1443, says us that his chapel have to adorn with figures narrating episodes from the lives of Saints James and Christopher – to manifest the family's social condition – as Giusto de Menabuoi and Guariento did in the main chapel and in the baptistery of the cathedral.

The cycle of frescos has been largely destroyed. An air raid on 11 March 1944, has destroyed it and part of the church of the Hermits – Padua building that receives this master-work of Renaissance painting in northern Italy – and destroying completely the apse of the church and the adjacent chapels: the *Assunta,* the *Martirio di San Cristoforo* and the *Trasporto del corpo* are the only works that have been saved from disaster, since opportunely detached from the walls at the end of the nineteenth century and moved to safer places during the war period. Small fragments, recovered from the rubble, were put in boxes, until the recent attempt of make-over and reconstruction of the entire cycle of Andrea Mantegna. In the first post-war, damaged items are returned entirely to the community changing, in part, the placement of the decorative elements. The attempt to reintroduce a spatial configuration of architectural objects in the scene, therefore lie not only on the wall paintings that have survived in excellent condition, but also on those that we do not have total information: in this case, the digital reconstruction [10] is based on pictures that was taken before the air raid of 1944, from the Graphic Arts of Amilcare Pizzi and the brothers Alinari Archives, concerning St. James life.
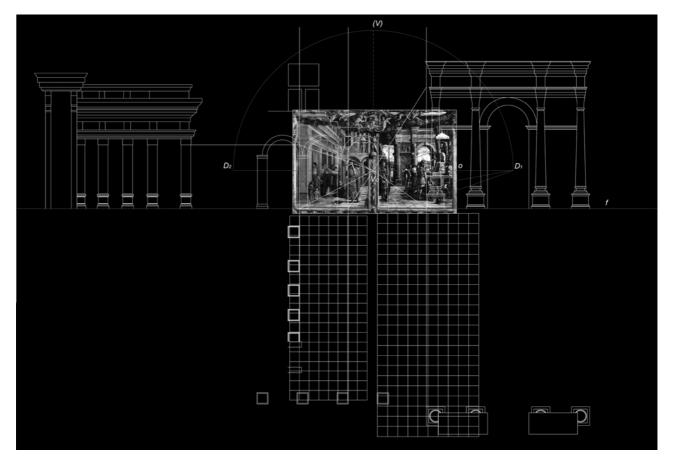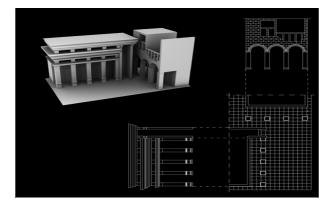
Fig. 5: Perspectical reconstruction of *St. James baptizing Hermogenes* and *S. James' judgement*.

In this essay we propose a method, that is applied to all panels of the wall paintings cycle, that assumes a backward path, based on the fundamental principles of perspective. It allows us to reconstruct virtually – with plans, elevations and digital models –, buildings represented in a correct perspective. From the tile *San Giacomo battezza Ermogene* and the adjacent one – in a vertical picture plane – the students ware able to identify, precisely, the position of the observer's eye on the framework, its distance from the picture, the horizon line and the ground line, using the strict square grid that form the floor of the represented scene (Fig. 5). Later, on the floor restitution, are placed the three buildings that surround the scene: two porch buildings, and an arc that finds its archetypal form in the Arc of Septimius Severus in Rome.

The main front of the Arc and one of the two porch are parallel to the frame work. This layout on the scene allow to give back easily the elevations, in real form and at the scale of representation; the third building has the main face perpendicular to the framework. We proceed with the digital simulation in three dimensions of the whole scene: virtual clones of all buildings placed in the appropriate position (fig. 6-7). Thanks to this virtual reproduction it is possible to investigate the accuracy of the method applied by Mantegna in the realization of the fresco, but also verify, for example, the accuracy of the shadows represented in it: in fact, it is possible to give back the exact location – in plan, elevation and in the virtual model– the real position of light sources and reproduce them with specific programs rendering models that can visualize, more or less realistically, clones obtained with CAD system.
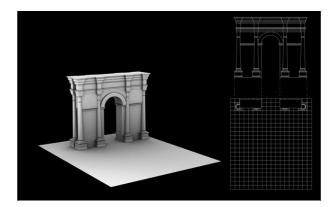
Fig. 6: Virtual Model of porch buildings (drawing by M. Zanatta)
Fig. 7: Virtual Model of the archs (drawing by M. Zanatta)

4. The geometrical *construction* of the wooden scenes: the Olympic Theatre in Vicenza

The desire to control and plan the anthropic space has deep origins, also if a real codification of the geometric rules were developed only in Renaissance; in this period the perspective allowed the scientific representation of the phenomenal space. Today these rules are still valid and, in addition, new technologies greatly facilitate the space control under many points of view; first of all they are able to enhance the capabilities of the human intellect, but they are as well useful like planning tools to design and analyze the space. After *perspectiva artificialis* demonstrated the close link between art and science, connecting the work of painters and architects to the geometrical optics [11], scholars codified slowly, more or less in a century, the Projective Geometry, which involved the theory about elements placed to infinity; in his treatise, titled *Perspectiva libri sex*, Guidobaldo del Monte, gave the first scientific proof of the existence of a vanishing point. In addition to this fundamental theoretical contribution, the last book of this treatise, dedicated to the scenery, as the title *De scaenis* suggests, provides a set of practical guidelines to establish the correct deformation to be applied to the buildings, getting an illusionary space. In this respect Filippo Camerota noted:

"*La trattazione di Guidobaldo, scritta in latino con un linguaggio matematico, avrà una sorta di volgarizzamento nel libro delle scene composto da Ludovico Cigoli, che possiamo considerare la prima vera esposizione delle conoscenze teoriche e pratiche necessarie allo scenografo. Vi è spiegato l'uso dei punti di concorso, l'importanza della giusta pendenza da dare al palcoscenico, la scelta del punto di vista preferenziale, il rapporto tra distanza di osservazione ed efficacia acustica, il problema del fuori scala tra gli attori e la scena, la necessità degli spazi di servizio per i movimenti dietro le quinte, ma soprattutto il modo di procedere nella progettazione delle scene: regole geometriche, procedimenti pratici con l'uso delle corde, e strumenti per disegnare linee convergenti ai punti di fuga collocati oltre i limiti del palcoscenico*" [12].

However, although no one, until that moment, had been able to pinpoint the ideal position of an observer, which regulates the construction of the whole illusionary space, some scholars sensed its strategic importance. Among them we can consider Vincenzo Scamozzi, the architect who, after the death of Andrea Palladio, designed and built the wooden scenes of the Olympic Theatre in Vicenza, applying the rules of the solid perspective (fig. 8).

The Olympic Theatre in Vicenza can be considered the first permanent and indoor theatre of the Renaissance; the wooden scenes were performed for Sophocles' *Oedipus Rex*, staged on March 3, 1585. Scamozzi designed three long streets to represent allusively Thebes, the city where the tragedy was set. The limited size of the area forced the architect to give the streets a strong perspective acceleration in order to create an illusory space deeper than the real one. Therefore, these streets are characterized by a high slope, caused by a narrowing of the cross section, which also implies the dimensional reduction of the elevation of the buildings. Of course these scenes, to keep their illusionary power, should not be crossed by anyone, otherwise the contrast in scale between a man and the scene would reveal immediately the deception.

Fig. 8: Olympic Theatre in Vicenza: view of the main street (by A. Giordano)

According to Renaissance tradition, these streets in the Olympic Theatre represent a symbolic space, an ideal city (fig. 9), opposed to the real *civitas*, represented by the public [13]. The analyzes, conducted with the help of the new technologies, have allowed us to create a virtual clone of these three streets, furthermore the reverse perspectives showed that, in opposite of the claims of some scholars, we cannot definitely say that for each of these streets there is only one single solid vanishing point, but a plurality of them, all physically located beyond the back of the stage. At this point we can advance two hypotheses to justify this Scamozzi's unusual choice: perhaps the architect wanted the illusion was preserved even for an observer located in an area next to the ideal point of view, or, as it is clear analyzing a proper perspective reconstruction built from a single point of view (fig. 10), this would have led to the impossibility of making the scenes, because the projective deformation of the decorative elements, like columns, pediments, capitals, etc., would have required executive thickness too small to be realized, although using wood.

The knowledge of the rules of the projective geometry, using new technologies, have allowed us to study with "another eye" this architectural masterpiece, underlining also all the skills of Scamozzi to design the space according to his needs, as well as highlighting the limits imposed by solid perspective or by the matter used to construct the scenes.

This methodological approach of teaching the rules of the space takes inspiration from the past as tool to address the present and the future, geometry is a wonderful help for the architectural design, not only to control the formal aspects of a project but also to convey ideas and thoughts, especially if one considers that the ultimate goal of architecture is to "improve" the space as true intellectual act. New technologies and the digital programs are only tools at service of ideas and, so architects and engineers are supposed to be able to control and envisage the space through its geometric rules.

One last consideration seems appropriate, I said before that during the Renaissance, no one was able to theorize the real location of an ideal observer,
 but using reverse perspective in this study case we were able to find it, in more than just one position: it is conceivable, therefore, that the rules about Projective Geometry codified by Guidobaldo del Monte are the mathematical expression of a sum of practical procedures, well known by Vincenzo Scamozzi.
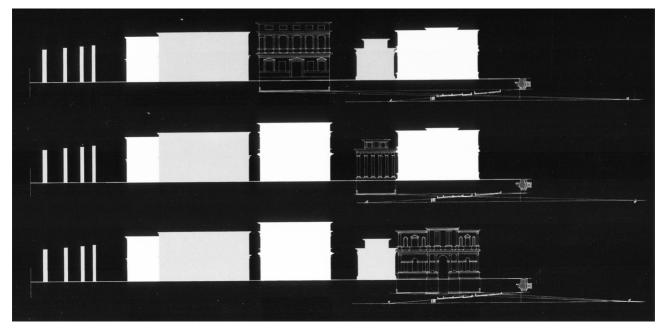
Fig. 9: Olympic Theatre in Vicenza: ideal elevation of buildings on the right side of the main street. (by G. Ferrara)
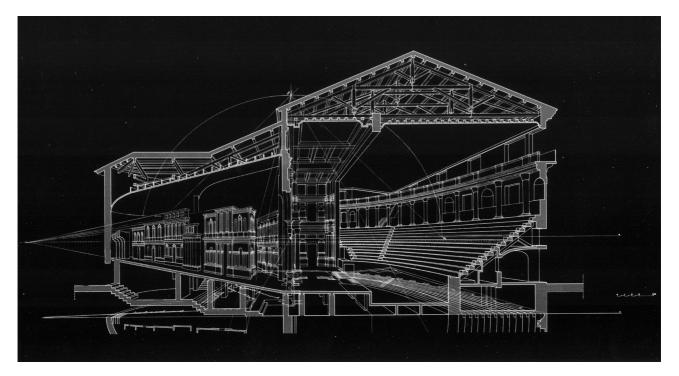
Fig. 10: Olympic Theatre in Vicenza: Perspective section, reconstruction of the right side of the main street (by G. Ferrara)

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[1] DE ROSA Agostino, SGROSSO Anna, GIORDANO Andrea. *La geometria dell'immagine. Storia dei metodi di rappresentazione*. Milano: UTET, 1999-2002. ISBN 8802057605, 9788802057606. The formulation of the projective geometry is ratified by the treatise, titled *Traité des propriétés projective des figure,* published by Poncelet in Paris in 1822. This discipline is therefore considered a more general extension of the former geometry: indeed, while remaining within the Euclidean space, it admits some general properties as invariants, called projective properties, including as special case also the metric properties of elementary geometry. Projective geometry calls two figures *equivalent* when they are transformed one into the other with a series of successive operations of projection and section, operations that leave unchanged those properties.

[2] ENRIQUES Federigo. *Lezioni di geometria proiettiva*. Bologna: Zanichelli, 1904, p. 377. ISBN 8808172406, 9788808172402.: "*Projective geometry can be considered as an abstract science, to receive, then, different interpretation from the intuitive one, establishing that the elements (points, lines and planes) of it, are determined concepts, among which the logical relationships, expressed by postulates, intercede*". (translation by the authors)

[3] 'S GRAVESANDE Willem Jacob. *Essai de perspective*. L'Aia: Chez la Veuve d'Abraham Troyel, 1711-1774.

[4] 'S-Hertogenbosch, 1688 – Leida 1742.

[5] ANDERSEN Kirsti. *Brook Taylor's Work on Linear Perspective*. New York: Springer-Verlag, 1992, p. 23. ISBN 0387974865, 9780387974866. Kirsti Andersen observes that this image is part of the figure 16 of the *Essai de Perspective* published in 1774, by the way, similar to the one published in 1711. Moreover Andersen notes that, before 's Gravesande, Guidobaldo del Monte has already used this method.

[6] BALLARIN Matteo. Il Disegno Oggi, in *Anfione e Zeto* n, 20, 2008, Padova, il Poligrafo (1988-2011), ISSN 03948021

[7] BALLARIN Matteo. Renderizzare: la separazione di Progettazione e Prefigurazione in Architettura, in *PresS/Tletter* n.6, 2010 (http://www.presstletter.com/)

[8] Andrea Mantegna (Isola di Carturo, 1431 - Mantua, September 13, 1506), worked as a young boy in Francesco Squarcione's workshop. His art is distinguished by its perfect layout perspective. The first artistic commission was an altar piece in Padua's church of Santa Sofia, now lost, but what makes him known in the art scene are definitely the frescoes in the Ovetari Chapel in Padua. In 1459 he creates the Altar piece of St. Zeno in Verona, for the homonym abbey – work brought by Napoleon in France and preserved in the Louvre and Museum of Tours – while working at the Gonzaga court in Mantua, where he is called to paint part of the Palazzo Ducale, that shows spectacularly illusionism of perspective.

[9] A document of 1372 proves that the noble Alberto Bono Ovetari is the owner of this chapel.

[10] Matteo Zanatta is the author of all drawings about the reconstruction of Mantegna's represented architecture.

[11] DE ROSA Agostino, SGROSSO Anna, GIORDANO Andrea. *Op. Cit.*. Vol. II, p.14.

[12] CAMEROTA Filippo. *La scena teatrale*. In AAVV, *Nel segno di Masaccio*. Firenze: Giunti Editore, 2001, p. 153. ISBN 8809023293, 9788809023291. "*The treatise by Guidobaldo, written in Latin and in mathematical language, will be translated into the vernacular in a book about scenes composed by Ludovico Cigoli, we can consider this work as the first real exposition of the theoretical and practical knowledge necessary to the set designer. It is described the use of the vanishing points, the importance of the right slope of a stage, the position of an ideal point of view, the relationship between viewing distance and acoustic efficiency, the problem of the scale between actors and scene, the need of serving areas for moving behind the scenes, but especially the way to design these scenes*". (translation by the authors)

[13] BARBIERI Franco. *Architetture palladiane*. Vicenza: Neri Pozza, 1992, p. 193. ISBN 8873055001

THE IMPORTANCE OF AWARENESS IN URBAN CONSERVATION AND THE ROLE OF CHILDREN, USKUDAR IN ISTANBUL AS A CASE STUDY

Hilay ATALAY[1], Yasemin TOSUN ANDIÇ[2]

[1] Faculty of Architecture and Engineering, Okan University, Turkey
E-mails: hilay.atalay@okan.edu.tr
[2] Msc, Urban Planner, Istanbul Metropolitan Municipality, Turkey
E-mails: yasemin.tosun@gmail.com

Abstract

As a result of industrial revolution, cities are faced with some problems due to rapid urbanization. Cities have became attraction centers due to the fact of rapid urbanization. Recently, the rapid increases in population and physical developments in cities have revealed some problems. It can be said that urban conservation is the biggest problem among others. Globalization process, cities' desire to become a world city, new investments for the city, intervention types and new planning techniques partially ignores the historic fabric.

Conservation concept, gained importance after the 19th century overall, comes as secondarily in the cities which are in a struggle for globalization. Providing sustainability of social values and transferring them into the next generations, and the continuity of local culture can only be achieved by supporting the history. In the developing countries such as Turkey, in order to provide Sustainability of cultural heritage primarily, it is necessary to gain conservation consciousness.

In this context, in this study, it is mentioned that conservation consciousness creation is necessary in order to transferring of cultural heritage to the next generations. Within this scope, children are the target group to create a public awareness. The importance of children relationship with the city, expansion of their city perception and their benefit to the community and their selves in the long term has been examined. . It has been emphasized the importance of children and childhood period in creating public awareness. Within this scope, An European Union Project has been examined about primary school students. The Project contains awareness studies in conservation in Uskudar, historical area of Istanbul.

Keywords: Urban conservation, children participation, children awareness, Uskudar

1. Introduction

City of Istanbul was the capital to three empires has the privileged place in terms of architecture through its extensive historical experience. All elements in this historical must be conserved by conscious responses and these important elements must not be destroyed between sudden and unearned income based urban decisions. People have taken the decisions regarding urban. The most important internal factor of non-performing urban conservation is derived from people. The conservation could be difficult because of unawareness of the people. Both people who are subject to the decision mechanism and citizens must have awareness about urban conservation. In this terms, thanks to the straining of the children given by schools, families and media, they could have highest conscious towards urban and urbanization. Thus, the effect of the people factor in the conservation issue will be minimized. Children are primary purpose to transfer urban

conservation from generation to generation. This group whose number is very high in the urban is the biggest tool and target of urban conservation. The awareness of the people especially in their childhood must be raised towards urbanization and they have to be trained accordingly.

Uskudar is the oldest settlement of Istanbul and it has conserved its historical structure nowadays. In the central district where the people having low income in terms of economy are living, It is more than important the results of the cultural heritage activities of the children between 8-10 ages. The best ways to adapt the children who are stranger to their own cities to the urban are the plays and trips. The perspective of the children against the town and their environment perception are highly important. If this speculation is well-grounded, then the generations who own common cultural heritage will be most loyal indeed.

2. Urban Conservation Concept and Urban Conservation Process in Turkey

Urban conservation concept has emerged years after the development of cities and city planning. The concept has been on the process of a major development and changed since the concept first emerged. Application techniques and forms of intervention of urban conservation changed within the change of urban planning, especially in the second part of 20th century, on global scale, urban conservation demonstrated to act with a collective consciousness. The basic purpose of urban conservation is to transfer past cultural accumulations to the future. The cities are protected from city scale to monumental scale, tangible values to intangible values.

Conservation, in simple terms, is an concept emerged in the last 200 years of urban planning system. It started with conservation of single buildings, after this subject, conservation of urban environment has developed; nowadays it has been started conservation of intangible past heritage discussion. Transferring all values of past into the future generations under the name of common heritage has been a a task in common responsibility of whole society in 20th century. Urban conservation tools and types are different from each other around the world though they have same purpose. According to countries' culture and value to be protected, new urban conservation tools and types have been emerged. Conservation actions applied in somewhere may not be applied in another region. Urban conservation includes common purpose internationally merely it contains different actions.

Until 1930's across the world it had been traditional approach to cities. Important theoricians such as Ebenezer Howard, Henri Le Febvre, Le Corbusier had developed new alternatives to resolve problem of cities and modernization. Within this period, in 1923, with the proclamation of the republic, reconsidering the cities and planning process has been started. As the beginning point of this planning process; Henry Prost ,invited Istanbul, planned city of Istanbul and made first decisions about Historical Peninsula which is historical city center of Istanbul. Although planning movements had started with Prost Plan, it has not transit to comprehensive planning until 1980's.

In 1858, it has been found the traces of conservation in the 133th article of punitive law. Wtih this article of the law, it had been provided the people who will destroy monumental and sacred buildings (Mumcu, 1969) . with the proclamation of the republic, in 1924, Muhafaza-i Asar-ı Atika Comission was established as an instution taking on a consultant task about monuments (Kuban, 2004). Jansen planned including first conservation approach in Ankara in 1932. Ankara inner part of a fortress and it's around was shrouded in this plan (Gulersoy, 1991).

It has been seen that main core of city center was not interfered in the plan in 1940s. By the 1960s, the government restricted rights on ancient monuments belonging private people. Constitution of 1961 has brought conservation obligation for buildings and monuments which have historical and cultural value. In 1972, ancient monuments law had been gone in effect. This new law was brought the opportunity to analyze larger areas in terms of urban and archeological under historical site conservation (Kuban, 2004). Between 1973 and 1974, it had been put emphasize on subjects such as record keeping, museum studies and works about these subjects started. In 1983, Bosphorus Law has been prohibited any kind of new construction except restoration of historical buildings in Bosphorus conservation area.

Istanbul wants to be a world city has been entered in the process of globalization. Within the globalization context, urban planning and conservation approach have been changed. All social and economic effects of globalization process have been seen in the cities, especially in the city centers that has been started the need for urban conservation more than before (Tosun, 2008). In the global scale, cities have entered into competitive projects and these big projects have been started to be prepared to compete with each other. These projects are subject to represent their cities, spread out their culture and economical development. At this point, the most affected areas of these cities are their historical city centers due to the fact that

uncontrolled developments, rant focus interferences, lack of awareness and also lack of conservation awareness.

3. Conservation Problems

It has hampered the existing urban conservation problems regarding urban conservation. Conservation problems can be examined by dividing those two. The first one is physical problems arising from the location of the structure, ground specifications, design problems, failure material and bad labor could generate the unprotectable structures (Ahunbay, 2004).

Other conservation problems are external causes indeed. Human being is the primary external reasons among them. The wars, heavy traffic, uncontrolled population rising, nonstrategic and unequal country and regional plans, unplanned urbanization, income focused approaches and responses, lack of awareness are the most basic conservation problems created by the human being. On the other hand, among those problems, the most important one is the lack of conservation awareness belonged of the people. The conservation awareness is very relevant to the urban awareness. People could not reach to conservation awareness without having urban awareness. The urban awareness means to understand and live the city, culture of the city, as well as to feel that they belong in the city and to disperse homogenously in the city without being a group, to feel the changes and development in the city, to feel responsibility for all kinds of negative and positive situations and to be participatory every sense.

 It is very difficult to compose urban and protection awareness adventitiously. People who come from rural area to urban or different groups in the towns want to sustain their own cultures and to live as before. It takes very long time to break these rules. Although people want to change these, habits coming from childhood, the lessons learned, the first environment that has perceived are the most important element of oppression.
At this point, it is more than important that the new generation should be educated by the urban awareness, to recognize and be aware where they are living and their awareness should be raised and their consciousness should be promoted accordingly. The contributions of family, culture, media and educations are very important to recognize the place where the children are living.

4. Children and Participation in Urban Conservation

Thanks to the training that is very important tool to compose and develop the awareness of urbanism, then, the adjective of citizen, adaptation of urban history and cultural identity and sense of belonging, mobilizing the urbanism dynamics by means of social culture, the right and duties of urbanism could be provided.
Within the scope of "Urban Awareness", three basic approaches that have been foreseen for the children are as follows:
  * To realize historical and cultural values of the city.
  * To perform the physical, cultural and social transformation of the city.
  * To protect the city by feeling the sense of belonging in the city
In addition, the effect of the media could not be underestimated. There is no doubt that spot films, discussion programs, the cartoon books, children's coloring book and story books have affected the urban perception of children significantly (Urbanization Council, 2009, Urban Awareness , Culture and Training Commission Report, Ankara-Nisan 2009, Turkish Republic Ministry of Public Works).

On the other hand, the participation in the broader sense is to plan the people's relevant subjects and to play an active role during the decision making process. This process is mostly involved stages such as defining the problem, collecting the relevant data regarding the subject and analyzing as well as providing the participation of the various age groups into the decision making process and developing the alternative decisions in this way, deciding unanimously for the best decision anad implementing the decision unanimously (Driskell, 2002). Children participation in city planning has been popular among many cities in the process of planning. Children ideas are implemented into plans and planning policies in some cities and some international organizations such as UNICEF believes that providing friendly and sustainable cities by advancing children participation is one of the best ways (Francis and Lorenzo, 2002).

Children participation have provided bringing children in their own areas to the cities and at the same time raising public awareness. The children must be taken into the account of social category in their participation to the planning process and the public awareness must be raised accordingly. The most common initiatives are Children's/Young People's Council and Participation in Planning Urban Spaces among the possible participation types of the children in the changing process of the cities. The council that has very important training value to train the children as active citizen presents the reformist form of the children participation in the social life (Alparone and Risotto, 2001).

The social environment namely individuals composed of structural environment are the milestones of this environment. The individuals who are the user of the cities have directed the spatial organization of their own cities so that their participation in the planning process are more than important in this sense. Each individual have right to speak regarding their own cities and to direct the town accordingly. In the meantime, children could develop their own environments where they live.

Councilors focus on transformation of the urban environment in quality of life. The purpose of the children participation can be listed as the following (Alparone and Risotto, 2001).

- To observe the environmental conditions and to promote life environment and education applications.
- To develop the sense of belongings and community participation
- Organization of the benefited services.
- Programs for the development of third World Countries and environmental rehabilitation

5. Participatory Model in Conservation of Cultural Heritage – Uskudar

Istanbul is intercontinental city and the city has been situated onto two continents; European part and Asian Part. The city firstly established in historical peninsula which is located in Fatih district, in European part. Uskudar is one of the historical districts of Istanbul located in Asian part.

Before the conquest of Istanbul, Uskudar was small Anatolian town which has important location. After conquest of Istanbul by Ottoman Empire, Uskudar had been had quick development and began to have urban fabric. From past to present, the district has been always a city centre, residential areas and Classical Ottoman neighborhood with it's unique historical fabric/pattern including important mosques, madrassas, fountains, turkish bats and caravansary from the wiev of architecture. Mimar Sinan who is the most important Architects has important monuments in Uskudar such as Mihrimah Sultan Mosque, Selimiye Mosque, Old Valide Mosque and Şemsi Ahmet Paşa Mosque. Besides the district have other important monuments such as Kız Kulesi, III. Ahmet Fountain, Valide-Atik Mosque, Cinili Mosque, Cinili Bath, Mimar Sinan Bazaar, Selimiye military post and etc.

Since May 2010, Model in Conservation of Cultural Heritage has been applied by Istanbul Branch of Archaeologists Society within the scope of Civil Society Dialog Istanbul 2010 European Culture Capital City Donation Program during one year. The partnerships of the project are Concorzio, ABN A&N Network Sociale Perguie, Italy, Antigone Thessalonica, Greece. The participants of the project are Istanbul University, Department of Prehistory and Atlas Bulletin which is monthly geographic and discovery bulletin.

Fig. 1: Location of Uskudar in Istanbul (http://www.ibb.gov.tr)

The aim of the project is to compose a conservation model by raising awareness towards cultural heritage of the people living in the Uskudar and organizing information activities as well as reviewing current cultural assets of the region through local volunteers and transforming information and notifications to the relevant offices on the internet addresses to be formed. The most important specification of the project is to protect children indeed.

The targets of the Project can be listed as the following:
- Providing formal training techniques and training of trainers about Uskudar to 25 Archeologists, city planners, architects and art historians,
- Carrying out information activities related to Uskudar cultural heritage to approximately 500 students,
- Reaching local volunteers by organizing meetings together with civil society foundations and local people in Uskudar district,
- In order to conserve the cultural heritage, the complaints have been taken, current and participatory monitoring processes have been monitored by web sites.
- In order to conserve the cultural heritage, to encourage the local volunteers and people to establish a system and to develop the monitoring process through the web site to be established.
- Three seminars shall be organized in different contexts where the Cultural Heritage will be main subject.

The volunteers who will train the students have organized weekly meetings and participated in the project development process. They have been informed about Uskudar architecture by means of Uskudar visits. In order to share the best experience in the implementation of the project and to develop the organizational capacity, preliminary review visits have carried out in August and September to the Antigone (Thessaloniki, Greece) and Consorzio ABN A&B Network Social (Perugia, Italy) organizations that are the project partners. During the visits, the best examples have seen in each two city. In addition, the meetings have organized towards participatory conservation and cultural management together with the experts and project application calendar and the context of the activities have discussed with partner organizations.

Afterwards, in December 2010, the meeting was held by the participation of district mukhtars, volunteers, academicians, civil society organizations, public foundations and associations and partner organizations on December 2010.

The project has been carried out by the training of the volunteers. The relevant trainings about culture and cultural heritage concept, history of Istanbul and Uskudar, Children Training, Physiology and communication trainings with the children have been performed to volunteers who will be trainers.

Training has provided for three hours in the project that has aimed at participation of the primary school students. At the beginning of the first lesson, a game was played by a small ball prepared by the volunteers The volunteer having ball has explained his/her name, occupation and why he/she is there for the children and he/she threw the ball to other volunteer. When five volunteer finished the name play, they have trown the ball to the students and they have started to learn their names. Thus, the children have started to get used to the teacher whom they have not known in this three hours. Immediately after play of name, a presentation was organized about what is the meaning of culture, cultural heritage as well as tangible and intangible heritage concepts and these have prepared by experts by using the children style interactively.

Children have divided into groups composed of five children in the second lesson and a card was distributed to the groups including one of the pictures of Uskudar's historical structures to each group. The children were asked to tell about that structure to their friends and a time of five minutes was given to the children and they have studied how to express those by using the body language. Afterwards, groups have stimulated their studies together with others. The friends in the other groups tried to find out that study. By means of this game, it was attempted to develop their visual memories and it was targeted to enable them to learn about the name of the studies.

Second game is a map game. Children are divided into different groups and they have three dimensional maps that show Istanbul Historical Peninsula and Uskudar. They attempt to settle the architectural arts in different money types and to put them into the map and thus, they could pay attention to the distance of the arts by taking into the consideration of Istanbul and its location.
The last game of the second lesson is the memory game. Visually, important buildings of Uskudar that have processed to the cards visually have put into the package. The package has mixed and lined up as closed. Childrens have respectively opened two cards among others, closed ones and they have attempted to find the same cards accordingly. Children will speak up as if " I found out Mihrimah Sultan Mosques among others or I could not find the pair of Maiden's Tower. Thus, the awareness could be raised both visually and namely.

In the last lessons, volunteer elder brothers and sisters asks them "where they will go if unknown friend or distant relative come to Istanbul and what they will talk about and where they will suggest them to see. Tell them by using poster and pictures". After giving them paint, picture paper, old bulletins, scissor and binder, we could learn about what they have procured, which architectural arts they have been wondering, which protective elements they have been affected accordingly. After collecting posters, the children will be asked who will do protection and all children will be voiced we are.

6. Result

There are some problems in the implementation of urban conservation in Turkey. These problems occurred in urban scale and structural scale could make the conservation difficult in a sense. However, the solution of all these problems could be solved by the projects and implementations in the favor of public benefit. The urban management has the potential to solve most of the problems by means of participatory policies. It must be carried out in accordance with the adaption for the public benefit. At this point, the public has most important task for public is . to carry the urban awareness and conserve the area where they are living. If each individual has sense of responsibility towards their living area, those places could be conserved and integrated against future.

At this point, the habits coming from childhood and lessons learned have become basic leader of the person. Providing the integrity with the urban and to endear them to their living places must be main responsibilities of the urban managers and families. Social policies to be applied towards the children in the city and the project organization that will strengthen their relations with the city, the consultancy services against the children in the town and their roles for the socialization must be defined. The urban management must have main responsibilities to help the children who have economic and social different to benefit from the urban possibilities in the equal base. Because, every children are equal.

The most important things for the children are children parks and green areas, when taking into the consideration of urban protection and planning vehicles. Another place must be designed for the children in the physical area. Children should go out and play in safe. The urban actors must prepare more realistic projects and the projects must be carried out towards the world of awareness. It will be more than important to establish the relations of the children with the city. Most of children are living together with their families without basic urban services. The children of the families who have problems with the air pollution and unplanned urbanization (particularly low income groups in the economic sense) could be grown up as antisocial. The urban management must have basic duties to transfer the negative situations to the positive situations. Thus, the individuals must be grown up who affect the urban not to isolated. Since the beginning of primary schools of the children, the awareness of the environment is more than important. Children know the trees, flowers and parks. However, when we are talking about the cultural heritage, they feel themselves strange to this concept.

The most important questions in the minds of the children that establish the figure of city are that if the city is sleeping, hungry, if the city has hand or arms, internal organ, if it is thirsty, if the city goes somewhere. Children have been grown up without knowing about the city although they have seen the concept of environment in the story book, some cartoons. Generally, until the adult period, individuals who could not go out alone could discover the urban at 14-15 ages. Families and schools are responsible to help children to meet them with the urban, to introduce them cultural values. Hence, the lessons should be included about town to the curriculum and each child should learn about their responsibilities about their environment, street and district accordingly. If the children do not learn about environment and if they do not have any awareness towards environment, these questions will have funny town description on their mind. They attempt to learn about the town by asking these questions. However, this definition comes from outside. The best awareness could be obtained when the children go outside.

The basic factor is to familiarize the children with the city is the game. There are some basic element for children to love their living area such as street games, friends etc. Traditional games are the basic factor of intangible cultural heritage and most of them could be lost timely. When children play in the street, these could be experienced. On the other hand, playing is involved with the relations of the children with the environment and their neighbors. If the children play in the street with his/her friends, he/she will love his/her living area, home and he/she loves the air, nature and save his/her memory. When he/she grows up, his/her sense of belonging will be developed and the feeling of protection will be promoted. Because, conservation is love.

Istanbul is the biggest city of turkey in terms economic and social aspects with its 13 million population. Approximately 30% of this population is composed of children between 0-15 age group. This big and

historical city that has such kind of young population must be known by the public. Although new approaches have been brought to the relations of the children with the city, the sufficient activities could not be still carried out in national and international sense.

The results of the project in Uskudar have revealed by the posters that have been done at the end of the lessons and satisfaction survey fulfilled by the students at the end of the lesson. The concepts on the memory of the children and architectural arts and other relevant questions how they find their teachers have taken part accordingly. The maiden's tower among the architectural arts on the memory of children is the most attractive one. The reason is that the Maiden's tower is located in the middle of Bosporus and it is very popular by legendary story of beautiful princess.

In this sense, it can be said as a result of the project as the followings;
•   Children in Uskudar are mostly curious about Istanbul and their attentions are very high as well,
•   They have listened very carefully about each sentence of the presentation and they have raised creative questions.
•   Particularly in the game of sculpture, they have animated the architecture arts enthituasimly.

The most important area where the children have contact with the city is public places such as the streets and squares where they are playing. The prioritized areas where the urban awareness could be provided for children are the areas where the easiest communication could be provided indeed. Thanks to the mental perceptions of the children that are open in the learning process of the children, various methods could be provided to raise their awareness in early ages. The sense of protection should be provided for the children through the games during pre-schools and primary schools. The application models must be developed in participation for children.

Fig. 2-3: Children drawing pictures and playing map game (http://katilimcikoruma.org/)

Fig. 4-5: Children's poster and Kız Kulesi in Üsküdar (http://katilimcikoruma.org/)

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Harmony and Proportion in Traditional Oriental Houses – Where Less is More

Mario KONG,[1] Maria do Céu RODRIGUES,[1] Maria João PEREIRA NETO,[2] Pedro JANUÁRIO,[1]

[1] Department of Drawing and Visual Communication, Faculty of Architecture, Technical University of Lisbon (FA-UTL). Researchers and permanent members of the Research Centre for Architecture, Urban Planning and Design (CIAUD) of FA-UTL, Portugal.
[2] Department of History, Faculty of Architecture, University of Lisbon (FA-UTL), Portugal Researcher and permanent member of the Centre of Cultural History FCSH - New University of Lisbon, Portugal.
E-mail: mskong@fa.utl.pt, maria.ceu.rodrigues@gmail.com, mjoaopneto@gmail.com, arq.pedro.januario@gmail.com

Abstract

At a time when resources are increasingly scarce and we have become increasingly aware of the need to save resources without sacrificing comfort or beauty, it is useful to look not only around us but also to the past and find inspiration from historic models.
We strongly believe that architecture is a product of creativity, imagination and invention, born out of the relations that are established during the thinking process between what is known, that is longed for and the notion of harmony and proportion inherent to the creator.
In this study we will examine the traditional houses of the East, with special attention to Japanese and Chinese buildings. Since the peoples of the Orient, out of necessity and economy of means, for centuries have created a way of life and an aesthetic philosophy based on harmony and proportion, where less is more.
Our research is based upon ten years of documental analysis of the mayor treaties on figurative arts realized in the western and the eastern world in the last 2000 years and on a continuum of published material on that subject.
With our project, we intend to foster academic reflection on the importance of harmony and proportion, present in the Memory and the Cultural Identity of places, as elements that will encourage and develop avenues for development of an architectural language in the current context of sustainable construction.

Keywords: Harmony, Proportion, Traditional Oriental Houses

Harmony and Proportion in Traditional Oriental Houses – Where Less is More

At a time when resources are increasingly scarce and we have more awareness of the need to save means without jeopardizing either comfort, or beauty, it is useful to look not only around us but also to the past and find inspiration from historic models.
The design and materialization of shelter is one of the earliest and most representative manifestations of the activities of men.
The diversity of architectural pieces is the result of specific needs that the various spaces are designed to meet. These needs however are not just of utilitarian nature.

Utility may be the factor that arouses the need for construction, however, the way the response to this need is given, the materials used, the technical means available, reflect the social, political and economic development of the societies in which they arise.

According to Rafael Echaide, together material production, science and art, architecture is in its complexity, a characteristic reflection of a given historical moment, of the society that gave it its reason to be. [1] And in the words of Pereira "their particular conditions of production as well as the political structure and social system act in parallel to the functional, technical and ideological factors, resulting in an architectural space." [2]

However, despite the many factors which are taken into consideration in architectural composition, the utility of the space and its suitability to the needs that gave rise to it should never be forgotten. The existence of architectural space would not make sense if it had no utility. It is in space that architecture is fulfilled.

Bruno Zevi says about this: "[...] the most important is to establish that everything does not have interior space is not architecture." [3]

When space starts to be seized, closed, shaped and structured by the elements of form, architecture begins to exist. Space therefore represents the primary element. However it would be unsatisfactory to define the essence of architecture only as its space, it would be like drowning right from the start the purpose of our investigation.

Society, by requiring concrete spaces at specific times, raises the problem while trying at the same time, by architecture and through architecture, to solve this problem either by building spaces, or by forcing man to adapt to the existing space.

However space is not exhausted in its relationship with man, it extends beyond time, evolving and growing with man.

To speak of time as the fourth dimension in architecture means understanding the historical evolution of architecture throughout the centuries and all the factors that comprise it. The predominance of one or another factor generates the different spatial conceptions. In the words of Isabel Santa Rita, "the conscience of time always departs from a past experience, some of them very vague, that inevitably enter the human mind. I would even say the very texture of life. Today's time is the sum of many other times. What we experience today is the result of many thousands of experiences lived by ourselves and by others. "[4]

The reflection presented here is an attempt, albeit theoretical, to understand the representation of existential space, experiential time and of what stems from its relationship with the man-made architectural objects. This is however much progress might influence us, it is important to know where we came from, so we know where to go. Following this reasoning, architecture also served for centuries as a means of transportation of symbolic cargo associated with aesthetic, socio-cultural, economic, social, political, economic, technical-scientific, etc. references of every age and of each culture.

The application of attributes such as shape, volume, light, shadow, colour, texture, ornaments and use of materials, allow us to articulate the basic special relationship between man and space, between space and its surroundings. These are the relationships that allow us to differentiate the various architectural expressions.

If in the West, man's relationship with space is traditionally the most prized in the East it is the harmonization of architectural space with nature that assumes greater importance.

In this sense, the big difference between Eastern and Western architecture is the role that nature plays in architectural space: the architectural space in the West is a man's attempt to dominate nature, in the East it is a kind of idealized place, where apparently nature dominates.

This particularity and specialty of architecture in the East, follows both a desire and a need to compose the three dimensions of space, which justify the existence of architecture, but also to enter in this composition space, form and material, thus establishing the connection of harmony and proportion of architectural design with the surroundings.

It is for these reasons that today, when faced with the need to find models that allow better management of the environment; we turn to oriental architecture.

Despite the great diversity of architectural styles that we encounter in the East, we find that the transversal theme is the quest to establish the perfect balance between functionality, utility, durability, beauty and harmony with its immediate environment, nature and universe.

In China's case, the layout of an architectural space, like the other arts, "derives from a tradicional philosophy, developed as a synthesis of the constant opposition in Taoist philosophy, between *Tao* and *Qi*, or the tension between the intangible (metaphysics) and the tangible (physical). In this fundamental pair of concepts, *Qi* refers to all the things in nature that can be perceived by the senses, while *Tao* is the origin from which all things are generated." [5]

That is, the Tao represents the search for harmony with the natural forces, the demand for the cosmic rhythm of life, the great syntheses in their pre-established schemes of objects, beings, of things of the

universe and the agreement of sounds, colours, body parts, elements of the cosmos that form the basic structure of Chinese culture and thought.

In order to complete one of the fundamental ideals of Confucius is that nature and the universe must be in harmony and this should also extend to humans. In Confucianism, *Tao* symbolizes harmony prevailing in the universe, that is, the good and balanced relationship between all things. This harmony is the model for the whole society. The individual must therefore live in harmony with all that surrounds him and this can be achieved if his interior is in harmony with the *Tao*. In a simplistic way *Tao* can be defined as the order of things according to natural law, the instinctive process that manifests itself from the ongoing transformations of the Universe [6], the balance of *yin* and *yang*.

This way of thinking and being will be reflected in all facets of artistic expression, thus resulting in a broad diversification of style and technique.

Thus, the Chinese aesthetic is a result of a confluence of principles that are structured around the contemplation of this spontaneous process of nature, where man is part and interact so that their own artistic creation represents the path of contemplation and reflection, the understanding of the cycles of nature, of order, and of the primordial chaos, to achieve a state of balance and harmony.

To the Chinese, a balanced and harmonious architectural space represents the culmination of the merger of the Confucian concept of art as a human creation following the model of nature and the Taoist faith in the superiority of the natural world as an art form.

This thought led to the construction of a stock of symbols, present in all aspects of Chinese life, culture and art, including in architectural design, where all elements play both aesthetic and symbolic roles. [7]

In addition to the Taoist and Confucian teachings, there is still to take into account the concepts of *Feng Shui* in order to interpret correctly an eastern space. *Feng Shui* is a mixed discipline between science and mysticism. It is a theory that encompasses many disciplines, from reading a place, through geomancy, metaphysics and reading cosmological influences, to psychology. It is a science that is applied to the natural and built environments. It is also the art of planning, locate, orient and build, so that the architectural objects set balance and harmony with the physical shape of the terrain, climatic conditions, geographical location and the persons to whom the building is intended. [8]

The concepts of *Feng Shui* and the mystical concept of Taoism are usually present in the composition and the construction of Chinese architecture, whether of common houses or of religious and imperial structures (Fig. 1).

The use of certain numbers, cardinal points, volume, light, shadow, colour, texture and ornaments in traditional Chinese architecture reflects the belief in a kind of immanence, where the nature of something can be contained completely in its own shape.

To support this assertion, simply enter a compartment of a Chinese house, whatever it might be, living room, dining room, bedrooms or even a garden. It will almost always present itself with great simplicity as a place where all elements, materials, colours, light, shadow, textures and ornaments were meticulously designed.

It should be noted here that, in addition to awareness on the need for economy of means, for the Chinese, according to the theories of *Feng Shui*, excess furniture and / or objects may represent obstacles that prevent the *Qi* energy from flowing and covering the entire interior space.

Good balanced use of resources and conscious awareness of the need for economy of means, causes Chinese dwelling space to be devoid of superfluous, i.e., it has only the essential elements of use, which often play simultaneously a utilitarian and decorative role (Fig. 2)

In Japan, despite sharing many of the philosophical principles of China architecture takes on a more intimate expression.

Most traditional buildings, whether of temples and palaces or of humble dwellings, are characterized by heavy roofs and by the dense shade they project.

These roofs are the result of the need to protect the building materials, more fragile than those of China due to the need to minimize the devastating effects of the frequent earthquakes, from the gusts of wind and rain.

The interior of the houses receive, due to the advance of the porch, low light. The transformation into a virtue of this factor, that probably elsewhere, especially in the West, would be considered a disadvantage, is a distinguishing characteristic of Japanese architecture (Fig. 3).

According to Junichiro Tanizaki, "the beauty of a Japanese division, produced only by the variation on the degree of opacity of the shadow, waives any accessories." [9]

The spaces themselves are stripped of any superfluous elements and the few objects found there, the colours and the materials used at the walls are arranged to produce the most dramatic effect possible in the middle of the play of light and shadow.

An example is the *toko no ma* (Fig. 4). This niche, usually present in a major division wall perpendicular to the garden, plays a key role in the decoration of a traditional home. Here is an object is displayed, it can be

an object of art or a floral arrangement. According Tenazaki however, the primary function of that object "is not decorative in itself, since it is more like adding to a shadow a dimension in the sense of depth." [10]

Also in Japanese dwellings living in harmony with nature is of utmost importance. This relationship is usually established through the gardens. However, as the interiors of homes, in the gardens the type of nature that is invoked is minimalist, stylized and idealized. It is this artistically manipulated nature, which is seen from the inside of the dwelling. This view of the garden often plays the role of the decoration of the space - it is a living picture (Fig. 5).

The relationship between space/shape and space/material in oriental architecture is the result of a culmination of experiences, feelings and emotions that characterize the eastern people.

As Westerners, we do not share those memories. However we can look, enjoy and draw inspiration from the simplicity of oriental architectural objects. We can, as many have done, recognize the beauty, balance, harmony and proportion that an eastern space, where less is more, transmits and learn to apply this lesson.

Fig. 1: Example of a symbolic element in a Chinese house in http://www.homemanifest.com/modern-mandarin-oriental-chinese-feng-shui-interior-design-idea

Fig. 2: Interior of a traditional Chinese house in LOU Qingxi, *Traditional Architectural Culture of China*, China Travel and Tourism Press, China, 2008, p. 234

Fig. 3: Light and shadow in traditional Japanese homes, in http://compe.designtope.net/nextmaruni2004/ref2_7_e.html

Fig. 4: Example of a *Toko no ma.* Foto by Maria do Céu Rodrigues.

Fig. 5: Garden view from inside a traditional Japanese house, in http://viewhomeinterior.com/tag/japanese-decor

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The role of drawing in regeneration of the paths of memory.
The site of Caponapoli

Teresa DELLA CORTE
Department of Architectural and Environmental Design, Faculty of Architecture, University of Naples
"Federico II", Naples, Italy
teresa.dellacorte@unina.it

Abstract

The research aims to start a survey on the site of S. Aniello in Caponapoli an ancient settlement that was situated around the highest point of the city in which there was the acropolis of *Neapolis*.

The reading-oriented adopt a structuralist method; in parallel with a process of progressive studies in depth, it operates a 'disassembly' of stratification making knowable the meaning of the existent, spatial and temporal, 'contaminations' that are transcribable in a *corpus* of representations, which are suited to highlight the regenerative critical states and potentialities of the studied area.

The traditional drawing is already an augmented reality that - as accepting an upgrade process - express itself much more through the modern possibilities which are offered by the information technology. In the new features of solid modeling reality is represented by structures-simulacra where the virtual navigation simulated space is permitted; infinite bidimensional aspects and significant 'cuts' can be extracted from the *continuum* of the model; they investigate and reveal the architecture in the same way of an anatomic dissection. Similarly, the latest technologies for the 3D data acquisition (like photogrammetry and the laser scanning), are able to change over from the physical object to its digital representation. They are strongly innovating the processes of reading and revision of the external data, making possible the extraction of complex formal parameters.

The creation of the simulated reality - as the area of Caponapoli - is extremely useful for the strongly stratified sites, which require operations of integration between memory and contemporaneity.

Keywords: augmented reality, stratification, contaminations, virtual section, regeneration.

1. Drawing as 'augmented' reality

Urban archaeology applications to the historic centres are increasingly extraordinary occasions to know the multi-layered urban sites, which are characterized by complex and articulate urban-architectonic palimpsests.

In great and small cities (for example, London, Milano, Roma, Lecce) have been conducted many experiences which have demonstrated that historical cities are richer and more complex archaeological contexts than the traditional open-pit sites; historical cities are archaeological sites which are hidden under our feet, under the asphalt or the flagstones of streets and squares where we walk every day, and sometimes even under our houses. In these archaeological sites, diachronic architectonical vicissitudes, which have been created by the sequence of cultures and interventions, intersect in a single space: for example, the recent finds which were discovered in Napoli on the occasion of the excavations undertaken in the construction of the subway, or the delightful site of Rione Terra (Pozzuoli).

The methodological choices and the definition of the "working tools" have a fundamental importance, because there's the exigency of creating knowledge structures for identifying an intervention hierarchy for the historic cities.

The preservation of the preexistences and their integration with the contemporary needs require devices able to interpret and to represent the complexity of the sites. This devices have to enlighten on the various interrelations, superimpositions, stratifications and reciprocal interferences between the sedimented parts, in order to take possession of the global significance of the place.

The architectural drawing is traditionally the partial and specific result of the subsequent stages of a site surveying. And then it's the final synthesis (or the gnoseological summary) of all the previous cognitive and interpretative operations which allow the representation. The drawing is the oriented simulacrum of the reality, in which continuum the most appropriate data discretization and selection are operated. The drawing is "the architect's real sight" [1], it's intrinsically able to reveal aspects and properties which aren't immediately visible in the 'natural' image of the studied object.

The survey of the whole historic city (or of a part of it, for example a block) requires the adoption of a structuralist method, just because there's a variety of aspects that may be found. In parallel with a process of progressive studies in depth, it's necessary to do a kind of 'disassembly' of the area, in order to attain the meaning of every part which contributes to the making of the whole. Consequently, the whole is tidied up, finding its rules of combination and transformation; these rules are transcribable in a *corpus* of significant representations, which are suited to highlight the regenerative critical states and potentialities of the studied area.

"Structural man takes the real, decomposes it, then recomposes it; this appears to be little enough. Yet, from another point of view, this "little enough" is decisive: for between the two objects, or the two tenses, of structuralist activity, there occurs something new, and what is new is nothing less than the generally intelligible: the simulacrum is intellect added to object, and this addition has an anthropological value, in that it is man himself, his history, his situation, his freedom and the very resistance which nature offers to his mind" [2].

Therefore drawing is a text which is parallel to reality; it's more suited to our cognitive appropriation than the experience of reality itself. In its role of interpretative action, drawing is an operation of adaptation (a critical and not diminutive adaptation) of reality; at the same time it's able to enlarge the reality, because drawing can highlight both the evident elements and the elements of the invisible world which "is formed not only by what can be seen, but also by what isn't [usually] highlighted in the field of view" [3].

In this sense, drawing is always been an 'enlarged' reality.

This fundamental peculiarity expresses itself much more through the modern possibilities which are offered by the information technology, as accepting an upgrade process . There's been an improvement of the virtual reality applications in architecture and other contiguous disciplines (firstly, the archaeology). After the first popular-didactic results (ideal reconstructions of buildings or lost cities), this improvement has produced an extraordinary modernization of the methods for studying the buildings and the sites. At the present time, it's not only a revolutionary support for the phases of data sampling and for their restitution and representation, but it also has a great importance in the process that identifies and structures the

Illustration 1: Zenithal aerial image of urban context of S. Aniello a Caponapoli.

connections between the outcomes of the enquries and their relation with the project hypothesis.

The new features of solid modeling allow the complexity management; reality is represented by structures-simulacra which are organized in layers where the virtual navigation of the accessible and practicable simulated space is permitted. Static and dynamic views, infinite two-dimensional aspects and significant 'cuts' can be extracted from the *continuum* of the model; they investigate and reveal the architecture in the same way of an anatomic dissection.

The possibility of a simultaneous visualization of this aspects produces a great figurativeness. It makes the modern concept of representation able to reveal criticalities and potentialities of the historic sites, and suggests their regenerative possibilities. Therefore it's an irreplaceable tool for sounding and knowledge.

Similarly, the latest technologies for the 3D data acquisition (like photogrammetry and laser scanning), which are used singularly or complementing each other, are able to change over from the physical object to its digital representation. They are strongly innovating the processes of reading and revision of the external data, making possible the extraction of simple information (like linear measurements, thicknesses, or diameters), and also of more complex formal parameters (like sections or best-fit surfaces), through the *reverse modeling* process.

Drawing has a revealing role, which is amplified by the present and future sceneries of *Augmented Reality*. Through the superimposition of one or more informative layers on the physically perceptible world, these sceneries multiply the amount of simultaneously available information concerning a particular real context. Therefore, they are useful future tools for the processes of knowledge and valutation of the impact on the highly complex urban areas.

The simple act of drawing already gives a sense of amplification of the reality. Even in the case of relatively simple objects, the act of trying to draw verifies that "the objects become more visible (even more real) when they are converted in a system of signs which are put on a two-dimensional support; so, they offer themselves to a comprehension that incorporate a memory (and this is a not secondary quality)" [4].

2. Caponapoli. Space-time interpenetrations and contaminations

The 'simulated' reality is able to duplicate the real context; it reveals the various aspects of the place and makes them visually comparable. All of these aspects are significant; but if they are taken singularly, they are insufficient to reach a critical knowledge which could generate and orient the intervention.

The creation of the simulated reality is extremely useful for the strongly stratified sites, which require operations of integration between memory and contemporaneity.

This is the case of Caponapoli, an ancient settlement that was situated around the highest point of the city in which there was the ancient acropolis of Neapolis. This area is one of the most sensitive to variation of times and situations; in the course of centuries, its important natural position – this area was defended by the ancient deep valleys (which correspond to via Foria and via Costantinopoli at the present time) – and the historical events of the whole city have determined many complex transformations and space-time

Illustration 2: Close aerial image of the urban context of S. Aniello a Caponapoli.
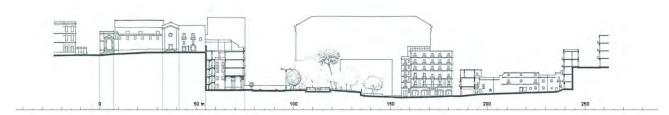
Illustration 3: Road transversal section of difference in level (about 17 m); from piazzetta S. Andrea delle Dame to salita Stella.

interpenetrations, which are revealed by various archaeological finds and by the complex consistency of the present built-up area.

Beyond the decorous alignment of 19th-century buildings downstream, and the apparent composure of the streets upstream, the built-up area is a very intricate three-dimensional net, which is constituted by interventions and superimpositions, alterations and erasures, stratified levels which are accessible through unexpected horizontal and vertical routes…; the texture of joints and interferences is seen as 'splitted into two', in particular in the points of discontinuity, where it is hardly readable.

This ideal structure of relations is permeated by a sense of spatial and temporal 'contamination', which is connoted by multiple values; in particular, there is a double value, which is referable to the meaning of the latin word *tactum*. This word has two very different (but always interactive) senses: the negative acceptation of 'contagion' or 'infection' (it is particularly associable with the improper or irresponsible interventions which enveloped the precious preexistence of the area of Caponapoli in the course of time) and the positive acceptation of 'interaction' or 'hybridization', which is very attached to the cognitive value that is assigned by the contemporary culture to the concept of multiplicity [5].

3. The story of the stratifications

The numerous archaeological finds place the origins of the site about the V century B.C.. Even if most of these finds are still divided or not visible (like under the clinic of medical semeiotics, in S. Aniello alley and near Maria Longo stairs), they show themselves in various points of the hill (for example, in Villa Chiara, near the transept of the S. Aniello church and under the floor level of the homonymous church); Roman walls of the Augustan Age in *opus reticulatum* were discovered here, at the same time as Greek walls of the III and IV centuries B.C., early Middle Ages tombs, traces of the apse of an early Christian chapel, and a series of finds which are probably pertinent to a rural sacellum and are datable about VI century B.C., before the foundation of Neapolis.

The present site is intensely steeped in history and myth (according to an ancient tradition, the bowels of the
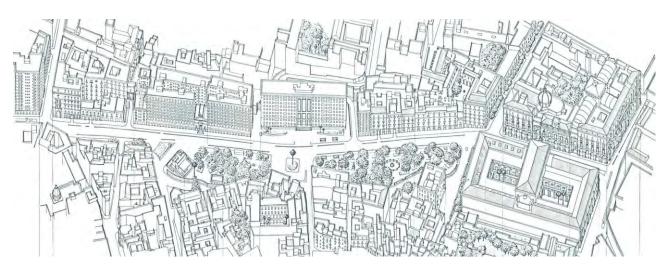
Illustration 4: Axonometric view of the study area in the context of piazza Cavour.
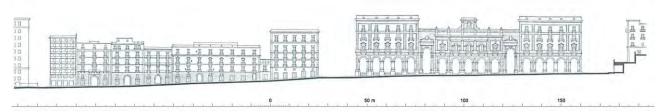
Illustration 5: Elevation of urban front of S. A Caponapoli, in piazza Cavour.

hill give hospitality to a supposed sepulchre of the siren Partenope [6]). It springs from the enlargement of the ancient S. Agnello church (IX century); this church rose on the previous chapel that was dedicated to S. Maria Intercede (VI century).

The present nave of the church was built during the Renaissance, in accordance with a Latin cruise scheme where the ancient church serves as a transept; it is an integral part of a religious complex which was subsequently supplemented by a monastery, a cloister and some residences. In 1809, after the abolition of the monastic order of S. Aniello, the monastery premises were sold to doctor Cosmo de Orazij, who englobed them in the structures of his new palace; this building is situated at the intersection between the directrices of Foria and Costantinopoli street, and it absorbed the garden of the ancient claustral space.

In the same period, the persistent structures of the ancient monastic citadel were hidden and compressed also by the large alignment of the buildings around Cavour square. Cavour square leans its volumes against the strong difference of altitude still today, and it contributed towards determining the sensation of occlusion which connotes the studied area. This sensation relegate the area to a sad condition of carelessness and decay, which is caused by many flaws in the relation between the fronts of these buildings and the ancient structures of the conventual complex.

In the sixties of the last century, a modern building was built along S. Aniello alley. This building put itself between the remaining buildings of the convent, between the esonartece of the Renaissance church and the south side of de Orazij palace; it dominates the slope of S. Aniello alley (this slope was previously arranged as a pedestrian way with a flight of steps) with a powerful rhythm on the facade. The apparent polish of the composition of this facade is reversed on the opposite side, where the new ferro concrete structures are indiscriminately inserted into the preexistent structures of the monastery.

It's the drawing of the city of Naples, given to us by historical cartography that, comparing the view of Alessandro Baratta (1670), the map of the Duke of Noja (1775) and the map of Luigi Marchese (1861), makes clearly readable a lot of these transformations; particularly, still in 1861, it's attested the presence of a pedestrian route which hugged the longitudinal extrados of the transept, from S. Aniello square, near to the

Illustration 6: The garden of the ancient claustral space of S. Aniello a Caponapoli's convent.

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side entrance of the church, arriving at the cloister. This route, reported also by the Duke of Noja, is already guessed in the view of Baratta; instead, the map of Schiavoni (1880) doesn't report it: anyway, this map also omits the empty space of the cloister, which is the only surviving element of all the stratification at the present time, so the dating of the obstruction of this route is indeterminate.

4. Contagion or infection

The site of S. Aniello has been the protagonist of a complex stratification, which bred a 'laddered' space. This space was completely transfigured, in its original values, by a lot of spontaneous and inadequate interventions which have compromised its historic and environmental value, and the uniqueness of its cultural identity. Sadly, this also happens where the 'plot' seems to become more clear, like in the cloister of S. Aniello in Caponapoli, with the garden, the well and ancient plants: in fact, the remains of the cloistered walls, with their round archs in piperno, are strongly damaged not only by improper insertions of other buildings in the course of the time, but also by a diffuse anthropic and material decay. The cloister is relegated to a condition of isolation, which is very different from the original condition of spiritual retreat: the two surviving sides of the arcade (the southern and the western sides) are no more accessible from the new contiguous buildings, while the use of the garden is reserved for a level of de Orazij palace, whose eastern structures of the facade incorporate the arches of the original cloister, ruining the depth of the arcade on that side; the ancient pedestrian route connecting the entrance and the transept of the church is also completely obstructed.

The whole site, and in particular the space of the cloister, are consequently 'closed' compared with the great integrative potentialities of the area: upstream, with the net of relations of the ancient centre; downstream, with the height of Cavour square and the cultural and communicative flows which are included in the square (archaeological museum, subways, …). Actually, the strong difference of altitude (about 17 meters) between S. Aniello church and the present Cavour square is the main cause of the problematic stratification and not only physical isolation of the area.

An unexpected vertical connection between the two altitudes already exists (it's a private connection consisting of an adventurous system of stairs which starts from the building overlooking Cavour square and throws itself on largo S. Aniello), but the improvement and the protection of one of the more stratified areas of Naples would be assured by the integrated refunctionalization of some of the existing buildings and the creation of a public connection between the two altitudes.

A strategical point for the creation of a vertical connection is near to the seat of the missing Costantinopoli Gate; it would be a new entrance of the routes of the ancient centre, and it would take possession of the existing space of connection between de Orazij palace and the contiguous building.

5. Positive interaction or crossbreeding

Drawing (in particular, the architectonic representation with the modern systems of modeling) is very important for materializing and turning the knowledge of the sites towards the present processes of urban

Illustration 7: The current state of the cloister of S. Aniello a Caponapoli.

regeneration. Lately, the revitalization of the area of Caponapoli seems to begin with the reclaiming of the homonymous church. Within the initiative promoted by the bishop's Court of Naples for reversing the neglect and the decay of the great historic and architectonic patrimony formed by the closed or unused churches (transforming them in social catalyzers useful for the production of culture and knowledge), the church has been reopened to the public, after a very long time of closure and spoliations, and it has been assigned to social and cultural activities in addition to the religious activity.

The long process of interventions and restorations, begun in the sixties of the last century, required archaeological surveys which showed exceptionally the whole history of the city, from the time of the foundation to present days. The large works of excavation under the church proceeded parallely to the coeval Italian discussion about the methods and the aims of the urban archaeology and the diffusion of the stratigraphical methods. The new methodologies based on the Harris' theories found the archaeological excavation on its accurate survey, because they consider the excavation as part of the knowledge process. The tidy activity of the stratigraphical method follows a structuralist approach and realizes a physical disassembly of the existing stratification; moreover, it associates an accurate and systematic data research with this disassembly. This activity is based on the concept of "stratigraphical unity", which is the definition of every trace left by every single human or natural action in the archaeological stratification of a site. It is able to infinitely multiply the amount of information which can be made up from an excavation [7]. Consequently, this activity requires the use of present representative instruments which will make possible the scientific management and the simultaneous control of the data, therefore the global knowledge of the site.

The very refined restoration work of the church, directed by Ugo Carughi [8], is inspired by a principle of simultaneity too; this work operated in the body of the nave, and inserted a glass footbridge around the central void that permits the sight of the Greek, Roman and early Medieval archaeological finds. The footbridge is below the floor level of the church, so the descent is like a descent into the void and it's possible to synchronically perceive all the ages, which are "from different times but in the same place".

The extraordinary charm of this perceptive condition springs from the dialectical presence of the various 'levels' of the stratification, of the various additions and modifications which sedimented themselves in the course of the centuries and are now simultaneously understandable.

This is the 'positive interaction' or space-time permeability, the dual aspect of the sense of 'contamination' which characterizes the area of S. Aniello. This interaction is referable to the conception of 'reality' as it is seen by the contemporary culture, whereas the intensification of the possibilities of information about the more various aspects of reality made this very idea of reality less and less conceivable. At the present time, far from the reassuring scientific formulations of the nineteenth century which considered reality as a rational cause-and-effect system, this multiform idea of reality is obtained from its numerous, contemporaneous images or interpretations.

6. A section of the time: the cursory scan of the virtual model

A similar transparency of relations always characterizes the fabrics of the living historic cities, in particular the densely stratified areas like the area which generates the complex identity of the studied site.

Illustration 8: The current state of the arcade of cloister.

Stopping the elusive mixtures which reveal and enhance the knowledge of the places, through the comparison of the various aspects (in accordance with the Renaissance Albertian principle for which every knowledge is obtained "*per comparatione*"), is the present duty of representation and its interpretative, methodological, technical instruments based on the modern *hard sciences*. Still now, the use of the section plane is an essential instrument for the acquisition and the transmission of the knowledge of an architectural site.

The architect entrusts section plane with its need to reveal the various sequential planes of a building, to scan them with appropriate vertical, horizontal cuts in order to bring back the unity of the building.

It's a close anatomical examination where the graphic sign "is able to separate the objects with unbeatable surgical precision (incisiveness)" [9]. Section plane is the scalpel of the architecture which all along connects the cut of the buildings with their intersection with ground and underground (the underground is almost always considered the place of memories and the identity place). In this case the anatomic metaphor is very close to the body of architecture, which is subjected to a progressive updating of the representative potentialities of CAD modeling and visualization; current human body scanning is a parallel process which is directly comparable to the new representation techniques, because they are similar to the axial tomography method or the magnetic resonance. In particular they allow moving the section plane over the model (like a ray of a scanner) [10], and stopping it in the most critical positions, always obtaining a two-dimensional section without distortions. A virtual section isn't a limitation, a separation; it's the place where synchronous relations and contaminations interact: between inside and outside, above ground and underground, nearness and distance, memory and contemporaneity, preexistence and transformation.

The virtual section is also the converging point of a double duality which is integral to the three-dimensional model. The first duality is the compresence of inductive and deductive logic: infinite sections can be extrapolated from the model, but the data of at least one of them are necessary for the construction of this very model. The second duality detects another interesting antinomy: on the one hand, the section discretizes the continuum of the investigated material object, breaking down it and making up one of the piece individually; on the other hand, its peculiarity of reading the relations between the parts and its dependence on the position of a cursor plane make it an instrument for investigation and global knowledge. This instrument fluctuates between the reductionist and structuralist scientific method (the opposite pole of the Strauss' theory) and integrates them [11].

The correlation and the combined visualization of the various sections and views which can be obtained from the virtual model , allow the constant control of the order of the elements which are present in the investigated context. They allow a global knowledge which was rarely obtained by traditional drawing.

The model is very dynamic, because there's the possibility to animate the sections in order to simulate a route into the model. In addition, dynamicity is mainly generated by its peculiar capacity to sound every entangled body *sub specie sectionis*. It's useful to understand the passages, the exchanges of height, the stratification of these bodies, in order to reveal criticalities and potentialities of the historic city; so, representation projects itself into a concrete planning dimension.

Illustration 9: The interior of the nave of the church after the restoration and during excavation work.
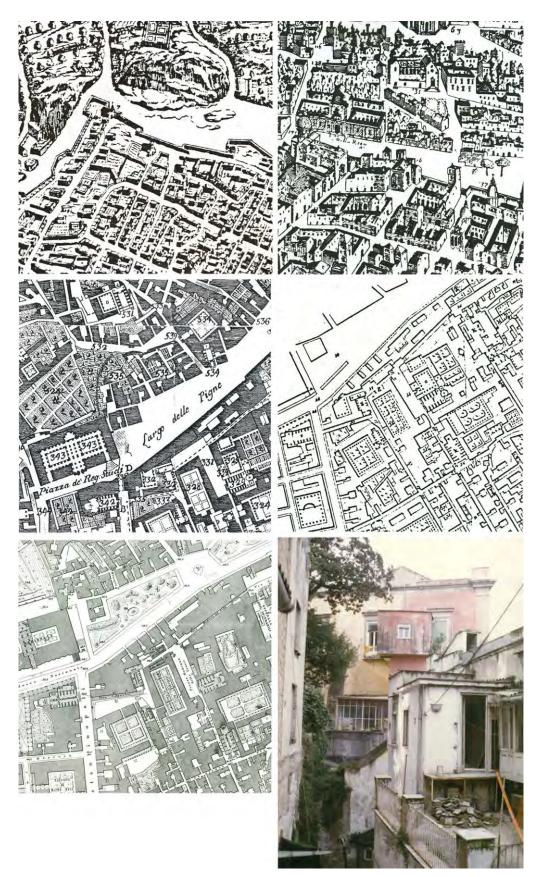
Illustration 10: From top to bottom and left to right, historical maps of Caponapoli and current image of ancient path site that lapped the transept of the church .

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XVI-XVIIth late gothic architecture in Busachi. Survey, three-dimensional modeling, diffusion on the web.

Paola CASU[1] ,Claudia PISU[1]
[1] Dipartimento di Ingegneria Civile, Ambientale e Architettura, Facoltà di Architettura, Università degli Studi di Cagliari, Italia
e-mail: pcasu@unica.it, cpisu@unica.it

Abstract
The Spanish domination has affected the Sardinia from the fourteenth to the eighteenth century. The traces for such a prolonged stay can not be summarized in a few, though of great value, buildings published in the literature. There is a huge underwater heritage, in the so-called "minor contexts", unexplored, but not lacking in importance and historical significance. It is absent, even in the best-known cases, spatial and geometric analysis based on the finding of the building: the published studies have in fact a purely historical character, almost completely ignoring the technical-constructive and geometrical space.
Here we report the first results of a research project in which the documentation has been made, mainly graphics, such as to illustrate every part of the buildings surveyed, with the ultimate aim to promote knowledge and thereby safeguard. Each phase of the project has faced several methodological and technological issues, from data to their management and organization for consultation. The method of investigation is highly technical. The results will promptly publish and useful, because it meant in terms of compatibility with current and common dissemination platforms, such as Google or similar. The end result will make available the data collected and processed into 3D models complete with data sheets, directly on the interface as "Sardinia 3D" or Google Earth.

Keywords: late gothic architecture, 3D modeling, web diffusion, survey, cultural heritage, Sardinia

1. Description of project
Study and conservation of the historical architectural heritage combined with a proper promotion of the territory could be a starting point for development, in a perspective of sustainability and conservation of specific local differences. The information currently available on most historical architecture located on the Sardinian territory are highly technical and accessible, but not structured for a functional diffusion. There are two fundamental issues that revolve around the problem, the preservation of the object and the operations related to restoration and the use and enjoyment of the object in relationship with promotional operations. In the first case, although there have been considerable advances in acquiring data for the urban historian who led the preparation of "recovery manuals" is still not a systematic survey of historical architecture.
In the second case we can see how the dissemination of information on historical and artistic heritage of Sardinia is still very weak. Sites as "Sardegna Cultura" and "Sardegna digital library" offer only few, scant information on the buildings they describe. A user of the Web, especially if foreign, is likely to try a lot of high-level information on-line: often want to see interactive visualizations of the monuments, that invite him to visit the monument from real. For each village are also usually shown a few buildings of interest, neglecting some emergencies very important from the point of view of history and architecture, but still completely unknown. The point of contact between the two aspects of the problem is the historical and graphics documentation

that can be used, with appropriate variants, as a starting point for both the restoration project and the promotion of monuments.

The project of research is therefore to revise the documentation system of architectural heritage in order to standardize and integrate existing data and draw a graphic documentation that support not only the technical aspects of design but also the diffusion of information on the web. Interactive 3D models, easily implemented with low-cost photogrammetric survey (photo modeling), can be built using software distributed for free (ex. Google Sketch Up). This models can be uploaded to the web quickly and easily, and viewed by any user. They represent an instant communication and are used not only in the documentation of cultural heritage but also in many other areas. The historical and architectural information so collected and compiled will form a portfolio of the village studied, which will be published and will be spent at the international level in order to carry out such a promotion from the perspective of cultural tourism.

1.1 Main stages of the work

The first phase of the work is to provide a general survey of the area to find the most historically significant architectures. The project focuses on religious and civil buildings, or parts of them, unknown to the existing specific literature. In particular, attention will fall on rural churches and smaller ones embedded in the historical center of the villages, which is not given any importance in the current books on architecture, but are a huge cultural heritage for the island's villages, yet completely unknown. Churches, preserved almost entirely, allow to obtain a series of reasoning related to shape and geometry, especially on vaults and ornate decorations carved on the main architectural and structural elements that compose them. The same importance is devoted to the study of civil architecture, studying the location, type, texture and through the survey and the graphic rendering. Where possible, it is useful to study details of facade and interior elements that allow for stylistic comparisons, to identify the geometric dimensions of buildings in order to discover the design method used by the builders.

The method used is drawing, survey and three-dimensional modeling, in order to produce graphic and photographic documentation. Survey method is highly technological and immediately accessible, because it is already thought in terms of compatibility with the current and common diffusion platforms, such as Google or similar. The final result will be to have the availability of data collected directly on a 3D interface as Sardinia 3D or Google Earth, where approaching with the cursor in the affected area will see all the buildings surveyed in that territory; moreover, the three-dimensional model appears, for every building fully intact. This system will facilitate the widest diffusion around the world of the architectural culture of villages studied.

2. The village of Busachi and architectures studied

In collaboration with the cultural association of *Collegiu* sited in Busachi we carried out the research project in question, aimed at promoting the culture of the village. Busachi is a small village located on the left bank of Tirso river, in a small natural amphitheater near the artificial lake Omodeo. Busachi was, since the medieval period, the capital of the region of Barigadu, in which also actually insist. The village is divided into three historic districts: *Busache'e susu* (Busachi abowe), which would coincide with the oldest part, *Busache'e Josso* (Busachi below) and *Campu Majore* (Major Field) [1].

In the first quarter we can found, the parish church of San Antonio; in the second one we can found the church of San Bernardino. The first, dated from the early '600, has a rectangular floor plan with three naves covered with barrel vault with lancet arcs. The presbytery is characterized by a stellar vault. The architectural features of the interior of the building identified it as a late Gothic architecture. The facade was made in a subsequent period. The church of San Bernardino has not a certain date, but some historians speculate that it was also built between the late 1500's and early '600, although an inscription on the facade bears the date 1779. The plant is in the shape of a Latin cross with barrel broken vault, divided into three parts by lancet arches.[2]

Within a strong territorial identity were then grafted styles of overseas art, mostly from the western coasts of Spain, ruler of the island for 400 years. In this way has been created an hybrids style that produced a new original and fascinating architecture still visible in these areas of Sardinia inland.

Two interesting examples, both built by the work of Girolamo Torresani, Marquis of Sedilo and Earl of Busachi, are, the monastery of the Sixteenth century, called *Collegiu*, and the church of *Conventu*. In 1577 the noble made the foundation of the College of the Society of Jesus in Busachi, with intent to promote, through the presence of pastoral care, basic education, both in Busachi and in neighboring villages. The choice of the Jesuits by Torresani was not random because of their beneficial presence in Sardinia in two colleges located in the cities of Sassari and Cagliari.
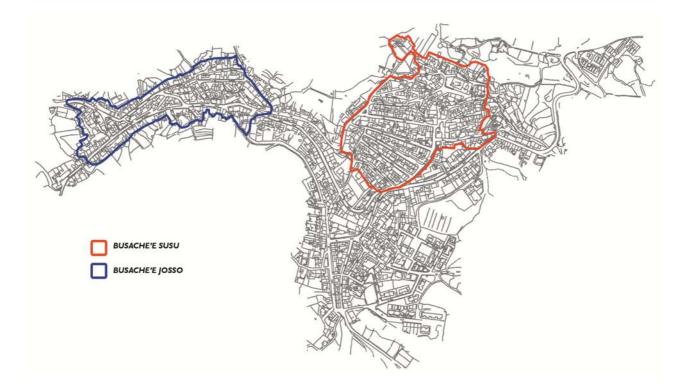
Fig. 1: The village of Busachi.

For this initiative Torresani donated many real assets including the building Palazzo of Busachi with the surrounding buildings, a chapel, yard, garden, barn, kiln, grinding wheel, and even the prison. The Jesuits stood for a few time in these places and they were followed by the Friars Minor of the Provincia di St. Maria delle Grazie, the only one in Sardinia. This monastery has long life, about 246 years. The company deals with the construction of the novitiate, on *Collegiu* and the church of Nostra Signora, whose vault is completed in 1730.[4]

The complex is similar to others made by the Jesuits in Sardinia in the same period [6]. It included the cloister, the monks' cells and the church. Today after a recent restoration has preserved almost intact the cloisters and cells, while are traces of the foundations and the apse of the church, which is experiencing a strong state of degradation. The church has a typical system of Jesuit churches of this period, while the late-Gothic cloister, presents the character as some other buildings on the island and the country itself.

Another important architectural evidence of this period is the structure called *Cunventu*, located in the main square of the village, entrusted to the Dominicans, and then also inexplicably abandoned. Built in 1571, included a large complex of which now remains only the church of San Domenico, that is a little gem of - Spanish art in Sardinian. Deconsecrated and left to decay, after careful restoration, now houses a collection of ethnographic objects and the Museum of Costume and linen. The building is an interesting example of the influence of Catalan and, despite being of modest size, it houses all the features of architectural and decorative repertoire of this cultural trend. The plant is rectangular, with a single nave, and a side chapel with ribbed vault full of ornaments carved directly on the stone of the major elements such as columns and arches angular, jagged ledges, niches with columns surmounted by a tympanum. The facade is simple and straightforward with flat top and canopy, which today remains only the ring, and the crest of the Torresani above the main entrance. On the left is a square bell tower. The nave is covered with a gable roof supported by four stone round-headed arches. Directly from the nave you can access to the bell tower, through a stone stair.[8]

This is one of the recurrent cases in the island where there is a blend of decorative elements typically Catalan and the classical Renaissance style, which leads to an interesting architectural composite style.

Fig. 2: Church of San Antonio; Church of San Domenico (*Cunventu*).

Fig. 3: Church of San Domenico (*Cunventu*); Church of San Bernardino.

Fig. 4: Church of Nostra Signora delle Grazie e *Collegiu*.

3. The rural village of Santa Susanna

The rural village of Santa Susanna is located about 5 km from Busachi and probably stands on the site of an abandoned medieval village known as *Moddamene* [1]. Are accessed through a portal with typical features of Spanish architecture. Through a fraught road, you can reach the hill on which stands the church of Santa Susanna, consecrated by the Bishop of Terralba in 1349.

The original church is medieval, but has undergone several changes and additions over time to take the form we now appreciate. All around the building there are the religious building called *muristenes*, made, in the nineteenth century, as in other parts of the island [7]. In the past this little buildings offered a shelter for the pilgrims for festivals and fairs. The building has a single nave without transept, with the main facade oriented to the west and a south side entrance. To the main entrance there is a porch with three lancet arcs. Also the side door is characterized by a medieval porch supported by columns resting on stone parapet. The façade is gabled with a belfry on the top. Above the portal there are three majolica paterae. The interiors suggest a possible temporal evolution of the building: the nave is covered with a gabled wooden structure with the presence of stone arches that divide it into three parts. This part should be the oldest of the church. The presbytery is also preceded by a round-headed stone arch with beams of stone finely molded as late Gothic school teach. In this part there is a barrel vault characterized by classical decorations that prove a most recent building. On the back wall there is a niche formed in the thickness of the wall, in which there is the wooden statue of the saint Susanna; below there is also an altar of stones with moldings.

The presbytery is also finely decorated with tempera both in the vault and in the walls. The painting tells the story of Santa Susanna, is not signed but is dated 1753, and is attributed by some scholars to the painter Gragorio Aru come from Fonni, a descendant of an ancient Genoese family and active in Busachi in those years, along with his father Pietro Antonio.[5]
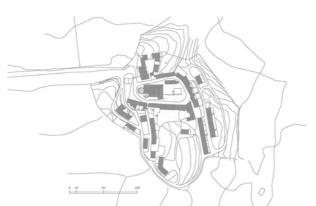
Fig. 5: The rural village of Santa Susanna.

Fig. 6: Church of Santa Susanna.

4. Interactive representation methods: procedure, potentialities and limitations

In an attempt to provide a description of the area in the most simple and immediate way, we used the method provided by Google Earth (available free on the web) that lets you share pictures, models, and other information, of handy and immediate use [3].

Google Earth allows browsing bird's-eye level or ground level, with the ability to enable Street View mode. This mode provides images of the buildings as if you really journeying along the constructed space. In either mode, you can insert a placeholder identifying a location using longitude and latitude coordinates.

For each placeholder you can enter detailed information, images and references to websites outside Google Earth in order to supplement and enrich the existing information. In the case of Busachi, we start from a situation of poor documentation. In fact, at present, in Google Earth you can fly over the area, or use street view, but there are no textual information related to places in the town. The supply of images, added by

users of the Web via Panoramio sharing tool, is more rich. 3D models of the most important buildings are completely absent. The information collected during the survey was organized into a system of data, charts and drawings, designed to the immediate dissemination. We experimented the system of dissemination of geographic data in Google Earth, creating a series of descriptive headings for each building documented in the research. The tools provided by the platform, allowing you to enter information, images and models of all kinds directly on the satellite image of the area. In addition, the Sardinian Region has implemented a similar program (compatible with Google Earth) based on the same principles that allows interactive viewing of the regional territory mapped and modeled in three dimensions with color orthophoto map extensively detailed.

Here we will outline the approach used to describe the area by the means provided by Google Earth.

First of all, we proceeded to rationalize the available data, meaning these: textual data, photographic images, and 3D models of the buildings. Each type of data has been grouped into different folders. These same folders are also created in Places of Google Earth. Still in Place, we create folders for the placeholders of the places to be represented. Directly in Google Earth we added the placeholders. Each placeholder, marked on the building, was customized adding features and descriptive notes in the space for the records of the caption. These operations were carried out with ease by drawing directly on the 3D viewer of Google Earth and real-time checking the correctness of the information entered.

For the inclusion of three-dimensional models, we followed a specific procedure dictated by the interaction between Google Earth and Google Sketch Up.

The two programs are completely compatible, and while the former allows the visualization of virtual environments, the second allows the creation. The use of the latter is extremely intuitive, both as regards the creation of models, both for what concerns the sharing of them in Google Earth.

For the creation of models we performed a direct survey of control measures, coupled to a photographic survey for the photo-modeling. In this way it was possible to model the basic volumes, sufficiently adherent to the real in terms of size, orientation and position on the ground.

The modeling did not go far beyond the definition of these volumes and spatial relationships between them, in fact, the complexity is not a useful data to share on the web. The model should contain the least possible number of surfaces and must reduce the complexity to a minimum because it is functional to the interactive description.
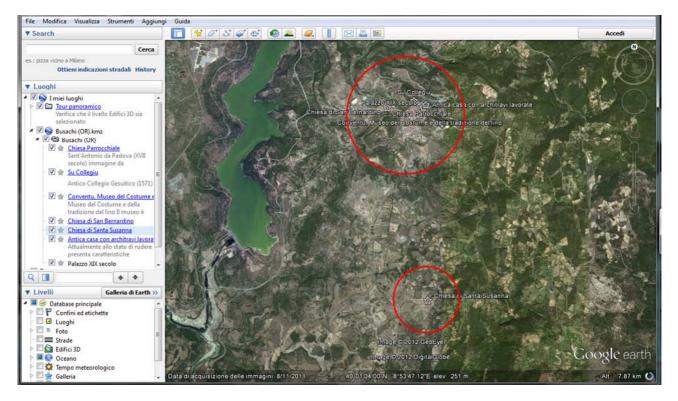
Fig. 7: Busachi and Santa Susanna: placeholders
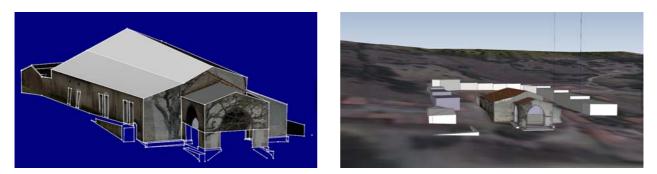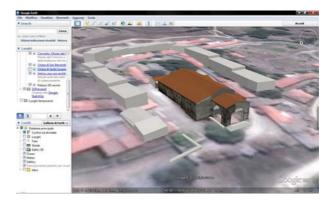
Fig. 8: Santa Susanna, phases of modeling: photo modeling and georeferencing of the model

Fig. 9: Views of the model in Google Earth
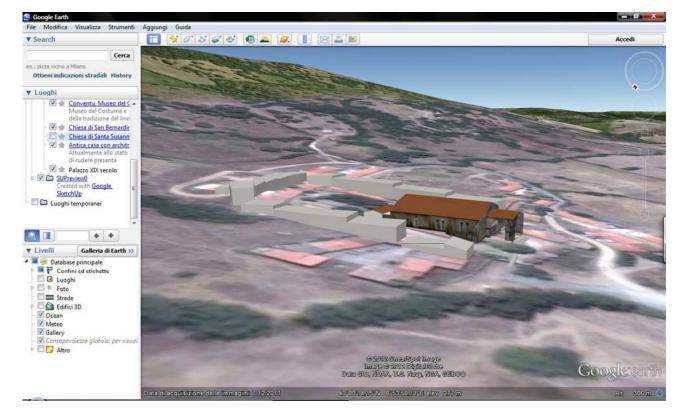
Fig. 10: Views of the model in Google Earth

The basic model has been built using specific software for the photo-modeling, and then was imported into Sketch Up to build a simplified diagram and covered with images as textures mapping, that supplement the lack of detail of the model. Another very important change was the repositioning of the model in the correct orientation according to cardinal points. This operation is necessary to make easier the correct georeferencing of the model.

The georeferencing procedure of models has followed the simple instructions provided by the Google Sketch Up online guide; using tools in the toolbar to interact with Google Earth, we have captured images of the terrain on which to place the models. Once settled over the land, the models were automatically exported on Google Earth.

All the operations described above were performed by operating on a local server, without sharing the results outside the local network, simply to test the functionality of the medium. At any time, however, these models, the cartographic processing and the information provided may be shared with all users of the web. Moreover, any changes made to the virtual system could be implemented in real time by all users.

It is necessary do some practical considerations regarding the usefulness of modeling operation in comparison with the powerful tool of Street view. The two display systems architecture, are both valid but provide information of different nature. Street view allows immediate display, but is not always available for all buildings. In the specific case of Busachi, monumental buildings are located in positions distant from the streets and therefore, street view documents a small portion of them.

Both Santa Susanna and *Collegiu* are emblematic examples, in fact in the first case it is possible to appreciate only a part of the complex church-surrounding buildings, in the second case it is possible to see only the entrance gate. A 3D model allows overcoming these limitations, adding a volumetric description of the buildings, and completing the representation of the entire monument only partially visible through photographic images (albeit provided by many different angles).

5. Final considerations

The analysis led to the following considerations regarding the land and buildings in it. If, on the one hand, a work of documentation was needed for proper cataloging and documentation of historical architecture, it was the inspiration, the opportunity to review in depth the history of the center and highlight the main features. The starting operation has been to rationalize the available information by arranging them to be functional for insertion into a simple consultation system that is already well established and widely used by thousands of users. The streamlining and simplification of the information has still not led to a impoverishment of the research. In fact, within the interactive descriptions displayed in Google there is an external link that provides more information and details accompanied by documented verified references. at the same time, the 3D models provide an immediate way of understanding of the space and monument, and also can be downloaded and viewed out of context. We experiment that: careful use of simple 3D modeling, and the inclusion of text with references to external links, allows increasing considerably the knowledge, offering information on the center studied. While browsing in Google Earth, the information included in the tags refer to other resources already available on the web relating to places described. As an example we can cite: YouTube videos uploaded by users, or entries on Wikipedia. In this way a user founds concentrated directly in the descriptive tag, the information that can be found scattered on the web and he should seek using a specific search. The interactive visualization allows any user, even those not accustomed to the traditional cartographic representations, to evaluate, in an immediate way, the interrelationships between population centers and the relationship of these with: access roads, internal paths, the topography of the area. Such tool, then, albeit with the limitations offered by the low precision due to the to the ease of use of the instrument, allows to describe in a simple preliminary draft of proposed land use to a wide audience that can evaluate the effects in a real time.

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[10] Web: http://earth.google.com/ Google Earth

[11] Web: http://sketchup.google.com/ Google Sketchup

The authors equally contributed to the drafting of the paper

+less
more
**architecture
design
landscape**

The design of simplicity against the representation of artificiality or *kósmos* vs *cháos*

Paolo GIORDANO
Dipartimento di Cultura del Progetto, Facoltà di Architettura, Seconda Università degli Studi di Napoli, Italia
arch.paologiordano@libero.it

Abstract
Functionalism the first, after the International Style, and, finally, the Post-modernism are the main stages of a crisis, the twentieth century, which produced a crisis of values in the merged globalism consumerism of the third millennium. A crisis arises mainly covering the put on a show of contemporary architecture that has lost its main objectives related to the hospitality of the different forms of living necessary for human life. In this perspective, the need for a return to simplicity must have as a goal for the ethical and aesthetic society of the third millennium: a society characterized by a constant voltage to the rampant consumerism that leads to a vulgar approval of commercial products and cultural ones. Simplicity as a value could be the best antidote to the apparent paradoxes produced by densification of consumption -energy, materials, images, territories- in a globalized society. In the continuous fluctuations of the main themes that characterize the contemporary debate duality -built/constructed, tradition/innovation, local/global, tectonic/deconstructed- the return to the concept of simple architecture could help to find that path that leads to his virtuous graphic and theoretical foundation in order to restore the original meaning and significance to the art of building the natural and artificial area's of our tomorrow

Parole chiave: semplicità, rationality, design

1. The design of simplicity
Functionalism for first, after the International Style, and, finally, the Post-modernism are the main stages of a crisis, the twentieth century, which produced a crisis of values in the merged globalism consumerism of the third millennium. A crisis stems mainly covering the spectacolaize a significant part of contemporary architectural culture that seems to have lost the search of his real objectives in society or those related to the hospitality of the different forms of living necessary for human life. A dwelling which, to be respectful of the natural environment, needs to relate to reevaluation of basic concepts that, taken together, could support the notion of conceptual simplicity of restoring the dignity held in the past. One could easily evolve into an essential elementary able to fight the contemporary architectural complexity that, in most cases, becomes a consistant novelty seeking, an end in itself, unable to protect the relationship with the place, natural or artificial, in which the new architecture is placed. Even the contemporary representation, through the so called virtual design, participated in this escape from reality to documentation and knowledge of natural and artificial contexts to arrive at a hyperreal figurative dimension and, in most cases, dreamlike, surreal and metaphysical. The concept of simplicity has suffered during the recent revolution in digital graphics, an ideal that has resulted in a depletion vulgarization and trivialization of architectural drawing. A trivialization mainly covering the stems spectacolaize of contemporary architectural culture that, through the copious production of virtual self referenced images, ends up losing the main goal of its task or one connected to the staging of

projects whose objective is the hospitality of the different functions necessary to human life: that working from home, from the social to the political, cultural than religious. Not only. Contemporary architecture has not been able to build even a new drawing shared cultural. Conversely, disruption of the different languages through the subjective search for isms figurative custom, started a whirlwind chatter representative based on the spectacular potential of the virtual image provided by the increasingly sophisticated Computer Aided Design. Transforming potential use, in most cases, the status of the innovative system for representing computer as a tool to serve the project (as a translation aid to help, aid, assistance and aid) to the nutrient sap varied contemporary creative process. In this context it should be noted that there is a trend for a distancing from revolution in computer design. Far from it. This is attributed to the more specific and disciplinary Computer Aided Architectural Design, CAAD, its rightful role as organizer and integrator of all technologies oriented to the management of the design with other metodologie. The current proliferation of computer design leads to a trivial use of its real potential, a negative reverberating chief concern of those characters held, always, from the fundamentals of architecture and its representation. Creativity against reason, subjectivity against objectivity, against the image representation, the virtual versus the real, the excess against the measure, against the concave convex orthogonal, the immateriality against materiality, the exception against the rule: these are the antithesis of the cultural representation describing a revolution involutive contemporary design that has marginalized, increasingly, the tradition of drawing from architecture principles that, historically, had guaranteed the modification of the territory in relation to it and not against it. The representativess of the characters identity contexts of settlement, for example, achieved through the use of local materials, local traditional building techniques, careful listening context of geography and topography situale has now become almost a given completely irrelevant in the processes of transformation of global society. The concept of representativeness is dissolved in the immateriality of the communicative nature of virtual images. In this perspective, the need for a return to the simplicity of the design must have as a goal for the ethical and aesthetic society of the third millennium: a society characterized by a constant voltage to the unbridled consumption that leads to a vulgar approval of commercial products and those cultural. Simplicity as a value could be the best antidote to the produced by densification of consumption - energy, materials, images, territories - in a globalized society. In the continuous fluctuations between the major themes that characterize the contemporary debate duality: constructed/erected, tradition/innovation, local/global, tectonic/deconstructed - the return to the concept of simplicity could help the architectural representation to find that path that leads to his virtuous graphic and theoretical foundation in order to restore the original meaning and to the art of designing and constructing the natural landscape and artificial life within which it develops human life. The identification of conceptual categories related to the idea of simplicity is, in this sense, an attempt to emphasize the need for a critical reappraisal of the purpose and primary objectives for which the architecture, through design, was made by always essential, indeed inherent, to living man. A requirement that, for the complexity of contemporary life, needs to relate to two critical form, son the one hand, to improve the quality of living conditions on earth and, secondly, to preserve the natural environment and artificial contexts of functional loads too oversized for the relative, specific and not unlimited, capacity for absorption. If is true that the living man on earth needs to function is equally true that the functions must inhabit the world by defending human needs, especially by modern man who consumes, unreasonably, naturalness. Emphasize the need for simplicity, instead of adding of removing, in the actions of man in global society means, in essence, try to take a road that constitutes as little as an added value both in quantity and in terms of quality sustainable development based on resource saving rather than wasting them are in need of a substantial intellectual investment knowledge and understanding as the only true factor responsible for the coupling of a new economy. In this perspective some thematic concepts should reactualized to be replicated in the global society as the principles needed for urgent reconfiguration of its structure and some consumer exempla architecture of the past recur, however, such models can explain the profound coherence between its configurative structure, their social utility and the way they fit in a natural or artificial settlement based on rules derived from the geographical or architectural history of one or the other. To this end if, on the one hand, the depth thematic categories of issues related to the concept of simplicity, - as the unity, practicality, and rationality, the rhythmicity represents a first attempt to "simplify critical" towards those cultural positions based on "critical simplification" of the other, the use of a description of an architectural model as that of the original design of the "Albergo dei Poveri" in Naples allows you to check the quality of simplicity even in an extreme case as that of utopian century building. Concepts and architectural models that, taken together, can help formulate a new hypothesis of modification sustainable land as opposed to the current transformation of unsustainable places of our living.
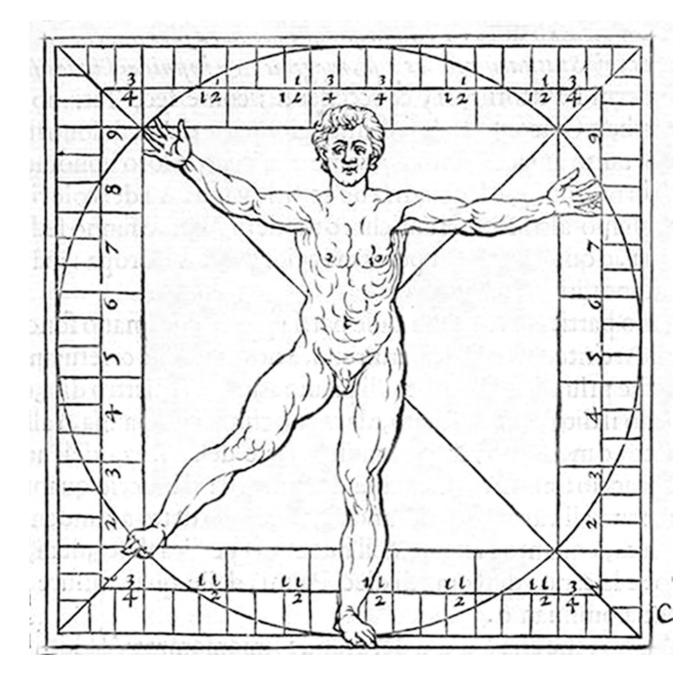
Fig. 1: Vincenzo Scamozzi, "Ideal proportions of the human body", of *L'idea dell'architettura universale*, Venezia, 1615
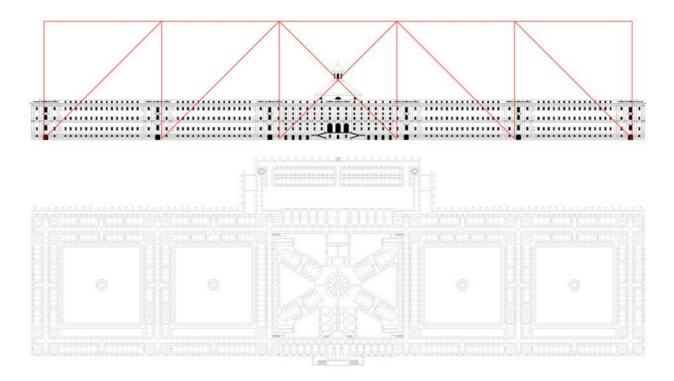
Fig. 2: Albergo dei Poveri, original project. Tracks proportional

2. The design of the unitary

Pitagora, linking the square to the one and all, basically posed the problem of unity. No other geometric figure presents the characteristics of specificity and generality as clear as synthetic: the square, in fact, is the union of four segments, dimensionally equal to each other, placed, each of these, two other perpendicular and parallel to the third system geometrical shape which, in architecture, corresponds to the system trilithic that is to that elementary structure composed of two pillars and perpendicular to a lintel brought which, in turn, is parallel to the ground line. The square also provides, as the sum of its four corners of ninety degrees, the total of three hundred sixty degrees in geometry that corresponds to the complete revolution of a body around its own axis. The square, finally, contains within it two diagonals where the measure is given by the root of the sum of the squares of the two sides which, in the case of unit size of the latter, is equal to the root of two. The overturning of the diagonal root of two, on one side of the square base, generates a rectangular shape formed by a side of unit size and by another measuring instead root of two. In this way the square with unitary side stands as the basic module for the concatenation of proportional figures, the so called dynamic rectangles, obtained by successive reversals of their own diagonal or by applying, from time to time, to the rectangles generated the known relationship Pythagorean. The philosopher of Samo (570-490 BC) had also revealed, the square, the inner order of the combinations for the odd and even numbers had in fact initiated the possibility of a reflection of compositional order based on measurability and objectivity and rationality of geometric unitary matrix. Monodimensionality, parallelism, centrality, specificity and angular dimensioning diagonals are characteristics that reinforce the idea of unity expressed by a simple that is set, since ancient times, all reasoning behind wanting to deal with a rational concept of beauty. For Platone a student of Socrates and teacher of Aristotle - the square called the conceptual path of those who having climbed the reason why the thing known and come to the first idea of this universal necessity, become the last link of his reflection. The scientific formulations of Euclide (Third Century BC) and Tolomeo Claudio (AD II), they determined, then fortunate composition of the matrix geometric square shape. In this sense, the ability to offer a mirror image with respect to the axis of symmetry horizontal, vertical and diagonal as well as the predisposition to synthesize through four points, or break down through four lines, or defined as a real two-dimensional surface enclosed by four sides have contributed to giving the geometric shape of the aura and feel of the modulator coveted status has always sought unity in the architecture of the past, both the remote and what is next. The unity of the square is different from that of the circle just because of his inherent willingness to be broken down into something different or more elementary than, for example, the circle is not given. If the circle can represent the unity of the latter is in fact only given as a dowry abstract to the square,

on the contrary, the unity is attributed as the practical value that can provide operations that refer, as recalled by Pitagora, so as to drive generality. And this kind of unity of interest noted in the square, or, by extension, the architecture in order to understand and clarify meanings, qualities and values. To relate the parts between them and between them and the whole, giving applicants dimensional values, comparing the elements of continuity and discontinuity, inquiring into the rhythm and the syncopation; relate to areas of similar architectural features (plan, elevation) compared an axis of symmetry perfectly specular or through appropriately tailored asymmetric equilibria: these are the main options to be investigated when the architecture through the proportional paths, looking through a reference in the simplicity of the unitary category. Many architectures of the past have been confronted with issues related to the square seen as a typology but not topological architecture: conceptual place within which the world of ideas has researched the topic of the unity in order to relate it to that of the truth as primary source of simplicity and beauty.

The interplay between the concept of unity and the shape of a square seen as an index of the geometric primitive concept of simplicity should not be considered as a design constraint to proactivity. The design possibilities inherent in an architectural practice that can restore the broken dialogue with a centuries-old tradition in fact be considered unlimited. The "Albergo dei Poveri" in Naples is the architectural representation of this potential. The unity can also use convenience, paying homage to the ancient concept of utility now supplanted by the vernacular of functionality.
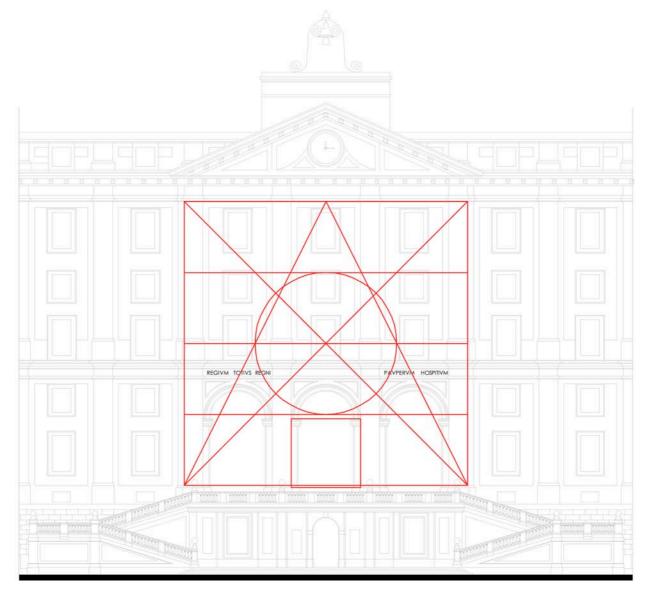
Fig. 3: Albergo dei Poveri, tracks proportional

3. The design of the practicality

The practicality is the feature that in things, in general, and in the architecture, in particular, denotes the adherence to reality of the requirements to be met. The convenience function that dowry should be able to facilitate, through appropriate forms and types, the relationship between man and architecture. Not always because the livability of the architecture is a requirement offered, as something arising from spontaneous design, to its users. Very often alleged creativity formal complexity and articulating distribution architecture to make a constructive infused with practicality. Typological archetypes of the enclosure and labyrinth represent the opposing concrete realizations of a simple and practical attitude on one side and the other complex and artificial. In the enclosure in fact, a place bounded by four walls perpendicular to each other two by two, the practicality of built manifests itself in full in the clear and precise division between an open space natural, the cháos outside and insecure, and a space delimited artificial, the kósmos internal and secure. In the back inside, much like the outside, it still constitutes as tame nature, however hostile and inhospitable. Here the ultimate goal, the function that underlies the intricate texture of types, is creating a sense of disorientation, bewilderment, which is accompanied, usually, to a state of bewilderment from which the user tries to escape. Far from the imperturbable cosmic orientation provided by the simple perimeter fence, with the clear identification of a functional stay inside, gives the viewer a state of calm and balance. In ancient Christian symbolism many iconographic representations relating to paradise or paradise lost to use the type of the sacred enclosure and, conversely, frightening maze to depict hell with its various groups and scary. Disturbing that group, referring to the contemporary, are reflected in the design exercises without any engagement with the reality of the place and, unfortunately, the real functional needs of a globalized society that would need everything except the current breakdown of the basic principles of architectural order: It 's necessary to prove greater distrust of the current state of electronic distortions and fantasies of architects and artists too prone to wander endlessly through the maze of images. A propensity, the latter, widespread that, a project, tends to favor the spectacle of images rather than the representation of the actual content of architecture. The weakening of the contents, therefore, is reflected especially functional programs and, therefore, in recurrent lack of practicality of use and management of the new architecture capable of producing, in most cases an indefinite space and empty . Plight, the latter capable of photographing with pitiless clarity the cultural drift of contemporary design that paradoxically, as of their character identity, pursues the quest for the instability, deformity, or the complication of all that is opposed practicality. The practicality, then, is that point of balance that the architecture of simplicity should find with his own typological nature, so that something less or something more would need to configure the features common on one side and irrational complexity the other, or as not meeting the specific needs and the needless complication of programs seen as inconsistent with the practicality natural gift of good architecture. Of course, practicality is not a functional quality easy to reach but a dowry punishable by a patient process of aging can satisfy representative, describing and interpreting the same time, both the reasons that the human architecture.
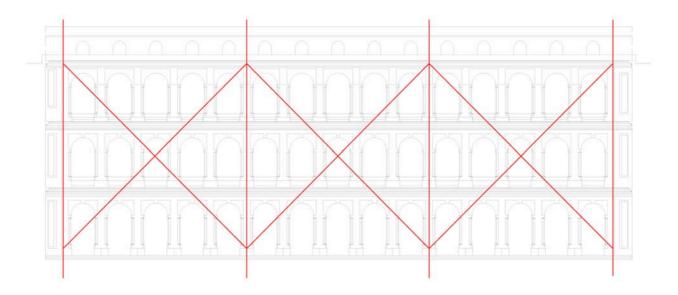
Fig. 4: Albergo dei Poveri, tracks proportional
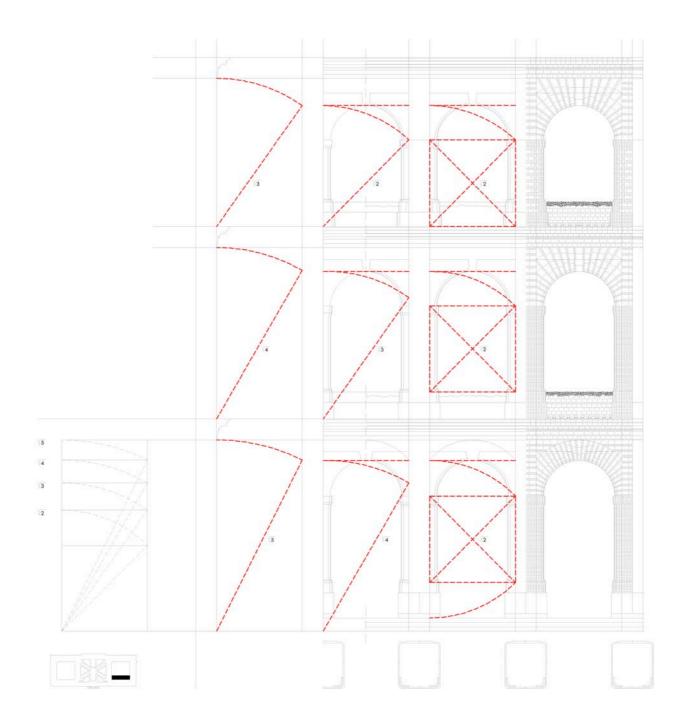
Fig. 5: Albergo dei Poveri, tracks proportional and texture.

4. The design of rhythmicity

The rhythm is, for simplicity, the ability to deploy with one or more parts of the architecture of the recurrent elements that combine to mark the time and linguistic structural architecture according to a hierarchy of easily identifiable. The rhythm is connected to the lines through the base of other figures or those items that beat the time of an architectural composition. In classical architecture would lead to the rhythm of the colonnade of the temple greek joke: the column was provided by a module is represented by the diameter of the same columns that structured the four sides of the archetype classical architecture. The rhythmicity should not be viewed or detected only in the presence of solid elements which are, for example, the columns of the temple Greek or pillars of the Roman structures but also through the presence of voids and openings of the architecture, whether they are doorways or windows, porches or arcs. The rhythmicity is expressed not only from right to left and vice versa, but also from the bottom to the top of an architecture. This rhythmic succession, in most cases of classical architecture, is realized through the use of string courses, cornices or eaves and attics crowns: factors that highlight their presence with the existence of another order rhythmic not linear character but superficial. Rhythmic vertical scans are mainly dominated by rectangles which, as we know from the geometry, may be gold or dynamic depending on the size of the largest dimension is provided by the length of the diagonal or the length of the diagonal of the half portion upper edge of a square shape assumed as a module base generator. All options, those that refer to the grammatical sense of the architecture or the mode of articulation of facts and figures with the volumetric mass of the building. The rhythm of classical architecture, in analogy to musical composition, is always based on repetition, in varying shapes and sizes, of certain elements that, taken together, are combined according to regular patterns and symmetrical: the arrangement of structures in plant or the alternation of full and empty on the table, the concatenation planimetric indoor spaces in their differentiation between served and serving spaces or overlapping of structural elements with decorations in relief in the underlying design of the facades are the primary canvases on which the plot is woven through rhythmic architectural elements such as pillars, columns, dividing walls, windows, pilasters, pilasters, cornices and string courses. The contemporary rhythm suggests, conversely, solutions like morphology and differentiated language in which the concepts of temporality, closely related to the measurability, are clearly readable in an architectural order due to these codes based on the regular repetition of the classical canons, or, conversely chosen from which emerges, according to an emphasis spectacolize, complete dissonance with respect to the principles established through the enactment of scores irregular and asymmetrical: on the one hand, once again, the rational architecture connected to the legacy of the past and on the other hand, the architecture as a work of art, even transgressive, willing to accept in its form, its type and its language characters deconstructed, fragmented and heterogeneous expressed by globalized society.
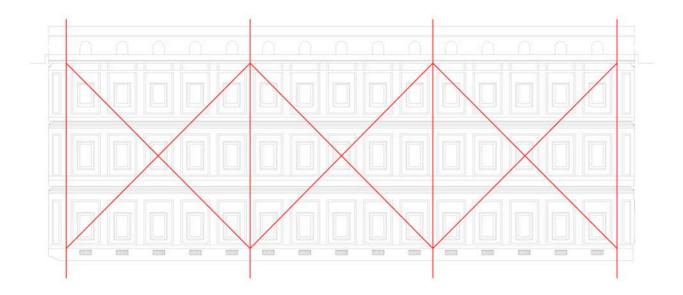
Fig. 6: Albergo dei Poveri, tracks proportional
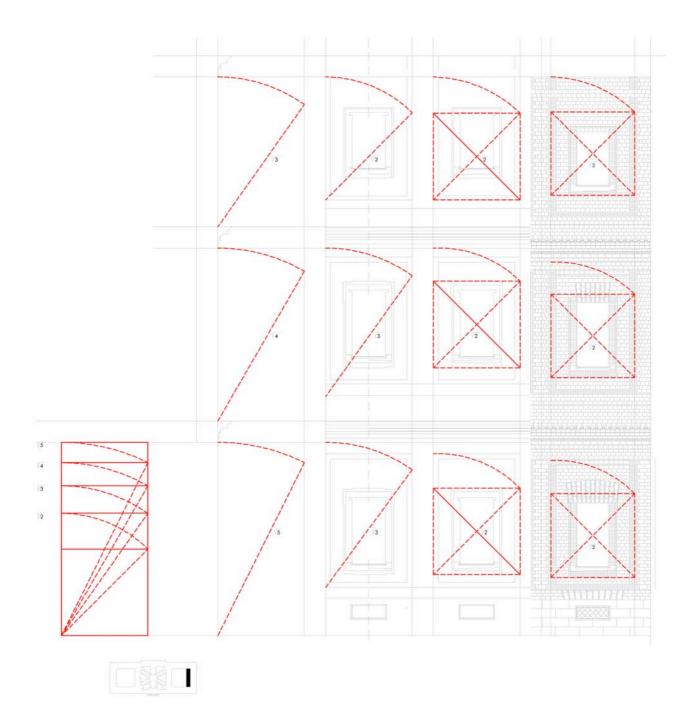
Fig. 7: Albergo dei Poveri, tracks proportional and texture.

5. The design of rationality

The rationality of simplicity should be interpreted, in an era of consumerism and dissipative condition as the present one, which stands for logical and reasonable. More architecture is capable of expressing rationality, the more its aesthetic value is high and related to the real needs of our contemporary use which requires careful and resources sensibly, from water to those energy as well as from those of matter to those food. Even contemporary architecture is pervaded by an agonizing desire for consumption and use of various materials, the more complex spatial configurations, the most advanced technologies. This architectural badly intoxicated that is combined with static and solid sense of beauty expressed by most of the monuments of the past a past that was violently deconstructed, fragmented, fragmented in favor of an open conflict with the essential and immutable conventions into architecture had more income collected and refurbished over the centuries. Deliberately illogical, disproportionate, and broken many dynamic contemporary architecture ride the wave that permeates the hectic life and the unbridled activities of our society, no more western or eastern, northern or southern but not simply global. Return to confront a project that will oppose this outrageous essentially means asking a question of convenience as well as logical reasoning: what is suitable to accept unconditionally the vicious circle? As it is convenient to wean the project the exercise of reasoning? As it is convenient to abdicate to the superpower of everything is possible? The answer, strictly speaking, is one: it is not convenient. Specifically architectural concept of beauty without rationality is not too convenient: if only for the intrinsic that allows the reasoning of what is logical and, because rationality is an exercise involving the reflexivity as we know, is the result of thought. Locate a path of logic in the architecture means addressing the issue of the necessary objectivity and rationality necessary to design and architectural design to avoid falling into the trap of subjectivity and creativity: a tempting trap, helped to proliferate in contemporary society from the need global marketing of the architectural image, or an image ready to spread through the network, to a world of diverse users, approved and unable to tune to a culture based on the logic of the choices on their potential rather than spectacular. The consumer society seems to need only architecture capable to send messages to the background, either, to the captivating advertising images of the latest generation cars or plebiscitary impending need for new political and economic empires of the Middle and Far East. Not of a traditional logic, contextual and management of the architectural megastructures part of the Third Millennium, with their waste, apocalyptic tribal feast of our planet, this is an uncomfortable truth to which the wise and ancient architecture rationality should not succumb. Introducing the category of rationality in the design drawing into architecture means reintroducing the beauty logic generated by the harmony of the parts and the parts with the whole: it is all relative to what is inside a single architecture and all that is represented by host and multiple environmental contexts of the different architectures.

6. The simplicity design in the *"Albergo dei Poveri"* in Naples

Groped to find a picture of simplicity in an architectural model such as that represented by the design of the original design of the "*Albergo dei Poveri*", prepared by Ferdinando Fuga in 1752, an exercise could be misleading if the conceptual category was not sought in the different thematic aspects that characterize the identity of its own: the square, index of unity, the fence, typological space of the inner courts, the rhythm, linguistic properties of the prospectuses and, finally, rationality is understood as characteristic of eighteenth-century building representing its identity, in together, transliterations of issues related to architectural simplicity. The "*Albergo dei Poveri*" is a building that offers, thanks to its morphological type and decorative-structural interpretation of the simplicity inherent in different categories, from time to time, the size, language, and the intimate proportions. As for the simplicity filtered through the category of greatness it can be argued that the "*Albergo dei Poveri*" is an architecture on a human scale. Its main prerogative type morphology is, unquestionably, the large size which, alone, contributes to the eighteenth century building architecture is abnormal in relation to other elements with which it communicates to the monumental urban scale and is related to tissue residential surrounding it. Infact, this exceptional greatness is not intended as a limit for either the building itself or to the city boundary, but as a resource primarily for its ability to establish itself as a measuring element of the natural hill behind it as it appears clearly represented in his original configuration, the face of the map of the Duca di Noja, in addition to the urban proactiveness demonstrated by the subsequent structure of the front part of the city's main architecture adopted which vertex from which radiate a system of road features trident shaped, and finally to the ability to make cohesive around its architectural mass of a system of housing is heterogeneous and fragmented and is neat and compact: these are the main features of a building, through the large, able to communicate visually with the landscape, with the city and the surrounding buildings. The ability of the "*Albergo dei Poveri*" to arise, even from simple perceptual point

of view, as the undisputed director of the architectural urban context of membership is, in essence, a mode of simplicity expressed through the theme of great size. As the size of the language is also an aesthetic category proportion with visible directly to the concept of simplicity. The determination of expression and simplicity figurative Ferdinando Fuga, components highlighted in the design of the exterior elevations and interior of the "*Albergo dei Poveri*", have aesthetic qualities to find in a reflection of types, and formal linguistics devoted to relate the new logic rationalist of architecture in the age of enlightenment. The linear sequence of openings on the main facade of the "*Albergo dei Poveri*", in spite of limited rhythmic variations of the decorative, provide an architectural object limited, albeit large, the idea of simplicity enriched by the modular architecture of the system generally. Similarly, not so much the succession as the linguistic uniformity of treatment found in internal reports of the courts of the "*Albergo dei Poveri*" is closely related to the possibility of providing a uniform size, then finished the architectural space right in his order that the extrinsic its perfection, and consequently its simplicity understood as synonymous with beauty. Also obtained a beauty, it is worth emphasizing, in accordance with the laws relating to the harmonious proportions of the buildings. In this sense, the "*Albergo dei Poveri*" meets a set of criteria to be able to develop harmoniously the traditional design of the exterior elevations as well as domestic courts. The short side fact, the eastern and western ones, are characterized by a square shaped plant onto which, for each court, four of which an interior elevations, the north, linguistically and structurally differs from the other three measures, instead of simple rectangular windows, framed between pilasters and cornices, of a triple vertical succession of arches replaced by massive pillars. Well canvases prospectus is dimensionally defined, in its various component parts, a triple series of tracks proportional enhance the aesthetic qualities. This analysis was performed on both the interstory height, or between entablature and cornice, is about the size of the pillar system, in its total height, and the partial, limited to that significant parts of the moldings of the pillars. As regards the first proportional system it was noted that the dimensions of the height of interplane are based on a succession of climb of rectangles that dynamic, the first to the third level, are the result according to a sequence √5, √4, √3. The second internal system proportional to the first, constituting the height of the whole arc pillars from the base of its eaves, the key proposes a vertical succession of climb of the arcs defined by a sequence of √4, √3, √2. The third system of proportional representation makes explicit the constant presence of a rectangle √2 traceable, according to different methods, the system arched pillars. The presence of traces proportional able to harmonize the internal surfaces of the short side of the "*Albergo dei Poveri*" are also found in the remaining three statements, or those defined by a simple and elegant orthogonal warp composed of vertical pilasters and cornices are placed in horizontal rectangular windows of variable size. Even for these statements of the wishbone western neighbor of the botanical garden that has built all three levels of the original prospectus was a bold graphical analysis and interdimensional and the heights, both on the size of the areas located between the windows host cornices and pilasters, and is then proportional to the size of the windows confirmed the upward succession, from bottom to top, the second harmonic of rectangles √5, √4 and √3, so found in prospectuses as well as the south eastern side of the court and Western Europe, eighteenth century building. As regards the dimensioning of the panes host the windows can be seen at the first level and second level the presence of second harmonic rectangles √3, for the third level of √2. Finally, it very interesting the sizing of windows whose height measurement, net perimeter of the moldings, is equal to the measure of the width of the box in which is housed. The square that inscribes the window gives rise to dynamic rectangles according to the square root of, able to define the heights of the boxes, laterally, superiorly by the pilasters and moldings of the cornices defining the outside placement of interior floors. The uniformity of the internal walls of the short side of the "*Albergo dei Poveri*" and the rhythmic succession of the elements of this plot is enriched proportional superimposed together and connected to each other and even between the linguistic structure of the grammar that defines the overall architectural design and measures of statements in question. Further confirmation of this grouping proportional between the parts and the whole is the presence of square grids that define the size of internal tables: each side of the short side is in fact visible forms through the identification of three squares each incorporated it as a basis five of the fifteen bays constitute an individual and as high elevations the size of three levels, the trampling of the court until the last ledge. As for the sizing of the eighteenth century interiors of the building was visible the actual use by Ferdinando Fuga is proportional paths in buildings and in both the longitudinal and transverse scaling in the central court. Compared to this last part of the eighteenth century architectural complex building inspection was conducted on both the remnants of the unfinished church and is on the same graphic reconstruction of the original design and final. The graphic reconstruction of the section circular chart of the transept aisles located between the four diagonals for the guests and the central middle intended for outside public also helped to identify this portion of the building the presence of tracks proportional again just on the figure the square and its development into a golden rectangle. The with of the transept is sized on the same measure that defines the height of the same until the tax rate of the hemispheric dome lowered. The diagonal of the

imaginary square so constructed coincide with the set of arches that mark the passage between the transept and the central X shaped four aisles designed to accommodate the guest of the four classes of the poor: men, women, children, girls. The golden rectangle, which is obtained from the square base provides the total height of the transept, culminating in a lantern covered with a hemispherical head. This modular system is embedded in a sovrasistema geometry defined by a square that has the basis for measuring the height and width of the central court. The diagonals of the square intersect the amount of the tax of that lantern. Such a square, in turn, is embedded in another that defines and gives a rythmn the succession of the short side in their longitudinal proportioning based on the shape of the square is also used for the sizing of the body of the factory building eighteenth century. It was noted fact that the measure of the width of the building is equal to the height of the three main floors of the building (ground floor, first floor and second floor) and that the golden rectangle is obtained from the square base that defined originally, the overall height of the building. Taken together, the original design of the "*Albergo dei Poveri*" demonstrates membership - through the unity, practicality, and rationality of rhythm - to the family of architectures based on the concept of simplicity while explaining its inner complexity. Retry final that the less may be considered, in most cases, more than the more.
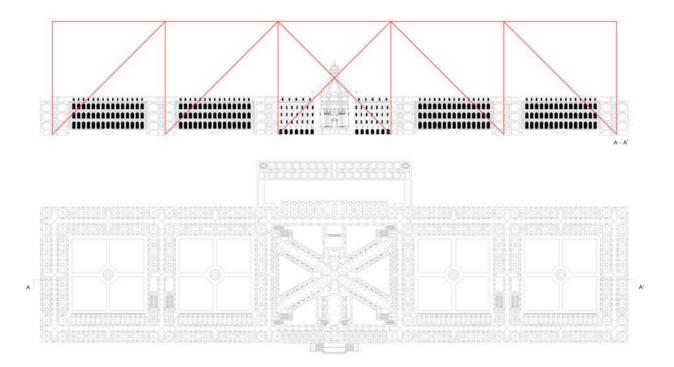
Fig. 8: Albergo dei Poveri, original project. Tracks proportional
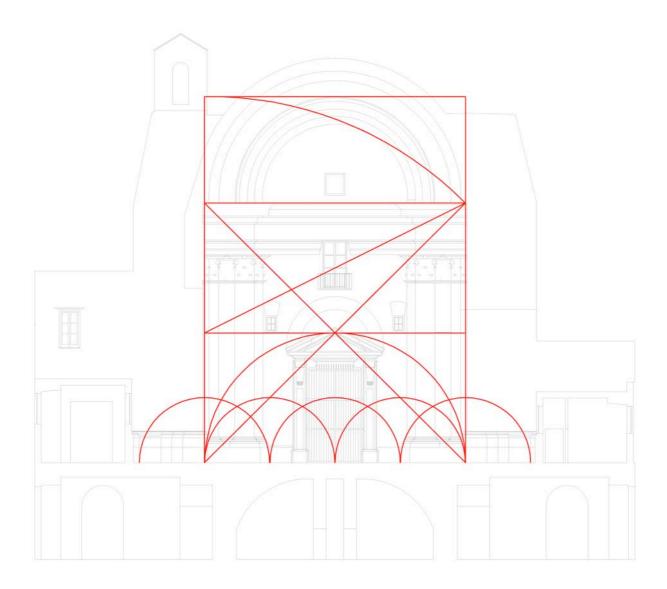
Fig. 9: Albergo dei Poveri, tracks proportional of Church.

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Less versus More: Ethics and Origins of Decoration in Architecture

Alexandra Al QUINTAS
Faculdade de Arquitectura Universidade Técnica de Lisboa, Portugal
E-mail aquintas@fa.utl.pt

Abstract

Mies van der Rohe has paraphrased through his architectural work "less being more" and introduced a minimal use of decoration in his own projects. Decoration had been previously questioned by Adolf Loos according to his writings as well as his architectural production.

Nevertheless, can we consider decoration as being totally eradicated from *Miesian* architecture? What about materiality and the inherent properties such as color, textures, brilliance, refraction, transparency or reflections? There is no such thing as "less" in the architectural production of Mies or even the Modern Movement.

We have to go deeper into the tradition of academic architectural teaching in Germany to establish the importance of Gottfried Semper and his concepts, namely the ones he summarized in the work *The Four Elements of Architecture* (1851). His constructs have reformed the whole idea of decoration, leading to an origin situated in some ancestral cultures.

Can we possibly assert that "less" can be "more" when wall decoration derives from patterns used in tents an primitive shelter structures? Nowadays, contemporary architecture, through the works of Herzog &De Meuron, Rem Koolhaas or Jean Nouvel, proceeds, satisfying human necessity by texturing surfaces, transfiguring spatialities, and nurturing the human gaze, eager for harmony and delight.

Keywords: architecture, ornament, gesamtkunstwerk, bekleidung.

The immense and cross-cut theme of 20th century architecture has been the question of the process of transformation and that of the degree of abstraction. It has also been debated the segregated by Loos theme of ornament. Ornament that more than constituting a simple decoration, integrates the language of design and a certain genealogy of shapes. "Less" ornament would imply a loss in meaning.

Art as a whole is a concept derived from an ideal that maintains a relation with an organic analogy, according to which, architecture could work as an organism, where the organs pertain to the whole in a perfect integrated system, as if the constitutive mater of architecture would be unique.

Mater tends to flow out of the frame, expanding horizontally, not detaining itself from unfolding its folds both in length and extension. Wölfflin has referred that a multiplication of lines in width would act as a "conquest for the informal", giving as examples such as the Gothic style with strong structural elements and light partition elements and the Baroque. This latter accentuates mater [1]. Deleuze defines Minimal Art as some kind of layered reality allowing to fold and unfold, these two as constant operations valid in the Baroque period as in today's context.

Decoration has been a facet that was discussed by theoreticians such as Ruskin, Morris, O. Wagner and Adolf Loos. According to the first, it pertained to the domain of Architecture and was close to the relation of forms in Nature, while to the second it constituted a form of appropriation and relation with the spaces, developed with quality. This occurred in a period when the Industrial Revolution generated a massive and unqualified production of objects.

Mies van der Rohe has been paraphrased throughout his architectural work with the expression of "less being more" and introduced a minimal use of decoration in his own projects. Decoration had been previously questioned by Loos, according to many of his writings, as well as his architectural production.

Loos was absolutely sure that the question of ornament or decoration in architecture pertained to an attitude close to that of the then so-called primitive cultures or to a childish frame of mind.

Nevertheless, he had a prolific production of writings and he even contradicted himself, from time to time, relying on Persian carpets or tapestries to complete the furnishing of his villas, conceived under the *raumplan* layout. Therefore, in the different levels that contributed to define the various spaces in which the inhabiting social functions would be performed, were ornamented with decorative stones and the carpets included in the furnishing would provide for some comfort in the spaces concerned.

Nevertheless, can we consider decoration as being totally eradicated from *Miesian* architecture? What about materiality and the inherent properties such as color, textures, brilliance, refraction, transparency or reflections? To be completely accurate, there is no such thing as "less" in the architectural production of Mies or even the Modern Movement.

It is obvious that the *Barcelona Pavilion* (1929), along with its walls with polished onyx was not deprived from ostentation in the use of materials. The texture and color of these surfaces had a formal rhetoric of their own. Evidently these resulted very detached from the Art Nouveau period or even the formal wealth associated with the interiors produced under Arts Deco [2] taste in various programs such as residential Villas, Hotels, Office-buildings, Restaurants, Theatres, Packet-boats, railway carriages.

Fig. 1: Mies Van der Rohe, Barcelona Pavilion, 1929.

Of course we need to go deeper into the tradition of academic architectural teaching in Germany to establish the huge importance of Gottfried Semper and his concepts on the interpretation of the origin of ornament in architecture.

This Architect and Academic summarized many aspects of his convictions in his work *The Four Elements of Architecture* (first published in 1851). He established a genealogy for the element of the partition in architecture and elaborated an explanation on the origin of decorative mural elements.

One of the four elements was the *enclosure* and its origin was defined by the activity of *weaving*. According to the fact that basic structures like fences or pens were woven sticks or strings of vegetal fibbers, the most basic form of a spatial divider still seen in use in parts of the world today is the fabric screen. The partition implied the function and only when it needed to bear load and have structural function the material aspect of it transcended the fabric.

His constructs have reformed the whole idea of decoration, leading to an origin of it that can be located near the shelters of some ancestral cultures. Can we possibly assert that "less" can be "more" when wall decoration derives from patterns used in tents and primitive shelter structures?

We should not forget the importance of the Polychromy question, raised in the twenties of the 19th century that constituted a "querelle" very popular among the archeologists and architects of the period. Moreover, the excavations that were done at the time, tended to confirm the suspicions, according to which, ancient Greek architecture was originally painted with pigments and the model developed in the Renaissance period of an architecture characterized by an immaculate whiteness, was far from true.

The overwhelming excess of ornament that was inundating the architecture in the 19th century, as a result of the stylistic revivals, along with the eclectic formal solutions in architecture, finally resulted in a rejection of such abundance.

Architects turned themselves into concerns related to an ethical attitude derived from new tectonic technologies, such as the use of concrete in the structural frame and the economic need to provide society with an architecture destined to other social classes but the bourgeoisie. "Less" would imply "more."

The *Gesamtkunstwerk* originated in the work of R. Wagner that instituted the Opera as a convergence to a whole of different arts like architecture, scenography, music, singing, dance, performance, costumes. It

continued as an ideal in Expressionist Architecture and the first period of the Bauhaus production and pedagogy (Weimar, 1919-1923).

An architecture less elaborated in terms of decoration would bring a richer one in terms of spatiality and the stress would be put on the spatial organization, along with the scale and dimensions of the different areas destined to the various functions. The human shelter became a "Machine à habiter."

The "Machine à habiter" brought a functionalist concept that would be later generalized and developed until its last consequences throughout the architectural production of the architects of the CIAM and even later the International Style.

Fig. 2 Le Corbusier, La Tourette Monastery, 1956-60.

Le Corbusier in his villas from the 20's, the *Unité d'Habitation* de Marseille, the administration buildings at Chandigarh or the monastery de *La Tourette*, that is, in the span of his own productive life, did dedicate a considerable part of his reflection to the aesthetical aspects of architecture. He used panels with bas-relief, murals and surfaces painted with color, establishing contrasts with concrete walls and other materials. This attitude would contradict the principle of the minimal use of resources in the treatment of architecture.

Fig. 3, 4: Luis Barragán's house and studio, 1948.

Even if the Modern Movement stressed the importance of the predominance of natural colors of materials, Luis Barragán emerged as an example of reaction to this common practice, with the symbolical and transcendental use of color in many of his works.

Mies brought to the United States, a material sobriety that would impose itself and generate a "style" that would last until the sixties and the first signs of the post-modern awareness in the seventies. "Less" seemed to be an option and it did not relate, in any aspect, to a context of economic restraint as the west was easily recovering from the post-war aftermath.

After the work of critics such as Charles Jencks and the theoretical landmarks by Robert Venturi, one was introduced to a sort of "Wild West", with a lack of retrains and references, where everything was allowed. We were dealing with a strong reaction to the postulates that had been driving architecture to such austerity that everyone was starting to reject. Both the agents of architectural production and reception was eager for "more", independently of what it meant, stood for, or the inherent implications.

The phenomenological approach since the work of Husserl draws the attention to the importance of the experiences lived in the first person to the vision of the work of art. The way according to which "I" see

something or the way I feel observed that makes me become subject-object, as a reflection of the "other" is decisive in the analysis of the work of art.

The materials that constitute a kind of membranes to architecture, the spatial limits defining the appearance, contribute, along with the chromatic or textural properties, or even the effects created by the incidence of light to a sort of spatial transfiguration.

The concept of *Bekleidung*, first set by Semper, is still in evidence nowadays in architecture for technology allows for the exploration of an epithelial organic metaphor. The skin of buildings receives an imprint that is very detached from the early strategies of decoration. In fact, it results more like a tattoo; something that belongs to the organic nature of the surface of the building.

Fig. 5 Herzog & De Meuron, Brandeburg University library, 1998, 2001-2004.
Fig. 6: Herzog & De Meuron, Ricola production an storage building, 1992-1993.

Contemporary architecture, through the works of Herzog & De Meuron, Koolhaas or Nouvel, proceeds in the process of displaying façades or spaces with decorative applied effects, satisfying the human "necessity" by texturing surfaces, transfiguring appearances, and nurturing the human gaze, still eager for harmony and delight.[3]

Many of the "clothing" applied to the works of Herzog & De Meuron transmit a language of their own, through color. Many of the buildings by Herzog & De Meuron present a certain laconism, an austerity close to that of Aldo Rossi's.

When Wölfflin proposed a global and synthesized reading of the History of Art, from visual categories, he was establishing the basis for the work of art to cease being a representation and become abstraction.[4] The avant-garde artists in the beginning of the 20th century believed to be contributing to a fluid History of Art, in continuous motion, which end seemed to consist in different representations of Nature.

Against everything that would seem natural, abstraction would consist more in an end than in a beginning. Establishing a huge turning point, the end of the 20th century was dealing with the search for the origin. Some philosophers like Nietzsche, first, and later Heidegger, established that a new beginning was implicit in this later period of History, both believing that culture needed to find new starting points.

Artists were astonished to find the unspeakable in the simple presence of the simple, anonymous things of everyday life. They tried to recreate this experience in Conceptual Art, Minimal Art ant Earthworks, which stand for a certain anxiety motivated for this search for an origin.

Frontiers between the arts, since some decades now, have evolved to become more and more tenuous and artistic experiences tended to a search of the origin. New media, like the light and the space have allowed for the work of Robert Irwin and James Turrell. Matta-Clark has approached the exploration of the limits of space, intervening in ruins.

Fig. 7, 8: James Turrell installations.

Jean Nouvel, Rem Koolhaas, Peter Zumthor and Herzog & De Meuron use a palette of textures like tattoos imprinted in the skin of the buildings.

Art has been traversing a period that seems to be ruled by a paradox. This resides, according to Yves Michaud, in the fact that the triumph of beauty and aesthetics is being cultivated in a world more and more stripped of works of art, objects with an "aura". The more aesthetical the world is, the less there are real works of art and art tends to volatilize.[5]

Fig. 9: Peter Zumthor, Kolomba Museum, Cologne, 2007.

The scene of the international architecture has produced examples of great relevance, with significant incidence in the recuperation of the cosmetic [6] character of the arts.

The constant cultural democratization, present in leisure activities, in tourism have contributed to transform museums in commercial terms; they became the malls of art.

This consummation of the industrial production of the works is accelerating the disappearance of the work of art. The world is "rarefied" for being necessary to preserve the reputation of art, of its illusory character, with the motivation of a certain still existing nostalgia.[7]

The relations between production and reception of the work of art are nowadays submitted to huge transformations, determined by a globalized world and suffering mutations in the social structures.

Also the production and reception of Architecture as an autonomous discipline, has been, by its specificities, subject to modifications, even though it is an art with a status of utility.

The critique to Richard Wagner's concept of *Gesamtkunstwerk* has been, according to Peter Eisenman, initiated in 1888 with an article by his friend Nietzsche, entitled "Nietzsche against Wagner", even he had at first admired the modernity introduced in the Opera genre by the Musician. *Gesamtkunstwerk* can be assimilated to a synthesis of the real with the virtual, or the duality established by Apolo and Dyonisos.[8]

Eisenman also states that Frank Lloyd Wright was the first, in the beginning of the 20th century to assess that Architecture is the mother of all Arts. Nowadays the prevalent among the architects idea of wholeness, will have a literal character and signify the simultaneous interpenetration of the concepts of function, aesthetics, place and symbolism.

Therefore, the central question seems to be, in accordance to Peter Eisenman, that of the autonomy of architecture, as a discipline. That concept is necessary to keep the integrity and diversity, and is emphasized when it becomes self-referential in a closed system, then considered as another form of totality.

As a discipline, Architecture should not colonize other discourses but use them to contribute to her own opening. *Gesamtkunstwerk* can assume different forms in harmony with the new features of art, becoming increasingly immaterial.

[1] Gilles Deleuze, *A Dobra, Leibniz e o Barroco*, p. 186.
[2] Exposition internationale des arts décoratifs et industriels modernes, Paris (1925).
[3] The desired intricacy that opposes to the monotony and introduces a certain amount of stimulation to the perception of a visual gradient, according to E. H. Gombrich, in his work *The Sense of Order*.
[4] Vide Rafael Moneo in "Celebración de la materia" in *Herzog & de Meuron, 1978-2007*, p. 22.
[5] Vide Yves Michaud, *L' Art à l' état gazeux, essai sur le triomphe de l' esthétique*, p. 9.
[6] From *kosmos*, meaning "universe", "order". Souriau, *Vocabulaire* d'Esthétique.
[7] This phenomenon is well explained by the analysis by Walter Benjamin, based on the opposition between the work of art, with an "aura" and the mechanically reproduced work in our own era. Walter Benjamin, *A Obra de Arte na Era da sua Reprodutibilidade Técnica*.
[8] Vide Peter Eisenman, "L' Opera totale come sistema" in *Lotus Internacional,* n. 123, February 2005.

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ONLY A HUGE STONE-WALL

Michele Giovanni CAJA,[1] Maria Pompeiana IAROSSI[2]
School of Civil Architecture, DPA-Dipartimento di Progettazione dell'Architettura, Politecnico di Milano, Italy
e-mails: michele.caja@polimi.it, piarossi@polimi.it

Abstract

 "*A huge stone-wall, with windows cut out of it. And that is that. You see with how few means you can make architecture – and what an architecture*!" With these words Ludwig Mies van der Rohe expressed his enthusiasm for Palazzo Pitti during his Italian travel in 1908, recognizing in the building his value as a paradigm out of the time, able to confront itself, even for its elementary construction, with the dimension of the contemporary city and architecture.
This contribution represents the first outcome of a research which, sharing the Miesian judgment, assumes the architectural re-drawing and relief as tools of knowledge and typological reconstruction of the Italian *palazzo* in its different variations and declinations.
An analysis focused to resarch the richness and variety present inside the selected examples (53 examples in 9 cities), but also to show their actuality as possible models in relation to the contemporary project's practice.
The theme is investigated under different points of view and through various comparative analyzes, with the aim to underline more general characters connected to the relation with the city, the architectural and spacial plan, the composition, the choices about construction and language.
From this methodological setting-out descend both the adopted representation codes and the primarily handbook's character of the reached results, exemplified in synoptic tables which classify the examples in relation to the problematical cases, which emerge from time to time: building type/placement inside the block, planimetric articulation/vertical distribution, building type/access system, ecc..

Parole chiave: *Palazzo*, Typology, Housing, Handbook, Representation.

1. Il palazzo come tema

Nel 1908 Mies van der Rohe, nel corso del viaggio compiuto in Italia, così manifestava il suo entusiasmo di fronte alla facciata di Palazzo Pitti "*uno degli edifici più forti* (…) *soltanto immensi muri di pietra con le loro finestre incise* (…) *con mezzi così semplici si può fare architettura!* [1], riconoscendo all'edificio il valore di paradigma sovratemporale, capace di misurarsi, proprio per la sua elementarietà costruttiva, anche con la dimensione della città e dell'architettura contemporanea.
Condividendo l'adesione miesiana e con l'intento di comprendere più a fondo la lezione contenuta proprio in quelle pietre, è stata avviata la ricerca tutt'ora in atto, di cui vengono qui presentati i primi esiti.
Si tratta di un'analisi condotta su una cinquantina di esempi noti di palazzi urbani situati in nove città storiche italiane e realizzati in epoca rinascimentale e oltre. La scelta di considerare il palazzo come tema d'indagine non è casuale, né tantomeno dettata da ragioni di ordine storico-critico o puramente tipo-morfologico. Nasce piuttosto in relazione al dibattito attuale sull'architettura di nuovi modelli residenziali per la città europea. Un dibattito vivo soprattutto in Germania e in particolare a Berlino, dove la questione della ricostruzione critica della città attuata negli ultimi vent'anni si è concentrata proprio sul tema della casa e del palazzo all'interno di isolati parcellizzati. Il palazzo viene qui inteso sia come modello contemporaneo per abitare la città storica, che come modello storico, riletto dal punto di vista urbano e tipologico e "ricostruito" a partire dalle condizioni attuali dell'abitare contemporaneo [2].
Inteso in questo senso il tema del palazzo viene qui affrontato da diversi punti di vista, quali:

• urbano: l'idea di città che sottende: compatta, a isolati parcellizzati;
• morfologico: il rapporto tra impianto volumetrico, spazi interni (corti e giardini) e lotto;
• tipologico: i suoi caratteri autonomi rispetto ad altre forme di residenza (la casa gotica, il castello, la residenza collettiva, ecc.);
• compositivo: la gerarchia delle facciate, il carattere rappresentativo, il linguaggio classico.

1.1 Il palazzo come modello urbano

A partire da queste considerazioni, che intendono sondare le potenzialità insite in una tipologia storica rispetto all'attualità dell'abitare contemporaneo, il palazzo si rivela come modello paradigmatico anche rispetto alle questioni di carattere urbano, cioè all'idea di città che esso sottende. Nel dibattito attuale sulle diverse idee di città oggi praticabili – che oscillano tra l'idea di città compatta ripresa dal modello della città storica, e l'idea di città aperta introdotta dal Moderno [3] – il palazzo urbano mantiene una sua autonomia e identità. Si propone come modello attuale di residenza in città [4] all'interno di un'indagine in corso sulla legittimità e validità di tipologie storiche per la città attuale (si pensi a recenti esperienze in Germania, che hanno dato nuova vita a tipi come la *villa urbana* o la *casa gotica*) [5].

Il tipo del palazzo urbano, come analizzato nella ricerca, si connota in base a due principi ad esso associati:
• una tipologia di spazi urbani fondata sull'idea di spazio formalizzato e concluso (strada, piazza, corte) rispetto a uno aperto e continuo;
• forme insediative basate sul principio dell'edificazione perimetrale all'isolato.

Da qui emergono tipi diversi di palazzi associabili a modelli concreti quali:
• il palazzo *parcellizzato*: variabile in funzione dell'entità di parcelle occupate all'interno di un isolato: dall'accorpamento di due o più parcelle e case adiacenti (Palazzo Rucellai)
• il palazzo *isolato*: quando si identifica con un intero isolato (Palazzo Farnese);
• Il palazzo come *parte di città*: in quanto modello autonomo ripetibile, può essere ripetuto a definire una parte unitaria di città (Strada Nuova, Genova)
• il palazzo come *fuori scala*: quando la sua dimensione è tale da renderlo comparabile con quelle di una reggia o di un residenza extraurbana (Palazzo Pitti);

1.2 Attualità del palazzo

Il palazzo sta vivendo una rinascita in alcune esperienze recenti, che tendono a vagliarne le potenzialità rispetto a logiche sia urbane che compositive. Proprio in rapporto al tema dell'isolato, e alla idea di città compatta con spazi definiti di strade e piazze che esso sottende, il palazzo si propone come tipo particolarmente interessante in quanto a cavallo tra la scala della casa individuale (la casa gotica, la villa urbana) e la grande casa collettiva (dai grandi isolati unitari a corte della riforma architettonica degli inizi del Novecento all'uso diffuso delle case in linea dei quartieri del Moderno). Seguendo il principio del montaggio e del collage la combinazione di frammenti o parti di palazzi riconferma d'altra parte una ricerca sulla *tenuta* dell'isolato come principio insediativo ancora attuale.

Tra i casi attuali che impiegano il palazzo come modello si ricordano:
• l'isolato sulla Schützenstrasse a Berlino di Aldo Rossi: un progetto-pilota per molti altri isolati berlinesi della *ricostruzione critica*, si propone come caso esemplare per la composizione alternata di frammenti di palazzi o di citazioni di modelli storici decontestualizzati: il frammento di Palazzo Farnese monta e sposta in facciata un comparto del loggiato della corte interna del modello romano [6].
• l'isolato della Cassa di Risparmio di Firenze di Giorgio Grassi: la ricerca di un isolato unitario a corte allude alla grande scala urbana di Palazzo Pitti e alla facciata in rilievo di Palazzo Rucellai, rivelando le aspirazioni alla costruzione di un unità volumetrico-architettonica, nonostante la suddivisione in parti imposte dal piano urbano preesistente [7].
• la ricostruzione in corso dei palazzi palladiani di Potsdam: nella contemporanea ricerca tedesca sul tema della *ricostruzione critica* della città e dell'architettura storica [8], il caso attuale della politica urbana di Potsdam, rivolto alla riproposizione di alcuni palazzi storici, già copie di palazzi palladiani realizzati nel Settecento, propone il palazzo come copia ricostruita in facciata divenendo *copia di una copia* palladiana (Palazzo am Neuen Markt 5) [9].

1.3 Questioni aperte e obbiettivi della ricerca

A partire da questi casi, ma se ne potrebbero fare altri che ragionano sul palazzo come modello urbano, restano aperte le ragioni del tema di lavoro prescelto, che riguardano in particolare l'indagine su palazzi

storici considerati come possibili modelli di residenza nella costruzione della città contemporanea.

Consapevoli di lecite questioni che un approccio di questo tipo solleva, quali:

• Il palazzo è o non è un tipo?

• Se può essere definito dal punto di vista tipologico, quali sono i suoi elementi d'individualizzazione?

• Quale rapporto vi è tra il palazzo, la casa individuale e l'abitazione plurifamiliare?

• Rappresenta il palazzo un tentativo di conferire un carattere monumentale alla residenza (una linea di ricerca che va dai palazzi rinascimentali fino a esperienze del Novecento, si pensi ai grandi Höfe viennesi o alle corti di Amburgo)?

• E' lecito oggi impiegare il tipo del palazzo o, più in generale, rifarsi a tipi storici per la costruzione della città contemporanea?

Senza volere, o potere, dare risposta univoca a queste domande, l'analisi si rivolge a individuare le parti proprie dei diversi palazzi attraverso il ridisegno critico, che mira innanzitutto a ricostruire l'individualità dei singoli manufatti architettonici, evitando il rischio di cadere in schematizzazioni astratte o concettuali. I palazzi vengono qui studiati come modelli veri e propri, non come semplici tipi riconducibili a principi generali astratti (il tipo a corte, a blocco, ecc.). Proprio per comprenderne la ricchezza, ma anche per mostrare, rispetto alla tendenza riduzionista e astratta di molta architettura contemporanea, quanto questi modelli abbiano ancora da insegnarci, sia dal punto di vista spaziale che architettonico.

Un ulteriore livello dell'analisi è poi quello di indagarne il rapporto con la città e con le parti costituenti il palazzo rispetto ai suoi elementi principali:

• il cortile o il giardino interno come spazio libero semipubblico incluso;

• l'androne come elemento di mediazione tra la strada ed il cortile;

• le scale come elementi architettonici e non semplicemente distributivi;

• la facciata come elemento rappresentativo e urbano.
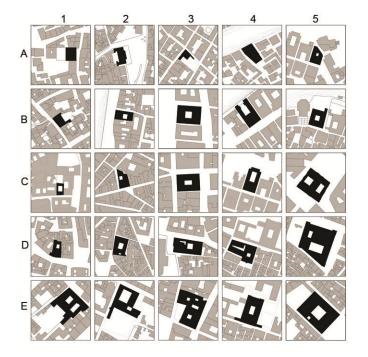
Fig. 1: Rapporto tra palazzo e isolato (1-5) e declinazione tipologica (A-E)

A1-A5: Iseppo Porto (Vc), Chiericati (Vc), Pandolfini (Fi), Grimani (Ve), Cambiaso (Ge)

B1-B5: Valmarana (Vc), Pompei (Vr), Giraud-Castellesi (Ro), Canossa (Vr), Piccolomini (Pi)

C1-C5: Casa degli Omenoni (Mi), Rucellai (Fi), Strozzi (Fi), Spinola (Ge), Marino (Mi)

D1-D5: Massimo (Ro), Cicciaporci (Ro), Caffarelli Vidoni (Ro), Rosso (Ge), Cancelleria (Ro)

E1-E5: Spada (Ro), Ludovico il Moro (Fe), Medici (Fi), Doria (Ge), Farnese (Ro)

1.4 La facciata del palazzo: tre diverse forme di riduzione

Il tema della facciata si propone come caso paradigmatico del rapporto tra il carattere rappresentativo del palazzo e la progressiva riduzione attuata dall'architettura contemporanea. E' possibile qui, portando il discorso nell'ambito del linguaggio, riferirsi a tre casi di riduzione, che hanno portato dalla facciata muraria decorata alla struttura a telaio di travi e pilastri. Tre forme di astrazione formale, tra loro lontane nel tempo, che rappresentano modi diversi di intendere il tema della facciata, riferita qui al caso particolare del palazzo.

L. B. Alberti riprende dall'architettura romana la *muratura* come fondamento costruttivo dell'architettura [10] e il *decoro* come elemento rappresentativo del carattere di un edificio. Il decoro, come lo intendeva Alberti in Palazzo Rucellai, non è semplice ornamento, ma strumento atto a rappresentare il carattere pubblico dell'edificio. Riprendendo il sistema degli ordini sovrapposti del Colosseo e di altri teatri romani, e applicandolo alle facciate delle case retrostanti, conferisce ad esse una inedita rappresentatività e monumentalità urbana.

Se tale procedimento definisce il carattere dell'edificio e ne sottolinea il ruolo pubblico rispetto al carattere civile dell'edilizia residenziale medievale, il modo in cui questo avviene risolve in termini architettonici il tema della facciata di un palazzo. La ripresa degli ordini sovrapposti viene effettuata in *stiacciato*, secondo la tecnica del bassorilievo donatelliano, riducendo le semicolonne a semplici lesene piatte e gli architravi a fasce marcapiano poco aggettanti. Elementi *araldici*, utilizzati come citazioni evocative di un ordine qui ridotto a semplice struttura di ripartizione in superficie della facciata. Avrà inizio da qui la lunga serie di facciate urbane, impaginate da un ordine sempre più astratto e geometrico, riscontrabile anche in contemporanee esperienze. Vedi l'uso di lesene, paraste e fasce marcapiano sovrapposte in modo da evitare la fuga a vista, in molti edifici urbani realizzati a Berlino dagli anni '90 da Hans Kollhoff, Petra e Paul Kahlfeldt, Walter Noebel e altri.

La critica di Adolf Loos ai palazzi realizzati sul Ring di Vienna alla fine dell'Ottocento si rivolge soprattutto all'uso improprio dell'ornamento, che diviene un *delitto* in quanto espressione inadeguata rispetto allo spirito dell'epoca, un'epoca che *"preferirebbe che le facciate delle case fossero lisce da cima a fondo"*. Gli elementi storicisti delle facciate non sono elementi integranti della struttura muraria della facciata, come nei modelli originali dei palazzi italiani, ma sono ad essa semplicemente applicati. *"Perché questi palazzi rinascimentali e barocchi non sono neppure fatti con il materiale con cui sembrano costruiti. Ora vorrebbero sembrare di pietra, come i palazzi romani o toscani, ora di stucco, come le costruzioni barocche viennesi. Non sono né l'una cosa né l'altra: i loro dettagli ornamentali, le loro mensole, le loro ghirlande di fiori, i cartocci e i dentelli sono tutti in cemento e attaccati sopra"* [11].

Non il fatto di impiegare elementi storici, dunque, quanto il *come* questi vengano impiegati in senso ornamentale, anti-costruttivo, è oggetto della critica di Loos. Compito dell'architetto, per Loos, è quello di trovare le "forme che sono strettamente legate alla natura stessa di un determinato materiale" e giungere a "un nuovo linguaggio formale per il nuovo materiale. Tutto il resto è imitazione."

La critica all'ornamento in Loos si fonda sulla consapevolezza che l'architettura non è più intesa come arte del costruire, ma è "scaduta ad arte grafica". L'architettura nega così la ragione costruttiva ricercata dagli "antichi maestri" e traduce la profondità della sua facciata su un piano bidimensionale. Da qui la difficoltà a rappresentare l'architettura del passato, come quella di Palazzo Pitti, "l'architettura più straordinaria", dato che "l'architettura autentica" non può "essere resa con efficacia sul piano" [12].

Che il padre dell'odierno minimalismo, di quel *less is more* divenuto quasi un motto di un'intera epoca ed emblema in negativo di quella successiva (dal *less is bore* di Robert Venturi [13] al *Titanic* di Stanley Tigerman [14], il fotomontaggio in cui la Crown Hall di Mies affonda in mezzo al lago Michigan), rimanesse così fortemente impressionato dall'architettura dei palazzi rinascimentali italiani è cosa meno nota. Di fatto il suo interesse per la storia, anche se tradotta in forme costruttive adeguate allo spirito dell'epoca, sarà un elemento costante dei suoi interessi, come ancora nel 1959 ribadiva, dicendo di avere "*imparato il massimo da vecchi edifici*" [15].

Anche se in forme contemporanee, alcuni dei suoi primi progetti degli anni Venti a Berlino sembrano riflettere dal punto di vista urbano il carattere proprio degli ammirati palazzi della città storica italiana. Nella loro compattezza volumetrica e nella loro condizione di edifici monolitici isolati essi emergono come dei veri e propri *fuori scala* all'interno della caotica struttura urbana ottocentesca. Essi presentano la medesima semplificazione volumetrica degli esempi storici, anche se la consistenza materica della facciata in pietra, non più necessaria dal punto di vista costruttivo, viene qui tradotta in pura struttura, privata di qualsiasi rivestimento, e ridotta a pura architettura "pelle e ossa" [16].

Una riduzione radicale, che comporta non solo l'omissione dell'ordine classico, ma anche dell'involucro murario, non più necessario da un punto di vista costruttivo. Come scrive Mies nel '24: "*Dato che trovavo assurdo ricoprire con la pietra lo scheletro in acciaio dell'edificio, gli ho dato una pelle di vetro*" [17].
La muratura lapidea dei palazzi storici viene sostituita da una *pelle* in vetro, che lascia intravedere la struttura retrostante dell'edificio, le sue *ossa*. L'architettura viene così spogliata non solo del suo *apparato decorativo* (l'ordine classico), ma anche della sua *carne* (la muratura). Viene così negata qualsiasi gerarchia alle facciate, implicita nei palazzi rinascimentali (la rappresentività del fronte principale, la semplificazione e il carattere domestico dei fronti secondari) e l'edificio, ridotto in senso puramente volumetrico, resta neutrale rispetto al luogo in cui si pone.
Loos e Mies, due maestri della riduzione, mostrano atteggiamenti simili, anche se differenti rispetto al rapporto tra architettura storica e riduzione formale. Il riferimento comune a Palazzo Pitti indica come essi siano fortemente attratti dalla massività lapidea della sua facciata, ma anche dalla sua semplicità e unitarietà volumetrica. Nonostante che l'introduzione delle nuove tecniche costruttive del cemento armato e delle strutture metalliche abbia comportato la perdita del muro come elemento portante, questo esempio italiano viene ammirato come fosse un modello, sia dal punto di vista urbano che architettonico. Ma se Loos (e con lui Hilberseimer) spoglia l'involucro murario dell'edificio da tutti quegli elementi che risultano essere solo ornamenti applicati, Mies persegue una riduzione che libera la struttura dal suo apparato murario. Da una parte l'architettura ritrova l'essenza della massa muraria, la sua massività atemporale, che dall'epoca romana a quella rinascimentale ha costituito il carattere primo dell'architettura – da cui la ben nota aspirazione di Loos a costruire come "avrebbero costruito gli antichi Romani" [18] e la ricerca delle "forme durature nel tempo" di Hilberseimer [19] –, dall'altra coincide con la sua struttura, intesa come ordine tettonico di elementi portati e portanti, secondo l'insegnamento schinkeliano [20].

1.5 Astrazione ed evocazione degli elementi classici

Da qui, si può dire, scaturiscono alcuni filoni della ricerca attuale in bilico tra classico e razionale, tra volontà riduzioniste e impiego astratto di elementi classici, usati nella composizione delle facciate in senso evocativo a rappresentare una continuità con l'architettura della storia. Dopo la volontà di *razionalizzazione* del Moderno, dopo il minimalismo e il riduzionismo concettuale degli ultimi decenni, questi sforzi si spiegano come tentativi di superare i limiti di un'architettura ridotta a pura stereometria o struttura costruttiva. Emergono da qui linee di ricerche differenti, ma simili nel tentativo di riappropriarsi del carattere rappresentativo dell'architettura e superare quel *minimum* espressivo, divenuto dogma per intere generazioni di architetti e ancora diffusamente praticato. Da una parte, la rievocazione degli elementi storici attraverso pratiche come quella della *citazione* o dell'*omissione* ha improntato alcune ricerche già a partire dagli anni '60 e '70, che hanno portato avanti una revisione critica del razionalismo ricercandone una continuità con la storia. Dall'altra la concezione dell'architettura come costruzione ripropone, in certe posizioni attuali, l'aspirazione al carattere rappresentativo della costruzione come riferimento astratto al classico [21]. E poi, più dichiaratamente, quelle esperienze in cui il riferimento al classico si fa più diretto, laddove la volontà evocativa si trasforma in vero e proprio sforzo di ricostruire la profondità (e non la planarità, seguendo Loos) dell'architettura storica. La facciata diviene in questo senso il campo principale di sperimentazione di un ritrovato rapporto compositivo in profondità degli elementi che la compongono.
Quali siano questi elementi e come impiegarli resta il tema principale d'indagine di queste ricerche sia in ambito architettonico che in quello dell'analisi teorico-compositiva. Superato il divieto di riferirsi al mondo formale degli elementi classici, conseguente all'abuso provocatorio e ludico che ne ha fatto la stagione del postmoderno e dal successivo annuncio della *fine del* classico [22], il classico rivela oggi una sua rinnovata attualità, anche per l'idea di città che sottintende e a cui da forma, dimostrando che esso "riguarda sempre non solo il passato, ma il presente e una visione del futuro" [23].

2. Problemi metodologici.

La volontà di affrontare il tema del palazzo urbano con intenti specificamente progettuali e non filologici o storici, ha orientato la ricerca verso metodologie d'indagine ed esiti volutamente manualistici.
Tuttavia, in architettura, la tradizione della classificazione quale fondamento teorico ed operativo al progetto rimonta ad un esempio illustre e d'ineguagliabile chiarezza, costituito dal secentesco *Maniere de bien bastir* di Pierre Le Muet [24].
Tale opera consiste nel *recueil* di 20 esempi di case unifamiliari, ciascuna rappresentata mediante piante,

prospetti e sezioni.

La sequenza degli esempi è regolata dall'incremento della misura della testata su strada del lotto edificabile, dando luogo ad una casistica di 13 *places* (parcelle tipo), con consistenza superficiale crescente da un minimo di 27 mq agli 850 mq (giardino escluso) della più estesa, così da coprire l'intera varietà del *parcellaire* parigino.

Si tratta dunque di un vero manuale operativo, poiché a ciascuna *place*, corrisponde la soluzione edificatoria ed abitativa ritenuta più adeguata, unitamente alle sue possibili varianti.

La risposta tipologica viene modulata al variare della consistenza dell'unità fondiaria di partenza; i primi nove esempi sono infatti ascrivibili al tipo della casa a blocco in profondità, caratteristico della tradizione costruttiva ed abitativa della città gotico-mercantile; i successivi nove esempi sono invece case a corte, definite nella declinazione costruttiva e linguistica dell'*hôtel particulier*, le cui varianti sono sviluppate fino all'undicesima *place.* Quest'ultima, caratterizzata da estensione superficiale di mq 725, rappresenta il limite ammissibile per l'unità fondiaria urbana, oltre il quale la risposta formale proposta è quella del *pavillon* e della *maison de plaisance aux champs* descritte dagli ultimi due esempi.

L'impianto classificatorio di Le Muet restituisce così, nella varietà ed unitarietà del suo insieme, l'immagine lontana di un mondo di forme certe, entro cui ad una determinata disponibilità di superficie corrispondeva una precisa possibilità di articolazione funzionale e distributiva, fondata su una definita idea di città, su un sapere costruttivo lungamente sperimentato e, infine, su un sistema di elementi linguistici e stilistici condivisi.

In un mondo siffatto – assai distante dalle condizioni della contemporaneità – il piano di divisione particellare del suolo svolgeva il ruolo di telaio, entro cui la molteplicità delle condizioni sociali e delle potenzialità economiche presenti nella città trovava corrispondenza di rappresentazione in una varietà finita, ancorché riccamente variegata, di risposte formali, distributive, economiche e rappresentative.

Analogamente, altri e più recenti esempi di manuali hanno mostrato la capacità di un singolo aspetto del fare architettonico, assunto quale criterio dell'organizzazione classificatoria, di divenire una chiave di lettura capace di riassumere rispetto a sé tutti gli altri e diversi aspetti dell'architettura.

Valenza tassonomica similare viene ad esempio assegnata da E. Neufert [25] alle attività quotidiane essenziali, il cui svolgimento governa, nella filosofia della definizione dell'*Existenzminimum*, il dimensionamento dei luoghi e delle parti della casa ad esso deputati o, perfino, dei singoli manufatti o elementi d'arredo.

Questa condizione di equilibrio ed intima interconnessione fra i diversi aspetti del costruire, caratteristica dei tradizionali manuali d'architettura, appare oggi irrimediabilmente perduta e se, da un canto, il parcellario urbano, privo di ogni regola di modulazione della sua scansione, appare piuttosto come una pelle così frequentemente e diversamente tatuata da poter narrare solo una storia intricata di conflittualità, dall'altro il mondo delle forme architettoniche appare ipotecato da intenti comunicativi, aspettative d'immagine e volontà di eloquenza della forma ormai del tutto separati dall'atto costruttivo in sé.

Non è dunque più possibile adottare un unico angolo visuale rispetto a cui analizzare le possibili risposte al problema dell'abitazione urbana, tale da riassumere l'ampio e, talora, contraddittorio ventaglio degli aspetti del fare architettonico.

Con la consapevolezza di non poter perciò più far riferimento ad un unico criterio di classificazione, nella ricerca qui in esame si è scelto di ordinare gli esempi di palazzi studiati secondo un principio del tutto convenzionale, raggruppandoli per città e, all'interno di ciascuna città, secondo un ordine alfabetico riferibile all'identificazione proprietaria con cui gli edifici sono correntemente conosciuti.

L'adozione di un criterio volutamente astratto e neutrale, analogo alla convenzionalità caratterizzante l'adozione per l'*Encyclopédie* dell'ordine alfabetico, ha permesso di assumere il tema architettonico del palazzo senza che alcun aspetto singolare (urbano, morfo-tipologico, costruttivo, stilistico, ecc.), risultasse prevalente rispetto agli altri e nell'intero ventaglio delle sue implicazioni.

Queste ultime sono state indagate mediante un procedimento articolato in due successive operazioni analitiche:
• descrizione standardizzata di ciascun esempio;
• composizione di specifici abachi di comparazione.

3. La descrizione degli esempi

L'obiettivo di costruire una raccolta di esempi di palazzi capaci di svolgere il ruolo di modelli operativi per la progettazione dell'*housing* urbano pone in primo luogo la necessità di mettere a fuoco una modalità di

rappresentazione omogenea per tutti i casi prescelti e, soprattutto, in considerazione del principio di neutralità adottato per la classificazione, capace di farne emergere affinità e differenze e di porsi in tal modo come strumento efficace ai fini della comparabilità degli esempi tra loro.

Con tale intento analitico, il più efficace strumento è risultato essere ancora il tradizionale sistema di rappresentazione basato sulle sezioni e proiezioni ortogonali.

Infatti, tale modalità di descrizione grafica presenta il vantaggio di non essere influenzata dal punto di proiezione che, per il fatto stesso di essere collocato all'infinito, introduce un principio di astrazione che consente di prescindere dal contesto specifico e dagli aspetti più contingenti, per far emergere quegli aspetti dotati di un grado di generalità tale da consentire la possibilità di risperimentare l'esempio di volta in volta proposto, estrapolandolo dalle condizioni locali o temporali che pur hanno contribuito a determinarne la genesi.

Tale ricerca del punto di equilibrio tra condizioni individuali specifiche e contenuto di generalità riflette la tensione tra convenzione e realismo che ha sempre caratterizzato il disegno d'architettura, il quale nell'intervallo tra queste due opposte polarità ha per lungo tempo sviluppato le proprie potenzialità conoscitive.

3.1. La scelta dei codici grafici tra convenzione e realismo

Il problema generale della rappresentazione architettonica si è sempre incentrato sulla necessità di fissare i modi di relazione tra la realtà fisica del manufatto – già esistente, nel caso del rilievo, o in via di definizione nell'iter progettuale – ed il modello preposto alla sua descrizione, guidato da un dispositivo "convenzionato", cioè costituito dal linguaggio destinato a descriverlo accettato e condiviso e, per questo, dotato di un grado di generalità tale da consentirne la reiterazione in applicazione ad altri oggetti analoghi.

Tale dispositivo è stato nel tempo codificato dai diversi metodi proiettivi posti a fondamento scientifico della più tradizionale accezione del disegno che i più recenti sistemi di rappresentazione digitale sembrano soppiantare, nella fascinazione iperrealistica del *rendering*, entro cui il progettista (o comunque il produttore dell'immagine) coincide con il fruitore del manufatto.

Codesta condizione d'appartenenza dell'osservatore allo spazio rappresentato distanzia enormemente i nuovi dispositivi di rappresentazione immersiva dai metodi di rappresentazione tradizionali e, perfino, dal più mimetico di essi – la prospettiva –, la quale presuppone la prossimità, ma, insieme, l'imprescindibile separazione tra lo spazio osservato e quello entro cui si situa l'osservatore, il cui confine è marcato proprio dal quadro prospettico che, come l'arco scenico nel teatro all'italiana, demarca il confine tra i due mondi contigui, ma comunque separati.

La proiettività ortogonale mongiana afferma invece un principio di astrazione rigidissimo, in cui la distanza infinita del punto di proiezione improprio sembra aspirare ad una sorta di volontà di visione assoluta, ad una descrizione delle cose e dei luoghi che, depurata dalle aberrazioni e distorsioni proprie della proiettività conica dell'occhio umano, risulti coincidere non con ciò che si vede, ma con lo schema logico, prima ancora che spaziale, di quelle stesse cose o luoghi e, dunque, quasi una rappresentazione del mondo *sub specie aeternitatis*.

Paradossalmente, proprio un sistema di rappresentazione fondato su un principio così raffinatamente astratto dal punto di vista della *ratio* geometrica costituisce lo strumento abituale, compreso ed impiegato da qualsivoglia utente e per la descrizione di qualunque fenomeno in cui la descrizione dello spazio abbia una qualche rilevanza (dalle mappe per i turisti alla pianta della stanza per l'acquisto della nuova credenza).

Il fatto è che il sistema delle proiezioni ortogonali, al di là del principio astratto su cui si fonda, presenta il vantaggio di consentire l'immediato apprezzamento metrico, la commensurabilità tra la realtà e ciò che è rappresentato e dei contenuti rappresentati tra loro, caratteristica che costituisce un requisito prezioso quando il fine della rappresentazione sia dichiaratamente tassonomico come nella manualistica.

Questo principio di commensurabilità tra la realtà e la sua rappresentazione mongiana, nel disegno d'architettura tradizionale era affidato alla sola mediazione aritmetica del fattore di riduzione, che per lungo tempo, ne ha garantito il valore conoscitivo e le capacità analitiche.

Invece, la disciplina sembra oggi oscillare con disagio, propendendo talora verso l'iperrealismo virtuale e talora apparendo invece propensa ad abbracciare incondizionatamente la smaterializzante sostituzione della nuvola di punti 3D alla descrizione grafica di un manufatto.

Per contro, si registra in ambito tecnico una sempre più accentuata prevalenza del grado di convenzionalizzazione, attraverso il moltiplicarsi delle tabelle UNI alle scale alte (quali quelle territoriali ed urbanistiche) o molto basse, impiegate nel disegno esecutivo.

3.2. La scelta delle scale di rappresentazione

Sembra indispensabile ritrovare anche nel mondo del disegno digitale quella capacità di lettura critica, che nella tradizione della rappresentazione cartacea la scelta di una determinata scala riusciva a garantire.

Nel lavoro svolto sui palazzi, perciò, al coefficiente di riduzione scalare è stato affidato il compito di mediare tra realtà e sua rappresentazione, fungendo da valvola di regolazione della quantità di dati ed informazioni di volta in volta introdotti nella rappresentazione, così come avveniva nel tradizionale disegno d'architettura, in cui l'adozione di un determinato rapporto di riduzione scalare coincideva con l'individuazione della finalità conoscitiva della specifica tavola, rendendo operante un criterio di astrazione dalla molteplicità del reale di quegli elementi – e solo di quelli – ritenuti capaci di svelare sistemi di relazioni significativi.

Le tavole tradizionali si comportavano, infatti, come carte geografiche tematiche, poiché la possibilità di rappresentare graficamente solo determinate famiglie di elementi era implicita nell'adozione di un certo rapporto di riduzione scalare. Una sorta di saggio senso della misura nell'introdurre dati ed informazioni era, in definitiva, imposto dalla soglia ammissibile alla miniaturizzazione grafica del dettaglio.

Oggi, invece, la diffusione poco consapevole di Autocad (che induce a far erroneamente coincidere la massa dei dati numerici inseriti con il file di stampa della singola tavola) unitamente alla elevata precisione grafica dei mezzi di stampa digitale, rischiano di spegnere la capacità di operare una selezione critica fra i fatti, che va consapevolmente recuperata.

A tal fine, nel corso del lavoro fin qui svolto sui palazzi, si è ritenuto utile riflettere sulle potenzialità conoscitive peculiari di ciascun rapporto di scala, per ritrovare il senso dell'operazione di selezione ed astrazione dei dati ed in tale modo sottrarsi con fermezza alla "vertigine del dettaglio", da cui si è costantemente cercato di preservare questo studio.

L'intento di far emergere i differenti possibili modi di declinazione della relazione con lo spazio urbano circostante – isolato, strada o piazza- ha perciò dato luogo ad una rappresentazione unificata degli esempi, a scala 1/2000 e con vista zenitale, volutamente scarna e priva di qualunque elemento di arricchimento grafico estraneo alla questione in esame.

Allo stesso modo, l'indagine sul palazzo, inteso come modello insediativo riproponibile, ha determinato una seconda modalità di rappresentazione degli esempi, orientata verso una finalità analitica tipologica.

Ciò ha indotto ad individuare fattori di riduzione scalare compresi tra l'1/200, adottato per i palazzetti di modesta consistenza superficiale (come la Casa degli Omenoni a Milano, in cui la differenziazione rispetto alle preesistenti *case da nobili* è affidata alla sola accentuazione del carattere di rappresentatività [26]) e il coefficiente di 1/750 adottato per i casi di dilatazione dimensionale fino alla coincidenza dell'edificio con l'isolato urbano (come nell'esempio di Palazzo Farnese a Roma o Palazzo Marino a Milano).

L'individuazione di tale intervallo di scale di rappresentazione come strumento ed ambito dell'analisi morfo-tipologica ha indotto ad espungere dalla rappresentazione tutte quelle informazioni non rilevanti rispetto all'obiettivo conoscitivo prefissato. Per esempio, non sono stati rappresentati i serramenti e sono state omesse le notazioni materiche (come l'esatta orditure dei mattoni o della pietra), se prive di rilevanza dal punto di vista della precisazione tipologica.
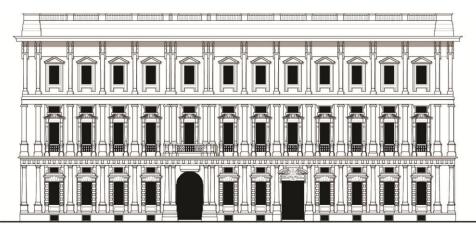
Fig. 2: Palazzo Marino, Milano: prospetto su piazza della Scala.

Una terza rappresentazione è stata poi predisposta alle scale più basse per descrivere i particolari linguistici e costruttivi, scelti in base alla loro rilevanza nella connotazione dei caratteri di riproponibilità dell'esempio di volta in volta prescelto.

Tale intento strettamente conoscitivo ed analitico è stato ulteriormente potenziato obbligando gli strumenti della rappresentazione ad assumere un *habitus* rigidamente autoptico.

Ciò ha subordinato a precise ipotesi interpretative la scelta dei punti per i quali far passare i piani secanti, orizzontali e verticali, da cui sono stati generati le piante ai diversi livelli e gli alzati, formulando uno specifico piano di sezionamento.

Nella sezione orizzontale, ad esempio, particolare cura è stata posta nella scelta della quota del primo piano secante, assumendo quale criterio analitico privilegiato il rapporto tra il suolo su cui ciascun palazzo insiste e la descrizione dei suoi caratteri distributivi e tipologici.

Con riferimento al sezionamento verticale, invece, la collocazione dei piani di taglio è stata finalizzata a far emergere gli aspetti connotanti il tema del palazzo e distintivi rispetto alla casa *tout court*, ravvisabili nella rappresentatività caratterizzante la costruzione sia dei fronti urbani e sia di quelli prospicienti lo spazio inedificato – giardino o corte – incluso.

Per raggiungere tale obiettivo, l'applicazione della teoria delle ombre nella descrizione degli alzati si è rilevata di particolare utilità, fungendo da sistema rivelatore sia dei principi compositivi classici regolanti l'alternanza di pieni e vuoti e sia dell'intento di monumentalizzazione, perseguito attraverso l'enfatizzazione linguistica e plastica di taluni elementi distributivi e costruttivi, come scale o cornicioni.

4. Principi di comparazione

L'adozione di specifici filtri di tematizzazione analitica ha consentito di avviare la composizione di alcuni abachi, ciascuno dei quali consente di comprendere come la specifica relazione istituita di volta in volta tra due aspetti o chiavi di lettura adottate dall'analisi urbana abbia contribuito ad arricchire il ventaglio di potenzialità espressive sedimentate nelle molteplici sperimentazioni del tema del palazzo [27].

L'applicazione dei filtri tematici, al momento, è stata sperimentata con riferimento solo ad alcune variabili definite; tuttavia essa potrebbe estendersi fino a comprendere dagli aspetti geografici e territoriali fino alla tassonomia dei singoli particolari costruttivi e costituire non solo il punto di estrema precisazione della conoscenza analitica dell'architettura della città e del territorio, ma porsi altresì come fondamento normativo, certo e sperimentato, alla prassi progettuale nel suo insieme.

Di particolare interesse sono risultati gli abachi che hanno messo a confronto gli aspetti urbani e quelli tipologici e, fra essi, la griglia che studia l'interazione fra le condizioni ubicative e le declinazioni tipologiche, determinando una modulazione del tipo edilizio, dalla soluzione del blocco elementare accostato entro la cortina stradale alle variazioni entro il tipo a corte (semplice e multiplo), per approdare nuovamente al tipo a blocco, dilatato alla scala del paesaggio ed articolato in linea nella soluzione di Palazzo Pitti.

Ulteriore approfondimento di tale casistica di esempi è pure costituito dall'abaco che indaga le variazioni linguistiche adottate per i portali di accesso in rapporto all'ubicazione rispetto agli elementi urbani (su strada, d'angolo, su piazza).

L'abaco rappresenta perciò uno strumento d'indagine prezioso, capace di far emergere collegamenti, affinità e differenze all'interno di una casistica di esempi solo apparentemente disparati e per questo non riproponibili, laddove invece l'approfondimento della lettura comparativa suggerisce la possibilità di riconoscere di volta in volta l'appropriatezza della risposta architettonica ad un problema progettuale analogo.

Un fondamento metodologico, questo, che consentirebbe il superamento nei fatti della logica vincolistica insita nel piano regolatore ottocentesco – e da cui non sono del tutto esenti neppure i nuovi strumenti di governo del territorio – per affermare invece un sistema normativo basato sul ricorso ad esempi positivi e modelli operativi entro cui collocare la ricerca nell'ambito dell'*housing*.

5. Appendice

I paragrafi 1 (1.1-1.4) sono a cura di Michele Caja; i paragrafi 2, 3, 4 sono a cura di Maria Pompeiana Iarossi. Le elaborazioni grafiche qui presentate sono state eseguite da S. Bon, C. Bosisio, C. Meli e S. Ubiglia sotto la guida degli architetti I. Brambilla, S. Zaroulas e con il coordinamento grafico di S. Lattuada.

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Forms and archetypes of the Nabataean façades at Petra

Giuseppe MAZZACUVA,[1]
[1] Dipartimento Architettura ed Analisi della Città Mediterranea , Facoltà di Architettura, Università *Mediterranea* di Reggio Calabria, Italia
giuseppe.mazzacuva@unirc.it

Abstract

The city of Petra in Jordan is an archaeological heritage of great cultural and scientific value for humanity.
More than 800 rupestrian tombs in the Wadi Mousa valley testify the great Nabataean architectural production.
The classification and dating of these unique architecture carved into the rock has attracted particular interest into researchers of the last century.
The study identifies the composition and style rules of Nabataean façades through the acquisition of a repertoire of knowledge and accurate graphical analysis.
The monumentality and complexity of the rock-cut facades contrasts with the geometric semplicity of the burial chambers inside.
In reference to a significant number of tombs, it was made a linear process of comparison among different types of tombs found in Petra in order to create a morphological abaco of the Nabataean architectures.
In addition, the development of a digital 3D model of the structures considered allowed the exploration and decomposition of the architectural shell and of its surfaces through countless sections and axonometric views. A fundamental operation for the reconstruction and preservation of these monumental architectural works subjected to a slow degradation by the action of time and weather.

Parole chiave: Petra_cultural heritage_Nabataean_3D modeling_drawing

1. Introduction

The monumental tombs of the city of Petra are the testimony of a great civilizations of the past, permeated by numerous cultural contaminations from the Hellenistic and Oriental world. This cultural diversity is done by a variety of styles and features (quality) translated into architectural results of great originality, in the constant search of an artistic expression of local identity.
The executive techniques of Petra's tombs reveal a unique method for the definition of the architectural elements in the sheer walls of Wadi Musa Valley, through a removal operation of the stone and proceeding to carve the components from top to bottom.
The drawings allow to investigate the designing and morphologic characteristics of the Nabataean funerary architecture through a linear process of cataloguing and dissection of architectural artefact in its distinctive features.
The tombs investigated were included within precise typological reference categories established on the basis of the main stylistic and formal characteristics of the external decorations.
This approach has allowed to identify recurring elements in the Nabataean production defining a grid of comparison to understand the stylistic and chronological evolution of the types on the site.
The direct knowledge of the Valley of Wadi Musa and Petra tombs, was directed to the acquisition of a broad repertoire of analytical information, where dimensional and formal aspects were synthetically investigated by tools of architectural survey and techniques of digital representation.

The two-dimensional representations obtained from the survey, are the necessary basis for the subsequent philological interpretation of the monument through a three-dimensional reconstruction of the original form.

The 3d reconstruction models[14], finally, synthesize the complex critical analysis applied on the funerary architecture of Petra, providing additional levels of interactive and exploratory investigation within a dynamic multi-sensorial space.

1.1 Petra: the city of the dead

The large number of the rock tombs makes of Petra an huge necropolis.

Following the path from the site towards the inside, appear, in the first instance, the excellent funerary and sacred works excavated in the rock and then, reaching the Centre of the Valley, you can admire the remains of the old city, which the social and political life of the Nabataean Kingdom carried out.

The steep walls on the border slopes of the Valley are suitable for carving and excavation of funerary frames. It is not a coincidence that the beautiful rocky façades were along the path of access to the Valley. In the royal tombs meets a wonderful sacred street.

The largest tombs, in extent and number, are located near to the great Theatre, along the outer Siq and at the sides of Gebel al Khubta; but, there are other minor groups of tombs disseminated in the whole area.

At the rich system of funerary structures joint other religious monuments, including churches, convivial rooms and sacrificial altars.

The Nabataean tombs are dug and carved throughout of the rocky fronts of the Mountain. These rock structures have an internal room obtained from the subtraction of stone material for the external frames, made by the processing of the rocky surface through carving operations and sculpture.

Inside space, in the most of the analyzed cases, appears essential and regular: generally, the plants are quadrangular and enclosed by burial niches or graves in the floor or in the side walls. The tomb can be composed by a single room or, in some cases, by secondary smaller burial rooms sideway placed (associated or autonomous).

The inside burial room is entirely collocated within the rocky mass, while the embossed façade puts out and sometimes it seems to come off keeping, however, a link with the rock array. Typologies are identified on basis of the location and at the type of tombs found inside of the sepulchers.

The exterior façade of the tombs is the expression of the artistic and cultural wealth of the Nabataean people. In most of the examples found, it is enriched with precious sculptural elements and stylistic features inspired to Eastern and Hellenistic art.

The cataloguing of Nabataean rock monuments bases on the examination of façades and it considers as parameters of comparison the different artistic and architectural characters present in the same compositions.

Fig. 1, 2: Khasneh and Ed-Deir.
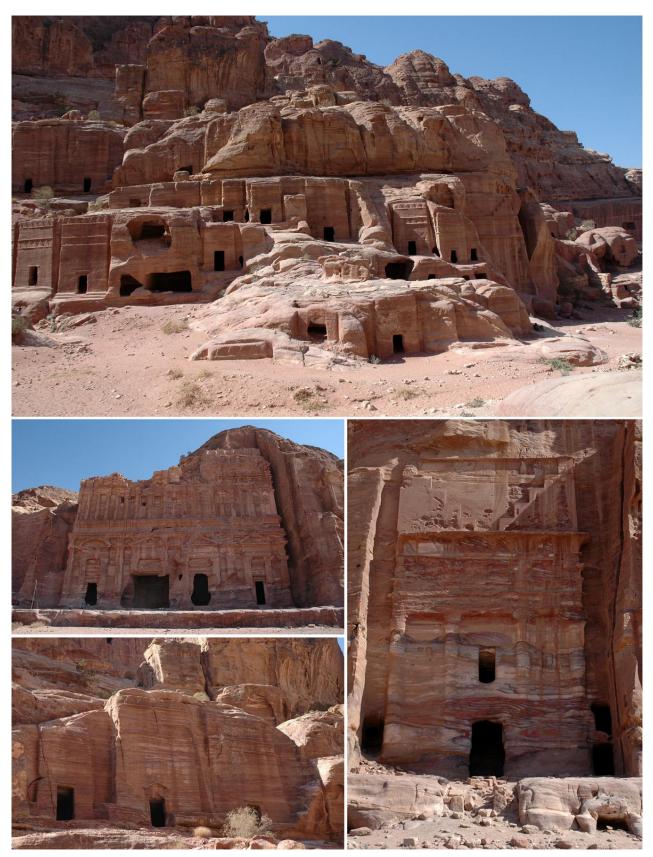
Fig. 3, 4, 5, 6: The Petra's tombs: Theater necropolis, Palace Tomb, Silk tomb and Pylon Tombs.

1.2 The stylistic characters of Nabataean façades

The Nabataean, in artistic and architectural field, assimilated the main tendencies coming from the Hellenistic and Eastern world. First, through the trading interchanges in the Mediterranean Sea, and then, about the presence on the Arab territory of the Greek and Roman dominations; while, from the Arab culture, thanks to the social and commercial intercommunions with the regions of Northern Africa and Arabia.

The stylistic, Eastern and Hellenistic treats mingle in the wide Nabataean building repertory, undergoing a considerable evolution that adapts to a renewed style "Nabataean".

Naturally, inside of this complex component system perceive some originality or formal variations of local mold in funerary monuments.

The most recurrent element of the original production in architectural works of Petra is the Nabataean capital[15]. It inspires in its peculiarities to the profiles of the main classical architectural orders coming up again in a basic and rough-hewed form.

In addition to the local capitals, in the Nabataean artefacts, it can detect the valuable Corinthians examples coming from the rich Alexandrian repertory. This type find it, above all, in excellent examples of Nabataean architectural production (Khasneh).

The column in the Nabataean façades assumes a decorative mean and it doesn't perform any static function.

The architectural order in the tombs of Petra presents considerable variations, the backups can be made from columns, , pillars, pilasters, half – pillars etc.

We often find the main side pillars coupled with the quarter column with capital or with two separated sections, or two quarters of column (ed-Deir) joint with its capitals.

The pillar with a quarter of column, it is a characteristic element of the Nabataean tombs in the first century B.C..
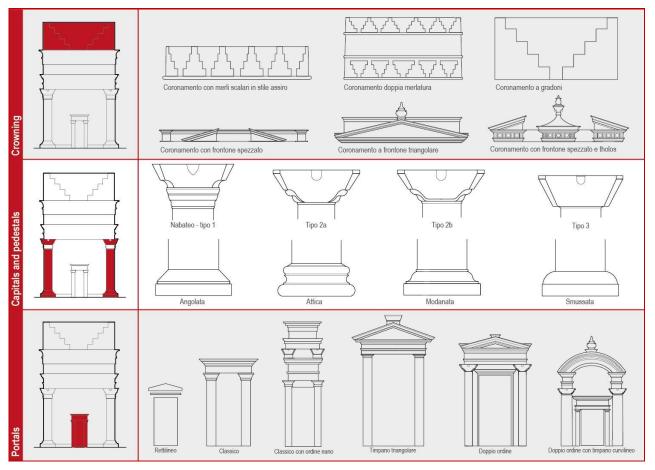
Fig. 7: Abaco of the architectural elements.

In the façades with superposed orders, the higher order backups, sometimes, they are not aligned with the ones below, because it does not perform any static function, but only decorative.

The main order, composed by high support and an articulated entablature, it describes the entrance portal: a conjunction element between the outside and inside space of the Tomb.

The numerous variations of portals found in Nabataean tombs shows great ability of the Nabataean people to combine the decorative elements of different array.

In the Petra façades, the pillars of the main order support a wide entablature (of classical matrix in the examples of the 1st century B.C. and 1st century A.D.) with a single or double architrave, frieze (smooth or Doric type) followed by a series of moulded frame.

The main entablature of more complex tombs (Royal tombs) can support one or more overlapping orders, formed by dwarf pillars with another entablature that concludes in a triangular pediment or an attic.

The culmination of the façades is a fundamental element for the classification of the Nabataean tombs, in which the most important studies on this subject refer it.

In the façades of the oriental array (Pylon tombs), there is a wide use of Assyrian battlements carved in an attic. The row of crowsteps can be single or double. The evolution of this decorative form sees the mutation of small crowsteps in two sets of five steps (step tombs) addressed and included in an attic. This is a feature inherited from the Mesopotamian world[19]. In these types the transition between the lower and upper part of the façade occurs through a cable frame.

The expression of the Hellenistic and Roman influence perceives in classical façades (Nabataean and Roman). The so-called "Gable Tombs" crowned by large triangular pediments, often overcome by acroters.

Another of the most significant elements of Nabataean architecture is the broken tympan, from the Ptolemaic models[17].

The reason of the broken pediment with *tholos* (ed-Deir, Khasneh, Corinthian Tomb) is an imitation of the architecture of Alexandria, although the basic models are of Hellenistic array.

The façades of Petra tombs, seemingly of classical setting, show the architectural solutions, very scenographic (almost Baroque style), with an important sculptural plasticity of its elements.

The Nabataean architecture is, therefore, the result of the assembly of different style elements based on a component reinterpretation in original way.

1.3 Executive technique

The construction process of Nabataean works depends on the topographical and geological characters of the territory and by technological expertises of the Nabataean people.

The vast territory of Petra Valley is surrounded by massive rock formations of sandstone, in which there are the numerous rock structures of the town.

The sandstone becomes the primary element of all Nabataean buildings, both for its workability and abundance within the same site. It was used in high buildings below form of blocks, while, to derive the sacred and funeral buildings was sculpted and carved.

The beautiful carved façades in the rock, from the Nabataean people, followed an effective method of processing and extraction of the stone. Many hypotheses were done respective to the possible techniques of construction used to this people to construct their colossal works, but the most reliable seems to be the realization of vertical surface by an excavation for following horizontal rows.

The procedure below provides two phases of execution.

In a wall of a cliff delineates the profile will be broken through the removal of sandstone blocks, starting from the top. The blocks are extracted with the use of wedges in a regular way, according to horizontal rows, as in a pit occurs , and then thrown down on the ground to be reused in other constructions[18].

After creating a flat surface placed in vertical cliff, it proceeds to the stage of defining the architectural frames and inside spaces. Starting from the top, there is a succession of horizontal levels up to the base. The first level on top defines a plan of support for the Nabataean workers, who work the architectural surface according to a project based on precise geometrical and dimensional rules. As the extraction of blocks follows, the Nabataean work the rock defining the features of the façade in its details and mouldings using cutting and engraving tools.

This technique doesn't allow mistakes in the planning inside aspects, because it is derived directly from the rock, beginning to the crown level (the project was drawn up on paper) and not from ground attack. The proportional relationships are, above all, between the architectural components to have a precise correspondence and a harmonious balance.

Besides, the static problems of structures are resolved by the Nabataean engineers through the perfect
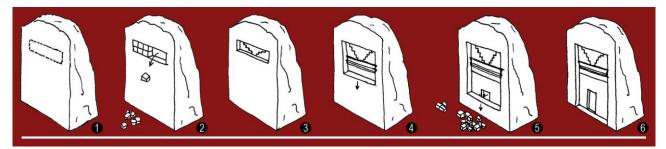
Fig. 8: Executive sequence for the construction of a Nabataean tomb.

distribution of the forces that emerge within the rock mass and not on the outside architectural elements: it involves also reduced dimensions of the burial chambers.

The emptying of the inner room begins to the parallel level at the architrave of the entrance door. The blocks are taken in a perpendicular way at the vertical plane and transported outside by some tunnels and passages created for this reason.

As evidence of this building technique of the Nabataean tombs can see, in the Centre of Petra, the Incomplete Tomb: a particular tomb under construction, where it can still identify the different phases of execution about outside frames and inner room.

2. The Petra's tombs: the three-dimensional modeling [14]

The operation of the three-dimensional reconstruction of the fronts and interiors, selected in a group of tombs in the Wadi Musa's Valley, it is necessary for the completion of research and analysis process put in place. The possibility to have some determined volumetrically forms in a virtual space allows to monitor and exploring the subject above many points, and so, getting interesting morphological and geometrical information. Besides, the method provides an incredible amount of data, which they are very important for the dimensional and chronological investigations of the Petra's monuments.

The three-dimensional reconstruction of the Nabataean artefacts originated from a series of two-dimensional, numerical and graphic processing, that it provides a valid scientific support for the decoding of the formal parameters of the real object. The knowledge of artifacts was realized through the use of tools of the representation.

For understanding the formal connections between architecture and territory developed it a process of critical analysis through from life drawing. While, the monitoring of the architectural forms and the metric data's acquisition foretold important campaigns of direct survey checking and integrating some data of the photogrammetric survey.

The metric data was processed with a software for the vector-based drawing (AutoCAD), defining a set of two-dimensional representations (plans, elevations, sections) of the monuments survey.

The orthogonal designs drawn up, lay out, the geometric lines of the architectural object as a result of an overlap between the photogrammetric images, the direct survey data and the graphic interpretation of the architectural elements according to some stylistic rules.

The photogrammetric applications have provided a large number of images of straightened planes, where we can detect the features of the façades of Petra, with his gaps and deficiencies had to the degradation of the surface. The interpretation of these parametric data, by a process of geometrical and morphological analysis that allows, according to the forms of classical architecture, to define an useful repertory for the three-dimensional reconstruction of the artifacts.

The set of two-dimensional documents, derived from survey, has provided the number of points, profiles, plans for 3D reconstruction of the architectural object.

The operation of the solid modeling occurred with a software for the vector data processing (AutoCAD) and the points management and surfaces that make up the object (3d Studio max).

Each architecture, to rebuild in three-dimensions, were drawn the main profiles that make up the horizontal and vertical planes. The choice of the appropriate modeling technic was based on metric information possessed, and it was fundamental for the search.

For the characteristics of the selected buildings, it prefers a representation of solid kind, where the concrete
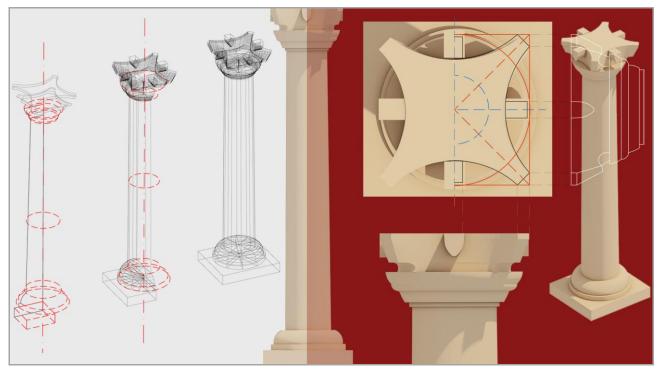
Fig. 9: Three-dimensional modeling of a Nabataean column.
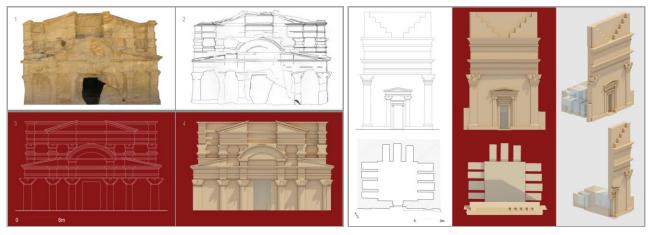
Fig. 10, 11: Bab el Siq Triclinium – Uneishu tomb: photogrammetric survey, geometric survey and rendering images.

form of the rocky mass and sculpted shapes is enclosed within its geometric borders; besides, it allows to apply effectively actions of subtraction and addition of volumes to make tangible the excavation process (subtraction) of rocky material from the full volumetric mass to generate an empty space inside. The subtraction's concept is the word-key in the Nabataean tombs project, where the full stone block is emptied inside, through subtraction of the corresponding positive geometric shape, but getting the negative part. Outside, the rocky front is carved for the architectural framework's definition of the façade. As if it was printed ideally into the vertical plane of rock a negative cast of the mouldings and decorations to obtain the positive image. This concept can be expressed in a comprehensive three-dimensional virtual representations that reproduce the dynamics of this important executive technique.

The fundamental operation for the three-dimensional reconstruction of Petra's monuments was that to identify the shared profiles between the different elements and drawing the geometric outlines of the basic

architectural units combining the characteristic points of each volume or surface. But even more important, in the specific case of rock fronts was the digital transposition in vector lines of the mouldings. In the most important examples of Nabataean architecture, these, perform a fundamental role to resolve the transitions between the plans and to articulate geometrically the rocky surface in organic way. They are the main components of architectural order set up in the proportional and formal rules.

For the reconstruction of the ed-Deir façade, rich of decorative details and involved mouldings, was adopted the best strategy to select the points and to decode the compositive rules of the architectural elements. The creation of the façade's model composes in some parts: rebuilding in a first phase, the vertical wall of rock from the profile of the plant and then shaping each individual architectural component divided by categories (columns, mouldings, openings, niches, crowning, decorations). Every detailed profile of items was treated previously by the 2-D processed repertory in AutoCAD and decoded through the codes of representation.

So, the mouldings both architectural orders of the ed-Deir were rebuilt for extrusion of its descriptive profile along a trajectory formed by a polygonal and horizontal line that follows the plant perimeter of the object. As regards the part of the crowning, formed by different types of shapes, some different modelling commands were applied to. The central part of the *tholos* was created by the *revolution* of its geometric profile around a central axis; while, for the two side broken tympanis had to progress by the extrusion operations changing the orientation of the coordinate system in connection with the different reference planes.

The extrusion faces or closed architectural profiles can occur along a defined trajectory, or along an axis of horizontally or vertically symmetry based on figures provided by the survey.

The relative forms to pillars, columns and walls have been divided in horizontal profiles to extrude along a vertical axis with metric defined parameters. In the specific case of the columns could apply the command *revolution* to generate the solid, rotating the whole profile of the column around an axis of the vertical symmetry. The column was divided into two parts: the stem with the base and the capital. The Nabataean capital presents in its profile the different sections which define the geometric shape. The "loft" command allowed from a good number of horizontal sections of the capital, the generation of the corresponding solid.

One of the most complex forms of Petra façades is the entablature, a collection of moulded items collocated on a perpendicular plane. For the modelling, of such entity, was created a corresponding profile by the characteristic outlines of the sequence of mouldings, from which it could extrude a three-dimensional body along an horizontal trajectory that follows the perimeter of the front. The complexity of concave, convex and linear lines of the moulding was built, geometrically, in the space. In immediate way, the sections of the wall of facade along its vertical were shaped.

The interior space of the tombs presents in the essential geometries based on regular surfaces and main points. The excavated space transposition occurred in two distinct phases, but interdependent. In a first step, it progressed in the plant modelling defining its topology with the creation of a full solid that incorporates every border areas, or the inner walls that represent the junction point between the stone block and empty space. The plant's solid (B) inserted into another larger volume (A), comparable to the mass of stone; through a subtraction operation between two elements (B-A) has been called the vacuum of the burial chamber. Connections between the façade and the interior carved space of the Nabataean tombs was represented, effectively, in axonometric wireframe images, numerous cutaways and deconstructions of the

Fig. 12: *Sextius Florentinus* : axonometric analysis.

geometric components. The cutaways axonometric have used the horizontal and vertical cutting planes to highlight the inner parts of the building envelope. This representation forms a good tool to describe the spatiality of the incorporated hollow into the rock.

The sequence of graphic produced images for each case-study reproduces analytically the decoding process of the architectural forms according to the precise geometric rulers.

The wireframe representation shows in close up the carved façade and in transparency the internal geometries. Instead, the second axonometric image uses a vertical and horizontal section of the inside architectural artifact, showing the negative outline of the plant impresses in stone and connections with the external frames. Finally, the axonometric representation of the whole volume of the plant in positive, it expresses the geometric regularity of the internal space configuration. These images arranged in sequence, constitute, a valid repertory of graphic analysis for understanding the formal dynamics of the Nabataean tombs examined.

The return of the architectural models has predicted the creation of rendering images to convey adequately the joints of the rebuilt forms. Besides the rendering for feature lines, previously described in the operations of axonometric analysis, the numerous renderings of volumes used to simulate the environmental and material characteristics of stone architecture have been executed. The rendering images were obtained from the mathematical models, previously processed by AutoCAD and imported in the software 3d Studio max; where, thanks to the rendering engine *v-ray*, it gets some immediate descriptive images of the Nabataean tombs. At the three-dimensional models was applied a monochromatic (ochre) material similar to one of the lighter shades of sandstone. Inside the scene was inserted a *v-ray* sun light with an inclination about 45° to simulate the diffuse light of the Sun. In the basic parameters of the rendering engine was selected the GI (Global illumination) algorithm, to capture above the direct sunlight also the indirect light reflected from surfaces, recreating a more realistic lighting of the scene. In each three-dimensional model of selected tombs were produced the different rendering images of axonometric, perspective and two-dimensional projections. The visual impact is significant, because it allows to take the accuracy of the architectural details and the complex play of light and shadows, which it affects the surfaces of the carved façade. In addition, the application of transparent materials at these volumes underlines the light contrast between the interior space (indirect lighting) and external surfaces, directly exposed to light.

The rendered images, effectively, communicate the plasticity of architectural frames present in Petra's monuments; obviously, these representations interpret a virtual reality of the rock architectures, through processes of geometric reconstruction of architectural components that allow to integrate discontinuities or gaps of the surfaces and volumes discovered in their actual form.

The 3D prototypes of the Petra's tombs and their digital representations provide, therefore, an important file of descriptive information of the morphological, dimensional, geometric and material characters, of the building envelope carved in the rock. The system of digital information will be used for purposes of virtual tourism through exploitation of three-dimensional numerical models able to reproduce faithfully, the architectural works present in the Petra's Valley. An interactive path that includes also the display of a DEM of the whole mountainous territory of Wadi Musa, shaping the surfaces of the steep rocky walls on the basis of the vector maps and satellite images. A passage that goes through the Siq and leads to the Khasneh and at the excellent rock façades of Nabataean people, allowing a virtual navigation outside and inside of architectural frames, it continues until to reach at the great expanse of Roman ruins, where the remains and traces of the buildings recompose reproducing some scenographic images of the old area.

3. Conclusion

This study on the tombs of Petra is aimed at providing further scientific developments in architectural and archaeological field, providing an effective graphical method for the interpretation of the design process of Nabataean architecture.

The 3d modelling of the Nabataean tombs collocates, therefore, inside to the experimental activities for analysis and conservation of the cultural heritages that have the main purpose of formulating some possible cataloguing systems and data processing, using the latest tools in the field of digital documentation and studying some alternative or complementary representation forms to the traditional ones.

The presented study is the basis for a methodological process of digital representation and interpretation of the Petra's archaeological heritage, defining the different keys to the reading on the basis of the communication and diffusion through the use of software and multimedia applications.
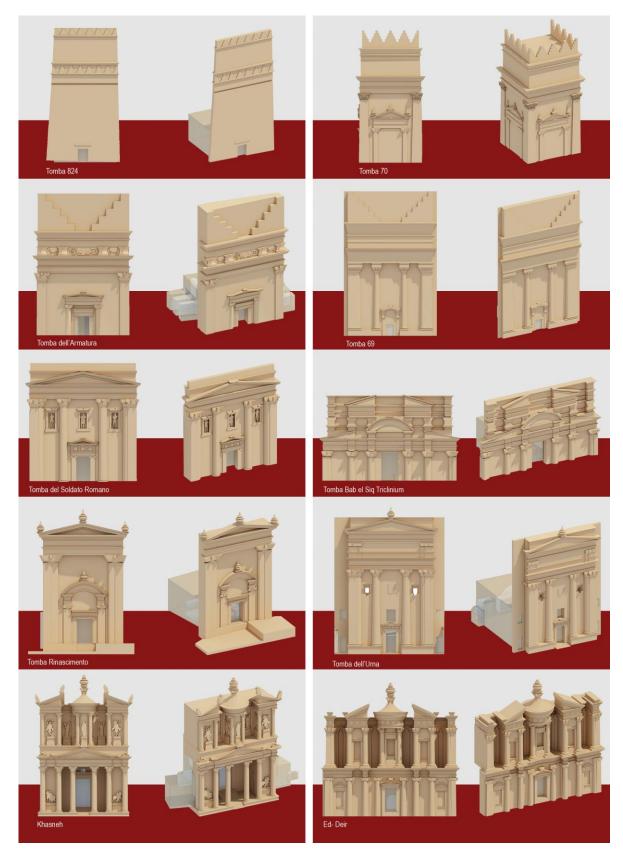
Fig. 13: 3d reconstruction models of Petra's tombs.

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Anastylosis with Glass Fill

Charles PHILLIPS,[1] Tim MACFARLANE[2], John LEE[3]
[1] Charles A. Phillips, PLLC, North Carolina, USA
caparch@conservearchitecture.com
[2] Glass, LTD, London, UK
tm@glasslimited.eu
[3] John Greenwalt Lee Company, Maryland, USA
jgl@johngreenwaltlee.com

Abstract

Since the beginning, man has attempted to make restoration invisible, and then more subtly, less distracting from the artifacts as reassembled. Glass used as fill, both structurally and as interpretive surface, allows us to come tantalizingly close to the theoretical goal. As a membrane defining historic enclosure (where missing) it can protect as a vitrine while providing the armature to suspend the artifacts in their earlier positions. If carefully managed it can mediate the environment within to provide passive conservation. Glass can be stronger than wood and many masonry materials and thus can become a prothesis to complete a structural member within its original dimensions allowing it to be placed back into service using carbon fiber where tension connections are necessary. Laminated glass not only provides redundancy for structural considerations but multiplies the myriad of coating options as well as the ability to imbed OLED arrays allowing computer imaging support of interactive interpretation. When faced with necessity and no other good solution, the authors undertook the appropriate design, structural analysis and physical failure testing to verify the prior statements for an actual project, gaining the support of Rob Cassetti at Corning Museum of Glass. Full scale installations in Plexiglas and plywood to protect some weather sensitive areas were installed demonstrating constructability and visual effect. We feel that this research should not die with our project.

Keywords: structural glass, carbon fibre, historic ruin, Menokin.

1. Introduction

Fig. 1,2: Menokin during mid-20th century at left; and in 2010 at right.

Fig 3: Menokin reassembled with glass providing the structure and fill (Computer rendering by Declan Nevin)

The recipe in hindsight is quite simple. Take one Apple Cube and cut it to the ragged profile of the ruin. Adjust the fins to the thickness of the ruin walls and to positions on either side of openings. Hang structural glass shelves between the fins to support belt courses, floors, doors, and windows. By the way, do not make any places that cannot be reached for cleaning.

Getting there was a bit more difficult. John Lee and Charles Phillips have collaborated for decades. While working to stabilize the ruin at Menokin it became apparent that even though a superstructure had been built, it was so high that it was not protecting the remains, including wooden floors and timbers from rain – then the sun would come out and it was a terrific parasol. Obviously the ruin needed to be enclosed to

Fig. 4,5: Looking up through the Apple Cube Store, 5th Ave. NY, USA; Menokin 3D CAD build out.

Fig. 6,7: The Harry Ransom Center, The University of Texas, USA; Original model of Menokin shown to Tim Macfarlane.

preserve a number of the materials. The superstructure was so minimally structured that it would not allow enclosure. In addition it was considered a visual blight that distracted from interpretation of the site. After lengthy consideration as to where to place the walls of the enclosure [if the walls are too close to the structure then it cannot be reasonably observed from inside the structure – if the walls are reasonably far from the original walls then the enclosure on the site overwhelms the site interpretation.] we realized that from an interpretative point of view matching the original walls was the only place where the enclosure would not be a detriment. Matching the original walls could add to the interpretation by connecting elements and visually providing the building mass.

Phillips as an architect, conservator and perpetual student of museology was often intrigued by the interpretive power of The Harry Ransom Center at the University of Texas which utilizes architectural glass to describe the sort of archival material that is contained in their collection. The Byzantine Chapel in Houston Texas, by François Minel incorporating frosted glass panels to provide the original spatial organization for rescued frescos also provided inspiration into the capabilities of glass. Ads were starting to come out for LCD glass in monochromatic colour; but it was the Apple Cube that connected mental image with reality. Tim Macfarlane was the lead engineer for the Apple Cube glass. Phillips, Lee, and conservator Ellen Hagsten arranged to meet Macfarlane for Breakfast at the 45th Annual (2006) Seminar on Glass at Corning, New York where he was a primary speaker. Breakfast turned into four hours; Tim joined the team and carried the model on stage when he spoke.

This paper is limited to our work directly associated with development of the glass house and associated glass prosthesis concepts. The direction of years of archaeology and documentation of the unpacking process, determination of the original framing plan and matching all of the timber artefacts to the plan, sorting the artefacts removed before the collapse which had been at moved at least twice before being piled

Fig. 8,9: 2005 Photo and 3D position documentation of artefact removal during unpacking the ruin; 2007 Sorting the interior trim removed before 1968 collapse (one room shown minus base and cornice).

into the artefact store room on site [along the way interiors of two other houses joined the disorganized stacks] cannot be dealt with here. We also will largely ignore the stabilization and conservation of the masonry and plaster remains. However it does need to be mentioned by way of context that Menokin was the home Francis Lightfoot Lee, who was one of the 56 signers of the our Declaration of Independence. As such this ruin of a well designed Georgian Cottage is of national significance.

2.0 Glass Fill
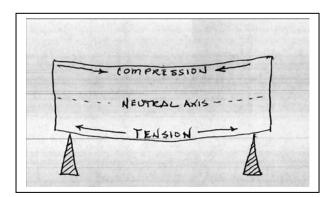
Philosophies of work on cultural properties have long advocated that one not attempt to falsify the record by confusing the old and the new work. At the same time infill must reconcile the losses and allow the artefact to be perceived as it was created allowing for reasonable aging. This often moves toward reducing the visual contribution of the fill. This can some times be accomplished by allowing the substrate to show in the missing areas if it is not too visually strong that it competes with the intact portions. Glass as a fill can even provide the structure when that is missing. It becomes not just feasible but compelling to accept a philosophy of allowing the artefact to be visible in the entirety of its remains while subtly implying the missing components. There is never any question of what is real artefact and what is not. The savings of interpretive time and space explaining what is and what is not, is emence. The visible building is a compelling concept. It allows us create an exhibit of this building as an artefact. It allows us to stabilize and store all of the miscellaneous parts and pieces that have been salvaged in their appropriate three-dimensional locations so that strange markings—evidence—on one piece can be related to apparent damage on other pieces, or a symmetrical location can be found on another piece. At the individual object level, these things are close to impossible to deal with—one cannot find the forest for the trees.

The arrival of Macfarlane really opened the team's eyes to the potential of glass. At that first breakfast he suggested that the glass skin be carried on structural glass fins rather than a metal armature and immediately saw the potential to use glass as a prosthesis for damaged structural artefacts, allowing them to be placed back into service. Under the worst case, the artefact could be suspended between two beams of glass, but as we talked it became apparent that in most cases the glass could be connected to the artefact and carry the original dimensions of the member across to its intended bearing point or other connection. We had been thinking of large sheets of glass as floor where the original boards were long since rotted. Macfarlane pointed out that since the glass was stronger than the original wood and since most of the floors were splined, we could use three layers of laminated glass where the central layer was not as wide as the top and bottom creating the groove for the spline. By using a tinted acrylic spline it would be visible within the floor and interpret the original construction. Since in most cases we could determine the varying widths of the random width floor boards they could just as easily be made the correct widths as they would be cut out by computer.

Several rules of thumb:
1. If glass is laminated with three or more layers, all of the layers can be fractured and the assembly will still carry the design load.
2. Standard glass sheets are about 5 times stronger that wood. This means that a glass beam 1/5 as wide as a wooden element will carry about the same load. 1/4 provides an additional factor of safety and if two laminated beams are spaced so that their outside faces are aligned with the outside faces of the wooden element, the composite provides the visual dimensions of the original with slightly more than two times the strength of the original. [dimensional compatibility and redundancy – a great combination]
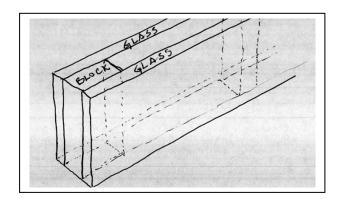
Fig.10,11: Basic forces in a simple beam; Glass beam of two laminated faces with blocks between.
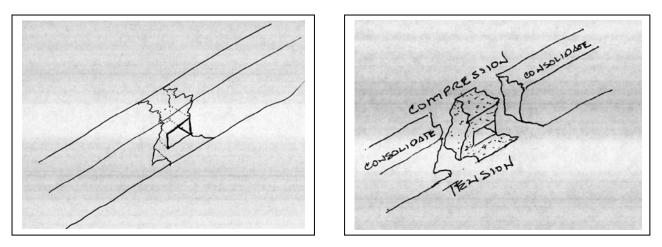
Fig. 12,13: Beam with completely deteriorated area at a mortise; Exploded view with a loose casting to fill the missing portion – if tightly assembled, in theory it only needs a tension connection at the bottom to function. See Fig. 14-17.

3. Standard construction epoxy adhering carbon fibre tape to the face of wooden elements fails within the wood itself; typically at the point where the epoxy ceases to penetrate. This means that high-tech adhesive systems are not necessary to exceed the strength of the original wooden system.

4. No book or computer simulation can tell how a specific deteriorated then conserved artefact fitted with a prosthesis will actually perform. Therefore All members returned to service must be tested individually, and as assemblies where appropriate, to a factor of safety beyond expected loading, in a rig that mimics the attachment that it will have in service. This is not testing to failure, but rather verification that anticipated capacities have been achieved.

Fig. 14,15,16,17: Loose blocks epoxied to a 1.5in. carbon fibre tape in various arrangements from bent causing the blocks to spread and become quite flexible, to very rigid as the blocks come into contact and meet compressive forces. The stick spanning the chair and table will easily support a 200lb. person – the table is likely the weakest element. The three sticks at the right are: at the top a series of blocks with a tape below; the center stick has a 1.5in tape inserted into a saw cut; the bottom stick has the tape fully covering the face. With the tape on the side opposite the force, each will resist more strongly that a plain stick without the tape. Note: the loose blocks do not even need to be attached to the tape toward the center of the span – The tape requires a sound connection to the end blocks only. Attachment to several at the ends helps distribute the adhesive bond strength. A mechanical attachment to the end blocks would relieve the need for any adhesive.
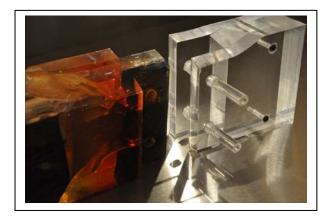
Fig. 18,19: Two views of the initial concept model for the glass prosthesis. The fragment of old wood is not from Menokin and salvaged from an urban trash container. It happened to have an angled top face and thus the top of the prosthesis was beveled at the point of contact. This would not likely occur in actual usage but obviously can be accommodated. The Prosthesis in the model is acrylic.

We went back to the basics; asking what do we really need for this element of the structure to do? Where are the forces and what are their magnitudes? We know that the original configuration was working quite well until the roof was allowed to leak. Therefore if we can work back toward the original configuration that should be adequate. Trust but verify. Most engineering texts and computer simulations are a poor approximation of real life. We are designing for real life not for some mythical computer simulation. Since we cannot look up the critical values for a deteriorated element we are forced into a testing program that will determine element by element what its actual resistance to force is.

Many of the beams and joists have had one or both ends rotted to non-existence. Some have pockets of rot that likewise, no longer exist even as the equivalent of frass. Some are little more than a veneer surface. The realization that a series of loose parts connected by a tension component such as a carbon fibre tape can carry more load than a single element of the same material and overall dimensions without the tape, was very liberating.

The primary point is that one can treat a deteriorated beam that developed serious rot at several major mortise locations 4 to 5 feet apart and is now in 4 major pieces and missing the mortises and put it back into service. There need not be any major armature outside of the piece or major loss of fabric from cutting away material for splices. The new and the old are always apparent, but now one can see where the structure goes and what it was intended to attach to and how the assembly worked. First the individual pieces that made up the element must be consolidated so as to be handled without loss and to be able to resist compression. Then loose castings must be made of the missing mortise portions [no loss of fabric] and if one end is missing several feet then an end transition for a prosthesis must also be cast. The prosthesis

Fig. 20, 21: The initial jigs were quick, crude, but effective. The force gage was old and out of calibration but provided a good comparative analysis.
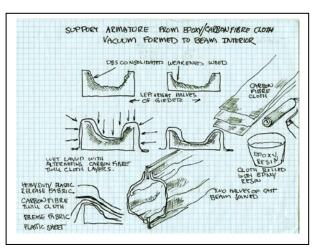
Fig. 22, 23: As the project progressed we got a little more sophisticated. This rig on the left is testing shear in torsion between the wood arm and the carbon fibre faced block seen just below the brim of the hat. The drawings on the right show the steps to making a carbon fibre core for a timber with a rotted center. Note the core will be filled with foam to reduce buckling.

fabricated to dimension and finally two or more carbon fibre tension members must be attached between the end of the prosthesis and the other original end. Test the beam for the necessary loads and put it back in place having lost very little of the information contained in its skin. Joists are just narrow beams with few mortises.

It would be nice to have an easy method to drill longitudinal holes that would essentially allow post-tensioning of the assembly with no visible skin loss. That is something for future research. We also looked at the possibility of creating a woven tube of very open design similar to a Chinese finger locking device like the ones we had when we were children, where one sticks a finger in each end of the woven tube and then the tube shrinks and tightens as one tries to remove the fingers. This wrapped around the assembled original parts and missing pieces would make it whole again while being completely reversible.

Fig. 24, 25, 26, 27: Show the steps described in figure 23.

Fig. 28, 29: Macfarlane and Phillips conferring about details for the East wall enclosure. As with most projects that involve unique detailing, it is best to do much of it on site. The right view shows the Plexiglas enclosure in place before the shading film detailing was applied. Although the glare provides a presence for the glass skin it does not visually over power the original structure. It does temporarily mask the interior which aids in understanding the form of the building.

Fig. 30, 31: When not standing where the glare is brightest, one can see the plywood fins. At the right the cast concrete bases for the fins are easily visible – a more elegant solution can be found. There is a sheet of plastic between the concrete and the historic masonry as a bond breaker. Interpretively this relationship with the glare also allows one to see the interior makeup of the building and how it goes together (form/detail).

We were faced with a problem of temporarily protecting the wooden floors and plaster in the North East Quadrant. Rain was blowing in and we could not wait until the whole glass house was funded. After rejecting the initial suggestions of a tarp, which would be difficult to control in a wind and probably dangerous; not to mention ugly. Then rejecting a plywood wall which would be comparatively expensive and just as ugly as the tarp; we proposed an equally expensive option using this as an opportunity to mockup the glass house concept and get some constructability knowledge about actually getting things into place. It is one thing to draw the fins in place, but how do you get them into place? How do you control a large fin without knocking down the ruin in the process? How close do you cut the contour (We chose 1/2in. – it worked) of the only fin that must embrace a portion of the wall where the outside half thickness collapsed leaving the interior half still holding up the second floor? Needless to say we learned a quite a bit.

We chose to use MDO plywood over a 1.5 in thick wood frame for the fins. This was 2.25 inches thick while the glass was intended to be only 2 in. but the wood was readily cut and manipulated on site. For similar reasons of on site adjustment we chose Plexiglas over true glass. Actually from a structural standpoint the real glass would have been a better choice and its rigidity would have made some of the end connections less of a problem. This being a temporary construction the cost difference was also in the favor of using the alternate materials.

The costs were minute however when compared to the current interpretive value and the ability of this mockup to sell the final product. Again it is one thing to talk about the visual impact and a computer rendering looks awfully good but a full scale portion in place is stunning and hard to argue with.

The interpretive value of the glass is immediately apparent. The ghosted in window stones and sashes could even be less pronounced but even as it is, the understanding of the building that it conveys is tremendous. Without the frosting how many visitors realized that the straight sections of the broken edge of the wall were actually the edge of the window stones? It takes much less imagination now to start to connect the elements to the missing corners and imagine the house complete; either as original or as envisioned in glass. What opportunities would be available, what exhibits could one develop with the ability to change the image on the glass? Make it display whatever can be created on a computer screen and then animated? This is a house of Georgian design and it was based on Classical proportions. What if, as one described the descriptive geometry of the façade, the construction lines appeared there in the glass? Menokin is located in the small rural community of Warsaw, one hour from Richmond the Capital of Virginia and about two hours from Washington, DC. Why not invite the town and surrounding neighbors to a picnic on the grounds and when
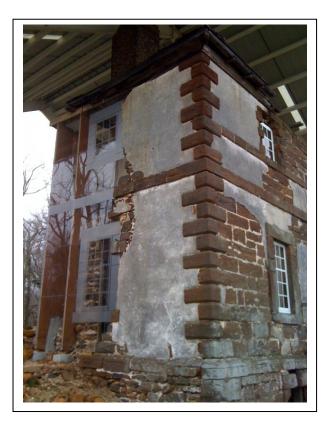
Fig. 32, 33: These views show the appearance of the shading film detail from the exterior and the interior.

the s un s ets, show a m ovie l ike "Star W ars" on a p ortion of t he f ront f açade? In t erms o f s parking t he imagination The Corning Glass Company has published a video on YouTube that may surprise you. Actually they have recently released an update: "A Day Made of Glass 2." They are both worth watching. How would you use gl ass as i nfill? We hop e t his pa per op ens t he do or t o m ore i nventive us es of gl ass i n her itage conservation and thank Hugh Miller, Richard Wolbers, Rob Cassetti and Peter Drobny for their kind support.

More information on our work at Menokin is available at
http://www.johngreenwaltlee.com/menokin/Home.html

Fig. 34: This is a composite of three views from http://www.youtube.com/watch?v=jZkHpNnXLB0

The visual description of the piedmont landscape in the historical iconography: from *Theatrum Sabaudiae* to landscape paintersd of eighteenth-nineteenth century

Maria Paola MARABOTTO
Facoltà di Architettura, Università degli Studi di Catania, Italia
mp.marabotto@gmail.com, maria.marabotto@polimi.it

Abstract

This study proposes the Piedmont landscape overview and comparison of some iconographic images, from Theatrum Sabaudiae (1682) to the views of artists, painters and engravers of the eighteenth-nineteenth century. The comparison of similar representations of the same city or part of a territory has highlighted the diachronic changes of different places and the landscape that contains them.

The landscape, understood as an expression mediated between territory and attendance anthropisation, was analyzed through the study of graphic documents of the city of Turin and the surrounding area made by Italian and foreign artists who passed through the Piedmont during their travels in Italy.

The paintings by Bernardo Bellotto (1721-1780) made for kings and princes of the House of Savoy Savoy now exhibited at the Galleria Sabauda of Turin and drawings by William Turner at the Tate Gallery in London kept describing, with different languages, different aspects of the same place. Therefore it is important to the comprehensive interpretation of the territory starting from the understanding of the changes of settlement, economic and social *topos* of using heterogeneous fields of investigation, which show the change of land use under the most varied aspects.

The critical comparison of the iconography of a particular historical period, realized through the present study, is one of the possible research areas, integrated with other, leads to true Knowledge of a place.

Keywords: historical iconography, landscape, Piedmont, perspective views

The visual description of the piedmont landscape in the historical iconography

The territory is a space defined by a set of physical characteristics that appeal to principles or ecological, institutional or economic or cultural. When people acquire knowledge of this individuality land where they live, they play those processes of construction which, with their sediment and interbreed, they produced the landscape. Land and landscape are categories highly interconnected in a single, larger historical design. They are a set of tracks, historical stratification of elements, culture and signs.

The landscape is understood as an expression mediated between the community and attendance anthropisation, as the relationship that develops between the built and natural elements, through historical, political, and cultural production that affect the transformation of the environment by man. Understanding this relationship is the basis of any knowledge of the area and allows you to identify the dynamics of change in which you insert the control of the further transformation processes.

The rural buildings, civil, religious, cultures, channels, paths, road networks, making up the signs of human presence on the territory, lose, on a regional scale, the significance of that unit and become elements of a comprehensive set of objects homogeneous built into the landscape. Their definition is tied to the prime

factors of colonization of the territory and its organization, as the conquest, settlement, exploitation, production, control the defense and civil and political administration; through each of them one can reconstruct the history of transformation of the landscape.

Are part of the landscape many relevant factors such as the coastal areas, rivers and lakes, mountains, parks, reserves and forests. But there are other landscape situations, particularly those related to human settlement of the land as agricultural landscapes, the signs of the roads, the geography of city centers, and all those elements that are subject to frequent changes.

Just because these items are considered significant and important in the complex system of relationships between humans and the environment, it is important to make an integrated interpretation of the territory, starting from the need to understand the dynamics of settlement, economic and social topos, linked to natural resources that have influenced the choice of a site. To do this it is important to use diverse fields of inquiry useful as indicators of change and land use under the most varied aspects.
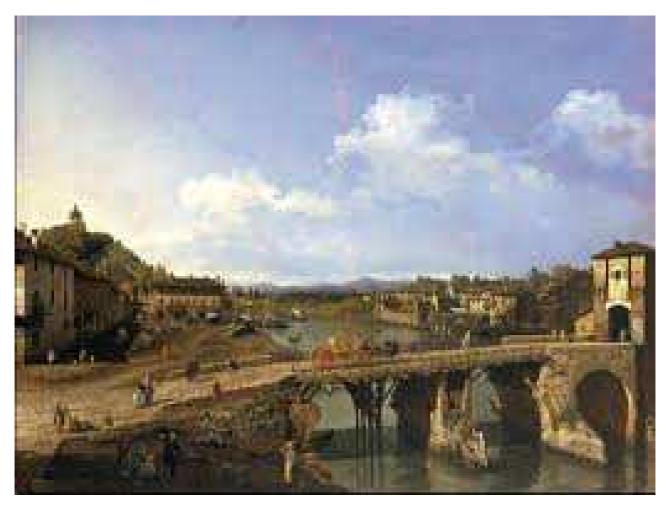
Fig. 1: Bernardo Bellotto, *The Ancient Bridge over the Po in Turin* 1745. Torino, Galleria Sabauda.

The study has investigated the Piedmont landscape through the review and comparison of some iconographic images, starting from the engravings of the *Theatrum Sabaudiae* (1682) - one of the most important documents for the knowledge of the Piedmont region in the late XVII century - to the views of artists, painters and engravers of the eighteenth-nineteenth century.

The *corpus* of one hundred thirty-four engraved plates that make up the *Theatrum Sabaudiae* covers different types of representations including orthogonal projections - plans, elevations, sections - axonometric, perspective, views and a bird's-eye perspective. And between subjects also very different: his court offices, military, civic and religious monuments, pleasure villas, hunting lodges and castles, fortification systems, ports and fortresses, monasteries, abbeys and views of the capital and major cities of the duchy. The great variety of subjects involved the use of different methods of representation at different scales, ranging from

urban scale to the geographical scale and reach to the architectural scale. Of one hundred thirty-four sixty-five incisions are drawings of cities and fall within the category of urban iconography which has as its purpose the "portrait of the city" that celebrates the city itself. This political and ideological intent requires that the urban image is captured in its full extension for which you choose privileged viewpoints able to make the shape urbis in all its spectacular potential.

Fig. 2: Bernardo Bellotto, *View of Turin from the Royal Gardens,* 1745. Torino, Galleria Sabauda.

Considering the period in which these representations have been realized, taking into account the technical and scientific culture of the time, we can say that the perspective view and the profile can be made with an observation *vivum* to the city, often supported by the use of proper instrumentation. The plan and bird's-eye view but are not the result of a real visual experience, but the result of a process of abstraction. In particular, the bird's eye view of itself as an alteration of the urban structure, obtained through a geometric procedure that is obtained through simulation of the flight that had not, at that time, real feedback. This was often performed as an axonometric foreshortened, a representation which exerted great fascination on the viewer and that is why they emerged as the most popular type of show for the urban images. The point of view very high offers the possibility of recreating urban space so that it is viable and recognizable in all its parts and provides an image of the city as a whole and with a good reliability topography.

The *Theatrum Sabaudiae* represents one of the most important works for the knowledge of the Piedmont region in the late seventeenth century. It was intended as a photograph of anthropogenic and natural area that offers a depiction of the political aspirations of the House of Savoy.

The critical comparison involved some engravings in the *Theatrum* representing the city of Turin and a few paintings and drawings of a later period. At the *Galleria Sabauda* of Turin are preserved two oil paintings by Giacomo Bellotto, Canaletto's nephew, the painter who lived between 1721 and 1780, which represent two views of Turin: *View of Turin from the Royal Gardens* and *The Ancient Bridge over the Po in Turin*, made in 1745. Commissioned by Carlo Emanuele III and unusual cutting decentralized to them was assigned the spread of the new image of modern European capital, the king of Savoy wanted to offer the city of Turin, together with the beginning of major modernization work of the Royal Palace.

The first view was compared with the table eight in the first volume of the *Theatrum Sabaudiae* which represents the reverse of the painting of Bellotto. The incision, made a drawing of Giovanni Tommaso Borgonio in 1665-1666, representing the *Bastion Verde* including the facade of the Palazzo Reale to the gardens with bastions seen from the south instead of north as the painting. The difference between the two different techniques of representation highlights different characteristics. The sign of the incisions is essential, of great clarity and effectiveness, and waiving of naturalistic landscape painting with a concrete and without force result. The picture that emerges is clean and inspiring solemnity thanks to an effect of optical expansion that expands the existing and part of the vision real simple projects.

Fig. 3: *Turin, Bastion Verde.* Theatrum Sabaudiae, Amsterdam, 1682, vol.I. Engraved a design by Giovanni Tommaso Borgonio, 1665-1666.

Painting by Bellotto the clear light brings out the imposing facade of the Palazzo Reale to the garden, while quick and brilliant brush strokes describe the details of the laundry hanging in the sun and the workers on the scaffolding of the bastion. The artist's interest is always double so as to depict the monumental architecture is that the suburban areas. The large size of the canvas along with the point of view at the top and the open view, contributes to the construction of large and airy image that anticipates the views of Dresden, Vienna and Warsaw were made following the author.

In landscape painting the basics are the documentation of the places, the artifice of the embodiment, the composition selected. But the constant element of the view is the perspective, even before the topographic fidelity. The view can be *"taken from the places"* that is exact, natural, but also *"invented"* that is of whim or fancy, but it is important the correct representation of the buildings, with their planes, edges, and the views expressed accurately; a chronicle of architecture as solid geometry and the theory of shadows. The purpose

of likelihood perspective is to stimulate the sense of space which must be reflected in a broad overview of the architectural centerpiece of our representation.

The time difference between the two representations shows a different urban setting. The engraving shows buildings around the royal gardens - the sleeve of the Royal Library with the Military Academy - and the ramparts graphically represented with a sign-linear, no-frills with the tower in the ravelin less impressive than that represented in the framework of Bellotto. As part of the venetian painter, left, check the roofs, including the Royal Palace and the cathedral, a polygonal dome of the Chapel of Sacra Sindone by distinctive design, hand engraving of Borgonio not present because they do not yet taken the time. The landscape outside the moat is not treated in the engraving of the *Theatrum* probably why it was necessary to give as much prominence as possible to the residence of the Savoy and its gardens. In view of Bernardo Bellotto space over the moat is defined and described, and the view extends over the next bastion in the background until you see the hills and the Alps.

Fig. 4: *Turin, Piazza Castello* Theatrum Sabaudiae, Amsterdam, 1682, vol.I. Engraved a design by Giovanni Tommaso Borgonio, 1674.

The panel five in the first volume of the *Theatrum Sabaudiae* rapresents Piazza Castello view from the south. Engraved by de Hooge Romyn designed by Giovanni Tommaso Borgonio and dated 1684, shows the square at a time of lively city life; on the big rectangular space, carriages, horses and people during at an event. The square is surrounded by the imposing buildings of representation that still crown the perimeter of the urban. A medieval castle on the right without the current Baroque façade of the Palazzo Madama, attached to the Royal Library by the Gallery no longer exists. On the left the long facades with wide porches on the ground floor and the Royal Palace in the background with the front yard separated by a fence with a large square with arches and a central door with three tiers. A similar representation of the square, over the previous incision, is a painting by Antonio Tempesta (1555-1630) kept at the Galleria Sabauda entitled

Competition in Castle Square in Turin. The square is seen from the south to the Royal Palace and central point of view very high place that produces a central perspective of great scenic effect. The buildings that overlook the urban space are still present today, although modified in prospectuses. The medieval castle has two towers on the façade now incorporated in the baroque facade of the Palazzo Madama; the fence that divides the square from the courtyard of the Palazzo Reale does not have the door with three floors and facade of the palace of the King is resolved geometrically differently. In the painting the prospectus is solved with three vertical partitions with the central part which has a more dignified façade crowned by a cornice with statues. In the engraving of the *Theatrum* the facade of the building is equal to that of today, with regular course and two towers at the ends of the building that will rise above the roof of the downtown area. In the two representations do not include the dome of the Chapel of Guarini and designed the bell tower of the Cathedral on the left image.

Fig. 5: Antonio Tempesta,*Competition in Castle Square,* fine XVI secolo. Torino, Galleria Sabauda.

The end result of representations is that of a precise determination of the dynasty, which makes great reality of the territory, enhancing wealth, population density, urban centers, factories, defensive structures, to underline its aspirations of power in Europe.
Research has completed a comprehensive interpretation of urban land through the comparison of iconographic images, starting from the understanding of settlement dynamics and using disparate research fields, which are useful as indicators of change in use of urban spaces. The critical comparison of the iconography of a particular historical period is one of the possible research areas, integrated with other, leads to true Knowledge of a place.

Fig. 6: Joseph Mallord William Turner, *Turin, The Castle Squar.* From Turin, Como, Lugarno, Maggiore Sketchbook,1819. London, Tate Gallery.

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Density changes in the redevelopment of the urban spaces

Carlo Alessandro MANZO

Facoltà di Architettura "Luigi Vanvitelli", Seconda Università di Napoli
Dipartimento "Cultura del Progetto"
e.mail: carloalessandro.manzo@fastwebnet.it

Abstract

Density control and ground-modelling are important factors to work out the redevelopment of urban spaces, both in the old cities and in the new urban settlements. Their smart use can help to carry out solutions within a good environmental sustainability first of all opposing to the waste of lands in the metropolitan territories. In order to improve private and public spaces of the contemporary city, we must study the best strategy to change the town-central areas, sometime reducing existent built volumes (or parts of them), sometime increasing the density in case of suitable places, any way to gain open spaces and green areas. The urban projects criteria I will deal with, use ground-shaping techniques to achieve essential solutions increasing green areas, and to answer to environmental sustainability and energy saving needs. These projects, designed for different urban contexts, create some "hypogean" modern architectures, (aimed to get underground useful spaces for utilities), trying to get some advantages: efficient solutions insulating buildings by thermic variations, protected spaces close to the new utilities, and safeguards of green areas creating grass-lands and roof-gardens over the new spaces. In order to investigate these problems the paper will exemplify the architectural designs for Vanvitelli residential area (Caserta), for Tor Bella Monaca social housing (Roma) and for a small square built in Cesa (Caserta).

Key words: redevelopment, urban design, density

1.   The density in the social housing redevelopment

Here I will speak about few architectural designs, made up in different urban contexts, underlining the problem of density and volumetric evidence in the singular place of the city. The density control is really an important factor to work out the redevelopment of urban spaces, both in the old cities and in the new urban settlements. Its smart use, maybe helped with ground-modelling techniques, can help to carry out solutions within a good environmental sustainability, first of all opposing to the waste of lands in the metropolitan territories. If we consider the needs to improve private and public spaces of the contemporary city, we must study the best strategy to change the town-central areas, sometime reducing existent built volumes (or parts of them), sometime increasing the density in case of suitable places, any way to gain open spaces and green areas. These urban projects use ground-shaping techniques to achieve essential solutions increasing green areas, and improving the environmental sustainability and the energy saving needs. Within the different composition proceedings, I tried also to create some "hypogean" modern architectures, (aimed to get underground useful spaces for utilities), not only to achieve a good architecture, but also to gain some advantages: efficient solutions insulating buildings by thermic variations, protected spaces close to the new utilities, and safeguards of green areas creating grass-lands and roof-gardens over the new spaces.

The redevelopment of public residential neighborhoods has been tackled in recent years with different levels of transformation depending on the approach to urban planning. On the one hand, there is a tendency in Europe to demolish buildings, motivated by a rethinking of the very idea of the large neighborhood, which is criticized for the lack of individuality and the high density of its distinctive features (towers, vertical residential units, etc.), quite apart from any architectural considerations. In the contrary direction, there is a will of restoration which, beyond economic and social reasons and population density, seeks to prevent the demolition work from

cancelling an important part of the rationalist experience. In terms of the techniques and the composition, the approach to restoration is motivated by criteria of environmental sustainability and efficient land use. Indeed, various schools of thought on residential architecture are reproposing compact designs with concentrated densities. These represent convincing reasons against the indiscriminate demolition proposals by means of which the supposed drive towards renewal often masks interests in property speculation (as in the recent case of Tor Bella Monaca in Rome). In terms of the quality of the urban layout and the architecture, many public residential neighbourhoods were built in Italy during the post-war period by important architects represent a heritage of historicized works of the modern city which should lead us to consider them as a resource for future urban transformations. A selective approach to restoration should safeguard the identity and character of this architecture, while offering a critical reinterpretation of outdated aspects.

In order to address this issue properly, it is important to bring specializations together within a unitary approach to architectural design. This is important for ensuring that the various components of structural and technological refurbishment, and environmental sustainability, are incorporated within a truly architectural perspective that also lays emphasis on the urban context. Even if the renewal of these recently built settlements is considered as "modern restoration", any proposed transformation should interpret the original features following the compositional approach behind the original work. This idea of *critical continuity* should not be restricted to mimesis and restoration but should consider the possibility of pursuing alternative paths and achieving unexpected results. In order to investigate these problems the paper will exemplify the architectural designs for Vanvitelli residential area (Caserta), for Tor Bella Monaca social housing (Roma) and for a small square built in Cesa (Caserta).

2. The densification in the IACP area "Luigi Vanvitelli" in Caserta

In the Prin-research (National Research Project involving departments of the Universities of Rome, of the Second University of Napoli, and departments from the universities of Palermo and L'Aquila) we selected a significant sample area for testing the densification criteria to redevelope the area. Considerable importance was given to the "structuring" role of the system of free spaces and courtyards which, in different ways, demonstrate the persistence of pieces of countryside which are inserted between the houses. The interweaving between green spaces and building is one of the innovative compositional principles of the modern city, and this has convinced us to focus on "courtyards" as the organizational core of the redevelopment of districts and as a central place for the services and productive activities. The various possibilities for intervention include the techniques of land modeling which incorporate the new spaces in underground structures, reducing the occupation of courtyards and increasing the surfaces of green areas. A key factor is given to productive green space with the aim of assessing, through measurable experiences, the recent popularity of urban vegetable plots and gardens.

In the Iacp Ina-Casa "Luigi Vanvitelli" residential area in Caserta, (designed in 1963 by a team led by Mario Fiorentino) made up of rows of buildings and tower blocks, an important role is played by the structure of free spaces made up of a system of courtyards arranged around a large central courtyard-garden. The intensive building activity that is saturating the rural areas gives a special emphasis to the size and quality of the free spaces of the district compared to the widespread fragmentation of buildings.

The main themes for modernizing the settlement concern the addition of services to the district and the upgrading of access to the houses.

The criteria of densification have been adopted by inserting within the large courtyard several buildings that meet both the domestic nature of the district and the requirements of an urban scale. Thus the large courtyard-garden contains new buildings without contradicting the unitary character of the collective space.

The additions are precious objects, linked to paths, barriers and excavations. They create new discontinuous profiles which break up the view of the continuity of the large walls of the buildings. In the "a pilotis" groundfloor area of the Vanvitelli district, densification involves the inclusion of small volumes designed to act as *social-rooms or shops*. In order to resolve the problems of access to the houses, new structures are created for the lifts which are directly grafted onto the balconies of the individual houses, creating new entrances to the residential units. This solution expands the balconies with *brise-soleil* and vertical gardens, creating a discontinuous design which partly breaks up the structure of the original facades without hiding them.

2. Ground-modelling in a Tor Bella Monaca residential court, Rome.

An interesting example is the Tor Bella Monaca district, a large settlement of over 25,000 inhabitants built in Rome in the eighties. In contrast to the design of Leon Krier presented by the council administration of Rome which plans for demolition and rebuilding, various Italian university departments have developed studies and proposals for redevelopment.

Despite certain weak points, Tor Bella Monaca has a clear structure "divided into distinct parts", a significant number of free spaces and a carefully structured typological composition of houses which (when suitably refurbished and joined to low houses) can play an important role in the relationship between the metropolis and the surrounding countryside. The mixture of functions and typologies (lines, courtyards and tower blocks) enables an effective relationship between land, open spaces, infrastructure and buildings which, in the city council design, was entrusted solely to the building-road relationship. Indeed, the Krier's design, supported by the council administration, proposes a densely inhabited residential district of a nineteenth century mould with an emphasis on single function residential units, despite the problems of sustainability and extensive consumption of the Roman countryside.

Instead, by following a perspective based on redevelopment, it is possible to count on the fact that currently almost 40% of the open spaces of Tor Bella Monaca do not have a definite purpose and can be used – using the criteria described above and without further consumption of the countryside – for a range of purposes such as private offices, shops and craft centres, and services. It is therefore possible to density and build on built-up space. With the construction of spaces for work activities and private services, using the experience of project financing; services on a scale with the urban sector (library/media centre, multiplex cinema, etc…); services on a scale suited to the district (for the elderly, children etc.), residences for different users (students, temporary workers, co-housing, etc…), it is also possible to "redesign" current public residences with different sizes of accommodation and services.

In the "redants" system designed by Barucci and Passarelli in the R5 sector, the proposed transformation criteria concern both the rationalization of existing housing in residential courtyards, and the inclusion of structures for the service industry in courtyards facing in the direction of the city. To overcome the problems of the weak points in the sector (the presence of housing on the ground floor overlooking the street, the lack of differentiation of the residential types and the lack of low houses), the priorities of the programme concerning the change of density were so identified:
-Reinforcement of the features and quality of the urban layout creating green corridors.
-Varying the range of residential types by introducing, in the large courtyards facing the countryside, terraced houses with gardens and houses with patios.
-Replacing the accommodation in the lower floors of the courtyards with service industry functions.
-"Targeted" demolition of the residences in low buildings, replacing them with tertiary sector activities or public services.

4. The rebuilding of a small square in Cesa

The architectural design for the rebuilding of a small square in Cesa (CE) starts from the need of replace the old power station, now out-of-date. It regards a triangular space on a trivial wide stretch, located in the entrance point on the way to the town-centre. Till now this space had been built with the 4 meters high block of the former power station, on which was fixed a Madonna Statue, very important for the local believers. The requirement program asks for a new power station with a plan of m 3,00 x 5,60, in a partial basement room but with minimum 1.50 meter free upper the ground level. Considering the small dimension of the suitable area, we used this new technical building to separate the main traffic street from the pedestrian place, usable for walking or resting. This small space with stone benches is reachable by a slope *path* along the power box side. The new pedestrian system allows to walk inside the new square reducing the basements dimensions on the roads.
-In this urban project the new power box is composed in a big stone wall, closing two sides of the space in order to form a small terrace higher than street, protected from the traffic, and in the same time to give an unitary solution well characterized for the passer-by. The wall covering has a "texture" alternating smooth and *bushammered* surfaces. For the benchs and the floors we used the same Trani materials, but the basements are paved with dark gray *piperno* stones.
The continuous design, both on the top and on the wall, is broken off with the fountain green marble slabs, well visible in the night for the lightened falling water.
The Madonna image is located in a remarkable but not central position, coherent with the theme of stone wall recint, facing to the benches of the small new square. She is covered with a thin structure in white and blue marble. This solution underlines that the statue place belongs to the whole walls system.
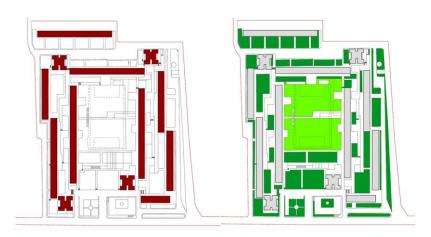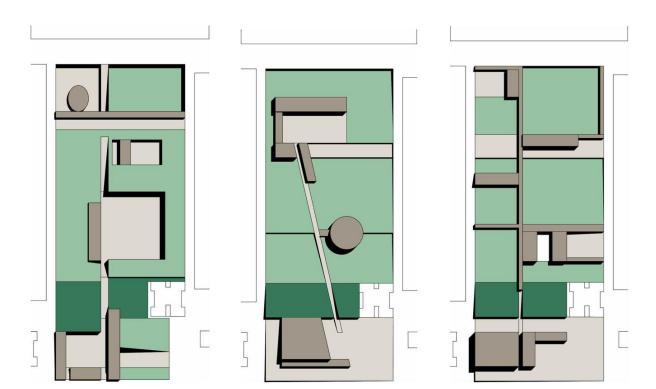
Fig. 1-2. IACP-Residential area "Luigi Vanvitelli" (Caserta) –Original plan and actual green areas (above)- C.A. Manzo, A. Santacroce: Three schemes for the densification of the central green court (below)

Schema "per modellazione del suolo"   **Schema "per elementi"**   **Schema per recinti**

Fig. 3-4: IACP-Residential area "Luigi Vanvitelli" (Caserta) – Central court design, research thesis of M.Antonia Giannino, prof. C.A.Manzo with A. Santacroce co-tutor, Faculty of Architecture of Second University of Naples.
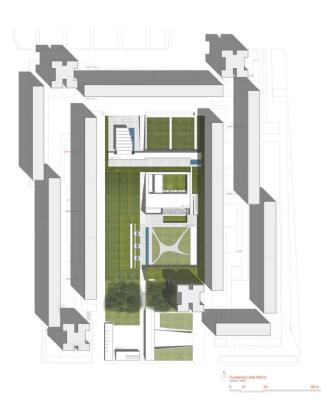
Fig. 5,6. Densification in Tor Bella Monaca R5 housing court, urban project. Degree thesis of Dionigia Barbareschi, prof. C.A. Manzo, Faculty of Architecture of Second University of Naples. General view (above), west side view (below).
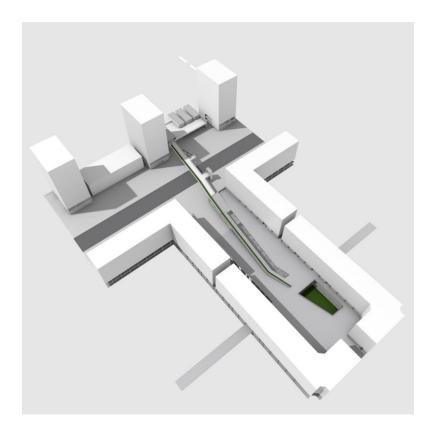
Fig. 7, 8, 9. Densification in Tor Bella Monaca R5 Court- Urban project. Degree thesis of D. Barbareschi, prof. C.A. Manzo- Section and market plan (above), view of market hall (below).
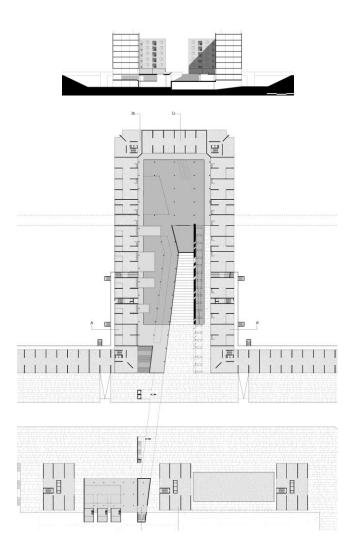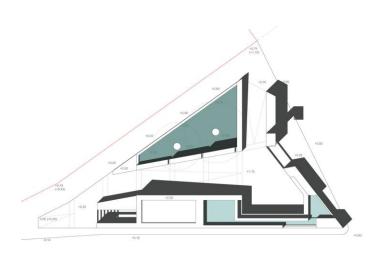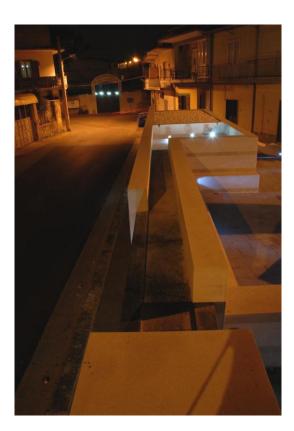
Fig. 10, 11, 12: New power station in Cesa (CE), 2008-2010. Agreement between Faculty of Architecture "Luigi Vanvitelli" (Second University of Naples) and Municipal Technical Office of Cesa: C.A. Manzo (head project), E. Pitzalis, G. Cioffi, A. Santacroce (*photo E. Spera*)

In search of a strategy to bring back Iranian windmills to local life cycle

Saeid Golestani, Somayyeh Sharifzadeh
 Faculty of Architecture and Urban Planning, Ferdowsi University of Mashhad ,Mashhad, Iran.
Said.golestani@gmail.com&; sharifzaeh_s85@yahoo.com

Abstract

To control the environmental conditions, people of many part of the world have chosen the way of reconciliation with nature. The effects of such approach are seen in different climates in different forms. Among all these approaches, the mechanical methods employed for generating energy are the samples that reflect human wisdom and intelligence in utilizing the environment facilities. Windmills are one the most exclusive items that convert uncontrollable powers of the nature to useful energies. The origin of them must be searched for in the east, and especially Iran. The remains of a unique form of this invention, which dates back to around 2000 years ago, can be found in the eastern regions of Iran, i.e. South of Khorassan and Sistan & Baluchestan. These structures as one of the most outstanding native buildings stand against the wind and their tall structure reflects the glory of the civilization of their producers and as Seifollah Bakharzi said: "They move around science axis".

   Deserting windmills due to the invasion of modern technology on one hand and starting destroying and renovation of adjacent contexts on the other hand, gradually pales the connection of these structures with the city and accelerates their destruction .The writers believe that knowing windmills is a way to understanding the deep link between economics, culture and local knowledge of the people who have chosen the harsh nature for their residence.

   In the present paper, the writers intend to present a precise interpretation of a range of Iranian windmills located in Nashtifan, near Iran-Afghanistan border through field study, analyze them and show a clear picture of the different aspects of such constructions, including their architectural and mechanical features, and their cultural position in the life of this secluded area. The writers emphasize the significance of global attention to this valuable site as one of the first origins of using wind energy. To do so, after a review on the history and evolution of Iranian windmill, and showing their position in the customs and traditions of the people in this region, the different parts of a windmill will be discussed and analyzed in two parts: Mechanical, and architectural structure. This will be done through maps and 3D models. At the end some suggestions will be proposed to renovate windmills and return these structures back to the living cycle of local society. In this regard some measures will be surveyed like establishing museum site to attract tourists and running the windmills to generate electricity for local community.

Key words: Windmills, Local technology, Local community, Local economy

Preface

The time human used the wind energy is not completely clear; but a many researchers say it was Iranians who controlled wind energy to move the mill.

   Iranian windmills has spread through Eastern part of Iran specially in south part of Khorasan and Sistan . They are the symbol of Iranian wisdom in controlling wind energy and changing it to useful forms of energy. As we will discuss afterward, Iranians found a simple but wise structure which was based on environmental facilities through centuries that is a mixture of mechanical science and architectural art.

Now, our role for preserving this valuable memorial of our ancestors which with no doubt is the result of hundred years of effort and experience should be emphasized.

Through this article, we want to emphasize on importance of more researches by exact and documentary introduction to Iranian windmills with a comparative approach from a new point of view. So with a review on history and the changing process of windmills and looking at the special type of climate of eastern part of Iran as the main factor of windmill formation, we will have a look at different parts of windmills.

In spite of two dimension diagrams, three dimension details of windmills based on exact checking will be presented. After ward in order to find out the differences between Iranian windmills and European types, in a part of article, we will have an introduction to the structure and manual of European windmills. At the end, the importance of a review in wind turbines from the two points of view will be reviewed.

Figure 1.View of wind mills in Nashtifan village in Khaf area. (Source: Internet)

History and changing process of Iranian windmill

Some researchers believe that the wind mills came into use 200 B.C (Balkhi, 1974) Ebne khaldoun[1] believes that the windmills in Sistan were in use before Arab rush to this land. The first source which you can find something about wind mills is an old Indian book named Arthosatra of kantili in which windmills invention goes back to 3400 years ago which it means 1400 BC and in that book was mentioned that windmills were used to move up water. (Farshad 1997, P.99)

Windmills as source of energy in Greek and Roman civilizations were unknown. The documents after Islam have clearer information about windmills which were used for grinding grains and moving water up.

The oldest written document in which you can find the word windmill is Masoudi history in that there is a dialogue between Aboulolo, the Iranian slave, and Omar, the khalif of Muslims. Aboulolo implied his ability in making a windmill (Masoudi, 1986, P. 677)

The writer of Sistan hisrory[2] writes: … and the other thing is that they build windmills to be worked by wind and they make flour out of wheat, but in other cities there is a need for animals or water to grind the grains. They also have built a kind of wheel to get out the water from well for their gardens and farms … and they get several uses out of wind … (anonymous, 2002)

These all present the long life of using wind energy by the wind mills. Ansari Dameshq[3]has drawn the oldest drawing of the windmill structure in Sistan. In this book, he has drawn many pictures of the visited sight-seeings and wonders by himself. Using them, now we are able to get informed of their structure. The structure that he has drawn is not the same as what you can see today, in fact the main structure is the opposite of what exists today. Turbines of windmills in that time and probably before that were at the bottom and the stone mill was at the top and it has been a model of watermill in which the turbine was moved by wind instead of water. (Modarres Razavi- …)
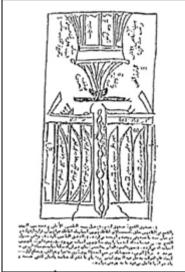
Figure 2.The windmill structure related to Ansari Dameshghi time. (Source: Nokhbe Aldahr book)

120 day winds as the main factor of Iranian windmill formation

Structure of wind mills can be seen just in some parts of Iran because its Function depends on strong, continuous and long time winds, so you can have them only in places where you can find wind so strong that it can move the heavy and huge mills. Sistan and Khaf in Zoozan fields have a type of wind called 120 day wind and this caused the wind energy to be used by natives and windmill was invented a long time ago in this land.

This wind start point is from the heights of Pamir and north of Afghanistan that first comes to Iranian and Afghan borders and the strong flow of that is in Sistan. Some reports say that the start point is in western part of Herat. It starts in early of May and continues to September and even October for this reason it is called 120 day wind.

Wind flow in Sistan continues in all seasons in Sistan and the most Cases are in summer. From September afterward the weather is more calm. Based on statistics at weather for casting station in Khaf (the nearest station to wind mill area) in recent 3 years (2007 – 2009) the highest average monthly speed of wind was for mordad which was 23 meter per second and the lowest one was for Aban which was 11 meter per second. In this area which is under the influence of 120 day winds, wind blows in more than half of the months of the year by an angle between 50 to 70 degrees, and in other months 170 and 320 degree winds are quite common.

Mechanical system and architectural structure of wind mills [4] :

Before taking a look at how Iranian windmills work, we should know about different parts and some idioms and words related to them. Below you can find the very important ones their plan and picture.

Mechanical system [5]:

1. Kharpol: To control the vertical axis in upper part a wooden axis is used with a diameter of 30 centimeters and about 4 meters long which stands on the side walls that the main axis of wind mill comes in the inner whole of the wall.
2. Tirpol: A wooden axis with 35 centimeters in diameter, in a round Shape contains 3 connected parts of pine wood. The turbin connects to it.
3. Bahoo: They are woods, 175 centimeters long and around 7 centimeters in diameter that connects the turbine to Tirpol.
4. Par: woods 15 to 20 centimeters wide and around 1 centimeter in diameter around 6 meters long that in each turbine 4 to 5 of them are connected to each other by Bahoo. Because of their resistance against wind the interchange the energy for wind mill.
5. Tavareh: It is a metal bow-tie like around 36 to 50 centimeters long which its width in the narrowest part (in the middle) is about 6 to 7 centimeters and the thickest part is 7 to 12 centimeters. Its diameter in the narrowest part is 2 centimeters and the thickest part is 12 centimeters this metal piece comes inside the

whole of upper stone mill and by the thick and metallic shaft which is at the end of Tir pol, it is run around and the windmill is run.
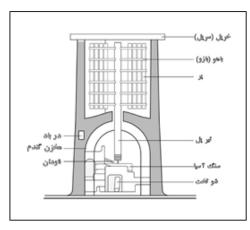
Figure 3.Section of a windmill in Nashtifan village. (Source: Writer)

6. Moushteh wood: A conical wood, 40 to 50 centimeters high and at least 3 to 4 centimeter in diameter and 13 to 15 centimeters in maximum by   which the interval space between the stone mills can be changed so the grind size can be determined.
7. Leakage: A wood around 15 in diameter and 60 long in which from its whole inside wheat from supplier is moved to stone mill.
8. Lak lakeh: A wood 40 to 50 long and 5 centimeters in diameter which is connected to leakage from one end and the other is free on stone mill; by its vibration wheat comes into leakage entrance.
9. Daneh kesh: woods 2 canters in diameter and 10 to 12 centimeters long which is connected to the walls of wheat supplier by a string. Using optional numbers of them in leakage, the amount of wheat comes into stone mill can be determined and by its vibration wheat step comes into leakage.
10. Wind gate: It is a canal 50 centimeters wide and long that leads wind from the back of windmill to a place inside it and used for blowing wind into wheat and cleaning it.
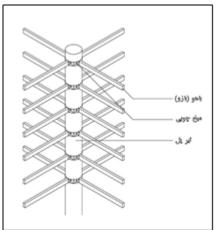
Figure 4.Wind gate position on interior and exterior walls. (Source: Writer)

11. Stone mill: It is a consist of two pieces of upper lower part they are around 35 centimeters thick and weigh around 900 kilo grams. The upper part is not fixed while the lower part is fixed and it has a whole around 20 centimeters in diameter in diameter in center called Galougah from their friction wheat changes into flour.
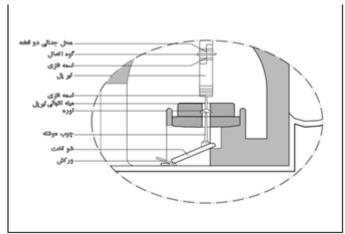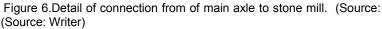
Figure 5.Detail of turbine of windmill. Writer)

Figure 6.Detail of connection from of main axle to stone mill. (Source: (Source: Writer)

Architectural Features:

One of the specifications of windmills is the mixture of mechanical science and architectural art and structure which is a native innovation and a masterpiece. The structure has a simple but wise structure. It has two different separate parts. They are the upper part and lower part. This structure has been made of the simplest material which was available at the time means Kahgel that is a mixture of mud and the wheat or barred dried plant . It shows the original native Iranian architecture that uses native constructing material and has simplicity and self sufficiency in the structure. Windmills create a beautiful sight seeing specially when they are built next to each other like the windmills in Nashtifan village. They are a result of smooth changing on soil which creates a symphony Between form and constructural material with environment. Nobody can forget the view of wooden turbines stand high in sky and challenge the wind.

Having Kahgel and mud break in their construction is a remarkable point in the structure of windmills because an important issue is the vibration caused by rotating of the turbine and the pressure created when wind touches the turbine. Using flexible and formed structure constructed by mud and break can tolerate them all well.

The upper part:

It is actually the out part of structure which has 3 walls about 4 meters high that stand on the roof of windmill.

Side walls: Two walls 50 to 60 centimeters in wide that start with the width of 4.5 at the bottom and end to 3.5 meter at top which control the upper part of windmill main axis (Tirpol).The step like form of side walls not only bring the stability for walls but also makes it possible to climb up the windmill for maintenance and service.

Back wall: This wall which confronts wind and is in eastern side is 35-40 centimeters wide and controls the confrontation of wind and turbine so there is a slot at the end northern part about 100 to 120 centimeters. It creates a force of wind flow as high as the wall height to turbines and the mill works. For more stability, the slot has been stitched by woods 10 centimeters in diameter.

The lower part:

This part makes a room for grinding activities and is about 9.5 meters long, 4.5 meters wide and 4 meters high. The occupied space is about 30 square meters. It has been made of mud and break too. In first section, activities such as storing wheat, and separating stuff from wheat by wind flow was led inside from the slot has been done and in second section the stone mill and wheat supplier (parkhoo) were located in this section, Tirpol connects to the upper store mill through a slot 60 centimeters wide in   the roof.

Figure 7.A wind mill in Nashtifan. (Source: Writer)   Figure 8.Section of a wind mill in Nashtifan. (Source: Writer)

V. Position of wind mills:

Time interval for using windmills regarding the blowing time of 120 day winds is from spring to early in fall about 5 months of year because only at this time wind is strong enough to rotate the windmill turbine. It is interesting that it is exactly the time of harvest. Mostly, windmills were built in group and in a line that has different reasons:

1-Tilting windmill together causes unity and more resistance.

2- They made a business place for dealing wheat.

3-Because any structures before windmills reduces speed of wind the back yard land was specified to the graves yard.

4-On the other hand for the maximum use of wind speed a high land was a better place for them. So such a land had several windmills.

Figure 9.Windmill position. (Source: Writer)

History and changing process of European windmill:

In this section, for having a clearer picture of differences between Iranian and European windmills we will take a look at short history and changing process of them.

Based on documents, windmills were used in eastern part of Iran for the first time; but about how they went to Europe, there are different ideas that mention some of them:

1. It is said that vertical axis windmills went to Europe through Al-Andalus (Lynn White Jr. 1962) at the time of Muslim government. (Some historians like Lynn White Jr. hasn`t accepted it.)

2. Some historians as Mickeal Johonton believe that this science went to Europe through Byzantine Empire. (Lucas, 2006) Late medieval some similar cases like Iranian windmills were found in Greece, and Kandia, Crete.

3. Windmills went from east to west through Crusades.

However, the debate about whether the European vertical-shaft windmill evolved from the Islamic horizontal-shaft windmill or was an independent development remains unresolved. (Lucas, 2006) The oldest documents for existence of horizontal axis windmills are related early years of 12 A.D. Lynn White Jr. presents the first Document of windmill existence in Europe in 1185 in Weedley Yorkshire. (Lynn White Jr. 1962)The first windmills had a vertical pole that the whole windmill was rotating around it to be on wind path. This feature, considering different wind direction was a necessity. At the end of thirteenth century, windmill towers were built that instead of whole structure rotation only the wooden cap part was rotating, in 1745 the fantail, a small windmill mounted at right angles to the main sails, invited by Edmond lee that lead the turbines in wind direction. During 1772 to 1789, to improve windmill function various turbines were invented, finally in 1807, an engineer from Norfolk named William Cubitt invented a new generation of windmills that is the basis form of automatic windmills and so the permanent supervision over wind mills was stopped. [0]

Figure 10.A comparative picture of two windmills in Iran and Europe. (Source: Internet)

Comparative view over Iranian and European windmills

To clarify the basic differences between Iranian windmills and European types we will have a comparison here:

1. Iranian types rotate around a vertical axis while European ones have a horizontal axis.
2. Iranian types were lower than 10 meters high while European ones were more than twice of Iranian type high.
3. Iranian types were built in row and in a complex so they occupied less room while European ones were built in log distance intervals to optimized wind energy wage.
4. Iranian models the power transformed to the stone mill directly using the main axis but the European model this was done by gears.
5. In Iranian types because of having a fixed slot for wind entrance only in certain directions it was possible to have the proper function although because the turbines were located in a room with 3 walls it was possible to have a good function in spite of changing wind direction in a limited changing direction interval.
6. Unlike European type in Iranian models by changing of wind you don`t need a rotating wind mill structure so you lose less energy.
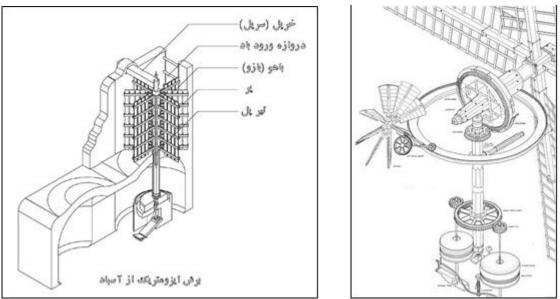
Figure 11.A Comparative picture of mechanical system in European and Iranian windmill. (Source: Internet & Writer)

Conclusion:

Generally speaking, wind machines are divided into two groups based on their rotation axis:1- vertical axis turbines 2- horizontal axis turbines. This direction can be found in historical Iranian and European windmills clearly.

Although from common and public point of view wind turbines are high towers with 4 wings rotating around a horizontal axis, but in today researches both types are considered important because each type is proper for a special climate and has its own economical and executive problems related to the location.

Having in mind what we discussed through these pages , it can easily be understood that the turbines are used these days to interchange wind energy to electricity and other forms of energy widely, is a science that goes back long ago in time, now the question is what is the importance of looking back in basics of this science.

Two different points of view should be considered:

The rational advantages of native technology used in Iranian windmill: Having documents for the integrative process of Iranian windmills during history and through centuries but this integrity process has been slowed down or stopped in recent centuries; while western engineers used wind turbines in producing of electricity by developing of this science in a way that this science has been exported to different parts of the world. But the question comes here into mind that weather these types of turbines produced in west is proper for windy climate of Iran and specially Eastern parts like Khorasan and Sistan. It should be asked, whether it is not the time for using the modern science to develop the native technology. If it is acceptable that the difference in Iranian and European windmills is in their rotation axis because of differences in Sistan climate and low lands of Europe, should not this be regarded today?

Vertical axis windmills are based on a long time experience as long as thousand years of history and it was their proper style for Iranian climate that caused them stand high through centuries and come to present time. So it seems necessary for Iranians to have a scientific and exact study over their specifications which is based on local features and characteristics to design new turbines proper for Iran climate (specially in Sistan and southern part of Khorasan where is the best location in Iran to make use of wind energy based on statistics). Another reason for having this technology in this part of Iran that makes it economical is scattered population and being far from industrial cities which makes transforming energy very expensive for this area.

2- Native technology as a cultural symbol: In spite at advantages for vertical axis windmills for unique condition of Iran climate, it is very important to keep in mind that this is a valuable memorial and a cultural symbol which can be preserved in two ways:

2.1. Reconstructing the remains windmills and changing them into public museums to introduce this birth place of windmills in the world.

2.2. Using them in a modern form and improving them by new technologies (for reducing waste energy by friction reduction, increasing in height or turbine width or decreasing in moving pieces weight and so on) while we preserve the harmonic structure and form with the local features.

Notes

1. The famous Arab historian and writer of Ebhe Khaldoun history book.

2. This book was written by more than one person, maybe two or three one after the other wrote the book. Mohammad Taghi Bahar writes about it in this way: "The writer of Sistan history was Molana Shamsedin Mohammad Mavali that wrote the book in 448 in Tajodin Abolfazl time and Mahmud Ben Yousef Esfahani again rewrite it in brief between 465 to725.

3. Shamsedin Abo Abdollah Mohammad Ebne Taleb Ansari Dameshgi Soufi was one of genius people of his time. He was informed about many fields of science and wrote some books. He was born in 645 and passed away in 727.

4. All maps, diagrams and 3d models drawn in this article related to Khaf windmills of Nashtifan village has been done by writers and students of Mashhad architecture college in 2009 named Morteza Aliabadi, Mehdi tabatabayee Yazdi, Sadegh Hashmi, Ehsan GHasemi .

5. Extracted from Khaf wind mills by Boqrat Naderi, Art and People Magazin, no.177-178

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Waste *versus* resource: updating a well-known practice

Rossella FRANCHINO[1], Caterina FRETTOLOSO [2], Francesca MUZZILLO[1], Fosca TORTORELLI [1]

[1] Dipartimento di Restauro e Costruzione dell'Architettura e dell'Ambiente, Facoltà di Architettura Luigi Vanvitelli, Seconda Università degli Studi di Napoli, Aversa, Italia
rossella.franchino@unina2.it; francesca.muzzillo@unina2.it; archfo@gmail.com
[2] Dipartimento di Cultura del Progetto, Facoltà di Architettura Luigi Vanvitelli, Seconda Università degli Studi di Napoli, Aversa, Italia
caterina.frettoloso@unina2.it

Abstract

Starting from the concept of sustainable use of natural resources, cross-cutting theme in the research carried out by the a uthors, we propose a refl ection on th e enhancement pra ctice of wa ste a ssociated with the anthropization phenomena of a pl ace. The combination of waste - resource while is not a new concept it's, from the environmental point of view, highly relevant and, therefore, there is a need to approach the problem in a sy stemic way promoti ng the diffu sion of inn ovative techno logies that can maximize th e input of the se "resources" i n new vital, prod uctive a nd de signing circ uits. It is evident, therefo re, the necessity to set strategies of su stainable wa ste management throu gh its re cycle and re use in orde r to contri bute to the safeguard and conservation of such a reso urce. More specifically, from the systemiz ation of critical issue s observed to building and l andscape scale with respect to the m ain human activities, the living, the auth ors suggest a synthesis framework about best practices for the recovery, reuse and recycling in the Architecture project (in particular: waste landscape, C&D materials, storm water, urban gardens) framing this approach in a logic of te chnological and design opportunities. Even at national and international level, in orde r to comply with the di rections contai ned in th e v arious F ramework Directives, the re a re nume rous in itiatives orie nted both to the reduction of waste production and to the promotion of innovative strategies by working directly on the sustainability of construction.

Key words: waste landscape, building waste, storm water, urban gardens

1. Waste landscapes: abandoning / integration characters (Francesca Muzzillo)

Two contrasting characters are contained in a "waste landscape". They make us become more aware of how human be havior can e asily result in a danger. But at the same t ime we kno w that wa stes are in a certain sense inherent in urb an processes. We should therefore better work to change their intrinsic values, instead of trying to eliminate them.

Alan Berger says: "Conte mporary modes of i ndustrial produ ction, driv en by economical an d co nsumerist influences, contribute to u rbanization and the format ion of wa ste landscapes – meaning actual waste (such as municipal solid waste, sewage, scrap metal, etc.), wasted places (such as huge parking lots, retail malls, etc.). The terms urban sprawl and the rhetorics of pro- and anti-urban sprawl advocates all but obsolescence under the realization that there is no growth without waste and that urban growth and dross go hand in hand, and always have, not because of anything human, or indeed even pertaining to life, but due to physics itself. Complex processes must export waste to their boundaries in order to maintai n and grow. This is the le sson that designers of the built environment should learn from nonequilibrium thermodynamics" [1].

From this point of view in a re cent exhibition in Rome the concept of recycle has been investigated in every possible mea ning of the word with ref erence to archit ecture: in each case recycli ng is consi dered for its capability of creating inno vative pra ctice [2]. Thi s i s an op portunity also for yo ung designers a nd with th is reference in the mind students could also make experimentations into their academic works. [3].

Indeed, the term "waste landscape" is new and what it exactly means is not completely defined, but, speaking of "wa ste la ndscape", we essentially i nclude a n id ea of m arginalized pla ces i n which the designer want to operate in order to make an improvement. This improvement not necessarily corresponds to an effort to bring the places back to the ori gins, but, ev en with contemporary a nd innovative shapes, the proje cts go i n the direction of a primordial simple relationship with nature.

"By shaping these typically marginalized places i n an ecologically revealing way, we can begin to unveil and recognize the destructive effects of our consumptive lifestyles. But more impo rtantly, we can create spaces that inspi re people to contemplate and re cognize t he value of enviro n mental quality as well a s t he development of strategies that enhance ecol ogical f unction. A s places that facilitate m eaningful human interaction a nd activity focuse d on recycling, waste and reuse op erations can galvanize a g roup of people around a common cause. They can help facilitate the paradigm shift from mindless consumption to thoughtful conservation. There is immense potential for waste places to act as local rallying points – spaces that remind us that there is such a thing as enough" [4].

No do ubt tha t creatin g a new sense of place fo r the identity of a com munity is one of the most imp ortant characteristics of de signing pro cess fo r wa ste la ndscape a rchitecture. But it is also, perhap s, the m ost difficult characteristic to restore. It is difficult suggesting a new identity which can merge again to become the core of a pl ace. So a careful research of co mmunity values is fun damental, not only as regards t he compositional features but also with ref erence to "c ommon imag es" in pe rceptive, sociologi cal and menta l sense. A p roject should depend on the continuous interaction between architecture and social perce ption of damaged places, which i s never fix. In f act, it is po ssible to notice the continuously changeable presence of external elements, contributing to the id entification of a place in a mobile relation between natural elements and life of p eople. It follows that we sho uld search solutions which are at once sociological and perceptive. Obviously the way in whi ch the n atural eleme nts are p erceived depe nds m ore o n the m orphological and material ag gregation than on sociological elements. And the consi deration of vegetation and water as constructive material s encour ages to value natural material s wit h a special attention to their possibility of being flexibl e. Different m utable p revailing conditio ns a re give n b y the nature itself of natu ral co mponents, which are dynamic into aggregation. The e ntrance of t he light, water, air an d vegetation, forced by int ernal directions, respects the core of the place.

Now, how should we operate du ring desi gn pro cess through d ata gath ering, evaluation of altern atives, schematic design and design development, focusing on the idea that the flexibility should be the guideline for new sustainable integrations of wastes?

Probably it is on the borders of a waste landscape that we could conveniently operate. The borders between the inte rnal areas and t he exte rnal ones of a waste l andscape a re pe rmeable in th e se arch for the connections between th e outside a nd t he in side, in order to find single p arts j oined togeth er with flo wing relations. The idea of Recycling for regenerating a place i s the most apt process to create relations among economic, aesthetic, social values into a dynamic ecosystem.

produce beautiful landscapes that reduce maintenance costs and protect the environment.

Overall it i s evident th at, espe cially wh en i ndustrial processes have rad ically cha nged the physical appearances of places, whatever a design process could pursue, it is signed by a common denominator: it is an idea of "reduction", taking account of reduced water, nourishment, costs and energy.

2. Construction and demolition waste: towards a "recycling society" (Caterina Frettoloso)

The theme of rehabilitation of the exi sting built h eritage in a n energy and e nvironmental key puts designers interesting challenges related not only to the issues concerning the specific character of the design solutions to be adopte d, but also to the delicate problem of cons truction and demolition (C&D) waste disposal. Such waste consists mostly of inert materials and then, in smaller amounts, of metals, plastics, wood, glass, often "scrap" processing of construction sites, and above all, a large va riety of small a nd big building components from buildings to be demolished.

From the perspective of the cont rol and reduction of the ecological footprint of the buildi ng and demolishing activity (even in case of renovation) there is a need, on the on e hand, of a sele ctive ap proach to th e demolition phases, on the other hand the adoption of controlled ways of waste recovery associated with such transformation processes.

This recovery can be aimed at re -use and/or recycling, depending on spe cific considerations related mainly to building material characteristics of waste, construction site logistics and available resources. It is important

to note that recove ry operations must be designed in a flexible space-time point of view, that is C&D waste can and should be placed in any building process, regardless of the construction they come from.

In 2008 approximately 860 million tons of waste in the construction industry were produced in Europe, about 33% of the overall waste production in Europe (Source: Eurostat). In the same year the Framework Directive 2008/98/EC wa s ena cted with the hope that it would have pro duced "a change of min d in the way on e considers the waste – from unwanted weight to precious resource – [contributing] to transform Europe into a "recycling Society" [5]. Article 1 1 (b), in fact, is worded as follows: "by 2020, prepari ng for re-use, recycling and othe r material re covery, includi ng filling operat ions which u se wa ste to repla ce oth er materials, n on-hazardous construction and demolition waste, (...), will be increased at least at 70% by weight".

These a re t he am bitious goal s, but up to no w, with the ex ception of virt uous count ries such a s the Netherlands, which has a percentage of 100% of recycled C&D waste, for the year 2008, closely followed by the United Ki ngdom, the Czech Re public an d Germany (with a mounts ranging from 79% to 37%), Ita ly occupies lower ranking places just with 9% [6].

Yet the advantages linked with a rational approach to C&D waste management are now a common heritage of knowledge and concern mainly:

a) reduction of waste disposal landfill sites;
b) saving of natural resources, through the integrated use of both natural and recycled aggregates;
c) new opportunities in economic terms related to the market of recycled aggregates.

On the other hand, the not so clear distinction between recycled and waste material (an aspect also faced in the Directive mentioned above), as well as the relatively low cost of C&D waste disposal landfill sites, at least in Italy, and other con siderations rel ated to both th e cultural sp ecificities of each pl ace a nd the buil ding techniques used that not always facilitate the selective divestment of the construction, are com bined to hinder the diffusion of practices aimed at rational and sustainable criteria.

2.1 Comparing experiences

In Italy, besid es environmental legislation increasingly oriented to a performance approach, the i ssue about C&D waste is dealt i n an operating way in Protocollo ITACA, already in the version of 2004. The evaluation on "enviro nmental burden s" finds "the con struction site solid waste ma nagement" as on e of the thre e categories of req uirements to be o bserved in the construction/rehabilitation of a b uilding o f quality. Th e requirement con sists in re ducing both the con struction and dem olition waste a nd the con sumption of non-renewable ra w materi als and, from a wider point o f view, prom oting an e co-friendly man agement of the waste; the p erformance indicator to b e used is the "relationship between the weight of waste which is not sent to landfills and overall weight of solid waste (%)" [7].

Meaningful e xperiences in Italy in su ch a se nse a re found al ready in the late 1990s, in h armony with th e "innovative" content intro duced by Ron chi Decree (05/02/97 - n. 2 2) even though today it is not po ssible to track meaningful feedback between regulatory framework and operational practices. Among the proje cts of public-private partnerships, the Program Agreement promoted by the Province of Bologna and in force since 2002 is an interesting example. The p roject goal co nsists i n "promoting an efficient, effe ctive, eco nomical and tran sparent man agement of C& D resi dues, based on th e co operation of all p ublic an d p rivate stakeholders involved in the wa ste cycle. T he Program Ag reement in cludes a whole of action s t hat Subscribers undertake to impleme nt all phases of th e waste cycle in orde r to minimize hazard s, reduce the quantity and increase recovery and recycling; [specifying] the modalities and procedures taken for the proper execution of certain steps particularly meaningful for construction and demolition waste management"[8].

Recently, Emilia Romagna wa s the mai n character of a project on the product ion of recycled aggregates from inert waste, entitled SARMa (Sustainable Aggregates Resource Management), a project co-financed by the European Union within the projects for the South East Europe (SEE). "The project aims at studying the sustainable a ggregates m anagement, and, amo ng other activities on legi slation, planni ng and control of aggregates resource, foresees specific close examinations on the evolution of inert waste recycling. Among the main aims of the project, there is the one to define the Sustainable Supply Mix (SSM), represented by a mixture of na tural aggregates, recycled aggregates, sub-products of mining an d earth a nd rock excavatio n, in orde r to maximize th e be nefits provided by u sing ag gregates from va rious source s, inclu ding u n-conventional sources" [9].

Even at European level, in order to comply with the directions contained in the Framework Directive there are numerous initiatives oriented, on the one hand to the reduction of C&D waste production, on the other hand to the promotion of a market, not only of recycled aggregates, but also of building components to be re-used. Such an aim is pursued also by work ing directly on the sustainability of constructi on testing, for example, technologies and construction tech niques that consider, am ong many varia bles, di sposal and its relative ways of demolition.

An example of extreme interest, espe cially for its te chnical - ope rational aspect, is the experien ce made in Boston for the construction of the Big Dig, the moto rway route which crosses the city for a long stretch going ahead with an underground tunnel. The construction of this tunnel, which has presented a series of problems relating to both en gineering a nd geological a nd archaeological a spects, creating a   huge amount of infrastructural steel and concrete material, has given the chance to make an interesting planning experiment. The de sign and the sub sequent construction of the Bi g Dig House by the Sing le Speed Design architects, addresses th e deli cate n eed to recover/re -use the se waste ma terials, " creating a p rototype re peatable anywhere th at had the i ntent to open a new course fo r building wa ste recycli ng also in quality-driven architecture. (...) The structural system of this ho use of about 300 square meter s consists of s teel and concrete di scarded from B oston's Big Dig and uses more than 30 tons of reco vered materials. The p roject proposes above all a protocol of material reassembly that can constitute a pattern of prefabricated production of components made of material from recovered building material " [10].

3. An innovative system for water reuse: the "green street" (Rossella Franchino)

It is evident, therefo re, the necessity to set strategie s of sustain able water m anagement through its re cycle and re use in orde r to co ntribute to the safeguard and conservation of such a reso urce. Wit hin the ration al water management in urbanized territories the recovery and reuse of rainwater is particularly interesting.

In the urba n context the   continu ous increasing of imperm eable su rfaces h as often d etermined g reat problems of erosions and flooding besides altering the hydrologic natural water cycle damaging the balance among precipitation, evaporation, groundwater recharge and surface outflow. It is evide nt that it is impo sed, therefore, a change of attitude in the water management in urbanized territories that must follow the natural cycle. The actions to be made for a sustainable management, therefore, are those ones to re-waterproof the ground, allow the infiltration of rainwater as much as possible and recover them in order to reuse them.

In order to check outflows and infiltrations of the meteoric water in the ground, both permeable paving and street gutter can be used, as well as infiltration basin, French drainage basin and rain gardens.

The rainwater collection for their following reuse can happen either with simple collecting systems exploiting ground pendency and permeable surface, or with more complex water collecting systems from impermeable surfaces such as roofs of buildings, paved surfaces, etc.

In the water reuse cycle, the building represents the central element of the network: it is able, in fact, to join the resource use exigencies with the same reuse ones, in an optic of sustainable environment.

A system for recoverin g a nd re -using rainwater for buildings i s set up in su ch a way a s to allow fo r th e collection of water from roofs, terraces and pavement gutters and to re-use it, after appropriate treatment, for various uses such as: WC flushes, car washes, washing exterior pavement areas, watering kitchen gardens, lawn and green-area irrigation, air-conditioners and heat pumps, reintegration water for anti-incendiary use and even for some electrical appliances like washing machines, appropriately fitted.

The system involves several phases, the first of which is collection. All impermeable surfaces are suitable as areas for collecting rainwater. Obviously, the greater the area for collection, the greater the amount of rainwater that can be collected for re-use.

The next ph ase i s that of filtration. A filter is fi   tted that pe rmits the re moval of those element s which deteriorate the quality of the wate r in the water-tanks. After this, storage is required for the water in h olding-tanks. Some of these a re fitted with a system th at slows and re gulates inp ut flow in o rder to p revent t he disturbance of sediment that collects on the bottom. The tanks can be positioned below ground outside the building or in basement spaces or storage spaces inside the building. Those tanks which are placed outside have the adv antage of b eing hidd en fro m sight a nd protected fro m accide ntal damag e whi le, those pl ace inside have the advantage of not requiring any tampering with the external system for thei r positioning and therefore eliminating the risk of damage to the main system apparatus. Furthermore, it is preferable to place the latter in a vertical po sition so a s t o re duce the amount of space they o ccupy a nd to position them in parallel in o rder to in crease capacity. The tan k con tains a p ump, which th rough a control unit passe s t he water into the recovery plant.

Within the sustainable water ma nagement of urb anized te rritories a p articularly interesting case study, that can be considered as a virtuous example of "water management", that is planning of systems that exploit rain as a resource is that one of Portland city in Oregon.

In 2007 thi s city stru ctured and carried out an in novative proje ct of su stainable rain water ma nagement according to the gene ral concept of "water man agement." The rainwa ter di sconnected fro m the se werage has bee n collected lo cally, treated   with n atural syst ems and pa rtly reu sed and pa rtly sub sequently reintroduced in the groundwater. It wa s ca rried out a re al "dive rsified water collection" th rough systems of garden roofs, filtering gardens, green streets, diffused in the whole city. Practically most of the impermeable surfaces have been replaced by p ermeable layouts endo wed with vegetation and abl e to a bsorb and filter

water and in some cases to store it, too. The point of strength of such a project is the so-called "green streets", that are the elements allowing collection and reuse of rainwater, but they are also more because truly they improve the liveability of the districts and they add green spaces to the city. The system consists of a net of green bands along streets and pavements endowed with pendency so that they allow the rain water collection in establi shed colle cting a reas whe re natural t reatments h appen befo re th eir ent ry in the groundwater. Besides, naturalistic engineering technologies are used to check water outflows.

Such "green streets" sensitively reduce meteoric water runoff, demolishing together with the quantity of rain that rea ches the se wage from the street and subsequently th e final rece ptor bo dies of wate r, also the pollutants that rain takes from the street mantle.

Moreover, the municipality of Portland tried to ca rry out other "gree n streets", beside s those ones already built, and planning new districts and carry out the rehabilitation of the exi sting districts in the viewpoint o f a sustainable rainwater ma nagement al so allo cating incent ives a nd fore seeing free techni cal advi se to the residents wh o want to carry out eithe r a garden o n their own ro of or a rain garden in fro nt of their o wn residence. According to t he data 2011 of Portland Bureau of En vironmental Services, the "gree n st reets" allowed the recovery of 140 million litres of rainwat er and their expansion would allow to reach 30 mil lion litres per year.

4. The urban gardens as a s ynonym for w aste rec ycling, recovery and reduction (Fosca Tortorelli)

We usually think of urban gardens as a way to occu py areas of the city, in ord er to fill with somethi ng alive, beautiful and useful spaces that are left free from building material , by choice or by chance. But perhaps our way of thinki ng the city – the city at the ce nter and the surrounding countryside in the ba ckground -- is no longer realistic. However, what the American urban historian Richard Ingersoll writes in *Sprawltown* may as well be true: According to him, almost without notice, the city has disappeared and has been replaced by the "sprawl", a p eriurban area cha racterized by shop ping ce nters, hi ghways, pa rking lots, houses, and em pty spaces. In such a sprawl, the citizen has become a sort of tourist, belonging less and less to his place, which he u ses mai nly throug h consumption. Thu s, Ingerso ll di smantles the city's old imag e and ma kes of agriculture, along with urban gardens, the tool for citizens to g et back their space and role. The countryside has gone back "inside" [11].

In these years, cities are organized on the basis of criteria that are increasingly demanding speed and space. It is the American model which has won and has been copied around the world, even in poor countries which could not re ally afford it. Spra wling cities seem u ncoordinated, even when they are the result of planning , and make us feel disoriented. The territories have been robbed and injured by an overdose of infrastructure, and unfortunately such a way of pla cing urba n functions is environmentally unfit and cause of great wast e.

The idea of a urba n garden is always positive, becaus e it is an expre ssion of creativity and sometime s a need, alth ough it is n ot possibl e to contribute positively to the urba n sy stem with a "spontaneous" or "anarchic" garden.

People should thin k of urban gardens from t wo vi ewpoints: th e natural a nd the soci al. T he spontaneous garden almost never contributes to the spontaneous birth of a social network while through a collective and coordinated management of urban gardens the two functions are always preserved..

The so cial g arden is in itself a form of particip atory manage ment of space . Howeve r, if you do social activities an d exchanges are not p resent, then social g ardens will en d u p becoming lots, whi ch a re intensively coltivated and close to o ne another. Many municipalities give t o urban g ardens' management a landscaped a pproach. Lev eraging on th e a ssumption that the la ndscape is a public go od, they enph asise how the activities of urban farmers are not aimed only to the noble purpose of self-production of good fresh, seasonal and natural foo d. In many ca ses it ha s been possible to overcome th e tendency towards intrinsic closure, in stilling in urban farme rs the pride ari sing from the re cognition of their work as a social mission aimed to build a better city.

In order to promote and keep this social function alive, activities are organised in these open gardens, which emphasise the nature of collective go ods, such as meetings, so cial dinners, t astings, lectures on bot anics, and so on.

A good exa mple is th e case of the sm all English to wn of Todmorden, located n ear the center of the Unite d Kingdom, where all began tank to the initiative of Pa m Warhursth, who, cultivating fruit and vegetabl e in the garden of hi s hou se, de cided to put sign s in orde r to invite by-pa ssers to come and collect wh at they wanted.

After a few months, a movement of people ready to help Pam started to develop. In this way, gardens, lawns and vacant lots started to be re converted in publi c places, where agricultars products would be available to all citizens. This led to the birth of a community legally constituted and called "Incredible Edible"[12].

All members decided to re-evaluate the active role one can play in ma king the way of livin g the city mo re sustainable. In this way, residents can do their shopping and eat fresh seasonal products. The overall goal is even more ambitious: becoming a self-sufficient city by 2018. But beyond this there i s also the aim to create a conscious movement, engaged in the construction of sustainable local economy.

Other fa ctors con nected with such a urban ag ricultural p ractice are imp ortant, since the y highlight h ow waste and all that is relate d to the a ctivity itself can undergo a transfo rmation and b e cha racterised by a sustainable use.

Up to today, proje ct and management philosophy h as given life to a strategy involving the revitalizatio n of inner parts of the city, organising such spaces into urban gardens units.

An efficient regulation of such urban gardens units. will have to inform the request and supply modality, with the expectation that vegetable waste will be transformed into compost.

The assignees will deliver in appropriate places veg etal materi al coming from each urban garden, in sm all pieces and in groups, with pre-arranged shifts de cided by the members of each urban gardens units. They will provide whatever is necessary for the transformati on of the substance into nat ural fertilizer or final compost.

In some Itali an cases, o ne co uld reali se that th rough such a m odus op erandi " a goo d urban ga rden" contributes significantly to the reduction of wast e production, to low cost production of a fertilizer useful i n order to keep the fertility of cultivated fields, and to a reduction of chemical fertilization and weeding.

Another rece nt exampl e is that of G enova"[13], which in collaboration with I talia no stra, Coldiretti Lig uria, Agricultural Institute "Marsano" and A miu, has give n birth to "innovative urban gardens", an initiative within the Smart City project. They are lots with a wide r surface compared to urb an gardens, which are p referably assigned to associations or groups in order to promote environmental education, develop projects to reclaim local traditions as well as traditions from the ancient 'cultivar', integrating them by using new methodologies.

It 's intere sting to analy se the dual aim pursued by t he initiative; the cho sen urban areas are subtracted to urban blight *(deterioration)* a nd neglected; environ mentally fr iendly ag ricultural practices are carried o ut, preserving biodiversity an d contrib uting to the coll ection of waste a nd th e development of comp osting, reducing the use of agrochemical products (fertilizers and pesticides), with the use of organic and integrated farming systems.

It is rem arkable that in such areas itineraries related to enviro nmental ed ucation for sch ool and fo r anyone who could be interested have been organised. To become assignee of an urban garden is sufficient that the citizen participates to the public muni cipal announcement. In this way, the assi gnee may cul tivate the lan d entrusted to him and get a production of flowers, fruits and vegetables for themselves and their families.

Fig. 1: The idea of urban gardens as a synonym for waste recycling, recovery and reduction

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Research, experimentation and social dimesion of the residential building in Naples between the end of 19th century and the beginning of 20th.

Maria Rosaria DELL'AMICO
Facoltà di Architettura, Seconda Università di Napoli, Italia
mariarosaria.dellamico@virgilio.it

Abstract

In the context of the urban and architectural changes in Naples after the dramatic 18th century's cholera infection, the topic of housing became a new researching field aiming at the adaptation of the design-based zoning constraints to the social changing needs.

On the basis of the influences of the great Exhibitions, the trade practice of architects and engineers who took part in the carrying out of the wide programme of the urban Renewal and Extension of Naples was characterized by the original planning approach based on the research for a social dimension of architecture, giving a contribution to the definition of the formal aspects of a folkloristic and bourgeois Naples.

The technical administration of the Municipality developed few housing philanthropic and cooperative initiatives and proposals, the new housing typologies were elaborated by experts belonging to the Renewal Company who played a fundamental role in the planning of the buildings. The housing policy adopted by the Company was oriented towards a differentiated building offer, according to the different social classes and housing typologies which, joining quality targets and urban decorum to the property market standards, gave to Naples the role of promising building laboratory to experiment building typologies.

Key words: Residential Buildings, Naples, Renewal, Typologies, Property Market Policy.

After the joining to the new unified Country and without its role of capital, Naples was living a deep political change and an economic change but, at the same time, rich in art, urban changes, strong architectural interventions which underlined the development of the contemporary city. Since 1860 we have recorded a great urban and building continuum between the interventions of the pre-Unitarian Government and the new Municipality, managed by architects and engineers dating to Bourbon period (among whom Antonio Niccolini, Stefano Gasse, Luigi Malesci, Gaetano Genovese, Orazio Angelini, Francesco Saponieri, Enrico Alvino, Luigi Giura) who faced the topics of rebuilding and joining the western outskirt, used by middle class housing, to the eastern one, housing industrial settlements and working areas, and the "modernization" of the city-centre to improve the living conditions of poor people [1]. Important rules were given by Garibaldi's provisional Government that, expropriating and expanding the outskirts (building a bourgeois district in Chiaia) and restoring the city-centre (the district of the Duomo), promoted the creation of the first popular borough in order to offer housing to lower classes: «a Government risen by people and living for people, aiming at satisfying this one, trying to give it healthy, comfortable, cheap houses» [2]. Confirming the continuum in the projects and plans of Bourbon line, the post-unitarian rules couldn't join the urban changes to the economic and industrial development of the town and proposed the introduction of a new economic strategy linked to the value of lands and buildings and given to privates or house sales companies [3]. The different economies of the lands gave rise to a new distribution of social classes that modified the 18th century's urban asset characterized by the presence of a "vertical" stratification in the same places and

buildings [4]. The urban architectural interventions in the first twenty years before the unification of Italy were about the building of a joining way between Museo and Port'Alba, in the areas where there was the edification of Accademia delle Belle Arti of Alvino and, later, the Galleria Principe of Naples (1876-83) by Breglia and De Novellis; the last part of Corso Maria Teresa, joining western and eastern area; dei Fossi street, today Corso Garibaldi, joining the railway station to Casanova bridge and Marina square; lastly they started the sea reclamation works of the area belonging to Chiaia, from Chiatamone to Mergellina, where they projected middle class residential settlements [5]. However, as it was an urban policy mainly free of an urban global vision and a coordinating action, they made a partial restoration not considering the problem of an overwhelming and bad socio-sanitary conditions of the central districts of the sections of Porto, Pendino, Mercato and Vicaria where there was a concentration of poor people. From a theoretic point of view the situation has greatly been studied since 1861 by Marino Turchi – Full Professor of health education, city councilor and chairman of a philanthropic association involved in the building of workers' houses – who produced a document essential to the knowledge of the tragic sanitary situation of Naples. The decadence of the capital could be associated to the social urban economic problems, consequently, professor Turchi underlined the necessity to check the sewer system and the water network, the building rules, the opening of new streets and the building of new buildings in the most degraded areas [6]. Mr Turchi underlined the worst living conditions among people of lower classes and proposed, without a technical solution, to use the urban reshape planned to rebuild the loop line between the station and the city-centre to clear up the lower districts, so changing the old urban asset [7]. According to such information and the international urban trends based on Haussman's model in Paris, the common urban topic to transform the existing asset was to project a stretching road line corresponding to the double target of improving the link between the railway station and the city-centre and to clear up the lower districts [8].

Despite the two competitions the Municipality had published in 1862 and 1871, witnessing the training level of experts about the foreign models, it was only in 1884 that the municipality was obliged to present a program of urban restoration, known as Renewal, when there was a new epidemic of cholera, the eighth after 1836 which affected the lower districts spreading out all over the city [9].

As it was an expensive intervention it was necessary to get an economic support by the Government which promulgated, after a long legal administrative iter, a special law supported by the foreign minister, Stanislao Mancini, Mayor of the city, Nicola Amore, Agostino Depretis, oncen Prime Minister, and by Prefetto Sanseverino, published on Jan. 15th 1885, n. 2892 [10]. Such a law pointed all the areas which could be considered useful at a sanitary building revival of the city which the Municipality owned by extraordinary intervention tools, among which special laws useful at expropriating demolishing buildings [11]. It was the first time Italy faced such a huge programme to reorganize a big city on rational and modern basis through a strategy which considered the sanitary renewal a key point to redefine and specialize the components of the urban environment [12]. The key points of the intervention were in the creation of a modern sewage system and a supply of drinking water, the demolition of the warehouses, the widening of the road network and the enlargement of the eastern city side, from strada Arenaccia to the surroundings of muro finanziere, by realizing the new working industrial district. According to such criteria Adolfo Giambarda, on October 18th 1884 presented to the Mayor Nicola Amore a general project on the base of another project dating back to 1871, dealing with the opening of a main road from the station to the crossing of via Medina and via S. Bartolomeo where they could create an octagonal square joined to via Toledo. Sixteen orthogonal roads towards the "straight stretch" plus other parallel roads should define a variegated texture modifying the existing urban tissue. To enlarge the structure they proposed to prolong the north side of Corso Garibaldi to piazza Ottocalli, before the "Albergo dei poveri", and the realization of a working district around three streets rising from the Reclusorio till the Arenaccia. To reduce the density of the central areas and housing evacuated people from the area they wanted to clear up, they envisaged the building of new districts on the outskirts at: Arenaccia, Ottocalli, Ponti Rossi, Miradois, Materdei, Vomero, Arenella, Belvedere, Principe Amedeo, Santa Brigida and Santa Lucia where they thought to open a coastal road [13]. The proposal of the Municipality about the enlargement was approved by the law 25th July 1885, also to the industrial popular middle classes. As regards the projects presented to the Municipality by the well-known professionals they named a speciality commission divided in three sub-commissions aiming at analyzing the problems about the sewage system, the redevelop of the low districts and the new buildings [14]. According to the survey of the Commission they decided to give the project of the work to the engineer Giambarba who modified the path of the straight stretch (where there were 14 instead of 16 roads of a width of 12 or 10 m) reducing it till Piazza Borsa where it branches off in two roads (via Depretis & via Gugliemo Sanfelice) to reach Piazza Municipio and via Medina while at the crossroad of via Duomo it lets in an octagonal square (piazza Nicola Amore) [15]. The straight stretch was the main axis of a new system of relationships between the centre and the outskirts: at east, next to the future industrial area, the artery linked the centre to the new intensive

districts for the working classes; at west, through a pre-existing road system it joined the middle and high class districts. The plan was definitely approved on July 22nd 1886 and the Municipality decided to put a commissioner in charge of getting the three main interventions: the expropriation of the lands and new buildings; the subdivision of the area in many different concessions and to conclude new buildings before demolishing the old firms and to build many cheap houses to grant housing to lower classes [16].

As regards the residential building, the involvement of the Municipality paid attention to people needs, identifying new typologies of cheap houses – not only in the east part of the city but also at Materdei, S. Efremo and Margherita di Savoia – through new criteria about «modern building devices and sanitary rules», a special need many researchers (among whom Turchi) previously asked promoting a philanthropic association aiming at improving poor and workers' living conditions and the Municipality too emanated a concourse to study the best types of cheap houses, on May 18th 1887 [17].

Reading the report of the Municipality dating back to 1888 about the development of such a project we understand that some of the proposals were based on the most modern national and international experiences, so that they could be "imposed" as prototypes to new private Associations aiming at building cheap houses [18]. As regards the choice of new cheap housings, the Municipality makes reference to European advertisements about popular houses, e.g. É. Muller & É. Cacheux's book *Les Habitations ouvrières en tous pays*, Paris 1879 and the two volumes by the German association in favor of the social policy *Die Wohnungsnoth der ärmeren Klassen in deutschen Großstädten und Vorschläge zu dern Abhülfe, Gutachten und Berichte herausgegeben* 1886, about the problem of the residential building in Germany, England and France under the socio-economic building point of view, making reference to a wide important bibliography and the building drawings looking like those ones in Rome, in Testaccio district, and in Naples on "S. Efremo Vecchio's hill". In order to monitor the conformity during the realization the Municipality asked for a special commission made up of three to five councillors. Moreover they monitored the uniformity of the building typology «according to the area they rose up and the coordination to the facades of the four main squares and the straight stretch which should be harmonized and decorated» [19].

The Municipality thought to solve the housing problems through a simple imposition to the builders of building typologies, creating rules about the esthetic of the facades, optimizing areal and light standards but without any limit to the rent prices, so deleting the benefits for poor people by 1885's law consequently creating a speculation. As we know the working phase of such a restoring plan was limited by economic interests of not-local important financial societies which had been attracted by the chance to get economic benefits in Naples. Consequently, there was the arrival of many Italian and European experienced researchers who gave a great contribution to the modern architectural production in Naples. The professionalism of people who have long been involved in the writing of the building projects was characterized by a new planning approach based on the research for a social dimension of architecture, so presenting a new graduate-professional the "*social engineer*" capable of reorganizing urban social and building problems and the dynamics of house sales so joining reality and utopia, sustainable economic settlements [20].

On October 20th 1888 the Municipality assigned the restoration works to «Società pel Risanamento di Napoli» by a 25-year agreement, a consortium of banks and northern building enterprises whose capitals were given by the Società Generale di Credito Mobiliare Italiano, by Banca Generale and Banca Subalpina di Milano, by Società Generale Immobiliare dei Lavori di Utilità Pubblica, by Banca di Torino and F.lli Marsaglia enterprise [21]. The new Company developed new modern housing models which, joining quality targets and urban decorum to the requests of the house sale market, gave to the big building site of Naples the role of laboratory to experiment building typologies [22].

The study of new types of housing was started by such a Company before its constitution when, in September 1888, the engineer Lodovico Martinoli, next general manager of the recovery plans and manager of the railway station of Sardinia, who studied the typology of residential housing in Naples [23], assigned to the engineer Piero Paolo Quaglia from Lombardy the writing of different housing typologies to get the approval of the banks involved in the financial aspects of the building work and, later, to define the terms of the contract work with the Municipality of Naples [24]. Once they got the assent of the graphs and the building work assignment, the Company checked the expropriations and the demolition of the buildings, the planning of the elegant buildings all along Corso Umberto I, corso Garibaldi and the main squares; popular and cheap houses between piazza Carlo III, via Arenaccia and part of the districts of Loreto and S. Antonio Abate, or the districts called "della Maddalena", San Cosmo's, the old English cemetery, Arenaccia and Cavalcatoio [25]. The company instituted an Office of Art, later incorporated in the Ufficio Tecnico, whose management was given to Quaglia, aiming at planning both popular building housing and elegant «modern buildings not subordinated to other cities' …always been up-to-dated about any kind of progress both in Italy and outside» [26]. Piero Paolo Quaglia became the main character in such a complex building Company

where he played an important role in solving architectural aspects of the Restoring plan [27]. He was particularly appreciated by Roman financial international building sectors and this influenced his appointment as head of technical studies of the Restoring Company. Strong relationships with the main representatives of the banks, among whom the Senator Antonio Allievi, director of "Banca Generale di Roma", allowed him a study tour in Europe subsidized by "Cassa di risparmio di Lombardia" «so that he was one among many artists who perfectly knew the building problems others faced in Austria, Germany and France to avoid in Rome and in the new Italy» [28]. The engineer has known Naples since 1885 very well, because, on behalf of Deserti & Fantoni building company of Rome, he elaborated some important urban and architectural projects, never carried out, such as: the drainage of Santa Brigida district, the new gallery Umberto I, a hotel in piazza Municipio, Rione Carità, the new district Santa Lucia [29].

Quaglia's main collaborator was the architect Vincenzo Benvenuti from Foligno (1858-1904), former partner since 1885 at "Studio di architettura" of Rome, they both participated in the building of the new Parliament in Rome and the restoration of piazza Carità and Rione Monteoliveto in Naples where, by the use of courtyard houses, they anticipated project solutions developed for the Company of the Renewal [30]. Apart from Benvenuti the project group of the Company is made up of interesting people, engaged as "drawers", among whom Urbano Neri, architect of Rome, Quaglia's collaborator in restoring the building of the Parliament, piazza Colonna in Rome and, in 1892, the building of the prefect's office in Benevento. In Rome he independently realized a proposal for the urban plan and the building of the Ponte Vittorio Emanuele on Tevere [31].

Stanislao De Mata, engineer of Naples who was born in 1872, was engaged by the Company in 1889 to deal with the lie of the buildings, the roads, the areas of Porto-Mandracchio, in Pietro Colletta street, in Depretis street, in Alessandro Poerio street, all along the straight stretch. He planned many buildings and terraced houses in Vomero, the corner building between via dei Mille and via San Pasquale (lotto XII), twin buildings along via Crispi, before the former Loreto Mare and planned the renewal of the city of Potenza in 1914 [32]. The Company entrusted the elaboration of new proposals about the "experimenting" plan of Renewal to external experts among whom the architects De Paschinis, Guerra and Comencini [34]. The last one (1849-1924) arrived in Naples in 1884 as technician of Società Veneta, and the Municipality engaged him to transform piazza Municipio and Maschio Angioino. He restored some of "palazzi umbertini", planned the "*des Londres* and Santa Lucia" hotels inspired to the new floral trend, and many restoring urban interventions in the western part of Naples [35].

The main role in organizing the Company was played by the engineer Giuseppe Florio from Naples who was asked to manage the building works. In 1885, together with the engineers Francesco Carrelli and Gennaro Sommella, he was the author of the project of the urban plan of Pozzuoli; during his working activity he elaborated the water-supply of the Serino, carried out the Teatro di Corato, the bathing establishment of bagni d'Ischia, the hotel of Telese and the big project for the new old people's home Misericordia in Casamicciola [36].

The engineer Ettore Vitale (1844-1935) from Naples was particularly important in managing the Company, he was elected chairman in 1901; since 1890 he has planned many residential buildings at Sirignano district (Caravita palace), Vasto district, Corso Vittorio Emanuele (Monsolini palace), via Duomo, via dei Mille (Betocchi palace), via Crispi, piazza Vittoria (De Senna palace) and Posillipo (Villa Maria). He managed the renewal of Ospedale degli Incurabili and Palazzo Corigliano in San Domenico square; he planned industrial buildings in via Arenaccia (Lancellotti plant), Ponti Rossi (Wenner factory 1905), the building of commercial warehouse in Corso Garibaldi and the hotel Londra in piazza Municipio. He managed the plumbing system of Regi Lagni, Caserta and Taranto, the railway Rocchetta-Avellino, the harbor station of Molo angioino, the quay of Santa Lucia and the dry dock in the port of Palermo; he took part in the competition to solve the problem of the sewage system of Naples in an innovative way; together with a group of bankers and businessmen he created a company called "Ghiacciaie e Neviere napoletane" whose he planned the headquarter in Naples at corso Novara 7, and in Libya and in Eritrea [37].

Attilio Rota, manager of the renewal work, was the chief engineer of a group of local inspectors who monitored the building and the test of many buildings [38]. In 1884 he planned, together with Luigi Scoppa, a new district at Ponti Rossi consecrated to the small manufacturer activities, the so-called "*arti rumorose e incomode*", housing workers in order to renewal the city centre [39].

The industrial engineer Eduardo Talamo (Cava dei Tirreni 1858- Roma 1916)'s activity was very important, in 1904 he managed the Istituto Romano dei Beni Stabili created by the Banca d'Italia about a planned management of the real estate contributing to the residential building reform and the renewal of Rome as capital [40]. Senator Pasquale Atenolfi's nephew, chairman of the Renewal Company from 1893 to 98, Talamo managed the expropriations and the building about the renewal works and elaborated building typologies that Quaglia considered negative [41]. In 1887 together with Gustavo Scielzo, he planned a

stretching of via Caracciolo till Capo Posillipo and was the tester of Galleria Umberto I built between 1887 and 1890 by Esquilino business firm and Deserti & Fantoni company according to engineer Emanuele Rocco's plan [42]. In 1897 after the Banca d'Italia got lands in the new western district of Chiaia, consequently the opening of via Filangieri, via dei Mille and the stretching of via San Pasquale a Chiaia till parco Margherita, the engineer was engaged by such a bank to liquidate the estate. In order to enhance the estate policy and to increase the estate profitability, Talamo planned a division of the original 15 parcels in 44 plots of land, characterized by the presence of buildings such as: small villas and small blocks of flats [43]. The planning solution looked like a modern bourgeois district and aimed at joining the urban and architectural developments of Naples to the National and European ones.

The engineer Vincenzo Veccia, esternal collaborator of the Banca d'Italia, author of many building surveys ordered by the Renewal Company and currently saved in the historical archive of the Banca d'Italia, was noteworthy [44].

The housing policy adopted by the Company was oriented towards a differentiate offer of the buildings, planned according to social classes and building typologies: the building plan satisfied local needs: from a family with many children ("*ticket famiglia*") type to a lonely person's, we believe no other Italian town has so many air, light typologies [45]. As regards the architectural middle class building the planning interest aimed at a better esthetic façade and to comforts: these housing typologies, from the simplest to the most decorated and comfortable, (any details missing in the old typologies) will become refined centers [46]. In the new urban areas of the pre-existing tissue were built blocks of buildings showing an homogeneous urban area through the reiteration of courtyard typologies which adapted to variable solutions and to dimensional changes, they granted a rational distribution of the entrances, halls, courtyards and stairs.

The new building typologies elaborated by the Company were classified in four solutions on the base of the bonds of the law of the Municipality and planned having store at the ground floor and flats on the first one. The first typology, planned on small rectangular shapes (16x25 meters), was characterized by the block-shape without courtyard but with a central stairway. On the ground floor there were the shops having a main entrance on the road, in front of which there were the flats. Around the stairway there were six flats avoiding internal long dark corridors and external disadvantaging ballatoio (long balcony leading onto a number of flats, usually overlooking a court yard) but without wasting stair area [47]. Each flat did not have corridors but rooms, kitchen and a hidden external lavatory, avoiding the typologies of Milan or Turin, where there were too comforts and were adapted to clerks or graduate professionals [48]. As Quaglia said: «a house planned for a family must have: bedrooms, kitchen, loggetta, lavatory, water supply, that is the independent housing» [49]. Such a kind of building, never realized by the Company as it was little profitable, became the base building module planned on bigger plots of land. As regards the large and long rectangular shape areas they adopted a second building typology according to the axis of the courtyard and dividing the two building parts through three rooms corresponding to the width of the courtyard.

On quadrangular shape plots of lands (30x40 m) they planned the third building block typology with a central square courtyard including "diamond-shape" stairs. From such a typology we get the so-called pluri-courtyard buildings of Loreto and Arenaccia districts.

The fourth typology - never realized - aimed at big rectangular areas (35x50m), was made up of four courtyards risen from the joining of five rectangular blocks, each of them having a central square stair around which rose the building housing blocks.

If on one hand the dichotomy between the social and economic aspects imposed different housing typologies, based on different social needs, on the other, the market and economy reasons aimed at reaching the same qualitative standards. The popular building typological solutions were repeated and experimented with the same logic in the wealthy middle-class housing typologies, even if with important changes as regards the number of housings and the ornamental elements of the facades. The housing equipments too changed according to the building areas resulting in widespread building solutions: «among the group of big factories next to the railway station there are very simple civil factories, divided in small districts, a little bit more elaborated than economic houses…as well as the factories that are being risen next to piazza Carlo III in Foria, opposite to Grande Albergo dei Poveri […] A better building category before the square of the railway station, called piazza Unità d'Italia, wider and larger if compared to the previous one. The same effect is reached by the new corso Garibaldi leading to via Foria opposite the just mentioned Grande Ospizio dei Poveri. […] A more civil category of factories is on the right and on the left of the new big Arteria del Rettifilo, called Corso Re d'Italia» [50].

The comparison between the residential typologies elaborated by the technicians of the Company of the Renewal and the buildings in Berlin, London and Paris allows us to trace new restoring models satisfying an interesting urban policy to compare national and European surveys [51].

The experimentation about the location of the buildings, the shapes and the methods pointed towards social and architectural models inspired to "Familisterio of J. B Godin" according to the Proudhonian model [52]. Since 1890's we have had a heated debate about the building typologies, as Giustino Fiocca's building of the Filatropica alla Sanità was soon thought being obsolete [53]. In 1880 the engineer Giulio Melisurgo considered obsolete the barrack-typology spreading over in Naples while the optimum was the Anglo-Saxon comfortable typology [54]. However the "isolated houses" were ideal but unrealizable. Piero Paolo Quaglia was aware and after a direct survey in Austria, France and Germany, he realized a capitalistic building system based on different social classes. In fact, in the building courtyard typology of Loreto district and the eastern area we can notice an analogy with the popular houses of Berlin, built by the architect Theodor Goecke (1850–1919) [55]. Other analogies are made evident in the Italian examples of the courtyard houses in Florence built between 1849 and 1851 planned by the engineer Enrico Guidotti (1821-1903) [56].

So experts were up-to-date about the most innovative housing typologies to be aware of a modern model of city, but they were also influenced by economic benefits so altering the original Renewal plan. The problem was clearly explained by Quaglia in a letter to the Company: «Anyone knows how patient I am and how much interest I've in studying and solving problems in order to get a profitable factory, even if renouncing the advantages architects like, such as: wide courtyards, developing stairs; on the contrary I have always studied the most useful solutions in contrast with the building code, dividing walls, height differences, oblique light, in order to gain and use the most of benefits from the factories» [57].

The carrying out of the plan was slow and the economic collapse of the Italian banking system in 1893 involved the Company of the Renewal in the bankruptcy. Changes in contract works of 1888, changes in the building code, interruptions of the building works were constant; there were so many accusations and slanders that they needed special laws about the financial supports of the Government and the Banca d'Italia whose support was necessary to conclude the plan after the postwar period [58]. The Renewal and Enlargement works were not limited to the mere solutions of the economic quarrels: the Banca d'Italia sold back the so numerous acquired goods as Giolitti promoted in 1893 and such a difficult situation caused the institution of the Ispettorato Tecnico Generale, managed by engineers, who had to deal with the management and the increasing in value of buildings aiming to sell them [59]. The Bank, together with the Company of the Renewal, the Banco di Napoli and the Municipality, worked at completing the unfinished buildings as established in order to get a major benefit, a minimum loss, and a main role to finish the works both in the central areas and in the developing ones [60].

The critical analysis of a rich survey saved at the archive of Rome of the Banca d'Italia allowed the knowledge of unknown technicians, engineers and architects, working at the Office of Art of the Banca d'Italia during the years of the Renewal: Nicola Facini, manager of the Department of general offices, Romolo Remiddi, in 1885 he was the manager of the Renewal Works, *pontine* swamps; Laschi Sigismondo, supporting engineer; Biagio Accolti Gil (1872-1940) of noble origins from Naples, technical author of the Banca d'Italia in Trieste and Reggio Calabria; Paolo Cortese, special employer; Angelo Ugo Beretta; Giuseppe Tarra; Rodolfo Buzzi; Pietro Rey and De Vincentiis Edoardo, engineers of Office of Art; Pietro Dell'Olio, manager of selling office; Ruggiero Simoncelli, inspector; Luigi Antico, Luigi Dall'Ongaro, Gennaro Astolfi, Efisio Piana, Guido Corsi, Umberto Taticchi, Luigi Lagomaggiore, Adolfo Amendola, Antonio Cottini, Tancredi Chionio, Cesare Monti, Giovanni Jacometti, Gioppi di Turckheim [61].

The new buildings carried out on the base of the building Renewal code were estimated according to detailed iconographic surveys, when the *Consiglio Superiore* of the Bank sold them. They documented the results of a building process managed by the *Istituto romano* in order to avoid the interruption of the "beneficial and brave program" of the Renewal Company which could damage the image of the city. Concluding, starting from the needs consequent the 1884's cholera and the new market laws, the Plan of Renewal and Enlargement was the occasion to relaunch Naples, even if sometimes in an anachronistic way if compared to European and National essays, thanks to the presence of experts who tried to interpret and improve the city according to modern urban rational architectural values.

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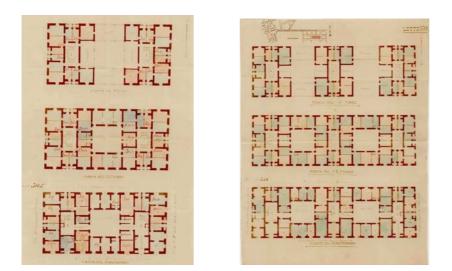
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Fig. 1: Plan of the Renewal work in the lower districts made by the engineer Lorenzo Allievi on behalf of the High Council of the Banca d'Italia (June 15th 1900).

Fig. 2: Building typologies made by the engineer Piero Paolo Quaglia.
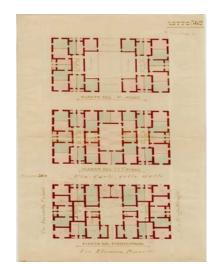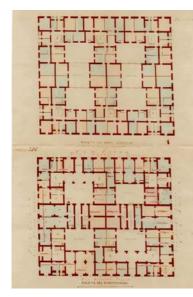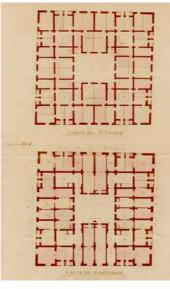
Fig. 3,4,5: Courtyard rectangular shaped council buildings in Loreto district.
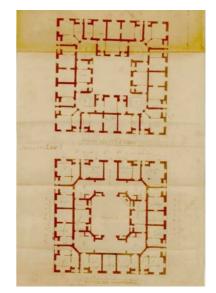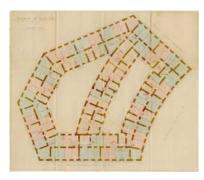
Fig. 6,7,8: Courtyard quadrangular shaped council buildings in Loreto district.
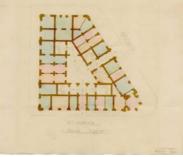
Fig. 9,10,11: Polygonal bourgeois buildings in Rettifilo.
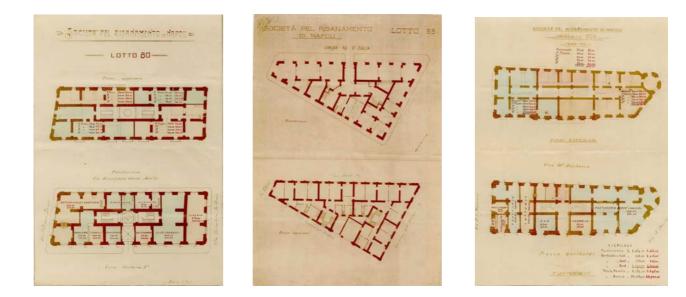
Fig. 12,13,14: Polygonal bourgeois buildings in Rettifilo.
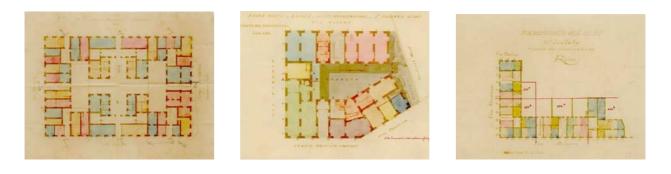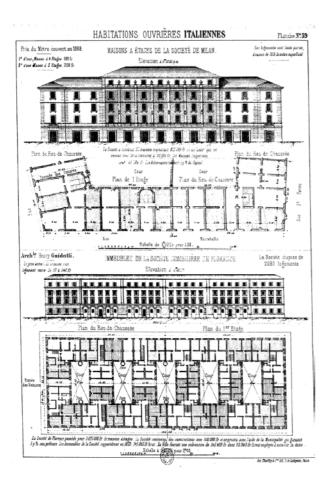
Fig. 15,16,17: bourgeois buildings in rione Vasto.

Fig. 18,19,20: Polygonal bourgeois buildings
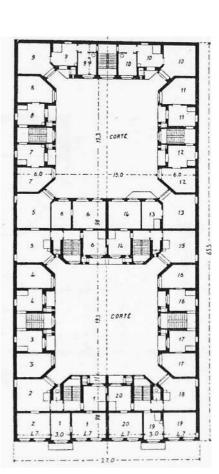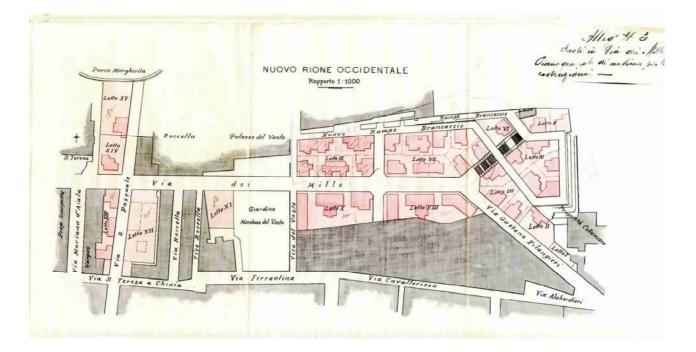
Fig. 21: Ing. Enrico Guidotti. Council houses   .   Fig. 22: Council houses in Berlin

Fig. 23: Ing. Eduardo Talamo. New western district of Chiaia.

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architecture
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Less Architecture.
Some world cases and their relationship with paradigms of Modernism

Francesco COSTANZO
Dipartimento di Cultura del Progetto, Facoltà di Architettura "Luigi Vanvitelli", Seconda Università degli Studi di Napoli, Aversa, Italy
francesco.costanzo@unina2.it; francescocostanzo@gmx.net

Abstract
New geopolitical phase, with coexistence of great emerging nations and geographical areas of decadence and decay, induced the affirmation of an alternative architectural tendency respect to iconic and dominant one, a tendency that exemplarily represents an application of the concept of less that is an attitude for acting in economical and material limited conditions.
This contribution wants to show some cases of this tendency in different geographical areas of South America, Africa, some Asiatic areas, some European degraded areas, and wants to highlight in which way, starting from operative conditions of less, New-Rationalism has adopted a compositional modus that unites construction and language, redefining architecture in its essential data.
These experiences, that some critics call New Contextualism, represent a new ecology, cultural and necessary datum of today, using what is present and available in situ.
These cases show that architectural composition has been renewed looking at ways to recombine local materials and architectural elements, determining new meanings and values through sophisticated compositional rules that are globally established by the best architectural discipline. This is the composition of simple stereo-metric forms and it finds the centrality of construction. In fact, as happened for Le Corbusier with his studies for African architectures, and as happens today for Mumbay Studio in India, forms and construction techniques are synthetic but achieve a high expressive value, determining compositional quality of architecture.

Key-words: Rationalism, *Utilitas,* Paradigm, Elements, Construction

1. Introduction
This paper about *less architecture* tends to highlight the theme of utility in architectural project. It has re-emerged in the last years codifying *utilitas* concept by Vitruvio, which absorbs and assumes contemporary characters. We must clarify three points that influenced this cultural process.
The first point is about the emptying of architectural themes. During last years there has been a tendency characterized by technical experimentation and iconicity, in which architectures are oriented towards the external space. They are thought starting from their communicative dimension – this condition assumed a priority role – and they are realized through a rhetoric of coating, skin and envelope or through spatial hyperboles in which technique and constructive advances are shown – in an interior speech.
This facts are someway connected with global neo-colonialism. It developed in different geographic areas with different forms and weights, in a constant demonstrative aspiration. The effect produced by this phenomenon is that the construction aim is increasingly distant from real needs, and it's impossible to understand effective program, architectural theme and architecture's purpose. Iper-capitalistic iconicity's logic is independent of relationship with reality, architecture's reason is less and so a reason's architecture is impossible, an architecture springing from a research about architecture's sense, from relationship between

architecture and its reasons. Moreover, in this general scenario, the designer architect perceives the infeasibility of his work, the irrelevance of his actions on the reality.

The second point is the fact that architects and architectural theorists distanced themselves from the worst cultural premises connected with financial economy's logic.

The third point is that the better components of architectural world don't deal with developed geographical areas, where financial logic has established itself, but they search geographical and cultural contexts where architectural needs are clear: construction of a small school, a small hospital, a small social space, houses responding to specific urges. Designers working in these places have clear programs, as Italian and European architects had during post-war reconstruction and through them, they realized valuable architectures.

The main issue is that in these experiences there is a connection between particular facts – local constructive techniques, project site's importance represented by inductive aspects of material culture and history as theorized data, but also the culture setting in participative processes – and a general fact we define a "universal" fact – the use of intelligent and sophisticated compositional techniques that architects learned in the best architectural schools of the world. There is the meeting between autochthonous culture's conditions and refined aspects of architectural composition. These techniques are globally diffused and they are consolidated by modern paradigms, that nowadays – with a right temporal distance (that purified the interpretation of modern architectures from critical biases) – reveal their didactic and demonstrative value.

This practice is original and shows the architecture's role and compositional research's value in architectural schools. This approach is distant from Bernard Rudofsky's premises for exhibition "Architecture without architects" held at Mo.Ma in New York in 1964. In Rudofsky's thesis the history of architecture and the time's role were failing. Instead, the time always gives particular conditions to be taken to advance.

2. Mumbai Studio

One of the most emblematic examples is represented by Mumbai Studio. These Indian architects are known because they participated at XII Venice Biennale of Architecture. They realized a mounting in which their work was presented showing materials used in their buildings. In this way they underlined a re-compositional intent, an assemblage, produced by a methodical position and influenced by a choice starting from necessity of using exclusively existing materials. This position is defined by real possibilities – the effective availability of materials – and by availability of resources.

Projects by Mumbai Studio highlight a precise design approach. Utsav House in Satirje, the Indian region of Maharashtra, is an enclosure-building set on the ground adapting itself to slight height differences and exalting the ground's conditions. This architecture completes itself in situ, as the authors Bijoy Jain and Jeevaraam Suthar stated, because of two reasons. The first issue is a compositional issue: during building's construction is possible to realize corrections, starting from observation of interior circumscribed space and of external landscape selected by architectures set against the enclosure. The second issue is a constructive issue: the building is completed through discussion with workers, collecting and choosing materials. They are limited resources that designer must quantify and must eke out.

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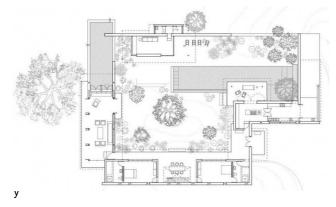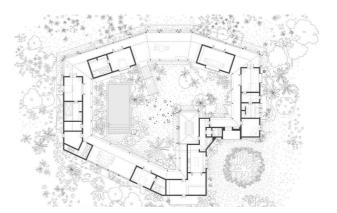
Fig. 1: Mumbay Studio, Utsav House, Satirje (India), plan
Fig. 2: Mumbay Studio, Tara House, Kashid (India), plan

This project reveals a precise and clear idea about architecture. It is composed through Semper's four elements as shown by Mies Van Der Rohe. In this case, the elements are: slender wooden pillars, concrete walls – often coated, as Mies often used to do – floors or basalt bases, thin coverings leaning on wooden beams. This compositional choice, using distinct elements, has a selective nature, within possible compositional registers. This choice is established before project's beginning and assumes a strategic aspect because it is about the construction with non-conspicuous resources and about a open method accepting in progress variations induced by progressive adjustments, refinements, suggestions and solicitations. This paratactic composition presupposes a clear definition of elements and it allows variations. This fact is not possible in holistic project, a project entrusting its fate and success to its shape. Shape presumes its rightness and it owes the success to its rightness. This "rigid" project is connected to a figural rightness but also to a predetermined constitutive method that doesn't allow variations because they could undermine design premises. Paratactic composition is sophisticated. For example we can think about isolation of elements – produced by clear individuation principles -, about corrections and breakings of enclosure as fundamental figure, about "will of form" conditioning building's closing elements – they demonstrate the craftsmanship of their making, that is the link with metal forging culture -.

Composition considers rhythms, geometries, procedures not simply referable to Indian architectural experience (autochthonous), but clearly connected with other cultures, with other significant experiences forming cultured anthology of architectural history. This fact is very evident in Tara House realized in Indian town of Kashid. In this architecture we can observe the great attention in building house's osmotic enclosure and the assumption of modern tradition. Diaphragm's precision: a wall built with thin wooden sticks allowing light to enter with modulation regulated by architecture. A clear device for a well-known image, for an experience that we know: La Tourette's corridors (promenades) are characterized by aureus rhythm of vertical elements established by Le Corbusier. Photos of this building-paradigm have influenced architects' imaginative world and their education. This light mitigation space, with vertical elements in backlight, exalts the presence of vertical elements and their bright distance.

Fig. 3: Mumbay Studio, Utsav House, Satirje (India), courtyard
Fig. 4: Mumbay Studio, Tara House, Kashid (India), passage with wooden diaphragm. Le Corbusier, La Tourette Monastery, interior space.

3. Anna Heringer

Work by Anna Heringer – Austrian thinker and architect working in Linz University of Art, Industrial Design and Architecture – represents some relevant points of less architecture.

Our intent isn't the highlighting of her activist attitude and of her work's humanitarian sense, or her attention in calibrating projects in relationship with craft constructive techniques. Our intent is to underline the relationship between these projects and the goal to define and defend the rural world's identity. This attitude hides the desire for an identity independent of urban and western models.

The first two projects analyzed were built in Bangladesh, the most densely populated developing Country of the world, that become independent of Pakistan in Seventies and assumed a democratic Constitution only in 1991. In this Country, we must premise, there are important urban concentrations generated by exodus from rural villages that still held an important cultural and economic role. Presented projects want to build perspectives – considered architecture's limits – showing villages' identity value and the possibility of creating a correspondence between architecture and traditional lifestyles to contrast the abandonment of these villages.
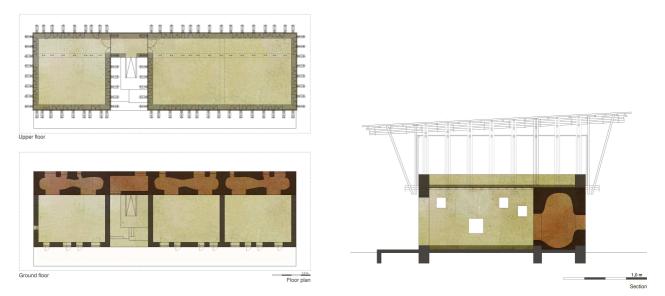
Fig. 5: A. Heringer, METI, Rudrapur (Bangladesh), external view
Fig. 6: A. Heringer, METI, Rudrapur (Bangladesh), first floor plan and ground floor plan
Fig. 7: A. Heringer, METI, Rudrapur (Bangladesh), transversal section

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METI project (Modern Education and Training Institute) in Rudrapur, in northern Bangladesh, is a two levels primary school and was built in six months, between 2005 and 2006. The materials used in this building are: earthbound materials such as loam and straw, and lighter elements like bamboo sticks and nylon lashing. This project – as underlined by Jury of The Aga Khan Award for Architecture 10th Circe – is not repeatable in its forms, in its constructive solutions, because it is connected with local conditions, but the approach is repeatable.

Heringer's projects look for constructive and climatic solution surpassing traditional buildings' advantages, in which bearing walls delimitate spaces with low climatic fluctuations. In Heringer's idea, architecture's constitution provides places characterized by great spatial value, inedited spaces demonstrating modern opportunities for development of traditional architecture.

In Meti project there is a volume delimitated by bamboo diaphragms, a great covered attic. It is a sedentary place, the light inlet is mitigated. Diaphragms' consistency and the possibility of opening them, regulate ventilation. Wind and shadow rooms, inhabited in hottest months of the year, consider covering as a shelter and develop this idea to determine new human experiences. This superstructure re-defines covering's role – starting from reflections about roofs by Le Corbusier, developed during his African voyages, arriving to codification of roof garden and living roof, and establishing new possible roles for covering in modern architecture -. Heringer doesn't let roof surface as indeterminate space, but she defines it as elective place measured by repetition of bamboo poles and beams. This rhythm is visible from the outside and contributes to define architectural character. All the elements, ground floor solid volumes and elective volume on the roof, define a Bangladesh typical "poetic of living". We must consider the condition of the hollow space contained in school's volume – interpreted as small house. It is a tunnel close to schoolroom in which young students dedicate themselves to individual activities. This space is poetical and evocative.

Paul Finch, in an article written for Architectural Review, speaks about desire for modernity expressed by developing Countries. This aspiration produces negative consequences in economy and culture, importing foreign models always expensive and inefficient.

"All too often, aspirations towards modernity in developing countries have malign economic and cultural effects where construction is concerned. Traditional materials and techniques are abandoned in favour of the import of expensive and sometimes energy-inefficient materials and products, benefiting only manufacturers in more advanced economies. The outcome can at worst be the imposition of alien buildings, forms and materials which don't last long and are difficult to maintain. Their only merit is to look new for a time. By contrast, this joyful project, in a poor rural area of Bangladesh (said to be the world's most densely populated country), shows that new and refreshing local identity can be achieved by exploiting the immediate and the readily available (...)."
(Paul Finch, Architectural Review, UK)

Fig. 8: A. Heringer, METI, Rudrapur (Bangladesh), attic
Fig. 9: A. Heringer, METI, Rudrapur (Bangladesh), tunnel for individual activities

Fig. 10: A. Heringer, DESI, Rudrapur (India) external view
Fig. 11: A. Heringer and BASEHabitat,, home for disable children, Orangefarm (South Africa), external view

Second project is DESI (Dipshikha Electrical Skill Improvement) in Rudrapur, a small school built in earthbound materials and bamboo. It shows the possibility of guaranteeing to poor families and middle class that modernity doesn't consist in west life-style but in advance of tradition starting from existing elements. Heringer observes that poverty induces a sustainable tradition, instead progress looking to the West imposes a change of materials used and technologies – depending on technological control (air conditioning, for example) - that are less sustainable than the traditional ones. Project adopts pavilion-system because it refers itself to aggregative modes of traditional buildings in Bangladesh. They are detached buildings – corresponding to different functions – often characterized by a courtyard. The break-up of the building and the articulation of detached elements respond to constructive simplification reasons. Windows system on facades doesn't respond to a simple compositional variation, but tends to calibrate natural ventilation system. Building, as underlined by the author, tries to reach a perfect balance of high and low technologies because it connects a traditional constructive idea with an advanced energetic system (solar panels for energetic self-sufficiency and for hot water production).

Third project, realized in 2005, is an ambulatory for children with disabilities and it is situated in Orangefarm, near Johannesburgh (South Africa). Project was promoted by prof. Roland Gnaiger with Anna Heringer – for Linz University – and it is included in research program BASEHabitat. Small architecture is built in earth, concrete blocks, clay, straw, timber, grass mats and it was realized by architecture students from Linz and Orangefarm community. Project – providing absolute energetic autonomy – develops the idea of ventilated roof. Diaphragms are made in earth and horizontal wooden elements and interpret a precise constructive idea showing linguistic possibilities granted by this technique.

4. TAM Associates
Work by Italian office TAM Associates is about hospitals and ambulatories for ONG Emergency. These buildings are situated in Sudan and in neighboring countries. They tend to realize medical cooperation between different countries (often in political hostility) with an eminent political character. In this way, the idea of health assistance as right is introduced.

Fig. 12: TAM, Container medical compound (Emergency), Soba (Sudan), external view of cafeteria and common spaces
Fig. 13: TAM, Container medical compound (Emergency), Soba (Sudan), external view of residential volumes

All the projects by TAM Associates express a particular idea of less architecture starting from different themes: reutilization of waste materials, adoption of simple constructive technologies – from earthbound wall to frame system with wooden elements or reduced to necessary shape and mass.

In Soba, near Khartoum (Sudan), Container Medical Compound for the Salam Centre – a complex consisting of small houses and a cafeteria for people coming from different countries and working in Emergency "Salam" Central Hospital in Khartoum – provides reutilization of ninety 20 feet (6 meters) containers. Module is repeated with some breaks – collective spaces – and it is adapted using caulk panels and realizing diaphragms to protect volumes from direct solar light. A second skin is separated from masses and it is wisely designed: covering is detached from modular volumes to become a ventilated roof and a sunscreen system builds verandah spaces for houses. These devices give unity to repetition, conclusion to sequence composition revealing a will of form for a simply modular architecture. Empty slots – voids – contributes to composition. Elements definition is a sophisticated compositional procedure: bearing in mind modern paradigms' lesson – especially cultured modernity pursued by Italian architect Franco Albini – every element is well-defined and its shape clarifies its constructive role. Sunscreen system is didactic because it separates white metal frame from bamboo diaphragm.   Similar principles are adopted in projects for nine pediatric clinics around Nyala in Darfur and in Cardiac Centre "Salam" in Khartoum (reference specialist centre for satellite clinics). In particular we can observe that centre, overlooking Nile river, has a complex program: guesthouses, service buildings, administration pavilions and buildings for medical activities.

In these projects is always present the idea of characterizing some spaces – in particular connective and collective spaces – starting from rhythm and structural elements' condition. In this way less architecture realizes itself: structural necessity is equipped with expressive power. In fact pillars and beams are designed following the idea of maximum material economy. Pillars often are formed by two vertical poles with punctual rigid junctions and beams often are vierendeel beams – separating elements in strain from compressed elements -. These composite elements – always isolated and so clearly recognizable – reach a formal richness and concur to define character of covered spaces. These places evoke sedentary condition and they respond to clear no-time actions: they define a shelter before they respond to a function.
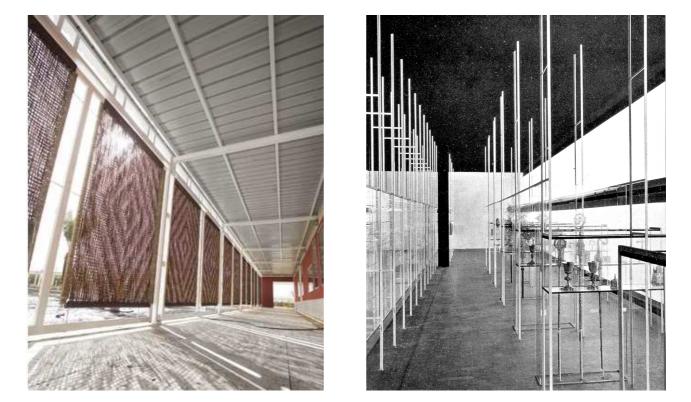
Fig. 14: TAM, Cardiac Centre "Salam" (Emergency), Khartoum (Sudan), view of external arcade
Fig. 15: Franco Albini, Exhibition of ancient goldsmith at IV Triennale in Milan, Milan (Italy), 1936, view of main room

Fig. 16: TAM, Cardiac Centre "Salam" (Emergency), Khartoum (Sudan), view of external spaces
Fig. 17: TAM, Pediatric Clinic (Emergency), Nyala (Sudan), view of external arcade

5. Conclusion

In this sense, project described in this paper clarify their participation in a common discourse: they realize themselves starting from a spatial plainness in which different elements give a characterization following a constructive and compositional idea of pithiness and laconism. Here we realize that less architecture is rational architecture. In the way these architectures evocate historical spaces and re-found local constructive knowledge, we find mature lesson of modern paradigms.

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The sad story of Carditello

Riccardo SERRAGLIO
Dipartimento di Cultura del Progetto, Facoltà di Architettura "Luigi Vanvitelli", Seconda Università degli Studi di Napoli, Aversa, Italia
riccardo.serraglio@unina2.it

Abstract

The Royal Estate of Carditello, former fiefdom of the Earl of Acerra, located in the rural territory between San Tammaro and Capua, in an area which is bounded by Regi Lagni canal to the south and Volturno river to the north, was acquired by Charles of Bourbon in 1744 to settle a stud farm in the buildings once used as stables by the prince of Caramanico. In the 80's Ferdinand IV decided to build a royal palace and to add around it a modern farm, entrusting the planning to Francesco Collecini, his special architect. Elaborating a just existing model, once experimented in San Leucio, he conceived a complex where royal residence and output buildings were in close contact.

The construction of new buildings began in March 1782 and the royal possession has been often enlarged till 1816 getting nearby forests and parks. The magnificent palace built in the centre of the large landed estate is the melting pot of roads conceptually similar to Luigi Vanvitelli's, the same he used for the royal palace of Caserta, and which is linked to the different rural buildings of the estate.

After the end of the Bourbon reign the estate was divided and at the moment the royal palace which is one of the most interesting architectural 18th century building - according to the critics – is managed by a local government which has recently decided for an auction sale. In the recent past such building has been damaged and forgotten, moreover it has recently been stolen especially in its memorial tablets and marbles belonging to a stair. The real situation is so serious the scientific community must denounce it in order to start a suitable safeguard and preservation of such an astonishing architectural complex.

Keywords: Royal Estate, Royal Palace, Royal Sites
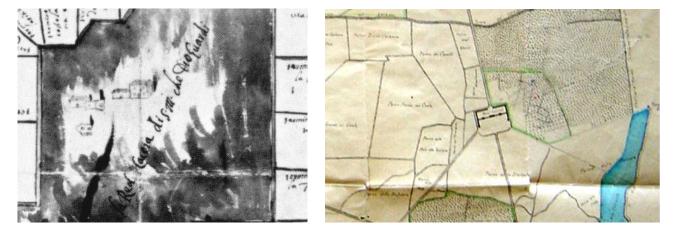
Fig. 1: Carditello, the estate before the construction of the Royal Palace (historical map, detail)

Fig. 2: Carditello, the estate after the construction of the Royal Palace (historical map, detail)

1. The story of the Royal Site

The Royal Estate of Carditello, former fiefdom of the Earl of Acerra, located in the rural territory between San Tammaro and Capua, in an area which is bounded by Regi Lagni canal to the south and Volturno river to the north, was acquired by Charles of Bourbon in 1744 to settle a stud farm in the buildings once used as stables by the prince of Caramanico. In the 80's Ferdinand IV decided to build a royal palace and to add around it a modern farm, entrusting the planning to Francesco Collecini, his special architect. Elaborating a just existing model, once experimented in San Leucio, he conceived a complex where royal residence and output buildings were in close contact. The construction of new buildings began in March 1782 and the royal possession has been often enlarged till 1816 getting nearby forests and parks.

A number of administrative documents of the Bourbon period, held by the State Archives of Naples and the Archive of the Royal Palace of Caserta, allow to retrace the steps of the building construction. Historical maps of the Royal Site describe the condition of the premises during the construction of the royal residence and completed works. Artists and craftsmen of great value attended the construction of the palace, overseen by Collecini. His closest collaborators were the architects Domenico Brunelli and Gaetano Bernasconi; in the definition of decorations collaborated with the famous painter Philipp Hackert and the theatrical architect Domenico Chelli, King Ferdinand IV's favorite artists; the gardener John Andrew Graefer, who was author of the English Garden of the Palace of Caserta, collaborated for the arrangement of green areas around the building. Before starting work, an accurate three-dimensional model was made by the cabinetmaker Antonio Ross, first presented to the king to evaluate the project and then brought on site June 9, 1787, to serve as references during the construction.

The work, conducted with unusual rapidity, ended in 1792 with the construction of the riding track, adorned with marble fountains and a small doric temple in the centre. The magnificent palace built in the centre of the large landed estate is the melting pot of roads conceptually similar to Luigi Vanvitelli's, the same he used for the Royal Palace of Caserta, and which is linked to the different rural buildings of the estate. Concurrently with the construction of the royal residence, were built new buildings for agricultural production in various areas of the estate and created works of consolidation of the channels and ditches for the outflow during periods of high flood waters of the Volturno. In 1790 the construction of the mills near Sant'Antonio's bridge required new measures of hydraulic engineering to allow the use at full capacity of the new milling plant. In 1792 it was approved the creation of a system to lift water from the River of Capua, in order to make it awailable for the mills, but changes to the hydrology of the area to improve efficiency were found harmful to the cultivation of hemp and flax in the surrounding land and to supply water to the city of Naples. It was thought to solve the problem entering the headwaters of the Mofito, near the town of Cancello, in the course of the Regi Lagni, and then channel them into the aqueduct of Carmignano, the main source of water supply in the urban area of Naples. This proposal was rejected because it was deemed harmful to traditional agriculture.

During the insurrection of the Republicans in 1799, the Bourbon army clashed with the French troops commanded by General Championet in the territory of Capua and the Royal Estate of Carditello was occupied by the revolutionaries and the French military. The Bourbon palace, considered the emblem of the monarchy, suffered serious damage. In particular, frescoes depicting members of the royal family were mutilated as a sign of contempt for the monarchy, while the lead pipes that fed the ornamental fountains were removed to be melted down and turned into ammunition. Once restored the Bourbon government, restoration work was undertaken by Collecini, who was attended by numerous artists, many of whom have already been engaged in the construction of the building.

During the French Decade, from 1806 to 1815, agricultural production went on in the structures of the Royal Site but recreational activities were stopped. After the Bourbon restoration new projects were designed to improve the profitability of the agricultural areas. For this reason, in 1819 the construction of a new canal, called in contemporary documents "Canale di Terra di Lavoro", began and were designed by Bartolomeo Grasso and Luigi Giura, engineers of the Corps of Bridges and Roads. This building would allow an efficient irrigation of agricultural lands of the Royal Site of Carditello and a good supply of water for milling plants. In addition, the new channel would enable river transport of agricultural products and the construction of four new mills in surrounding areas. The completion of the work was opposed by landowners and by the administrator of the province of Terra di Lavoro, Sant'Agapito Marquis, who felt irrigation practice detrimental to the traditional crops of the area. They obtained the suspension of work in 1825 and the construction of the canal was finally abandoned, despite numerous proposals by technicians of the Corps of Bridges and Roads in attempt to make working at least the portion already built, from Acerra to Marcianise.
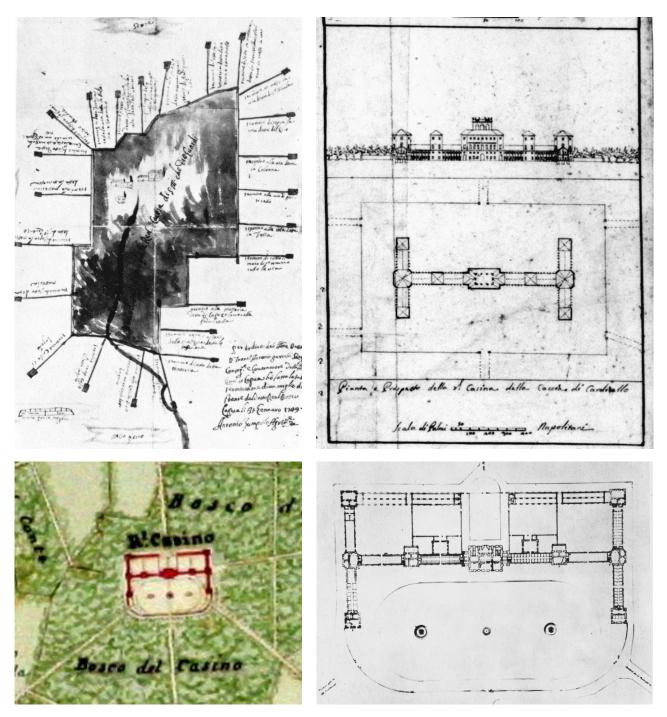
Later in the Fascist era, the colonization of agricultural land in the province of Caserta included even the Royal Sites of Carditello and Calvi, assigned at the "Opera Nazionale per i Combattenti" in 1919. In this

period infrastructural works were carried out, such as the arrangement of the drains, the installation of a pipe of cast iron in replacement of old pipes, the realization of a new electric power line, interventions of deforestation of wooden areas, which could be grown. The management of the Royal Sites of Carditello and Calvi was distinguished by other territories administered by the "Opera Nazionale per I Combattenti" for the experimental nature of the agricultural process, while the neighboring lands were consecrated to local production. As in other regions administered by the "Opera Nazionale per i Combattenti", such sites were run out by a coordination centre, which would have been housed in the Royal Palace of Carditello and adjacent buildings. Two task projects were introduced involving the use of the Royal Palace of Carditello as the administrative seat of agricultural activities in the area. The first, drawn up by engineer Leopoldo Barini in 1929, forecast the restructuring of the towers arranged between the low service buildings. The second, drawn up by engineer Luigi Giura (namesake of the previously cited for the "Canale di Terra di Lavoro") in 1939, involved the transformation of the palace of Carditello in a service centre for the surrounding farm located in the territories, with functions similar to those in rural villages founded by the "Opera Nazionale per i Combattenti" in the territories of the "Basso Volturno" in the same years.

At the moment the royal palace which is one of the most interesting architectural 18th century building - according to the critics – is managed by a local government which has recently decided for an auction sale. In the recent past such building has been damaged and forgotten, moreover it has recently been stolen especially in its memorial tablets and marbles belonging to a stair. The real situation is so serious the scientific community must denounce it in order to start a suitable safeguard and preservation of such an astonishing architectural complex.

Fig. 3-4: Carditello, frescoes in the Royal Palace (details)

Fig. 5: Carditello, the estate before the construction of the Royal Palace

Fig. 6: Carditello, historical drawings of the Royal Palace

Fig. 7-8: Carditello, plants of the Royal Palace (historical maps, details)
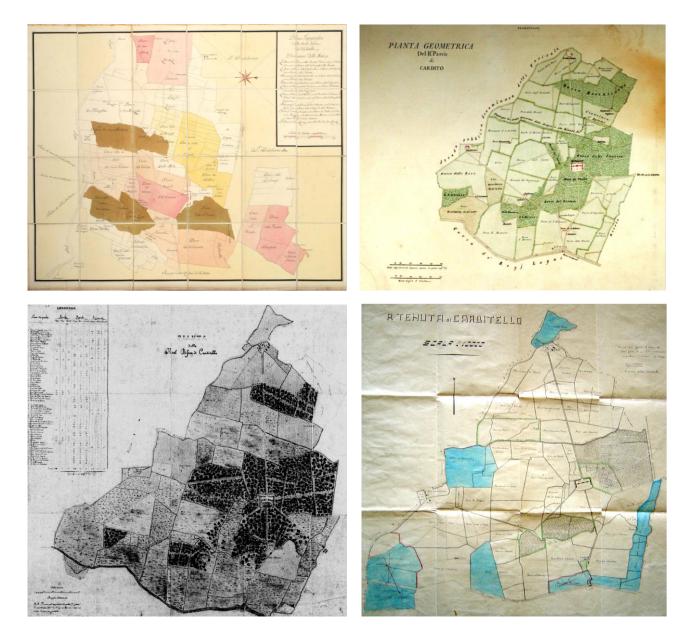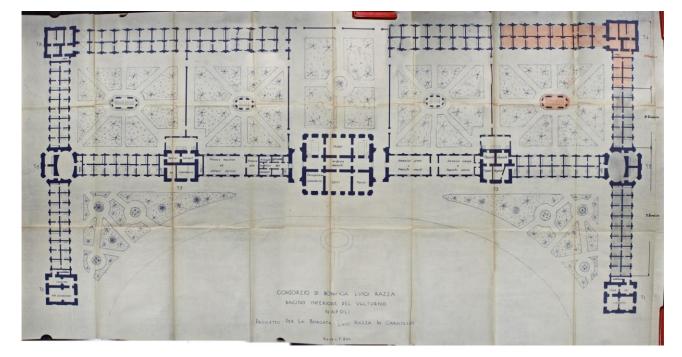
Fig. 9: Carditello, the Royal Palace under construction (historical map of the estate)

Figg.10-12: Carditello, the Royal Palace after construction (historical maps of the estate)
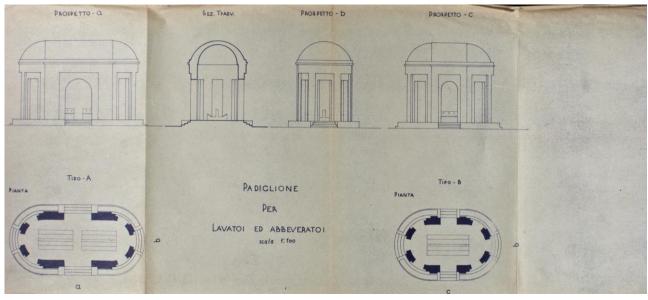
Fig. 13-15: The Royal Palace, restoration project (engineer Luigi Giura, 1939)

Figg. 16-17: The Royal Palace of Carditello

Figg. 18-19: The Royal Farm of Carditello

Figg: 20-21: The Royal Palace of Carditello (interiors)

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RECOVERY COLLECTIVE MEMORY OF PLACES.
THE CIRIO INDUSTRY IN PAESTUM (SA)

Mariarosaria VILLANI
Dipartimento di Storia dell'Architettura e Restauro , Facoltà di Architettura, Università Federico II, Napoli, Italy
maryvil@hotmail.it

Abstract

The fabri c "e x-Cirio" ab andoned by 1987, place d in t he arch aeological are a of Paestum in front of th e ancient Justice Gate, represents a great potential for the area.
Inserted withi n the feasibili ty study for the creation of the "Arch aeological Site of Paestum " (re alized fro m CIPE with f unds from th e Mini stry of He ritage an d Culture), in whi ch p refigures a resto ration a nd new functions of the factory with the excavation of the Sanctuary St. Venera placed beneath one of the sheds.
The proposed contribution to knowledge, throught the historical and bibliographical reserches directly related with the direct stu dy of th e archite ctural structu re, aims primarily at providin g a contribution of a cogni tive type of architectural structure.
This is part of a series of early industrial architecture of the 900 lots in Campania at the behest of Cirio, but is unique not only for the value of collective hi storical memo ry, which represents th e a rea, even fo r o f the relationship with the archaeological pre-existence of the Sanctuary of Santa Venera.
Secondly, it aims to sho w h ow the recovery of material values (a rchitectural and archaeological) and intangible (a collective me mory of historical p roduction site), rap presented an inseparable a nd p reparatory poles for the recovery activity aim to the conservation and the development of the architecture.
facendo attenzione a non modificare gli stili ed i formati.

Key words: Cirio, Paestum, Recovery, Memory, Sanctuary of Santa Venera

1. Recovery collective memory of places

The monu ments are carriers of flexibl e values over time, but at the same time the value of the same monument, as well as its definition, is subject to change.
Already in the pream ble of the Charte r of Cra cow 2000 we find that " Each comm unity, by means of its collective memory and consciousness of its past, is responsible for the i dentification as well as th e management of its heritage."
The enlargement of the protection from a single monument to the "Cultural heritage as a means of providing material evid ence of civilization" all owed to consider since th e 80s of the 900, the h eritage of indu strial archeology a s a mate rial t o be p reserved and passed do wn to f uture g enerations a s a bearer of material values related to the peculiarities architectural own industrial manufacturing, and intangible assets, related to the culture of work and production.
The ind ustrial archeol ogy therefore introdu ces a ne w con cept of indu strial m onument as an inalie nable heritage of the community.

1.1 The development of Cirio industries in Campania

Besides the automotive and manufacturing, the food industry was certainly one of the sectors that have greater contributed to the development of Italian economy.

In 1895 Francesco Cirio founded «Cirio General Society of canned food», basing on the fortunately industry "method Cirio" of conservation, which in turn drew on the method preserves the products introduced in France by Nicolas Appert.

Since the end of 1800, when the piedmont factories exported huge quantities of canned abroad, it became clear to the entrepreneurial spirit of Francesco Cirio such as distance from places of production of raw materials would make unattractive the industry and its development.

He saw in Campania, thanks to the wealth of raw materials for processing in situ, especially in the Neapolitan area, through the land of agro-Nocerino-Sarnese goes up to the fertile Sele's plain, the possibility of a wide range, and in 1882 opened in Salerno the first factory of canned food of South Italy.

In 1889 the production moved in Castellammare were was built a new factory, followed by the establishment of Pontecagnano in 1900, and that one of Vigliena in 1925 designed by Angelo Trevisan [1], where was fixed the national headquarters of the company.

The spread of the company Cirio in Campania becomes strong engine of economic development so as to be shown in 1935 as the most important industries of the Province with a record of national level in the canned food [2].

Economic development is associated with the social one, so much that in 1909 in the Queen Magazine for Ladies and Misses, we can read "Quite rightly our magazine was in charge of the House Cirio, since this provides jobs and income to hundreds of young girls, and it ensures an exemplary life, giving them equal time with the money used to support the existence of even the education that comes primarily from a life of work well understood and regulated " [3].

1.2 The plant of Paestum

Located in front of the walls of the ancient city of Paestum at the Justice Gate, the factory Cirio rappresent, along with near to bacco industry of Cafasso, an important architectural evidence of the production characteristics of the area developed in the early decades of the 1900.

At the beginning of 1900 still showed Paestum is described as the travelers of the Grand Tour as a swampy and unhealthy [4].

The establishment of Paestum was built in 1910 but began production only in 1935.

During the Second World War, was occupied by American troops who landed on the shores of Paestum in 1944 and use it as a militar base, using the opposite area as a park for vehicles.

Production resumed in 1946 and continued uninterrupted until 1987 when, following the sale of the brand to the SME in 1970 we are witnessing a profound economic crisis that will lead to permanent closure of the factory, almost simultaneously with the closing of the plants situated in Castellammare, Pontecagnano and Pagani.

Hanging in part under the the modern shed of the Paestum's plant, are the remains of the Sanctuary of Santa Venera, dating from the fifth century a. C. represents one of the most interesting examples of suburban sanctuaries.

The discovery of traces of a bridge, suggests that the temple was connected to the city through the Justice Gate beyond the river as yet that was one of the founding elements of the matrix of the cult.

The sanctuary was composed of several buildings including the so-called rectangular oikos within which was inscribed a circular structure detectable by the remains. Not far from her was the oikos, the rectangular building, probably used in purification rituals and sacrifices. Through some discoveries and inscriptions, it was assumed that the temple was dedicated to Aphrodite [5].

Excavations in the Sanctuary starting from the 50s by the Superintendent of Cultural Heritage Pellegrino Sestieri and will be pursued by Mario Napoli. Will then be taken in 1981 as a collaborative effort of the University of Michigan and University of Perugia under the sponsorship of Soprintendenza Antichità e Belle arti of Salerno and Avellino. The discoveries made during excavations were published in the two texts tha describe the results of a dig [6].

After the closedown in 1987 and the sale of the production machinery, the factory was bought by private and since that moment it was abandoned to a state of decay.

Only in 2009 was bought by the Archaeological Superintendence of Salerno, but already since the year earlier included in the Feasibility Study for the archaeological site of Paestum [7].

The study led to the arch aeological park aim s to overa ll recovery of the ancient urba n fabric th rough th e elimination of the road that cut off the special continuity of the city. In addition to not allow correct perception of the ancie nt fabric, the mode rn ro ad cut off and cove r up in h alf many of the most imp ortant monument such us the ancient Amphitheater , the head of the Forum, the Ekklesiasterion.

Among the m ain topics, besides the recovery of the continuum of the city and the path al ong the walls, we find the involvement of museum display of the Sanctuary of St. Venera - rehabilitation of the ex-factory Cirio.

The pro posed interventio n assume to keep the veil on the road , pull down the two sh eds adde d in 196 0 under which it develo ps the Sa nctuary a nd th rought the u se of inn er sq uare, pla ced high er than th e excavations, would allow a view f rom above archaeological remains. In side the buil dings along the road, it provides for the establishment of a thematic section on suburban sanctuaries.

The facto ry as a rchitectural organi sm is born with it s architect ural form, rel eased a cademic style s, with concerns of a purely functional.

In the plant in Paestum i s clear h ow the functional di stribution derived from t he typical production cy cle of canned food.

The entrance located on the main road introduce to the inner square used for unloading of goods.

By the services for employees begins the sequence of spaces closely related to the sequence of moments of production.

The first step of the production sequence occurred in the room where they select tomatoes unloaded in the yard. Through a conveyor belt that ran through the square, the raw materi al was carried out in the she d in front of which occurred in the pro cessing of concentrate. From he re the passage to the she d in adheren ce occurred in which the canning and the load on the means of transport which had an output of its own way.

The original structure of the factory, represented by the block o n the st reet, consists of ma sonry bearing in local lim estone, typical of the Paestu m, regula r-sized, slightly rough-hewn, which at pre sent shows no disruption of static type s. The ma in de gradation d ue to aban donment and consequ ently to expo sure a nd growth of vegetation. Also for the two sheds added in the 60s made up of two curved metal roof trusses, the main cause of deterioration is represented by exposure to the atmospheric agents.

1.3 Preserve is more

The pu rpose to keep in mi nd for ea ch type of interv ention on be half of the monuments, should be ai med primarily at keeping intact the document without making selections and breaks, refer to the basic principles of modern restoration, whi ch take account of material com patibility with the existing use, reversi bility, the concept of "minimal intervention", and the distinctness of the modern additions.

Moreover, in the specific case, the simultaneous presence of two structu res so different from each other, the archaeological and ind ustrial o ne, require a coo rdinated multi-disciplinary a pproach capable of maximi zing the potential of use through the conservation of both the different monuments.

The pu rpose of prese rving the archite ctural a rtefacts through n ew u ses, co uld assum e that the site as a catalyst of in novation, hel ping to creat e a new cultural envi ronment in the region. Pre serving the factory, embodies a symbol of a so ciety t hat has b ased its economy o n can ning p roduction for nearly a cent ury, through the conversion of the local economy could obtain the redevelopment and the creation of new type of economic growth for the local population.

The conversion to new uses of the property would brings a new trend of socio-economic development which is linked to the dissemin ation of knowledge of history and texture of the material and immaterial well through the use of the monument.

As stated in t he 'International Cultural Tourism Charter of ICOM OS (1999), we must en sure that prog rams promoting tourism are able to protect and enhance the features of the cultural and natural heritage sites.

In other term s it is ne cessary, a s exp ressed by Gi orgos Sefe ris "a faith in these old si gns withi n the ir landscape: th e faith that they have a soul", and through conservation ensure that this so ul is feels li ke a testimony of the intrinsi c value of cultural heritag e keeping alive the memory of the producti on site, as a n inseparable part of the soul of the place.

Fig. 1 Aerial photograph made by American troops in 1944. We can see the factory in relation to the plain and the city of Paestum_ Source: Association Agorà of Capaccio

Fig. 2 Photo made by American troops in 1944. The factory was used as a militar base_ Source: Association Agorà of Capaccio
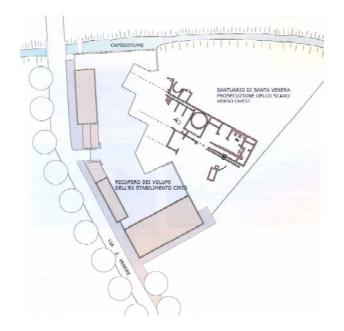
Fig. 3 The occupation during the second world war_
Source: Association Agorà of Capaccio

Fig. 4 The occupation during the second world war_
Source: Consorzio bonifica di Capaccio

Fig. 5 Interventions provided by the feasibility study for the
archaeological park of Paestum
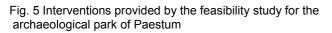
Fig. 6 Façade on the Sanctuary. Current state_
Photo by Mariarosaria Villani_2010

Fig. 7 External façade of the current state_ Photo by Mariarosaria Villani_2010

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Between memory and Mediterranean paradigms: drawing and graphical analysis of eighteenth-century villas in the territory of Bagheria (Palermo)

Gaetano GINEX,[1]
[1] Dipartimento Architettura ed Analisi della Città Mediterranea, Facoltà di Architettura, Università *Mediterranea* di Reggio Calabria, Italia
ginex@unirc.it

Abstract
This essay aims to propose a work on the villas of Plain of Hills in Palermo and Bagheria, "rereading" the famous book by Margherita De Simone "Palermo Villas, a historical profile and surveys" published in 1974, with the aim of representing – through digital design by comparing it with the traditional survey back then - the architectural phenomenon of the holiday residences in the eighteenth century in Palermo and its surroundings. These buildings had a very strong presence, characterizing its agricultural territory for more than one hundred years. A phenomenon, that of the villa in Plains of Hills and in Bagheria, which deeply studied in the book by Margherita De Simone, still holds a special interest. This is because often the renovations on these houses show the will to eradicate their nature by attributing them functions and destinations not strictly appropriate to the architectural "sense" that have characterized their "figure" for many years. The aim is to spread the dimensional, typological and morphological changes through the elaboration of "models" that can be explored and seen today as "updated" surveys of the cultural heritage and of the special phenomenon of the villa in the Sicilian eighteenth century, with particular reference to the territory of Bagheria.

keywords**:** paradigm_model_survey_villa_de-construction

1. Between memory and mediterranean paradigms [*]
This work puts forward a survey about villas in the area of Plain of Hills in Palermo and Bagheria, "rereading" the famous book by Margherita De Simone "Palermo's villas, a historical profile and surveys" published in 1974, with the aim of representing - through digital design by comparing it with the traditional survey back then - the architectonic phenomenon of the holiday residences in the eighteenth century in Palermo and its surroundings. These houses had a very strong presence there, characterizing its agricultural territory for more than one hundred years. A phenomenon, that of the villa in Plains of Hills and in Bagheria, which deeply studied in the book by Margherita De Simone[5], still holds a special interest. This is because often the renovations on these houses show the will to eradicate their nature by attributing them functions and destinations not strictly appropriate to the architectural "sense" that have characterized their "figure" for many years. And it is the "figure" of these works that is developed in this essay.
The aim is to spread the dimensional, typological and morphological changes through the elaboration of "models" that can be explored and seen today as "updated" surveys of the cultural heritage and of the special phenomenon of the villa in the Sicilian eighteenth century, with particular reference to the territory of Bagheria.
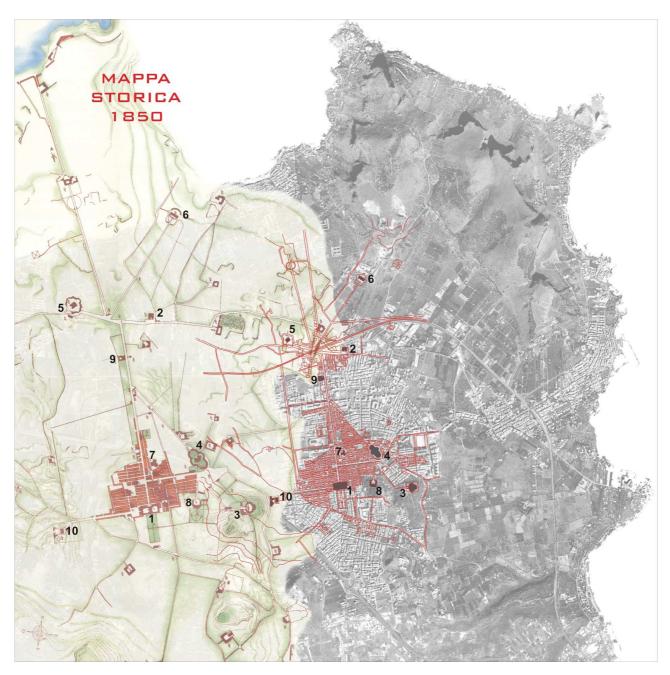
Fig. 1: Territorial framework (Bagheria, district of Palermo).

This is a topic which is at the base of a complex set of ideas that affect the didactics, the design, the representation of the architecture in my research. The subject matter tends, in fact, to highlight the interest in the topic of the design-*image* and the design as *techno-digital culture*, complex topic to decode with traditional keys of interpretation. The purpose is to look into genres of intellectual processes translatable into images of spaces following what we have experienced over the past few years - in the study and in the didactics of the field of the representation of Architecture.

The attention given to some of these works (and in particular to some buildings that have been duly studied with other methods and intentions) aims to represent a desire to investigate the original essence which they were made with, together with the will to promote the knowledge of them. They are in fact architectural values, unknown to many, but fundamental in the history of late-Baroque architecture of Sicily and that, having undergone various alterations over the years, especially in terms of intended use, have lost their
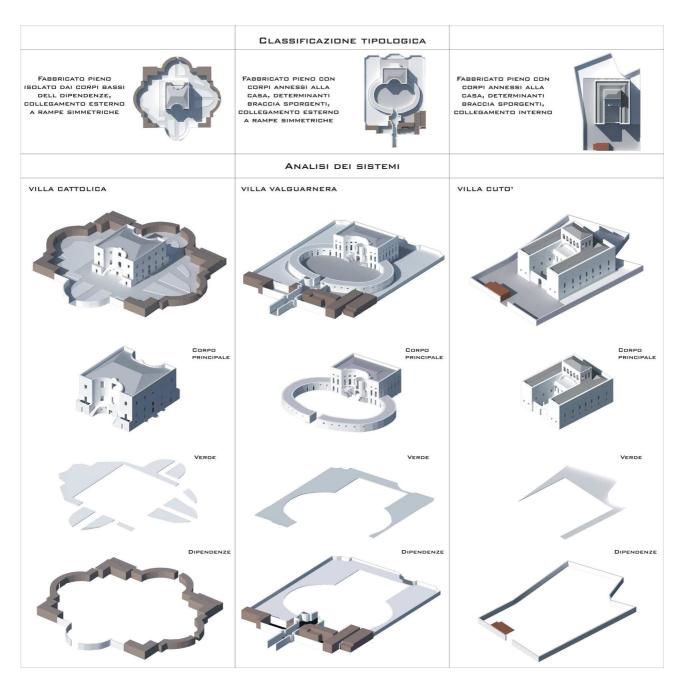
Fig. 2: Typological schemes 1.

vocation of suburban residences.

The study and so the representation of these structures has revealed the presence of common compositional elements, made in a different and original way in each of them, but which over time, through questionable works of renovation and recovery, changed their essence, not only as a single element but also as overall structure.

The essay must be understood as an opportunity to delve into methods and techniques of representation, and, above all, as a step of a training process that allows you to experiment with forms of expression for a critical understanding of the potentiality of the "image" in the field of the architecture; then showing how the potentiality offered by the graphical language, is crucial nowadays "to understand the direction" of the creative, communicative, popular and cognitive process of the architectural thinking.

The purpose of this paper is to provide a general framework on the main theorical and practical aspects,

	CLASSIFICAZIONE TIPOLOGICA	
FABBRICATO PIENO ISOLATO CON COLLEGAMENTO INTERNO	FABBRICATO ARTICOLATO IN CORTILI CON COLLEGAMENTO ESTERNO	FABBRICATO PIENO AD UNA ELEVAZIONE CON CORPI ANNESSI SUL RETRO DELLA CASA

	ANALISI DEI SISTEMI	
VILLA VILLAROSA	PALAZZO BUTERA	VILLA RAMACCA
CORPO PRINCIPALE	CORPO PRINCIPALE	CORPO PRINCIPALE
VERDE	VERDE/CORTE	VERDE/CORTE
DIPENDENZE	DIPENDENZE	DIPENDENZE

Fig. 3: Typological schemes 2.

useful to understand critically at a communicative, expressive and historical level, the techniques, methods and languages of the architectural *representation,* starting from existing surveys which for many years represented a unique reference on the subject matter.

We've taken into account the villas of Bagheria already masterfully explored through a long campaign of survey (*) in order to highlight some "*interpretative keys*" by using the three-dimensional *image*.

The result has been to re-interpret these models with a series of graphic exercises which have as object the study of the model, its representation and, more generally, the visual language of the model itself in his perceptive, communicative and expressive aspects.

Thus, one of the main goals to achieve emerges: to represent, understand and communicate *Architecture* through a mature and conscious use of the graphic language with stimulating modeling systems useful to understand the contemporary architectural expression as a laboratory for experimentation and testing, a time

of study designed precisely as a research *laboratory*.

From the above considerations, the central theme on which our observations rotate is therefore the image, but especially the study of a new kind of *images*, spatial forms generated by all the relations between architecture and elements through the use of new technologies.

This *new kind* of images - while maintaining (and amplifying) the semantic value peculiar to the representation, occur in various ways, creating perceptions, works and new critical elaborations. But also deeply and conceptually different from the basic images produced in the survey campaign launched in the seventies on the topic of suburban villas.

Images with multiple expressive values that analyze the architectural space in various directions. Images that seem to prefer expressive statutes strongly hybridized, where "*communicating an idea*" requires actions and elaborations different from what has gone before.

Images that invite the user to following steps of knowledge in favour of a progressive growth of the initial fact.

Images that reveal their structure with further processes of knowledge from which derive the planning idea at the base of a model both simple or complex.

Therefore the role of the digital image is, in fact, for many reasons that of a visual *medium*.

Indeed, in our case, the meaning of image is "*a category both ambivalent and misleading, which lies midway between the concrete and the abstract, the real and the conceived, the sensible and the intelligible*" (J .-J. Wunenburger*, Philosophy of the images.*).

Images that simulate, simultaneously, a double essence: on one hand the realistic trend of information that takes place in the faithful re-production of the "truth" of the reality forms; on the other hand the tendency to formal decomposition and interpretation of the constituent process.

A kind of "*synthetic* and paradigmatic construction of the images".

Imagines that - following what Virilio calls the *stereophony of reality* - allow us to develop a model through which watching-ourselves from an external point of view; images able to duplicate reality, offering simultaneous experiences different and more complex than reality.

A new kind of images that are reopening known issues, in particular on the topic of the shape in architecture and introducing interesting innovative contributions.

Innovations that expand the study, but still generate distrusts and difficulties in critical and operational elaboration.

Thus it is necessary to understand and better distinguish the role played by digital images in various reports above mentioned and, specifically, in the process of contemporary research on the representation of architecture and the importance of modern in architecture.
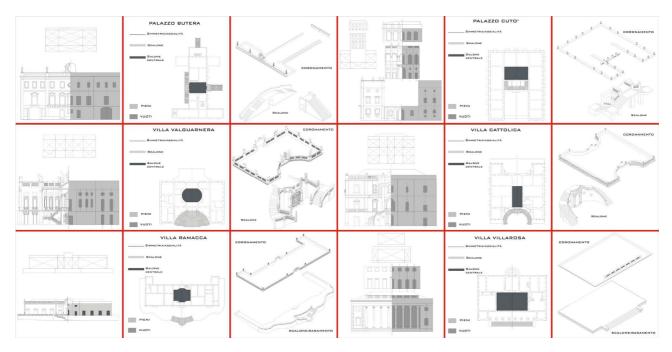
Fig. 4: Study of the facade (Morfemi).
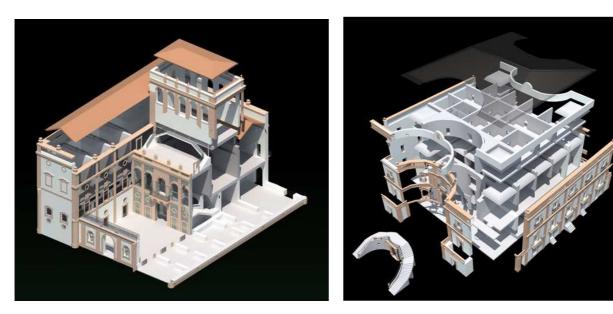
Fig. 5, 6: Villa Cutò; Villa Cattolica.
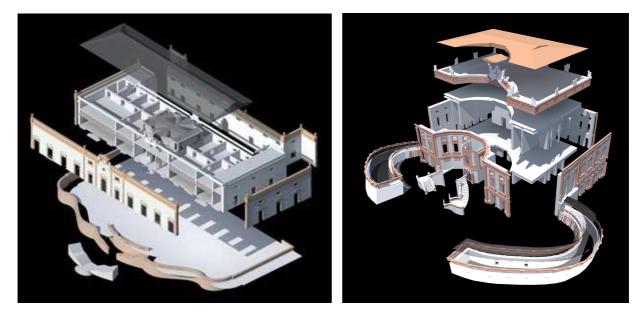
Fig. 7,8: Villa Ramacca; Villa Valguarnera.

Looking at the new forms of digital processing of these works and considering , in particular, the planning, cultural and social results of the phenomenon, emerges, in fact, a scene not different from its original in which the *image* - as "*laboratory*" of *representation* and *conformation* of the architecture - is the favourite *medium* for displaying and elaborating thought, in a scenery where the notion of reality and space, filtered through the technological eye, takes a different value.

A multifaceted reality of this new kind of images (*surveys* in our case), based on the lightness and clearness. We want to remind that as new technologies have helped to expand and renew our notions and the messages in the era of digital dematerialization look for more and more metaphorical languages, they still remain tied to "figurative representations". This study involves "the need for an upgraded critical review of the whole stormy field of the relations between language and thinking and, inside it, of the relations between logical thinking (and language) and figurative thinking (and language) ."(Bettetini).

The central topic of this paper seems to be then:
- What results may have this new way of thinking and enjoy the *image*, the survey (in our case) and its representations, at a stage where the three-dimensional digital model assumes the role of *medium*?
- *Re*-productions that can interact, communicate, evolve, change and re-change invading multiple genres simultaneously.

Thus putting yourself critically before the work of architecture means, then, coming out of the flow of time to bring into focus the processes during which such testimonies were produced and have become what they are.

It is the notion of space, then, that takes on extraordinary importance to us.

Operating in space, in fact, represents, at the same time, a way to sort in one configuration the parts of a building and a form of ontological knowledge to which the human sensory experience is connected. The analysis and the representations consistent with the formal, expressive and cultural nature of the object under investigation, are then studied as systems of representations, that, starting with "*classic*" elaborations (plans, elevations, sections, axonometrics and perspectives), are oriented toward complex representations related to the notions of design and animation.

Thus there are two key words put as a link between thought and reality since each operation which generates meaning, involves an artistic production compressing in itself both the medium used and the use of interpretative models of creative processes and logics of carrying out.

The simulation can therefore be defined as an activity through which we create models, whether real or virtual.

The transition from analogical to digital does not determine changes of great importance, if not in the nature of the system of representation. A new era, which is configured as a valuable instrument by means of which you can represent reality investigated through modellistic formalizations increasingly complex.

The boundaries of the representation seem thus to tend toward a gradual expansion, far from consolidated graphical languages, the design of architecture become the search for expressive values that refer to something else. The digital images presented here and that ideally want to continue the study of several decades ago by Margherita De Simone, represent the idea of the villa as a "*movement*" simulating a particular perception and mainly giving birth to the foregoing considerations.

Creating a "global directory", an information network of the goods of cultural interest to create circuits that interact through models of interpretation, thus defining an interactive code of preservation which, through a multimedia platform implements the data testifying the specificity and the typical values of the places and the architecture works of the Mediterranean landscape.
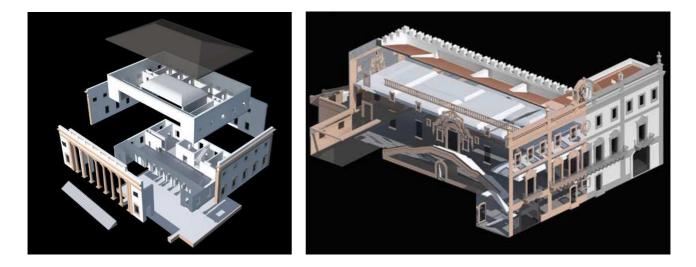
Fig. 9,10: Villa Villarosa; Villa Butera exploded axonometric.
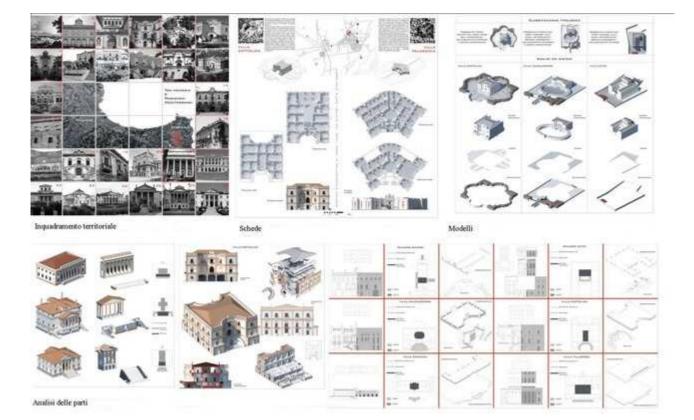
Fig. 11: Programmatic lines.

Fig. 12: Villas Overview.

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THE CONTRIBUTION OF THE TELEMATIC UNIVERSITY IN THE FIELD OF CULTURAL HERITAGE: THE MUSEUM SYSTEM BETWEEN PRESERVATION AND VALORISATION

Tatiana KIROVA [1],
[1] President of Literature Faculty, International Telematic University UTIU, Rome, Italy
e-mail:tatianakirova@uninettuno.it

Maria Cristina LAPENNA [2],
[2] Literature Faculty, International Telematic University UTIU , Rome, Italy
e-mail:mc.lapenna@uninettuno.it

Silvana ARICÓ [3]
[3] Faculty of Cultural Heritage, Suor Orsola Benincasa, Naples, Italy
e-mail:silvana.arico@gmail.com

 Abstract

The cultural heritage meant as a territorial system definable as "museum field" needs ad hoc valorisation models. The *Progetto di conoscenza* becomes essential to allow the detection of cultural resources, the definition of the socio economic context and the compatibility of the use in order to calibrate the   *Progetto di Valorizzazione* for a "qualitative" requalification of the areas.
From this consciousness, the International Telematic University Uninettuno UTIU fixes an additional "**Educational Offer"** able to supply on different scales and for different users, suitable tools that allow to operate in the field.
This offer is characterized through *percorsi didattici*: .
- *training*;
- *scientific educational training*;
- *the definition of non normative fields*.

 Keywords: Cultural heritage, telematics, museum, conservation, defense.

The contribution of the telematic university in the field of cultural heritage: the museum system between preservation and valorisation [1] [2]

Today, more than in the past, we are conscious about the value of the cultural heritage not only as a subject of art and history but also as the integral part of policy, social and territorial dynamics that contribute to define their identity.
The "territorial systems of cultural heritage" meant as "museum fields" with precise connotations need ad hoc models of valorisation that find in the analysis of the condition of things, the foundation for the definition of a new operative procedure.
The *leit motiv* of the event *Less – More* fits positively to the will of the present contribution to emphasize for the cultural heritages meant as museum fields, criticalities and values, limits and potentialities.
Less – as a decay and decadence condition – is the term used to define: the general crisis that involves all our heritage, the situation that characterizes the way to understand the museum valorisation that is at a stop to the eighties acquisitions.
More – meant as most – is the term used to define: the existent cultural heritage on the national heritage; the growth of the fruition demand from stranger countries from Mediterranean Basin to different continents: missed opportunities to intend, in a suitable way, the valorisation of our heritage.

The cultural heritage, meant as an independent entity from the reality in which it falls on, has brought to different shapes of unsuitable and non homogeneous valorisations compared with the context on which they fall; considering – on the contrary – the cultural heritage as part of a system brings to the detection of new models of valorisation detected through the definition of cognitive information systems or through the philological prosecution of the territorial history to discover again its identity.

In both cases, the "***Progetto di conoscenza"*** is workable through the definition of monitoring cards that allow the detection of cultural resources, the definition of the socio economic context and the compatibility of the use. (Fig. 1)

On the base of the furnished data of the cognitive analysis it is possible to identify the indicators for the definition of the ***Progetto di conservazione/valorizzazione*** aimed at a "qualitative" requalification of the places through the integration of the cultural, material and immaterial resources.

This new way to understand the cultural heritage needs some professional figures able to manage, both during the analysis and projection phase, complex realities that include different shapes of knowledge. This is not changeable, according to the strict rules of our system; it is necessary to provide somebody who works in the field of cultural heritage of updated and suitable tools in order to satisfy the new needs.

From this consciousness, the International Telematic University Uninettuno UTIU fixes an additional "**Educational Offer"** able to supply on different scales and for different users, suitable tools that allow to operate in the field.
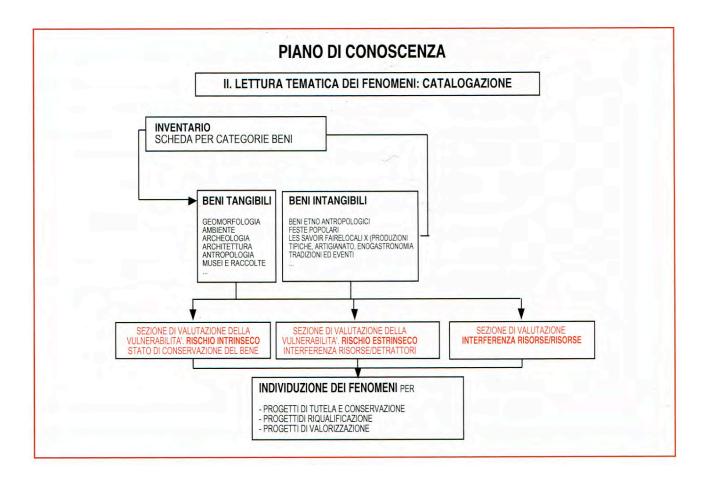
Fig. 1 – *Modello del Piano di Conoscenza dei siti UNESCO* – Lo schema conoscitivo, attraverso la definizione di schede, prende in considerazione i "beni tangibili/materiali" e i "beni intangibili/immateriali" di un ambito territoriale utili alla definizione dei progetti di tutela/conservazione/riqualificazione/valorizzazione. (T. K. Kirova, *I siti italiani iscritti nella Lista del Patrimonio Mondiale dell'UNESCO*, 2004).

Described as **Progetto di Istruzione Permanente,** the educational offer through the telematic system is articulated in three phases:

In the first phase called *CONOSCENZA,* led through video lessons, it will supply the necessary tools for the cognitive analysis of the cultural heritage to different scales, from the architectonical one to the urban one and finally to the normative one in order to define a valorisation model.

In the second phase, every single student will try, through the support of the tutor, to define a *PROJECT,* shaping the ideal model achieved during the cognitive phase to the reality of a specific context.
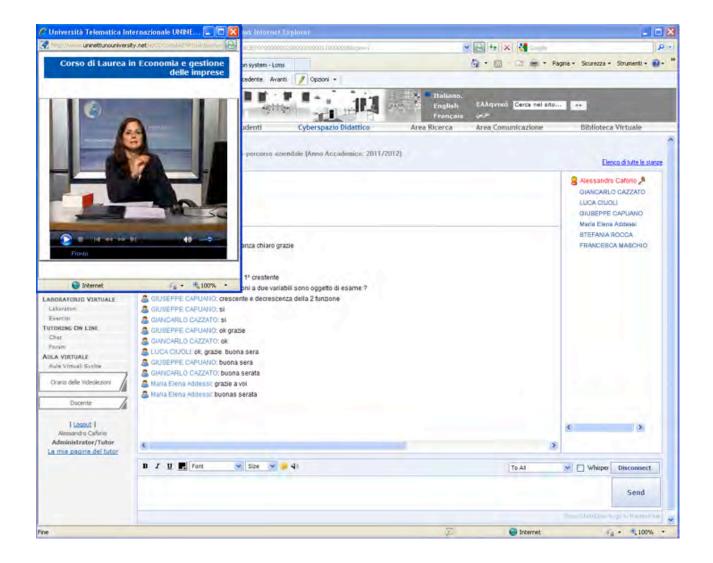
Fig. 2 – *UTIU* - Esempio di aula virtuale in cui il tutor interagisce in tempo reale con gli studenti.

In the third and last phase, through a *virtual laboratory,* tutors and professors will proceed with a punctual check of several offers. (Fig. 2)

As a privileged observatory of the market needs and taking as a model the UTIU project with TELECOM students, some specific **percorsi didattici** will be created and addressed to whom is working in the field of cultural heritage. (Fig. 3)
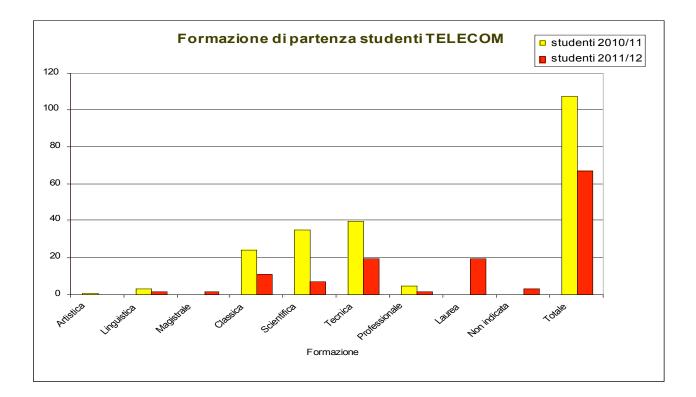
Fig. 3 *UTIU, Facoltà di Lettere – Operatore Beni Culturali –* Formazione degli studenti Telecom iscritti. Modello su cui sono stati calibrati per altre aziende i pacchetti dell'Educazione Permanente.

Starting from the supervising of the models already made or obtained from the seasons of the financing funding sources (European Council, European Community, Cultural roads, Cities, Castles and villages) they will follow the following steps:
   - training for students coming from primary and secondary school;
   - educational scientific updating for whom is working in the field (Superintendent), reference models supply for the operative procedure;
   - the definition of non normative fields.
The figure of the cultural heritage operator needs an education like an Interdisciplinary system that involves not only humanistic subjects but also anthropology, chemistry, architecture and engineering.
An Interdisciplinary system that has to involve even who is now working on the *landscape,* a specific field that lacks of a precise connotation and that needs an univocal involvement from natural sciences (environment/ecology) and from esthetical/ecological sciences (territory/man/nature).

Adjustments and Guidelines for innovating the museum system [3]

The contemporary definition of the concept of landscape then contains a multitude of issues covering both conventional methodological approaches aimed at the enhancement of the historic - artistic, is the consideration of the natural landscape and sometimes built as part of cultural interest, is stillevaluating intangible assets such as traditions, languages , dialects, enogastronomie etc.
An essence therefore extremely heterogeneous, whose approach can not be divorced from the wider multidisciplinary training banner.
Operator training is dedicated to the cultural heritage of interdisciplinarity, a necessary condition for the best action to safeguard the good historian, archaeological, heritage museum.
In the sixties the promotion of historical and artistic heritage was through the use of the museum, his was an elite audience of art lovers and scholars, a place in a quiet conservation activities, contemplation and research.
In recent years, the museum concept and methods of use have been greatly developed, so that today there is a need for a reformulation of the basic ideas, without denying the validity of some previous solutions.
Develop our knowledge about the functions of the museum and how they are evolving from the 70 came up to our present time, is very important. Discover activities, provide new opportunities with the use of technology for the improvement of museum system and in line with the latest addresses of multidisciplinarity should be a goal shared by all. You need to learn new research and solutions appropriate to our times and our problems, so that the new reports between the museum and the environment are integrated with more and more settlements in the reform of the museums.

Rarely, the debate between conservation and innovation, the assessment of unresolved dichotomy between the value of the past and need to use a contemporary, as is interest in such a meaningful part of the dissertation on the museum, intended as a single item, container or state of art expression of art, or as a plurality of elements, physical and / or afisici, which may help define the "knowledge network" so valuable for the preservation of a historic monument.
Thus we can understand the challenges of balancing two requirements, still not fully resolved: one is to ensure the protection and readability of the monument, so to preserve the cultural value of the "container", the other to set up a proper museum exhibition that can and must balance the most appropriate to emphasize the work "container" and the most effective level of enjoyment and use by the public.
In recent decades of the museum has changed its appearance according to the discussion that led to a profound revision of the concept of cultural and artistic heritage, taking into account the increasingly consolidated model ofsocial and educational use resulting from implementation of the methods transmission of knowledge from a distance or in e-learning, developed and borrowed developed very well in academia.
The Mav (Virtual Archaeological Museum) at Herculaneum represents a good example of innovative multi-sensory, effective transmission of knowledge from anywhere using teaching methods acquired in the university, the use of three-dimensional images, computer-made and accompanied by music influences the ad hoc represent a new method of cultural enjoyment to learn and discover in detail the historical realities of Herculaneum and Pompeii before the eruption Vesuvius in 79 AD. (Fig.4)

Fig. 4 – *Museum Mav of Ercolano.*

The visitor is transported into a virtual context faithfully reconstructed by the use of modern technologies. The journey begins after passing a sort of ancestral door dematerialized bodies in streams and connective intelligence leading to the discovery of names and faces of the ancient Herculaneum, with which it is aware of the history of the community and their way of life.

A potential transmission of knowledge is not diminished but actually strengthened by this essence afisica, can contribute to the creation of an excellent network of knowledge and potentially infinite strutturre, therefore, a real "network museum" free from the constraints imposed by conflict between conservation and utilization.

The increase of contact channels, and then the implementation of the flow of visitors, physical or afisici has, for a museum, also effects of strictly commercial nature: the increase of potential users and, therefore, the potential demand, can make the museum a commercially more attractive in terms of investment or sponsorship, a further opportunity for lenders to advertise your brand or your company.

Cultural tourism is proving, for several years, one of the fastest growing economic sectors in Europe, one in which "people are increasingly willing to spend money not on Their consumer goods but services on That allow Them to have Personally enriching and memorable experiences". Which is why invest in cultural tourism should be a resource on which to bet. Even museums, should be able to offer a product that can guarantee you a memorable experience, so it is worth to spend.

The versatility of the museums that run on multi-media contexts has direct consequences on the global supply museums, its cultural transmission and economic impact in terms of revenue and induced local: it is a monetizable value is not always easy to quantify, but that could prompt investors and lenders, public and private media to decide to invest in the appearance of cultural communication.

In the seventies Rosenberg stated: "In Italy, there are laws, regulations heavy, a bureaucratic system complicated enough, but behind it there is a knowledge and a defense of the artistic, popular among the people of each city, which is by far higher than that of other countries. Beyond the law, government, bureaucracies, there is actually very close to the Italian heritage, who has his eyes open on its importance and his salvation".

Today, unfortunately, our areas of protection have expanded over the past, the area of conservation is very extensive as the need to protect the artifacts and monuments that can no longer be exposed outdoors and which in most cases should be replaced with copies or musealizzati. Insufficient commitment and resources for this to happen.

The modern museum structure must therefore be able to provide a service of cultural information organized, at the same time carrying out a pilot function educational.

From here the necessity for each school ask its scientific services, education, preservation, even to the outside, as supports for the performance of other functions.

The question comes from the public it is no longer a passive audience: you must live in museums, or, even better, experience.

There is another important aspect overlooked because, today, in Italy as in France: that a museum is a place for the public. The American museums such as London are more open than ours: places where people go to enjoy the art books, etc.

They are places of culture and civilization. There is no incompatibility between the museum organized and attentive audience, but, in general, there may be an instance of conflict between conservation and the use of. The real conflict comes on if the museum becomes the object of a fetish market with unskilled and the media.

If sold, as is often the case, along with the package, the museum no longer serves no function, it simply becomes an asset to exploit. The same thing occurs occasionally and for reasons entirely different with the schools, particularly elementary and middle school education, often introduced as a walk in the museum. It is, in both cases, the examples of misuse of museum complexes, which arrives to empty results for users and produces negative consequences, even destructive, for assets subject to a mass-use indiscriminately.

From this born the need to establish a connection between tour operators and inspection services, designed to be a more effective distribution of admissions criteria, and museums in the area, taking into account the cultural level of the user. The organization of tourist routes, for example, should gather educators from the museum's suggestion of different routes, which in any case provide a historical overview, so as to leave even a single day in the visitor, structured picture of the known .

Even for the museum-school relationship, you need a job preparatory visits, which can be done under the museums themselves but assisted by personnel capable of using appropriate technology, such as projections and video. Too often students are accompanied on a visit in the cultural scene by personnel not trained and not suitable to illustrate the path.

A useful contribution to the refinement of the training function can also result from the opening of the museum to visit restoration laboratories, where knowledge of artistic techniques will complement the information on historical works.

Preserving, protecting the fragile work of art, irreplaceable, one in perfect condition and transmit to future generations must be our common objective.

So how to defend the historical collections held in the original sites and still privately owned and endangered by the growing economic difficulties and abandoned all'incuria and degradation. We must pursue the possibility of preserving monuments and art of great importance. The situation in which there is the Palace of St. Carditello Tammaro currently represents a good example of cultural property is not protected and abandoned. (Fig. 5, 6, 7).

Fig. 5 – *Royal Palace of Carditello.*

The "holding of Carditello", fifteen acres of land and a royal palace built by the architect *Francesco Collecini for Ferdinando IV* di *Borbone* to *San Tammaro*, in the area of the province of Caserta, which the Romans called *"Campania felix".*

Inside were the frescoes of the painter Philip Jacob Hacker, who hosted Goethe in his "*Travels in Italy*". The verb in the past is a must: most of the decorations have been lost, destroyed by years of neglect and water infiltration.

But the Palace is owned by the Consortium for reclamation of the lower basin of Volturno, a Regional Authority founded to govern the discharge of wastewater and stormwater. The Consortium, unfortunately, is disastrously in debt, which is why the Palace has been foreclosed and auctioned to the highest bidder.

In places the object of cultural heritage, the number of visitors and of itself constitutes a problem: you know the damage caused by changes in temperature and moisture of the breath, and even the physical consumption of the monument caused by the continuous flow of people. Contact with a large audience, sometimes uncontrollable, also poses a problem of physical safety of the works and monumental building that houses them.

Fig. 6 - 7 – *Inner Royal Palace of Carditello.*

So there is a safety threshold between conservation of the building and operation of the museum included in the monumental place, which is sometimes exceeded. However, it remains true that, especially for historical collections, the relationship between monument or monumental buildings and works of art can work, within the limits of a previous target compatible with the new function. And since the monumental buildings, once restored, if used, are for a new rapid deterioration, the museum re-use is advantageous. But to say that the museum would necessarily be included in a monumental force is also an indication of our predecessors.

It also means even close the door on the possibility of being able to build a new structure designed and engineered specifically. A museum built in the language of modern architecture, is visited by an audience not only attracted by the works of art, but also the manner in which they are exposed.

A monumental building is an organism that lives or dies. You just give him a chance at life, even accepting small changes. This is a problem of measurement, the calibration difficult, which must be taken into account. There are very good examples of the rest: some renovation of monumental buildings have yielded good results. He added that there is a sort of rebound of communication between the character of the building, and things exposed, in the sense that the building can transform itself into a vehicle of communication of the culture transmitted by the works contained.

If the answer to these problems with a new update also theoretical functions of museums, not to be forgotten, however, that some endemic deficiencies can be solved with elementary precautions. Haskell said even "trivial": "that all objects are well marked by plaques and that the museum is better integrated with the local community. Everyone should be able to come and go as they wish, without cards, without a ticket. The museum director has to have respect for the audience, letting go, explaining that what is responsible, explaining what are the most beautiful things, most important, non-academic way, but giving everyone a chance to understand.

The organizational structure of museums appears easier to implement the model of science museums, art or history, but has more difficulty managing the museums of archeology and art. Probably because most of the museums and galleries Italian derives from private collections flowed back into public schools. Archaeological museums are fueled by the discovery of specific areas of excavation, and therefore have a more organic, and tendency to a gradual enrichment linked to its territory. As for galleries and museums are used, the story changes, their development is generally determined by occasional events, such as the presence in the market for works that would otherwise be dispersed, their presentation to export or what is more, in payment of taxes. The museums are they therefore have to act as a shelter for the works whose conservation is threatened.

The randomness of such acquisitions produce disastrous consequences, which affect the exhibition halls, where often an excessive presence of artifacts, including non-significant or repetitive. The Italian warehouses, on the other hand are already a fundamentally flawed, full of works that can not be displayed because of low interest, small paintings of modest quality, copies, furnishing the state with private purchases received or bulk donations.

We must consider the importance that the museum will in our lives, and in Italy than elsewhere.

Over the countryside and cities deteriorate, the more things that were part of our daily life, such as the "Ara Pacis" in Rome, which we used to see outside, we see now caged in a museum. We must accept the emergence of a culture of museums. It is increasingly important that you allestiscano and museums that are well organized, respecting and protecting the object.

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The contribution of the telematic university in the field of cultural heritage: the museum system between preservation and valorisation - T.K. Kirova e M. C. Lapenna

Adjustments and Guidelines for innovating the museum system - S. Aricò

Which drawing to deliver more information?

Giuseppa NOVELLO, Massimiliano LO TURCO
I Facoltà di Ingegneria, Politecnico di Torino, Italia
e-mail: pina.novello@polito.it, massimiliano.loturco@polito.it

Abstract

The paper explores the potential of methods and languages designed to facilitate the communication of appropriate information content for the different levels of detail required in the creation of an architectural design, levels with different purposes, but nevertheless co-ordinated.

Within this thesis, the many different facets of drawing and the language of graphics are confirmed as agents of intellectual mediation, as a support for expression and also as dynamic cultural and evolving factors. In order to reply to the new demands of performance, due to the increasing fragmentation of responsibility for design, some adjustments in the workflow are needed, essential to support renewed practices; in fact, supporting this dynamic, the representation seems to have recovered a role of increased visibility and importance, regaining an effective recognition through a reconfirmation that remarks the delicate function of communication, interpretation and criticism.

The added value of the BIM methodologies (Building Information Modeling), is not limited by the ability to handle graphical representations at different scales with a single 3D model, but it answers to some requests connected by the data complexity inherent with the design and construction, actively supporting the engineering process: this means to relate actors or the building process to each other in a new way, reforming the assets and the processing modes, requiring explicit coordination for activities and procedures.

At this regard, we analyze new operational workflow through a brief description of some designs carried out through the collaboration between DISEG (Department of Structural, Geotechnical and Building Engineering) and the Building Service of the Politecnico di Torino [1], speaking about drawings and representations.

Keywords: Building Information Modeling, database, drawing, representation

1. Foreword

It is always very hard speaking of architectural design ; on the other side, talking about some kind of work that may occur during the process that takes place between the moment of conception till its complete realization it could be paradoxically easier. Indeed, this statement is useful to limit the area of interest of the following arguments, having the contribution that is declared in the title: being able to identify some critical aspects of the working-out processes, focusing the attention on those methodologies that are best suited to manage the complexity information of the design representation. [2]

The theme is not certainly new, but the purpose is to update some mentioned thoughts with the comments suggested by the latest operating procedures, in order to present some experiences conducted directly on the field. We are inspired by the intention "to exert ourselves", in order to critically analyze and to abstract some principles of methodological value; this seems to be still the task of our way of doing research, looking at the drawing and the representation techniques as media collaborating for a deeper knowledge. It is required a renewed focus on other forms of knowledge and of action, as well as a position of listening to the needs that are expressed by other actors involved in the design process. During this process the Representation field is involved as a dynamic agent, stimulating action and collecting instances, working to

produce ideas that, responsibly, must be evaluated and verified through a series of tests. In order to better operate, those checks ask for an ever higher quality and quantity of data.

Are there some advanced tips to improve the efficiency and effectiveness of this complex process? We will try to answer by addressing to topic issues such as the role of the use of digital technologies, evolved from more established practices and based on a systemic and relational approach. We examine the limits and the virtues, exploring new communication languages and investigating the diffusion levels [3]; while we are still working on it, we anticipate some evaluations that could be discussed, deriving new demands from the debate, surely an essential topic for future studies. [4]

Digital graphics processing has become standard practice in recent years: it is a compulsory stage in design today. On the other hand the tool is not considered equally efficient in reducing the risk of omissions and errors. The reasons are to be sought in the limitations of the software, such as for example the types of Computer Aided Design (CAD) applications used, largely employed for the production of two dimensional drawings. The inefficiency perceived by users is the direct consequence of a certain difficulty in using the tools compared to the simpler interfaces found for office automation. The division of a drawing into classes of layers has always been a topical argument for the standardisation of information and methods of use and always an important subject for study by international standards authorities. One of the most significant international models is that drawn up by the American Institute of Architects (AIA),the BS1192 standard for Great Britain, the French System Unitary de Communication (SUC) of the 1990s and the Swedish CAD Guidelines Bygghandiingar 90 - SIS 1999.

Although BIM software applications in current practice ensure results of a much higher standard than those of traditional two dimensional CAD software applications, structured use of them can further improve the conception and design processes as well as the construction and maintenance processes. Often the BIM concept is associated with a quicker method of virtual modelling, which definitely guarantees faster results and higher quality, but it is not yet able to fully unleash the potential which a database for data of a different nature inside it possesses.

Here too standards must be adopted: at this regards, we mention the National BIM Standards Committee (NBIMS), based on standards for the interoperability of data and on the relative taxonomies and they put the various information sets into hierarchies following an approach that is appreciably different from those of the past, including classification systems, guidelines and best practices. Today's construction scenario contains a plurality of positions behind which lie just as many cultures which represent different conceptual approaches to design.

This paper explores the capabilities of the latest languages (both the analytical and/or the synthetical ones) of the new methodologies, connected to the preparation of the architectural design.[5] These techniques, exploiting the opportunities offered by parametric calculations, improve the communication of content using correct information for the various levels of detail. The increasing complexity of the project actions, often shared by a plurality of subjects, must be highly coordinated.

So, there is therefore the Uselful Drawing, [6] which is pragmatic and functional, whose results exceed the drawn architecture characterized by information systems organized in a database constantly interrogated and quickly changed. Here the updating processes foresee automatic controls, overcoming the traditional analogical representation forms, adapting themselves in more dynamic ways. In other words, it is therefore a less sequential Drawing, and a more relational one.Within this complex background, the many different facets of drawing and the language of graphics, a broader concept and perhaps a more preferable term here, are investigated. They are confirmed as agents of intellectual mediation, as a support for expression and also as dynamic cultural and evolving factors, which have frequently been adapted, to contribute to a renewed quality of the design process, thereby recovering a role of greater visibility and effective relevance.

According to this view, the representation role seems to have recovered a role of greater visibility and importance, regaining an effective general recognition that has substantiated the delicate function of communication, interpretation and criticism. The surplus value of BIM methodologies is in fact not only connected by the ability to handle graphical representations at different scales using a single three-dimensional model; moreover, it seems to answer to some urgent requests moved by the complexity of design and construction. In fact, this approach actively supports the engineering process relating professionals to each others in a new system, reforming the processing mode, requiring more explicit coordination of activities and procedures, particularly through the management of *parameters*.

2. The importance of being Parameter

At a time when professional practice is demanding increasingly specific competencies and extremely tight timescales, a tendency is emerging for software technologies to be used in a more deliberately structured

way, in a continual quest – one which is at times laborious, at others more fruitful – for procedural strategies that enable the use of shared platforms. At the same time, the market is responding by offering a large number of applications devised to resolve the various specific requirements. The term *parameter*, from which some of the considerations in this book are derived, assumes different connotations depending on the context in which it is applied. Whereas in mathematics it represents an arbitrary constant used in systems, formulae and equations, in a design environment it can take on other, different shades of meaning. This is a good opportunity, then, to unravel this terminological tangle: unlike parametric software, BIM object-oriented software has more in common with architectural design, where the internal libraries available are actually classified by building element type. So there are software applications in which the parameter is central to a system of associated dimensional relations and is given flexibility by procedures that facilitate not only the formal conception but also the changes occurring in the subsequent construction stages, which is fertile ground for experimenting with programming code. In other contexts, the same term refers to the control of a certain number of variables (geometrical, relational and other ones) that enable a particular process (design, construction, management, etc.) to be managed. [7]

For computer science, a parameter is a value that a function expects to receive in order to do its job. In other words, the function, the program itself and the operating system expect (values) and want to know (what to do), because the programmer has expressly envisaged that information be supplied for those purposes, i.e. by requiring that parameters be defined. In the familiar context of design software packages, the process of constructing relationships and generating objects via modelling procedures is often carried out using a programming environment provided within the individual applications that is known as scripting. This refers to a programming language available within a software application that enables it to be tailored from the inside, by customising the tools and creating new ones.

These tools have made functions available to designers that were previously inaccessible (or required special, complex operations), thus enhancing not only the modeling procedures but as a result also making it easier to use shared formats to exchange information. The purpose of this is to enable interoperability within the individual products, Both parametric and object-based software are moving toward this common objective, on parallel paths: For the former (in terms of the most authoritative names on the international scene), we are seeing new operating processes being developed in which the professional works closely with the programmers, creating tailored applications as and when required. As for object oriented software applied to the architectural design sector, the most effective use of software tools enables some procedures to be customized, as discussed earlier, through an ongoing search for shared methodologies for organizing the data that are managed by the system.

3. BIM: Building INFORMATION Modeling

Current technology has useful virtual alternatives to offer, then, such as the adoption of three-dimensional models for display, simulation, analysis and calculation purposes. If, on the one hand, there is a risk of making the control of some highly sensitive procedures more complex, on the other, the BIM approach, whose potential is yet to be fully realised, has the power to confine traditional CAD tools to the role of producing series of drawings. Although two-dimensional drawings are certainly able to convey the designer's intention, they are often blighted by errors, omissions or inconsistencies, which can easily be identified using automatable checks. It 's definitely a less poetic Drawing if compared to some representations of the past, but its contents are highly informative.

Although a host of design studies are taking an interest in these issues, few are using this methodology to best effect. These tools enable significant changes to be introduced throughout the traditional architectural design process; in particular, the benefits can be estimated using a multi-functional diagram that compares the effort made by professionals to produce the design documentation in the various phases of the process with the time required to do so. The diagram provides a comparison of the distribution of the technicians' efforts through the various phases in a traditional CAD environment (graph 3) with how it looks when basing the design process around the use of a BIM (graph 4). The impact of later alterations to the design can also be assessed: it can be seen that the effort needed to make these changes is equal to, if not greater than, the effort required in the initial decision-making stages (graph 1). What's more, the impact of the costs of the subsequent alterations increases exponentially throughout the process. To that end, it is useful to refer to the procedure proposed by Lachmi Khemlani [8] in which, as the author suggests, "*[…] minor variations from this sequence can occur from time to time, but the essence of it remains as shown*".
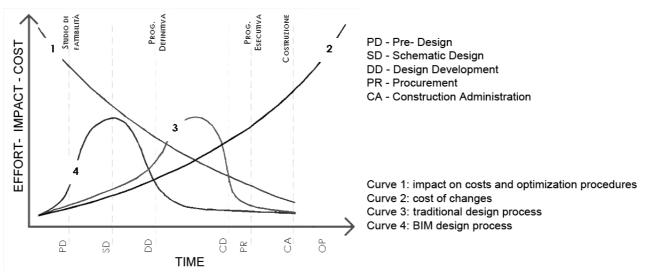
Fig. 1: Macleamy curve comparing the course of the current design process with the results of using a BIM approach in terms of effort, timescales and costs

In architecture, the process of progressive automation has taken and continues to take a path that is well-trodden in the history of the evolution of software, as most of the applications were primarily intended to support a process known as *Drafting*, including the initial forays into computer-aided drawing. The use of the third dimension in the representation of architectural designs and a systematic recourse to three-dimensional modelling have established a subsequent stage, known as *Modelling*.

The design process typical of the drafting stage is not affected by the use of three-dimensional modelling software, as the two-dimensional design phase is followed by a three-dimensional modelling phase, independently of the Monge representation. For this very reason, the three-dimensional model is very often developed outside the design team and only after the design development stage has been completed, as a natural "dead end" of the design process, one which is used only for the purposes of disseminating the design.

The process of progressive automation moved on with the introduction onto the market of the first "object-based" architectural software packages. Indeed, the introduction of the BEMs or Building Element Models, in place of abstract geometrical entities, represents the main step forward with the BIM philosophy: whereas the Drafting applications made possible the two- and three-dimensional geometrical representation of any architectural construction, the Modelling software applications make it possible to build it, albeit in the form of a virtual building. Hence the term *Designing*, for a tool dedicated to design in a completely innovative environment.

The automation of some of these processes will lead to the point when all the design information will be created and handled digitally, thus maximising the benefits of this new "virtual format". In other words, we will have a digital model of a building, one that is not just geometrically accurate but can support completely different kinds of information. For this reason, the final stage is called *Collecting*, which corresponds to the design of the architectural construction in a purely BIM context. The introduction of BIM has brought a radical change in the management of the design process, and it is crucial to understand the impact that this has had, and will continue to have, in the construction industry. The very concept of the BIM is based on the possibility of incorporating meta-design information of a non-graphical nature, such as numerical and tabular data, into the 3D model.

Here the Drawing and the Representation roles are completely renovated, being able to coordinate and control the entire design process, through the management of complex procedures.

4. BEM: Building ELEMENT Model or Building ENGINEERED Modeling?

As previously stated, the BEM acronym stands for Building Element Models, a digital representation of the architectural elements that are introduced and used within the BIM environment for the creation of 3D models. At the same time we propose a new sense of BEM, in which the meaning of Element could be approached by the term *Engineered*, underlining the need for engineering process for new technologies, making them more efficient.
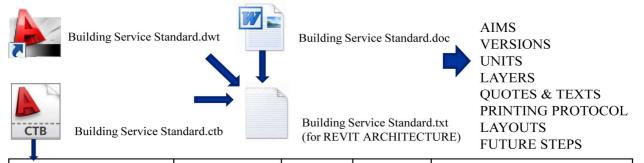
Information flows in the building industry to today are compared with the continuous return or feedback of that same information, given the need to relate different types of data to each other and take account of their reciprocal influence. The concept of "*quality*" in the building sector defines particular aspects of the building process for which a direct relationship between requirements and performance is necessary. At this regard, Drawing has always constituted a privileged means of communication, but the subject of "design as a measure of quality" does not end with the communication of the ideas or with the specification and verification of the ideas with regard to those who implement them.

The monolithic character of traditional building is flanked today by the requirement for an analytical dimension that can be broken down, the design of which results from the overlap and reciprocal co-ordination of the various sub-systems and the use of BIM tools seems to be the best answer to these requirements. We can talk of out-and-out codes for design drawings, constituted by a set of rules that allow to "regulate" the graphic data communication. Below there is a summary of the main procedures that maximize the concept of engineered model.

4.1 Process engineering and standardization of procedures: the case of the design of new student residences

The engineering procedure is well defined referring to the process performed to design of new university residences (Ministerial Announcement for the construction of new residences for students - Law n.338/2000, published in Official Journal, the 28th of April, 2011 n. 97). This case study is particularly interesting for the organization of work carried out by adopting standard codes, easy to understand and easy to use in order to effectively implement the dialogue among designers of different expertise.

In practice, it was drawn up prior document for the designing phase, greatly simplified compared to the international protocols, in order to capture two aims: firstly, to harmonize the procedural expertise to the same basic level, ensuring that professionals could adopt it in a shared environment; then, to update standards and procedures to those experienced in the BIM environment. Doing that, it is possible to enter and extract data from CAD applications, allowing less critical information workflows.

CAD Color	Printed color	Weight	% Filled	Contents
1 – Red	Black	0,1 mm	100%	Quote systems, layout
2 – Yellow	Black	0,1 mm	100%	Elevation lines, not sectioned lines
3 – Green	Black	0,15 mm	100%	Frames
4 - Cyan	Black	0,09 mm	100%	Sectioned Walls, Structures
5- Blue	Black	0,4 mm	100%	Ground line
6 – Magenta	Black	0,05 mm	90%	Furnitures
7 – Black	Black	0,1 mm	100%	Layout lines
8 – Dark grey	Black	0,05 mm	70%	Hatches
9 – Light grey	Black	0,05 mm	80%	Edile per impiantisti/linee molto sottili
10 – Red for Construction	Black	0,25 mm	100%	New elements
50 – Yellow for Demolition	Yellow	0,25 mm	100%	Demolished elements
Other colors	By color	0,4mm	100%	HVAC, electrical, plumbing systems

Fig. 2: Proposal for standardization protocols: the scheme summarizes the connection between CAD and BIM standard used for new architectural design of the Politecnico di Torino.

Shortly, the protocol includes a set of prescriptive guidelines that contain elements of unification for the management of the projects, specifically dedicated to its representation such as layout templates, layers, text size and pen thickness. We tried to use standardized naming and symbols, also available for CAD drawings and for the treatment of processed data in a BIM environment. Moreover, this work had as intermediate

target a gradual upgrade of staff training for the Building Service working group. The future goal is to extend BIM methodologies to all areas of design process. A radical change has seemed, at present, impractical, especially for those sectors that use CAD applications like graphical representations derived from computational algorithms run by other applications (as in the case of plant design).

Abaco dei massetti	
Nota chiave	Tipo
	RU_Partizione orizzontale_Strato portante_Solaio gettato portante vasche interrate 30 cm
Ms1.1	RU_Massetto su ambienti non riscaldati_Aree connettivo_25 cm
Ms1.3	RU_Massetto su ambienti non riscaldati_Aree servizi igienici/spogliatoi_25 cm
Ms1.4	RU_Massetto su ambienti non riscaldati_Aree comuni_25 cm
Ms2.1	RU_Massetto di copertura_Zone tecniche praticabili_25 cm
Ms2.3	RU_Massetto di copertura_Terrazzi_27 cm
Ms2.6	RU_Massetto di copertura_zone interne di connettivo_27 cm
Ms2.7	RU_Massetto di copertura_zone interne bagni comuni e spogliatoi_27 cm
Ms2.8	RU_Massetto di copertura_zone interne aree comuni_27 cm
Ms2.9	RU_Massetto di copertura_zone tecniche interne_27 cm
Ms4.1	RU_Massetto su ambienti non riscaldati_Aree tecniche_25 cm
Ms5.1	RU_Massetto di interpiano_Camera_20cm
Ms5.2	RU_Massetto di interpiano_Bagno_20cm
Ms5.3	RU_Massetto di interpiano_Aree comuni_20cm
S1	RU_Partizione orizzontale_Strato portante_Solaio gettato portante 31.5cm
S3	RU_Riempimento_igloo e completamento

Fig.3. Different drawings taken from the 3D model: thematic drawings, 3D views, schedules and some details obtained from the BIM model. (Authors of the virtual model of the Codegone residence: eng. G. Cangialosi and eng. M. Lo Turco).

Even in these cases, which present specific and non interoperable information, procedures can be organized by adopting particular protocols, so as to guarantee the efficiency and effectiveness of technical communication.

Also within the BIM platform, the second topic was the adoption of various templates according to the different types of intervention (referring to different levels of design: master plan, preliminary, final or executive designs, new or existing buildings…). The time constraint seemed the perfect opportunity to put into practice certain procedures till now known only in theory.

The two design project, although characterized by different plan distributions, show remarkable similarities in relation to manufacturing technologies, components and building materials chosen for walls and floors, reducing the time used for drafting of construction details, quantity take-off and its evaluation of economic costs and exposure. From the operational efficiency viewpoint it is important to decide in advance the view models, such as the standards for the visualization of the project at different scales (1:200-1:100-1:50, in order to speed the transcription of drawings at different scales, equipped with some topics expressly required by the announcement. It was organized an information system based on relations between some parts and the entire design project, thanks to a graphic representation organized through a unique model. This methodology is destined to bear the complexity that occurs whenever it is needed to start from the conceptual phase up to the construction one, working as the product of data processing and, at the same time, being challenging and fascinating if collectively shared.

4.2 Teamwork: the case of the reutilization of a heating station into new classrooms

Each new project provides interesting ideas to carry some innovations in the working methodology, maintaining the desire of doing research and trying to compare results issued from previous experiences. In the mentioned case study, some areas will be converted into new classrooms; it was decided to adopt a working system that would allow multiple users to work concurrently, using the same file. The goals of the trial were to assess how and whether it was possible to:
- maximize efficiency production through adopting a coordinated and consistent BIM working approach;
- define the standards, settings and best practices that ensure high quality results and uniform drawing output across an entire project;
- ensure that digital BIM files are correctly structured, in order to enable efficient data sharing working in a collaborative environment.

There are several methods to enable collaborative working in a BIM environment, including working practices and team management. This topic deals with the principles of subdividing a model for the purposes of:
- multi-user access;
- operational efficiency on large projects;
- inter-disciplinary collaboration.

We must honestly remark that each project carries out a period of knowledge and testing able to improve the traditional workflow. Doing that, each new project means an improvement of the traditional workflow. Till now, the information sharing technology was done using external references (linking) in order to split the architectural part (Revit Architecture) from the structural one (Revit Structure).

The design of new classrooms was the ideal chance to progress in the trial: also in this case it was carried out on the basis of international experience, first of all the example of AEC (UK) BIM Standard for Revit, a workable implementation of the AEC (UK) BIM Standard for the Architectural, Engineering and Construction industry in the UK. This Standard is aligned with BS1192:2007 Collaborative Working, which defines the process for project collaboration and efficient data sharing. Focusing the attention on collaborative environments, we have defined specific processes aimed at effective data sharing in real time.

Regarding to this, the technology called Worksets allows multiple users to simultaneously make entry on a single template file, called central file, which is frequently updated by implementing multiple local copies.

The use of worksets is useful when the design phase is already far from the initial stages, in a phase in which it is requested the production of a significant amount of executive drawings that can hardly be quickly delivered by one person.

The work is then divided into different skills (structural, construction, engineering ones) so that the individual professional is responsible for a particular scope.

DC_Abaco delle porte demolite _DC				
Famiglia e tipo	Larghezza	Altezza	Area	Nota chiave
CT_Por 1Anta FC: CT_SF_5cm Infisso	1.19	2.33	2.78 m²	Po/11
CT_Por 1Anta FC: CT_SF_5cm Infisso	1.23	2.33	2.86 m²	Po/11
CT_Por 1Anta FC: CT_SF_5cm Infisso: 2			5.64 m²	
CT_portone ingresso: 395x400	3.95	4.00	15.80 m²	
CT_portone ingresso: 395x400: 1			15.80 m²	
CT_Uscita interrato: 85x210	0.85	2.10	1.79 m²	
CT_Uscita interrato: 85x210: 1			1.79 m²	
porta interna: porta 70x210cm	0.70	2.10	1.47 m²	Po/2
porta interna: porta 70x210cm	0.70	2.10	1.47 m²	Po/2
porta interna: porta 70x210cm	0.70	2.10	1.47 m²	Po/2
porta interna: porta 70x210cm: 3			4.41 m²	
porta interna: porta 90x210cm	0.90	2.10	1.89 m²	Po/3
porta interna: porta 90x210cm	0.90	2.10	1.89 m²	Po/3
porta interna: porta 90x210cm: 2			3.78 m²	
Totale generale: 9			31.41 m²	

Fig.4. The variable time can be effectively managed within the BIM, as demonstrated by the following documents that compare the status of fact, the future project, demolition and construction section view and extract theme of schedule. (Authors of the virtual model of new classroom design: eng. G. Cangialosi and eng. M. Lo Turco).
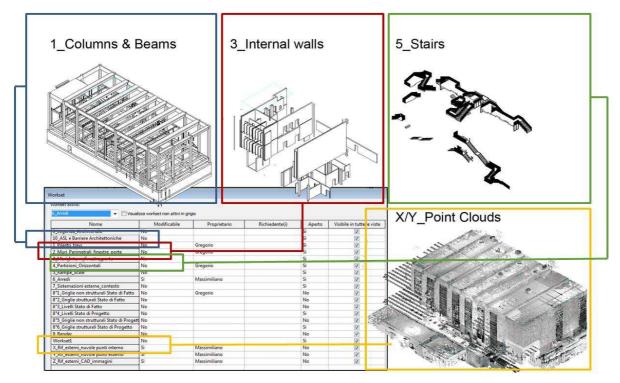
Fig.5. Through the workset management based on a set of simple rules that govern the interactions between the owner of a particular area (structures, walls, horizontal elements, point clouds,...) and some applicants, it is possible the current work using the same virtual model.

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It is also possible to keep track of different changes applied to the model so that we can have a record of undertaken actions. This work is an excellent example of integration between the various professionals, both for the survey made by 35 laser scans directly imported into the parametric software, and for the planning, dividing the digital model into several worksets, as shown in fig.5.

5. Conclusion and future proposals

The adopted methodology has seemed very productive, as it has greatly reduced the design time and the number of errors, especially those related to interference between architectural and structural elements, (identified in both graphical and tabular views) contained within the shared platform. The most obvious benefit is the permanence of information of different nature: this is a topic element not only for the success of the design process but also for an equally controlled and organic process of management /maintenance.

As for purely design aspects, future versions of the standard are intended to enlarge the skills involved, including other actors, such as plant engineers, builders, contractors.

From the operational point of view, Politecnico di Torino created a dedicated department to deal with the integration of processes and information systems (known as IPSI), which, under the guidance of the Board of Directors, launched the Politecnico's Facility Management (FM) plan in autumn 2009.

The plan aims to optimise the management of the University's internal processes, by providing an information system containing the data on the various activities, thus creating a single database as a reference point for sourcing information and carrying out subsequent analyses.

It is a "time Drawing ", able to handle a before, a during and an after, not only in the design process than with the capability of the database to be associated with design changes over the time. A drawing, therefore, apparently less iconic, but with strong information contents.
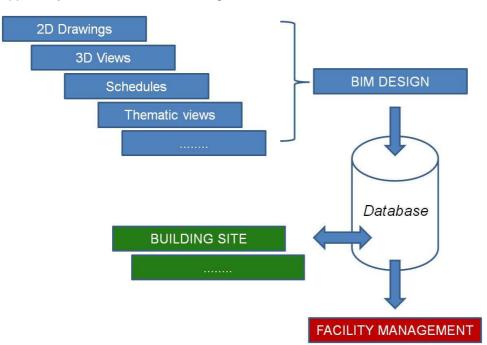
Fig.6. The diagram shows the main themes that constitute the design phase, ordered and managed by the database that is used again in the construction phase and for subsequent management applications.

The availability of an information system of this kind makes it possible not only to manage the data but also to devise and administer effective working and procedural processes. The technology can also be used in combination with BIM software and can facilitate an interoperable exchange of information between the two.

For the FM project only, the basic virtual model will gradually replace the traditional CAD plans. This change will be no mean feat, as it will bring a real quantum leap in quality, one that will require the whole logistic area to adopt the BIM methodology. This change will encourage greater interaction between the parametric software systems and the FM applications, such that all the analyses can be carried out against linkable data, thus ensuring greater control over the processes and eventually enabling full data interoperability to be achieved. [9]

Finally, the methodology represents a new way of thinking about Drawing, in a fresh and renewed role, which organizes, arranges and manages a multitude of possible representations, constantly comparable: so, data sharing of different expertises enrich the relational database proper of the new systems.

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Investigating on boundary.
Integration approach to architectural rapid characterization

Pasquale ARGENZIANO, Alessandra AVELLA
Dipartimento di Cultura del Progetto, Facoltà di Architettura "L. Vanvitelli", Seconda Università di Napoli, Aversa, Italia.
pasquale.argenziano@unina2.it, alessandra.avella@unina2.it

Abstract
In this manuscript, we investigate the diagnostic acquisitions that is possible to run on the surface of the built in order to develop a protocol for remote sensing diagnostic activities - which are fast and low cost - for the characterization of all visible objects. Particularly, we investigate the relationship and the integration between 3D laser scanner data, photographic and colorimetric data and thermographic ones.
This experiment was tested on a segment of the medieval town wall of Pisa.

Keywords: multidisciplinary analysis, masonry wall, digital survey, 3D architectural modelling, thermography

Introduction (P. Argenziano, A. Avella)
Every natural or anthropogenic 'element of reality' manifests itself to our senses through its surface conformation. The surface is the limit that contains the object; it is visible expression of exogenous actions that modify the object in time and space. From territory to city, from architecture to design product, digital diagnostic technologies allow not only to characterize each visible (morphology, material, color) and invisible (temperature, deterioration) manifestation of object surface, but also to establish the 'deep' consistency of the object with non-invasive or semi invasive analysis. The data set contributes to the definition of a multi-dimension model, as already experienced by authors inside research activities of the CRdC Benecon.
This study, however, integrates the topic with a much wider multidisciplinary approach and takes into account the archaeological and the architectural heritage researches undertaken by the Second University of Naples, Faculty of Architecture with coordination of Carmine Gambardella. The Multidisciplinary approach allows to investigate the Reality from the territorial scale to the scale of architectural structure, the scale of the minutes object, through the discretization and measurement of tangible and intangible values that characterize it. This survey method associates the n dimensions of the survey with relevant scientific expertise, expanding the widespread concept of Representation to an integral of multiple disciplines that contribute with their own specificity, integrating data and techniques, to study complex object of investigation. The tool that enables a synchronic and diachronic interpretation of the investigated object is represented by the layer of knowledge. The layer is the 'plain' on which the homologues data are organized after being acquired through multidisciplinary investigation. According to the thematic of the Forum, the authors focused on diagnostic acquisitions that is possible to run on the surface of the built in order to develop a protocol for remote sensing diagnostic activities - which are fast and low cost - for the characterization of all visible objects. This experiment was tested on a segment of the medieval town wall of Pisa. The fortified system of Pisa dates back to the mid twelfth century and is still in place for more than two-thirds of its original length. The square towers are connected by crenellated walls about 10 m high and 2.2 m wide with an articulated stratification. The wall hangings are limestone square blocks while the brick battlements are approximately 1.5 m high. Established the current situation of the places with focused inspections, a integrated digital

survey has been planned and implemented by means of 3D laser scanning, topographic station, GPS station, thermal camera and high-definition camera aimed at the development of a geo-reference discrete model 'point cloud' of a wall segment as an example and to the relative thematic modelling. This multidimensional model allows to label the "status quo" at survey time (t) and to build up a digital model that is the synthesis of critical acquisitions. It becomes the starting point for a cyclic monitoring (Δt), performed with the same sensors, as well as the reference for the choice and for the planning of further non-invasive or semi-invasive investigations ('touch sensing'), that can be carried out in contact with the built and that will require more time and cost.
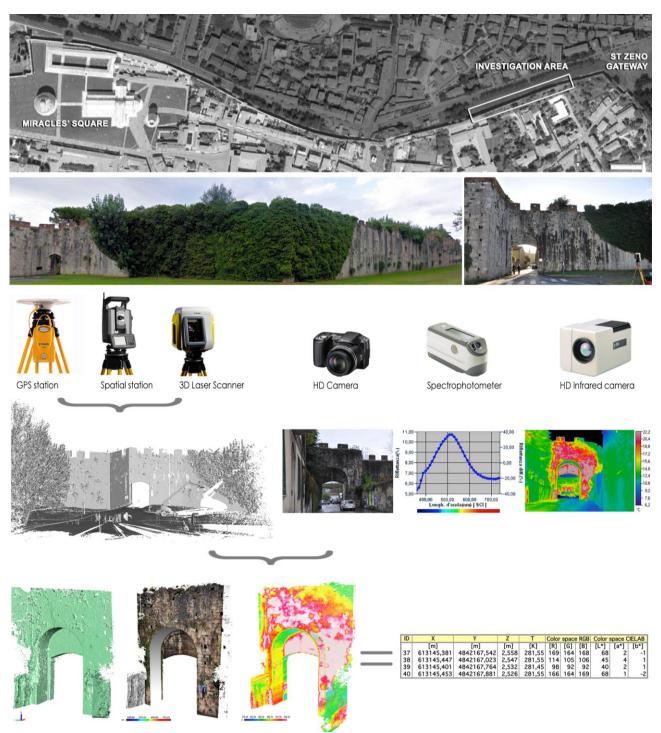
Fig. 1: Integrated digital survey: 3D laser scanning, topographic station, GPS station, thermal camera and high-definition camera (P. Argenziano, A. Avella, 2012).

3D Geometrical characterization of surrounding walls as basis of the integrated digital model (Alessandra Avella)

The integrated digital survey of a portion of Pisa's city walls, which unwind around the town for about five and half km, is the result of a method of approach based on the integrated interpretation of acquired data.

The following research provides:

- measuring the metric and morphological features of architectural elements, through advanced monitoring survey techniques;

- devising a discrete (punctual), 3D digital model of a portion of the surrounding walls, which may embody the whole surveying/rendering process described in the survey protocol given in this study.

- implementing geometrical surveys with feedback from high-definition thermal and colourimetric methods.

The so described 3D digital model acts as a fundamental geometrical layer, collecting metric data (which reproduce the spatial and structural features of an architectural element) together with thermographic and colourimetric information used for surface characterization.

The first step of a survey field work, following a preliminary activity-planning (as mentioned in the last part of the study), consisted of measuring a topographic network to identify the study area: that is accomplished by using an open polygon line constrained at its extremes to the IGMGPS95/ETRF2000 network in two geo-referential vertexes (coordinates were calculated based on the ETRF2000 European conventional system, which is currently one of the most updated systems adopted by Istituto Geografico Militare, Firenze).

The detection of two benchmarks at the polygon's far ends was carried out statically, by placing two GNNS antennas respectively on the IGM trigonometric vertex, of known coordinates, and on other benchmarks within the area of interest (the IGM trigonometric vertex selected as a geo-reference was n. 104613, in "Le Rene", Pisa).
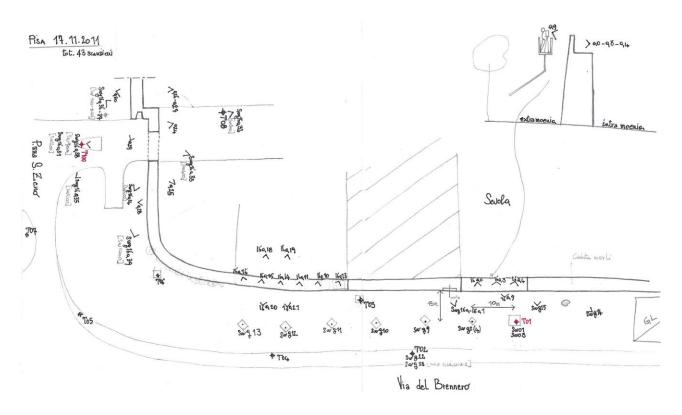
Fig. 2: Points of view or scan worlds of 3D laser scanner, GPS, and spatial station in a survey sketch (A. Avella, 2011).

The geo-referenced benchmarks, placed along the perimeter walls in the green area that stretches from Porta San Zeno to Bastione Parlascio, are used for further topographic reading and survey analysis with laser scanning.
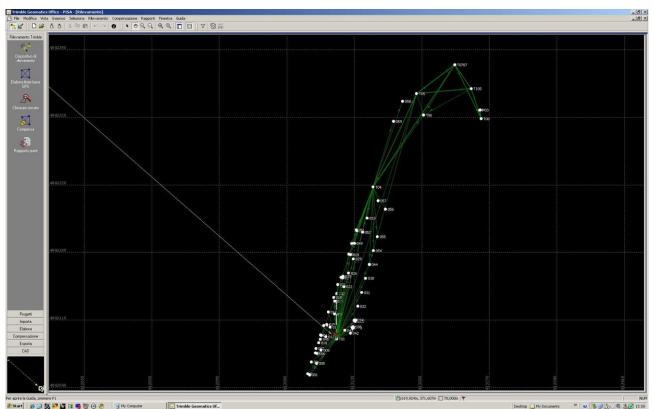
Fig. 3: Portion of the city walls between Porta San Zeno and Bastione Parlascio: georeferenced topographic polygon (P. Argenziano and A. Avella, 2011)

In such regards, the topographic survey was designed and accomplished by means of a robotic total station through an open, nine vertex polygon line that was measured with standard procedures based on combined reading of vertexes, set out ahead and behind the reference station point.

Processing of topographic data was then obtained during the work in progress and according to geoid ETRF2000, in the UTM map projection ,Time zone 32, acknowledged by IGM.

The XYZ coordinates were entered in the 3D laser scanner- control software to generate point clouds that had been previously geo-referenced with absolute coordinates, then dynamically aligned during data capture. This operation allowed for the optimization of the data post-processing phase in lab, and offered this research a quicker and more convenient approach.

Therefore, the first task of fitting the architectural element an its context into a geo-centric coordinate system was later followed by the geometric characterization of a segment of Pisa's city walls, rendered by the 3D Discrete Digital Model.

The metric and morphological description of a portion of the walls was carried out during a 3D laser-scanning work, and obtained in two steps:

- resolution calibration, depending on the average distance between the object's station points, the surface texture, and the quality of feedback.

- repeated monitoring from well-defined station points, that were selected depending on the rate of overlapping scanning and on coverage of all shadow cones (which happen to be hard to avoid when using a 3D laser scanning in open environments affected by human action).

To be more specific, the 3d laser-scanning was accomplished with an LS3D Trimble GX sensor, after installing forty-three monitoring stations (Scan Word) for an amount of 54742957 million points, detected through a constant 1x1 mesh network on all surfaces and at an average 15m scanning distance from the object. To this end, the innovative Trimble GX technology was used during the laser scanning phase to control the depth of scanning itself, in order to keep the user's defined space unvaried between 3D points, thus yielding a uniform 'point density', whatever the scanning distance is.

The result is a well-ordered set of points (called point-cloud) arranged in Cartesian space on a real scale to render the surveyed object as a material body, which one can virtually explore by moving across the billions of dimensional coordinates that reproduce it; such possibility enables the "visitor" to remove some parts, in

order to highlight others, and to filter data (which vary in density and stratification), and also places the observer in free spots, according to the altitudinal acquisition logics.

The city walls' punctual model was created by lining up fifty two 'point clouds' on a geo-referential basis: these clouds had been variably creamed off during data processing, based on the morphology of the object to reproduce in a range of 0.5 - 1cm, thus reaching the lowest density possible in every square cm. It may be remarkable that the survey project studied for this case didn't consider using artificial targets for the relative alignment of all scanning, in order to preserve the historically relevant architectural work from deterioration (a consequence of these targets clinging to the walls). All visual perspectives were recorded using at least three 'natural' singular points, that were easy to recognize in the survey area. During laser scanning with Trimble GX sensor, we proceeded to thicken the topographic network acquired through the robotized station, by using the already aligned polygon-vertexes as stations and monitoring positions.

Furthermore, due to the complex planimetric and altimetric geometry of the above-mentioned wall sections, and the peculiar environmental conditions, it was necessary to perform 3d terrestrial (twenty-five SW) and aerial (twenty SW) laser scanning at different hours and times of the day, that better suited our work. Scanning at different heights off the ground (fulfilled by lifting the laser scanner on an up to 30 meters-extendable crane) allowed for coverage of all areas, removing the shadow-cones resulting, from flower-beds vegetation, walkways and battlements, when filming on land. The Trimble GX laser scanner, equipped with an integrated digital camera, enabled a live rendering of the scanned object as point clouds, textured with its actual colours; that is a crucial aspect when it comes to recognize, at first glance, the material texture of a digitalized architectural element's surface, or when it comes to take close ups of the same object to enrich its details. In addition a high definition photography field-work was launched to allow a photorealistic colourimetric texturization of 'point clouds', thus completing the takes from the Trimble GX sensor-integrated camera. The survey field-work was followed by data processing at Benecon SCaRL's ARS (Environment, Representation, Structure) laboratories. The advantage of using sensors of the same brand, during the survey, consists in the possibility to process all data, from raw feedback to the mapped point-cloud model, in a Real Work environment, where they can be easily confronted and aligned. This survey integrates data, provided by the 3d-scanning of the architectural element's geometry, with high definition-digital photography, and finally implements them with surface characterization; that is the path that best describes our notion of 3D-Discrete Digital Model.
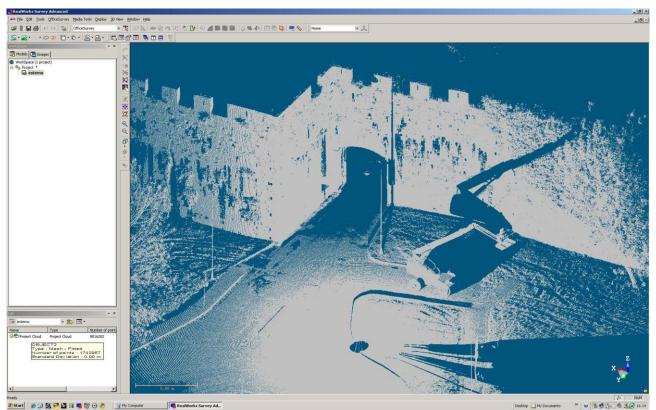
Fig. 4: Pisa, Porta San Zeno. Point cloud scan station (P. Argenziano and A. Avella, 2011).

The photorealistic, colourimetric and thermographic characterization of the surrounding walls meets the Integrated Digital Model (Pasquale Argenziano)

The palpable surface of an architecture is the visible display of its material features, as well as the result of internal and external stress and transformation, caused by a number of factors. Appealing to the prompt, convenient approach we mentioned earlier, it is possible to make a comparison between medical science and architectural studies: doctors can infer the possible cause of an illness by drawing on the careful and direct observation of the patient, and by performing routine examinations (such as, measuring body-temperature, heart-beat, blood pressure, muscular reflexes etc.), in order to make a preliminary diagnosis that will have to be confirmed by further, more accurate investigation. A well-sorted teamwork of experts and technicians can use their skills and knowledge to get the full picture of a building's structural situation through preliminary observation and the digital technology used in characterization, thus collecting information on the surface's chromatic texture and on the heat absorbed/released by its walls in different time slots. The use of technological instruments obviously follows and converges on the 3D-geometrical characterization of the architectural structure. As an application to architecture and to the specific case Pisa's surrounding walls, such characterizations concern the field of image diagnostics, that is supported and controlled through 'punctual sampling' with a method of approach and goals that largely differ from 'texture mapping' (which allows for a three-dimensional visualization of the architecture). Still, the integration of pixels with punctual data is handled during post-processing, and before mesh modelling: the digital images are projected on the overall 'point cloud' representing the architectural structure, preserving the discrete approach of the geometrical model. This turns to be not only a chart filled with Cartesian coordinates, but also the first step for the creation of broader multidimensional database.

According to specific parameters, the digital technology used on field consists of: a high definition camera (Nikon D700), a spectrophotometer (Minolta CM2600d) and a thermographic camera (Flir SC3000). The digital camera recorded the architectural structure's real image, depending on environmental conditions that normally influence visibility and the chromatic quality of RGB pixel-converted surfaces. The digital spectrophotometer – that was applied to a number of chromatically distinct points of the architectural structure's surface – allowed for chromatic correction of the pixelated images, going from a qualitative estimate in the RGB photographic space to a quantitative estimate in the CieLab space. Through the integration of such digital instruments we managed to characterize the architectural structure's surface in the visible spectrum, that is, in the electromagnetic range of 360-740nm. Finally, the thermographic camera recorded surface temperatures in the format of pixelated images, adding quantitative information (depending on the used parameter) that are invisible to the naked eye, since they result from lower electromagnetic frequencies (740nm- 1mm infrared). In the survey's interest, all instrumental operations were sequentially coordinated according to their acquisition method. The thermographic screening was performed in two day-slots around dawn and sunset, that provide the highest peaks of absorbed and released light. The photography field work was carried out in excellent light conditions, that is, when light hit the wall's opposite (and chronologically different) sides. In both cases, the image capturing was obtained by applying practical photography techniques borrowed from traditional architectural photogrammetry, that would reduce perspective distortion to the lowest extent possible.

Last, the use of the spectrophotometer was enhanced by placing it on a crane equipped with an adjustable man-lift, so that the operator could record the architecture's surface at different heights and distances.
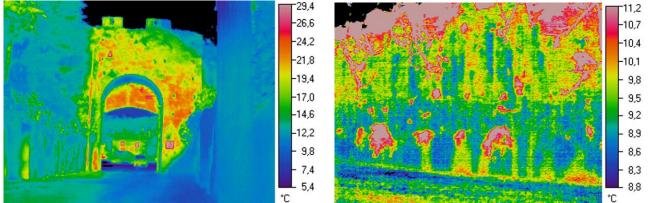
Fig. 5 - 6: Porta San Zeno and section of wall at Bastion Parlascio. Two infrared images (P. Argenziano and A. Avella, 2011).
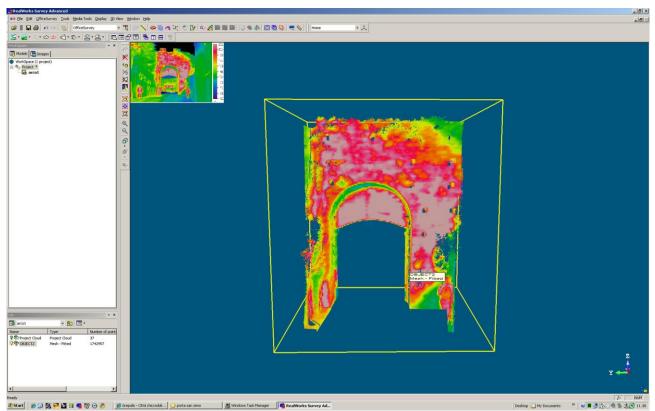
Fig. 7: Porta San Zeno. Projection of a thermal image on the particular point cloud model (P. Argenziano and A. Avella, 2011).

Considering the walls' shape and architecture, as well as its surroundings, such technique turned out to be fundamental for all digital data capture. The collected information was later processed by dedicated software and selectively adjusted to the point cloud model (a fixed and geo-referenced geometric entity).

Since no artificial targets had been positioned in the scanning field (in order to preserve the architectural structure's artistic value and its surface) the projection of digital images on the point cloud was operated by matching homologous points with the two given reference spaces.

Thanks to the photographs taken with a low resolution–digital camera (pixel 768x576), integrated with the 3D laser scanner sensor, this procedure has been reduced to the simple task of pre-emptively detecting singular and unambiguous points on the surrounding walls. This operation is fulfilled, on field, with actual hand-made drafts and sketches before proceeding to remote sensing.

The 'point cloud'-photorealistic mapping technique, performed by a sensor, has certainly simplified the projection of high resolution images, improving the accuracy of colourimetric coordinates associated with the cloud's corresponding points; on the other hand, the introduction of 'natural' singular points has aided the projection of all thermographic images that lend themselves to a difficult interpretation, compared to the cloud's discontinuous geometry and the photographic representation of reality.

To give an example, we could think of a thermographic camera recording invisible phenomena, that are rendered on computer displays in a variety of false colour scales (set before acquisition), some of which may lead to a difficult interpretation in space. Beyond the case of Pisa's city walls, it is important to underline that the projection of photorealistic and thermographic images (pixels) on the point cloud recalls the basics of 'reverse perspective' and 'interior orientation of a photogram', pertaining the field of architectural photogrammetry. By fixing, at least, three homologous points shared by the 'point cloud' and the actual image (a few software can detect up to 21 points), an operator can set the camera in retrospect when taking the photograph and, thus, solve the unknowns related to the outer system's projection centre and to the angular alignment of the photographic/thermographic camera. So, pixelated images are re-projected over the 'point cloud', reproducing the moment at which the digital snapshot was taken in a 3D geo-referenced space, and still respecting proportions and shape, though in a virtual environment.

That generates a correspondence between the digital image's pixels and the cloud's points, which is proportional to the camera's resolution and rounded up/down by dedicated software (provided that no photographic hardware on par with the 3D laser scanner resolution is available on the market). Considering the point cloud's average 10 x 10mm density, the resolution of photographic and thermographic cameras

(respectively pixels 4256 x 2832 and 640 x 480), their 'fields of view' and the average uniform distance between cameras and the surrounding walls (respectively m 15 and m 10), we can estimate that each and every photographic pixel has been projected on a 4 points/cm^2 spot of the cloud (that is to say, a 4 point area adopted RGB and Cielab colourimetric coordinates as its own), whereas every thermographic pixel has been projected on a 256 points/ cm^2 spot of the cloud (in other words, a 256 point area adopted Kelvin degrees by its thermal coordinates). Considering the average size of mansory blocks, equal to 540 cm^2, the relationship between thermal data and point-cloud model is well-defined. The underlying relationship between points and colourimetric/thermal pixels add further 'dimensions' to the 'point cloud model', and to its corresponding tabular layout.
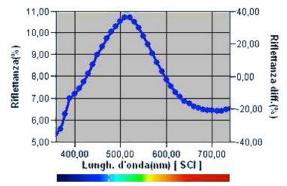
Fig. 8: Spectrographic graph of a point measured on a stone wall (P. Argenziano, 2011).
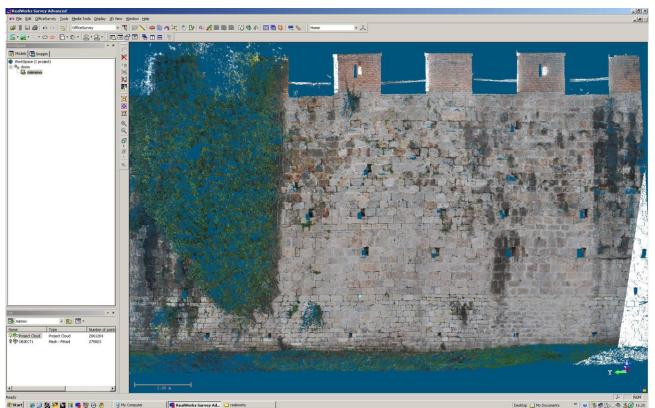
Fig. 9: Section of wall at Bastion Parlascio. High-definition photographic image corrected with spectrophotometry and projected onto the point cloud model (P. Argenziano and A. Avella, 2011).

Conclusions (P. Argenziano, A. Avella)

The underlying relationship between points and colourimetric/thermal pixels add further 'dimensions' to the 'point cloud model', and to its corresponding tabular layout. The conditions of promptness and "reduced costs" (on which this protocol is based) little have to do with the use of low cost-sensors, that provide a rapid capture technology: their aim is, indeed, the overall optimization of the survey process. Managing working-time duration and costs of a field survey, or a post-processing activity, means optimizing human and technological resources.

This goal can be easily pursued by introducing a teamwork of three people with same technical skills and methods on direct-instrumental surveying, and with a good knowledge of the sensors' functioning and potential. Instrumental resources can be optimized by obtaining the most accurate metric (S.I. unit: m), thermographic (S.I. unit: K) and colourimetric (S.I. unit: RGB, CieLab) acquisition of data, and through a thorough planning of all survey operations, in the best environmental and logistical conditions (as briefly explained in the chart to follow).

The captured data can be scientifically integrated, as they refer to the GNSS technology (the only world-wide reference system).

	Temperature		Solar exposure		Distance	Satellite coverage	Material		Daily timing				
	Environmental	Surface	Sunshine	Shading	Range	Range	Reflective	Absorbent	0 6 12 18 24				
GPS Station						1 ≥ PDOP ≥ 5							
Spatial station													
3D Laser scanner	t ≥ 0°				d ≥ 1m								
HD Camera					f(d) = pa								
Spectrophotometer	t > 5°				d = 0								
HD Infrared camera	t > -15°	t > -20°			d > 2m								

	Daily timing				
	0	6	12	18	24
GPS Station					
Spatial station					
3D Laser scanner					
HD Camera					
Spectrophotometer					
HD Infrared camera					

Fig. 11: integrated digital surveying plan on November 2011.

The collected data define a 'discrete model' that may give us insights on the architectural structure's state of preservation, and acts as:

1) a 'digital database;

2) the first step of diachronic monitoring (Δt), which can detect possible changes in the object's surface both in the visible and invisible spectrum. In fact, what happens on the architectural object's surface is the effect of external causes (weather, pollution, human activity, vegetation growing over, seismic movements), that are presented in this discussion, as well as internal factors (humidity, deterioration etc..), that will be subject to further study. The digital database's architecture is laid out as a chart where each row represents a point from the 'discrete model', while columns feature the S.I. units of measurement.

ID	X	Y	Z	T	Color space RGB			Color space CIELAB		
	[m]	[m]	[m]	[K]	[R]	[G]	[B]	[L*]	[a*]	[b*]
37	613145,381	4842167,542	2,558	281,55	169	164	168	68	2	-1
38	613145,447	4842167,023	2,547	281,55	114	105	106	45	4	1
39	613145,401	4842167,764	2,532	281,45	98	92	92	40	2	1
40	613145,453	4842167,881	2,526	281,55	166	164	169	68	1	-2

Going into detail, the first column (ID) identifies any of the cloud's point, and is generated by the SW; any other column features respectively geometric data (X,Y,Z), temperature (K), and colourimetric values (R,G,B, and CieLab).

Before closing the protocol, a few more considerations are required:

- if it is, indeed, possible to create a database like the one showed in fig. XX, then we must make it clear that all currently available SW are able to visualize only 'coupled information', for example, XYZ and RGB coordinates, XYZ and K, or still XYZ and reflectance, however they don't allow to make queries into the 3D Integrated Digital Model database (by coupling, for instance, a number of geometric data with an equal number of carefully selected colourimetric information);

- despite the introduction of the CAD three-dimensional modelling software thirty years ago, the integrated reading of data is still carried out through thematic maps and bi-dimensional, analog or digital visual-patterns, reducing our possibility to handle 3D-data to a plain bi-dimensional projection of the data itself.

- given such remarks, in the field of cyclic monitoring it is possible to confront only mono-thematic variations, i.e. the modification of a 3D or 2D geometry in time, a temperature variation in time or still a colour change in bi-dimensional space, whereas it still isn't possible to make queries concerning different themes in three-dimensional space with varying time (t).

On these grounds, we may assume research will continue to value the importance of visualization and representation of 3D and 4D data.

Fig. 13: Porta San Zeno. Comparison between the point cloud model, the photo-realistic model and the thermographic model, extracted from the multidimensional database (P. Argenziano and A. Avella, 2011).

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Territorial seismic safety evaluation and appropriate survey: liberty buildings in Naples

Mariateresa GUADAGNUOLO,[1] Adriana PAOLILLO[2]

[1] Dipartimento di Cultura del Progetto, Seconda Università degli Studi di Napoli, Aversa, Italy.
m.guadagnuolo@unina2.it
[2] Dipartimento di Progettazione Architettonica ed Ambientale, Università degli Studi di Napoli FEDERICO II, Napoli, Italy, adrpao@libero.it

Abstract

The *new UNESCO Recommendation* on the Historic Urban Landscape (HUL) states "Urban conservation is an important part of modern heritage policies". That is mostly exploited in Southern Italy, even associated with cultural tourism. Towns are the result of historical stratifications, represent a harmonious complex of architectural styles, and are a cultural heritage independently of the presence of monumental buildings. In 20th century first two decades in Naples, new middle class quarters developed, especially on Vomero and Posillipo hills. The new architecture was influenced by the so called "Floreale" or "Liberty" movement developed simultaneously with "French Art Nouveau", with the German and Austrian Jugensdstil, as well as with the Spanish Modernism. The main building typology responding to the bourgeois expectation was the Liberty villa or the 3-4 storey house, characterized by decorative elements inspired by medieval period as turrets and bow windows. Restoration policies cannot neglect structural safety, requiring an accurate knowledge of seismic risk of existing buildings. The aim is the quick evaluation of the safety level (LV1) of buildings in the most seismic areas. This assessment can be performed by simplified methods that are different from the specific ones used in the intervention design. In this paper, a methodological example concerning territorial seismic safety evaluation (LV1) and appropriate survey is presented, with reference to a specific building typology representing the liberty movement in Naples.

Key words: Seismic safety, Naples, Liberty, Masonry buildings, Territorial scale.

1. The Liberty architecture in Naples

Around the end of the nineteenth and the beginning of the twentieth century in Naples as much as in other European cities a movement that would mark figurative arts and architecture in the first two decades of the 20th century started to take place (to spread around). This movement in Italy was labeled "Floreal or Liberty" (from a well-known London firm manufacturing floral styled furniture objects) and developed in parallel to Art Nouveau in France, to Jugendstil in Germany and Austria, to Modernism in Spain. In the city of Naples architecture is primarily affected by this new artistic current and its diffusion in the two decades 1900-1920 is most evident in the newly urbanized middle-class neighborhoods located on the Vomero and Posillipo hills. The building type that best responded to the residential character of the bourgeois hilly quarters was primarily the liberty style villa or petit-palace. Their typical features follow the movement lines that prefer the basic asymmetry expressed in architecture by a wavy linearity inspired by flowers and vines and realized through stucco reliefs and painted bands both inside and outside the buildings. The site plan also is released from the rigid forms to win a plan freedom that abolishes the unique perspective and enhances the façade surface movement and the light and shade effects by the use of glass and polychrome materials as well as by the woven game of wrought iron railings and canopies. In addition to examples classifiable as fully
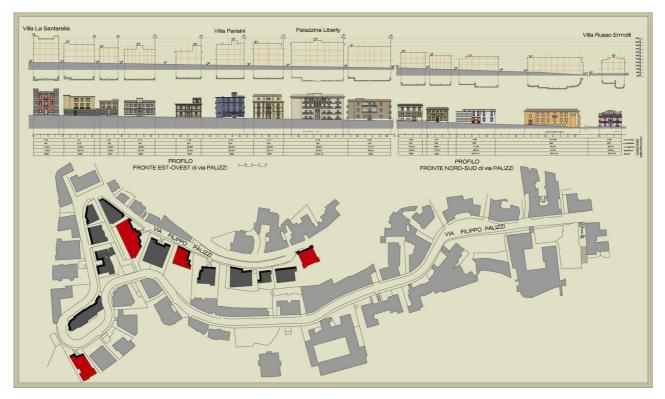
Figure 1. The Liberty architecture in via Palizzi

respondent to the liberty peculiarities, several contemporary petit-palaces on the Vomero hill are to be attributed to a hybrid mixture generated by the use of eclectic accents. This is for example the case of Villa Peruzy, in via Aniello Falcone and Villa Spera in via Tasso, both considered more pertaining to a neo-romanic taste, or the case of Villa La Santarella in via Luigia Sanfelice, that waves toward a neo-renaissance style. In the bigger palaces also economic needs result in abandoning the free plan scheme, and then the liberty language is only limited to the façade decorations.

1.1 The floral roads of the Vomero hill

The most significant urbanization of the Vomero hilly area starts around the last decades of the nineteenth century with a well defined program, consequence of the approval of a wider planning and road expansion project that included the whole city; and that is in line with the taste and the contemporary trends of the European town-planning. Up to the second half of the nineteenth century, as a matter of fact, the hilly area was considered as a suburb with a number of suburban villages around the magnificent villas Belvedere and Floridian, the Certosa di San Martino and San Francesco di Paola monasteries. Around 1885 within the program of "Risanamento", the construction of the new hilly district began following a radial scheme around large squares and new roads. The roads were arranged in an orthogonal layout and were entitled to those Neapolitan artists who frequently lived nearby. Where instead the steep terrain did not allow a regular lotting out, the new middle class roads were connected to the existing roads in the city lower part, thus outlining a system of winding roads at exclusive residential character such as via Palizzi (Figure 1), via Aniello Falcone, via Tasso and Parco Margherita. These are by the way the roads where the most representative liberty villas and palaces were found. Buildings that are work of the major architects of the period like Leonardo Paterna Baldizzi, Michele Capo, Stanislao Sorrentino and Adolfo and Gino Avena. The buildings here examined are all characterized by a marked eclecticism that determines sometimes neo-romanic, sometimes neo-renaissance peculiarities and in any case composite forms. Their characterizing elements besides the stucco and frequently painted decorations are the balcony corbels in shaped iron quarrels, the curvilinear and frequently spiral staircases, the existence of cylindrical turrets or polygonal bow windows.

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1.2 Examined buildings

1.Villa La Santarella, via Luigia Sanfelice n.16, (1909).

Built on behalf of the playwright Edoardo Scarpetta, it has a square-shaped plan marked in the top by four embattled and protruding turrets that confer to the building the shape of a small neo-renassaince three storey castle. The wealth of decorative elements is expressed by the gray ashlar stone covering, by the round arches, that surround the balcony openings and the windows, and by the continuous battlement all along the upper perimeter.

2. Villa Lorely, via Gioacchino Toma n. 14, design by Adolfo Avena (1912).

The residential palace of villa Lorely is located in a hairpin loop of via Toma. It presents a corner solution with a semi-circular tower with a ground floor entrance and a window marked by six small columns. Façades are asymmetric, one defined by a register of three window openings decorated with stuccoes representing intersections of geometric shapes and patterns, the other marked by a corner balcony that opens with a sequence of low arches supported by column-pillars which reduce the construction compactness. On the back there is a garden at a level lower than the roadway.

3. Palace in via Palizzi n. 19, (1912-14).

This four level late-liberty building with one level lower than the roadway is marked by compactness animated by the broken movement of the street front. This is emphasized by a protruding central body with the greater part of the stuccoes of the entire façade which is instead monochromatic and horizontally articulated only by the lines of continuous balconies supported by corbels and bordered by iron railings.

4. Palace Russo Ermolli, via Palizzi n.50, design by Stanislao Sorrentino (1915-18).

This palace built on a steep terrain is marked by a street front with a main entrance corresponding to the fifth level above ground and connected to the road by a suspended walkway. The entire façade is enriched with a bundle of stuccoes reproducing creepers and with a cornice that becomes the slab of the last level crowning balcony. The façade balconies facing down-hill are supported by corbels and furthermore embellished with a high frieze, with medallions and balusters of complex design.

5. Villa Catello-Piccoli, via Cimarosa n. 79, design by Adolfo Avena (1918).

This villa presents the same decorative elements derived from the medieval repertory of villa Giordano. The villa is built on a pre-existent building complex and a nice rational arrangement of the interior is successfully obtained. The external configuration resembles a small fortress with a basement characterized by a rustic ashlar while the lateral façade is marked by apparently random fluctuations of the ashlar. The first floor in its central part opens a simple window while in the upper floor the openings are embellished with stucco decorations. On the main façade along the roadway a large opening in catalan style, today a shop, is present as well as a tapered corbel.

6. Palace in via Parco Grifeo n.28, design by Adolfo Avena (1920).

This building evolves on an almost rectangular establishment marked in the front right corner by a full-height circular tower and in the left one by a bow window starting at the forth level and ending with a double pitch cover right under the building crowning cornice. The peculiar position of the main staircase space in the right rear corner with a mist linear trend, the use of mullioned windows sometimes at lowered and sometimes at round arches, the use of masonry interwoven balustrades colored to contrast the façade red all this makes the whole work especially rich and well in line with the liberty current.

7. Villa Spera, via Tasso n. 615, design by Adolfo Avena (1922).

This villa built on an existing rural house exhibits medieval decorative elements such as loggias, turrets, terraces and bow windows as expression of a neo-romanesque style. The rectangular plan evolves on three levels gradually stepped back from the entry prospect. The irregular openings are framed by arched windows with columns and prominent keystones on both sides. They were once embellished with polychrome glass but were asymmetrically distributed on the facades made of light red bricks and animated by casually protruding bricks that induce a soft ashlar effect. In some strategic points on the façade esoteric symbols are engraved. The interior is characterized in the down-hill corner by a remarkable spiral staircase that wraps at full-height the inner space. The roof in renaissance style is pitched.

8. Villa Pansini, via Palizzi n.15, (1922).

As in several other examples villa Pansini too is marked by prospects at different levels as a result of the via Palizzi slop. The villa plan is comparable to a square. The higher valley façade as well as that lower uphill show facades marked by a different distribution of the openings that appear only decoratively uniform and connected by the eaves continuity.

1	Villa La Santarella (1909)		
address	via L. Sanfelice n.16		
metric data	length	17,6m	
	width	17,6m	
	height	18,8m	

2	Villa Lorely (1912)		
address	via G.Toma n.18		
metric data	length	21,2m	
	width	18,3m	
	height	20,4m	

3	Palace Liberty (1912-14)		
address	via Palizzi n.19		
metric data	length	34,5m	
	width	18,5m	
	height	16,2m	

4	Palace Russo Ermolli (1915-18)		
address	via Palizzi n.50		
metric data	length	29,4m	
	width	17,0m	
	height	27,2m	

5	Villa Catello- Piccoli (1918)		
address	via Cimarosa n.79		
metric data	length	12,9m	
	width	15,7m	
	height	15,0m	

Table 1. Examined buildings built between 1909 and 1918

6	Palace (1920)	
address	Parco Grifeo n.28	
metric data	length	42,2m
	width	16,3m
	height	28,4m

7	Villa Spera (1922)	
address	via Tasso n.615	
metric data	length	23,0m
	width	17,4m
	height	16,9m

8	Villa Pansini (1922)	
address	via Palizzi n.15	
metric data	length	21,5m
	width	20,5m
	height	22,7m

9	Palace (1928)	
address	via Lordi n.6	
metric data	length	55,8m
	width	25,4m
	height	26,7m
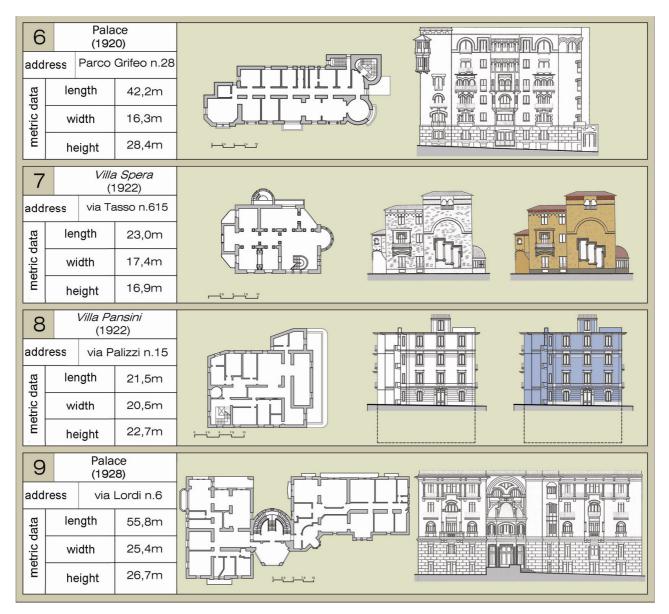
Table 2. Examined buildings built between 1920 and 1928

9. Palace in via Lordi n.6, design by Adolfo Avena (1928).
This building realized together with the adjacent Avena Palace during the rearrangement of the square in front of the main funicular in piazza Fuga, exhibits a system consisting of two distinct bodies linked by a central volume that acts as a hinge. The whole building ends with a continuous crowning but with a front articulated and offset with respect to the road course. The front is marked by a continuous ashlar basement common to the first two levels and with simple openings. The next two levels are marked by arched openings supported by small columns while the last level is highlighted by lodges and turrets. Peculiar is the central body solution with a polygonal plan and topped with a half-dome on the second level that re calls the north European architectonic avant-garde.

1.3 The geometric survey to evaluate seismic safety

The knowledge of the masonry historical construction is the prerequisite for assessing the present seismic safety and choicing effective improving actions. Techniques of analysis and reading of historical buildings are

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linked to the different cognitive steps of different reliability and effect on the building. Indeed the knowledge can be obtained with different levels of detail, depending on the survey accuracy, on the historical and experimental investigations. The making features are used to define an interpretative model that in the various stages of its calibration permits a qualitative interpretation of the structural functioning as well as a quantitative structural analysis. The model reliability, that is closely related to the detail level and to the available data, enters a growing deepening process to which confidence factors to be used in the current or project states are linked. At any rate the geometric survey is constructed at a detail level consistent with the requirements of the geometric model adopted in the analytical evaluations. At first, the construction identification, its location with reference to specific risk areas and its relationship with the urban environment, thus producing a first schematic survey of the building, were carried out. The next geometric survey of the building in its current state has been correlated not only with the system whole geometry but also with that of its constructive elements. The stereo-metric description of the building has led to identify the plain-altimetrical features of its constitutive elements. Thus at each level the geometry of all masonry elements as well as the inter-storey and roof height and the location of possible niches and skylight passages has been detected. The survey results are reported in the drawings of plans, elevations and sections in a scale not exceeding 1:100. The processed survey graphs yield the overall geometric configuration and permit to identify the structural scheme which is thought to be resistant in the two orthogonal directions. Such scheme then becomes the computing model in order to determine the shear strength of each floor whose sum yields the overall resistance of the entire building and then the first level seismic safety.

2. Territorial seismic safety evaluation

The assessment of building safety level, as well as the necessity and the suitability of eventual retrofits, has to be risen from the comparison of the structure capacity, evaluated as the result of qualitative and quantitative knowledge of the building, and the seismic action demand, as a reasonable safety level function. This comparison can be carried out at different accuracy levels, from a territorial seismic analysis (LV1) to the much more complex structural analysis of single buildings (LV3). Restoration policies firstly need the evaluation, in reasonable times, of the safety level (LV1) of the buildings in the most seismic areas. This assessment can be performed by simplified methods that are different from the specific ones used in the strengthening design. The P.C.M. February 9th, 2011 Directive "Cultural heritage seismic risk assessment and reduction with reference to the Italian national building code N.T.C. 2008" [2] identified some simple mechanical models, to be used for performing the territorial seismic safety evaluation (LV1) of the most common buildings types. The adoption of these models, even with uncertainty, has the advantage of providing a reliable and comparable assessment on territorial scale, just significant to the planning purposes. More valid estimates on individual buildings require, however, more sophisticated analysis methods. The seismic safety index I_S can be estimated using a procedure requiring only the building geometry knowledge. I_S greater than 1 indicates the building to be able of withstanding the reference seismic forces, provided by the seismic code; on the contrary if I_S is lesser than unity, the building safety is lower than that prescribed. A building safety level, representing the necessity of interventions, can be computed as the ratio of the structure capacity, assessed as a result of a qualitative and quantitative building knowledge, to the seismic demand, suitably modulated as a function of reasonable levels of protection. Therefore, 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_{SLV} is the ground acceleration leading to the achievement of the building ultimate limit state (SLV), related to the type A subsoil category, computed as a function of the fundamental period of vibration T_1 of the structure, as follows:

$$a_{SLV} = \frac{S_{e,SLV}(T_1)}{S \cdot F_O} \qquad T_B \leq T_1 \leq T_C \tag{2}$$

$$a_{SLV} = \frac{S_{e,SLV}(T_1)}{S \cdot F_O} \cdot \frac{T_1}{T_C} \qquad T_C \leq T_1 < T_D \tag{3}$$

whereas $a_{g,SLV}$ is the design ground acceleration, corresponding to the assigned return period of the earthquake, still related to subsoil A.

The ordinate value of the elastic response spectrum $S_{e,SLV}$ is calculated as follows:

$$S_{e,SLV} = \frac{q \cdot F_{SLV}}{e * \cdot M} \qquad (4)$$

where q is the behavior factor, F_{SLV} is the lower building shear strength, e* is the mass fraction participant to the first mode of vibration and M is the total seismic mass.

The shear strength F_{SLV} of the building is computed on the base of the walls shear resistant area at the i-th floor. The masonry walls stiffness and resistant homogeneity, the walls predominant failure type, the masonry spandrel beams strength, and the plan irregularity are taken into account by suitable coefficients. Furthermore, the evaluation of masonry building seismic safety must be performed both with reference to the building behavior, controlling the entire structural system strength capacity, and with reference to local collapse mechanisms, controlling the out-of-plane failure of walls and masonry portions.

2.1 Seismic safety of Liberty buildings

According to the above briefly described procedure, outlined in [2], by considering the geometric features of the Liberty buildings on the Vomero hill, the acceleration factors f_a of nine palaces were computed. These palaces were chosen as the most representative in terms of building geometries and openings; their plans are reported in Tables 1 and 2. Table 3 contains the indexes computed for earthquakes acting on both directions (longitudinal x, and transverse y) and assuming a confidence factor of 1.35 (corresponding to a complete survey of the building geometry and a limited knowledge of the mechanical properties of materials). The acceleration factor f_a is computed through Eqn. (1) according to a seismic safety level corresponding to buildings of limited relevance and class of use normally crowded (Class II); a ground motion acceleration of 0.093 g and a B/C soil class are assumed. The fundamental period of vibration was computed as $T_1 = C \cdot H^{3/4}$ where H is the building height and C was assumed equal to 0.05. In addition, factors in Eqns. from (2) to (4) were assumed as follows: the S coefficient equal to 2.1, the F_0 factor equal to 2.713 and the q behavior factor equal to 3.6. The outlined results show f_a values lower than the unity for all the examined buildings; the lowest values are exhibited by *Palace in via Parco Grifeo* and *Palace in via Lordi* in the y-direction. This is due to the extended development along the x-direction and few resistant walls along the y-direction. On the

Buildings	Acceleration factor f_a	
	$f_{a,x}$	$f_{a,y}$
1. *Villa La Santarella*	0.58	0.87
2. *Villa Lorely*	0.62	0.72
3. *Palace in via Palizzi*	0.58	0.6
4. *Palace Russo Ermolli*	0.63	0.55
5. *Villa Catello-Piccoli*	0.58	0.65
6. *Palace in via Parco Grifeo*	0.77	0.45
7. *Villa Spera*	0.7	0.74
8. *Villa Pansini*	1.0	0.83
9. *Palace in via Lordi*	0.58	0.44

Table 3. Acceleration factor f_a of the examined buildings
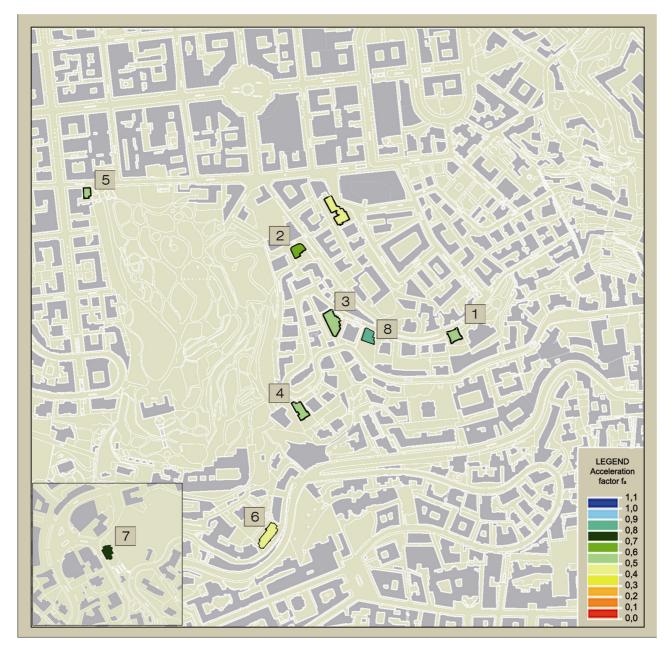
Figure 2. Map showing buildings with colours of their acceleration factor f_a

contrary, *Palace in via Palizzi, Palace Russo Ermolli, Villa Catello-Piccoli* and *Villa Spera* exhibit the same behavior in both directions. Despite its compact plan, *Villa La Santarella* has a strongly different behavior in the two main directions because the resistant walls along the x-direction disappear completely in the upper stories. *Villa Pansini*, which has an almost squared plan and similar wall distribution along the stories, exhibits an acceleration factor value close to one in both directions. The validation of the results obtained by the above LV1 analysis was previously verified by the authors with respect to the building typology, and in [4] with respect to industrial buildings. Such validation was carried out by comparing the LV1 simplified analysis with more sophisticated methodologies. Result are also shown in the Figure 2, each building is colored according to its acceleration factor.

3. Conclusions

Several roads with liberty palaces built at the beginning of the twentieth century are present on the Vomero hill in Naples. These buildings are representative of the liberty movement, marked by a construction asymmetry and plan freedom. Restoration policies cannot neglect the structural safety, requiring the knowledge of the seismic risk of existing buildings. This paper was aimed at investigating the seismic safety by simplified procedures (LV1). As a matter of fact it has to be highlighted that most of existing buildings were designed and built to resist primarily the vertical loads. Therefore many of them do not appear suitable to resist seismic events, and could undergo damage under earthquakes. The above results also underline that the studied buildings appear more vulnerable to transversal seismic loading, mainly if the plan layout is rather long and transversal walls are widely open or absent.

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Cities in translation: the shapes of Earth

Corrado DI DOMENICO
Dipartimento di Architettura, Seconda Università di Napoli, Aversa, Italy
corrado.didomenico@unina2.it

Abstract

A reversal of meaning that translates the idea of the city in a geological and stratified vision, complex and labyrinthine, made by far associations, like forms changed as rocks. From here, the analogy with the metamorphosis of the natural and anthropic elements suggests a *new state of the housing*. So, here will be shown drawings and visions of new cities that demonstrate a city-making compatible with the shapes of the Earth, from the large to the inner landscapes, as a 'metonymic' image of the urban form. It's a kind of discourse that points to the 'sustainability' as a concept related to Art as the higher state of the Nature, before than the matter of environmental preservation. Spaces of the city and shapes in the landscape will be intended as a relationship between masses, exactly like the ancient concept of architectural space, as an 'inside landscape', as well.

The urban form, the clarity of architectural plans, it"s now no longer detectable for all the cities, and cities" shape is no longer an „idea", no longer envelops a vision, except that one interconnected to a grotesque and global media narration. Cannot trace any edges, domains, spatial relationships.

It"s from here that we can start a thinking, as if from its ending: by zenithal views from the satellites that are available today in every still-motion trip of a data connection. From there, opens up a new vision, unthinkable combinations of figures, new and clear relations between the city and the forms of the world.

Keywords: City-making, Earth-forming, Space, Ancient traces.

Introduction

«[...] So that world and space seemed the mirror of each other, both minutely adorned with hieroglyphics and ideograms, each of which might be a sign and might not be: a calcareous concretion on basalt, a crest raised by the wind on the clotted sand of the desert [...] In the universe now there was no longer a container and a thing contained, but only a general thickness of signs superimposed and coagulated, occupying the whole volume of space; it was constantly being dotted, minutely, a network of lines and scratches and reliefs and engravings; [...] because it was clear that, independent of signs, space didn't exist and perhaps had never existed». [CALVINO, Italo. *Cosmicomics*, (Translation by William Weaver), Penguin UK, 2009. *Le Cosmicomiche*, 1965]

Developing a theory: from the horizontal view -through the spatial prototype -, to the vertical vision, the plan of the system into the landscape. A so faraway ancient and a so close contemporary view.

City making: projects, models: pieces of cities, clods and islands, horizontal housing units. The landscape as an architectural problem.

Translating Earth Images: satellite views, coordinates and shapes. Landscape and figures: a circular vision.

1.1 Space, three views

A small court crops the essential space of Nature, 'stolen' to the landscape, aligns to the rooms in a perspectives sequence that sights lived places and other courts. Three points of view, which enclose as many visions of Nature, mutated into architectural form: the organised nature, in private courtyard, the nature as a vision outside the space -in glimpses that embrace the landscape- and the changing nature of the zenith view to the sky.

The first view encloses the horizontal plane of the gaze into a basin, in an open sky room; the second allows an escape, a removal, and rotates the head toward the horizon to align, with a detour, the glimpses; the third view breaks at the top and correlates the axes' triad by reconstructing, on the visitor vertical centre, the decomposed spatial cube. Could be an house. The most complex, spatially, but the most simple, architecturally.

From visual crossings of the houses of Pompeii, where the perspective progression breaks visual diaphragms, and alternation of light and shadow, to further sliding of the views in the houses of Mies van der Rohe, the interior space around the court, between the courts, is a labyrinthine path that describes the *intérieur* as the original and transverse prototype in architecture. In Mies, in its houses, the three levels of spatial vision (the nature, the nature stolen to the landscape, the nature crystallized from inside) are simultaneously passed through one perspective that describes the complexity of the horizon as a foreshortening from inside the house that serves as a center (Hubbe house). The Seagram, which is a skyscraper, is positioned to slide horizontally on the platform of the urban basement, creating an unexpected place on Park Avenue and a roof garden on the 51th St.

From the precinct to the thresholds, it's a whole science about the progression of a path through the space that is discovered from architecture by its horizontal planes of penetration and its projection planes. The space disappears in full consistency of transparency. Overlapping and blurring of vision planes.

The studies by Le Corbusier for the plans of the *unlimited growth building*, represent a theorem for axes path stalking, where form the presence of thresholds, hallways and walls, appears a map that defines the scope of the Cartesian approach to the spiral path of the museum . «*Le musée n'a pas de façade, the façade visiteur it will jamais, it will que the l'intérieur du musée*» [1]. A building-threshold: the same conception of space in Egyptian architecture, where the crossing areas, diaphragmed by fences and gates, build an *Interieur,* till its exterior and, like in a time-passage through the space, to arrive unexpectedly in the museum, fully heart of its tortuous and wide place at once, without interruption *(fig. 1).*
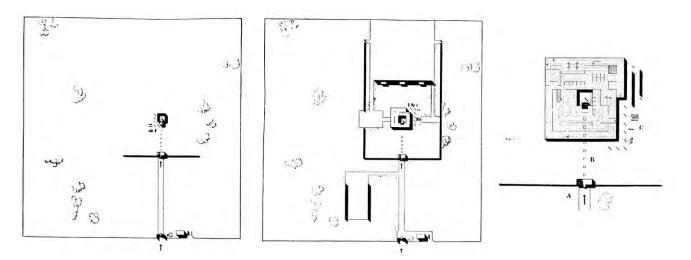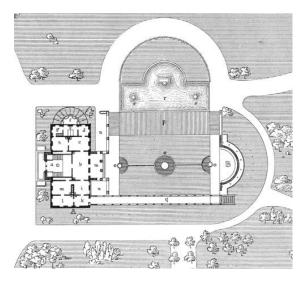
Fig. 1: Le Corbusier, *Musée d'Art contemporain*, Paris 1931

Even the villas by Schinkel are based on the horizontal science of geometry to create buildings that are already architectural systemic space and *inner landscapes*. So, in Charlottenohf *(fig. 2)*, the axial access path is interrupted perpendicularly to the base of the porch, causing the visitor to divert, to turn around the exedra, foreshortening the classical facade of the main building to an higher level - determined by the inclined plane of the garden-, to find themselves, then, at the center of the exedra, in axis with the water canal, already inside the theorem of an *architecture-landscape.*

A space built by points of view (Greek space) on a scientific diagram of the positions and rotations in the horizontal plane of the plan. Everything is designed in the plan and studied by the perspective.

The architecture is the field of spatial behavior on the plane. Emplacements and positions which geometrically relate the points of view, the objects, the parts of the system-building.
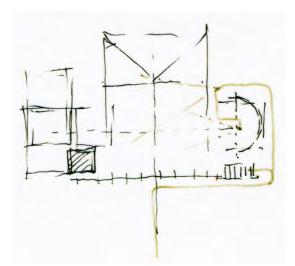
Fig. 2: K.F. Shinkel, *Schloss Charlottenhof*, 1829. Sketch plan with paths diagram.

Pathways and labyrinth, forwarding of precincts which breaks thresholds, are like step by step progressive veils that organize an accurate spatial concept and an horizontal view of the space, designed as a map from its rules. Human horizontal vision and vertical look of architecture.

Perfectly Egyptian, exactly Greek, space is at the origin of architecture that is built over time through its prototypes, its heuristics that progressively define the patterns qualities of the forms.

The importance of Greek temples base platforms, that define a relationship of intertwining of the building with the mutability of ground line in the landscape, imposes a horizontal center, which departs from *crepidoma*, from which branches off the visuals through the columns. At Miletus, the *Didymaion* (Temple of Apollo) presents the fluted base of the columns with a myriad of torus moldings, which multiplies the horizontal plane of the column base, in a progression of rising horizon, all contained in a complex order *(fig. 3)*.

Fig. 3: Mileto, column of the *Didymaion,* VI cent.

The temple of Apollo at Delphi, however, already in high position, lying on the floor of a natural *cavea* between the steeped shapes of the sacred hill, represents the culmination of a tortuous path (*climax*), that climbs, and duplicates the natural base in a very elevated platform, that makes the temple jumping directly *in* the landscape of the great plain, like a trampoline, a flattened fold of the rock. The horizon and its goals are literally stuck in the oblique plane of the rocks and the temple becomes center and new hinge threshold.

In this relationship with the natural elements, exactly by the way of changing ground line of the Delphic space, Jorn Utzon's designs for Elviria *(fig. 4)* show a planar geometrizing of the oblique lines of the hills, as if drawing the cut plane of architecture, in the image of an *horizon* embedded into nature. The relationship with the landscape is crucial, in ancient times for symbolic and religious matters, for the construction of architecture as its own spatial interface, as its own system of interpretation and duplication, just like a process consisting of container and contained.

Two horizontal models: the Greek temple as the construction of concentric thresholds that leave the cell spreading to the countryside, which immediately acquires the function of overlooking -or *panorama*- and the Egyptian temple as a linear progression of thresholds in a complex of shadows, where the sky is painted on the ceiling.

It's a space based on the fidelity of the horizontal view, the main breaking direction of the gaze and its routes, and geometric order related to the law of gravity, lead to the vertical, which reconstructs the triad of Cartesian space and places at the center of the world (*megaron*, *onphalos*, precinct, court) every waiting position between the distance of thresholds.
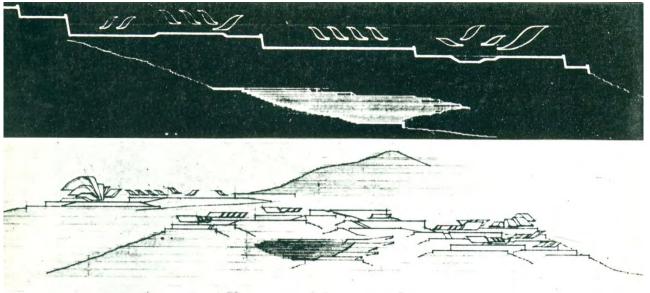
Fig. 4: Jörn Utzon, Competition scheme for *Elviria*, 1960.

1.2 The ancient vertical view of the plan

In ancient times, the architectural form was, certainly, built as a branch of nucleuses or fences, steps and passages based on discovery and approaching paths, all interpreted as axiality and slidings that penetrated the landscape in the system of natural elements, but it was also a symbolic form and diagram built as if it were seen from above. Let's see how the vertical connection between earth and sky, with its cultural values, was a key factor in defining a spatial center and how that was the focus of expansions (visual and functional) of the plastic form.

The zenithal view was a shot of imagination which contained the mental image, or an approximation figure close to the concept, to the symbolic content that the landscape context wanted to get through. Some Leonardo's studies about damming the Arno are exemplary: it's bird's eye perspectives, unbelievable for that period, which organize a conceptual representation of the area *(fig. 5)*.

Movement and determination of a privileged position are dynamic and construction of the points of view. Thus, we can imagine, draw perspectives that pass through visual thresholds between courts and walls,

Fig. 5: Leonardo da Vinci, *Bird's Eye Perspective for a Planned Dam on the Arno*, drawing, ca. 1504

intricate spaces of the precincts. The 'one meter and sixty' horizontal cutting plane determines the vision of the eye as movable and compositive centre. As if from the ancient Greek space, from the *Hermes* and *Hestia* spatial dialectic, to now, we can find a contiguity with the aerial views which bring again to our attention the importance of the spatial systems into the landscape.

In the book written with Benno Albrecht, *I confini del paesaggio umano,* Leonardo Benevolo says that in the design practice, what accompanies and guides the thought, are the abstractions that we call *figures*. «Some of them are descriptive and general, as 'environment' or 'landscape' and not prelude to an attitude that faces any problem. Others, will assume, as early as their formulation, more operational values, such as 'scale' or 'border', 'confines'. The mental figure is versatile [...], it's immediate, fast imaginable, and highlights a peculiarity of project thinking: to proceed by images. In design practice, the figure acts as an initial condition. [...] The word 'border' can take these features, and be a mental figure for the project» [2].
The architecture was built by demarcation of boundaries and the plan was the *figure* or the mental diagram of boundary vision from above. This determined the system that was to be automatically interpretation of the site, as each site was designed from its origin, the border, the mental image. The landscape itself was a cultural image linked to the overall vision of the world -the site of the project, the foundation site are always a new center-, and the architecture was the symbolic definition of a precise *nomos*.
So, for Carl Schmitt, «for thousands of years mankind had a mythical image of the earth in its totality, but no scientific experience of it» and, thinking about the old maps, the representations of the known lands, we see that kind of mental and cultural image of terraqueous globe, is a complex vertical view of the sites seen from above. We can add that, perhaps, just the architecture was that scientific experience for the definition of the laws of nature and the worldview, and those passed by the definition of boundaries, areas, enclosures, posts and domains, such as markers seen from the sky or symbols of a taking position of the world. Sighting boundaries crossing thresholds as the expansion of the circles in the water. Spatial domain based on the vertical axis of the mental vision from above. Archaeological Plans of a timeless vision of the space.

1.3 Earth-forming

«The border is independent from the concept of scale and does not fall in the statement what Gulliver tells, commenting on the size of the kitchens of Brobdingnag: Undoubtedly philosophers are right when they say that nothing is great or small in itself, but comparatively. They are so similar to each other, the border of a state, that of a city or a small private space» [3]. The urban form, the clarity of architectural plans, it"s now no longer detectable for all the cities, and cities" shape is no longer an „idea", no longer envelops a vision, except that one interconnected to a grotesque and global media narration. Cannot trace any edges, domains, spatial relationships.

The ancient cultures land art, disappears by the meshes of the city. «In the Neolithic period, the signs of human presence are multiplied on large areas of natural empty landscape, and form a very extended range, up to a geographic scale, which seems huge to us, and in fact remains unsurpassed throughout the subsequent history» [4].
It"s from here that we can start a thinking, as if from its ending: by zenithal views from the satellites that are available today in every still-motion trip of a data connection.
From there, opens up a new vision, unthinkable combinations of figures, new and clear relations between the city and the forms of the world.
Perfect shapes appear through the deserts and the formless reveals itself between the areas of the city. The relations with the large-scale, that in ancient times were symbolic, re-open, and now can reveal a new 'mantic' of places to translate and to trace shapes and geometries. As if through archaeological plans and sacral marked places.

The idea of an *informal and abstract poetic* allows us to consider the architecture as it appears objectively in its formal mutations. The zenith view of the space will clarify the presence of the architecture in the same way as the anthropic environment that extends between the cities by its geometric rules, and will start a thinking to redefine an *architecture of the earth,* a new way to see the geography, like a system of architectural forms, spaces converted into geography, like cities translated into landscape.
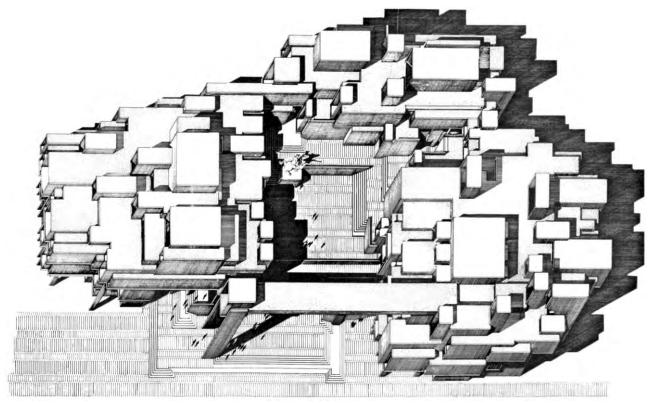
Fig. 6: Paul Roudolph, *Orange Government Center*, NY 1963-70, axonometric view.
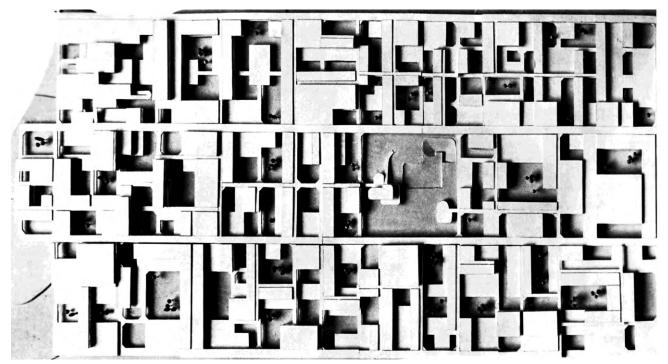
Fig. 7: Candilis-Josic-Woods, *Freie Universitat*, Berlin, 1963. View of the model.

It's as if, since then, the visual perspectives were concentrated in a single focal point that overturns the traditional view in any asymptotic perspective that will definitely change the perception of space. Many design experiments, from the satellite architecture of Paolo Soleri, to the city that are related to large scale landscape of Candilis and Woods *(fig. 6),* or to architectural gemmations of Paul Roudolph *(fig. 7),* introduce a conscious desire to work on large territorial systems or tilt the balance of size that architecture had with the world.

It was as if everything was visible from a distance. As a metonymic process, in a close relationship between container and content, the various landscapes intersect each other at different scales, like an image inside another which describes a process of generation of the shape. An earlier record for this kind of forms behavior was investigated in a study of the couple Charles and Ray Eames, in the film *Powers of Ten (1968),* whose circular vision from large to small and vice versa, seems to confirm the discovery of vision vertically acquired from Earth seen from the Moon. A sort of theory that develops a concept related to scale relationships that exist between the landscape and the things, at all levels, where the *«Scale is the new geography».*

Here we can find a circular discourse from the Earth-shapes to the landscape as a spatial system, from the cultural presences which innervate the system of colours and objects to the architecture. So, for instance, in Le Corbusier's *Carnets,* it's clearly defined that the colours of Chandigarh are derived from the nuances of tone traced by the aerial views, and the city plan is related to the texture of an Indian bed. This is the circular view of the architecture. You can call it 'landscape' or 'plan', but the matter is how deep is the vision of the content.

As if from a distance we were able to recognize a shape to everything. A general beauty, a unit of work to the scale of satellites. At a certain point, latent forms and marks appear on the surface of the earth, which, together with other tracks, become synopsis. A world of signs, interrupted tracks, forms in composition and disaggregated figures, that show us, unbelievably, a marked space, a talking space more than spoken, a manifold and iridescent set, from place to space. That's the zenithal vision, this new gained view, which plays the small and the big in a perspective asymptote, not in "*bigness*". That"s a call to collection of forms.

We can recognize forms by association, aggregations or repetitions, similarities with other forms or with objects, seems to be faced to a formal tautology, between life and nature, architecture and the earth's crust, you can find a continuity. *Translating the forms in cities* were a "primitive future" can aggregate the archaical and the contemporary in a syncretic image drawn by present peaks and past folds.

The forms of involuntary shapes of the world, as if from a far landscape, seem similar to voluntary forms of art, and the anthropic traces design a clear map of a mental and cultural city. There is a metamorphosis of natural elements which is important to trace because suggests us the state of the form.

So, what is the image of the world that, today, the Architecture can contain?
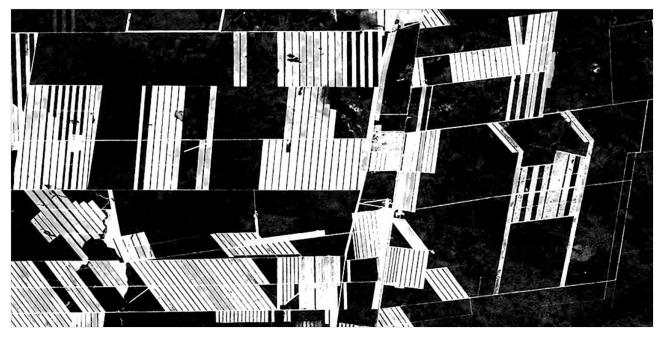
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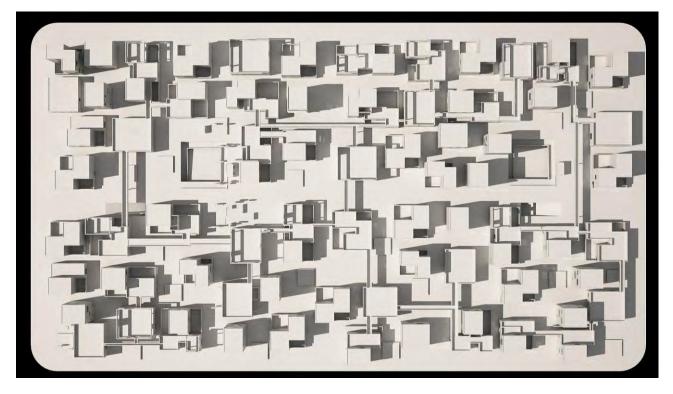
Satellite view, *Texas U.S.*
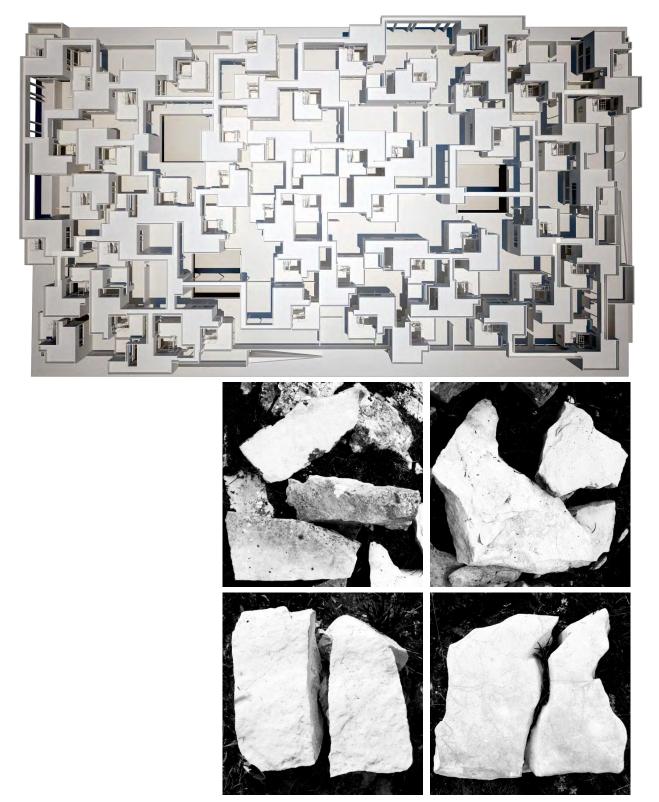
Satellite view, *South America*

Study models for a small city: *translating the landscape*. Corrado Di Domenico, Architectonical and Urban Design Workshop, Students' works. Faculty of Architecture, SUN, 2010.

Study model for a small city: *translating the landscape*. Corrado Di Domenico, Architectonical and Urban Design Workshop, Students' work. Faculty of Architecture, SUN, 2010. (Above).
Corrado Di Domenico, *Shapes and Stones*, photographs 2008-2011. (Bottom).

La Resurrezione by Pericle Fazzini in the Aula Paolo VI at the Vatican*
The restoration of contemporary art by sacred multi-disciplinary dimensions

Carmine Gambardella[1], Saverio Carillo[1], Danila Jacazzi[1], Vincenzo Sepe[2], Maria Carolina Campone[1], Pasquale Petillo[1], Riccardo Serraglio[1], Pasquale Argenziano[1]

[1] Facoltà di Architettura Luigi Vanvitelli SUN
carmine.gambardella@unina2.it, saverio.carillo@unina2.it, danila.jacazzi@unina2.it, mariacarolina.campone@unina2.it, pasquale.petillo@unina2.it, riccardo.serraglio@unina2.it, pasquale.argenziano@unina2.it
[2] Facoltà di Architettura, Università degli Studi "G. D'Annunzio", Chieti –Pescara
v.sepe@unich.it;

Abstract

The preservative restoration of the great work of Pericle Fazzini (1913-1987), entitled *La Resurrezione* in the Aula Paolo VI at the Vatican, has involved the workers of the Fonderia Del Giudice (Nola), and (for free) the authors of this paper, as researchers of the Faculty Architecture "Luigi Vanvitelli" and of the Benecon Research Center, for over seventy days.

The University contribution was orientated towards the scientific project of its conservation and restoration, as well as providing a repertoire of diagnostic tests that have supported the intervention protocol, appropriately designed, applied by the Foundry and confirmed by the Directorate of the Vatican Museums and Laboratories.

The essays describe the multidisciplinary methodology, analytical operations as well as techniques that have marked all the development and implementation phases of the preservative restoration, from concept to project, from shipyard to communication. At the same time, particular attention was given to the spectacular architectural space designed by Pier Luigi Nervi.

In line with the Tenth Forum topics, the work was inspired by the minimal intervention – remote analysis and non-invasive interventions – accurately planned, for the best expected result, that has returned the dazzling image to the statue as Pericle Fazzini has realized in a mixed alloy of bronze and brass. The work has also provided material and structural integrity of the articulated metallic mass.

Keywords: Contemporary Architecture, Multicriteri@, Conservation, Remote sensing, Bronze

1. Foreword

The site of the restoration of the masterpiece by Pericle Fazzini entitled "The Resurrection", opened on Wednesday, September 28, 1977 by His Holiness Pope Paul VI, started work on Monday, October 3, 2011 and ended on Tuesday, December 13, 2011. Promoted by the "Founderia d'Arte 2000 s.r.l.", represented by Giuseppe Farina and Dr. Antonio Del Giudice, approved by the Directorate of the Vatican Museums Director, Professor. Antonio Paolucci, in conjunction with the bronze restoration laboratory of the Museums headed by Dr Flavia Callori, in collaboration with restorers from the Istituto Centrale per il Restauro, coordinated by Dr. Emiliano Africano, graduated from the same Institute in the specific sector, as well as with the scientific direction of profs. arch. Saverio Carillo and Danila Jacazzi of the Faculty of Architecture "Luigi Vanvitelli" of the Second University of Naples, using the instruments of the Centre of Competence Benecon at the Second

University of Naples directed by prof. arch. Carmine Gambardella with the technical coordination of the architects Pasquale Petillo and Pasquale Argenziano, the technical collaboration of Eduardo Fiorillo and Donato Marcantonio of Topcon Italy and the external help of prof. Engineer. Vincenzo Sepe of the University "Gabriele d'Annunzio" of Chieti-Pescara. The particular of condition the work of art, its location and use have influenced and even defined the time required for the interventions to be carried out, in relation to both the specific conservation needs of the monument as well as to the use of ergonomic resources. Thus, many of the tasks that should have been carried out in advance, due to the amount of time available and commitments of the Aula, were carried out, in part, simultaneously and synchronously with the other interventions on the monument. In many ways, therefore, the work carried out, and could not be otherwise, was a privileged opportunity to study the precious relic considering that *a proper restoration* would have taken much longer with a series of preliminary investigations that would have compromised, at least partially, the use of the Aula, obviously creating a series of complications.

Fig. 1: Vatican, Aula Paolo VI, La Resurrezione by Pericle Fazzini

References

* The work presented is taken from *Resurrezione Fucina di Fede*, GeMar Edizioni, Roma 2012 which contains the specific bibliographic references.

2. Representing Knowledge in the Restoration and Protection of Cultural Heritage
Carmine Gambardella

The restoration work on the masterpiece by Pericle Fazzini, "*The Resurrection*", one of the most significant works of art of the papacy of His Holiness Paul VI, lasted more than seventy days, ending on December 13, 2011 and with several professors from the Faculty of Architecture as well as the Competence for Excellence, Benecon contributing to this essay.
The research was carried out with the support of innovative technologies and is based on the concept that any action for the protection, maintenance and improvement cannot be separated from a preparatory activity of multidimensional knowledge based on the discretization and extent of the heritage. Even in this case, widening the traditional notions of geometry and measurement, a complex representation was produced, with every element of the subject, material and immaterial, defining a dimension that contributes as a whole of the competencies as given to the state of the art always detectable and, similarly, is a reference for future maintenance and restoration activities.
The dimensions are the disciplines that contribute to the understanding of the complex phenomena of decay that, interacting, re-establish a model for understanding the integrity of the object under examination. The scientific corpus has as reference a discipline that is the basis of our investigations, "Echogeometry", intended as a technological echo of reality, a model where it is possible to measure all the tangible and intangible relationships between the elements, in order to return, the objects or parts of them, the architecture as constantly evolving dynamic entities in light of the safety and transmittability of the works themselves in the future.

Fig. 2: La Resurrezione. Orthographic projection by point cloud model (Benecon).

With this approach, the results of the studies are not given though the summation of individual, monothematic knowledge, but rather a complete understanding of the data, in which all the information is qualitatively and quantitatively, integrating the complex knowledge of the object or part of it. Each point is no longer described only by the Cartesian coordinates that define its position in the space, but rather by multiple information obtained from the studies carried out in several disciplines that contribute to the capitalization of the data. Thus, the echogeometric approach makes it possible to "measure the whole", i.e. to recognize the basic characteristics of the identity of objects, architecture and landscape through the reading of the signs

translated into experience that, on different scales of investigation, not only concern objects and buildings, but also environmental systems, ecological networks, watersheds, coastal systems, historical landscapes, types of settlement and production, as well as agricultural fabrics, all the characteristics whose loss or degradation may affect the protection. Multidimensional representation is a fuzzy boundary between what has already been done and what there is to do, including all the dimensions that are useful for the knowledge of an object on both a small and large scale. It already contains the prediction of possible changes, proposing scenarios for reliable scheduled maintenance, monitoring, protection and regeneration. The innovation of this approach is based on the production of a complex and dynamic system of knowledge, articulated so as to allow for the production of a wide series of discretizable information. The method has a general validity, having been tested and applied in different contexts as well as at different scales, from individual products to the territory, from Pompeii to the Nativity Church in Bethlehem, the Pio Monte della Misericordia in Naples to Michelangelo's David statue and the statue of Pan and a goat in Ercolano, and now, the Resurrection by Pericle Fazzini. The integration of multidisciplinary knowledge and skills (restoration, representation, history of architecture, chemistry of materials), were applied as an essential prerequisite for the managing of the planned restoration. The activities that were conducted in constant synergy with the research groups, related to the subject areas involved set up a field laboratory, producing a fully-integrated, multidimensional and multi-scale digital representation.

Furthermore, the investigation has also had a strong educational value. In fact, PhD students of the Faculty of Architecture, with the associated Center of Excellence Benecon, were involved in research alongside professors and senior researchers and were able to have a significant learning experience. When research orientates teaching, the University produces a higher quality of human capital, with cultural assets of our territories requiring skilled operators who can draw from the humus of our identity the talent they need to create the job with Art.

In conclusion, I hope that our research can be placed within the limits between a broadly Cartesian view of an object and the intense one of Leibnitz. on the limit as a place, as a topos of the research project, the development of knowledge has been entrusted to a dynamic concept that, in order to overcome metaphysical obstacles, proposes spiritual and patrimonial scenarios based on our roots.
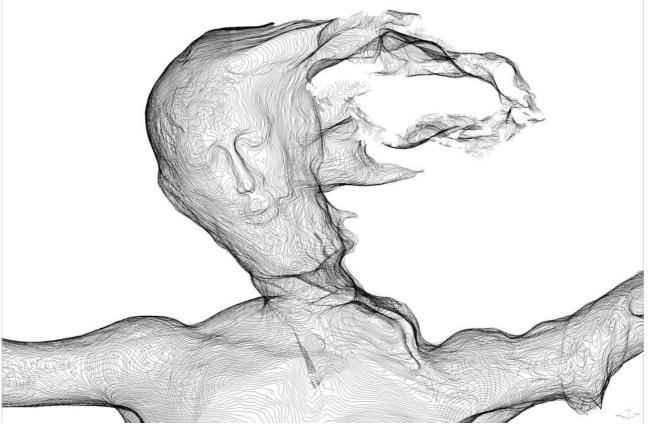
Fig. 3: Christ contour lines model, detail.

3. Conservation project, cleaning interventions and restoration protocols
Saverio Carillo

A first definition of the time required to carry out the cleaning of the sculpture was calculated on the basis of its size, with it being about 7.60 metres high, 16.60 metres long and 2.60 m wide. The visual investigation revealed that it is made of a copper alloy with brass fittings as well as the use of the of lost wax casting technique.

The visual investigation initially defined the state of conservation a generally satisfactory condition of the monument and upon which the first approach was based, which did not include the most beneficial and precise feedback, that was subsequently obtained after having mounted the scaffolding. The state of preservation, therefore, as a result of an detailed visual investigation led to a series of general considerations according to which the sculpture could be evaluated to be in good condition. The proposed evaluation orientated the intervention project by referring to the location and function that the monument has, due to its expressive meaning as well as complex media figure that its *image* represents.

In addition to the above considerations, there is also the principal aspect of the conservation intervention that the role of the operational tool carries out in the development of the complex modern sculpture that, due to it being so close, physically, to the focal figure of one of the oldest and most authoritative human institutions, and certainly the most charismatic figure in the Christian West, must condense the valuable contemporary decor that recognizes the role of the Petrine Throne when dealing with the uninterrupted secular continuity of over two millennia of existence.

Fig. 4: Sculpture detail.

The scientific responsibility for the direction of the restoration has therefore evaluated the coherent relationship between the technical equipment and diagnostic and operating protocols in agreement with the findings of the Laboratories of the Vatican Museums Directorate not only because of the application methods but also the anticipated results, as well as those while the work is being carried out.

On the other hand, the experience of Fazzini at the Vatican is almost at the end of a long very significant period for the Catholic Church of the twentieth century that, through one of the most archaic materials of human culture, tried to incorporate into their environment contemporary artistic expression that had previously been strongly. Similarly, the royalty and continuity value of the historical dignity of the ecclesial reality places were highlighted by the "adding" of numerous bronze valve "*Doors*" that were open to the advent of modernity, even at the cost of cultural controversy with the State Administration. The case of the Doors by Emilio Greco for the Cathedral of Orvieto, put in place on 11 August 1970, after eight years of waiting in the aisles, which subsequently occurred after the decisive intervention of Paul VI, explains the cultural climate a work like *The Resurrection* summarizes.

Figg. 5-6: Rome, Saints Peter and Paul Church, main bronze door details.

The complex bronze sculpture was, therefore, shown by the Holy Father on the day of its inauguration: "But we will not talk unless about the monumental and unique figure, that of Jesus Christ the risen, living and blessing, which dominates this room, and that we are inaugurating today , the work of the sculptor Pericle Fazzini: it says what the testimony entrusted to the apostolic ministry is, to be that of Jesus, who is crucified, made Man and Christ evidence that here the successor of Peter and with certainty humility of faith want to proclaim. Yes, we want to entrust this to our voice, in simple and clear enunciation of words and image that he wants to express, but almost suffocated by their exuberant real meaning (cf. THOMAE *Summa Tbeologiae*, Ia, 2 ad 2). Jesus is the Way, the Truth and the Life (*Io*. 14, 6). Jesus is the light of the world (*ibid*. 8, 12, 9, 5). Jesus is the Bread of life (*ibid*. 6, 48). Jesus is the Good Shepherd (*ibid*. 10, 11-14). Jesus is the Son of Man (*Mt 16.13 Mt 25.31 Mt 26:24*), is the son of Mary (*ibid*. 13, 55), is the son of God (*ibid*. 14, 33, 26, 64 *Io*. 9, 35 etc.) Jesus is the alpha and omega (*Revelation* 22:13)" (Paul VI, General Audience of Wednesday, September 28, 1977). The references and citations of the papal text are the explicit meanings that are recognized and "used", in a functional way, of the *media machine* that the sculpture itself is jointly conceived to the immense Hall, for which the values to be specified in the restoration intervention must aim precisely to *facilitate the reading* of such peculiarities of expression.

The profound significant meaning of the work, also represented by the reading of Paul VI during its inauguration, is itself, in terms of the expressive analysis that the restoration work helps to guide and enhance, a binding trace in the direction of the entire research, including the restoration itself, cannot fail to make explicit. Specifically, the homogenous and coherent cleaning of the entire bronze surface, regardless of location or image of the single portion, should contribute, in the restoration, to the preparation of lighting that is able to fully satisfy the requirements for the use of the complex sculpture, especially in relation to it
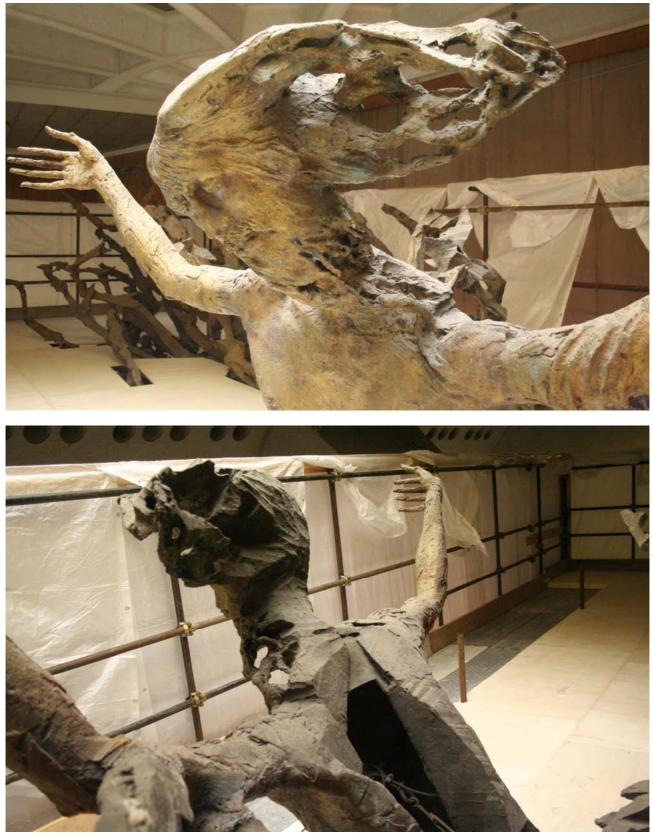
Fig. 7-8: The bronze Christ sculpture.

Fig. 9: The bronze Christ sculpture.

being the *scene* and *crown* of the papal Throne in the action of the Magisterium exercised as a place of acceptance of the Christian Synaxis.

The sculpture, made in the Michelucci Art Foundry in Pistoia between 1972 and 1977, overall, is in a condition that can be called good. The environment in which it is located has helped to delay the oxidation/corrosion processes, thus, avoiding any consistent changes to the entire sculpture, which also has less detailed parts, over time, that could have led to irreversible superficial changes. Prior to the conservative intervention, it was entirely covered by a layer of dust and atmospheric particles with various deposits, concentrated in substantial quantities where the sculpture has horizontal planes or less inclined pronounced parts. This also occurs near the horizontal planes and in the recesses creating a "visual haze" that compromises a correct reading of the whole, rendering the "polychrome" lighting of the different tonal accents of the elaborate construction ineffective. The overall colour scheme of the entire sculpture retains the restrained golden yellow hues, sometimes with strong tendencies towards the ocher range, with added red-brownish nuances from the manganese on the less pronounced surfaces. The variations in lighting are, in part attributed to the different nature of the surface materials, which will be subsequently referred to, as well as to some of the treatments chosen, evidently by Fazzini to have the desired end effect. The overall image of the metal surface is affected, however, by the widespread oxidation that is, in several parts, certainly due to the composition of the alloy mixture used, various shades of white or light green.
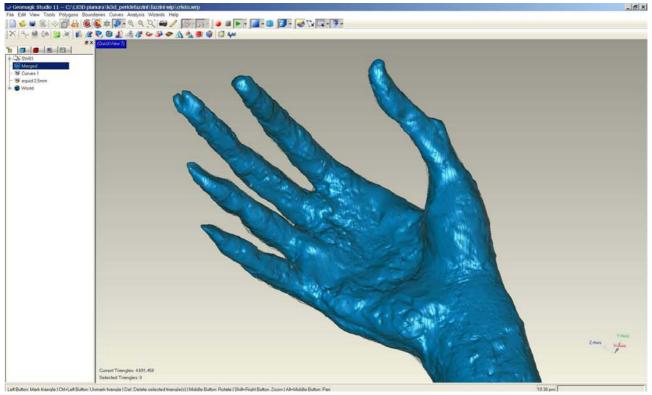
Fig. 10: Christ's left hand, meshing 3D model processed by point cloud.

The chromatic alterations may also be an expression of an oxidation process that is still in progress, probably caused by the variations in the amount of moisture present inside the large hall that, due to its function, with it containing a large amount of people, could led to the transformation, sometimes, of the temperature conditions, as well as the condensation effects which may induce reactive conditions in the materials of the metallic layer. Further degradation processes can be notice in other parts, such as those of high "flashes", caused by the casting, with the "cooking" effect or "deformed" conditions of the metal for more "serial" production. There are widespread cracks and lesions in the discretized parts of the monument that may be due to the "composition" and "'assembling" operations. There are numerous untreated welds, especially at the back, that have led, from an aesthetic point of view, to unsatisfactory solutions, giving the

impression of a rather rush mounting, leaving parts of it pending that were never completely finished or deliberately left so.

The restoration involves an initial phase of documentation and diagnostics, useful for the characterization of the alloy, the present degradation phenomena as well as the planning of the intervention. The processes of the mechanical removal of the deposits and the washing of the metallic layer, illustrated in the scientific literature of protocols to be adopted, are the operating terms also on the basis of the choices considered *to orientate* the intervention. Specifically, for example, it is priority to maintain the *status quo* of sculpture, even if some of its conditions could led to specific assessments of the scientific purpose of the restoration. The case of the earth used in the casting to produce it and, in part, still present in the bronze could be an dialectic opportunity of confrontation. Similarly, the welding at the back or other aspects documented video-endoscopy which has prevailed on the basis of the logic of minimum intervention aimed at preserving the given absolute testimony represented by the work itself.

Upon concluding the intervention, between the sculpture and the surrounding environment, there will be a series of layers with barrier functions and sacrifice, upon it will be possible to intervene in order to carry out planned routine maintenance.

4. The reasons for restoration: reflections on the methodological approach
Danila Jacazzi

Why restore the Risen Christ by Pericle Fazzini just 40 years after its creation? And, consequently, why a book on the Resurrection?

This is probably the question that many will ask given the popularity of the sculpture that dominates the background of the Hall Paul VI.

As is often the case, there was no preordained reason, nor programme with a deadline or precise aims, but rather, a project resulting from the meeting and cooperation of different professionals who wanted to record in a book their thoughts and experiences during the restoration.

However, there were various reasons behind the decision to submit the well-known sculpture to a skilful restoration, which, without entering into specific details, requires some more general, critical considerations.

Over the last three decades, the debate on the arts and restoration has been variously traversed by a problem that has imposed a critical reading of traditional history in the search for intervention principles and methods: the issue of the restoration of contemporary art.

Fig. 11: Sculpture details.
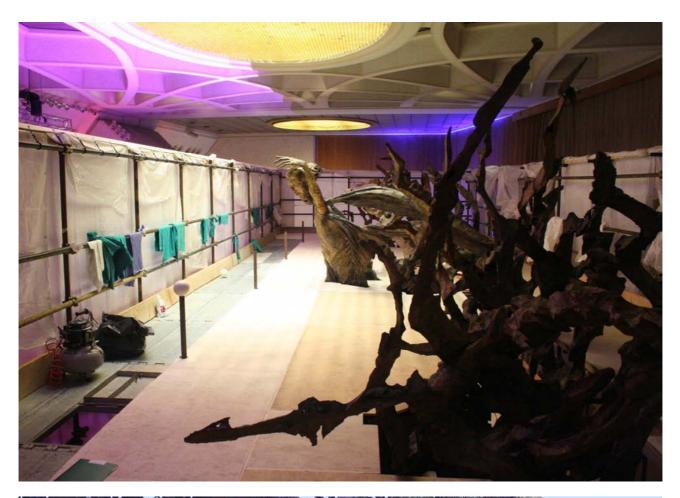
Fig. 12-13: The shipyard upper level, the comparison between the picture and the point cloud model.

Art produced in the 1900s has, in fact, often used "unusual" materials, often perishable, as well as new techniques that preclude the concept of long-duration and transmissibility. The restoration intervention model was, therefore, inevitably the subject of a critical review that significantly developed the types of application.

There are no doubts that the great masterpieces and artistic heritage of the modern world are an asset to keep and preserve, but the historiographical basis upon which they are compared through the studies by historians, art critics and theorists is constituted by the recognition of a methodological identity of the restoration of contemporary art with respect to the canonical theory of Brandi, elaborated in relation to the experience of the old. The *unity of methodology* principle – in which the theoretical assumptions of the restoration should universally apply to all artistic disciplines – established by Brandi, has influenced the Italian debate on the restoration of contemporary art. Although this principle has recently been questioned, the theoretical background established by Brandi in relation to the concept of restoration and its applicability is still valid:

"restoration is the methodological moment of recognition of the work of art, in its physical consistency and its dual aesthetic and historical polarity, in view of its transmission to the future".

"As a product of human activity – continues Brandi – the work of art poses a twofold instance: the aesthetic artistic value that corresponds to the basic fact of artistic for which the work is a work of art; the historical case that implements it as a human product carried out in a certain time and place and that it is in a certain time and place".

The theory summarized in these brief quotations can easily refer to the contemporary arts, which, like the artistic production of the past, require historical contextualization and critical evaluation. These include both the aesthetic, in the case of works of art being recognized as such, as well as the historical, as a "unique and singular" product of a "historic present that has become the past", as well as of a given cultural-historical moment.

Fig. 14: Sculpture details during the restoration.

Reviewing the assumptions made by Brandi, therefore, any doubt of the adaptability of his theory to contemporary art seems to disappear, even if he theoretical principles in the field of restoration – citing Carbonara – are "intended as guidelines and methods of thought and not as a rigid or prescriptive recipe. Theoretical propositions to be filtered through a personal commitment, encouraged by the demanding, prudent and experimental attitude which Foucault talks about".

An indispensable prerequisite of any restoration, whatever the nature of the work in question may be, is, the evaluation of the specificity of the work and the appropriate weighting of the intervention project, assuming a "demanding prudent and experimental attitude".

It is in the complexity of practice, rather than in the methodological reference framework, that the restoration of contemporary art differs from that of the old.

The restoration, albeit limited to a deep cleaning of the work, always involves a choice, "postulates – as highlighted by Carbonara with reference to architectural heritage – a design and aesthetics solution" that cannot be entirely neutral.

In the case of the restoration of the *Risen Christ*, with an appropriate scientific and philological methodology, the state of conservation of the material which the sculpture is made was carefully examined and only after this investigation, were specific restoration strategies developed. Diagnosis of its conditions was carried out with the aid of digital equipment that made it possible to gather scientific data in order to understand the degradation factors and, consequently, the planning of the restoration and prevention of further degradation.

Therefore, a restoration in which science, technology, research and craftsmanship have interacted to ensure a correct and adequate aesthetic appreciation of one of the most beautiful bronze works of the contemporary world.

Fig. 15: Bronze plaque Michelucci's Foundry.

5. For a structural reading: a work of apparent lightness
Vincenzo Sepe

The cleaning of the sculpture by Pericle Fazzini, carried out from October to December of 2011, was an opportunity to observe closely, with scaffolding installed by the technicians of the Vatican Governorate, an extraordinary work of art from many different points of view.

Innovative from an iconographic point of view, it redefines the classic theme of Christianity, placing it within the anguish of twentieth century man overwhelmed by the nuclear threat, as well as in terms of size, due to the large scale required in order for it to fulfill its role of scene of the Audience Hall and the material used, a copper/bronze alloy. Even from a technical point of view, the work of art is, a considerably interesting structural challenge.

It is approximately 16.40 m in length, about 6.30 m high and approximately 2.40 m wide, with it being the background of the terminal part of the Paul VI Audience Hall, where there is the Papal Throne.

Its transverse dimensions are less obvious, but equally impressive, reported in Figures 2 and 3, which are about 2.40 m, and then go up with parts projecting towards both the back and the room. These include the figure of Christ who is reaching out, with it starting at a height of about 3.00 m and the entire figure being at least another 3.30 m tall along with a vertical projection of about 1.25 m,. Thus, exceeding the base upon which the whole bronze structure is placed, resulting in an extraordinarily dynamic effect.
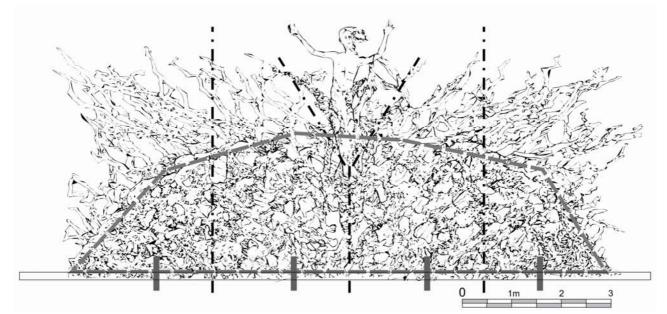
Fig. 16: Structural scheme of the sculpture (front).

A first reading of the work from a point of view of the overall balance – with more detailed considerations being made in the future – that has not been adequately studied due to the short space of time allowed for the cleaning – has a total weight that varies between 280 - 300 quintals according to the testimony of the heir of the Renzo Michelucci Foundry, Mauro Patrizio, son of Renzo, who worked directly on the its creation. On the basis of his testimony, it was also possible to reconstruct the five sections in which the sculpture was divided for transport as well as obtain information about its assembly.

Despite the absence of detailed quantitative information, the wise balance between the weights of the various parts of the work becomes clearer by subtracting the eye from the "upward" effect wanted by the artist. In fact, on closer examination, it is worth noting that the work is characterized by a mass of material towards the base and a relationship between the full and empty decreasing from bottom to top or, if preferred by a thickening of the material towards the base of the sculpture. The "branch" elements in the bottom part gradually thin out as they go up, with the scenic effect of a dispersion – as if evaporating – of the material heading towards the sky on one side, while on the other contributing – without seeing – to the overall

stability, with the barycentre – while not determinable with the information available so far – being below where it might appear to be upon first sight. On the other hand, the base is extended by the curvature of the contact surface between the metal sculpture and the base, so as to obtain a maximum distance between the most extreme points greater than the average thickness of the contact surface.

Fig. 17: The restoration shipyard.
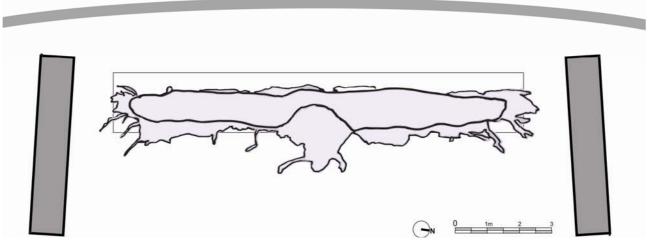
Fig. 18: Structural scheme of the sculpture (plant).

According to Patrizio Michelucci, for each of the four base sections, anchorages had been planned berths, reflecting an "engineering" of the work of art that goes far beyond the typical aspects (welding between parts, metal core inside hollow surfaces) of a foundry piece, more obvious than relevant.

The restricted cleaning time and the need to not impede it, did not allow for any studies to evaluate the nature and characteristics of the anchoring system to be planned, and more generally of the transmission system of loads to the base. This issue will be dealt with in detail in the future, with it not only being relevant to the maintenance and conservation of the work over time but also of considerable scientific interest, from the point of view, of the area that is never fully explored in which a work of art "embodies" the subject, especially if characterized – as in this case – by volumes and weights of unprecedented importance, whose apparent lightness or evanescence is "only" the result of a comprhensive technological culture, which seems to almost evade the laws of gravity.

6. The restoration of contemporary art by sacred multi-disciplinary dimensions
Maria Carolina Campone

The study aims to highlight how the *Resurrection* by Fazzini is able to effectively express the binding characteristics of twentieth century religion, marked by a strong intimacy, with the image of the *logos* for the faithful gathered in the Audience Hall. In doing so, it reasserts the iconic value of the work of art as such, admirably summarized by Lotman as the synthesis of finite and infinite, "the whole in the episode", which assigns to the piece of art a totally unrestricted space of the whole, physical and not.

The theme, central to Christian iconography, is solved with the figure of a Christ rising above a formless chaos, image of death and destruction. As the author admitted, it admirably summarizes one of the fears of the last century, that of nuclear power, defeated and dominated by the divine figure that rises with outstretched arms and opening to enclose the whole of humanity. The artist uniquely re-interprets a theme dear to the Christian tradition, recoding the classical image in light of the considerations of his time, of which he was an authoritative interpreter.

Fig. 19: The bronze Christ head in Michelucci's Foundry (1975).

Fig. 20: The bronze Christ sculpture in Michelucci's Foundry (1975).
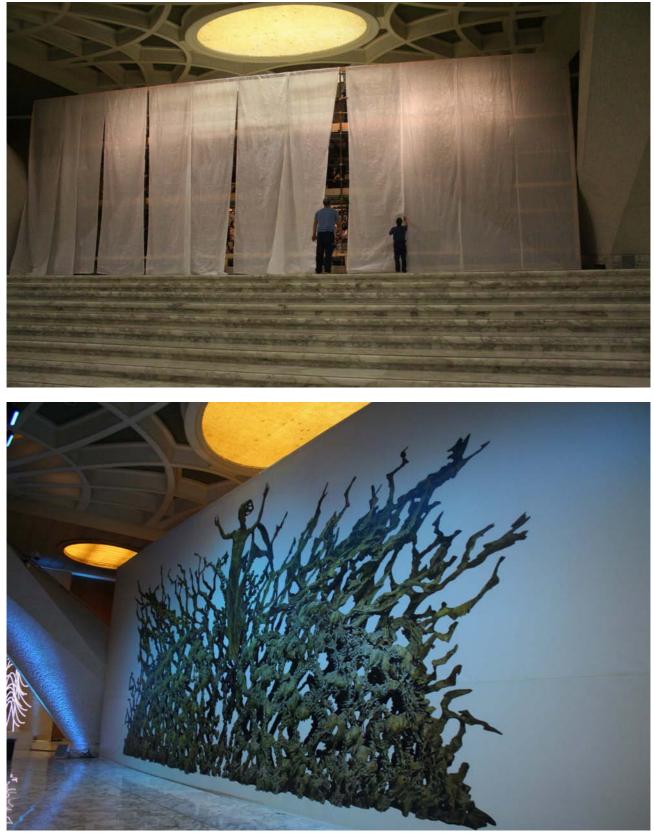
Fig. 21-22: Restoration shipyard setup (2011 October).

In the sculpture in the Vatican, the Christ stands emerging from a primordial chaos without any other figures, according to an individual concept of faith and religious experience which distinguishes the twentieth century. Simultaneously, the presence of an amorphous mass, which surrounds the divine form and accompanies the upward motion, transcribes in the material, synthesizing it, the "powerlessness" that, according to Hobsbawm, characterized the last century and which consists not only in the depth and complexity of world crises, but also in the apparent failure of all programs, old and new, to maintain or improve the condition of mankind.

In this failure, the only salvation for the believer is faith in the event of Redemption, of which the resurrection is the essential moment, expressed by the upward – moving metaphor of absolute spiritual freedom – with which Christ frees himself from the material, while still remaining bound to it. Fazzini immortalizes the Risen Christ in an eternal moment: the Son is already potentially in the Father, but is still being held back. He inter-cedes, inter-comes, remains present, and of this presence, the sculptor is able create the essence through a figure that is the bridge between two worlds, Intermediate Passage, an open dialogue, involving the nature involved in its upward movement.

The renewed iconography of the event of the *re-rise* that the sculptor from Grottammare suggests, assumes a search for dialogue, openness to others, which is rooted in a deeply "mystical" experience in its etymological origin of the term, which the study highlights.

The "sculptor of the wind" reaches the climax of his dynamic search, returning, with his formal choices, to the ontological origins of the revelation. Not surprisingly, the artist says that, while making the work of art, he felt that he was almost "forced, dragged" to its conclusion. The force of the wind blowing everything visually overwhelms the intensity of the religiousness of the Maestro, strongly felt and directly engaged in the majesty of God entered into the very force of nature.
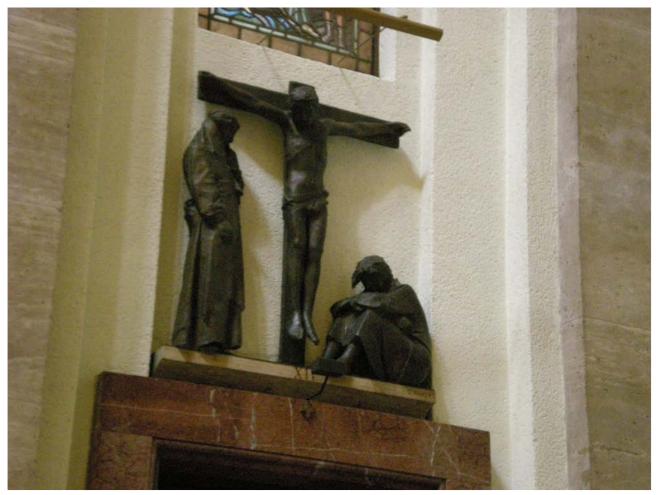
Fig. 23: Rome, Saint Eugene Church. Via Crucis (XII) by Giacomo Manzù (1950).

The study highlights how the crasis between the considerations present in the formation of Fazzini, coupled with an intense spiritual participation, are united in the Resurrection inthe Vatican, in order to express through images the implicit awareness of the dynamic nature of the Divine present in everyday life and history, particularly relevant in a social context, such as that of the late twentieth century, that tends to see the dignity of the human person as an essential foundation of social life.

The aim – the divine figure caught in a central moment in the history of Christianity – is overcome by the poetry of the invention, the attitude to graft the form in space or the wisdom to root in the soul, the movement, but not reject the painting experience, repeating the chiaroscuro effect in the material.

The objective is to provide a universal model of the human and divine, offering a visual language that is incredibly simple and spontaneous, inspired by a poetry inspired by the sense of being lost that takes hold of man before the mysteries of life and the universe.

7. For a reading and diagnosis of the material
Pasquale Petillo

Maurizio Marabelli, a renowned expert in the restoration of metals, when republishing his 1995 study in 2007, complained about the significant absence of a unified and shared approach to how to approach the problem of conservation of these specific pieces: "In a certain sense, to date there is still a methodological uncertainty, arising from the fact that the Charter of restoration by Cesare Brandi lacks a Protocol, at least, in the sector of metal products". The guidelines for interventions in this matter are an interesting dialectic aspect to resolve particular issues such as, in general, the treatment of surfaces, the resulting aspect of the restoration and above all the environmental conditions in which the artefact is left upon completion of the work. The general conditions of the piece are, therefore, the determinant of a positive outcome: it is clear that the behaviour of a metal surface in the open will be quite different from that of one such as the sculpture in the Audience Hall.

Fig. 24: Pistoia, Michelucci's Foundry. Sculpture tour to Rome (1977).

However, even for this specific creation and the particular function it has, the structure shows different exposure times to microclimatic mutations, therefore, capable of providing surface variations on the metallic layers with consequent switching of the reagent states and alteration of the chemical-physical balance. A leading scholar in the conservation of metals and pioneer of modern restoration techniques –although, later, invariably the subject of distinguished observations and distinctions – noted, particularly in the nature of the bronze statue, of its multiple component *alloy,* to be a complexity of effects that were created with inevitable consequences for the final aesthetic appearance of it being the skin of the work. In relation to a historian fixated about St. Paul Outside the Walls recalled: "The remaining door thus presents very serious damage and are far from those commonly observed in excavated bronzes (Etruscan and Roman) or those which have suffered the influence of environmental conditions such as monuments exposed to the elements (horses of Venice, Donatello's bronzes in Padua, St. Peter's Filarete Gate, etc.). Damage of this type is always determined by electrochemical changes, favoured by damp environments as well as the presence of particular substances (carbon dioxide, ferrous oxides, organic acids, etc.), which, in the soil and prolonged action of rain water, creates an favourable environment for an ion exchange of the various elements, thus, the formation of salts and oxides of the metals constituting the bronze alloy. Where there is copper in greater abundance, there is a larger amount of incrustation. It has various aspects: smooth, spongy and mineraloide as well as different colors ranging from emerald green to malachite green, red to brown and even white. Upon chemical examination, this salification reveals the presence of copper oxides, copper chlorides, basic copper carbonates, as well as the salts of iron and tin. The first result from the ferrous metals and the soil at the excavation, while the second are part of the alloy. Due to the electrochemical process previously mentioned, there is a considerable increase of volume in the salification poorly soluble in those recesses of easy solubility such as chlorides and basic carbonates.

Fig. 25: Pistoia, Michelucci's Foundry. Sculpture tour to Rome (1977).

Complex atacamite and nantokite mineralizations are formed in the excavation minerals, over centuries. In fact, the electrolysis that is carried out between the buried objects and the salts and acids of the soil occurs through the charge of the same metals that form electrolytic cells and transport the metal ions.

On St. Paul's Gate, even if there is the briefly described damage caused by time, it is not as extensive as to cause concern because, among other things, its action is shallow". The Director of the Materials Analysis Laboratory of the Vatican Museums, Vittorio Federici, thus, commented on the complex nature of the bronze statute, due to the very fact that the material is a result of different elements, mixed in varying percentages, that could result in substantially different figural and formal definitions. In this case, by exploiting the information of Mauro Patrizio Michelucci – of the well-known and prestigious company of Pistoia where great historical and artistic masterpieces have been made as well as pretext of furious historical controversy and criticism triggered by the doors of the cathedral of Orvieto by Emilio Greco, nephew, among other things well-known architect of the Church of the Autostrada del Sole in Florence, Tuscany, Giovanni – this is red bronze statue, made according to the canonical proportions of 5% tin, 5% zinc, of 5% lead and 85% copper. However, there is a substantial percentage of brass, at least with regard to the dermis in view of the sculpture – more widespread in the lower part (on the left as viewed in the Audience Hall) – probably requested by the artist in order to obtain special light effects in the light of the general consideration of the manufacturing plant that a bronze statue with brass in it is considered to be of lesser quality.

The preciousness effects, however, achieved with the use of brass are also enhanced by the presence quite large parts of the statue being untreated, where the different roughness of its fusion with tones of blacks on the newly cast statue. For example, in the numerous "intertwined branches" of the two convex caverns of the lower part of the sculpture which, like chains of DNA, there are large quantities of material extensively stacked in a rotary motion. In the plastic masses parts that seem to summon, especially in the dome-like form with of legs, there is a sort of mass of birds, – evocative, in other respects, of skulls and portions of upper limbs in human survivors scarified in the ulna and radius with only carpal and metacarpal remaining – the affixing of nitric acid, occurred in the bronze mould, made it possible to obtain greater detail in the colouring process precisely where the sculpture tends as a whole. The opportunity to use, visually of a greater quantity of reflections for the roughness of the "skulls" or "bodies!" of the birds is without doubt a visual counterpoint of considerable formal interest, obtained through the "philological" and "canonic" treatment of foundry techniques. The removal of the fusion crust and valourisation of the gold hues of the copper or reddish of the brass through the reactions with the chemical preparations are salient features of the piece, because of the realization of the imagined and planned intentions of Pericle Fazzini.

Fig. 26-27: Exam of outside/inside details during the restoration shipyard.

It is not by chance that many welds have been left unfinished. Among the reasons to be assumed for the other parts and, especially for the "flashes", it is believed that this is an additional safety feature, mainly motivated by the strong projection of the individual parts and the easy with which the entire work will be affected by vibrations. Refining the amount of deposits created by welding with acetylene could weaken the overall bronze statue. The blackish streaks of the welds have been left at the back, leading to the image of an effective use of the welding. This very feature presents a series of signs that create quite a few interesting technical problems for the restoration as well as the possibility of a "tout-court" or "heavier" restoration.

The topics upon which the dialectic discussion is based, deal with issues of self-reflection in light of operational choices. The presence, for example, of substantial traces of casting soil within the individual bronze elements of the sculpture – as highlighted in detail through the video-endoscopy, need particular consideration in view of the weight and more extended structural behaviour component of the individual lugs. The longitudinal hollow elements show, through the many "windows" left to realise it, not only for g the lute for the casting of the monument, but also the tools that made up the "soul" of the lute itself. The lute, which is nothing more than a mixture of powdered clay with scagliola, held together according to the shape desired by the artist through the metal, made it possible for the wax to configure the product formed and finished by the forms, so as to assume, as soon as the bronze entered the mould, the appearance given to it through the modelling. In this case, the general shape of the sculpture, as is known, was made by using polystyrene elements.

The "investigation of the inside" also highlighted the fusion nails as well as the distance metres between the walls of the individual "bars" of the quadrilateral section in a fascinating path and the creative point of view and, perhaps, even more, from the interpretative point of view.

8. The religion of concrete
Riccardo Serraglio

Commenting on a masterpiece like the Hall of Audience by Pier Luigi Nervi would be difficult. The Nervian building – subject to both authoritative approval and disapproval – has been, of course, accurately described and historically contextualised, by contemporary reviews from its realisation up to the recent monograph by Conny Cossa and recent essay by Carillo and Petillo during the restoration of *The Resurrection* by Pericle Fazzini. This is a masterpiece of contemporary art as well as one of the most famous buildings of the twentieth century that, like the extraordinary sculpture that defines the scene, has became part of our everyday life through the countless television appearances. However, as an inattentive spectator, I never paused to reflect *sub species architecturae* on this unique building before having the opportunity to visit it with due circumspection of the ceremony on the occasion of the completion of the restoration of *The Resurrection*. Nevertheless, I am are a great admirer of Nervi, and I personally include in the select group of elected representatives of architecture – he was an engineer – considering him to be the best interpreter of the expressive potential of concrete in the twentieth century.
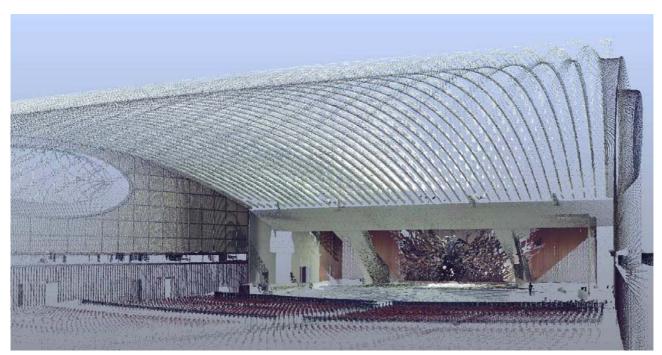
Fig. 28: The 'Aula Paolo IV' point cloud model, perspective projection (P. Argenziano, Benecon 2011).
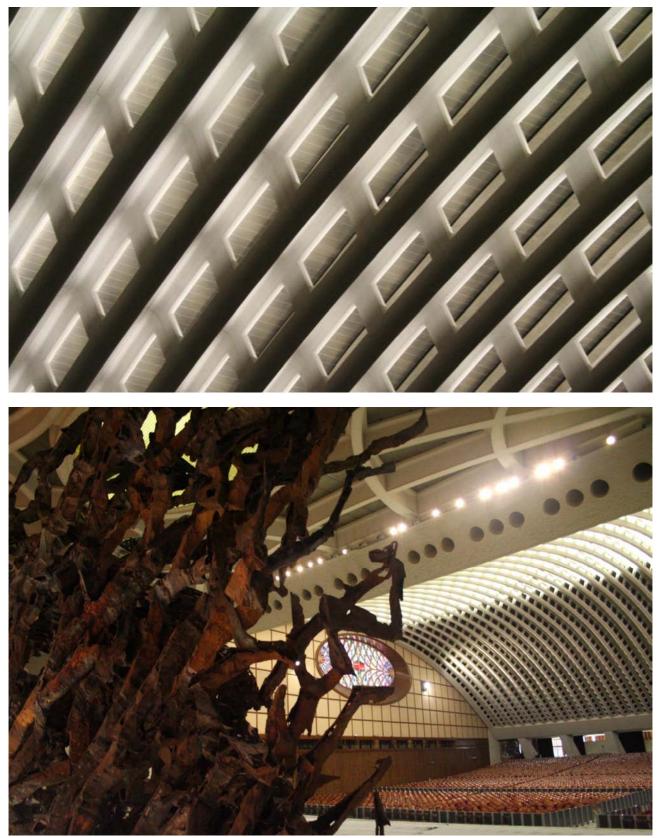
Fig. 29-30: Aula Paolo VI and Fazzini's sculpture.

I will try to describe some of the feelings, perhaps trivial but certainly sincere, perceived from this piece:

Firstly: the courage of Nervi. Upon accepting the invitation of Pope Montini, he accepted the inevitable comparison with Michelangelo and Bernini. A courage that, mind you, was not presumptuous but contemplated and weighed. In my opinion, the papal auditorium is proof of the extraordinary maturity of the designer, because he does not want to the contrast, in terms of a challenge, his creation to the masterpieces of the past, but with the modesty of the strong, assigning it a supporting role, while at the same time, full of meaning and personality.

Secondly: the greatness of Fazzini. I cannot imagine the Audience Hall without The Resurrection in the background just as I cannot imagine the Stanza della Signatura without the School of Athens or the Sistine Chapel without the Universal Judgement. The dialectical relationship between Nervi and Fazzini, contextual and following the completion of the building, could not generate a more stable balance between the sculptural and architectural masterpieces.

Third and finally: The educational significance of the building. Finally overcoming "[...] the climate of ecclesiastical distrust to more recent materials especially in the specific approach of explicit powers of expression", the Audience Hall represented a pass for a genuine use of reinforced concrete, which would have allowed many other designers freedom of expression, definitively marked by the concealment of this material by some who unjustly considered it to be suitable only for structural elements, or concessions to a fashionable decorative style of bad taste.
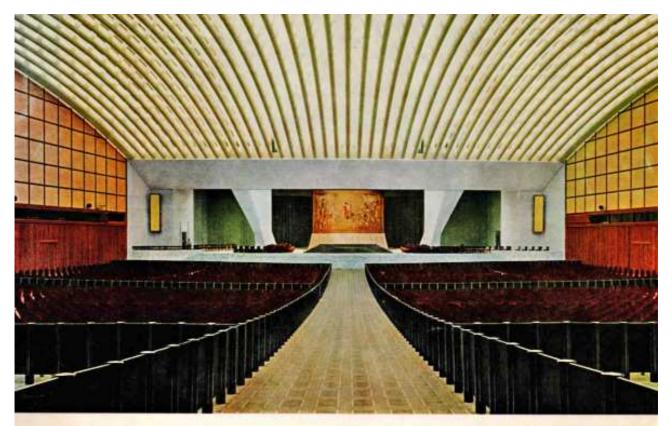
The enormous amount of concrete poured in the period after World War II at the end of the twentieth century for the postwar reconstruction and subsequent housing boom is associated to a generally poor level of built environment. In fact, the daily living of Italian cities clearly shows the serious imbalance between the quantity and quality of buildings made from concrete. It is precisely due to this uncontrolled use that this unique material has become a common negative perception and has become synonymous with ugliness.

Fig. 31: Sculpture detail in concrete architectural space.

However, we cannot blame the concrete, it was nothing more than an instrument in the hands of constructors. We should, rather, report those who have used it inappropriately. On the other hand, the construction research in the twentieth century cannot be limited to reporting negative data, which may seem to be overwhelming, but must also include recognizing noteworthy elements, both for the individual connotations as well as the improvement of the environment in which they are inserted.

In this sense, the religious architecture represented – and still is – an environment congenial to the appropriate use of concrete and it would be possible to compile a long catalogue of ecclesiastical buildings worthy of consideration, made from this material in subsequent periods of the twentieth century. I hope, therefore, to be able to develop in the near future this issue along with Carillo and other colleagues of this assorted group of scholars who participated in the research prior to the restoration of *The Resurrection* by Fazzini, considering not only the best-known works, but also the many buildings constructed by ordinary actors of the profession, which in many cases were able to interpret this theme with appreciable results.

Fig. 32: Monographic magazine cover on 'Aula Paolo VI' by Pier Luigi Nervi (1973).

9. Examination of the sculpture: high-tech aids as configuration and representation diagnostic knowledge

Pasquale Argenziano

The multicriteri@/Multidisciplinary approach to the knowledge of a cultural asset – as experienced over the years – at the Benecon Research Centre has in its design or rather in the three-dimensional geometric characterization, the first and strategic methodological step, regardless of size, the space or material consistency. This is the definition of the *geometry layer*, fundamental action due to it ordering all the subsequent scientific-disciplinary characterizations that relate to it, with this layer being the backbone of the larger multi-dimensional model.

In the digital era, the *design* retains its epistemological roots based on the interaction eye-mind-hand, extractable with graphic signs on two-dimensional media. Their potential for control by recording more accurate geometrical dimensions increases and affirms the inherent handling characteristics of the broader process of knowledge of the asset. The eyes, mind and hands are the human tools for the sensitive knowledge of *The Resurrection* by Pericle Fazzini and make it possible to appreciate the size, the proportions in the architectural context, the spatial complexity as well as the textural quality of the materials. They are fundamental aspects for the planning of the technical and scientific characterization of the complete work of art and, in particular, the geometric and morphological investigation.

According to a previously tested technical-operational protocol the geometrical and morphological investigation of the Resurrection was planned focussing on two specific issues: the choice of digital instruments that are more powerful than the reality of the place and the chronological development of data acquisition as a function of the conservation interventions and restoration site.

The most advanced three-dimensional geometric surveying techniques and technologies of detection include 3D laser scanning and digital photogrammetry. Upon comparison, the first was chosen, given the exceptional spatial organization as well as the particular texture and colours of the bronze surface. The scanning laser is, in fact, more precise in the presence of irregular morphologies, with alternating full-empty and concave-convex elements with significant undercuts as well as in the presence of darker-coloured and opaque metal surfaces.
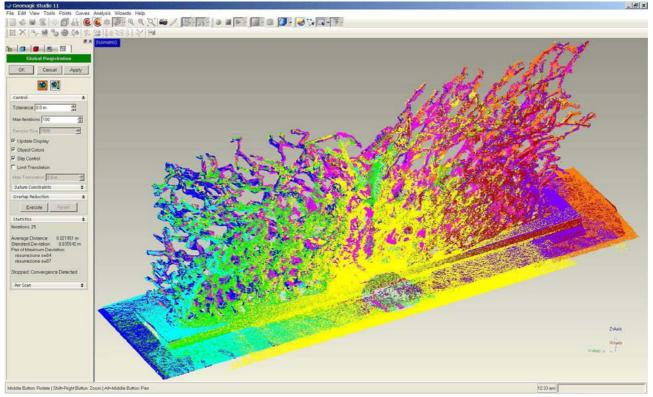
Fig. 33: Point cloud post-processing model, graphical colour representation (P. Argenziano, Benecon 2011).

Given the historical and artistic value of *the Resurrection* by Fazzini, the Benecon team planned to carry out the study in three sessions related to restorative activities; prior to the restoration site being set up in order to "crystallize" the condition of the premises, during the restoration to monitor the progress of the work as well as reach the apical areas of the sculpture using the scaffolding; at the end of the work to record the work and determine a delta with ex-ante conditions.

This laser scanning survey is in line with the most reliable methods and practices in the preservation and maintenance of archaeological, artistic and architectural assets. As stated by Luigia Melillo, crystallizing the three-dimensional geometry of an object – scaled to different sizes in accordance to the current regulations (DM 04.20.2005) – creates an everlasting digital data-based analysis that can be "used for the making of copies" and as an "objective reference to verify over time the state of preservation" of the cultural asset. Moreover, such a database would be "a sort of "memory", a store of information in the event of the loss of the work itself. Imagine, for example, what if a natural disaster or a terrorist event caused the destruction of an old masterpiece. There would be the photographs, scientific descriptions, maybe even a few copies, but the three-dimensional object would be lost for along with all the details that characterize it. The 3D relief could be used to realise a perfect copy to perpetuate the memory and knowledge of the object itself. If the work were badly damaged, the three-dimensional relief could be very useful in restoring it.

Returning to the geometric analysis of the *Resurrection*, in the three data acquisition sessions, several instrumental detection processes were iterated using two different integrated laser scanner-phase time-triangulation sensors through the overall geometric control of a topographical sensor with millimeteric accuracy. The instrumental approach was inductive: After having placed the statue in a single Cartesian reference system, the complete geometry of the work station from multiple points – placed at a set distance and with a resolution of 10 dots/cm^2 on the metal surface, was recorded with the sensor phase time, while the triangulation sensor measured the most interesting and peculiar sections of the sculpture, at a resolution of at least 100 points/cm^2. The accuracy of the data was increased tenfold due to the particular hardware used and triangulation sensor the acquisition technique used, which operated by human hand can follow any plastic form freely set in a space.

The 3D laser scanning of the Resurrection was performed with a sensor in phase time in order to fully take advantage of the technological characteristics. Each point on the bronze surface was "touched" and "measured" by the laser scanner, resulting in 4 numeric values, the three Cartesian coordinates and the reflectivity value – the fraction of incident laser radiation reflected from the surface at that point. This dimensionless value is comparable to a reading of the object in the spectrum of near-infrared (NIR) and therefore is particularly interesting and a forerunner of specific experiments in the restoration field.

Fig. 34: Photorealistic architectural 3D model, perspective projection (P. Argenziano, Benecon 2011).

The integration of the two sensors led to the definition of a variable-resolution geometric model, textured with photo-realistic images – also at different pixel resolutions – classified at during the different stages of the restoration, in relation to the various and multiple morphological specificities of the masterpiece by Fazzini.

The "multi-resolution three-dimensional model" to scale (point cloud) of the entire Resurrection has more than 70 million points that apparently reproduce its morphological continuity, but in reality, is discontinuous due to it consisting of all the points read by the laser sensors and integrated into a single Cartesian system. This model is the "geometric layer" upon which to incardinate the larger multi-dimensional model. All the information on the sculpture by Fazzini, the chemical, structural, colour and morphological aspects, are related to each point in digital form.

The colours and morphology, in particular, are two types of scientific and technical information that can be obtained from the laser scanning analysis. The surface shape (DSM) was determined by the autonomous and semi-automatic processing of the point cloud, with overall colour being returned by the time series and ordered by the RGB images acquired by the sensor in different scanning sessions.

In the area of DSM modelling, current scientific literature defines two different approaches: the *meshing* or construction of surfaces through the triangulation of the points constituting the discrete model or the discretization of operated rational geometries by means of coordinated plane sections of the points cloud model and the relative geometric extrusion. The first approach, used in this case study, is ideal for processing DSM non-rational geometries, with obvious applications of the areas of marked plastic forms to any scale. However, the second approach is particularly good in the modelling of volumes that can be related to Euclidean samples, for example urban fabrics, the structure or construction elements.

The work carried out on the sculpture and the more accurate modelling of plastic figure of Christ suggest a parallel example of the relationship (not just figurative) between the structure of human skin and that of the 3D digital laser scan model. The points cloud represents the "dermis" upon which the DSM mesh lies, comparable to the epidermis that is divided into layers according to the colour information, colorimetric or thematic issues (curvature index, contour lines, chemical characterisation etc.), which gives the larger model the interpretative image of the various scientific assumptions.

As previously mentioned, this comparison is not only figural: the 3D laser scanning like photogrammetry gives the morphology of the object which can be textured with photorealistic images, with derived geometric themes as well as with the various characterizations of the surface layers obtained with non destructive digital sensors that read and analyse the surface of the object. It is worth considering the spectrophotometer, the thermal camera, the covermeter, the video-endoscope, to mention only the sensors used in this study.

Fig. 35-36: 3D laser scanning action and mesh 3D model by point cloud model (P. Argenziano, Benecon 2011).

The multidimensional analysis considers the "body" of the cultural asset so as to study it "live" and "in vitro", with, the team, therefore going beyond the metal surface. With the aid of digital video-endoscopy, the eye of the researcher was taken inside the sculpture, recording new images and valuable information on the structure, as well as technical solutions during melting and the thicknesses of the different sections. The concrete base upon which the bronze mass stands was analysed with the digital covermeter, highlighting the main anchorage areas on ground for the structural analysis of the statue within the larger architectural machine by Pier Luigi Nervi.
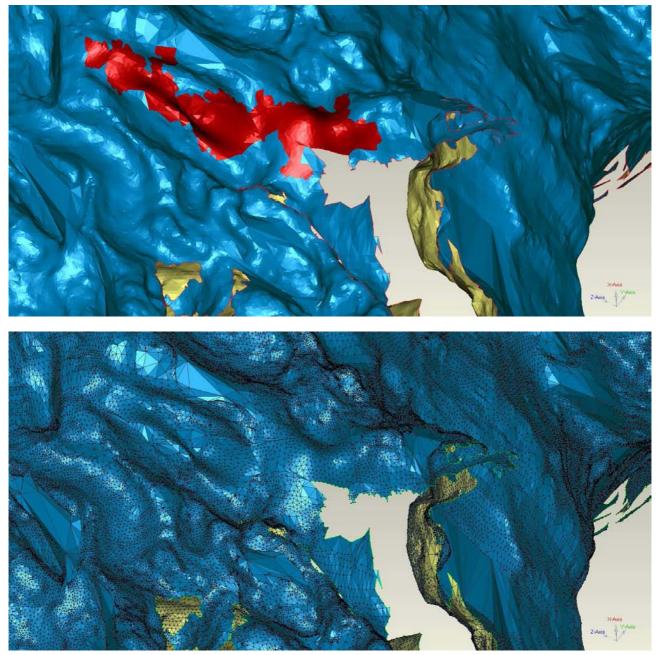
Fig. 37-38: Snapshots of mesh 3D modelling (P. Argenziano, Benecon 2011).

By making this information system, the DSM model acquired a "physicality" not only because the framework under the "skin" of the sculpture is described but also because a step by step multidimensional model was created .

The multi-dimensional attributes, organized in an analytical and discrete way, are related to the points cloud and visually manifest themselves in thematic projections on the DSM. If the point cloud is the geometrical database of the object investigated, each discrete element is identified with a unique code and the multiple coordinates (Cartesian, spectral, colorimetric, chemical potential, etc..) are attributes of a table structure to be implemented in order to increase the scientific investigations on the object under study.

The definition of the geometric layer of the Resurrection in the Audience Hall, already characterised by various and coordinated investigations presented in this volume, would be the first step towards the definition of a multidimensional model that integrates "detailed" knowledge of the bronze artefact.

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The Social Housing for a new ethic of architectural Project

Lorenzo CAPOBIANCO
ARV, Architettura "Luigi Vanvitelli", Seconda Università degli Studi di Napoli, Aversa, Italy
lorenzo.capobianco@unina2.it

Abstract

If, on the one hand, the condition of widespread deterioration that seems to omologate our cities from the center to the periphery is the declaration of a contemporary inability to retrieve the ancient relationship between nature and built that presided over the founding of the city, on the other hand, the global crisis presents us a impressive generational data: entire sections of society are, at the same time, excluded from the target of popular houses and private of the economic capacity to access the market. The project of architecture should regain that sense of ethics and social that can represent, today, a proper and necessary disciplinary contribution attempt to the solution of a much more complex question. Precisely because in a time of deep crisis, any construction, from small urban design element until recovery or the construction of a new neighborhood, sees grow its value exponentially. Not a case that we record the progressive growth of interest in a new form of housing: the social housing. A "sustainable" alternative to the popular houses, the Social Housing combines the low environmental impact at the high energy performance and content of construction's cost, permeating of a logic ethics and a strong social connotation an increasing number of financial transactions that involve collaboration of public and private operators. In the same line it is also places the initiative of european competition "Housing contest" which was attended, with success, by this project.

Parole chiave: Social Housing, widespread deterioration, ethics of architecture

1. The contemporary scene

The conditions of widespread deterioration declined in terms of waste of resources and energy dispersion that today seem to homologate in the same uniasiness the appearance of our city from the center to the periphery, declare their structural and systemic character.

They, in fact, are the inevitable consequence of the difficulty of managing the existing built heritage and the processes of construction of new volumes. These conditions, on the other hand, returns the immediate perception of the depth of a crisis related to the contemporary inability of recuperate the relationship between nature and built that presided over the founding of the city in history. These are conditions of degradation that is possible to measure in comparison with similar European experiences, and that lead to the apparent inability of management and interpretation of new forms of public space, to the rarefaction of the quality in the new buildings both from a purely technological point of view and in reference to the idea of architectural project, in the difficulty of the authorities in processing widely shared designing development strategies, into the uncertainty of shared cultural references, in the absence of a clear system of values and performance requirements (and with it the ability to distinguish) for contemporary interventions, and, last but not least, the growing difficulty of architects to interpret and communicate the instances and the sentiments of urban communities. Not all aware of the social problems connected to this process of progressive deterioration of the habitat, especially when the goals of environmental sustainability are forced to confront whit an unfavorable and dramatic economic downturn in global scale that projects the future in the insecurity. The city offers to the new generations of citizens the complexity of the urban fabric and an organization of

services that are distant, impractical because it is put into question the ability to meet one of the primary needs of the human being: the house.

It is a impressive generational fact that large parts of the social body, in particular the young, intended to compete with a twofold difficulty: on the one hand the exclusion from the target of popular houses, on the other hand the deprivation of economic capacity to access the market. It is a generation handed over to a sort of limbo, for which does not seem to be approaching another way out if not the expectation to the "protection" of the family of origin.

In confirmation of this scenario are the 2011 Istat data which, compared to an increase in the cost of the house that goes from 50 to 100% for the purchase and from 130 to 145% in the hiring market in the last ten years, has suffered a decline of 3.2 % on an annual basis of contracts of sale and a literal collapse, at the same time, of the 8.1 % in signature of loans for the purchase of the first house.

Occasional workers, insecures, temporary employees, young families, pensioners, a veritable army in numbers, substantiates the population of our country.

Fig. 1: The "Pignasecca", a historical district of Naples

1.1 The role of architecture

The only architectural project can not provide the solution to these complex problems, but a reflection on its statute, ond the available tools and its priorities, it is still required. Therefore the architectural project should find, without rhetoric, its civical original vocation, that social and ethic sense, its civilians reasons that seemed to have lost in the contemporary season but that can represent, today, a proper and necessary attempt to disciplinary contribution to the solution of a much more complicated question. More of a clue to the spread of this need for moral renewal is offered by the theories of the decrease which is inspired by a growing number of experiments in historical and degraded fabric of the contemporary city.

In England, for example, the streets abandoned by trade, victim of the crisis, the "slack space", escape to a destiny of dangerousness and re-populate itself thanks to artists and local communities that transform the free spaces in cultural centers and handicraft production.

The studies of Ivan Illich and Richard Semmet, tell about a new way of feeling, free from killer instinct of economical capitalism, that makes it possible to find the ability to do together beautiful and useful things and that becomes the engine of the relaunching of entire communities. However, in this direction, are the concepts of 'sustainability' and architectural experimentation which, probably, would deserve a deeper reflection. One renewed look is that what exceeds, in the exercise, the "artificial" specializations and the disciplinary distinctions, conditions which proved to be as less unproductive if measured respect our urban landscape. Precisely because we live in a time of deep crisis, any achievement, from small urban desing until the recovery or the construction of new neighborhood, sees grow its value exponentially; for this the consciousness and the architectural quality may no longer be understood as autonomous characteristics of the project, but they assume characters of necessity in an organic and integrated generative process from the definition of the type of construction up to the study of architectural detail.

Fig. 2: A more and more frequent image of the contemporary city: abandoned shops

1.2 The Social Housing: some experiences

Not by chance that in the current architectural debate, we record a progressive growth of interest for a new formula of the residential building: the social housing. Closed the season of the reconstruction of state and, fortunately, also the one of the wild speculation due to which, still today, our cities are paying the consequences, the changed economic conditions and the dramatic growth prospects, bring to the attention of the market the social housing as "sustainable" alternatetive to the popular houses. The attempt to combine the low environmental impact to the high energy performance and low cost of building, permeates of a logic

ethics and of a strong social connotation an increasing number of financial transactions that involve collaboration of public and private operators. An applicant formula provides for the granting in gratuitous bailment of the ground fromrt of the Municipality, which thus becomes co-sponsor of the operation of construction, in return of the guarantee of a controlled discounted price for rent or sale. In this direction the Municipality of Parma has approved, in 2010, the construction of 852 social housing, in Turin, in 2011, has been inaugurated "Sharing", the largest Italian project of temporary social housing that move from the conversion of a former Post's building and, for the next few years, the investments dedicated to quality homes at low cost are quantifiable in 10 billion of euros.

Fig. 3: "Sharing", Turin 2011

2. The "Housing Contest"

In the same line it is also places the initiative of european competition "Housing contest" which was attended, with success, by this project. The design team, formed by Lorenzo Capobianco, Antonella Violano and Francesca Capobianco, has responded to a request for a residential building on 5 levels which extends for about 5000 square meters of residential surface at a low cost and high energy performance. The choice of the project has been entrusted not so much to the design of a single building as far as rather to the organization of a flexible modular system to accommodate the different functional and dimensional requirements.

The starting point of the composition has been in the definition of a structural system with a constant pitch (3.60 mt.) that will make it possible a free association of the five required housing typologies. All the houses, in this way, may be variously determined in the constitution of individual building blocks, which are distributed by a line system, and their amount and size is function of specific needs. In this case, in our opinion, the

proposal solution suggest a limit size for the building (20 meters in height, and 120 in length) beyond which it would be preferable not to go.

Fig. 4: Housing contest, East Elevation whit hanging gardens

The required five residential levels are distributed, starting from the first floor, in eight separate blocks using the ground floor of the building to accommodate wharehouses and common services, among which, a fitness room for the exclusive use of residents. Access to homes is imagined through a system of stairs and elevators, outside from the area occupied by residential blocks and in the open air. This physical separation between vertical links and residences makes it possible to define a real further "urban scene" (the eastern front of the building) characterized by the presence of seven hanging gardens for the exclusive use that can also be used as "condominium garden" (planting in a pot), and by a system of internal green terraces that define a privileged and protected habitat to the sleeping area of houses that all overlook on this space. In addition, the system of pedestrian access located in correspondence of the stairs blocks and of the wharehouses draw the perimeter of a long private green dedicated to the children's play.
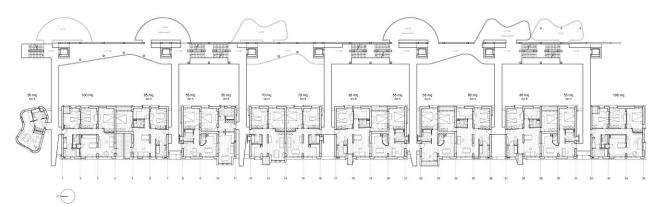
Fig. 5: Housing contest, Plan of the Third level

The type of accommodation, to the vary of the size, is declined while maintaining constant the division between living area and sleeping area through a functional area of central services. The living areas are facing to the west, by defining the front of the building through the alternation of horizontal cuts and bow-window, while the bedrooms facing to the east, above the internal square and on the green terraces, placing himself in relation with a controlled space protected from the street. The building choice of a constant structural step allows, to equality of sqm., to configure a wide range of solutions of prospectus of east front for each individual types: solutions with loggia, solutions with bow-window, ribbon windows or solutions with small terrace are available for a free design and constantly changed front of the building. To reduce the effort the and maintenance's cost related to the considerable presence of green condominium's spaces, has been formulated the hypothesis of an automatic watering system that exploits the recovery and reuse of rainwater adhering to the principle of resource saving that presides over the project.

Fig. 6: Housing contest, West Elevation detail

Fig. 7: Housing contest, West Elevation
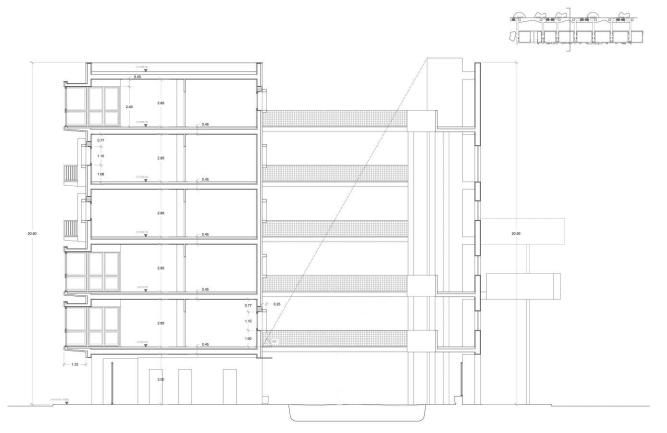
Fig. 8: Housing contest, Cross-Section

Fig. 9: Housing contest, The condominial garden

Fig. 9: Housing contest, An internal view of the 85 sq-mt type

Fig. 10: Housing contest, An internal view of the 100 sq-mt type

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ARCHITECTURE AND URBAN PLACES

Ottavia GAMBARDELLA
Dipartimento di progettazione urbana e urbanistica, Università degli studi di Napoli Federico II, Napoli, Italia
E-mail: ottavia_gambardella@hotmail.it

Abstract

The contemporary city is characterized by deindustrialization, tertiarisation of the economy and growing process of relocation; the disposal of places, buildings, artifacts belong to its history. "Indicator of an impossibility, disposal often involves changes in scale and spatial relationships" [1] "The contemporary city is by its nature unstable, the site of ongoing changes that give rise to the formation of critical situations and temporary solutions of problems." [2] The biggest problems of our territory concern the use of land, the lack of public spaces, the bad condition of the housing built after the war, the energy consumption and the related pollution, the issue of waste and non-recyclable materials.The theme proposed concerns the design of a settlement of Social Housing inside an area of Bagnoli previously occupied by Italsider. Starting from the analysis of the territory and its genius loci, the indications of the PUA and of the urban transformation society Bagnolifutura, the project is a tool of regeneration for the abandoned area, in a sustainable way. I chose this topic for my contribution because the method pursues a growth based on less land consumption, less enengy consumption, less waste of resources; and it pursues the research of a possible solution to the problems of our time.

Keywords: regeneration, abandoned area, sustainability.

1.The study area
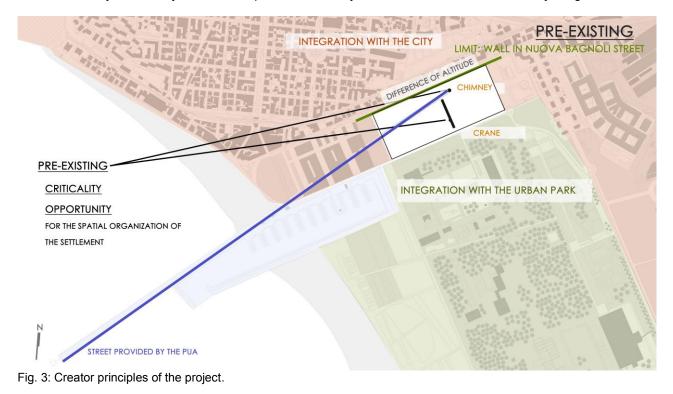
Fig. 1: Picture of the study area.

Fig. 2: Orthophotos of the study area

"The European city has rediscovered in recent decades, a new porosity. It is related to the phenomena of the disposal of large areas, or of a myriad of small lots within the tissue. "[3] The theme that I propose concerns the design inside an abandoned area, and more specifically of a settlement of Social Housing in Bagnoli on a site previously occupied by Italsider. The project is seen as a tool for regeneration of the disposal area in a sustainable way. The study area is a lot putted on sale by the urban transformation society, Bagnolifutura.

Fig. 3: Creator principles of the project.

The lot borders to the north with Nuova Bagnoli street, to north-east with the auditorium "La Porta del Parco", to the south with the large disposed area, site of the urban park planned by Francesco Cellini and provided by the PUA, and finally to south-west with an area in which are provided accommodation and commercial activities.

"The quality of the relationship between the new and the existing is complex and can not be reduced to the addition of something that was not there before to a system of fabrics that already formed a part of the physical world. The new is contaminated with the existing, and this becomes different in contact with the new. "[4] For this reason, the definition of the project was based on the analysis of the territory and its genius loci. The lot is characterized by several critical issues, such as the difference in level with Via Nuova Bagnoli and the related wall that goes along the street; the presence of two elements of industrial archeology: the crane and the chimney; the road that goes through the lot provided by the PUA.

2.The project

The project aims to transform the existing structures from criticality into opportunity for the spatial organization of the settlement and it develops from a grid and several streets that cut the grid and allow the connection to the city and the physical and perceptive connection to the pier and the sea. Elements such as the crane and the chimney become points of orientation for the new settlement. "The points of orientation are essential for a healthy life in any environment, whether urban or rural. Without them, the citizen can not read his country, nor even understand it. "[5] "A characteristic and legible environment, not only provides security, but makes the human experience potentially more intense and profound."[6] The project aims to create an union between the district and the urban park designed by F. Cellini, through the recovery of its guidelines for plan development; it creates physical connection with via Nuova Bagnoli through pedestrian access to the lot; perceptive connection between the project area and the residential area through the partial elimination of the wall on the Nuova Bagnoli street. The project of the settlement also provides the creation of two levels of usability placed at different heights: 0 level dedicated to commercial activities and functions of the district, level 1 social activities and semi-public space of interaction.
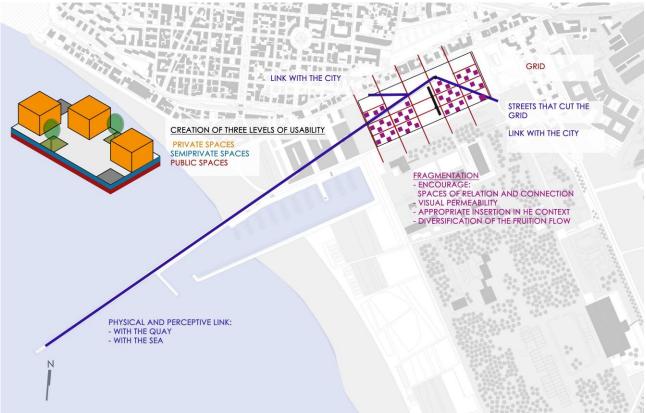
Fig. 4: Creator principles of the project

Fig. 4: Masterplan

"The emerging of environmental issues, their severity and their potential for conflict, has enlarged the debate to the global arena, in the form of scenarios, of the future planet." According to Viganò there is a "close relationship between the awareness of the conclusion of the experience of the modern city, the emerging of new forms of settlement, and the need to analyze their consequences in the future, to imagine alternative scenarios. "[7] Considering the problems of our country and our time, more attention has been paid to the climatic analysis of the area and consequently to the optimization of the sun exposure and of the wind exposure of housing. The fragmentation allows the summer winds to penetrate inside the settlement while the winter winds from the north-east are blocked thanks to taller buildings and a green barrier. The project involves the surface modeling of the ground with recovery of the excavation soil, the creation of a linear park, social spaces and urban gardens belonging to the Social Housing.
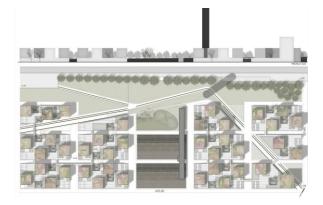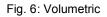
Fig. 5: Masterplan and profile

Fig. 6: Volumetric

At the building scale the design strategies are the use of a dry constructive sistem and the distribution of interior spaces depending to the solar gains during the day and in relation to the activities that take place inside the building. The control of the internal ventilation is implemented favoring the creation of windows located on opposite sides. The control of solar radiation is implemented on the west through vertical screening for transparent windows and on the south through front orizontal screening. The ventilated wall to the west allows the reduction of heat in summer while the coat wall to the north allows the control of heat loss. The project involves the use of renewable energy sources like the photovoltaic panels integrated into the roofing system and the recovery of rainwater for irrigation of green spaces and common services, using external paved surfaces and roofs of buildings as collecting surfaces.

Fig. 7: Perspective view

The central theme of the project are the public and semipublic spaces of relationship. "Space is not designed as a simple negative or empty, but as places available to accommodate the many facets of an idea of community."[8] The project method pursues a growth based on less land consumption, less energy consumption, less waste of resources, and pursues the search for a possible solution to the problems of our time. It promotes the idea of a project as "a continuous reading of history, founded on the recognition of the landscape's structuring character, of the historical/testimonial values, to undertake alternative design paths, to establish a "synergic interaction" between diffusion and recovery of "historic territory", interpreting the effects of new settlement trends. [9]

Fig. 8,9: Perspective views

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Complex of San Lorenzo ad Septimum. Architectural contribution to sustain energy

Efisio PITZALIS
Dipartimento Cultura del Progetto, Facoltà di Architettura Luigi Vanvitelli, Seconda Università di Napoli, Aversa, Italia
E-mail efisio.pitzalis@gmail.com

Abstract
Within a collaboration and communication among different subject areas, the garden of the complex of San Lorenzo ad Septimum - Faculty of Architecture of Aversa - is the place chosen to prepare the architectural prototype of a solar energy system. The floor plan consists of the newly formed multi-cellular matrix combination wrench. This matrix unfolds in a process of slippage along the sides of the hexagon base and second alternating between full and empty. The formal nature honeycomb then a warrant for land for small samples, necessary to the custody of the parts and the housing of various seeds. This focus is in full agreement with the vocation of planting woodland and rural dwelling newly refurbished function on the example of the ancient convent of the orchard. This genetic parentage is able of establishing a dialogue between interventions distant thunderstorms. A dialogue laced with references and allusions to memories that emerge in the thick perimeter planted with greenery. The resulting texture reminds "viti maritate". These are the hallmark of the agricultural system of Aversa, but also the reference cards with festoons that adorn the city center during religious festivals. The colored glass held in the dense network perimeter recall the statements of votive lights, and weld in this way, the religious origin of the ancient building complex of the current scientific university. Faith and science together in a common root of knowledge.

Key words: protoype, energy, multi-cellular, memory, knowledge

1. Architectural contribution to sustain energy
On the inside of a sinergetic collaboration between different areas of discipline, the garden of Saint Lorenzo's complex ad Spetimum-center of the Faculty of Architecture of Aversa, is a prechosen place to prepare the architectonic prototype of a energetic solar panel system. In particular, the useful system for autosustainment of the eight century body is placed in the posterior part of the courtyard, in the intermediate portion between the existing garden of the rectangular planimetric sods and the grove with quadrangular mesh. The planimetric system of the new formation is constituted of a multicellular aggregation from a hexagonal matrix that is developed second after a process of slidings along the sides of the hexagon of the base and second, an alternation between full and empty adaptions that intercept visually the pieces of the pre-existing historic building. The whole project is constructed in a way to not occlude or to minor in an excessive manner the sight of the ancient complex of the building, and at this end the texture of the handmade ex-novo, everything imprinted on the transparency, is garanteed for total permeable vision. The natural form of the beehive then guarantees an occupation of the ground for a little sampling, necessary for the custody of the area's parts for lodging of the seadbeds and mushroom farms, in full accordance with the vocation of woodland planting an rural dwellings newly refurbished functioning on the example of the ancient convent of the orchard. This provides genetic parentage, so to speak, a reciprocal relationship between ancient and modern that can establish dialogue between the intervention of distant thunderstorms . A dialogue laced with references and allusions to memories that emerge, decanted from excessive historicists, in the thick brushwood perimeter

that contains vertically the volumes of the hexagonal base. This texture recalled the screws (intertwined?) : It is the Aversa hallmark of the agricultural system, but also an architecture of minors that can be safeguarded, that of the congratulational festoons that adorn the historic center of the old town Aversa in religious festivals. The colored glass held in the thick boughs of the perimital prospectives return in a match of veiled allusion, the votive lights, welching in this way, the religious origin of the complex of the ancient building of the current science university. Faith and science together in a common root of knowledge. The single element with a hexagonal plant consists of a wooden platform resting on the punctual perimeter supports that are anchored, by means of anchor bolts, and a cement block buried 40 cm into the ground. In this way the soil is stripped in singular points to a minimum depth in order not to affect anything. A system of support surface springs, ajustable in function of soil compaction the suspension ensures the ground and the wooden base perimeter groove, while an umbrella device, with a central pillar cable for the watershed of water, cooperates statically with the flat metal perimeter system. These are anchored to the flat base and cover by screwing the ajustable galvanization and enamelling. The coloring of the metal are ivory white in contrast with the colorful pieces mounted on the metal cabinet behind. The cover housing in its thickness holds the solar panels, which in this way are completely hidden from view, from below. Around the aggregate system, there are 8 cell lodge activities related to the function/agricultural rural orchard, 1 cell repair and a small trench for stratigraphic studies of soil and 1 final planimetric deformed cell matrix that contains the technical elements for the collection and branch energy produced by solar panels. The height of the cells is 3.00 meters with a suspension volume of 10 cm, around the base slab. Having regards to the conformation of the ex-novo article, of particular importance is the nature of the removable architectural complex thus obtained, easily removable, replicable and reassembled in different points depending on the changing needs of use. This possibility, within the system is modular and combinable and ensures the correct installation in particular of the historic building of merit. This is the easy maintenance of components useful for commisioning of solar panels for energy self sufficiency.

Fig. 1: General plan of the monumental complex

Fig. 2: South West Elevation

Fig.3: South East Elevation

Fig. 4: Section cell

_struttura primaria   _struttura secondaria   _chiusure orizzontali
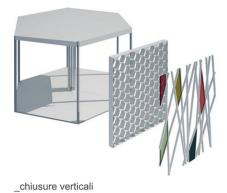
_scaffalature esagonali   _chiusure verticali   _esploso assonometrico

Fig. 5: Cellulare structure
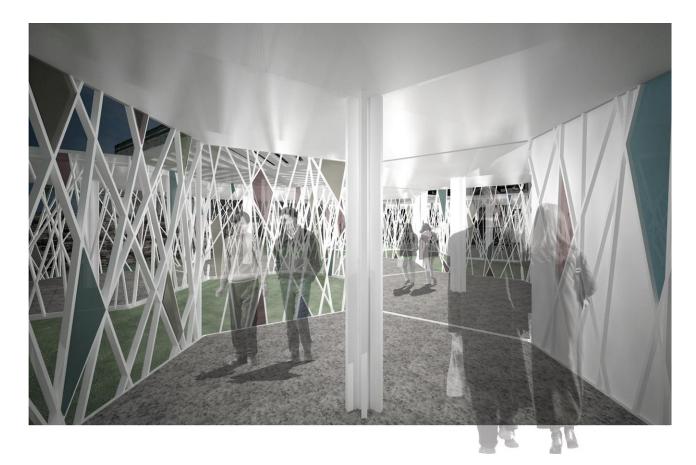
Fig. 6: Internal perspective of the cells

Segezia

Gianluca CIOFFI

Dipartimento di Cultura del Progetto, Facoltà di Architettura, Seconda Università degli Studi di Napoli, Aversa, Italia, gianlucacioffi@hotmail.it

Abstract

To reach Segezia needs, as it remembers Pennacchi, to pass under a double row of eucalyptus ' trees that connect them toward the center; the tall bell tower, well visible also from far, guide like a lighthouse in the countryside.

Segezia is born in the strategic sketch performed by the Onc driven by Araldo Di Crollalanza and technically submitted, with the Urbanistic Plan of the Tavoliere, to the architect of foggiana's origin Concezio Petrucci. The objective of the intervention is to put in evidence the system of division of land of farmhouses spread that have in the town centers and suburbs the points of reference of the gravitating polycentric constellation around Foggia.

In the project for Segezia, certainly a point of arrival for Petrucci, it is clearly visible the stylistic jump made in the elaboration of the plan and in the built restitution; it is a clean, dry and centrifugal system, a feature proper of the systems theorized by the leader teacher of the organic movement, Frank Lloyd Wright.

From the point of view stylistic reports clearly a planning evolution, the architect's architectural will, (prematurely disappeared), the point of arrival of a search who often engaged him with the theme of the rural city - theme that has been often ignored by the great architects of the time focused more on the architectural object - and that it stays, in every way, his last realized work.

Keyword: chief town of country

Segezia, the conclusion of the experience

To reach Segezia needs, as it remembers Pennacchi, to pass under a double row of eucalyptus ' trees that connect them toward the center; the tall bell tower, well visible also from far, guide like a lighthouse in the countryside. The city enjoys the same color, the same bright atmosphere of the small and large urban centers of the Puglia's and particularly in the regions of Gargano; atmosphere which resents also in the architectural composition of Segezia, in its entirety, so varied and picturesque. [1]

Posta Tuoro (former name of Segezia) is the first of the towns and villages, built with the" Plan for the Tavoliere" designed by Petrucci, then there is the town and villages of Incoronata, Cervaro and Giardinetto which are, however, partially completed during war (1943), while others never get started. Segezia is born in the strategic

sketch performed by the Onc driven by Araldo Di Crollalanza and technically submitted, with the Urbanistic Plan of the Tavoliere, to the architect of foggiana's origin Concezio Petrucci. The objective of the intervention is to put in evidence the system of division of land of farmhouses spread that have in the town centers and suburbs the points of reference of the gravitating polycentric constellation around Foggia. This project adds to previous attempts by the Consortium for the remediation of Capitana, producing, however, poor results, detectable in the two interventions Mezzanone suburb (La Serpe) and Siponto. The project is made by Concezio Petrucci and, only this time, he continuing the research on the new city began and continued for Aprilia and Pomezia. The Regional Plan, first outlined by the Opera, was developed in consultation with the architect Concezio Petrucci, who prepared the completion of the system subsidiary tracked, formed by the arrangement of some "tratturi" direct to Foggia, with the primary intention to relieve the roads, real backbone of the drainage areas, the slow and bulky agricultural traffic aimed to the chief town. Other tracks planned are designed to connect with each other [...] the six new major towns designed in the region and [...] create a new, much larger ring of bypasses around Foggia [...]. The ONC, in order to provide the people scattered in rural homes, has crafted the construction of six new villages [...] to fulfill administrative, political and religious needs [...]. Of these centers, three are new municipalities of chief towns (Segezia, Incoronata and Daunilia). [2]

The experience of the city is part of a period of great ideological turmoil on the question of how to design cities. The work seems to prefer a monocentric city scheme and sees in the group headed by Petrucci an effective interpreter, in fact, they are able to apply the best indications of the ONC. The substance of a rural town is that it is not a city, in practice the characteristic that should be their own is to be anti-city, point of reference for people all over the country and not stable population in it. Therefore, since the permanent population is about three thousand inhabitants, it is not clear how this proves a problem for traffic or congestion. The original idea is not to found a city that must expand continuously, but only be a symbolic place where you join and identify with the community for those who are scattered over the country, the place, therefore, where to find the public institution and religious, in this connection is easily noticeable how, the early works built are always public buildings, and then residential buildings, precisely because that is not the primary purpose for which they were born, these buildings are the true essence of the foundation and the part on which the designers attention is focused. The contrasts are reflected also in the academic power clashes that see opposing the two great barons of the time: Piacentini and Giovannoni. Piacentini on several occasions criticized the plans of his rival's protege, Concezio Petrucci, who in a letter he assumed the responsibility to reply to the lines: "V.E. he forgot, instantaneously, that until yesterday he preached in his lectures at the School of Architecture to avoid the roads North-South and East-West. Today, transalpine fashion is back on checkerboard patterns with those guidelines. This will be fine for the northern regions where people trying the sun frantically, in homes, with large windows, in the streets with the NS orientation or almost. But in Italy, Sir, do not you walk the streets without the risk of sunstroke and in fact, VE recommended a few years ago to avoid that orientation. Do not you remember? Climate conditions have changed or have changed his views? "[4] Segezia surely is influenced by the historical local Romanesque as evidenced De Angelis [5] who speaks of St. Nicholas of Bari, the cathedral of Ruvo, or Troia. For George Mason, Segezia represents a stylistic gap compared to the rationalism that has characterized the way of designing cities by groups involved in the various competitions, sees the influence of neo-classical Scandinavian, from Aalto to Asplund, for sure how much importance the designer admits he held "... the simplicity and purity of Tuscan architecture." [6]

In the project for Segezia, certainly a point of arrival for Petrucci, it is clearly visible the stylistic jump made in the elaboration of the plan and in the built restitution; it is a clean, dry and centrifugal system, a feature proper of the systems theorized by the leader teacher of the organic movement, Frank Lloyd Wright. The strong element is the square with public buildings, a single square, the Wright 's fireplace, the compositive core from which to start the arms of the cross, the main axes which are inserted in the square and extend the campaign, the artificiality of the offset allows to have public buildings as a backdrop, according to the known signs of Gustavo Giovannoni, teacher of Petrucci and sponsors in various contests. By the urbanistic analysis is known as the "Fascio's home" is lower in tone and in the lateral position compared to previous compositions, it is in contradiction to the fascist's rhetoric who wants the symbol of the power system as a predominant feature and the Fascist tower with the Arengario fully obscured by the steeple of the church. The square is, therefore, characterized by the strong presence of the bell tower that polls sleek and slender on the extended composition of the buildings; along the staggered arms is prepared in a very simple composition the houses for the residents in the city: on the axle north-south the houses binate and on the perpendicular to it, east-west, houses to team with garden. "The plan assumes a stellar form, to Greek cross, favoring the modern criterion that extends to articulated and open formations I pour the country, also not opposing itself to the Italian urban planning tradition of origin "castrense", founded on the orthogonality of a thistle and a decumanus." [7]

The sketch of the plan for Segezia loses, therefore, also that rigidity and allusion to the regime contained in the Roman castrum, the intersection stays only thistle-decumanus, but it loses him the idea of a city rigidly circumscribed within an enclosure; it is a city open shutters factum it hears again some inevitable epilogue. Petrucci strives him to reach a modern and reassuring project, turned to a population for him country, not gotten used to radical and sudden changes, to reach the purpose, is submitted to elements proper of the classical and popular architecture even if in some cases it shows to know how to also plan well to the international way, as in the case of villa Cernò. "The central plaza is of measure suitable to the greatness of the town center (m. 40 xes 100) and introduces the greatest side toward the National Street, to do yes that the new building nucleus can introduce to whom passes long such road a great architectural consistence, also in the first period of its formation." [8]

As already seen to Pomezia, also to Segezia the bell tower detaches him from the surrounding volumes to rise him isolated as element of territorial reference and compositive piece organizer of the urban sketch; Petrucci is a careful architect to the traditions and the spirit of the place, he often succeeds in getting a good result filtered by a mixture of traditional constructive techniques and modern languages; for all the public buildings of Segezia, it uses a constructive system in carrying masonry with bricks of the caves of Lucera, only exception is made for the loom in cement armed with the bell tower that, however, as it makes to probably notice Cucciolla is not thought so in initial phase, "The bell tower that dominates isolated on the angle of the church square will have the central nucleus, within which the staircase unties him to helix, in bricks masonry. Around such nucleus nine orders of loggias are prepared overlapped that they lean on a plinth dressed again of stone of Trani. The loggias are formed from a peristyle of plates in ingot of stone of Trani on which leans the pure lintels in stone of Trani and the insoles of armed cement that form the various ledges of it. To the summit it is the bell cell surmounted by the conic cusp" [9], and Cucciolla adds "you can be thought that for the architect this detail of the general composition dresses again particular importance to mark a change in its language and in the hierarchy of its universe of symbols: rarely, in fact, in his preceding production, Petrucci has used and, above all exhibited, so the "modern" loom in armed cement, if not in the project "private" of the villa Cernò to Bari and in some details of the work St. Michael of Foggia. Perhaps now, in the case of Segezia, built while everything one world of values and certainties goes to splinters, Petrucci wants to signal the to mature of one critical afterthought of his, using a language anti-rhetorical, in no conventional comparison with the tradition really to give form to the tower, that is to the symbol for excellence of the "new city"; this comes besides fact, you are noticed, for the bell tower of the church, and not in the "littoria" tower that, straight it misses in the general setup. [10]

Compositionally the carrying structure of the bell tower is to square base, every side is quadripartite from openings and repeats him overlapping itself for nine orders; the covering is in stone of Trani seized to the loom with metallic pivots; the structure to loom leans on a solid cubic plinth, from the monolithic aspect, also dressed again it in limestone, from here part the staircase that is screwed inside the tower that is dressed again in facing bricks, with I get off on landings of rest protected by balusters to tubular metallic horizontal, draws stylistic of a modernity rationalist of nautical derivation; the ascension concludes him in the bell cell surmounted by conic steeple, dressed again in green enameled ceramics of Vietri. The bell tower is thought as an autonomous element in comparison to the church, it stretches out ahead him in toward the plaza; . isolated in front of the Church, tall and slender, it dominates the whole urban aggregate, and it is the compositive focus of the Plaza, around which all the other constructions are gathered and tied up according to an unitary urban planning and architectural order. On the backdrop of the street coming from the sour one, visible from very distant, it will serve from call and reference to the farmers of the distant agricultural houses, [11] it is slender and balanced compositionally; it succeeds in conjugating well tradition and innovation so that to observe the Duce's indications.

It is certainly an important element of the project that illuminates of itself the whole urban composition and it gives measure and sense to the buildings; it can be considered, perhaps, excessive for quality, in relationship to the around but, surely it is an anti- rhetorical object, elegant and secular, realized as a small miracle, in the eccentric lowland of the Tavoliere, in dialogue with the endless line of horizon, Maria Luisa Madonna defines it as "a sort of squared tower of Pisa with echoes of the Apulian cathedral " [12], it represents a fundamental point for the project, testified by the weight that it assumes in the numerous sketches that Petrucci makes about Center. The church is evidently thought of continuity with the bell tower, the two buildings certainly represent the most important pieces of the whole composition; they are tied up among them from the before church square the façade of the church. "The church is situated to side of the central plaza of Segezia on an ample church square that stretches him before the façade and to one of the sides that it looks out upon on the plaza. Such location allows the maximum exploitation of the view of the architectural masses of the temple the plaza. Insofar

on the side open three doors that will serve to the ordinary entry in the unique aisle have been, while the principal door will be open only in the great occasions of religious parties. In correspondence of the three side doors, they open on the wall opposite three chapels votive, while in front of the principal entry the presbytery introduces him with the greatest altar, the pulpit and the choir." [13]

The plant is to unique aisle with the three chapels that are extended northwestern, the three accesses on the southeast plaza and the apse rectangular turning to barrel. "Wide it is the presence of interventions taken care of by artists as Amedeo Vecchi for the majolicas of the Crucis Street; Thomas Bertolino for the Baptismal source; Giovanni Cavalieri for the Easter candle; Conrad Corelli for you furnish him sacred; Gisberto Ceracchini, exponent of the "Roman school", for the fresco apsidal that doesn't come, however, performed". [14]
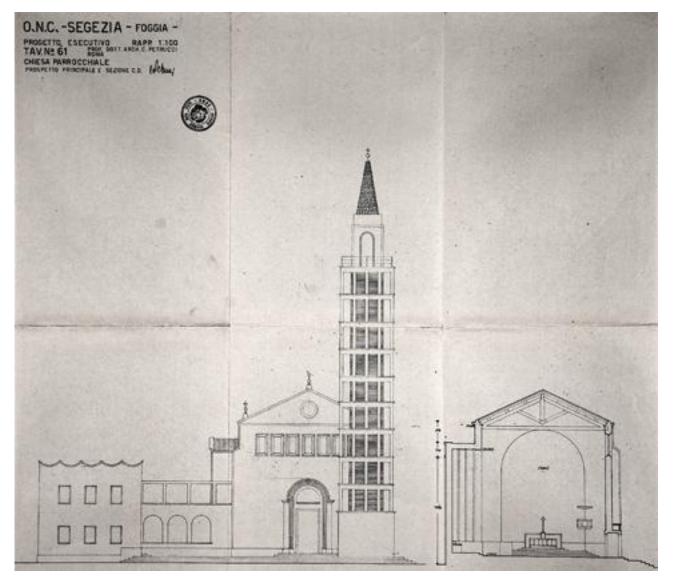
As already happened in other cases, also for Segezia it is visible a release of modernity in the realization of the buildings in comparison to the elaborate ones of project, more traditional, perhaps also to gratify the superior organs of the party, it stays that it is practical enough diffused for many projects compiled in the two decades, you are enough to think about the enormous release modernist of the mails of Vaccaro in comparison to the elaborate ones of project. " Near the pulpit, in the aisle, it is the Easter candle; the baptismal source is to the side of the principal entry. The confessional ones are situated in special places, sideways prepared to the chapels votive, easily visible from the central aisle. In direct communication with the presbytery, it is the sacristy and the parish office, that have access independent from the plaza, through an ample place with side closets, from which it is also accessed the pulpit. The coverage of the aisle of the church is to roof with the nervous systems to sight; the side chapels and the presbytery are covered at times to barrel; all the other environments have attics in armed cement; the sacristy is crowned by a conic little dome of armed cement that it remembers the ancient Apulian "Trullo." [15] The church, therefore, for same admission of the author, it hears again some influence of the local architectural repertoire, but revisited anew and with the graft of some heterodox lines, as for instance the inserts polychrome majolica of Vietri "like a jeweled fabric." [16]

Anthony Pennacchi [17] he/she sees in the continuous centrality of the church with the bell tower, this last underlined to landscape staircase as lighthouse and point of reference for all the farmers on the territory, a clear message of the victory of the faith on the fascist military power; it believes that Segezia, built to the peak of the parable of the two decades, signs the end of that historical period and the beginning of a new aware antifascist conception. The public buildings, that complete the central part of the Center, are prepared as to curtain of defense of the bell tower, almost positioned in barycentric way, and they seem to play a perspective role in the study of the views; in fact, they are prepared in way progressive altimetrically up to the lowest volumes in the houses not realized for always guaranteeing a good view of the bell tower. The precise goal of the architect is the to want to stretch the more possible the volumes on the line of horizon, making then to emerge, with vertical rush, the only bell tower. The road of access to the Center conducts us to the town building, that has of side the buildings of the firm (residences and offices) and the mails. On the west side there are other residences with the cafe-inn and a side of the church, that from which you/they open the doors of access, since the principal entry usually stays closed; in nearness in the church they are situated the scholastic buildings: church and kindergarten, close then the buildings Onc, the policemen's barracks, the clinic and the covered market. The town building is dressed again in facing bricks of Lucera on triplex order porch of seven arcs to all sixth that forms some deep shades in façade that oppose the covering in stone of Trani of the church and the bell tower of the strong banging of shades and light, it effectively detaches him from the whites and calms houses that surround it sensitively accenting its important civic function. [18] Petrucci speaking of the triplex order of overlapped loggias says that they are thought, according to the traditional type of the southern architecture. [19]

The House of the bundle is evidently under tone in comparison to the precedents examples; the "littoria" tower is timidly reported above the atrium, the covering is in mighty ashlar of stone of the near Apricena, the Arengario and richly decorated by sculptures of Francis Magni; it is connected to the municipality through the postal office that is prepared to the plain earth, while to the superior plan there is an apartment from lease. The architect specifies that" [the] anticipated constructive systems for all the above described built they are those Apulian traditional that corresponds to the necessities of the autarchy." [20]
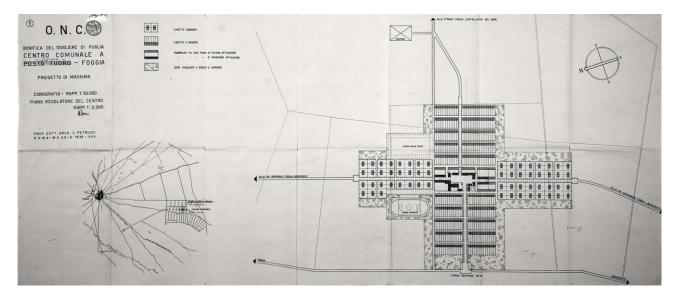
The barracks and the clinic constitute a body to if the opposite side of the building for residences and shops, the barracks on two plain allocate to the plain earth offices, dormitories and kitchens, to the plan superior two lodgings for military. Residences and shops are prepared on buildings to two floors some of which "connected from underpasses they contain the covered market."; IV I lot. This last is formed from a quadrangular porch covered with a light platform in armed cement with the accesses allowed by the above underpasses; making

exclusion for the building destined for the coffee restaurant and inn, it substantially concerns a least aggregate constituted from shop and back office to the plain earth and residence to the superior plan, the sense it is that to recreate an intimate relationship between house and shop as custom in the small suburbs. Segezia as other cities been born in the imminence of the burst of the second world conflict, are alone partly completed and, as already happened in precedence, only in the share of the public buildings, this because they are such buildings to constitute the part most important, the least nucleus of existence, being these cities to service of the population disseminated in the country. From the point of view stylistic reports clearly a planning evolution, the architect's architectural will, (prematurely disappeared), the point of arrival of a search who often engaged him with the theme of the rural city - theme that has been often ignored by the great architects of the time focused more on the architectural object - and that it stays, in every way, his last realized work.
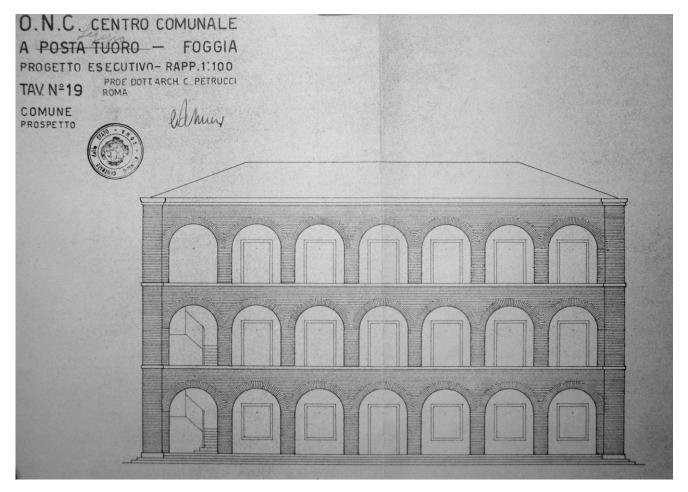
Church _ Elevation and section. Guidelines design for Segezia. Arch. Concezio Petrucci, 1939

Plan _ Guidelines design for Segezia. Arch. Concezio Petrucci, 1939

Town hall _ Elevation. Guidelines design for Segezia. Arch. Concezio Petrucci, 1939

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The church in the theatre: the relation with the old age in the architecture of Benevento in XVIII century.

Patrizia MOSCHESE
Facoltà di Architettura, SUN, Aversa, Italia
E-mail patriziamoschese@yahoo.it

Abstract
The church of Santa Maria della Verità is a really interesting example in the architecture of Benevento in XVIII century. It has been built on the ruins of the roman theatre in Benevento. It is a monument that hasn't been recognized yet as a symbol of the urban decoration.
This work was built at the end of the XVIII century, on Saverio Casselli's project who was an ecclesiastic architect as a professional polyhedron, and who worked in Benevento between the second half of XVIII century and the beginning of the XIX.
The studies of the documentary founds, preserved in the Record Office in Benevento, have given the possibility to establish the steps of the plan, the choices and the reference models used by the architect. Moreover, these studies have marked the relation with the old age in the architectural culture of Benevento in XVIII century.

Parole chiave: Benevento - XVIII century - architecture – old age

A particular interest has been found on the church of Santa Maria della Verità in Benevento, built on the ruins of the roman theatre by the architect Saverio Casselli [1].
Its setting was required after the earthquake in 1702, that destroyed the native church built thanks to Cardinal Orsini in a different place from the current one [2].
The former church with an octagonal plan, dedicated to Santa Maria della Verità, was built by the architect Giacomo Manerba in 1693. Its project has been preserved and attests the planimetric configuration of the building [3].
As the documents preserved in the Record Office of Benevento, the project of the new church of Santa Maria della Verità, wished by the archbishop Banditi, is assigned to Saverio Caselli in 1779, who supervised the works too [4].The architect wanted that the building of the new church would be based on the ruins of the roman theatre in the area called Triggio [5].
The strange position close to a roman structure is advised by technicians who are charged by the bishop Banditi, to find an ideal site for the new foundation. Casselli takes care of these advices after a wise strategic choice which was shared by his main customer coming from the order of Theatines [6].
The choice of the area of Triggio could be linked to the habit of Theatines to create their churches in strategic points of the city, where the presence of people was higher [7]. Moreover, by starting again the settlement of the area of Triggio, begun by Orsini after the earthquake in 1702 with the cleaning of the area, Casselli plans to transform this area in gardens, maybe as hanging ones; this idea is well shown in the detailed project found in his *Topografia della Pontificia Città di Benevento* in 1781 [8].
Many sources between the XVIII and the XIX century, show the condition of the theatre in a urban stratified context, by attesting the presence of little houses got from the ruins of the old structures [9], which will be completely reemerged only in 1985 [10].
The roman theatre, wrongly called amphitheatre, wasn't considered as symbol of the urban ornament in XVIII century because of the presence of houses whose bricks barred to distinguish the ruins of the arcade [11].
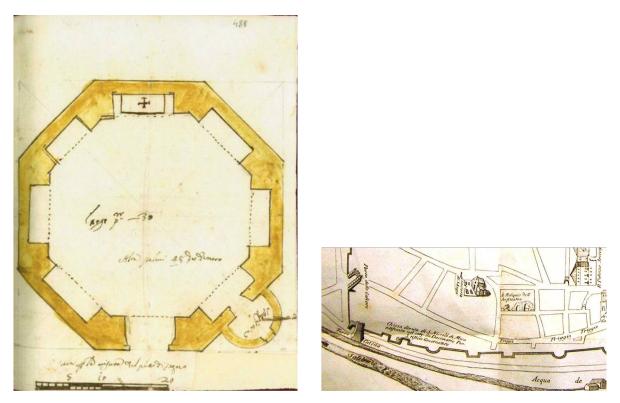
Fig. 1: Giacomo Manerba, plant of the old church S. Maria della Verità, ASBn, Notai, certificates of the notary Giuseppe de Pompeis, b. 2490, f. 488.
Fig. 2: *Pianta della Pontificia Città di Benevento* printed in 1764 - draftsman L. Pizzella, engraver V. Aloja. (in the area of roman theatre in particular).

Casselli is the first architect to recognize the real shape of the old roman area, and to make a survey in 1779 linked to the project of the church of Santa Maria della Verità [12].

The ruins of the theatre hidden by modern buildings, and the Banditi's wish to create, there, a new church, let Casselli not to respect the former structures on which he plans to put the bricks of the new church.

In the second half of the XVIII century, the attitude towards the old cities wasn't established on modern principles of protection for monumental buildings, even if the architectural culture recognizes the value of the classic areas. Susanna Pasquali writes: "If Bernini, in occasion of the Holy Year in 1650, and Carlo Fontana at the end of the XVII century could plan the settlement of a church in the Colosseum, during the jubilee in 1750, such a project that come out again, found the unfavorable opinion of who wrote that a modern building distorts the old open air-theatre" [13]. A similar opinion – Pasquali continues - comes from Paolo Posi about the replacement of the old penthouse in the Pantheon with a new one with modern shapes. Giovanni Gaetano Bottari too, says that the new settlement of Santa Maria degli Angeli with its further transformation of the central hall, made by Luigi Vanvitelli in 1750, takes the areas near the *tepidarium* away from the old thermae [14].

The choice of Casselli – as his drawings attest in the past – to create a new church on the ruins of a roman monument can be justified by the consideration of the old things in the XVIII century. Studying the old era in the XVIII century, represents a good means to become an architect, to enrich his culture and to find ideas to put into his own works.

As educational aims, the survey of old monuments is really useful , made during *Gran Tour* and proposed by the Academy of San Luca either as practice than as topics in academic competition of the third stage [15].

So, the documents about the steps of the settlement of the church are important to explain the cultural opinion about the old age.
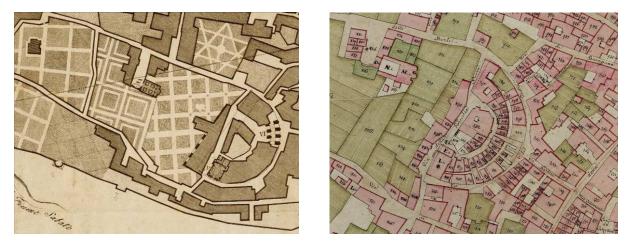
Fig. 3: S. Casselli, *Topografia della Pontificia Città di Benevento*, 1781, (a particolar feature of the area of Triggio).
Fig. 4: Luigi Mazzarini (papal engineer), particolar of the roman theatre in *Mappa originale della Città,* 1823, Archivio di Stato di Roma (ASR), Catasto Gregoriano, inv. 277, n. 1.
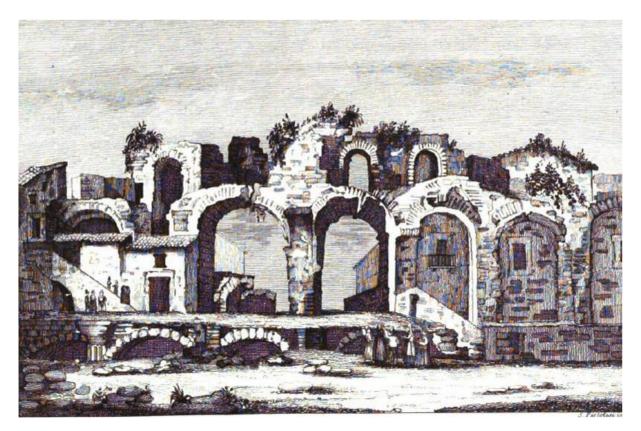
Fig. 5: Saverio Pistolesi, *Avanzi dell'Anfiteatro di Benevento*, (from *Storia dei Monumenti del Reame delle due Sicilie*, Napoli: Stamperie e Cartiere del Fibreno, 1846, tomo I).

Fig. 6: The three-dimensional reconstruction of the roman theatre in Benevento and of the church of Santa Maria della Verità. (Photo taken from the convention *L'Acustica dei teatri antichi*, week of the culture from 18-26 april 2009, edited by the teacher engineer Gino Iannace).

Fig. 7: Facade of the church of Santa Maria della Verità in the roman theatre. (Photo taken from the convention *L'Acustica dei teatri antichi).*

While the currying out of the works – drew up by Giacomo Frarotti who was the representative of the Cardinal archbishop Francesco Maria Banditi, and Ignatio de Juliis who was the master bricklayer, in 1779 – plans to demolish some original structures of the roman theatre together with the demolition of the former buildings, on the other hand in *Piano e Dettaglio* Casselli affirms that all the valuable things found during the excavation as inscriptions, coins, gold, silver had to be considered a property of the cardinal Banditi [17].

So, we can affirm that documents recognized these valuable finds as important, which could enrich the old collecting, but the structural parts of the old architecture weren't appreciated with the same value.

The plans of the church, preserved in the Record Office in Benevento and published in 1976 in *Benevento Sacro* by Gaetana Intorcia, reproduce the plan, the facade and the area of the church and of the parish church [18].

The first table - *Piantato della chiesa Parrocchiale di San Giacomo* e l'*Elevato della Facciata della Parrocchia* - presents the drawings of the plan and of the facade.

The church, with a rectangular plant, has only a nave with two chapels on the side.

It is covered by a big elliptical vault divided at the end by a marble balustrade which defines the presbytery area.

The high altar formed by an elegant decoration with polychromatic intarsia, ends with angels as support corbels, is still today present [19]. Differently, the two side altars had been demolished during the works repair made in the 60th of XX century [20]. Maybe the balustrade that defined the high altar had been demolished too [21].

In the second table, Casselli plans the area of the church, where we can find geometric spans of ionic pilasters, triumphal arches and simple painted cornices which are the only ornamental elements. In the longitudinal area there are ionic pilasters and artificial doors that defined the nave.

Thanks to the three lunette windows and the central big window of the façade, the inside area is lighted. The section shows a strict relation that links together the formal composition of the façade with the inside area. In fact the composition of the spans-reproduces the motif of the pilasters with ionic capitals, lightly over hanged, and with cornice in entablature for the façade.

In the 1933 De Lucia gave to Casselli not only the role of Architect but also that of manager about the painting works of the church, attributed to the scholar in 1786. The new documents can date the wall decorations between 1781 and 1782.

De Lucia attests the bad state of the painting decorations which had been spoilt by the dampness, and covered by the plaster [22].Today what it is left of the pictorial work created by Casselli is only e minimum part on the right side of the apse. Where it makes out the remnant of the original scenery with the shaft of fluted column and the ruins of a feigned marble decorations that frames the door.
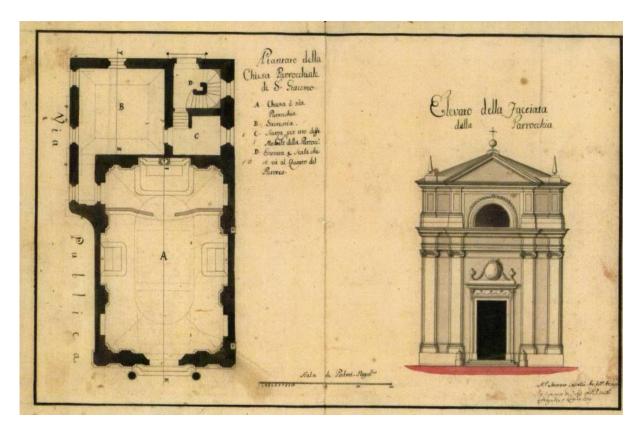
Fig. 8: Saverio Casselli, plan and facade of the church of S. Maria della Verità, ASBn, *Notai,* 8456, f. 137. 1779.

The ornamental intervention envisaged by the architect is in line with a taste for the spectacular widespread in the cultural climate of the XVIII century, both in Papal Rome and Bourbon Naples, the idea of Casselli to interrupt with an optical illusion the space through the architecture as an ornamental decoration comes out in the work of Bramante for Santa Maria near San Satiro in Milan.

The architect to extend the space of the church that is too little uses the drawing of trompe-l'oeil on the outside wall of the high alter Bramante creates in perspective with the effect of *trompe-l'oeil*, a barrel vault and lacunar as an ideal prosecution of the nave.

Casselli too has to intervene in a very little space limited in the plan from the structures of roman theatre where it is joined.The nave takes up the whole planimetric composition of the church sacristy and additional environments are situated, behind, the presbyteral area.The illusory trompe-l'oeil becomes, so, a necessary device to extend the perception of an architectonic space that is too limited. The introduction of artificial doors in the walls of the nave and the spatial expansion made by the use of scenery painted, indicate a particular sensibility of the architect for the pictorial decoration perceived as an instrument of spatial composition.

Casselli considers as models the scenery architectures built on San Feliciano theme of the staving in of the wall and the variety of the visual directions of bibienesca tradition that we can often find them not only in

Fuga, Vanvitelli and Gioffredo, but also in the use of vaults and artificial doors used by painters that work in the vanvitelline equipe such as Gaetano Magri and Giacinto Diano [23].

The church of Santa Maria della Verità was realized during the initial stage activity of the architect, that even if he was only 30 years old, he was able to express his simple and elegant style, however he was influenced too by the neoclassical culture.

His first ten years of activity represent for Casselli a period of an hard professional engagement during which the architect uses a simple style and at the same time perfectly harmonious following the formal and proportional system inherited by the sixteenth century. Casselli suggests, indeed, for the composition of the façade a component solution very used in Rome academic environment where his formation may be done.
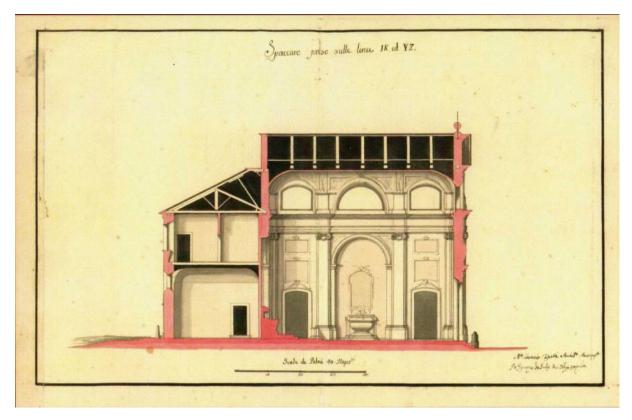
Fig. 9: Saverio Casselli, section of the church of S. Maria della Verità, ASBn, *Notai,* 8456, f. 138. 1779.

It is interesting to notice the presence of the thermal big window that was used by Palladio and Vignola and of the tympan placed on the top that were morphological solutions visible in different examples of the second eighteenth century; as in the plan for the church of Sant'Aniello in Piano di Sorrento, work of the architect Gaetano Barba, elaborate around 1787 [24]. The project is compared with the solutions proposed by Valadier in Santa Maria del Popolo and in San Pantaleo in Rome; the reason is the presence of the thermal big window and of the tympan [25].

But we can find relevant similarities of formal dictionary link together to the church of Casselli also the solution suggested at the beginning of XVIII century by Valadier for the façade of the church of Scolopi in Frascati.

From the study of the drawings, it is clear that for the architect of Benevento the plant is the main element that creates the architectonical space. The ornaments are avoided according to a refined geometric definition and a simple composition expressed both on plant and on the structure.

The decoration of the principle façade constituted by pilasters, the only formal elements, results simple and essential. The façade of the church of Santa Maria della Verità presents indeed a podium on which is based on four pilasters with ionic capitals that flank and frame together to the trabeation, the portal of entrance with the marble armorial theatins, the group one belongs to the customer.

The final stage of the façade is made by a crowing dominated by a semicircular central big window and by a double triangular tympan where a cross in the middle and two pinnacles on its sides are placed. The present configuration shows, instead, a circular opening in the double tympan that is not present in the plan of Casselli. Even in the composition of the prospect, the ornamental structure is reduced to few elements extremely efficient, such as a huge order of pilasters, the final window and the double tympan. The formal solution realized for the façade could be linked to the theatin customer Francesco Banditi, as similar to typologies used in the second half of XVIII century from theatin order that relates to the armorial bearings [26].

The church of Benevento presents, indeed, a similar layout to many churches dedicated to San Gaetano, the founder of Theatin order in particular with the oratory of San Gaetano in Vicenza, realized for the theatins between the 1708 and 1709 that presents a different window up to the portal. It is also similar to the church of San Gaetano di Thiene in Siena, built between 1683 and 1700 at the end enriched on the portal by a big niche with filler with the *Madonna con il Bambino e Santi* at the centre.

The plan for Santa Maria della Verità represents so, the practical realization of a precise dictionary based on geometry, proportion and on harmony defined since the beginning of the architect, the themes that marked his professional activity: the relation with the old things, the geometric definition of spaces and the integration between the arts.

Fig. 10: Benevento, the church of Santa Maria della Verità.
Fig. 11: Benevento, interior of the church of Santa Maria della Verità.
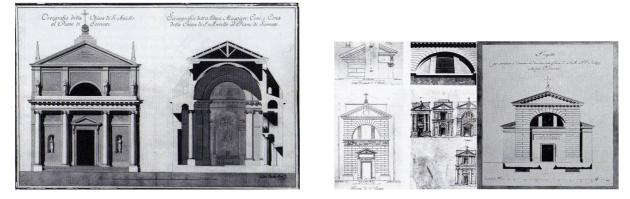
Fig. 12: Gaetano Barba, the church of S. Aniello al Piano di Sorrento. Facade and section of the high altar. Roma, Accademy of San Luca, n. inv. 2110. (from JACAZZI, Danila. *Gaetano Barba: architetto neapolitano (1730-1806).* Napoli: ESI, 1995). Fig. 13: Valadier, church of San Pantaleo a Rome, 1806. Fig. 14: Valadier, plan for the facade of the church of Scolopi a Frascati.

Fig. 15: Vicenza, oratory of San Gaetano, 1708-1709.
Fig. 16: Siena, church of San Gaetano di Thiene, 1683-1700.

Riferimenti

[1] The contribution comes from the researches made by the author during her Doctorate in *Storia e Critica dell'Architettura*, XXII ciclo, SUN, Faculty of Architecture, titled *Saverio Casselli e la cultura architettonica del Settecento a Benevento*, coordinatore prof.ssa Giuseppina Amirante, tutor prof.ssa Danila Jacazzi. Concerning the architect Saverio Casselli (1750-1830) we refeared to GIORDANO, Giovanni. Mons. Saverio Casselli architetto beneventano. *Studi Beneventani,* 6, 1995, pp. 211- 222, to the doctorate of the author and to recent contribution MOSCHESE, Patrizia. *Saverio Casselli ingegnere nella Pontificia città di Benevento*. In D'AGOSTINO, Salvatore (a cura di). *Storia dell'ingegneria.* (Atti del IV Convegno Nazionale, Napoli 16-17-18 aprile 2012). Napoli: Cuzzolin, 2012, pp. 415-428.

[2] DE NICASTRO, Giovanni. *Benevento Sacro*, (edizione a cura di Gaetana Intorcia). Benevento: De Martino Editore, 1976, pp. 316-317. The church situated in the West area of the city, bordered with the palace of Archibishop and with the church of San Giacomo dei Muratori.

[3] DE NICASTRO, Giovanni. *Op. cit.,* p. 316. Il The drawing of the plant is preserved in the report office of Benevento, in the bottom Notaries, certificates of the Notary Giuseppe De Pompeis, n. 2490, a. 1692, as found in DE NICASTRO, Giovanni. *Op. cit., and recently published on the catalogue*: *Il Futuro della Memoria - Storia segni e disegni della città di Benevento tra XVII e XIX secolo – Il centro urbano,* a cura dell'Archivio di Stato di Benevento, Ministero per i Beni e le Attività Culturali, Benevento, 2006.

[4] ASBn (Archivio di Stato di Benevento), Notai, Atti del Notaio Ignazio de Rosa, b. 8456, ff. 137-143; cfr. DE NICASTRO, Giovanni. *Op. cit.*, p. 317. The notary source is indicated in *Benevento Sacro*, edited by Intorcia. The author puts for the construction of the church, probably for a mistake of transcription, the date in 1799, instead in 1779.

[5] ASBn, Notai, Atti del Notaio Ignazio de Rosa, b. 8456, f. 137, f. 139. In *Piano* Casselli writes: «Distribuita tutta la lunghezza e larghezza suddette sia obligato l'Appaltatore formare quattro scavi della lunghezza e larghezza di palmi cinque quatrati prossimi ed a piombo alli esistenti antichi fondamenti di detto anfiteatro sulla parte di Mezzogiorno e Ponente e proprio su' gli viene elevata la Chiesa a fine di esaminarli e riconoscerli e questi ritrovati manchi o corrosi sia obligato l'Appaltatore risarcirli e rinforzarli».

[6] ASBn, Notai, Atti del Notaio Ignazio de Rosa, b. 8456, ff. 126-136. A deed drawn up by the notary Ignazio de Rosa in 1779. Ivi, ff. 129-130: *Banditi* «*ha deputato persone ad esaminare il ristretto della detta Parrocchia di Santa Maria della Verità, affin di rinvenire un sito proprio, e sufficiente per l'edificio non meno della Chiesa, che della Casa Parrocchiale, le quali dopo aver giurato con posata riflessione l'intiera Parrocchia hanno* riferito, non essere in quella altro luogo proporzionato per amendue detti edifizi, se non il sito posto nel luogo detto il Triggio, seu San Bartolomeo, e proprio parte dell'antico, e famoso Anfiteatro, coll'infradicende picciole adjacenti Due Casette (…)»; Ivi, f. 131, in the document we can also read: «(…) quale Signor Casselli avendo ritrovato il luogo più che sufficiente per l'opere suddette e perchè di amendue ne ha formato disegno, e Pianta, ed anche il Piano, ed avendoli umiliati al Signore Cardinale, l'Eminenza Vostra l'ha in tutto approvati, e secondo questi vuole siano edificate la Chiesa, e Casa suddette; (…)».

[7] In the bibliography on the subject we can indicate FRASCARELLI, Dalma. Insediamenti teatini nelle strategie urbanistiche di primo Seicento: Roma, Napoli, Palermo. *Regnum Dei*, n. 127, Roma: 2001, pp. 3-16; BOSEL, Richard. *L'Architettura dei nuovi ordini religiosi*. In SCOTTI TOSINI, Aurora (a cura di). *Storia dell'Architettura italiana. Il Seicento*. Milano: Electa, 2003, tomo I, pp. 48-69.

[8 The huge bibliography on *Topografia della Pontificia città di Benevento* dedicated to the pope Pio VI we can report the recent contributions: STROFFOLINO, Daniela. *Benevento nella pianta di Saverio Casselli del 1781*. In DE SETA, Cesare e BUCCARO, Alfredo (a cura di). *Iconografia delle città in Campania. Le province di Avellino, Benevento, Caserta, Salerno.* Napoli: Electa, 2007, pp. 139-142; PARISI, Roberto. *Iconografia di una città Pontificia: Benevento in età moderna e contemporanea*, in DE SETA, Cesare. e BUCCARO, Alfredo. (a cura di). *Op. cit.*, p. 183.

[9] Among the artists that have made interesting projects on roman theatre, we can report Giovanni Paolo Panini, Pierre Gabriel Bertheauld e Carlo Labruzzi. Cfr. PARISI, Roberto. *Op. cit.,* p.183.

[10] Cfr. PARISI, Roberto. *Op. cit.,* p. 181. The first excavation begun in 1889 with Almerico Meomartini, who drew a perfect plant of the ruins. About the excavation cfr. DE LUCIA, Salvatore. *Passeggiate beneventane*. Benevento: Tipografia D'Alessandro, 1925, pp. 262-266.

[11] DE LUCIA, Salvatore. *Passeggiate …*, cit., p. 257; BOVE, Franco. Mutamenti della struttura urbana nel XVIII secolo, Benevento ed il Sannio nel Settecento. *Rivista Storica del Sannio*, 26, 2, 2006, p. 225.

[12] GIORDANO, Giovanni. Il primo rilievo del Teatro Romano. *Realtà Sannita,* n. 5, 15 Marzo, 1986, p. 3. Casselli made in 1779 the *Pianta dell'Antico Teatro detto Grottoni di mappa, foglio II* and a drawing of the reconstruction indicated with *foglio III, present in the album made by* Casselli, *Raccolta de disegni de prospetti dell'Arco Traiano e (…) Diversi altri ruderi, Diocesian Historic Archive of Benevento*, Patrimonio Casselli; Cfr. even GIORDANO, Giovanni (a cura di). *L'Arco Traiano a Benevento nei disegni di mons. S. Casselli*. Benevento: Commissione Diocesana di Benevento per i Beni Culturali, 1985.
Concernig the roman theatre see the recent contribution IANNACE, Gino. La riscoperta del teatro antico: il teatro romano di Benevento. *Rivista Italiana di Acustica*. anno 2011, vol. 3(4), pp. 10-15.

[13] Cfr. PASQUALI, Susanna. *L'Antico.* In CURCIO, Giovanna. e KIEVEN, Elisabeth (a cura di). *Storia dell'Architettura italiana. Il Settecento*. Collana diretta da F. Dal Co. Milano: Electa, 2000, tomo I, pp. 98-99. The author indicates through the notes the references: Di Macco 1971, p. 83, according to Bernini; Hager 1973, for Carlo Fontana; Pasquali 1998, for the 1750; concerning the work of Fontana cfr. FAGIOLO, Marcello. *Da Domenico a Carlo Fontana: i progetti per le Colonne coclidi, le Mete e il Colosseo.* In FAGIOLO, Marcello. e BONACCORSO, Giuseppe. (a cura di). *Studi sui Fontana una dinastia di architetti ticinesi a Roma tra Manierismo e Barocco*. Roma: Gangemi Editore, 2008, pp. 23-37.

[14] PASQUALI, Susanna. *Op. cit.,* pp. 98-99.

[15] Concerning the metrical surveys of the classic monuments proposed by the Academy of San Luca cfr. MARCONI, Paolo. – CIPRIANI, Angela. – VALERIANI, Enrico. *I disegni di Architettura dell'Archivio Storico dell'Accademia di San Luca.* Roma: De Luca, 1974, volume I; GIUSTO, Rosa Maria. *Architettura tra Tardobarocco e Neoclassicismo. Il ruolo dell'Accademia di San Luca nel Settecento.* Napoli: ESI, 2003; PASQUALI, Susanna. *Il rilievo dell'antico nei programmi dell'Accademia di San Luca.* In CIPRIANI, Angela, CONSOLI, Gian Paolo, PASQUALI, Susanna. (a cura di). *Contro il Barocco. Apprendistato a Roma e pratica dell'architettura civile in Italia 1780-1820.* Roma: Campisano Editore, 2007, pp. 485-489.

[16] ASBn, Notai, Atti del Notaio Ignazio de Rosa, b. 8456, ff. 126-136. On the purchasing and following demolition of some houses made for the construction of the work, cfr. ASBn, Notai, Atti del Notaio Ignazio de Rosa, b. 8460, ff. 91-96.

[17] ASBn, Notai, Atti del Notaio Ignazio de Rosa, b. 8456, ff. 137-138. The works are paid one thousand nine hundred .

[18] DE NICASTRO, Giovanni. *Op. cit.,* tav. XIII e XIV.

[19] Cfr. ASBn, Notai, Atti del Notaio Ignazio de Rosa, b. 8456, ff. 74-82. Up to the altar, a painting that represents Sant'Andrea e San Gaetano, enriches the little church. San Gaetano Thiene is the founder of the congregation of R.R. the Fathers of Teatini, the order one belongs to Banditi, while Sant'Andrea is the protector. On the order of theatins cfr. DEL TUFO, Giovan Battista. *Historia della Religione de' padri Chierici Regolari.* Roma: Guglielmo Facciotto e Stefano Paolini, 1609; CIBRARIO, Luigi. *Descrizione storica degli ordini religiosi compilata sulle opere di Bonanni.* Torino: Stabilimento Tipografico Fontana, 1845, vol. I, pp. 521-525.

[20] DE NICASTRO, Giovanni. *Op. cit.*, p. 317.

[21] ASBn, Notai, Atti del Notaio Ignazio de Rosa, b. 8460, ff. 50 e 57.

[22] DE LUCIA, Salvatore. *Arti belle e artisti in Benevento dal secolo XV ai nostri giorni.* Benevento: Le Forche Caudine, 1933, pp. 10-11.

[23] GARZYA, Chiara. *Interni Neoclassici a Napoli.* Napoli: Società editrice napoletana, 1978, p. 36.

[24] Cfr. JACAZZI, Danila. *Gaetano Barba: architetto neapolitano (1730-1806).* Napoli: ESI, 1995.

[25] JACAZZI, Danila. *Op. cit.,* pp. 84-85.

[26] For the armorial bearings cfr. ANDREU, Francesco. Voice *Chierici Regolari Teatini.* In *Dizionario degli Istituti di Perfezione.* Roma: Edizioni Paoline, 1975, vol. II, p. 998.

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Internationalization strategies followed by three mexican pioneer companies
Grupo modelo, Grupo bimbo and Cemex

José G. VARGAS-HERNÁNDEZ [1] , Mohammad REZA NORUZI [2]
[1] Profesor Investigador miembro del Sistema Nacional de Investigadores
Departamento de Mercadotecnia y Negocios Internacionales
Centro Universitario de Ciencias Económico Administrativas Universidad de Guadalajara
josevargas@cucea.udg.mx,jgvh0811@yahoo.com,jvargas2006@gmail.com
[2] Policy Making in Public Sector; Islamic Azad University, Bonab Branch, Iran
mr.noruzi@modares.ac.ir   mr_norouzi@pnu.ac.ir   mr.noruzi.pnu@gmail.com

Abstract
The opening of the Mexican economy and globalization bring new opportunities for Mexican companies to expand their markets and get their products around the world. The internationalization process requires a sound strategy for the consolidation in foreign markets. The aim of this study is to analyze the different internationalization strategies followed by three Mexican companies with a global presence: Grupo Modelo, Grupo Bimbo and Cemex. We conclude that the differences in their strategies arise from the characteristics of each of these companies.
Keywords: Mexican companies, strategy, expansion, internationalization.

INTRODUCTION

The landscape of this century requires companies to be increasingly competitive, and that not only have to compete with domestic rivals but new players come in search of a single market. Today's competitive advantages and are no guarantee of success without a solid strategy that will ward.
 The decision made at the time a local company to expand its market to new countries, must be supported by an internationalization strategy appropriate to the characteristics of the company. It also has a wide range of options for entering new markets, exports, licensing, and joint ventures with foreign partners, strategic alliances, acquisitions, establish subsidiaries, among others. However the best choice will be consistent with its objectives and characteristics.

BACKGROUND

Globalization is a phenomenon that accelerated in the late twentieth century, in the last three decades, increased international economic transactions, thus expanding economic relations between countries.
The world economy entered a process of numerous scientific and technological advances that changed production patterns worldwide. The deregulation aimed at removing trade barriers between countries was a consequence of globalization, which for some companies has been a growth opportunity, whiles for others a latent threat to the entry of new competitors.
In the mid-eighties with the entrance to the General Agreement on Tariffs and Trade (GATT), the Mexican economy began a process of trade liberalization which is consolidated with the entry into force of The Free North American Free Trade Agreement (NAFTA). Thus our country adapts a new economic model: the neoliberal model, which encouraged external competitiveness from trade liberalization (Branches, 2005).

The new economic policies of this new model involve change and restructuring of Mexican companies. The Mexican economy opened to international trade and financial markets, gave a strong boost to exports and foreign investment was allowed in more sectors of the economy. All these actions benefited large Mexican companies in their growth and expansion, while allowed to integrate into international production and exports through acquisition of companies abroad (De Gortari, 2005).

Grupo Modelo, Bimbo and Cemex were three large Mexican companies that were consolidated in the country and sought to internationalize through different positioning strategies in international markets. A common denominator among these companies was the use of acquisitions and alliances with foreign partners, but the strategies followed by each were different.

DEFINITION OF THE PROBLEM

According to De los Rios (2005) among Mexican multinational companies successfully in the internationalization process are: America Movil, Bimbo, Gruma and Cemex. Clarifying the process of internationalization beyond imports and exports, i.e. involves the establishment of subsidiaries or the acquisition of companies is elsewhere.

This research focuses on the analysis of internationalization strategies followed by three of Mexico's most important companies of our country with a presence in international markets: Bimbo, Cemex and Grupo Modelo were chosen because these three companies have been recognized by national and international magazines as successful businesses in foreign markets. According to the ranking made by the group and published on its website CNN Expansion, these companies are among the 500 most important companies in Mexico. Cemex is in the number 6 in the place Grupo Bimbo and Grupo Modelo 11 at number 22 (see Attachment A).

Moreover these companies to analyze different strategies to position it clearly in foreign markets.

Hypothesis:

The characteristics of each of these three Mexican companies are a major determinant of the choice of different strategies and ways of entering foreign markets.

OBJECTIVE

To analyze the internationalization strategies and positioning in international markets of three Mexican companies with a worldwide presence: Grupo Bimbo, Cemex and Model and demonstrate that these three companies have expanded their market by using mergers and acquisitions as growth strategy.

 • Analyze the trajectory of each of the three companies in the global context.
 • Establish the most important factors influencing the success of each of the companies chosen.

FRAMEWORK

Cortes de los Rios (2005) says that many of Mexico's most important economic groups were created and managed its expansion, consolidation and development thanks to the acquirers and mergers took place. It analyzes the behavior of the acquisitions in Mexico in the period 1986-2005, concluding that this type of operation shows a cyclical and economic fluctuation coincide with the country, increasing in the late eighties and early nineties.

 On the other hand shows that mergers and acquisitions for our country are concentrated in banking, finance and telecommunications. In the study period prevailed horizontal acquisitions, followed by vertical and finally concludes that the process of mergers and acquisitions is indeed, as she defines a "vehicle" for the internationalization of Mexican companies.

 Moreover, Celso Garrido (2001) a study on cross-border operations during the nineties in Mexico, distinguishing foreign acquisitions made by companies established in Mexico, Mexican takeovers by foreign companies. This study shows results that say the process undertaken grades Mexican companies and groups to internationalize their production activity. Garrido ranks results of acquisitions fleshed out by Mexican companies at three levels: macro, meso and micro.

  This work is a case study of the different strategies for entering international markets and show that despite the existence of a common denominator among these strategies, as is the case of acquisitions, the company's own resources play a key role to allow them to take different paths to achieve their goal.

CONCEPTUAL-THEORETICAL

When a company decides to expand into new markets is essential to plan a strategy to reduce the risk of failure, for this is to consider the advantages and disadvantages of different forms that have to enter these

markets and also to consider its position market and the characteristics of your company. In this context we say that an international strategy is one used by a company to sell its products outside its national territory.

Internationalization is a process by which a domestic company can extend their productive activities to other countries, according to Peng (2006), is a process where a multinational organization is responsible for any commercial or production of an enterprise located in different parts the world.

The reasons that lead companies to make the decision to internationalize your business are the benefits they can acquire if they implement the strategy succeed. These expected benefits are:

1. Increased market size. Expand their productive activities to another country gives them the opportunity to captivate new customers, new markets to sell their products.

2. Better returns on their investments. It is expected that investments in other countries generate above average returns.

3. Better economies of scale, scope or learning. Producing under economies of scale production reduces costs and produces the same internationalization synergies, which shares knowledge and learning.

4. A competitive advantage of location. When a company decides to settle in another country with the intention of reducing costs many times companies are looking for markets where they can get cheap labor, natural resources or cheaper energy or potential new customers in that country (Hitt, Ireland & Hoskisson, 2008).

There are two ways of entering foreign markets, on one hand the non-property, as its name suggests involve entering new markets without the need to use part of its assets or capital. Examples of these: Exports and contractual agreements.

Moreover there are still properties, which involve the establishment of subsidiaries in new markets; investment is needed to begin operations. Some examples of these: Joint ventures (joint adventure) and partially owned subsidiaries. This approach gives rise to multinational corporations (MNCs) which are companies that operate with foreign direct investment, its function is the control and management of value-generating activities in foreign countries (Peng, 2006).

If a company decides to export has two possibilities: Direct export is the direct sale of goods to foreign customers or where the indirect export sales to foreign markets is through intermediaries.

Contractual agreements are classified as:

A. Licenses / franchises. When a foreign company buys the rights to manufacture and / or sell products in the domestic business. This in exchange for a royalty per unit produced or sold (Hitt, et al., 2008).

B. Projects ready to operate. Projects are paid for certain activities for a business (construction of facilities or personnel training, etc.)..

C. Research and development contracts. Agreements between companies to assist in research and development one can work for another.

D. Joint marketing. A set of companies agree to jointly market their products.

Property forms Returning to internationalize. a company defines what is a joint venture (EC) which is understood as a company originated and owned by two or more companies This new company can be a minority (when one of the generating company has less than 50% ownership), 50/50 (partners have the same percentage of ownership) or majority (a company has more than 50% of CD) .

For their part, wholly owned subsidiaries (SPT) are subsidiaries of the multinational company, located in different countries. In turn, these can be of two types: operations on a blank field, when companies begin operations from the construction of these. Moreover mergers or acquisitions are the most popular form of entering foreign markets. Involve the transfer of assets, knowledge, and control operations between companies.

Because the latter is the most sought after by companies wishing to establish themselves in other markets then we pause this for a better understanding.

A merger is defined as the combination of assets, operations and management of two companies to establish a new legal entity (Peng, 2006). Meanwhile an acquisition is the transfer of control of the assets, operations and management of a company (object) to another (purchaser), making the object in a unit of the purchaser (Wright, 2002). In reality the acquisitions are more common than mergers. These operations can be carried out in three directions:

A. Horizontal. Are acquisitions between competitors within the same industry? This is the most common type, as it increases the market power of the synergies obtained by exploiting the costs and revenues.

B. Vertical. This type involves the relationships between companies which makes them focus their suppliers (up) or its buyers (up). With this acquisition the company is vertically integrated, controlling additional parts of the value chain

C. Conglomerate. These are transactions where companies interact unrelated products.

Hitt et al. (2008) adds the related acquisitions occur within an industry closely related and transborder acquisitions are those which as its name says, transcend territorial boundaries.

Moreover, this type of transaction may be hostile or friendly, the first concern when management of a target company is against the acquisition, this company is not seeking a takeover bid. Such events increases during downturns in the economies, as it is easier to detect companies that are undervalued mismanaged in relation to its assets (Thornton, Keesnan, Palmeri & Himelsten, 2002). The acquisitions are friendly when both companies are in agreement to carry out the transaction.

The table in Annex A summarizes the advantages and disadvantages of each of the modes of entry to foreign markets.

A complete model of foreign market entry described in Peng (2006), which considers the tripod base of the strategy as a sound strategy. Considerations based on the industry through the diamond of Porter's five forces suggests a review of the industry environment it belongs to the company, this analysis can uncover opportunities to open new markets.

For their part, resource-based considerations, led by the model VRIO (value, rareness, imitation and organization) are a factor to be taken into consideration the managers of a company when deciding to enter international markets. Many times the value of the assets of a company are key factor to compete abroad, likewise if a company with resources much rare and difficult to imitate, has assets that can exploit an opportunity in other markets.

Finally considerations institutions are perhaps one of the key firms in search of new markets should consider when embarking on new markets. Knowledge of the rules are vital for easier entry to markets unknown. Although globalization seeks the integration of countries, institutions and culture rules are factors that have not yet unified.

After the theoretical review that supports the internationalization of companies in the next section proceeds with the individual analysis of each selected Mexican firms to conclude this section with a comparison of the various factors that influenced the success of internationalization of each company.

METHODOLOGY

The methodology for the preparation of this work was the revision of the paths that have these three companies since its inception to the present, past and putting special emphasis on internationalization. It also is evident through its success through the search and tracking of recognition has been given to these companies. The information collected for this analysis comes from the official website of each company, as well as annual reports and additional sources such as empirical studies for these companies.

The next section will be the case study of each selected Mexican firms: Grupo Bimbo, Cemex and Grupo Modelo.

ANALYSIS OF MEXICAN COMPANIES
GRUPO BIMBO

Founded in 1945, today this company is one of the largest bakery companies in the world and a leader in the Americas has earned recognition for their production and sales volumes. According to its annual report 2010 (Grupo Bimbo, 2010) has 103 plants and over 1000 strategically located distribution centers in 17 countries in America and Asia. One of its most valuable assets is the possession of one of the most extensive distribution networks in the world with over 41,000 routes.

Starting operations on December 2, 1945 the first production plant in Mexico, under the direction of Jaime Sendra and Lorenzo Servitje, Bimbo is placed on consumer preferences through the presentation and quality of their products. In 1946 this plant is expanded and begins structuring the area of vehicles, which later became his strategic asset for the growth of the company. The Bimbo distribution network began with an agreement to distribute its products with carriers who distributed newspapers in the province. However this was not enough and had to open routes and outside agencies, the first in Puebla in 1949.

The distribution of products of this company took from town to town, following the paths, roads and railways, so vendors were opening up the market.

The growth of this company in our country was the result of knowledge of the needs of its consumers (building products) and vision of its managers to take advantage of opportunities offered by the market, spread around the country through establishment of new silver and the acquisition of some of its competitors.

In search of closer integration in 1973, Bimbo began making jam in order to supply one of its lines (Marineo dedicated to making cakes and cookies) of raw material. Also in the late seventies Bimbo executives found themselves in the market for sweets and chocolates retailer an opportunity, as this was poorly attended, and decided to put a small candy manufacturing plant (Ricolino). Thus began a diversification outside the bakery and confectionery.

After consolidating the domestic market, leaving Mexico in 1984 the first trailer with Marinela products, bound for Houston, Texas. And in 1989 began international expansion with the creation of Bimbo Bimbo Central America and Guatemala with the construction of the first plant outside the country.

In 1991 created the Latin America Division (OLA) to operate the expansion south of the country. In this decade the company acquired Alesa (Chile) and Holsum, bakery leader in Venezuela. Bimbo is created El Salvador, Costa Rica, Argentina and Peru in Colombia, established a partnership with Noel, the largest biscuit company in the country In 1998, the purchase of American bakery Mrs. Baird's, a leader in Texas that had 11 floors.

In 2001 he made the purchase of Plus Vita from Brazil, which confirmed its leadership Bimbo Latin America and in 2002 acquired the Canadian company George Weston Ltd. Bimbo In this decade, began its presence in Europe with the purchase of the company confectionery Park Lane, located in the Czech Republic.

This decade also acquired in Mexico: Bakeries El Globo, La Corona, Gabi Cookies and Joyce. Bought outside the country: Pan Europe (Guatemala), Los Sorchantes (Uruguay), South Lakes (Chile), Lalo's Bakery (Colombia), and finally Laura, and Plus Vita Nutrella LTDA, the latter one of the bakery companies more large and important in Brazil.

In 2010, specifically three strategic acquisitions: Dulces Vero in Jalisco, Mexico, Hong Jin Wei in China and the U.S. Foods Bimar Finally in November of that year announced the purchase of the bakery division of Sara Lee bakery largest U.S., which as a group Grupo Bimbo Baker worldwide.

In short today Grupo Bimbo has 103 plants worldwide, 42 plants in Mexico, 34 in the United States, 25 in Central and South America and 2 in China. The first quarter reported sales of $ 29.312 million pesos, an increase of 3.5% over the previous year.

Currently this group has more than 150 brands, the best known are: Bimbo, Marinela, Milpa Real, Aunt Rosa, Oroweat, Entenmann's, Thomas', Boboli, Mrs. Baird's, Barcel, Ricolino, Coronado, La Corona, El Globo bakeries, Suandy, among many others.

All group companies are located in four divisions: Bimbo SA, brings together companies bakers and confectioners in Mexico and Central America, Barcel SA, which integrates the business of snacks and Ricolino, Bimbo Bakeries USA (BBU), serving the U.S. market and Organization finally Latin America (OLA), responsible for operations in Latin America.

ANALYSIS: GRUPO BIMBO

As we can see, the expansion of Grupo Bimbo is the result of significant investments it has made to establish new production plants, strategic alliances and acquisition of companies. His strategy was to acquire or ally with local companies that will offer something in terms of technology or distribution capacity, choosing only those companies that share their values; if the companies did not meet the latter requirement would enter the market from scratch.

One of the key factors that have influenced the success of Grupo Bimbo in the national and international market, innovation is not only their products but to organize the company as the coordination of their plants requires the use computing platforms that support business processes. On the other hand is a company that knows its customers, the distribution network has created allows a more direct and frequent contact with customers, allowing you to identify new growth opportunities and product innovation based on consumer preferences.

In this sense Bimbo has a very important competitive advantage: its ability to reach more distant outlets. Bimbo in our country has to sell their products to an average of less than a mile from each consumer (Grupo Bimbo, 2011). This distribution network is one of the intangibles of the company, which tried to establish the same way in other countries, without a clutch that has found cultural differences that have led to the need to adapt to each country based on their conditions individuals. Finally Grupo Bimbo is a company that just look to expand geographically, also seeks to be a profitable company, which has managed to increase the efficiency of each of its processes. For that seeks to optimize its resources by using technology.

CEMEX

It is a Mexican company initially dedicated to the production and distribution of cement and concrete, but is now a global company that offers products for the construction industry. It began operations in 1906 with Cementos Hidalgo plant in the north. After significant growth for six years, the operation of this company is affected by the Mexican Revolution forced to suspend operations. In 1919, partially resume their operations and not until two years later when the market comes back completely.

Cementos Hidalgo in 1931 merged with its competitor Cementos Portland Monterrey, giving rise to what is now known as Cementos Mexicanos SA (CEMEX). For about thirty-five years, this company has a steady growth backed by the expansion of its plants in the northern region.

Until 1966, decided to venture into the southern part of the Mexican Republic, acquiring in that year the plant Cementos Maya, Mérida. With this acquisition continues to meet demand in this part dl country through Portland Cement brand Maya. That same year the new plant starts operation Valles, in order to meet the Huasteca region in Mexico.

In order to expand across the country in 1967 opened a plant in Torreon through brands pozzolanic Portland cement Portland Cement Monterrey and Monterrey; the plant is responsible for meeting growing demand in the Northeast. Plants installed in all regions continue to grow by increasing its production capacity.

In 1973 Cemex acquired Portland cement plant in the Bajio region of central Mexico. 1976 was a watershed for the company as a part begins trading on the Mexican Stock Exchange and on the other side becomes the leading Mexican producer of cement to its acquisition of Cementos Guadalajara.

In 1986 starts joint venture with U.S. cement companies, in order to enter that market. In 1987 acquires Cementos Anahuac. And this year it created a solid team of professionals who are in charge of the integration of acquired companies. It also implements a satellite system that allows you to connect all the facilities of the company (CEMEXNET).

When purchasing your competition, Cementos Tolteca Cement Company in Mexico second in 1989, Cemex became even without significant presence in other countries, one of the ten largest cement companies worldwide.

It was not until 1992, when he decides to start its internationalization process, which starts on the European market by acquiring the two largest cements in Spain: Valenciana and Sanson. Two years later ventures into Central and South America, buying Cemento Bayano in Panama and the company expires, Venezuela's largest cement. Also, the purchase of Balcones cements plant in the United States.

In 1995 Cemex continues its international expansion this time to acquire Cementos Nacionales, the leading company in the Dominican Republic. A year later became the third largest cement company in the world to be part of your company Cementos Diamante and Samper in Colombia.

Not content with its spectacular growth in such a short time in 1997 the largest cement company in Mexico comes to Asia with the purchase of Rizal Cement and APO Cement in the Philippines two years later. That same year, Cemex ventures into Africa by acquiring Assiut Cement Company, one of the leading cement producers in Egypt also buying Cementos del Pacifico, Costa Rica.

 Mexican Cement century starts with the determination to consolidate the already developed markets in 2000 purchase Southdown, Inc. in the United States in 2001 and acquired Nicaragua enters Saraburi Cement Company in Thailand. The operation performed in 2005, doubling its size and expanding its market to more than twenty countries, mainly in Europe. This transaction is the acquisition of the British building materials RMC, which according to a press release on September 27, 2004 posted on the website of the Mexican company and meant a great synergy that will allow the centralization administrative functions, optimization of network marketing, logistics and process standardization.

 Far from purchases made by the Mexican company in 2000, implemented an initiative to identify, incorporate and implement standardized best practices within the entire organization (CEMEXway). This initiative consolidates the group that was responsible for the integration of acquired companies.

 Finally the integration of the Australian company Rinker Group Limited, the Mexican company consolidates its position as a leader in the cement industry.

ANALYSIS: CEMEX

As we see in the above description Cemex in less than twenty years the company extended global territory through the use of acquisitions, it is surprising success of this instrument through which although not clearly mentioned in its path also has been due to the economic and financial company that manages the.

Cementos de Mexico took advantage of the benefits it gives its sector to grow, among them is the oligopolistic power that exists in the cement industry worldwide and on the other hand the technology needed to get started in this industry.

It is also important to highlight the use of information technology as a key tool for coordination and smooth running of all its businesses. In addition to this we believe that one of the intangibles that this company has is the group of professionals responsible for integrating each of the acquired companies, which we believe has been a fundamental part of their success in geographic expansion.

Finally for this company innovation is also one of its strategies on the one hand to stay ahead in terms of the needs of the construction industry. On the other hand has also allowed it to innovate the production process which has gained efficiency by getting competitive production costs and has remained a profitable company.

For the first quarter of 2011, record gross profit by 963 million dollars and a profit margin of 28.5 percent. Your total debt to 17,059 million dollars estate

Finally, to confirm the success of global expansion strategy we can summarize that has followed it, one of Mexico's most important companies of our country and worldwide presence, has been placed today in 35 countries.

In Central and South America is in Argentina, Colombia, Costa Rica, Dominican Republic, Guatemala, Jamaica, Nicaragua, Panama and Puerto Rico and our trading operations in the Caribbean. In Europe in Austria, Croatia, Czech Republic, Denmark, Spain, Finland, France, Germany, Hungary, Ireland, Latvia, Norway, Poland, Sweden and the UK.

In Africa and the Middle East with operations in Egypt, Israel and the United Arab Emirates Finally in Asia is found in Bangladesh, Malaysia, Philippines, Taiwan and Thailand.

This company has continued growth by taking advantage offered by your industry and geographic expansion strategy. The cement industry has a short chain which facilitates the vertical integration (Torres, 2006). In this sense the location of subsidiaries in places where you can extract the raw material, was one of the strategies for geographic expansion.

Cemex has a presence in other countries by building or acquiring complementary businesses in these markets, this has been done without the need to accept foreign capital. This type of strategy was successful thanks to the short chain of cement, and innovations necessary minimum the oligopolistic structure of this market (Pozas 2002).

According to de Gortari (2005) when Cemex acquisition takes place, first make a review of the country's culture and the target company after that his team, made up of trained professionals in the area of systems, resources human, financial, acquisitions, business relationship management, conducts a comprehensive analysis of the company. If the transaction takes place beginning a process of integration with the aim of unifying the levels of productivity and culture will be outcome. In addition, this company takes advantage of regional economic activity and consumption capacity.

GRUPO MODELO.

Today, Grupo Modelo is the leader in developing, distributing and selling beer in Mexico Founded in Mexico City in the year by 1925.

Since its founding the basis of growth of this company took in two ways, firstly the acquisition of breweries in the country thus acquired new brands and on the other hand the construction of new plants will allow increasing production capacity. In addition to these two pathways, exports have been the tool that this group has chosen to internationalize in markets around the world, which has contributed significantly to its growth.

I make the first acquisition was the purchase of Brewing Company in Toluca and Mexico, Victoria Marks and Pilsener in 1935. By 1954 the brewery acquired the Pacific, Mazatlán, Sinaloa and Brewery Star in Guadalajara, Jalisco. In 1960 he joined the group Northwest Cervecería Modelo, Ciudad Obregon, Sonora.

Exports of beer of Grupo Modelo in 1933 started albeit sporadically, with the first American foreign market.

In 1964 he established the Cervecería Modelo de Guadalajara in 1964 and in 1967 opened the Cerveceria Modelo Torreon. For the year 1979 built the Tropical Brewing Company, located in Tuxtepec, Oaxaca, but starts to operate until 1984.

A strength of this group is the vertical integration that have since not only focused on building new breweries but also worried about the creation of companies that produce the inputs required by the brewer. That is why in 1979 he founded the company Cebadas and Malta Calpulalpan, Tlaxcala and in 1981 the company Inamex Beer and Malta, in Texcoco, Mexico State. In the same year acquired Cervecería Yucatan.

We can say that the internationalization of the Mexican company gains importance from 1985 when Grupo Modelo beer exports start to new foreign markets, this time the beer the company heads to Japan, Australia, New Zealand and some European countries. In 1990 Corona beer is exported to Hong Kong, Singapore, Greece, Holland, Germany and Belgium.

Zacatecas Brewing Company began operations in 1997. That same year, Corona beer stands as the first imported beer in the United States.

In 2006 Grupo Modelo set up an alliance (Joint Venture) with Constellation Brands, a leading international wine and spirits. This alliance creates Crown Import LLC, headquartered in Chicago. Began operations in 2007 and the main reason being is that Grupo Modelo has a single importer in the North American market. That same year he started building another brewery in Nava, Coahuila.

Grupo Modelo currently exports about 6 brands of beer in 156 countries around the world, these brands include: Corona Extra, Corona Light, Negra Modelo, Modelo Especial, and the Pacific.

ANALYSIS: GROUP MODEL

According to the trajectory described by this company, its expansion into territory was through the acquisition of breweries from other companies and the construction of plants characteristic of the group. One of its

strengths is its vertical integration which allowed him to strategically integrate companies that provide their own raw materials and packaging. In this sense also has a strategic partnership that gives it mainly American machinery of high technology, which guarantees the efficiency of their processes.

With regard to international expansion, as it says Hitt et al. (2007) companies engaged in the production and marketing of beers have few growth opportunities in its home market, which urges them to offer their products abroad. This was the case of the Mexican company, however as some firms internationalize by acquiring companies in other countries, this Mexican company has achieved its goal of placing their products in different countries of the world only through exports.

Although exports have certain constraints such as less control of the marketing and distribution, this group has dispelled this disadvantage by establishing offices in strategic locations in order to respond in a timely fashion importers, distributors and customers, it also meets the goal of placing products in a strategic model.

When Grupo Modelo decided to venture into new markets, makes a study of the target market considering their economic and cultural conditions, likewise due to their experience have learned to look after intellectual property issues and laws. Finally enter the market with adequate infrastructure in sales, promotion and marketing.

CONCLUSIONS

We conclude that a common denominator in its internationalization strategy between the three companies chosen for this work was to use acquisitions to expand its market. But while two of them, Grupo Bimbo and Cemex, these types of transactions conducted in foreign markets, Grupo Modelo now consolidated its position by acquiring companies in the same business only in the country.

Cemex was the three most dynamic in terms of foreign companies compare in terms of time and quantity.

Among these companies there are common elements that have been present in their internationalization strategies such as innovation not only in products but in new systems of organization. All three make use of information technology for better coordination of all group companies or company.

Despite having a similar strategy, each of these companies differentiates your strategy based on characteristics of the company. On the one hand Cemex has advantages given the sector where, as it is an industry with few producers of cement. On the other hand Grupo Modelo by the type of good it produces, allows you to use exports, it does not require the installation of plants in each market again.

In this study we recognize intangible assets of two companies, which have been a tool that has helped the success of your business. Cemex has a group of professionals responsible for integrating each of the acquired companies, allowing them to be integrated resources, knowledge and learning specific to the company obtained in each market.

One of the intangible assets was recognized of Grupo Bimbo's distribution network which has enabled it to reach a large number of consumers and be at the forefront in meeting the needs of its consumers. Examples of these needs have been a wide range of products more healthy.

Grupo Modelo because it only makes its internationalization through exports, has expanded to a large number of countries through the establishment of offices in foreign markets not only engaged in the marketing and distribution of their products, but also is responsible for positioning your product in strategic locations.

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Appendix

Anexo A. Ranking of the 500 most important companies in Mexico

	Business	Location	Sector	Jobs	Origin of capital	Net Sale (mps)	Operating income (pesos)	Net income (pesos)	Total assets (million pesos)	Total liabilities (camera)	Equity (million pesos)
1	Mexican Petroleum	DF	Petróleo y gas	147,294	MX	1,094,155.00	476,812.30	46,137.30	1,332,037.20	1,398,877.20	66,840.00
2	American Mobile	DF	Telecomunicaciones	55,627	MX	394,711.00	104,209.00	76,913.50	453,008.00	275,102.40	177,905.60
3	Walmart of Mexico	DF	Comercio autoservicio	176,463	EU	270,451.20	22,268.50	16,806.10	133,139.20	49,991.40	83,147.80
4	Commission of Federal Electricity	DF	Electricidad	83,812	MX	220,034.00	39,818.00	1,185.00	803,044.00	422,342.00	380,702.00
5	Carso Global Telecom	DF	Holding	77,729	MX	209,539.10	44,035.20	16,004.70	369,790.20	244,966.20	124,823.90
6	Cemex	NL	Cemento y materiales	47,624	MX	197,801.00	15,833.30	1,409.20	582,647.30	326,288.80	256,358.50
7	Fomento Mexican Ecinomic	NL	Bebidas y cervezas	127,179	MX	196,103.00	27,012.00	15,082.00	211,091.00	95,262.00	115,829.00
8	Telcel	DF	Telecomunicaciones	17,347	MX	142,362.20	69,154.00	0.00	0.00	0.00	0.00
9	Grupo Financiero BBVA-Bancomer	DF	Servicios financieros	32,568	ESP	137,709.20	26,955.60	21,612.40	1,107,779.50	993,065.50	114,714.10
10	Telephone of Mexic	DF	Telecomunicaciones	52,586	MX	119,100.20	52,315.00	20,468.70	178,355.40	140,034.60	38,320.80
11	group baby	DF	Alimentos	102,000	MX	116,353.00	12,054.00	6,081.00	96,713.00	55,756.00	40,957.00
12	Alfa group	NL	Holding	52,384	MX	115,632.00	8,762.00	2,020.60	108,088.00	71,729.40	36,359.30
13	Group Financiero Banamex	DF	Servicios financieros	40,000	EU	115,535.20	21,595.00	18,755.70	1,124,690.00	967,893.00	156,797.00
14	General Motors of Mexico	DF	Armadora	11,000	EU	110,422.00	0.00	0.00	63,897.00	52,449.00	11,448.00
15	Coca-Cola FEMSA	NL	Bebidas y cervezas	67,426	MX	102,229.00	15,835.00	8,970.00	110,661.00	42,189.00	68,472.00
16	Telmex International	DF	Telecomunicaciones	24,769	MX	92,540.10	11,051.80	9,104.50	174,300.70	74,815.80	99,485.00
17	Volkswagen of Mexico	Pue.	Armadora	14,255	ALE	92,531.30	58.00	203.50	47,736.90	25,410.90	22,326.00
1	Nissan	DF	Armadora	0.00	JAP	90,000.00	0.00	0.00	0.00	0.00	0.00

8	Mexicana									
19	Organización Soriana	NL	Comercio autoservicio	76,800	MX	88,637.30	4,584.00	2,868.30	65,725.40	33,794.90	31,930.50
20	Grupo BAL	DF	Holding	39,303	MX	88,045.00	12,177.00	7,836.00	145,460.00	90,511.00	54,949.00
21	Ford Motor Company	DF	Armadora	7,700	EU	86,000.00	0.00	0.00	0.00	0.00	0.00
22	Grupo Modelo	DF	Bebidas y cervezas	36,707	MX	81,861.60	21,730.00	8,630.00	117,362.20	21,129.80	96,232.50
23	Infonavit	DF	Servicios financieros	3,966	MX	67,906.00	4,575.00	11,168.00	599,403.00	539,718.00	59,685.00
24	Grupo Carso	DF	Holding	70,377	MX	66,035.60	9,073.60	7,339.40	97,677.50	37,980.30	59,697.30
25	Chrysler México Holding	DF	Armadora	6,200	EU	65,800.00	0.00	0.00	0.00	0.00	0.00

Source: extracted from the ranking of 500 most important companies in Mexico, CNN Expansión.

Anexo B. Annex B. Forms of internationalization

Modes without capital				
			advantage	disadvantages
export	direct		● Control distribution ● Economies of scale	• High transport costs • Little control over marketing • Trade barriers (tariffs)
	indirect		• Focus on production • Do not pay the export process	● Menor control de distribución ● Desconocimiento del mercado extranjero
Acuerdos contractuales	Licenses / franchises		• Low expansion • Low risk • How to expand yields based on previous innovations.	• Little control technology and marketing • Ability to create competitors • Low Income
	Projects ready for operation		• Ability to gain technology from countries with restricted FDI	• Ability to create competitors • Lack of long-term presence
	Contract R & D		• Ability to access the best technologies at low cost	• Difficulty negotiating • Risk of causing competitors • Loss of innovative capacity
	joint marketing		● Ability to get more customers	• Coordination Limited

Modes that involve capital				
			advantage	disadvantages
joint Venture	joint Venture		• Risk sharing • Access to new assets, knowledge and skills	• objectives and interests between partners • Heritage Limited • Difficulty coordinating globally
Wholly owned subsidiaries	Greenfield operations		• Total Ownership • Control operations • Protection of knowledge	• Political risks • High development costs • Speed slow entry
	acquisitions		• Input speed • Do not add new capacity	• Add new capacity • Political risks • High costs • Low speed • Integration Issues

Source: Authors' calculations based on data from Peng, 2006 and Hitt et al. 2008.

THE DEVELOPMENT OF THE PRINTING DIVISION OF THE KOREAN GOVERNMENT (1880- 1910):
- JAPAN INTRODUCED MODERN PRINTING TECHNOLOGY TO KOREA -

Dr. Hyun-Guk RYU

Professor, Visual Communication Design Program, Tsukuba University of Technology, Japan

E-mail h-ryu@a.tsukuba-tech.ac.jp

Abstract

The purpose of this research is to discover the missing factors in Modern design history of Korea and to investigate the introduction of modern printing technology and historical development of the Government Printing Division. Korean modern printing technology was introduced not by the westerners but China and Japan. "Chosunsinbo" which introduced the printing press and letter types for the first time in Korea (1881) was a newspaper for the Japanese merchants' organization living in Busan, Korea. "Korea Imperial Government Printing Division" so called "Yongsan Printing Office" in particular, it reformed types and distributed the standard letter types to the public. In this regard, this paper has been focused on reconstituting history based on research data explored to clarify the historical development of the Korean Government Printing Office.

(1) The historic development of the Korean Government Printing Office is clarified from the perspectives of typeprinting history.

(2) The significance of the first Korean newspapers, stamps and banknotes, the employment of Korean and Japanese editors and printing technicians, their roles and activities and the characteristics of typographic design are clarified.

(3) The introduction, development and trends of Korean typeprinting, printers and press machinery are examined based on verified research data.

(4) The roles of the Architectural Bureau of the Branch Printing Office (Takjibu), the architects' activities and the characteristics of architectural buildings are clarified.

Keywords: Korea Government Printing Office, Newspapers, Japanese, Typographic, Architectural

1. Introduction

This study aims to examine the historical development of the Korean Government Printing Office, the process of introduction and development of modern printing technology and related activities and restore some history omitted from the modern history of design.

Due to a long-held closed-door policy espoused by the Joseon Dynasty, the introduction and dissemination of modern printing technology were closely related to the expansion of western influence and missionary work by Christianity. The Japanese forced the Josoen Dynasty to sign the unfair Ganghwado Treaty (1875) with them in order to advance into the market and secure their control over the Josoen Dynasty while coercing the Josoen Dynasty to open its port. In this regard, Japan recognized the importance of newspapers as political tools. Bakmunguk, the first Korean Government Printing Office, was founded in 1883, and Hanseongsunbo published the first issue with the help of the Japanese. In the meantime, Hanseongjubo (1885), a newspaper, was published by Koreans, but it was closed down in 1888. In 1900, the Agriculture, Commerce and Industry Department Printing Office was revived as Government Printing Office after 12 years later. With the installation of the Post Office (Woojeongguk) in 1884, a modern postal system was introduced, and stamps were printed for the first time, but they were not distributed. After that, it was converted into the Mint Authority, and the Branch Printing Office (Takjibu) was installed as part of a governmental currency reform in 1895 introduced printing and casting facilities. As it became necessary to introduce independent printing facilities for the post and for currency in March 1895, the government offices were reorganized, and the Agriculture, Commerce and Industry Department was absorbed and abolished by the Mint Authority of the Branch Printing Office (Takjibu).

In so doing, the Government Printing Office that started as Bakmunguk went through the Agriculture, Commerce and Industry Department and Mint Authority of Branch Printing Office (Takjibu) before its abolition. After that, it was known as the Printing Bureau of Branch Printing Office (Takjibu), Printing Office of Korean Empire or Yongsan Printing Office. With the Japanese annexation of Korea in 1910, the government offices were reorganized, and it was renamed as the Printing Office of Joseon Government-General. In so doing, public printing and paper manufacture were controlled by the colonial government that combined a printing factory and printing administration.

Although the Korean Government Printing Office played an important role, few studies of it have been conducted until now.

Fig. 1: Joseon Dynasty inspection organization(1881)

Fig. 2: The Ministry of Foreign Affairs(1882)

Fig. 3: BakMunGuk, the first Korean Government Printing Office,(1883)

漢城旬報

統理衙門博文局

第一號

朝鮮開國四百九十二年

癸未十月初一日

旬報序

Fig. 4: The Chinese Character Newspaper "Han-Seong-Sun-Bo" (1883)

2. Bak-Mun-Guk

2.1, Background of Establishment

The first modern printing office was installed as the Government of the Joseon Dynasty found it necessary to adopt the products of a new modern civilization. As Young-hyo Park's argument for the necessity of newspapers was suggested to Emperor Gojong in 1882, 'Hanseongbu (Seoul City Hall)' was ordered to take charge of publishing newspapers. As a result, 'Bakmunguk' was installed on August 17, 1883, and Young-mok Min, from an extremely conservative group, was designated as the governor, and Man-sik Kim was appointed as vice-governor. Inoue Kakugoro (Editing and Translation Officer), a Japanese advisor equipped with vast amounts of ability in Japanese, English and Chinese, was invited, and Ushiba Takuzou, Tkahashi Masanobu (editor), Matsuo Miyodarou, Hajime Harada (military advisors) and Seitarou Honda (woodwork) were hired to take charge of editing and translation. Miwa Hirose (type casting) and Sanada Kenzou (print typesetting) were invited as printing technicians to publish newspapers.

At that time, it was hard to find anybody who was well-versed in newspapers in the Josoen Dynasty except for some intellectuals, so it was necessary to get help from the Japanese. Originally, the newspapers were supposed to be published in Korean and Chinese, but only the Korean newspapers were issued in the wake of opposition from the extreme conservatives. Young-mok Min, the central figure of the conservatives, became a publisher. At that time, intellectuals who had not been experienced in conducting exchanges with foreign countries in terms of institutions and goods were tainted with Sinocentrism, and they firmly believed that the world revolved around China. However, radical articles dealing with theories of the earth were published, and they had a great impact on the intellectuals of the Josoen Dynasty.

2.2, Role and Activities

2.2.1, The Chinese Character Newspaper "Han-Seong-Sun-Bo"

Bakmunguk published Korean newspapers for the first time by using modern lead type and letterpress

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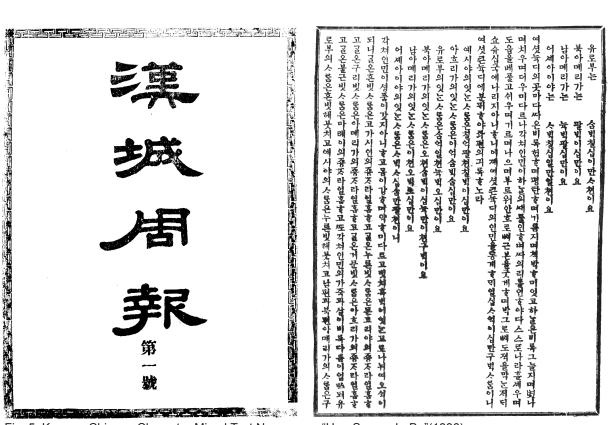
Fig. 5: Korean, Chinese Character Mixed Text Newspaper "Han-Seong-Ju-Bo"(1886)

plate printing machinery imported from Japan in 1883. From early 1884, Korean technicians began to take over the entire typesetting and printing process. The newspapers covered current events centering around official bulletins, foreign news, information on governmental agencies, and prices on the market.

Only the Chinese character type (Ming-style font) made by 'Factory Letterpress Tsukiji, Tokyo' was used in newspaper typesetting. The plate type was 188 × 257mm in size, and it adopted a western magazine style. One page consisted of 23 47-Chinese character lines. Each issue was composed of about 16 pages and it was released three times every 10 days. A compact manual cylinder press was used in printing.

Expecting support from Japan, reformists staged a coup d'état in 1884, but it ended in a failure without help from Japan. At that time, the conservatives attacked Bakmunguk, a stronghold of reformists, to burn down all types and printing facilities. This was due to the fact that Bakmunguk took the opposite stance against the conservatives and the Ching dynasty being used as a launchpad for the Japanese. For this reason, Hanseongsunbo was published only 41 times, including the first issue, before disappearing without fulfilling its reformist mission

2.2.2, Korean, Chinese Character Mixed Text Newspaper "Han-Seong-Ju-Bo"

Even the conservatives, who took advantage of reformists as an instrument of political propaganda, recognized the necessity of Korean newspapers for the purpose of facilitating the development of the nation and fulfilling its intended goals. At this juncture, Yun-sik Kim with the Department of Overseas Trade purchased types and printing machinery from Japan, books required to publish newspapers from Germany and sample papers from China in March 1884. Bakmunguk resumed its operation in October 1885.

In January 1886, it was edited as Hanseongjubo, and 16-page newspapers that combined an official gazette with an enlightenment paper were published every week. The Korean type used in this paper was made by Su-jeong Lee, a Korean language teacher with Tokyo University of Foreign Studies, in 1882, and a new typeface based on Korean type No. 4 and Chinese character type made by Takeuji Koudrou, a sculptor with 'Factory Letterpress Tsukiji, Tokyo' , was adopted. Bak Jang took charge of

editing and Young-han Kim and Taek-hwan Oh served as printing technicians. They were all Koreans, and this is a new historical discovery.

It carries significance in that, for the first time, newspapers began to be published by Koreans through the use of Korean types. It also reflects the fact that social needs were rapidly increasing amid change of the times. In the meantime, as Korean type was adopted along with Chinese character type, newspaper readers expanded to include ordinary people (commoners) as well as intellectuals (aristocrats). However, Hanseongjubo suffered managerial difficulties before being closed down in July 1888, and 'Bakmunguk' was completely abolished as well.

3. Nong-Sang-Gong-Bu

3.1, Background of Establishment

When government offices were reorganized during the 'Eulmi Reform' in 1895, the Camphor Unit was combined with the Engineering Unit and went through a series of changes in operation and personnel until 1910. In the same year, the Agriculture, Commerce and Industry Department began making preparations to install a Printing Office. First of all, a plan was made to educate technicians with regard to the installation of the Printing Office. The government was requested to fund the purchase of printing machinery and dispatch five Korean paper and printing technicians, Jeong-ryong Ha, Gyu-weon So, Yeon-gu Kim, Gyeong-ju Lee and Hi-jin Weon, to Japan;, but the request was not accepted. In the meantime, the Agriculture, Commerce and Industry Department acquired the 18 original plates of the "Moon- Wi Stamp" (1884) that were kept in Japan. The printing house installed by the Agriculture, Commerce and Industry Department in 1896 was renamed as 'The Agriculture, Commerce and Industry Department Regulations Subcommittee' before being officially inaugurated as the 'Central Office' with the name of 'Printing Office.'

3.2, Role and Activities

The state of the printing of Korean stamps prior to 1910 has been sorted through by year based on analysis on research data. As for the order of printing of stamps from 1884 to 1903, the Moon-wi Stamp was printed in 1884, and it was followed by the Taegeuk Ordinary Stamp (1885), the "Daehan Gashae Ordinary Stamp" (1897), the "Ordinary Stamp" (1900), the "E-Haw Ordinary Stamp" (1900), the "Iljacheomshae Jeonwicheomshae Ordinary Stamp" (1901), "Emperor Gojong's 40th Anniversary Stamp" (1902) and "Eagles Typical Stamps" (1903). A total of 9 kinds of stamps were published by year.

3.2.1, Moon- Wi Stamp (1884)

The Moon-Wi Stamp, the first stamp, was not distributed as the postal system introduced as a modern institution was abolished in the wake of a coup known as Gapsinjeongbyeon. The stamp was named "Moon-Wi" because the then currency was the 'Moon.' The Japanese Printing Office was commissioned to print them, and Saito Tomozou took charge of the original drawing while Edoardo Chiossoned, an Italian, was responsible for carving the original plates.

3.2.2, E-Haw Stamp(1891)

The "E-Haw Stamp" was made in 1891. A trial stamp was made by a Korean technician, but it was referred to a Japanese technician due to a lack of technology on the part of Korea. However, Chang-han Ji (1851-1921), who stood out among painters at that time, took charge of the original drawing. Like a trial coin manufactured in December 1884, it was characterized by a pattern of Taegeuk that symbolizes the nation abroad.

3.2.3, Eagles Typical Stamps (1900)

This was designed by V.E. Clemencet and printed in Paris, France. The name Coree is the French version of the English Korea and could be used to mislead people not aware of the difference between English and French. It was the last of the Korean stamps to be issued by the Imperial Korean

Fig. 6: Moon- Wi Stamp (1884)

Fig. 7: E-Haw Stamp (1891)

Fig. 8: Eagles Typical Stamps (1900)

Government. From 1905, Japanese stamps were used to represent Korea on the international stage. In the French colonial period, postage stamps were mostly large in size. In 1900, stamps were accepted with the domestic pattern of design with an eagle symbol of the Roman Caesar., His subsequent pattern was typical of European countries.

3.3, Features of Typography

In 1884, Haeseo-style was applied to Korean and Chinese characters, and Sans Serif Style was applied to English and Arabic numerals. In 1890, designs made with only the Ming-style Chinese characters and a modern style appeared. In 1895, Haeseo-style was replaced with Gothic style in Korean, and it seemed intended to strike a balance with the Sans Serif Style in English.

Fig. 9: Inchoen Jeon-Hwan-Guk

Fig. 10: Japanese settlement in Yongsan, Seoul.

4. Tak-Ji-Bu "Jeon-Hwan-Guk"
4.1, Background of Establishment

The Mint Authority was established in a Japanese settlement in Yongsan, Seoul. As the number of Japanese residents increased, it became necessary to come up with a new monetary system in order to correct the negative effects of the existing mint system and expand governmental finance. The construction of the Mint Authority, a large-scale mint house, was initiated on land owned by the

Japanese Government-General of Korea, and it was completed in January 1885. Various machines were imported from Germany, and F. Kraus, a technical advisor, C. Riedt, a printing technician and C. Diedricht, a machinery expert, were invited to initiate its operation from December 1887.

4.2, Roles and Activities

Trends of activities conducted by the Mint Authority prior to the Japanese annexation of Korea were analyzed. The results can be classified as follows. They are divided into a total of five stages which are the Gyeongseong Mint Authority Period (1885~1888), the Incheon Mint Authority Period (1892~1900), the Yongsan Mint Authority Period (1901~1902) and the Osaka Mint Authority Period (1905~1909).

The Seoul Mint Authority imported mint machinery from Germany in 1883, and the Ganghwa Mint Authority mass-produced quality coins to be supplied to the trade market in Incheon. The name of the country and the year of issuance (1885) were indicated, and the currency unit was marked in Korean and English. Gold-gilted coins and silver coins with different values were issued in 1886. From 1888, the year of issuance was indicated to commemorate the foundation of the nation, and silver coins and copper coins began to be used. With the introduction of the New Monetary Ordinance in 1891, coins were finally issued in earnest. In 1901, a Printing Department was installed at the Yongsan Mint Authority, a regular mint house, in addition to the existing Mint Department. One month later, the Printing Bureau of the Agriculture, Commerce and Industry Department was abolished to relocate the entire carving and printing facilities, and all Japanaese technicians were transferred.

As a result of a survey on figures who requested technicians at the Osaka Mint Office to provide advice and transfer technology, it has been found that Gyeong-su Ahn (an envoy of Emperor Gojong), Hayasi Yujo, Omiwa Chobe (currency expert), Endo (Director of Osaka Mint Office), Hasegawa Tameharu (Deputy Director of Osaka Mint Office) and Masda Nobuyuki (President of Osaka Steel Company) provided funds and carving technology. Masda strongly recommended the western monetary system inducing adoption of a similar system to the Japanese monetary system. In addition, such Korean technicians with Incheon Mint Authority as Hyeong-sun Lee and Seong-geun Ha were dispatched for 9 months to the Osaka Mint Office in 1891 to acquire mint technology. As there was a discussion about expanding the Incheon Mint Authority in 1892, Director Yong-ik Lee dispatched Wook Han and Sang-jun Seo, printing technicians, to Osaka. However, facilities in the Incheon Mint Authority were relocated to Seoul at Emperor Gojong's command so that they could be controlled by the Yongsan Mint Authority.

4.3, Yongsan Jeon-Hwan-Guk

All new printing facilities in the Mint Authority were introduced from Germany, and each and every department was led by Japanese supervisors. The Mint Authority printed sample notes by using hanji, traditional Korean paper, manufactured in Korea in November, and letters and figures were exquisitely indicated on an unspecific part of the notes. This was applied even to hidden documents and could compare favorably with foreign notes. However, they were not put to practical use, and the Mint Authority was closed down in 1904. After that, notes of the Josoen Dynasty were issued by the Osaka Mint Office (1905-1909), and they were generally circulated as Japanese currency.

5. Tak-Ji-Bu Yongsan Printing Office

Japan won the Russo-Japanese War in 1904, taking over the reins of the Joseon Dynasty, and Mekata was appointed as a financial advisor in accordance with the First Japanese-Korean Agreement. He shut down the Mint Authority except for the Printing Department and Paper Plant, and the Branch Printing Office took charge of printing and paper operations. As a large number of Koreans were involved in printing and paper operations, Young-han Kim (1857~1927), who accumulated an abundance of

Fig. 11: Yongsan station

Fig. 12: Tak-Ji-Bu Yongsan Printing Office

Fig. 13: First Paper Factory

Fig. 14: Japanese Government General of Korea

experiences in the printing and paper sectors while serving as an administrator of the Branch Printing Office, was sent to Japan in 1904 so that the could make an inspection. It was required to produce the various printed materials needed to prepare for a planned colonization. Young-han Kim was promoted to Printing Director of the Branch Printing Office in 1905, and he revisited Japan next year in order to purchase printing machinery. As the printing operation was highly valued, a large-scale facility expansion was implemented, and the police were dispatched to guard the Yongsan Printing Facilities of the Branch Printing Office. It has been found that Jin-ho Yu (1861~?), Sang-cheol Lee (1859~?) and Tae-hwan Oh (1873~?) worked as printing technicians with the Branch Printing Office.

5.1, First Paper Factory
5.1.1, Paper Manufacturing Plant
While inspecting the Ohkura Shou Paper Processing Office of the Printing Bureau of Japan in April 1881, Sinsayuramdan which consisted of 62 Koreans was introduced to facilities imported from an Austrian paper company and "Simili Japanese vellum" developed by Japan, and a contract was made to purchase machinery. However, the introduction of paper-making facilities was temporarily suspended in the wake of a failed coup staged by reformists. As the Japanese government urged the Korean government to pay a penalty for breach contract, the Korean government was forced to officially establish a contract to purchase machinery in 1888.

Two ring net expression paper machines were installed at a paper manufacturing plant of the Mint Authority to produce note paper from 1902. Various printing facilities in the paper manufacturing plant of the Branch Printing Office were burned down in a fire that broke out in 1906. However, they were expanded in restoration work in 1907, and it led to a paper manufacturing plant that could produce about 800,000 sheets of paper a day by 1909. It was shut down in 1911 to be converted into the Central Experimental Station of the Japanese Government General of Korea. After that, it was operated by Fuji Paper Manufacturing Company in Japan with approval from the Japanese Government General of Korea in 1917.

5.2, Tak-Ji-Bu Architectural Office

5.2.1, Background of Establishment

With the installation of the Statistics Monitoring Office in 1906, a large number of Japanese officials were appointed, and many official residences were built for them starting with the establishment of the Branch Printing Office (Tak-ji-bu Architectural Office). As to the number of construction projects conducted up to 1910, after the establishment of the Branch Printing Office, the ratio of official residences and lodgings was as high as 83%. As the Japanese governmental organizations were reshuffled after 1910, construction of official residences was conducted at a rapid speed. At that time, Seoul suffered a serious lack of houses in the wake of a sharp increase in population, and massive distribution of official residences contributed to stabilizing housing distribution.

5.2.2, Design Features

Official residences of the Japanese Government General of Korea (Korean Colonial Government) shared common characteristics despite differences in sizes and types according to the ranks and civil service grades of residents. A case in point was spatial configuration based on a compromised formula between westernized Japan and Korea. All characteristics of Japanese traditional housing (general living space), western spaces introduced from the west in the modern era (common spaces such as a living room, a kitchen and a study) and Korean traditional space (called Ondol) for adaptation to the Korean climate were found in one house. Ondol was installed only in some rooms according to a Japanese-style ground plan so that they could be used as living spaces during the winter time. It was also possible to figure out how Korean-style Ondol was applied to a Japanese-style house.

5.2.3, Activities of Architects

The Japanese Government General of Korea was a government office installed to govern the Joseon Dynasty that belonged to the Empire of Japan according to the Japanese annexation of Korea in 1910. The government office building was established within the Gyeongbok Palace in the present Seoul. George De Lalande (1872~1914), a German architect, took charge of a basic plan, and it was taken over by such Japanese architects as Nomura Ichiro and (1872~1914) and Kunieta Hiroshi (1879~ 1943) after De Lalande died. The construction project was completed in 1926. After the Korean War, it was used as a government office building and as the National Museum of Korea. The building was demolished in 1995.

6. Conclusion

This study has focused on clarifying the historical development of the Korean Government Printing Office from 1883 to 1910.

(1) The historical development of the Korean Government Printing Office was divided into four periodic stages which were the introduction of new printing technology (Bakmunguk, 1883~1888), a base of establishment of new printing technology (Agriculture, Commerce, Industry Department, 1895~1910), the establishment of new printing technology (Mint Authority of Branch Printing Office, 1885~1902) and deployment of new printing technology (Yongsan Printing House of Branch Printing Office, 1902~1910). It also examined the roles and activities of the Korean Government Printing Office.

(2) Regarding the publication ssuance of "Han-seong-sun-bo" (1883), the first newspaper written in Chinese characters alone, Inoue (editing and translation), Miwa Hiroshe, a printing technician (type casting), and Sanada Genjou (typesetting) were involved. As to the publication of "Hanseongjubo" (1886), the first newspaper written in both Korean and Chinese characters, in three years, ten Korean technicians including Bak Jang (edition), Tae-hwan Oh, a printing technician (type casting), and Young-hwan Kim (typesetting) participated in its publication.

(3) New types were manufactured by the 'Factory Letterpress Tsukiji, Tokyo'. In particular, Korean type No. 4, types that had been made to publish the Meiji Chinese Dictionary (1882) were imported, and it

was based on an original drawing by Su-jeong Lee, a Korean language teacher with Tokyo University of Foreign Studies, and carved by Takauchi Koutarou. The type was Haeseochae (text style) that was highly recognized for being elegant and sophisticated. It was introduced to the Joseon Dynasty and used for as long as 70 years.

(4) The Japanese Printing Office was commissioned to print the first "Moon- Wi Stamp," and Saito Tomokazu took charge of designing the original drawing, and Edoardo Chiossoned, an Italian, took responsibility for carving the original plate. After that, Chang-hwan Ji, who was Korean, served as an original drawing artist.

(5) F. Kraus, a technical advisor, C. Riedt, a printing technician, and C. Diedricht, a machinery technician, were invited from Germany so that technology could be transferred from them.

(6) George De Lalande (1872~1914), a German architect, took charge of a basic plan of for the building of the Japanese Government General of Korea (1910) by adopting an art nouveau style, and the construction project was taken over by Nomura Ichiro (1872~1914) and Kunieta Hiroshi (1879~1943), Japanese architects, after De Lalande's death. The project was completed in 1926.

The findings of this study are indispensable to education about Korean type printing and design history. Korean typographic design was endeavoring to find a way to make a fresh start based on design theories from Europe and Japan. The roles and activities of the Korean Government Printing Office defined in the study were important matters with regard to the establishment of quality typography in the future.

There were new discoveries in the history of Korean printing type.

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less
more
architecture
design
landscape

An Equilibrium Towards 'LESS-MORE' Problems ?

The Innovative Preservation of the Modern and Contemporary Cultural Heritage in Architectural Space

Iwona SZMELTER

Faculty of Conservation, Academy of Fine Arts

Postgraduate Museums Studies, University of Warsaw, Poland

iwona.szmelter@gmail.com`

Abstract

This paper presents the equilibrium of 'LESS-MORE" problems of scientific contributions aiming at restoring, collecting and spreading out the best practices of care of the latest cultural heritage. It means the implementation of knowledge and complex issues involved in care of atypical modern and contemporary art, especially murals in architectural space, both tangible (material) and intangible (idea).

In XXI century there has been an increasing focus of new ideas in all areas of care of cultural heritage , including conservation and its multi-disciplinary approach. This has been very important for the relation between architecture and different types of wall paintings, murals and atypical installations. Many factors make it essential: artwork aesthetic unity with the architecture, legal aspects, the interface between the legacy of art and the environment, paradigmatic sustainable projects and last but not least – the question : who should finance it? The idea of getting so-called "paintings installations into the space" is presented.

It addresses the case studies of famous artworks of Leon Tarasewicz and Miroslaw Balka which are narrowed to an individual macro-scale of 'LESS-MORE' an equilibrium, as a part of International Network for Conservation of Contemporary Art-Central-Eastern Europe activities (INCCA-CEE) coordinated by the author. [1]

Keywords: Conservation, Restoration, Preservation, Modern and Contemporary Art Heritage Management, Social Sustainability

1. Preface

We have observed specific aspects of 'less-more' individual contributions focused on artworks in architecture and public art, plus broad issues related to the low priority of modern and contemporary legacy and consequent they are attributed to lack of funding it is given. There is a problem of the absence of adequate models, parameters and guidelines for care of contemporary legacy in difficult economic situation.

Some of the most influential artists of the twentieth century, including Leon Tarasewicz, Alina Szapocznikow, Alexander Calder, Nikki de Saint Phalle and others - produced wall paintings, murals, painted sculpture and other forms of public art intended for installation in architecture or outdoor settings. Moreover many contemporary muralists are spontanic and unknown. The problem of the care of latest legacy seems to be very universal and focused on the structure of administration and funding of conservation in the whole world. Some consideration are presented below heads towards the holistic care for current cultural heritage.

2. The Concept of the Complex Care of Modern and Contemporary Art in Architectural Space

The model for care of the modern and contemporary art in architectural space is very complex. The target group are: architects, curators and conservators, museums staff etc., where the conservation needs of complex installations have often been disregarded. The models have an open character, based on the needs of the individual artwork.[2] The key drivers for the care of cultural heritage are:

2.1. Concepts of Conservation - address how to preserve and restore the original expression
and emanation of the idea embodied in the object, including the permissibility of the replacement
 of   elements. The concepts also address full spectrum of project – passive care, preventive conservation/or active conservation/restoration/ or reconstruction.

  2.2. Legal issues: The legal aspect of artist's guidelines concern the principles and methods of re-installation of the object, or conservation by documentation and digital registration of ephemeral elements. The role of exhibition design is an element in preserving the integrity of the work - the important role of the space itself. Very crucial is the need for an authorization of new form of restoration, so-called emulation, neo-creation, etc.

2.3. Archives; different type of documentation containing information about artwork, the social and historical context of it , including the space and the idea it embodies on the basis of data and the historical context, interviews with the artist, press reviews, television reports, films, and contemporary documents.

2.4. Artist Participation; interviews with Artists and Various Advice Regarding the Lifespan of their Artwork

 Contemporary artists have to be partners in conservation projects, starting from pre-acquisition and registration of artwork, agreement for interventions, indications etc. – all based on interviews with them. On the other hand

the users want to ask artists for 'care'. Below I quoted very practical guidelines for author's:

"Take pictures to document your work as you go along.

 A "time-frame" series of images will be very useful to you in the future.

 Shoot photos from the same spot, although there can be several places from which photos are taken.

 Keep track of the materials you use and how you use them. Protect your work against vandalism.

 Think about applying an anti-graffiti coating or using security lighting" [3]

3. Case studies - Leon Tarasewicz and Miroslaw Balka Legacy

Let me quote the legacy of artists – Leon Tarasewicz and Miroslaw Bałka as problematic examples of the sorts of things we are talking about here.

3.1. Leon Tarasewicz – as an Author of Atypical Paintings and Public Art

Leon Tarasewicz is a well-known Polish-Belorussian avant-garde painter and installation artist and an academic teacher. He was born in 1957 in the Bialystok region. Last 30 years he has been actively working in Poland and abroad. He cooperates on a regular basis with the Foksal Gallery in Warsaw, the White Gallery in Lublin, the many Galleries in Berlin, many institution in Italy. He represented the Polish art at the 49th International Biennale in Venice in 2001. On the other hand he painted a monumental wall painting on open space for long-time exposition (2008, Milano) with his special care for the quality of industrial paints and environment. Tarasewicz created many painted installations in public space; he covered the painted areas of a square on the open air (Barcelona, 2002) after the temporary exhibition on the square was cleaned.

Fig. 1 Leon Tarasewicz, Paintings action on the square. Plaza Real, Barcelona, 2002

Leon Tarasewicz painted artworks in interiors on self-designed surfaces, based on classical paintings materials and technology as well as industrial paints and elements of the architectural constructions. The great part of the legacy of Tarasewicz disappeared. For example when he painted on walls and pillars (1997 CSW Warsaw), - after one year the composition were removed from the surface. When his paintings "flow down" to the gallery floor (1999, 49th International Biennale in Venice) they were removed after exhibition.

Fig. 2. Leon Tarasewicz, *Labirynth,* .Kielce, Poland, 2011

In 2005 the artist started experimenting in public space and he was combining his large size painting on symbolic corridors with mirrors, created illusory experiences which broaden the area of expression of his monumental artwork in many galleries [3]. The painted installation were very popular in open air too. The appreciation of a great numbers of viewer's made Tarasewicz's art legendary 2011, Square of Poets, Kielce).]We have an archives devoted his artworks but most of them were ephemeral because the absence of proper care and economical reason.

3.2. Miroslaw Balka - Considering Memory and the Care of Ephemeral Art Legacy

Miroslaw Balka born in 1958 in Otwock, international avant-garde artist, last year was invited to present his work in the Turbine Hall, the main exhibition room of London's Tate Gallery, as the 10th Unilever Commission. The artist created the project called „*How It Is*",   the title is a reference to the work of Samuel Beckett. The work

which was exhibited for a few months (from 13.10.2009 to 5.04.2010) was a huge metal container 13m high and 10m wide, the interior of which is completely dark and in addition covered with flock paint, a material which absorbs light. The only light source which reaches the visitors inside is from the rectangular entrance opening to which a ramp leads. After entry, the viewer is enveloped by a dark tunnel. The work is composed of the basic elements of art, such as darkness, space, silence, meditation. It comprises an intuitive experience of reality by the viewer. The work of Balka is interpreted as a reference to the events of the twentieth century and more modern history of Poland, the Holocaust, social changes and the uncertainties that accompany them, the emigration and displacements of populations.

 Balka leaves his viewers freedom of interpretation and talks of the construction of his giant work as well as his co-operation with the Tate Modern in London, and remarks on the efficiency and benefits for the artist of its system of acquisition. In effective manner the artist communicates information on the role of individual materials, and on the idea and message of the artworks. [5] After exhibition in Tate "How It Is" was demolished, but as it has been well documented, it is possible to reconstruct this project, given that a proper agreement would be obtained with Tate.

We know a precedence with reconstruction such great installation, for example Olafur Eliasson artwork called 'Your Black Horizon' exhibited a haunting light piece at the 2005 Venice Biennale in a pavilion designed by David Adjaye. The exhibition "was part of the Thyssen-Bornemisza Limited Edition Art Pavilions, which host unique specially commissioned sight-specific art projects on a rotating basis. In 2007 the Pavilion was moved from San Lazzaro Island in Venice to Lopud Island, Croatia. David Adjaye designed the Pavilion to be a flexible and easily adaptable structure with multi-purpose capabilities and over 400 square meters exhibition space" [6]. In a new context of landscape the exhibition is type of neo-creation of an artwork acoordingly to new understanding of cultural heritage (as nature and 'man made').

Miroslav Balka, "1120 x 875 x 2" the exhibition at the National Gallery Zacheta in Warsaw. Currently the work is available exclusively as a project documentation (conservation via documentation) – the installation was a floor (the title of the work is "Size") covered with a trick layer of laundry soap with the specific, sharp smell stimulating our

sense of smell and producing associations with the period when his type was used in the East European countries under the economical Soviet domination. The smell - soap' Balka's installation was made from Czech soap; is in the archive for emulation of smell in the case of re-installation. Re-installation is possible only with the consent and cooperation with the author.

For Balka "Contemporary time does not exist, we cannot capture what is continuous. As we move ever into the

future we are always based in the past. This is the state of my sculpture, there is heat from this pillow, and it's impossible to catch, this continuous flow. As soon as you touch it it's colder than it was at its source. Everything we touch is coming from the past, it's our access to death. For me the important thing in my art is to try to catch that consciousness of life" [7]. This allows the raising of his own personal existence and also the heritage of the most recent and dramatic history of Poland to the rank of a universal artistic message.

4. Consideration in 'Less-More' Spirit of Responsibility of an Artworks

Each of the above Tarasewicz artworks casus deserves more careful examination in the work toward the ultimate goal of developing a positive relationship between those who produce murals and those who wish to preserve them.

We will use the basic knowledge to understand the interaction between wall paintings, atypical decorations, public art and context of the aim of conservation of cultural heritage. We consider both; the idea and the matter in a model for complex preservation-conservation project. In the results of the debate about the legacy of Leon Tarasewicz I have to notice that there are a big thing more than the materials and techniques investigations, there is a need for the concept of co-operation with artists towards the registration of his intents, ideas. This is a big problem if youchange the real concept of the artistic creation because legal consequences, the lack of the integrity of artwork in architectural space. Towards respecting the potential deterioration we noticed that the moisture problems should be identified and repaired before conservation. Excessive moisture can damage the paint bond, penetration, moisture saturation, and causing areas of paint; blistering, cracking, flaking, and peeling. In restoration the same type of paint should be used for all new layers of paint.

The legacy of Miroslaw Balka from my point of view as a curator- conservator; in every case of re-installation of artwork yields and requires complex information about material structure of artworks, their image and ideas. The perceptual context of changeable artwork depends on the environment in which it is presented, hanging or standing, with the quality of size and space within its philosophy *gestalt* as an object. It brings this cycle closer to open-installations. The author's radical adaptations include his guidelines for curators and conservators.

5. Public Art and Social Sustainability

The problems of the lifespan of modern and contemporary art and care of current cultural heritage in architecture and public space is well known.

 The most characteristic attitude for the artists themselves is self-identification. The concepts of the artists have become part of social history and are an important context of their works. The issue of identity in culture is a

topic of interest in several scientific disciplines. As a consequence, several investigative methods are used to investigate it. from sociologic, historic, legal, ethnologic and from cultural studies.

Concepts characteristic of different disciplines are used in the interpretation of the results. Some investigators equate identity and awareness. These concepts are used to define the state of both individuals as well as groups. Public art is a critical component of the built environment and adds much to the city's quality of life. The Short North has a growing national reputation as a leader in promoting public and private art. It's status as an arts district has played a key role in its revitalization and will continue to influence

development in the corridor. These guidelines seek to address the placement

of public art and other related considerations, but not the content of such art [see 3]:

Example of `Regulations - Chapter 3115 of the Columbus City Code addresses the creation and responsibilities of the Columbus Art Commission. Art is defined by words :

"*all forms of art, regardless of its permanence, created in any*

medium, material or combination thereof. Art may take the form of individual

works or site- specific installations integrated into the design and physical

development of the capital improvement for which the art is created [3].

 (…) "Public art is required to gain approval by and meet the evaluation criteria

of the Columbus Art Commission, as provided in city code. These

criteria address the following topics: artistic quality/excellence,

appropriateness to the site, originality, permanence, safety, feasibility,

maintenance and donor requirements.

• Public art may possess functional as well as aesthetic qualities; it may be

integrated into the site or a discrete work.

• Larger new development projects should include works of public art into

the design of the project.

• Art should be incorporated into new public spaces and visible elements

of significant infrastructure improvements.

• Placement of public art in public spaces, such as parkland, plazas and

Public art should create interest and invite

people to interact with the piece.

sidewalk cafes is encouraged.

• The design of public art is influenced by the area's physical context in

terms of composition, scale, mass, and materials.

• Public art is designed and installed to not damage or visually obscure

contributing buildings or building elements" [3]

Quoted above guidelines are pioneer's. Despite of the very important role of public art we still have no solution

for the administration system, conservation funding and social sustainability.

Another point of view was presented during symposium "Mural Painting and Conservation in the Americas" in

Los Angeles, California, on May 16-17, 2003, which was held in recognition of the significance of 20th century

mural art - Timothy W. Drescher wrote in his essay:

 „There are community-based organizations that can carry out the conservation—the key

being the group that organized the project, not just the one that paid for it. Successful

restorations along these lines have been carried out in Chicago, San Francisco, San Diego, and

other cities. One quails at the involvement of civic or government institutions, precisely because

they do not, and probably cannot, adequately understand these works. There are exceptions, of

course, but government priorities are most likely different from those of communities.

Government's role is to provide money, advice, and equipment/material support, but not to make

the decisions beyond that". [8]

The practical question 'who should/can pay for it' in many cases seems be without a solution.

6.Conclusion

Concluding – the controversial issues of 'less-more' conservation, restoration, neo-creation of works of art in

architectural space turn around the issues modern and contemporary cultural heritage. In conserving and

displaying a work of modern and contemporary art in architectural spaces we need guidelines that address the

artist's intent, the materials, and the integrity of the artwork – and even the possibility of re-installation,

emulation, neo-creation. The needs of paradigm of classical theory of conservation is arising and sets out a

cutting edge solution for the transformations experienced by the academic model of conservation knowledge in

Poland within the trans-disciplinary science and humanities. The equilibrium of the innovative conservation and

care for the visual artworks of modern and contemporary cultural heritage in architectural space is possible only

when it is based on complex administration system, and care of cultural heritage; between architects,

conservators, curators, artists. Based upon an innovative training model and collaborative effort between

academic and cultural institutions, conservator of modern art has to act as advocates and often play the role of

the orchestrators of different activities. Conservator and architect in new strategy can provide answers to crucial questions to the lifespan of the artworks and care of heritage regarding artistic identity, intent and ideas, authenticity, conservation, reproducibility and their social role.

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Le Vie dei Mercanti | X Forum Internazionale di Studi

less
more
architecture
design
landscape

The cities and the drawings. Street art projects as shared practices for the revitalization of urban areas

Giovanni Caffio
Dipartimento ARCH, Facoltà di Architettura, Università "G. d'Annunzio", Pescara, Italy
me@giovannicaffio.com

Abstract
In recent years we have been witnessing a reversal regarding the phenomenon of urban graffiti: from vandalism and naive expression of youth problems it has gradually acquired the status of art. The attention of the world has officially declared this grassroots form of language as an artistic expression finally worthy of appearing in exhibitions and museums. Artists, previously accustomed to work clandestinely in the streets, have seen their work exposed in art galleries.
What interests us in this essay is to emphasize the important social role played by the most advanced forms of street art as a catalyst of collective attention towards the public space revitalization. Murals allow citizens to become active part of a community; they can trigger processes of revitalization in neighbourhoods, towns and whole cities; they work to strengthen the identity of a social context; intensify existing ties, create new economic dynamics, in a joint project involving citizens belonging to all ages. The examples, of which the essay offers a study of the most significant, are numerous and growing, a sign of a growing interest in grassroots artistic movements that can change the face and the prospective to improve degraded urban areas through the conscious, and often provocative, use of drawing.

Keywords: street-art, drawing, city, renewal.

1. The street art phenomenon

"Street art" or "urban art" is the name given by mass media to the colorful and varied artistic number of experiences and experiments that have as their place of creation and manifestation throughout public areas, in particular contemporary city. Often made illegally, but also through projects shared and participated with the local community, they adopt different techniques that demonstrate all the flexibility and creativity of artists: spray, stickers, stencils [1], video projections, sculptures, installations, performances and guerrilla art actions. Contemporary street art has been developing within the more complex and articulated phenomenon of urban graffiti. The differences between these two areas are faded and difficult to detect because they share the same spaces (the street and the more degraded areas of the city), techniques (spray paint, stencils, markers, to which in street art is added a most frequently use of paint brush or roller) and the same implementation procedures based on flick and fast gestures. The element that separates the two areas of expression, however, is that in case of street art content is often provocative and politically and socially oriented, they turn to the general audience of citizens and have the deliberate aim of improving a degraded urban environment, in case of urban graffiti or writing, however, the message is fundamentally self-referential and closed within a style code for followers, it has a strong expressive value of social unease that seeks affirmation and visibility mainly within confined enclaves of the territory and, often, is accused to result in pure vandalism.

Fig. 1: Taki 183, New York City, c. 1971. Fig. 2: Photograph by Jon Naar, New York City, 1973. Fig. 3: Henry Chalfant, second from left, during *Style Wars* shooting, New York City, 1983. [2]

Writing is recognized as an artistic expression of New York ghettos subculture since the '70s and soon exceeded its original geographical and cultural boundaries to spread quickly to the rest of America and Europe. Although its origins are traced to the habit of American allied soldiers during the forties to draw the famous Kilroy scribble, graffiti was born on trains in Philadelphia in the late sixties and developed later in New York in the seventies up to achieve a basic stylistic maturity in the mid-eighties. First tags (*nom de guerre*) have been beginning to appear since 1972 and over time they transformed becoming larger and larger, more complex and complicated. Among the first active writers we remember names like TAKI 183, Rammellsee and Samo, signature behind which lurks the famous artist Jean-Michel Basquiat. Fundamental for the worldwide diffusion were the documentary *Style Wars* (T. Silver, 1983) and the film *Wild Style* (C. Ahearn, 1983) and the first collections of photographs and reportages as *Subway Art* by Martha Cooper and Henry Chalfant [3] and *The Faith of Graffiti* by Norman Mailer [4]. It was thanks to the work of these passionate photographers and filmmakers that we were able to document and enhance these important works with such ephemeral character. Over time, the writers more interested in developing their own artistic research began to work in dedicated urban areas such as "hall of fame", a space made available for them in which they can paint legally. These are places made available by municipalities with the aim to contain and control the phenomenon of writing, away from city centers and residential areas of value, or freely chosen by the artists in remote and deprived areas where the works of the "spray-can art" or "aerosol art", are tacitly accepted by supervisory authorities. Many contemporary artists, while retaining their roots in writing [5], have expanded their range from walls to typography, design and clothing, thus making the graffiti aesthetics a recognized and disseminated style. To mark the evolution of the phenomenon often critics speak of *Post-graffiti* to indicate the experiences that, starting from urban graffiti, are directed towards larger and more established art fields, and *Graffiti Design* for influences within fashion and graphics.

Far from being merely become a cultural phenomenon and a contemporary style, street art in hits heart responds to multiple impulses: it is an expression of subversion and anarchist critique to the private property, a reclamation of public spaces and social practices such as those produced by the mercantile intrusive advertising, a desire to introduce personal works to an audience wide and not tied to the restricted realm of galleries and art institutions. The provocative and rebellious value of street art was the main theme of the exhibition *Viva la Revolución* [6], organized by the San Diego Museum of Contemporary Art in 2011 and curated by Pedro Alonzo. The exhibition offered the opportunity to question the fundamental theme of the relationship between "illegal" art, the space at disposal (the city) and the material that sustains it (the walls). The exhibition highlights how the current phenomenon is indebted to many art expressions born in the late seventies and early eighties in which urban space, and the different cultures associated with it – from writing to advertising – was been acquiring bigger and bigger importance. The artists involved in these early experiences, from Keith Haring, Barbara Kruger and Jenny Holzer to collectives like Gran Fury and Guerrilla Girls engaged in political campaigns, deliberately worked on images and media belonging to the mainstream culture, with the aim of reaching as many as possible observer citizens. Furthermore, these artistic experiences faced with curiosity the relationships that develop between art works and urban environment in ways that certainly suffer influences from Pop Art and especially from the situationist movement and performance art, with their new forms of involvement of spectators and the practice of *détournement*. An interesting aspect that arises from this experience that took place inside a museum institution such as the Museum of Contemporary Art of San Diego is the apparent paradox that comes from wanting to expose or produce art that, by definition of the same curators, is "unauthorized and illegal "[7].

Fig. 4: Keith Haring, New York City, 1982. Fig. 5: Jenny Holzer, *Inflammatory Essays*, New York City, 1983. Fig. 6: Barbara Kruger, New York City, 1982. Fig. 7: Guerrilla Girls, D*o Women Have To Be Naked To Get Into the Met Museum?*, New York City, 1989. Fig. 8: Jean-Michel Basquiat / SAMO, New York City, c. 1980. [8]

Since the '90s, a real cohesive and nomadic art movement began to spread its works on the streets of New York, Los Angeles, San Francisco, Paris and London thanks to a global urban network widespread through websites, publications and collective projects. Virtually, every major city in the world, and even some smaller tones, house forms of urban art or graffiti, but there are few places that gained more importance for having given rise to particular forms of avant-garde in both aesthetic and technical level as well as being the cradle of the first important work of street artists. For example, Paris still has a very lively art scene with artists such as Space Invader, ZEVS, Mosko et Associés, Jerome Mesnager and Zoo Project. Interestingly, these artists put themselves in continuation with previous art makers such as Jacques Villeglé, Yves Klein, Arman and Christo and Jeanne-Claude, whose *Rideau de Fer* in 1962 is one of the first illegal art work. Other precursors can be considered Gérard Zlotykamien and his work with spray paint, Daniel Buren and his interventions in the Paris metro, and, reaching the '80s, with Blek le Rat and the Figuration Libre movement.
In England the most important exponent is definitely Banksy whose provocative actions appeared first in the early '90s and continued up to his exhibition titled *The Cans Festival* (London 2008) and the great success of the show held in 2009 at the Bristol City Museum and Art Gallery. Banksy is the artist who is perhaps better than others succeeded to make public and diffuse the idea of street art as a vehicle for economic and social criticism. His works, made with the rapid stencil technique, tackle with corrosive irony social issues such as freedom of expression, the brutality of the police repression, the intrusiveness of control, bourgeois morality and prohibitionism. The American scene, after the crisis of the writing phenomenon happened after the massive effort of city governments to address vandalism through arrest and heavy penalties, see alongside established artists as Kenny Scharf, Ron English, Shepard Fairey and Robbie Conal, younger ones as Gaia, Swoon, Mark Jenkins, the duo Faile. Particularly important are some projects of urban renewal interventions through street art in numerous American cities: the project Living Walls with works in Atlanta and Albany (NY), the Miami Wynwood Walls, the important Philadelphia Mural Arts Program born in 1984 and other initiatives present for years in Pittsburgh and San Francisco's Mission District.

2. The Italian artistic scene
The theme of the paintings included in the urban context is again at the center of attention in Italy in the early '80s, in synchronism with the affirmation of graffiti also in the Italian cities and with the contribution of early researches on the subject (in this sense fundamental is the exhibition *Italian wave* curated by Francesca Alinovi). These early experiences are anticipated by those produced in the climate of the twentieth century by Sironi, Campigli and Funi, major attempts to explain, even in theory, the pictorial expression in relation to spaces alternative to the usual circuit of galleries and art venues. Emerged clearly the need to strengthen, if
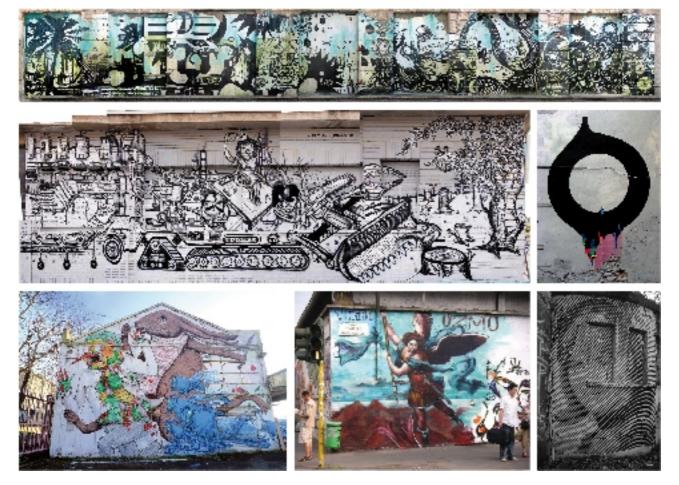
Fig. 9: Microbo e Bo130, Milan. Fig. 10: Cristian Sonda, Rho, 2010. Fig. 11: 108, Bassano del Grappa, 2010. Fig. 12: Blu and Ericailcane, Bologna, 2010. Fig. 13: Ozmo, Foligno 2010. Fig. 14: Stan & Lex, Roma 2010.

not to create, a relationship between daily life and work of art painted in continuation of that trend to merge art and life that belongs to all the '900, from avant-garde movements to this days. In the apparent gap that separates research from the second half of 1900 until the '80s we can remember many examples of this art approach to urban space. There is the painted towns tradition, beginning with the earliest experiences of Arcumeggia (VA) and San Sperate (NU) to Dozza (BO), Casoli D'Atri (TE) and Maglione (TO). Smaller towns and villages, as in big American cities where immigrant communities (Latinos and African Americans) use to mark their precise identity through signs traced on the walls, adopt these forms of expression as means to declare the continuity of a collective "genius loci".

This impulse is shared by the younger writers who strongly affirm their own identity within an alienating and alienated urban setting. It is important to remember the echo on the national art scene, of the exhibition in Florence by David Alfaro Siqueiros in 1976 who exposed a great overview of the Mexican artist, a great experimenter of formal solutions and technical choices in which industrial colors and the use of the compressor combine with traditional pictorial practices. To the figure of Siqueiros we can also associate the social and political activities of artists like Aurelio C. in the Centro d'arte Pubblica e Popolare in Fiano Romano, and the Chilean artist refugees in Italy after the military coup of 1973 and in particular the Brigata Pablo Neruda. To close this short series of anticipatory activities of the street art we remember that, between the '70s and '80s, many artists often performed together in public areas such as the collective Autonomo degli artisti del Ticinese, promoted by Giovanni Rubino, the Fabbrica di Comunicazione in Milan and the Collettivo Artistico del Movimento Studentesco, which, with different attitudes and practices, experiment the relationship between work experience and urban space.

Arriving to more recent years, we can consider pioneers Pea Brain (Monica Cuoghi teaming with Claudio Corsello) and 108, while from the early years of this decade primarily three schools emerged in Milan, Bologna and Rome [9]. Among the major names involved we can mention Sten Lex, active since 2001 and

Fig. 15: Murales by Os Gemeos, Nunca and the Italian Blu realized for the exhibition *Street Art,* Tate Modern, London, May-August 2008.

considered among the pioneers of "Stencil Graffiti", Bros and street poet Ivan Tresoldi, Abominevole and Ozmo, who offer early intervention at a national level in 1999, TvBoy, now active in Barcelona, Microbo and Bo130, the illustrator Cristian Sonda, Nais and Orticalnoodles. Initially active in Bologna, but now working all over the world, are Blu, street artist and video maker worldwide famous after his participation in the exhibition of 2008 at the Tate in London, Ericailcane and, finally, Dado and Stefy. In late 2000, the movement took different courses and is now in part institutionalized through collaboration with city administrations as well as with the world of museums and galleries.

3. Street art as a new urban value catalyst
In Italy there are many policies of institutionalization and emergence of graffiti-writing conducted by several Italian councils and by private actors in recent years. Let's consider, as examples, the initiatives carried out in Turin with the project Picturin, the development project for young energies sponsored by the Italian Ministry of Youth actives in ten cities including Civitavecchia, Foggia, Campobasso and Teramo, a series of festivals run by private organizations such as the Pop Up Festival in Ancona and the Fame Festival in Grottaglie (Taranto). Through these examples the phenomenon of writing can be analyzed as a form of citizen participation oriented towards art practice marked by the urgency to assert personal existence and voice. These acts are always directed towards the general interest and are committed by individuals who, through the practices of the tags, bombing or graffiti art, trying to rewrite urban space. This is an appropriation and aesthetic redevelopment of urban space, especially peripheral metropolitan areas. Many local governments have accepted the civic potential of these practices, developed and flourished illegally, so that they can emerge, often making them institutional and, therefore, legitimate to the eyes of a, often contrary, public opinion. A punitive approach different from that one led by many Italian mayors in recent years. As we have shown above, graffiti art has a history and artistic importance now widely established, in which many writers have become established artists, able to pass from the walls of the city to those in museums. The multiplicity of the phenomenon, however, is not consumed in its artistic value but embodies ideas and needs from the world of political communication, the urban redevelopment and practices of active participation in the transformation of public space. The realized projects were able to give value to this variety of stimuli, considering the graffiti practice as juvenile forms of civic action, initially secondary and then becoming more integrated in public art forms. These actions are aimed at creating a collective voice and

Fig. 17: ROA, *Draw the Line Festival,* Campobasso, september 2011.

identity that leads to the recovery of urban space and taking possession of the aesthetic and cognitive space of an urban environment, felt first as hostile and homologising and then re-written in collaboration with institutions. The city is a system that continually produces signs and meanings, a discursive space that projects onto itself a heterogeneous text, in which frictions, human practices, social values, cultural and political issues (institutional or underground) attribute to space meanings to be deciphered and composed. In the city we have not only graffiti but a chaotic whole, from the cognitive and aesthetic standpoint, made up of street names, billboards, ephemeral architecture, street signs, voices more or less conflicting. These projects were able to trigger a common table in which testing collaboratively one of these forms of writing in the city and record the shift from simply writing on the walls to street art.

The phenomenon of graffiti/writing has long been interpreted as a self-referential practice (tag, lettering, bombing...) with which ghettoized citizens are free to speech declaring their presence in contrast to the alienation and anonymity of the suburbs produced by the industrialized society. According to this view, the art legacy of these writing actions is closely linked to the political and existential need, first individual and then collective. Let's think about the transformation undergone by graffitism in critics and in the general opinion which evolved from uncontrolled and spontaneous act to street art with explicit political values as testified by those mural produced by antagonist groups active, since the early nineties, in many European capitals and in Italy, in Milan, with the Leoncavallo and, in Bologna, with the famous XM24 where took their first steps artists such as Blue and Ericailcane.

Interestingly, from the aesthetic point of view, the shift from writing to the street art coincides with the one from forms of self-referential writing, abstract, preferring the work on the "letter" and the tag, to figurative practices, which, on the contrary, tend to experiment with representation and act as a return to more traditional techniques of painting as seen in the works of Belgian Roa or Spanish Aryz. It would seem that the work of institutions and of a part of the art system, together with the development of a different views inside the new urban planning, made possible to enhance the artistic section of this form of active citizenship, reducing (or hiding) the motivations of social and aesthetic alienation that brought the first writers to compulsively prove their presence with the tags, often banal expressions of vandalism directed to occupy an amorphous urban fabric. This does not eliminate the compulsion to assert themselves through graffiti (although the phenomenon, compared to the '80-90 is much reduced if not disappeared, as happened in New York City), especially when it is the effect of a state of malaise and social marginality, but it is indicative that when the city, and its many players, seek to share the creation of forms of writing and re-write the city, the result will lead to greater social cohesion, a strengthening of local and historical identities, and the enhancement of urban space with its multiple meanings.
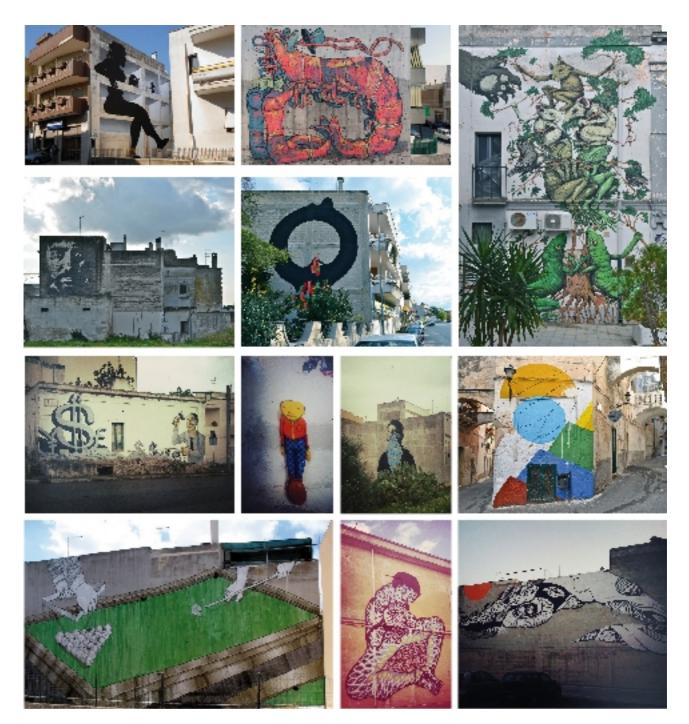
Fig. 18: Fame Festival, Grottaglie (Ta). Organized annually by Studio Cromie (Angelo Milano), the festival brings together artists from across the world to spend one to four weeks in the city during the spring and summer, creating installations, murals, screenprints, and ceramics in advance of a group show usually held in september. The event is away from any political interference and public funding and each year is accompanied by a vein controversy. Some of the first works, specially the ones made by Blu and Ericailcane, met a strong local opposition that caused the removal of the paintings from the walls. During these years people now seem to appreciate more and more the art touches that are coloring their city.The interventions are set non only in peripherical areas, where trivial rise condominiums in areas desolate and almost deserted, but also inside the old town, an area important for the city as the seat of the ancient quarter of ceramics. Thanks to new works of street art, the small town has gained international reputation attracting tourists interested in seeing the works of some of the biggest names on the world stage. The Festival, now arrived at the fourth edition, among the others, shows works by (from top to bottom): Sam3 (Spain), Aryz (Spain), Ericailcane (Italy), Vhils (Portugal), 108 (Italy), Nunca (Brazil), Os Gemeos (Brazil), Dolk (Poland), Momo (USA), Blu (Italy), Bastardilla (Colombia), Lucy Mclauchlan (Great Britain). Photo by Pippo Marino.

Fig. 19: Banksy, Leake Street, London, 2008. Photo by Michael Greenwood.

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URBAN PROSPECTION:
RECOVERY OF UNUSED SPACES FOR CULTURAL USES AND ADAPTATION TO EXISTING URBAN STRATEGIES

José Javier GALLARDO ORTEGA
Professor / Department of Graphic Expression, School of Engineering and Architecture, University of Zaragoza, Zaragoza, Spain
Architect / Department of Culture and Big Projects of the City of Zaragoza, Spain
Director / Magazine 'Z Arquitectura'
Director / National non-profit association urban.prospection.network

E-mail | jjgaor@unizar.es | bang@gbang.biz

Abstract
Urban diagnosis
The starting point was the development of strategies, understood as a program that is developed to achieve goals. The adjustment to those strategies have enabled the contemplation of tactical processes, discovering how to do it, 'thinking about what one does.' Selective analysis revealed invisible structures of our society.

Projects development
Converting into diagrams | The proposed concepts became diagrams. Program analysis, simplification and exaggeration of the initial situation were brought to a outlining point where one originally only knew scattered relationships: those could now be freely discussed in terms of relations of common interest.
The concept | The recovery of disused buildings has been imagined as permeable, allowing high-level relations with surrounding flows. In this way, the building would work to coexist with its troubled situation and not attempt to order it, but to allow 'stuff' to happen there.
The actions | Actions have been understood as a "bottom-up process" or renewal from below, less institutionalised, possibly more real and allowing to "think about what one does." The initiatives have led to participation, social outreach and community work.
Economic efficiency and patrimonial revitalisation | The reuse of disused buildings has pursued expanded goals, namely: functional sustainability related to interlocked programme solutions but with the possibility of independent or simultaneous activation, the forecast of future maintenance costs and, in particular, the social returns and/or cultural relationship with the financial resources invested.

Keywords: Low-cost design, Design for all, Sustainable development, Social sustainability, Economic sustainability

1. Development

Starting from April 2011, a working group participated by the University of Zaragoza and the University of San Jorge in Zaragoza, was established in order to develop the projects proposed by the Candidature for European Capital of Culture Zaragoza 2016.

The consequence... set up a workshop which we called "Urban Prospection Workshop." [1] The goal was the development of projects of the Candidature, through the recovery of unused spaces for cultural purposes, to complement the existing and in the process cultural facilities.

It is relevant the role of the university: "public and the University of Zaragoza provides centrality both in terms of audiences and as generator of public spaces, in the specific process within the Spanish context". This is the new academic power into connection required with political, creative and business power to exercise positive influence in our social sphere.

The workshop was divided into two working groups headed by the rapporteur who endorses this document:
- The Scientific Committee composed of experts in urban planning and urban sociology. This is the urban diagnosis: strategy and public space.
- The Projects Development Team, formed by young architects, professors at the School of Engineering and Architecture at the University of Zaragoza and the School of Architecture at the University of San Jorge in Zaragoza, and architects from the University of Oporto, Portugal and CEU University in Madrid, Spain.

The work resulted in maps of data and link of the city, which served for reflection for further development of projects; these were published in sheets that display diagrams, concepts and images of the imagined, based on the catalogue of tools proposed by the workshop.

1.1 Urban Diagnosis: strategy and public space
It was decided to adapt the workshop to the existing urban strategy by recognizing connections and linkages between the proposals developed and between them and the equipment in service.

The starting point was the strategy, understood as a program or project that is developed to achieve objectives and that, therefore, tells us what to do, but the adaptation to a strategy allows the contemplation of tactical processes, whose show how to do it, "thinking about what we do."

It was possible to think about the concentrated and dense city. Speaking of density does not mean that there are many people per hectare or square meters built, but the city, even a park, it is interpreted as any city, as an urban artefact rather than as a residual fact. It was verified that the continuity of public space allows you to find without looking, through the necessary wealth of chance and unplanned encounters the city should offer. . We needed, therefore, open and flexible urban space that would support the passing of time and the incorporation of new elements generated by the proposed uses.

It has been revealed the recovery role of centrality of the university as a generator of public spaces, particular process within the Spanish context. Consequently, the strengthening of university spaces connected with the "cultural containers" can and should generate economies being able to conclude that culture and university are the twin engine of the city.

1.2 Maps of data and liaison
"To think Zaragoza" and adapt the existing urban strategy needed the selective analysis through diagrams development. At the beginning of the workshop were inventoried aspects related to density, type, location, etc. Through the graphical representation, abstract data were interpreted in order to describe the general structural features. Although it may seem an administrative matter, the creative moment occurred when we ask ourselves what should be registered and how. These analytical explorations have revealed invisible structures of our society that are reflected in the maps of data and liaison.
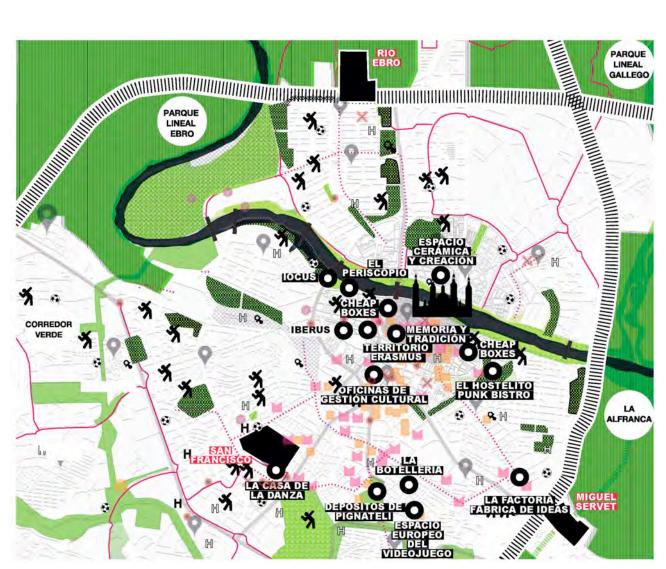
Fig. 1: Zaragoza 2016: under construction. [2]

1.3 Projects development

The diagrams development | It was among the means used to visualize the data, and thus make them to be handled and to design. The proposed concepts became diagrams for the project development. Program analysis, reduction and simplification, exaggeration of the initial situation was brought to a point of outlining where originally we knew only scattered relationships and separated components (data, phenomena, ideas and forms) that could be freely discussed in terms of the relations of common interest.

The concept | Disused buildings, recovered, have been imagined permeable, allowing circulations highly related to environment. In this way, the building will work coexisting with its troubled situation and not attempt to order it, it only will allow 'things' to happen. It will not completely impose certain conditions, making it a flexible container stripped of coded language in forms and materials.

The actions | Those have been understood as a "bottom-up process" or renewal from below, less institutionalized, possibly more real and allowing "to think about what we do." The initiatives proposed by the workshop have involved participation, social approach and work with the community, fostering dialogue between those who do and those who use with the active participation of creators and artists. We intended an appropriate balance between the necessary actions: the institutional or "those who do," the renewals from below or "those who think" and the academic power, "one who can lead influences" in our social sphere.

Economic efficiency and heritage revitalization | It is implicit in the reuse with minimal resources, of disused buildings, recovered for culture. However, in many cases, these circumstances do not prevent high costs in relative terms, for this reason, the prospection workshop has pursued expanded objectives in relation to this matter, namely: functional sustainability related to interlocking program solutions but with the possibility of independent or simultaneous activation; control of construction resources; the forecast of future maintenance costs; and, especially, the social and / or cultural profit in relation to financial resources invested, in colloquial terms, quality/price ratio. Moreover, economic efficiency can be also related to the actions, which seek to change the static conception of culture and art associated with their display and consumption, by other dynamics, linked to the process and production.

Fig. 2: Positioning and working tools for projects development at the 'Urban Prospection Workshop'. [2]

1.4 Positioning and working tools

It is important to position the architectural strategy that we want to outline for the Candidacy of Zaragoza 2016. A strategy able to draw up a plural outlook developed through a continuous and collective workshop that has served to analyse, diagnose and propose. That allows architecture to talk about topics of interest for the citizens, which will enjoy Zaragoza as cultural capital. Therefore, we are proposing a catalogue of architectural tools to join all the proposals. A context of common strategies allowing us to describe with the same codes the different ideas that we propose. These tools target at different fields of interest. From the most tectonic and constructive parts – to classify the kind of spatial action proposed to be developed- to those more related to urban planning that will allow us to take out the programs to the public areas of the city.

Our interests were intensified in three important points.

The first will be an acute accompaniment of the participation process of the candidacy. Different strategies will be taken on by the architectural project that will make possible design teams to be built with multiple profiles: reflecting on how citizens can have an active role on decision taking on these projects.

The second point presents the implementation of the development plan for the candidacy by means of the restoration of underused buildings. Therefore, those constructions will be recovered for the city, a latent infrastructure able to optimise the resources and considering architecture from a much more contemporary point of view.

The last point will focus on how to understand the architectural elements as progressive objects with an evaluative development. They will grow and decrease in accordance with the needs of the citizens for any program at any given moment, before, during and after Zaragoza 2016.

1.5 Actions or transforming effects at Zaragoza's city
A series of actions have been proposed for the regeneration of the neighbourhood of St. Paul in the Old Quarter of Zaragoza. The aim is its transformation into workspace, relational, and residential services for people such as college students, among others. It is in motion the creation of the 'Flower and Culture Market' in the spring of 2012, first initiative to recover unused buildings (Old Pumping Station of the city) that will serve to create public space and the social dynamics, generating independent activities and others related to the presence on site of the Seven Arts.

These are actions under way or planned in other sectors of the Old Quarter: rehabilitation of buildings; the small-scale urban developments to facilitate the movement of citizens; Recovery as public spaces of urban voids; new uses for obsolete infrastructure (designed for administrative, social or cultural purposes); the encouragement of models of public-private participation (private management of infrastructures or public services; incentives to attract the private sector; and the promotion of International Excellence Campus Iberus/Erasmus district.

The first initiative comes with the transformation of the Convent of the Order of Minims of Victory; initially designed as Museum of Fire and Fire fighters, is now a relational space for Erasmus students with study rooms and classrooms for teaching Spanish to foreigners. These actions are integrated within the Downtown Revitalization Plan "The Culture Transforms the Centre" which is expected to generate a feedback effect in the medium term, result of an integrated and continuous action.

Fig. 3: 'Flower and culture market' at Zaragoza [3]

2. Urban.prospection.network
The opportunity to develop the Urban Prospection Workshop resulted in the creation of the urban.prospection.network, cultural and private institution, non-profit and with national and international public projection, founded in 2011 by the undersigned of this presentation.

The urban.prospection.network aims to encourage and promote sustainable development of communities through the creativity of young professionals. Aimed at cultural management, employment for young graduates and impulse of social participation, urban.prospection.network directs their field of study and action on sustainable processes of recovery and recycling of content and concepts, taking on the conceptual basis the reoccupation of abandoned urban structures and its connection with the public space and

landscape, in relation to the creative possibilities motivated by the contemporary situation. It is an urban laboratory network where professionals from multiple technical, artistic and scientific practices offer expertise in creative urban intervention, in order to cooperate in the development of urban and rural areas through multidisciplinary projects at various scales: forms of action beyond the established and generating intensive processes of creation and collective participation associated with the impulse of the sustainable city.

The pilot program is taking place at Calatayud, through the creation of the creative.factory.1|calatayud. This situation is made possible by the signature of a collaboration agreement between the urban.prospection.network, the City of Calatayud and the University of Zaragoza.
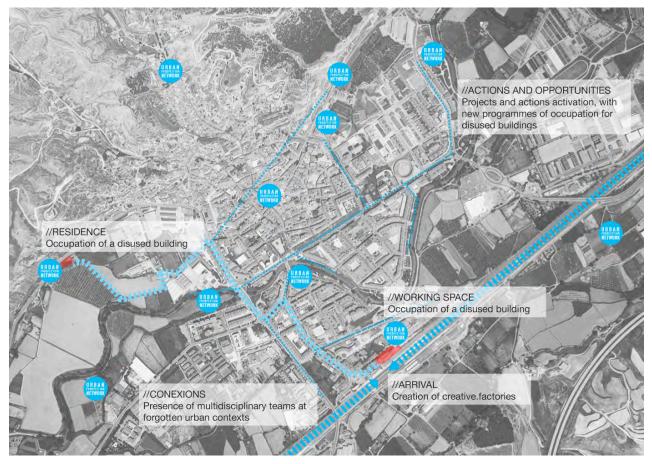
Fig. 4. Action plan at the city of Calatayud [3]

2.1 Actions or transformer effects at Calatayud's city
Projects and management actions are being developed in order to allow the reuse of the former Waters House the residence of the urban.prospection.network team from the spring of 2012. At the same time are being recovered two wagons of the train model TER 597 located in the "Railway Station Park" for use as a workplace and representing the urban.prospection.network.

To reach, To occupy (disused wagons to work) and To reside (recovery of the former Water House) is the method of implementation of the urban.prospection.network in order to identify opportunities for management and urban planning. The first opportunity for development is the creation of the Skate park at the Park of Margarita, with the aim of promoting the green axis of the channel.

Fig. 5: Rehabilitation of the 1965 disused wagons as working space of the urban.prospection.network at Calatayud [3]

2.2 Generic goals of the urban.prospection.network

/ Urban Prospection through the promotion and defence of the concept of functional sustainability of the cities, promoting actions for rehabilitation/reuse of disused buildings and structures and the creation of public space.

/ Save from the progressive forgetting the kind of 'unused buildings' understood as 'present built heritage'. For a building to be rated 'disused' is necessary that the population and the entities assume it as such and therefore should never be forgotten.

/ To promote research that may arise, from the conceptual project, the recovery of all the in disuse built environment and its protection against aggressive real estate.

/ Establishment of processes of response to the lack of infrastructure in different settings, completing and diversifying (in audiences, functions and location in the city) the social, cultural, sports and academic facilities.

/ Development of minimal impact projects that aim functional profitability and allow the use of the buildings by completing all the space, with reduced maintenance costs.

/ To submit proposals of management and occupation that allow to identify a list of unused buildings.

/ Interventions in urban voids, regenerating degraded environments in historic centres, loo-king for social participation and work with the community.

/ Interventions in the gaps of the new urban spaces that arise in the periphery of cities. The occupation of spaces on the ground floors of apartment blocks, to locate basic needs of facilities (libraries, neighbourhood associations, senior citizens, school children, etc.) will create relationship and connection to public space (the house does not end at home, communicating housing and urban context) and will be complemented with the occupation of public parcels/private lots with no activity, by using recycled materials and low-cost executions, managed to create a relational urban model through the location of landmarks, axes, networks and systems.

/ Prospection of the edified and its relations with the landscape, on an urban and/or territorial scale.

/ To propose new concepts of occupation, through adaptive hybrid programs of uses.

/ Strengthening of the connections between political, creative, academic and business forces.

/ Social participation, promoting the relationship between those who do and those who use them.

/ Dissemination of national and/or international projects which transmit innovation, creativity and knowledge with the aim of promoting sustainable development and functioning of cities.

/ Strengthen global discourses that generate brand awareness and that allow the communication of the projects.

/ Encourage the growth of cultural industries, promoting active participation of citizens and creators and encouraging networking.

/ Activation of citizens potential which, by the experiences of the past, does not depend exclusively on the creation of 'cultural containers'.

/ To use relevant artists and cultural producers communities as triggers, through the display of his creative process and its interaction with other agents.

/ Organization of spaces on two levels: local communities as a tool for social innovation and 'creative economy', meaning any social intervention as a hub for creating and producing technical, scientific and cultural support for the national and international consumption.

/ Generate new economies to ensure their sustainability.

/ Connection of the social infrastructure projects and cultural strengthening at the university spaces, when available at the site of intervention.

/ Academic power must be understood as an economies generator (as well as audiences and public spaces).

/ Incorporate into the strategic vision the management details of areas and projects, to ensure that aligns with the stated objectives.

/ To work and strengthen creative and innovative community networks that use network infrastructures such as resources and organizational platform.

/ Citizen networks will generate social innovation for sustainable development, inclusive and creative; cultural, scientific, creative and technical productions as a generator of new economies through cultural entrepreneurship.

/ To create international hubs of cultural, technical and scientific economics, as talent importers and exporters of cultural production, working based on small entrepreneurship initiatives to provide them with scale through its organization in networks of all kinds.

/ Culture and university can be a twin engine of the city: culture as a tool to promote pro-active and innovative citizenship and as an economic engine. The university as a generator of public space, knowledge and innovation.

/ To create urban laboratories in order to increase the capacity for social innovation and pro-active citizen participation as well as improving the linkage of some of the potential drivers of innovation (such as universities) with the real economy and society.

/ The local 'amateurs' citizens' network who actively participate in production projects for intervention at the local level shall be learning, civic debate and collective construction communities of the city from 'bottom up'.

/ The networks of 'professional' creators oriented to the arts and culture production will have a global horizon and a potential generator effect of local economies and at larger scale.

/ Local creative professionals and local networks shall share resources and work collaboratively to develop interdisciplinary projects.

/ Creation of a platform for dynamics of citizen networks to identify, build and strengthen networks of all kinds through a combination of facilitation, resources (spatial, of knowledge and of technologies) and visibility through the actions: Mapping of existing initiatives and creators ; Visibility of creative processes (culture and technology linked to the process, to labour assets and to production); Transfer of project documentation to digital spaces; Network of managers, mediators and communicators.

/ To promote actions for local networks of 'amateur' citizens, creating an ecosystem of citizen laboratories oriented to the social innovation and based on the transmission of disciplines, the collaboration between professionals and local 'amateurs', on 'learning by doing' through the development of collaborative projects and inserted into the culture of prototyping. Living-labs, medialabs and self-managed social centres shall be taken as reference, through processes of negotiation and collective agreements between citizens and public institutions.

/ If appropriate, encourage actions to turn the university into a platform for the creation of new economies and their integration into civic innovation processes.

/ To conceive the 'university projects and containers' integrated with the proposed strategies for citizen networks to design actions that lead citizenship to the university spaces and secondly, and more importantly, lead 'the academics' to the cultural, technology, science and innovation spaces.

/ To promote the reflection and the discussion related to any area of knowledge, broadening the participation of audiences increasingly diverse and heterogeneous.

/ To promote young creative professionals in the contemporary artists scene.

/ To support the professionalization and internationalization of young artists.

/ To promote and encourage the creation of technical and scientific knowledge in technical and creative areas.

/ Encourage the exchange of ideas, promoting cooperation projects.

/ To promote personal and professional assessment through training initiatives.

/ Community awareness for creative production of young professionals, raising them to social change agents.

/ Creation of public employment, with the objectives: training of university students without professional experience, communication of a social message through creative production, and work with the community, creating social proposals through acts of prospection and response.

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Le Vie dei Mercanti | X Forum Internazionale di Studi

+less
more
architecture
design
landscape

"LESS IS MORE". Eternal truth, eternal good and eternal beautiful

Maria Grazia CIANCI
Department of Architectural Planning and Studies - DIPSA
Faculty of Architecture, University of Studies of Rome Three, Rome, Italy
cianci@uniroma3.it

"Less is more"

Design has undergone substantial changes over the last few years, the new technologies, the new ways of making architecture have distanced the thought of designing from its graphic representation: thought and image have not always coincided. Design's role, its sense has lost credibility, it has been emptied of meaning, it is no longer representative of itself; the relationship which once existed between idea and knowledge has altered its connotation: the idea is no longer the mind's design but the design of avant-garde technology, of the exploration of the virtual.

As Platone posited, ideas are the cause which allows the world to be thought of, they therefore form the premise of knowledge. The Idea, which is more properly translatable with «shape», is subsequently the real object of the knowledge: but it is not only the epistemology of reality, i.e. the cause which allows us to *contemplate* the world, the cities, but rather it constitutes the ontological foundation as well, being the reason that causes the world *to be*, that makes cities exist.

Ideas represent the *eternal Truth, the eternal Good, the eternal Beauty*, to which the vain and transitory dimension of sensory phenomena, of transformations of reality are juxtaposed.

Today's cities are mirrors of contemporaneity, it is as a matter of fact that the sensory phenomena which trigger the becoming of the images, homologated cities, virtual cities, mutating cities become blurred: it is no longer possible to distinguish reality from imagination. The images and their becoming overlap making "Reality" increasingly more unfathomable and there is no instrument that can export the concreteness of such transformations into time.

Keywords: Totality, knowledge, contemporaneity, homologated cities, creation.

Fig. 1: Giacomo Costa: "Fusion n.3" - A world suspended between creation and destruction.

1. A world suspended between creation and destruction

The "city", where men and his creations are compared, exchanged and connected, is and will always be a place of reflection and experimentation for architects. Simultaneously, it must become a place of protected memories. Architecture generates architecture. Conceptual thinking generates images. Images generate design. Designs generate memory.

"Today's city is a scattered reality that is no longer supported by a sovereign firmness, but rather by a shining opulence"[1].*"A world suspended between creation and destruction"* is the title of one of the latest essays written by the French philosopher, J.L. Nancy; who covers aspects that are connected to the world's creativity and expressive multiplicity by addressing philosophical themes from an anthropogenic viewpoint to a figurative one.

This assertion generates different interpretations; from the most obvious ones to the more complex ones under a single interpretative matrix: the *"globalized"* world that coincides with itself. There are no figurative and conceptual elements that can represent the world from the outside.

However, the "globalized" world seems to have only acquired the ability to multiply itself - according to Nancy by all means available. This is repelling: *"it's as if the world were now a journey shaken by an impulse of death that will soon have nothing left to destroy other than the world itself "*[2].

Is it fair to maintain openness towards unpublished materials, surprise, generosity, creativity and expressive opulence?

It is certainly better to question ourselves as to the expressive complexity of architecture by simultaneously trying to find satisfying answers that can avoid any doubt.

The contemporary man is the "creator" of the contemporary world. He is also the author and interpreter of his own creation and, as such, he should assume his responsibilities: understand the events and social transformations to critically interfere in the concrete expression of such reality.

Understanding reality can no longer be achieved by exploring the virtual world. Today, more than ever, the word "exploring" no longer represents a fear towards innovation, but rather the desire to discover the unknown. However, all of this complexity and all of this expressive and architectural opulence make it impossible to read that which can be "read". By eliminating the superfluity and purification, as according to Mies van der Rohe's words "less is more"[3], we want to generate a process of exclusion: to cut, eliminate, exclude, re-dimension, subtract, simplify, lighten and reduce the architectural reality.The beauty of architecture can therefore be seen again and so can its best expression, which will also turn it into a contemporary element.

Fig. 2: Giacomo Costa: "Act no.8" – The great monsters.
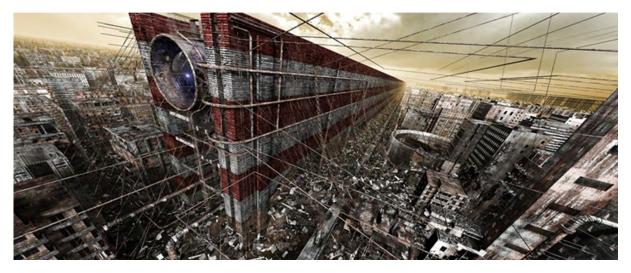
Fig. 3: Giacomo Costa: "The imaginary cities no. 4" - The virtual process and the metaphorical statement of reality.

1.1 Complex Grammar

Contemporary architecture uses a complex language full of metaphors and impalpable conceptual stratifications, but it also furiously invades and penetrates the urban space. It fills itself with sensational images that touch the most intimate senses of human beings, therefore inciting uncontrollable reactions: passion, hate, interest, waiting... but never indifference. These complex linguistic stratifications belong to a subjective code; a code composed of a complex grammar that is often difficult to decipher.

This enigmatic code is well represented by the horizontal architectural achievements of Giacomo Costa, a Florentine artist. These epics, personal and attractive visions of the contemporary elaborate the theme of unrealistic cities. A science fiction-like, surreal and virtual panorama, or a reflection of our contemporaneousness, which assumes an entirely symbolic value to witness the colonization of humans within the natural environment [4].

The impression one gets when looking at his accomplishments is that of a lack of reality.

Urban visions suspended between tradition and modernity, between reality and dreams; complex visions that float through our minds like small "perceptive inputs" ready to stimulate our creative memory.

Fig. 4: Giacomo Costa: "The imaginary cities no. 6" - Realty and imagination.

These overlapping "visions" and these contemporary - or not - architectures contrastingly cross each other's path, therefore generating emotional outbursts. Just like the many architectural achievements of contemporary masters.

Reality is no longer static. It is in continuous evolution and the images, designs and models are able to express such changes: a back and forth rhythmic and sometimes uncontrollable yet impulsive evolution.

Our perception is focused on an incomprehensible path. The trajectory is not satisfied with reality so it unveils through a space full of illusions.

Complexity and opulence often generate "monstrosity", an architectural metaphor that navigates through architectural space trying to find its definitive and final position.

This form of navigating through unknown "seas" is often turbulent. It entails great mastery and control over the "available instruments" and one can easily get lost. Not being able to control such instruments is what made the contemporary architectures deviate; far from the "still lands", without points of reference and through a very difficult journey. This tendency to exasperate in terms of shapes and ideas must necessarily end once the extremely complex and abstract point has been reached.

Finding an objective reference within this simplicity is essential: making the real world coincide with the virtual one and vice-versa, but also the complex one with the simple one, internationalization with nationalization and black with white. For this reason, one must become self-conscientious and find a solution.

Maybe, the solution is simpler than one may think. We can find it in what we do naturally:

1) *We stumble upon a problem;*
2) *We try to resolve it by - for example - proposing a new theory;*
3) *We learn from our mistakes, especially from the ones we encountered during the critical discussion of our attempts to resolve the situation;*
4) and finally, we backtrack and accept our responsibilities [5].

And this is a "life lesson" we should never forget.

We must have the courage to face reality, no matter how complex or difficult it may be, and we must address it decisively and firmly.

If we direct our efforts towards a common objective, towards simplicity, then we can open a gate through the fatally contemporary trend to end the process of "exaggeration".

We could therefore go back to the "eternally true, eternally good and eternally beautiful" elements by neglecting the *"special beauties in order to reach the single vision of eternal beauty: Goodness".[*6]

Fig. 5: Zaha Hadid; Grand Buildings, Trafalgar Square.

Fig. 6: Lebbeus Woods: Unrealistic cities.

2. New horizons: changes and standstills

The future things to come, the ones that degenerate or change, are "*the fruits of perfect things in a certain way*". This is why it's good to try and find the origin of such ideas.

We need to get rid of the superfluity in order to find the real essence of things; pure beauty, absolute goodness. We need to get rid of some of the superstructures and of expressive complexity. We need to abandon excess and to find that rigor that makes architectural thinking eternal.

Mies van der Rohe's "*Less is more*"is a motto, but also a way to understand the founding reasons of architecture in order to "*fully understand the word itself and without associating it to the other meanings it entails*" (Franco Purini 2007).

We must acquire awareness on the frenetic and complex appearance of contemporaneity. Such complexity can only be grasped from a dynamic perspective. Highlighting the evolution of characters rather than their state of permanence is not sufficient.

"I think that practice is not sufficient for the arts that are not purely applied. Learning how to think is extremely crucial. An artist must be able to justify what he does.

*In order to achieve this, he needs principles to determine his judgments and to justify his decisions so that he cannot instinctively say what is good or bad. Principles that will help him express his human judgment; the judgment of a man who knows how to attain Beauty and to justify himself" (*Marc Antoine Laugier, 1775).

Continuous changes, temporary interruptions, other infinite variations, standstills and back and forth movements generate ideological, expressive and - especially - visual confusion.

This is a type of behavior that tries to find the new instruments of this digital revolution to compare itself to a reality that is undergoing continuous transformations: even at the cost of getting lost in the blobs or in complex geometries that can only be achieved with the help of a computer.

Thanks to all of this, the appearance of metropolis Europe has strongly changed over the last ten years.

The atopy, hybrids, out of scale figures and the new monumentality now prevail: all disarming figures!

There are no more hierarchies or measures of reference; everything is expandable.
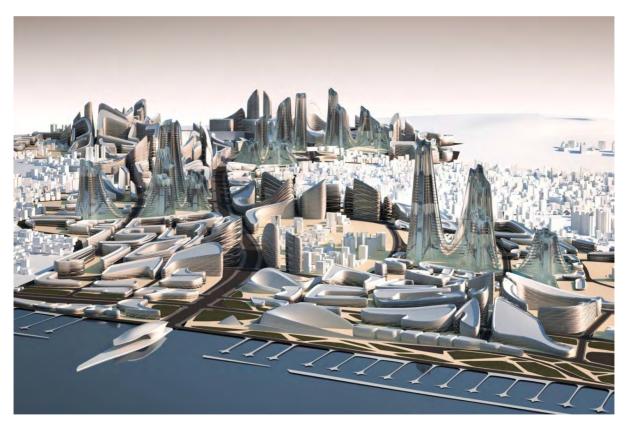
Fig. 7: Zaha Hadid; Kartal Pendik, Masterplan Istanbul.
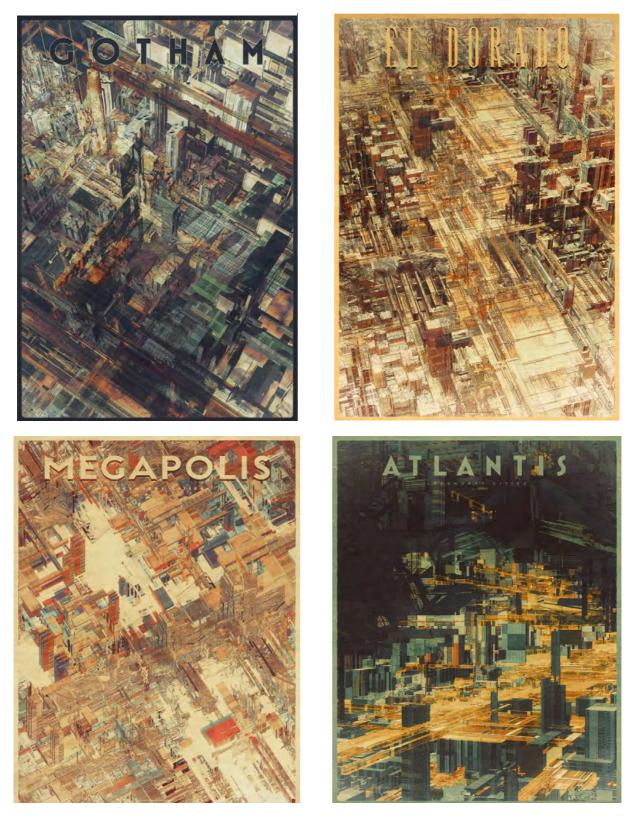
Fig. 8: Atelier Olschinsky; Legendary Cities. Urban complexity and stratification.

2.1 Thinking through images

The city and its architectures have become illegible and metaphorical. For this reason, we need a new code of interpretation that can allow us to translate and codify them. The ancient myth of Babel, a place of dispersion and disorder, was chosen as an example in one of Rosario Pavia's essays.

It was used as a symbolic reference to explore the shapes and identities of the third millennium's cities.

It resulted in "*an overproduction of images*" that appear to be indecipherable, like a *"messy magma deprived of spaces, objects and relations"* [7].

The city is more and more becoming the fruit of an overproduction of images. Their dominance erases the scales and their disarticulation imposes new methods of orientation. The vision is swiftly centered on immediacy; the gazes are directed towards the surface.

The image of the contemporary city must not only be that of Babel and its limits, negativities and contradictions. It can and must also be part of a project, challenge and involvement; which can only be achieved by deciphering and by making the world less opaque.

By simplifying its representation, or by canceling and subtracting communication data, signs and images, we can attain a principle of continuity, narration and interrelation for the different scales.

This new urban condition allows few alternatives.

Calvin had grasped them lucidly "*...there are two ways to make sure we will not suffer from it: one is to accept this hell by becoming part of it until it can no longer be seen. The other is risky and it requires continuous learning: trying to figure out who or what is behind this hell toget out of this hell, making it last over time and by giving it space"[8].*

This simplification and critical analysis process can lead us to rediscover the primary values of architecture; therefore redirecting the attention towards the generating principles of anything.

Towards the ἀρχή.

"Thus, the "ἀρχή" do not only represent the similarities we see in different things, nor the dimension from which they come and go. They are the strengths that will determine the future [changes] of the world, or the 'principles' that will produce them and return them to what they were through their governance." [9].

Moving forward with one clear thought in mind from the start: discovering to improve, evolving to grow, experimenting to create and leaving to return.

The things - of the world at least - are part of Everything and they do not sit there motionless and unchanged. They move, vary, come to life and die. They are generated and corrupted, they come and go. Richness is found within the essence of things: *"less is more"*!

"A greater part of those who first philosophized on the idea that the only principles of all things were of materialistic nature, thought that was how all things came to life or originated only to go back; while keeping their substance and changing their qualities.

They say this is the element, the principle (ἀρχή) of things and this is why I believe that nothing is produced or destroyed since the remaining substance is always preserved". (Aristotle, "Metaphysics", I, 3, 983b)
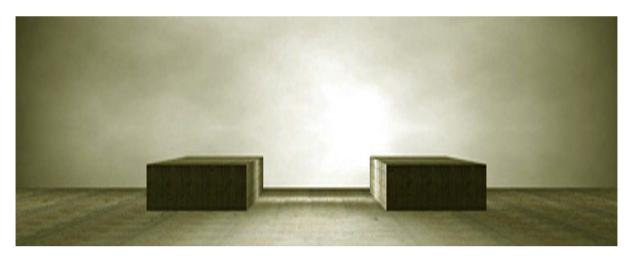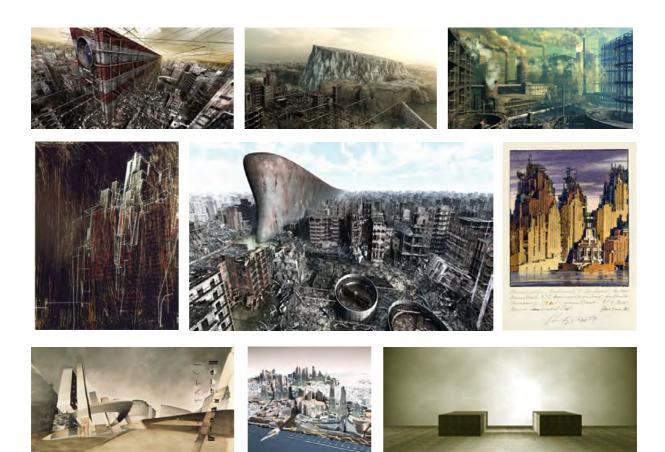
Fig. 9: Giacomo Costa: "Horizons no. 7" - The exclusion process: spatial rarefaction.

Fig. 10: Lebbeus Woods: Metropolitan signs: elimination, subtraction, fragmentation.

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Algorithmic Art · e · crafts.
A Process Paradigm of Assembling 'Multiplicities'.

Evangelia PAVLEA
Dipl. Architecture, Aristotle University of Thessaloniki
M.Arch Architectural Association London,
P.h.d. candidate , Faculty of Fine Arts, School of Visual and Applied Arts, Aristotle University of Thessaloniki, Greece
elinapavlea@googlemail.com

Abstract
Contemporary design thinking is gradually shifted   from a physics based view of the world, to a biological one. Namely, a shift away from typological thinking to population thinking; therefore, to an architecture of performance. Contrary to typological thinking, population thinking identifies the notion of multiplicity as an organizational principle that defines a many and incites architectural variation. Thus, the architectural object would be understood by means of its morphogenetic process and defined as a multiplicity rather than a type.
Artistic and scientific agendas, address a design repertoire that emphasize on process paradigms abstracted from the developmental logics of the architectures of biological systems.
The current paper will address a theoretical framework for new pathways, linking algorithmically folding procedures and bio-computational theories, with the embodied act of making & the role of the handcrafted. It will draw an argument about intelligence, performance and beauty, assessing case specific criteria to folded art·e·crafts by means of geometric behaviour, material characteristics, manufacturing constraints and assembly logics.
The paper makes a statement for the process of folding by thinking in terms of the many and applying variation as a system of thought. It relates process and form with pattern and behaviour; and designates a design apparatus driven by choreographies of inter-relationships and interdependencies as in natural formation patterns.
.
Keywords: morphogenesis, variation, performance, multiplicity, natural patterns

1. A 'Many' as a system of thought

1.1. The Natural Paradigm
Ernst Mayr states that, 'For the typologist, the type (eidos) is real and the variation an illusion, while for the populationist the type (average) is an abstraction and only the variation is real'.
Modern typological thinking employs the idea of type to standardise norms, functions and manufacturing techniques. This manifestation does not account for the parameter of time; therefore any architecture of performance.
Peter Trummer incites a transition from type – based thinking to a population – based approach and defines the Deleuzian notion of multiplicity. A concept related to the processes that drive the appearance of the variety of forms within our world. Multiplicities are related to process paradigms; delineated as interrelated functions of form, structure and material behaviour.

The developmental logics of natural systems suggest a paradigm which focalize on the process of formation instead of a set form. Their architecture is perceived as a system comprised of and working with a series of interrelated systems. It is considered successful in the sense that it uses the minimum amount of material to make their structure and because it is optimized to influence their local environment.

Behaviour rather than form constitutes the generative pattern under investigation. Behaviour is non linear and context specific.

The physical process that underlies the development of living forms is called morphogenesis and emphasizes on the forces that generate them. Within architecture, when morphogenesis is employed as a generative design tool, it facilitates the development of component-based, polymorphic systems.

Morphogenesis comes into view by two processes: differentiation and integration. Differentiation within a system manifests itself as an increase of differences. Integration accounts for an increase in number or strength of system's connections.

A design paradigm following principles abstracted from the natural world exhibits emergent properties. It also evolves and maintains its entity under the process of self – organization. Variable materiality, assembly strategies and iterative geometry operations account for the display of emergent and self – organization phenomena. As Michael Weinstock states, an emergent whole form can be a component of a system emerging at a higher level – and what is 'system' for one process can be 'environment' for another.

1.2. Folding as a Morphogenetic Technique

The current paper will propose a methodology for assembling differentiated surface elements by addressing ordered sequences across the process of paper folding. Multiple rotations manifest the generative principle.

It suggests a morphogenetic process that demonstrates the architectural object as a physical - analogue system capable of generating surface elements, out of the inherent properties of paper folding. This involves an investigation around the definition of folding both in geometrical and material environments. It engages the resultant flat and folded outputs, geometric analysis of experiments' outputs and their implementation into an assembly synthesis.

The methodology, instead of defining a specific typology for a surface element, describes surfaces as a multiplicity and it focuses on the variation of objects and their assemblage.

Additional to form generation, the primary objectives are driven by understanding the origin; flat state and the processes that guide the evolution of the artefact. Emphasis is placed on the chains of operations that are executed and on the formation pattern of the three dimensional; folded object.

Speculations upon regularities and symmetries both in flat and folded state along with repetitive patterns, inform the morphogenetic strategy of the assembly synthesis. Analysis based on a real scale material combines geometric outputs with a structural system's logic and identifies the assemblies' performative capacities at a local, regional and global scale.

A flow chart that processes all the data into an integrated schema is illustrated as an epilogue for the specific research; providing a prologue for potential analysis methods and corresponding applications.

Design experiments, physical or digital, take place through an envelope of possible formations and produce multiple variations of form, inseparable from their structure and material. Processes where form, structure and material act synergetically so that their interactive output cannot be deduced to a single object.

Self - organization principles are expressed by means of geometry. An increase in the order of system's behaviour is generated through geometrical iterations. Material inputs and assembly strategies create differentiated behavioural patterns; while local units have a dynamic relationship to each other and to an informing global geometry.

What emerges is the necessity for redefining local and assembly inputs across the design process. Emergence is produced out of geometry and material performance, when it comes to the point where the initial inputs to the system are not identified in the repetition pattern. Then, the system needs to redefine the initial input with regards to geometry, scale and materiality. Keeping constant the geometric form, differential material inputs result in differentiated performative patterns (Figure 1).

2. Research Analogies

2.1. Pattern in Nature

In natural morphogenesis formation and materialisation processes are inherently and inseparably related. Therefore, to understand the process of folding as a morphogenetic one, it is necessary to define a fold both within a geometric and material environment.

Natural material systems involve movement to achieve adaptation and responsiveness. In plants, the mechanism is differential pressure in an asymmetrical arrangement of cells.

The behavioural principles stemming from the reaction of the sensitive plant, Mimosa Pudica, when it is irritated, incites a morphogenetic folding scheme associated with hierarchy interdependencies.

The plant, when stimulated, folds its leaflets around an axis by rotating and bending them downwards. Specialized organs that constitute strategic nodes within plant's topographies serve as flexible joints that control the movement sequentially. Stimulus repetition enhances the overall performance and the polymorphic output.

The movement is reversible and operates as a defensive mechanism.

Hierarchies within hierarchies are established under local interactions, expressed through sequential folding by rotations around variant angles and axes that take place across plant's topographies.

Natural systems' folding function in order to facilitate deployment, refers to a total of angles around a node more than 360^0.

Deployment in nature is by definition a criterion for survival. Growth itself refers to the deployment of a single cell. Effectiveness of deployment constitutes a parameter of success for all living organisms.

Folding in plant systems is actuated by changes in shape, as aforementioned in the sensitive plant, or changes in stiffness by controlling fibre orientation.

Leaf unfolding is actuated by a single fold. It is an irreversible process that indicates growth.

The leaves of most plants while folded inside the bud, unfold to generate a surface. Symmetry with regards to axes is crucial for system's stiffness while unfolding. Namely, leaves unfold in two ways: by a primary axis that elongates simultaneously while the surface unfolds in a biaxial or in a radial manner.

The surface between axes expands simultaneously with them. The controlling factor is fibre orientation in the walls of cells of the upper and lower surfaces of the leaf. Expansion finishes when the fibres have rotated 90^0, where the process ends and the surface is stiffened in the expansion direction. The process is environmentally oriented. In this case geometry is integrated into a mechanical function. The axes (veins) transport water and assimilation products within the leaf and provide mechanical support. In parallel, they enable a leaf to decrease drag in the wind and subsequent mechanical damage and sustain their own weight and other small loads (Figure 2).

2.2. Integrating Geometry and Materiality.

In stark contrast to natural deployment and within an abstract mathematic environment folding process constitutes a system of parametric equations. Folds' topology is related to rotational functions which coordinates points on a circular circumference by means of a constant radius.

Folding is accelerated [180^0, -180^0] or decelerated within a range of 360^0. Restrictions are related to the sequenced folding actions that take place, due to the fact that each fold added, varies the relational parameters of the folding equation.

A material adds certain constraints to the rotational function that characterizes the mathematical immaterial process of folding. These constraints regard fold direction and fold angle range. Taking the logics of a very simple material system interrelated with the folding process such as paper, certain constraints and limits of making through the self-forming tendencies of the material affect the folding function.

The process that facilitates paper folding is scoring. Paper folding and scoring are mostly a matter of understanding the properties of paper fibers. While folding, it stands crucial to consider paper scoring parameters such as grain direction - the direction in which the fibers align on a specific sheet of paper, fold sequence and paper thickness. Therefore, the most efficient way to fold and score paper is positioning grain direction parallel to the folds and score.

In an attempt to scale up the process, additional constraints should be added to the folding function. Some of these constraints are related to factors such as material thickness, joint connection ensuring surface continuity and strain energy stored in each fold.

Folding as a process has the characteristic that no stretching occurs along the surface that is being folded as long as the surface thickness is relatively small.

Scale constraints of the flat pattern are imposed by sheet folding and cutting technology.

For example, a folded component is generated after a 3-fold rotation. Radius variations of the circle in which the component is inscribed is defined within a range of [75cm, 150cm] specified by flat sheet dimensions.

Static structural analysis will define the material thickness. Scale applied, is equivalent to the smallest radius r = 75cm given by the aforementioned constraints at flat state. The material is structural steel analyzed under gravity loads. It designates a construction material that cannot stretch and has tensile yield strength of 250 MPa which shows significant resistance to   plastic deformation. Analysis commenced shows that 1mm thickness component is the most appropriate to proceed because it demonstrates rather low stresses (the tensile yield stress of steal is at 250 MPa), while mostly deformed areas are the wide ones and the ones that are folded at a small angle.

2.3. From Mathematical Analysis to mathematical synthesis. Generating the Symmetry Operations.

Folding as a process itself constitutes a symmetry operation, since it preserves all lengths and angles occurring in an object.

A regular plane is defined as the one that is extended without boundaries in all directions and can be filled or divided into infinity, according to a limited number of symmetry operations, with similar geometric figures without leaving empty spaces. M.C Esher's regular tilling demonstrates a paradigm according to which symmetry operations are fed upon themselves to produce repetitive patterns.

Taking advantage of these dynamical relations of rotations and reflections applied sequentially, we generate a flat pattern. The component employed to proliferate the pattern is defined by a three-fold rotation of a unit of 120^0. Folded assemblies are generated by the symmetry operations of rotation and reflection applied to the component iteratively, both at a flat and folded state.

The assemblies perform an incremental loop of rotations and reflections till certain conditions are met. The flat pattern, being self-generated, has the potential to be repeated and generated endlessly. A domain is defined that affects assemblies' periodicity. Having applied a specific number of rotations and reflections, the initial component needs to be redefined in terms of scale, material and geometry so as to preserve its significance within assemblies' growth, under symmetry operations.

3. Assembling 'Multiplicities'.

A recurrent assembly methodology, generates folded variations, corresponding to three dimensional artefacts and two dimensional surface elements. The proliferation environment is defined by an algorithm that drives components' distribution. The algorithm is generated by a sequence of symmetry operations – rotation and reflection. Its successive states are traced by means of 'rotation centres', a multiplicutive construct that drives the transformation process into 'population' outputs. Population outputs increase in number till material and therefore assembly constraints are reached; and the algorithm recurs.

3.1. Synthesis. A lattice, a primitive cell and fold definition.

Two grids are constructed out of fold intersection. A rectangular grid resulting from evenly spaced horizontal and vertical fold lines; and a square grid from diagonal fold lines. Fold intersection, generates nodes that define a lattice as a repeating arrangement of points spaced regularly. Any point can shift onto another by using symmetry operations.

A local geometric formation within a lattice establishes a primitive cell. The primitive cell is defined as the minimum topological area corresponding to a single lattice point demonstrating translational symmetry in two dimensions.

Node connection of the two grid systems sets up a regular pattern attributed to triangulation techniques. Therefore, pattern hierarchies are invariant of node displacement.

What vary are the generative symmetry operations. Node displacement limits translational symmetry to the horizontal direction.

A fold is defined by a line. Any fold line subdivides a pattern in two regions. Any additional fold is integrated in this division. Node alignment corresponds to fold lines. Node interdependencies within this local domain generate a fold pattern. Triangle arrangements within this domain define fold sequences. Physical experimentation on paper folding detects that an angle of 120^0 degree appears to be the most efficient.

Folding is a sequence dependent process. Folds interact with existing folds, when a fold line is added to the pattern in an interdependent manner. Sequence and direction of folds added redefine the folded formal output.

Folding assigns rotational functions. Fold interaction synthesizes a synergetic system of successive rotational functions that exhibits self-organizing behaviours.

A fold addition adds a rotation mechanism, interrupting the relaxed folded state. A new function is defined that incorporates geometric information with regards to the points added by the fold line. Surface subdivision constitutes the corresponding output. A fold angle system is a dynamic system of sequential rotations, related to a specific fold angle.

Aggregate rotations generate assemblies' formal output both in flat and folded state. Material parameters integrated geometrically, add information to the rotational function.

A 'fold layer' strategy regulates the sequence of folds applied to the component. Folding progression characterizes component's transformation from a flat to a folded state. It constitutes of two hierarchy levels. The first one corresponds to the successive application of folds till the radial symmetry displayed in the flat

pattern is exhausted and respond as fold sequence. The second one refers to layers of folds build upon fold sequences.

Fold interaction assess differentiated symmetry patterns across the folded surface (Figure 3).

A sequential fold aggregation characterizes the final folded configuration. Assembly layer refers to a fold addition process; so as to facilitate edge connections between components while assembling.

Any interference at flat state is reflected to the folded one and vice versa. The aim of the assembly process is to identify up to what extend repetition, is identified at a folded state. Therefore, rotation and reflection hierarchies constitute the operation toolset to generate assemblies in both states.

Assembly connections refer to component possible connections. Assembly process necessitates additional folds to prevent paper from bending.

A notation strategy is used following the sequence of operations applied. Differentiation manifests itself, on account of rotation centres; a multiplicative construct that recognizes the assembly logic. A threefold assembly represents a rotation centre. Assemblies' generation establishes hierarchies within rotation centres.

4. Assembly Strategies.

Two assembly strategies direct component proliferation within system's growth process. The first one, A_1, successively manifests itself into a three dimensional object. The second one, A_2 manifests itself towards a surface element.

Assembly A_1 exhausts its potential connections after being executed a finite number of times; by creating a loop within the global assembly system. A hierarchical arrangement demonstrates the geometric proliferation environment according to which the assemblies are self - generated under symmetry transformations (rotation – reflection). Each assembly within its hierarchy displays a geometric uniqueness.

Although the design process terminates to a surface element, the system provides variations of potential outputs. The notion of component is expanded, opening the possibility of building up a larger system. Material aspects are incorporated into assembly logics.

The component needs to be redefined to reduce and maintain the complexity of the surface element. This is achieved by any successive sub-assembly system provided that displays similar rotational symmetry to the initial component. The process is repeated iteratively in a fractal-like manner till certain constraints are met. The algorithm will eventually terminate reaching an end – state, provided by boundaries established through material and manufacturing constraints. (Figure 4).

4.1. Rotations centers and Irregularities.

Rotation centres provide the focal areas to follow the traces of the geometric progression while the assemblies' growth process. Rotation centres' hierarchies provided by the sequence of rotations applied, assign local, regional and global topographies across the formal output; which constitutes a surface element. Geometry hierarchies correspond to differentiation hierarchies induced from material constraints. Differentiation is introduced from local scale by interrupting the mathematically defined folded symmetry of the component. (Figure 5).

4.2. Symmetry and Structural Behaviour.

The symmetries of a structure often reveal secrets about how an object behaves.

Analysis is conducted by imposing acceleration loads under standard earth gravity to the component and specified assemblies. The selected material for analysis is structural steel.

A recurrent analysis commences upon component's structural behaviour. It also attempts to identify relations between deformation gradients and symmetrical features. Interdependencies between fold hierarchies and parametric analogies between material thicknesses and orientated structural performance under rotations are detected. A diagram indicates interrelations among differentiated structural behaviours at a local and regional scale.

The structure's deflection recognizes repetitive deformation patterns. Fold addition is a method to reduce deformation provided that it is coherent to the structure's symmetry.

Symmetry preserving phenomena are detected between local and global topographies. (Figure 6).

Deformation patterns display radial symmetry. A regional arrangement displays differentiated symmetrical deformation patterns. Scaling up, radial symmetry is shifted into reflection symmetry where deformation patterns are symmetrical along one axis. Rotation centres display the minimum deformation results. They function as structural symmetry regulators in a larger scale. Fold addition is a method for reducing deformation. The analysis indicates that when a fold is added the deformation is reduced by half. Deformation patterns display radial symmetry for all components regardless of fold hierarchies.

4.3. A Process Driven Diagram.

This research proposes a methodology for variable patterns and processes at a flat and a folded state, that synthesize architectures of multiplicity.

Multiplicities, in the course of the research manifest themselves as interrelated functions of form, structure and material behaviour; constrained by manufacturing and assembly logics.

Variations are the output of recurrent geometric processes. Material constraints direct the number of iterations and therefore, population's output.

Assembly organizational principles incite architectural variations, additionally.

The first assembly strategy results in populations of three dimensional artefacts. It exhibits periodic behaviour on the course of the process recurring simultaneously with open – component redefinition. It terminates when its edge connections are exhausted.

The second assembly strategy describes two dimensional populations and terminates when material properties do not allow for further geometric proliferation and necessitate either component redefinition or material substitution..

Criteria for addressing an application would include a context specific analysis conducted to an individual artefact. The contextual environment would dictate the formal output.

Further research would regard a parametric construct of all the aforementioned variables which integrates manufacturing constraints, assembly logics, material characteristics and scalability into a digital model and captures system's self-organizational properties to generate a repetition pattern. (Figure 7).

5. Epilogue.

The research paper demonstrates variable folded assemblies emerging from geometric variations under radial symmetry by addressing formal and material multiplicities.

It attempts to question the inherent nature of an s art·e·craft, following the theoretical framework and the tools and techniques available provided by nature's process paradigm. Emphasis is placed on the primary objectives and the processes that define its substance.

The effort of the synthetic process is transferred from the formal properties to determining essential criteria and establishing the interdependencies and hierarchies between them. The question raised regards the essential nature of the art·e·craft, questioning its boundaries regardless its surrounding context and getting feedback from the process that generates itself.

What is an art·e·craft ?, a process paradigm, a methodological toolset, diagramming techniques, formal variable outputs or the argument itself ?

Providing that even the most abstract formulation of thought has a material dimension.
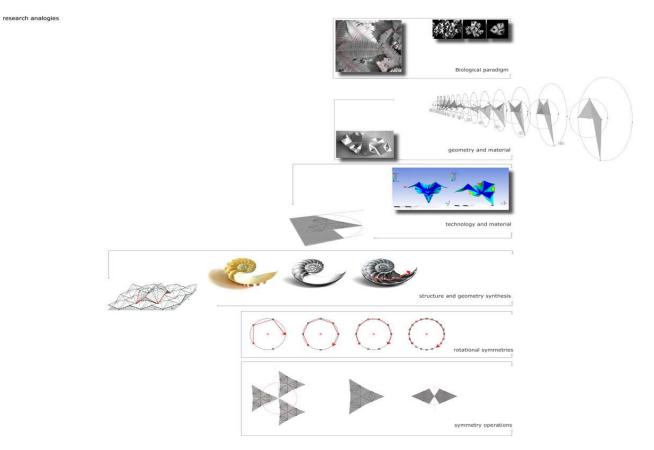
Fig. 1: A diagram delineating the research analogies.
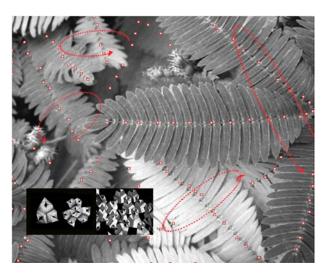
Fig. 2: Rotational interdependencies and growth irreversible patterns, across plants' topographies.
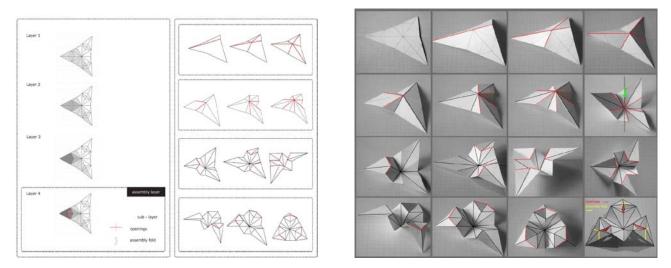
Fig. 3: Fold layer strategy, fold sequence strategy and component's transformation from a flat to a folded state.
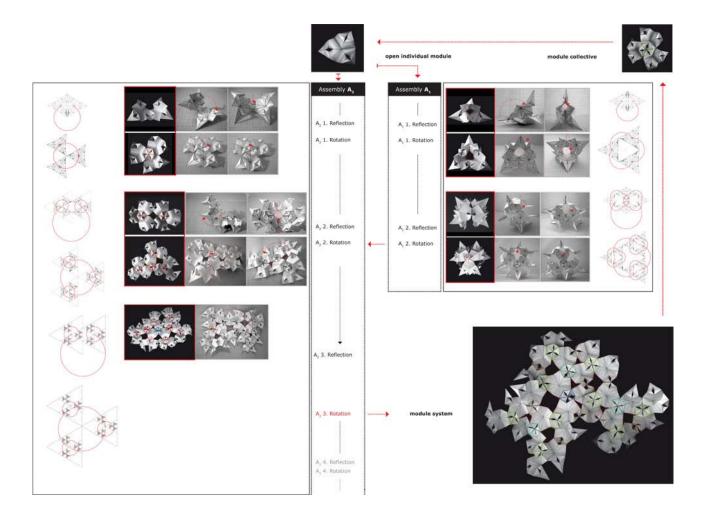
Fig. 4: Recurrent assembly process diagram.
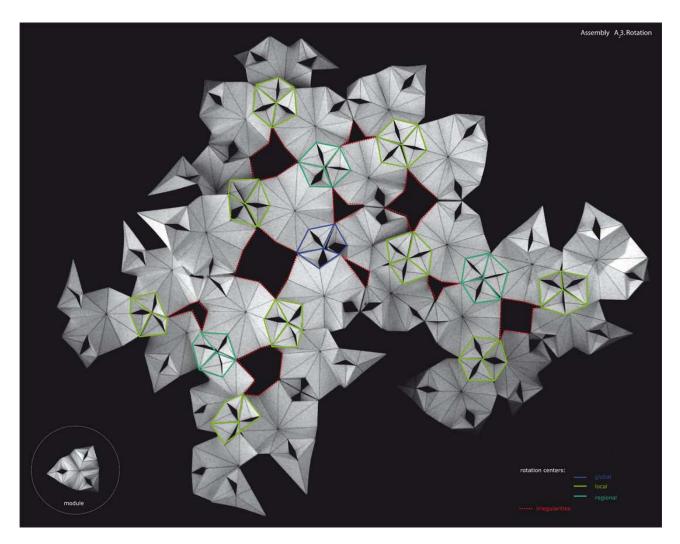
Fig. 5: Assembly A_2 demonstrating a surface element out of three iterative component's rotations.
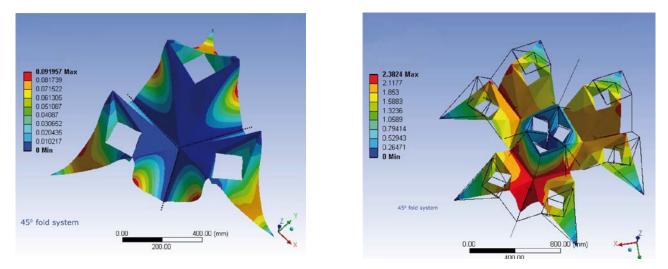
Fig. 6: Deformation patterns after structural analysis exhibit analogous rotational symmetries with the synthesis process.
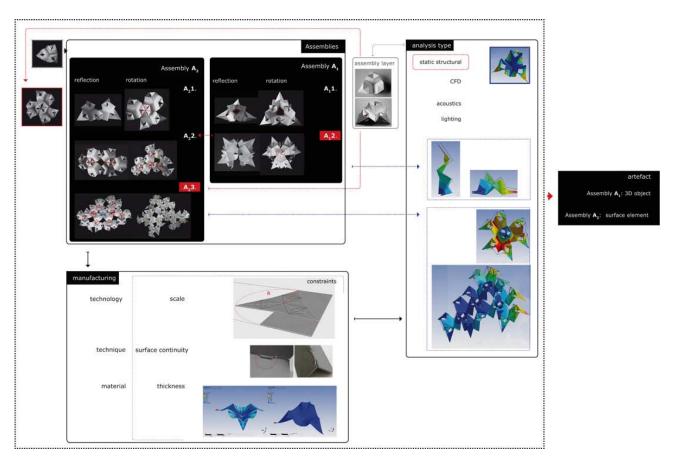
Fig. 7: An aggregate process driven diagram.

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FOUND OBJECTS AND AWARENESS IN INTERIOR SPACES

Mergül SARAF

Department of Interior Architecture, Faculty of Fine Arts, Okan University, İstanbul, Turkey

mergulsaraf@gmail.com, mergul.saraf@okan.edu.tr

Abstract

Creating a new function for an existing building directs the designer to accept some pre-made elements or arrange these elements. This arrangement, which is a radical and arguable spatial discipline, interprets rules, sometimes obeys or else disobeys them. Found object can be an example to this type of attitude. Marcel Duchamp, who created original art objects by using ready-mades like a urinal or a shelf with full bottles, is the first person who came up with this idea. A found object can add an identity to the space, create an atmosphere, correlate with the past and create a dynamic association between today and the past. In this study, the notion of the found object and sensibility in interior spaces is examined along with the relation between these concepts through several examples. The character of interior space, relationship between interior space and user, connection between interior design and art is mentioned as well.

Keywords: Found Object, Ready-made, Awareness, Responsive Interior, Autonomous Interior

1. Introduction

It is expected that a design should have been original, innovative and aesthetic, which comes up as a result of design action that is a challenging process. The aim of the designer is being unusual, functional, aesthetic, economic and permanent when creates a new space. According to this understanding, many design methods came up, for example conceptual design, sustainable design, etc. Working with found object came forward with this idea. Designer would prefer to use the history of building, structure of building, the relation between the building and local people, the building itself or an object which is completely foreign to space. At this point the designer is related with some notion and sense of art (anlamadım). Found objects are related with readymade objects which is also a sense of art, but has different features. These different features are important factors which lead designer to create original and aesthetic spaces. The notion of found object is related with Surrealism and readymade object is related with Dadaism, however both of them are basically related with Avangardism.

2. Found Object and Ready-made

The avant-garde artists take the painting out of the canvas and open their doors to all kinds of material, thus prepared the ground to bring out new possibilities in art. The tendency of putting the industrial (fabrication) products in the center of artistic creation was a comman creation strategy during the Postmodern art movements. Using ready-made objects in art, was one of the basic attitude of avangardist artistic movement, mainly in Dadaism which occured in Switzerland in 1916, Surrealism (1924 – Manifeste du Surrealisme) and Pop Art (in 1950's in USA and UK). Many other avangardist movements as Performances, Arte Povera, Conceptual Art, Fluxus, Happenings and Process Art were impressed by the movement of using ready-made in art **[1]**.

Dadaism is a sense of art which is aganist the art movement of the period, based values of society and destruction of World War I. Dadaists were expressed that they refused the tradition and teased and humiliated a corrupt society. However, by art works which came up with ready-made materials, they enriched the art and had been a pioneer in many subsequent art movement [2]. The movement of using ready-mades, is a sense of art which came out with Dadaism, was a pioneer movement and had a contrary nature on the period which it came out. Marcel Duchamp, who put forward the idea of ready-mades, is one of the most important agents of the Dada movement. Duchamp turned various objects into art objects which have no values in daily life. "Bicycle Wheel (1913)", "Bottle Dryer (1914)", "Fountain (1917)" and "L.H.O.O.Q (1919)" are the most important ready-mades of Marcel Duchamp's.

"The 1936 Surrealist Exhibition of Objects brought together a bewildering range of items including natural objects, interpreted natural objects, incorporated natural objects, found objects, perturbed objects, readymade objects, American objects, Oceanic objects, mathematical objects, and Surrealist objects. Only the readymade and the found object still retain any currency. Marcel Duchamp's readymade and Andre Breton's found object have such different legacies that they now arguably constitute a categorical distinction. This was not so clear in the mid-1930s when Breton could define ready-mades as "manufactured objects raised to the dignity of works of art through the choice of the artist." [3]" Another definition for ready-made is stated in Andre Breton and Paul Eluard's Dictionnaire Abrégé du Surréalisme in 1938 published under the name of Marcel Duchamp ("MD" to be precise): "an ordinary object elevated to the dignity of a work of art by the mere choice of an artist" [4].

Breton described the found object (trouvaille or objet trouvé) as a solution found not by logical means, and one that differs completely from what is anticipated. The object found as if by chance is situated at the point of connection between external nature, perception, and the unconscious, and thus has a peculiar, elusive relation to vision. The found object is encountered and the effect is traumatic. The contrast between the Duchampian rendezvous and the Bretonian encounter should now be clear. While the readymade is essentially indifferent, multiple, and mass-produced, the found object is essentially singular or irreplaceable, and both lost and found [5]. Ready-mades are ordinary, non-featured mass products. On the other hand found objects have features like "beauty" and "unicum." When a ready-made is isolated from its nature, it gets a new identity and also a ready-made has no aesthetic feature. With these features ready-made is a different notion from found object which is a notion of Surrealism.
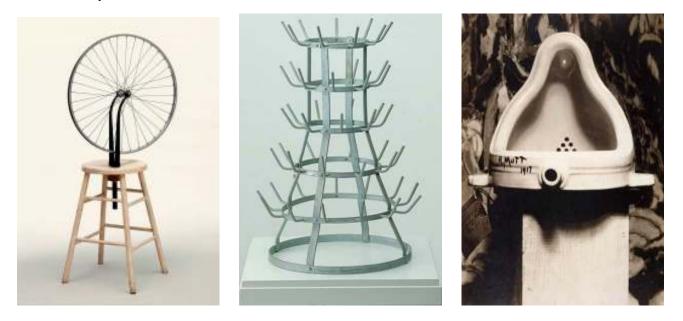
Fig. 1,2,3: Bicycle Wheel (1913) (on the left) [6], Bottle Dryer (1914) (in the middle) [7], Fountain (1917) (on the right) [8] by Marcel Duchamp. Undoubtedly, Fountain is the most provocative and famous ready-made of Marcel Duchamp. Fountain is the sculpture which belongs to a plumbing firm and signatured by Duchamp with the name of R.Mutt. He joined to the first *Salon des Indépendants* exhibition in New York in 1917. Duchamp was one of the juryman of the exhibition [9].

3. Awareness In Interior Spaces

The training and education of an interior designer is based around the understanding and usage of the restrictions and possibilities of working with an existing building. This situation requires the designer to have a kind of awareness. In other words that is an acceptance of what is already on-site and willingness to emphasize those found qualities. An existing building offers many clues about the way in which it can be adapted. These clues include several restrictions, possibilities and qualities. The designer can prefer to accept the restrictions and use these possibilities or put forward these qualities to show awareness. The designer can use the history of the existing building or prefer to emphasize the specific qualities of that space. This may be as simple as to accept the space's structure using significant structural elements as doors, Windows, atriums or even maybe as complicated as to reveal the surfaces which correlate with the history of the existing building. Creating a new function for an existing building directs the designer to accept some pre-made elements or make some arrangements on these elements. These arrangements, which are radical and arguable spatial disciplines, interprets rules, sometimes obeys or else disobeys them.

When awareness in interior spaces and working with found objects get together, two new notions come up; *"Responsive Interiors"* and *"Autonomous Interiors"*. The structural elements of an existing building can be a kind of a guide for the designer during the remodelling of an existing building. The structure of an existing building can constitute an inspiration point for the new design concept. The position of structural elements as windows may offer many clues such as how to get daylight into the space. The designer can use the history of the building or the cultural relation between the building and the local people. Briefly, the designer prefers to use the restrictions and possibilities of an existing building in responsive interiors. In autonomous interiors, the designer creates the new interior design concept without a relaiton with the character and the structure of the existing building. The new interior places inserted into the existing building but the effects of the existing building is limited on the new interior. However, the new interior has a significant and characteristic identity. Briefly the designer prefers to deny to use the feautures and the structure of the existing building.

Fig. 4,5: The Loftcube by Wegner Aisslinger [10]. Loftcube is an autonomous space that can positioned on the roof of an existing building or in a forest or even in an existing building. Loftcube is an autonomous space on urban scale.

Fig. 6,7: Vakko Wedding Nişantaşı/İstanbul/Turkey (2006, on left) **[11]** and Vakko Wedding Suadiye/İstanbul/Turkey (2011, on right) **[12]** by Seyhan Özdemir and Sefer Çağlar / AUTOBAN. Store design is anohter typical sample for autonomous spaces. Designer creates a brand image, based on this existing elements which can have ability to use in different spaces. Store spaces are generally temporary and are designed to live until they are out of fashion.

Fig. 8,9: Sakıp Sabancı Mardin City Museum, Mardin/Turkey **[13].** This museum is a sample for responsive interiors. In the beginning this building was used as the Cavalry Barracks, then as the Tax Office Building, was restored by the Sabancı Foundation and refunctioned as a city museum and an art gallery. The narrow and long structure of the building is arranged as exhibition halls based on this structure. The main principle of the design is to create an exhibition hall that can perceive the spatial integrity which is covered with a cross vault. The existing alcoves are used as exhibition units.

Fig. 10,11: İstanbul Archeological Museum, İstanbul/Turkey **[14].** This is also a sample for responsive interiors. This structure could have been a contemporary art museum as Reina Sofia Museum in Madrid, instead it is arranged as an archeological museum. The historical artifacts that inside in the museum and the structure of the building emphasize the value and historical backgrounds of each other. They also correlate with the past.

4. Usage of Found Objects in Interior Spaces

Adaptation or remodelling is a process of completely altering a building, on which the most obvious change is usually the original use or function. In this process, new spaces are designed in an existing building, new circulation areas are created and new arrangements are made on relation between spaces. This process is also named as "adaptive reuse" or "refunctioning". The designer must have the ability to make decisions about which parts of an existing building will be protected or which parts will be removed, how to address the meaning and the value of the existing built fabric, during the process of a remodelling or an adaptation. The designer who behaves consciously, must understand and read the cultural value of an existing building and the relation between the building and the local people. Because an existing building is an important element which correlates with the past. As an architect and an academic, Jorge Silvetti explains this in his essay titled *"Interactive Realms": "At the risk of sounding too partisan and biased, I would say that even in historic times documents were not always available, and buildings (monuments, vernacular constructions and public works) are themselves important texts, often providing the first and most lasting impression of a culture."* **[15].**

There are different features of each architectural building and interior space. The designer can encounter with many different features of an existing building which can be reused during a remodelling or an adaptation. Using these different features can enable the designer to create unique architectural buildings and interior spaces. An unusual and extraordinary object or surface can reuse which find during a remodelling or an adaptation in its natural space, can reuse. This technique, which is using this kind of special elements that belong to the space, is called as *" working with found objects".* An object or a surface can be found object basically. Working with found objects in space can be done basically in two ways. Found object or surface, in its natural space can be incorporated into that space. Found object, which exhibits or evokes the history of that space, can add value and character to that space, can correlate with past or with the new function of that space or can create a different atmosphere or mood in that space. On the other hand a found object or surface, completely foreign to the space, can be incorporated into that space. This found object can belong to a different age or culture; although it can have a character diametrically opposed to the new function of space. This found object which is completely foreign to space, can create an impressive expression, can emphasize the function of the space or can enable the people in that space to get into different moods.

Fig. 12,13: An interior space from the Reichstag, Berlin /Germany **[16, 17].** The Reichstag Building, constructed in 1884-1894 by the Architect Paul Wallott and renovated by Norman Foster in 1994-1999. The Soviet soldiers left grafiti on the interior walls of the Reichstag during the World War II. Most of the statements expressed the relief of surviving the war, and a desire to return home. In addition to the writings, bullet holes can also be seen along walls. It was decided to leave the graffities and bullet holes on view, as a sign of transparency and a chilling reminder of the history of Reichstag during the renovation in the 1994-1999. This is a sample for using a detail or a surface as a found object.
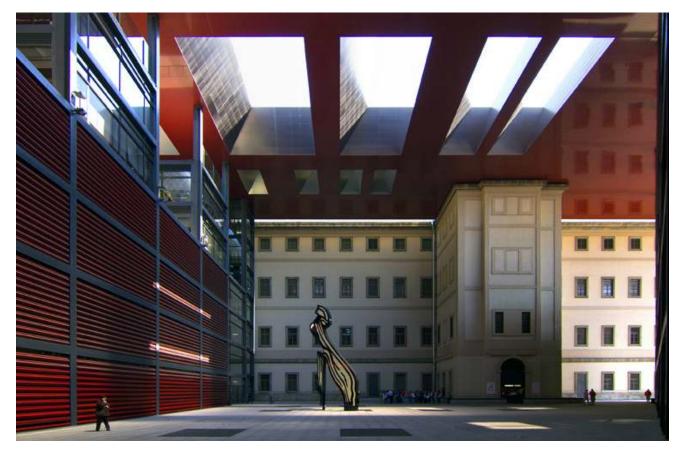
Fig. 14: The Reina Sofia Museum, Madrid/Spain **[18].** While the Museo Nacional Centro de Arte Reina Sofia officially opened its doors in 1990, the building has been remodelled by so many architects over the years. Originally founded as a hospital by King Carlos III in the 16th century, the structure was redesigned by Architect Fernando Sabatini in the 18th century. The southwest side of the Sabatini building is the side which

the Reina Sofia reveals its uniquely modern identity, thanks to the French architect Jean Nouvel. In 1999, Nouvel designed an addition in an attempt to open more space for the museum's permanent collection, that is housing the museum's library, restaurant, and bookshop. The blazing red lacquered triangle canopy is a found object which completely foreign to Sabatini's Building. On the other hand this modern found object connects the Sabatini's Building – the old one – and Nouvel's additions – the new one. In other words we can say that the canopy – the modern found object – correlate with the past and the present.

Fig. 15,16: The Esma Sultan Waterside Residence, Ortaköy/İstanbul/Turkey [19, 20]. On the left an interior view and on the right an exterior view of the residence can be seen. The residence was constructed by Architect Sarkis Balyan, who was one of the most important architects of the period of Ottoman Empire, by the desire of Sultan Abdülaziz for his daughter Esma. The structure has been burnt by a fire that broke out in 1975. The front side is remaining today, after the fire, and it has been renovated in 1990. In addition, a steel and a glass construction have been created into the original external brick walls. The structure has been providing service since 2001 in welcoming (invitation and organization) sector. In addition it also hosts the International Istanbul Jazz and International Istanbul Music Festivals. This is a sample for using a historical existing building's itself as a found object. This usage is also gets in touch with the notion of sustainability.

5. Conclusion

Reuses of found objects show a kind of awareness that related with space. Found objects are an expression of respect to the space that correlate with the history of space. This situation can direct the designer to make a claim the history of space. Also the users of space can correlate with the space and its history through found objects. These personal relations can provide us to be aware of the world and interior spaces which we live in.

Found object is basicly a notion of art which can incorporate sensibility of art to the space. We can feel, see and make sense of spaces in which we live and also we can correlate with the space and our own personal history through this awareness. So, people can notice that not only the users of the space are living, but also the space is a living organism.

A found object located in its natural space, gets in touch with the notion of sustainability and thus creates another expression of that respect. Reuse of an existing building is a basic act of sustainability. The existing building is already located on urban scale and waiting to be reused, just as there is a found object located on space. Reuse of existing things, revaluing and rehabilitating can be a summary of this expression which is related to showing respect.

A found object which has a historical value, refers to the history of the space, while reminding the notion of time, past and cultural value to the people who use that space. This reminding can direct us to take a lesson from the past events, also remind us the people who lost their lives in an event like a war which had happened.

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[17] http://anawantstostalkme.blogspot.com/2010/09/cultural-convergence-also-photos.html

[18] http://www.bywojtek.net/spain/09.jpg

[19] http://www.tff.org.tr/Resources/TFF/Images/EsmaSultan1-kesilmis2.jpg

[20] http://tr.wikipedia.org/wiki/Dosya:Esma_Sultan_ Yalısı.JPG

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+less
more
architecture
design
landscape

A CREATIVE LAB OF DESIGN FOR OUTSIDERS

Marco BORRELLI, [1]
Facoltà di Architettura, Seconda Università di Napoli, Italia
E-mail: marco.borrelli@unina2.it,

Abstract
The scientific contribution of the interior design and tecnological research is inspired by the social value expressed in the project "**Feli-city**", whose main object is the creation of temporary spaces or "**creative laboratory**" focused on the rehabilitation of people who are socially and psychologically marginalized such as "**hope-less**". The outsiders are generated by the advanced society giving privileges to "exclusive profit" logics rather than civil and ethical values. Hopeless is a subject with psicological hardship produced by the flexible capitalism in its recession, where the "**less**" of the project "**Feli-city**" represents "less waste of human creative asset, evaluation of unexpressed potentials as a consequence of the experiences gained". The main content of the creative lab is rappresented by the right dimension of an institutional contest able to interact with current psycological disease through design training.
More subsumes the less as dedicated personal services, and better prospects of listening, it means to project in the current scenario of the knowledge factory, new forms of integration through a shared system of spontaneous human relationships in places appropriately tailored to promote a "**personal outing**" in close collaboration with young designers able to manage the creative process, useful and necessary for **social rehabilitation**.

Key-words: Social Rehabilitation, Creative Laboratory, Hope-Less, More-Service, Feli-City

"*One has to allow the possibility that there cannot be a complete destruction of a human individual's capacity for creative living and that,even in the most extreme case of compliance and the establishment of a false personality,hidden away somewhere there exists a secret life that is satisfactory because of its being creative and original to that human being.*" **(D.W. Winnicott, 1896-1971)**

1. Assunti, obiettivi e scenario di riferimento
The occasion of the project: The scientific contribution is inspired by the social value expressed in the project "**Feli-city**", presented in collaboration with the Designer Edgar Uggiano and with the Association for Social Promotion "Pietre Vive alla salute"for the contest organized by the Community of the Old Town Centre of Naples and "Il Mattino".
The interdisciplinare character of the actors: Such planning experimentation developed in the range of research on design and interior architecture in college of architecture's laurea degree course of industrial design of the Second University of Naples is based on new considerations and methodologies which promote innovation according to the model of the sociological-economical developement gathered by the

metaphor of the *Triple Helix* *[1]* in which the base of success is given by the convergence of three fields actually considered distant and untied:

a) *University* **b)** *Enterprise* **c)** *Politics institution*.

The creation of the social value originates from action and correct synergic organization of the three factors of which we highlight the specific features:

a) *University* through the open source is set up in a new model of *Hybrid University* *[2]* for its main role of research and developement linked with the actions of social policy, **b)** the Economic System of Social *Enterprise* expressed by the third sector aimed at the social progress through ecological innovation and by the Community of the Old Town Centre of Naples which finds social innovation and developement of new ethic values able to promote personal and social growth of local community,and the role of the **c)** *Politics* expressed by the municipal corporation which represents the governance and the referential system aimed to guarantee the right balance of relationship between local entrepreneurship and research.

*The mission***:** The construction and emplacement,where necessary,of new structures in the service of the citizen,able to intercept the social and psychic discomfort of a new cathegory of outsiders, the "hopeless", to guarantee an earlier form of psychological outing aimed at the constitution of new **Workshops** or **Creative Labs**. The instrument of innovation is assigned at the definition and construction of a creative unit where two moments of doing togheter are activated:the bank of time and the bank of ideas owned by the creative community. The instrument of originality is assigned at the figure of design for health in social range which re-sets up consolidating the already well known declinations of user-centred design, co-design, design for all, design for interaction to offer itself as a first level structure for psychological support aimed at the redemption and recovering of discomfort and environmental context of reference.

1.1 The analytical-descriptive phase of less' dimension

The modern industrialized and globalized society engenders different forms of exclusion, discomfort and outcasting since it doesn't give the right support to all the persons, often labeled as differents,who can't integrate themselves completely in the social context in which they live. Therefore these new figures need an early form of redemption through a psychological and creative outing to express their personal experiences by a system of intersubjective relations and recreational activities. Such condition of the individual results nowadays the fruit of a discomfort ripen and imposed by an economic system which advantages profit logics rather than civil ethical values and sustainability to such a point to originate,in the scientific research of interior design field too, analytical reflections on the *Third Sector* *[3]*. Toward the state the third millenium's society has noticed a detachment of the old models of welfare state since the factors dependent on labour market's crisis,weakening of the familiar fabric and loss of references into civil society have enlarged the gap between the traditional catalogue of safeguarded risks and the new set of necessities and social questions, producing a new "*Risk Society* *[4]*". The psychic and social discomfort condition, associated mainly with the condition of poverty has taken several connotation becoming part of a bigger phenomenon which aggregates differents forms and typologies of marginalization such as social exclusion,vulnerability and lack of self confidence.Such new figures of outsiders, defined in our article as hopeless, represent new forms of psychic discomfort and isolation, fruits of "*Flexible Capitalism* *[5]*" in its recessive phase, where the "less" of hopeless can represent generically scarcity and instability,but also lack of references and loneliness of the isolated individual;therefore,the term "less" must be read as a quality as expression,from the individual,of internal pain and deep sensitivity as well as experiences, knowledge and trans-territorial visions. Nowadays, as the hopeless, also the jobless and the youthless are individuals who in their field meet difficulties of various nature,and so the society must trigger protective actions and safeguard about the condition of their minimum requirements of psychophysical health aimed at the social recovery and working reintegration in their autonomous creative and productive dimensions. The research is inclined to offer metaplanning inspiration's occasion on interior design and design of services' field aimed at the developing of transitory spaces or labs "of doing", simply definied "creative labs" spontaneously builded and dedicated at the social and psychological recovering of such outcasts. The **Creative Lab** represents the right dimension of a new inst[i]itutional context with an outpatiently nature which acts on the current dimensions of[ii] the psychic discomfort of those who lose their job in advanced age too or for those who can't find it, and at the same time can't recuperate the right spirit of interior revenge meant as recovering of a spiritual dimension of active partecipation. The key character of such new experimentation starts from the assumption that nowadays exist different typologies of creative spaces or workshop labs aimed at the sharing of a "common feeling" related with the diffusion of social values such as creative handicraft, reutilization and recycle, civil and social rights of the individual, creative enterprise through small incubators of social enterprise and even the makers or "garage inventors" who are revolutioning the industry by using the internet and the open source.
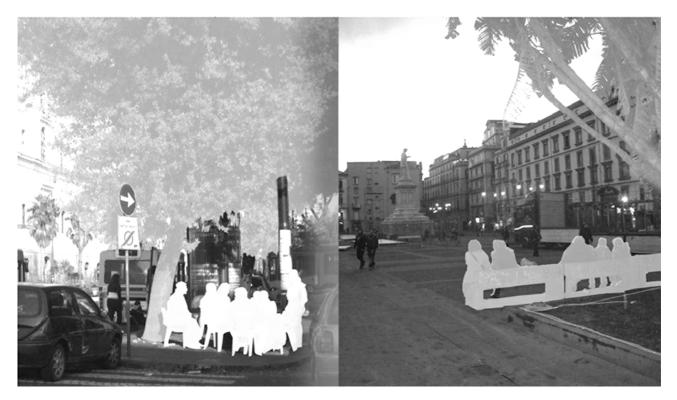
Fig. 1: Outsiders trying to meet in the modern dispersive city

Here are some of the examples to be considered as "emblematics" since they represent the basics in the research of some study cases (case history) taken as sample to set up the proposed model of **Creative Lab** of the project "*Feli-city*" as pilot project:

1) Promotion of handicraft lab that draws on do-it-yourself's culture (creative handicraft lab cfr. www.lamentecomune.it)

2) Promotion lab for reutilization and recycle as environmental sustainability with pedagogical aims (creative recycle for children lab cfr. "Le mani creano… Piccoli oggetti d'arte" www.riciclareconarte.it)

3) Promotion lab for social and civil rights of people wardship and their generation (cfr. Social Design Agency Lab www.thinkpublic.com)

4) Promotion lab for individual growth and developement for assertion and promotion of interpersonal relations (cfr. www.relazioniinarmonia.it)

5) Enterprise incubators promotion labs (cfr. www.officineformative.it)

6) FabLab promotion labs "Social workshop for digital manifacturing and hand-crafted prototyping" (cfr. Enterprise incubator www.fablabitalia.it and/or www.fablabtorino.org/)

The limit of such cooperative experiences starts from the presupposition that the partecipate contribution in which sociologists, psychologists and welfare workers, collaborates, with their institutional qualifications of subjects aimed at the formation and evaluation of discomfort, lacks the comprehension of the aesthetic-creative dimension latent in the hopeless and that cannot emerge but by the intersubjective contribution and the presence of the **designer**. The competences specifically bonded to the designers'creative actions would help in the medical history phase and in the assistence for all the actor subjects (outsiders) that after the outing must restart their own projectual dimension through the rediscovery of the "insight" (creative intuition).

1.2 The operative phase of the exercise through the "more"

The location for the set up of the creative lab's concept would be detected in some small spaces in the hands of the current local structures(for example the municipal corporation's headquarter or the local sanitary companies)to guarantee experimentations in favour of social assistance and rehabilitative cure addressed to such figures to favor psycho-social integration.The **innovative character** of shared partecipation between protagonist **actors** of the counseling intervention among which leads the designers,the psychologists and the sociologists deputied at the reception phase and at the structuring of the path into the creative work too,consists of time (bank of time) and ideas management(creative community) aimed at the recovering of a

productive and recreative cooperating dimension in terms of environmental sustainability too. Then the designer in the following phase after the medical history,by the recovering of more operativity,builds the right environmental and communicative conditions to start a process of **Creative Rehab** of the capacities and of the emotional and cognitive resources of the individual, producing immediately a sensationi of indipendence, autonomy, serenity and self-esteem.The building of homely, stimulating and original shaped and coloured spaces and contexts ,originated from shared process of auto-reproduction tipicals of do-it-yourself way, through the guide and control of the deisgner guarantees a general improvement of the perceptive condition of the individual toward the space as well as the relationship of indipendence between man and environment. The creative lab represents **more services to the people** prefiguring the receptioning space as field for planning understood as a "school"of politeness, humanity and for talents' personalization since it allows the outsiders to percieve theirselves as active subjects, in reference with tools and with the utilization interactive's and attitudinal link's methodologies to build an integration. **More interactive areas** where the immaterial represents the new frontier of **creator's** dimension, more **edutainment** (education and entertainment) through events and analysis of the relationship between cause-and-effect of the outsiders operating concretely emulating models and evaluating the result.

Here are some examples of **interaction between subjects, areas and objects**:

1) Real and/or virtual noticeboard (database and bank of time) where the registration of the capacity and availability of the actors and creators with the counselor designer is possible in chronological order through a relationship of empathy in which emotional interrelation exchange is fundamental – **interaction between subjects,**

2) Utilization of tablets (materials workbanches on stalls or immaterial [6]) useful for the sharing of a planning concept to bring in phase of progress of definied project and performable in a prototype form too (3D printers or rapid prototyping machines) trough this relationship the designer is able to build new sceneries – **interaction between subjects and areas,**

3) Definition and realization of particular work-areas manual and technological-experimental able to explore the properties and the potential of **natural materials** for example recovery of ground scruff of mussels' and nuts' shells in order to melt it with natuarl glue such as resins, rabbit glue, various clay in order to obtain new self-carrying conglomerates , or and **artificial materials** of disused artefacts obtained by a first phase of comparative selection such as plastic recover which represents the artificial basic material with the worst environmental impact for its disposal (PE-polyethylene, PP-polypropylene, PS-polystyrene, PVC-polyvinylchloride, PET-polyethylene terephthalate) – **interaction between subjects and objects.**

2. Interdisciplinary work mediated by the action of the designer for health

The **originality character** of suchCreative Labs consists in the identifiction of a new actor figure of the productive and creative management process as the **designer** who, contextually with the operation of hopeless'psychic rehab explain the topic of the **more** expressing himself as a mediator of holistic knowledge of the system produced addressing the creation's target of quality through management capacity of different experts. Such universe of objects tought and produced in a team under the control of the health's designer are tought and realized for the user considered no longer as a diseased but as a subject with specific necessities addressed at the reappropriation of its collocation.

A *supply chain of knowledge* [7] governed by the designer able to mediate the connection between designer counselor and actors-creators as well as processes and materials in the third sector in which the presence of the state is still late in putting in effect of social governace polithics.

Such new idea of design is far from the common definitions of "user-centred design", "co-design", "design for all", "design for interaction" which considered the product-design as a tool aimed at users who started from standard situations to define objects and products of extended use, to arrive to a most inclusive form to realize a dimension of **Design for health** [8] mainly focused on behavioural diseases of the individual in a psychological and social context. In detail appeals on actions of control and management of designer's activities to generate a process of improvement achievable through emotional and artistic-creative solicitations , to build a form of rehab and reintegration of the individual with his provenance context. The designer as **Personal Creativity Trainer** [9] busy in the improvement of the active role's value of each subject creating the conditions for the change inside and outside of himself trough technical and methodological processes developed as integration of psychotherapeutic protocols aimed at the emprovement of self-esteem and creative talent.

The expressed value through the reappropriation of denied rights (the job) costitutes a valid mission of innovation expressed as references with triple helix developement model in so far as the convergence of the three institutions offers a big projectual imput of civilization aimed at the comprehension of the emerging categories until now soffused by the economic system of negative growth.

Paraphrasing **Serge Latouche's** [10] treatise on the dicotomy between **serene decrease** inasmuch as advantageous tendence to things'natural dimension, against **negative growth** as source of unequal and not in agree with the available natural resources' consumption, means in the scientific contribution of the project Feli-city to introduce a new form of related dualism **less /more**, which transposed in social context means to appreciate in the **less** creative and aesthetic dimension of the inadequacy sense generated by the consumerist society, expecially in those who lose their job against the **more** unscrupulous use of technologies in which the designer only represents the saving answer to the belonging relationships'control system to the present scenario of human existence.

Less subsumes the More as more dedicated personal services, and better prospects of listening, it means to project in the current scenario of the knowledge factory, new forms of integration through a shared system of spontaneous human relationships in places appropriately tailored to promote a "personal outing" in close collaboration with young designers able to manage the creative process, useful and necessary for social rehabilitation.
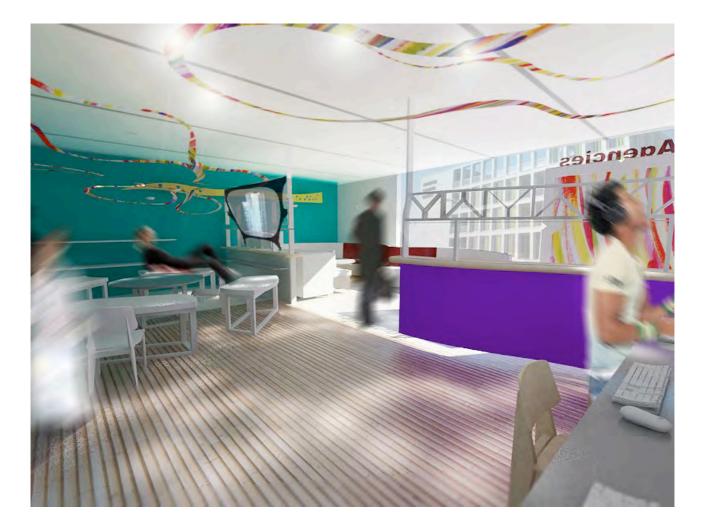
Fig. 2: Creative Lab's Interiors for Psychological Rehab through more services to people
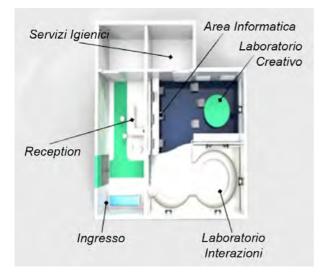
Fig. 3: Creative Lab's Zenital View

Fig. 5: Interaction Lab from inside

Fig. 6: Creative Images projected on wall and ceiling

Fig. 7: Interactive Panel for Virtual City Sightseeing

Note:

[1] Etzkowitz & Leydesdorff Triple Helix innovation model

[2] Mario Calderini lectures, teacher of Innovation's Management and Strategies in Torino's Polytechnic School

[3] Definition: The Third Sector includes a series of organizations (cooperatives,foundations etc.) placed between the state and the market, represents an answer of unquestionable efficience to the Welfare States'weakening supplying products and services of social benefit

[4] Ulrich Beck, *Risikogesellschaf. Auf dem Weg in eine andere Moderne.* (traduced by PRIVITERA Walter , SANDRELLI Carlo*) 1 ed. Roma: Carocci Editore, 2000, pp. 380. La società del rischio. Verso una seconda modernità*. ISBN 8843016504

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[6] IPAD Interactive Technologies, Cloud Computing

[7] Web: http://blog.debiase.com/2012/03/informazione-di-mutuo-soccorso.html Enrico Viceconte's Comment in March 2012

[8] Francesca Giofrè, *Autismo. Protezione sociale e Architettura.* Firenze: Alinea Editrice, 2010, ISBN 9788860555380

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Fashion Designers' Insight in the Global Crisis

Dr. Karama THABET[1], Dr. Hazem ABDELFATTAH[2], Alexandra CABRAL, M.A[3]
[1][2]Faculty of Home Economic - Department of Clothing & Textile - Helwan University, Cairo, Egypt
[3]MODATEX - Professional Education Center, Lisbon, Portugal
dr_ka_ha@yahoo.com, bravehazem@yahoo.com, cabral.fashion@yahoo.com

Abstract

The on-going political and economic crisis has been affecting the integrity of many countries, in a way that their expression related to design and art reflects a strong will to pursue the preservation of their identity. The academic debates indicate now solutions for how to overcome this problem in the fashion industry, leveling the interests of countries and corporations.

We analyze what Portugal, after the international financial rescue of April 2011, and Egypt, in the current period of the post-revolution of January 25th 2011, share now. While analyzing the impact of the national cultural patrimony references in the preservation of countries' integrities, we evaluate to what extent its input can develop fashion industry. When cultural richness and historical identity are connected to fashion design and textile research and development, conditions are found, especially before both traditional and technical textiles.

Sustainability of processes becomes an essential mill of the management of political and trade union strategies. Creative strategy of fashion designers is vital in the collaboration between institutions and universities, so needed for an effective solution implementation.

Keywords: Fashion Designers; Contemporary Crisis; Know-How; Culture; Economy.

1. Questions of investigation, objectives and methodology

_ How can research and development strategies, carried out by universities, companies and designers, boost the creative economy?

_ How does the contribution of the patrimony legacy in iconic textiles and cultural material and immaterial references influence design practices and textile research today?

_ Have the fashion designers been showing recently a concern in preserving their countries' cultural integrity through their designs?

_ How can the fashion designers' insight contribute to the new management strategies?

Objectives:
The research aims to highlight the importance of reviving the creative economy, by activating the role of fashion designers in the contemporary Portuguese and Egyptian fashion industry – especially after the financial rescue of April 2011 and the revolution of January 25th 2011, respectively.

Methodology:
The research follows an analytical descriptive method concerning the economic situation of the countries under study and also of the condition of their textile and clothing industry.

1.1 Socio-economic framework

Within the first weeks of 2011, the Egyptian people achieved a fundamental change in the government and leadership in its own country. This historical event, which any political analyst could foresee, has not come to an end yet [2]. Since the revolution in January 2011, Egypt economic performance has weakened, having the Growth National Product (GNP) decreased in about 4% and the industrial sector income in 12%. The tourism revenue breakdown unsettled the balance of payments, which in turn influenced the decrease in the foreign reserves. This represented a fall of 9 billion dollars during the first half of 2011, and of 11 billion, between the second half of 2011 and the first half of 2012 [11]. Estimations indicate that this may lead to a gap in the outside funding, raising a number of questions about the role of the EU in the future of Egypt, and its abilities as one of the external actors, along with many Western and Arabic countries that promised to support Egypt overcome the negative economic effects as a consequence of the revolution. Nevertheless, this support hasn't been efficiently or strategically applied. The Egyptian government tried to keep the financial balance through external borrowing, which compromised the independence of the state and its identity, under the popular rejection to that kind of borrowing. The government was forced to turn to its own resources, especially the ones that were not used or seemed to be obsolete, so as to push forward the economic cycle.

The textile industry is one of the valuable resources, since it has always played a central role in the Egyptian economy. As being the second largest sector after the agrarian industrial sector, it meant 30% of the local employment rate in 2008. It produced 3% of the GNP, representing 27% of the industrial one. 14% of the non-oil exports in 2009 were due to the textile industry contribution. According to the statistics of Central Bank of Egypt, there are more than 6000 companies related to the sector, registered at the General Authority for Industrial Development, 75% of which are garment manufacturers. They produced more than 313 million pieces for international brands such as Marks & Spencer, GAP, Wal-Mart, Levi Strauss, Target, and Calvin Klein, in the year 2009. Even so, the decline affected this industry, forcing the government to change its policy. The measures consisted in implementing a creative economic strategy to develop design procedures for the achievement of a privileged position of Egypt in the industry market – decreasing the dependence on the design prepared by the importer [18].

Like in Egypt, the Portuguese industry has always been highly focused on the manufacturing of textile and fashion goods. In 1985, Portugal joined The European Economic Community and got cash flow from European programmes to develop the country and its industry, with the expectation of becoming competitive in the emerging world market. Nonetheless, a change of paradigm was necessary [7], so that a country based on non-design production could improve design skills in order to diminish its dependency on manufacturing for others. As design was not regarded as a priority, the investment was directed to the usual manufacturing market, and so it has been, although with exceptions, until now. With the globalization phenomena and the admission of China in the World Trade Organization in 2001, Portugal had to face worldwide competition for the first time in history, as far as the textile industry was concerned. Following China, also India, Brazil and Russia started to have the means to become competitive themselves [1]. When the international economic effects led by the American subprime crisis in 2008 were taken as ended, new difficulties came up. The recent European crisis based on the countries` loan bonds, in which Portugal is included, has forced the nation to ask for the International Monetary Fund intervention for financial rescue, in 2011, with a subsequent political and governmental change.

Portugal is facing its highest rate of unemployment, estimated by 14.8% in February 2012, affecting mostly young adults bellow 25 years old (35%), paradoxically the most qualified generation so far in the country. The data from 2011 revealed that 150.000 workers emigrated, and the majority of them with high education. When Portugal is one of the countries in the world with the greatest percentage of senior people and the lowest birth rate, we question its development in the near future. Nowadays, the country faces an economic recession, which can get to a negative growth of 5% in 2012, according to the Bank of Portugal. Regarding the textile and garment sector, there are thousands of factories which have been closing down due to their dependence on international brands [1]. Nonetheless, the Portuguese exportations still represent 6.5% of the GNP, according to data from December 2011 – and when design starts being included, we forecast a growth in this matter, as the shoe sector has showed us.

1.2 Creative economy and culture based innovation

Before such situations, designers see necessities merging with opportunities, as the needs for economic growth merge with the requirements for the evolution of this industry sector. Lately, the focus on the development of creative economy places design as the windmill of new strategies, as said before and as

Borja de Mozotta also shows by saying that *"design activity becomes an agent of change for prototyping the new socio-technical system (…), as well as for helping companies manage the transition between the old and the emerging socio-technical systems."* [3]. Based on these matters, some guidelines can be traced for the textile and garment industry sector. We focus on the present context of vanguard, in which the fashion system accepts various kinds of design approaches, and in which the *"specificity of creative economy, with its own wide-ranging logic (…), forces a new development approach and experiments' exchange amongst various sectors"* [5]. From those strictly connected to the fashion trends and market researches, to others linked to conceptual design and even art, all of them can accompany peoples' needs and feed the economic system. We can also establish a linkage to the core of creative economy, with its creative industries acting in a crossroads platform for all of the arts, business, culture and technology - enhancing the flexibility and openness to the new, and the ability to adapt. They comprise the cycle of creation, production and distribution of goods and services that use intellectual capital as their primary input [14].

Fashion design as creative industry can be empowered by the linkage to other creative and cultural industries, as well as by e-commerce, so as to find appropriate ways of stating certain designs as being Portuguese or Egyptian. For example, the idea of a «Portugal» brand is being discussed since 2005, and now is regarded as an imperative will to create a national identity in fashion design [10]. Actually, in a country where the fashion and textile sectors have a strong economic influence, we reflect on the ability to sustain it as a whole, before various qualified professionals that are able to apply design management strategies – as the survival of companies is no longer possible in an individual working logic in this climate of economic crisis [16]. Hence, we can consider that if fashion design finds a fertile cross-contamination with many fields, either Portuguese or Egyptian fashion design need to be developed in an environment of cooperativeness, in order to become competitive in the global market: combining designers, entities, companies, museums and universities. Paiva notes that the universities need a *"routine of cross-connexion of actors with ideas, being aware that the dissemination of concepts is empowered by a network of collaborative labour, which strongly depends on the capacity of convergence and meeting of investigators"* [10].

There is no doubt that a culture based innovation, founded on the existence of a motive is essential for making design competitive. The international conferences demonstrate the necessity of merging design and culture for new approaches for companies, with a focus on identity; for example, in 2012, we have the "Identity, Culture & Communication" international conference at the Saint Louis University (Madrid, Spain), the "Identity" international symposium at the Dar Al-Hekma College (Jeddah, Saudi Arabia) or the 1st International Congress on Fashion and Design, CIMODE (Guimarães, Portugal), where the "fashion, identities and cultures" theme will be discussed. Plus, the creative industries today contain the interaction between heritage and technology, and Europe has a huge stock of culture and creativity, that could be considered. Nevertheless, we identify a considerable lack of education in creativity in our society, mainly in Portugal, that would be necessary to generate a political will to allow designers to have an active role in the development process. Despite this, even the Portuguese Government recognizes that the heritage of a country isn't *"worn out in its own contemplation and fruition"* and that it can produce culture, generate employment and improve life quality [4]. What we see is that as long as an effective implementation of new designs based on heritage isn't actually consummated, it will only be experimental and we wonder until when. Perhaps an insight into the profits of the creative services could speed up the change.

The creative services have had a fast rate of growth in exports, with an annual rate of 8.8% between 1996 and 2005. During the period between 2000 and 2005, the trade in creative goods and services increased at an annual average of an unprecedented 8.7%. The value of world exports of creative products in 2005 increased by 424.4 billion dollars compared to the 227.5 billion dollars in 1996, according to preliminary figures of UNCTAD. This positive trend has happened in most European countries, and it is expected to continue in this decade, assuming that the global demand for innovative goods and services continues to rise. Besides that, the European brands are amongst the best in technology, luxury goods, tourism, media publishing, television, music, computer animation, videogames, design and architecture. European creators and artists in architecture, design, fashion, cinema, music, and modern art have worldwide influence [9]. It is clear that developed countries still dominate the global market for creative products. Nonetheless, many products from developing countries are already benefiting from the creative industry boom, particularly in Asia. Unfortunately, the large majority of developing countries are not yet able to harness their creative capacities for development [12]. In Africa, for instance, despite the abundance of creative talents, the creative potential remains highly unused. The continent's share in global trade of creative products remains marginal at less than 1% of world exports, despite sharp increases. As it is the case for other developing regions, this is a reflection of both domestic policy weaknesses and global systemic biases [8].

1.3 Egyptian and Portuguese legacy: influencing design approaches

We find that the previous Egyptian governments did not provide the creative climate, neither did they support the creative economy nor the creative people, despite the presence of human wealth (artists and designers), as happened in Portugal. We can see a vast stock of ideas that can contribute to the dramatic boom of the Egyptian and Portuguese economies. Let's focus on the Egyptian case, with its clothing and textile industry, one of the most significant creative industries in Egypt. Its competitive advantages, such as availability of raw materials and human resources, meet a long history and tradition that began in the time of the ancient Egyptians. In this context, we find important to mention the Cairo Fashion Week, one of the Egyptian creative industries that combines culture and economy in a media event (Fig.1), or even Amina K's contemporary designs with traditional influences (Fig.2). As throughout history, the textile industry is closely linked to other art forms; so the history of textiles parallels the history of artefacts, to demonstrate changing materials and techniques, patterns of agriculture and trade, and distinctive social structures, such as rituals, identity, and everyday life [17].

One of the most important historical textiles, which have been recognized in a large variety of ways till today, is the one of Coptic textiles. With appealing aesthetics, the woven images they exhibit serve as reminders of the ancient interest in textiles, by holding a cultural expression related to that artistic mode. Coptic textiles derived from the Arabic word "Qibt" for Egyptian, the name Copt referred to native Egyptians as opposed to Greek or Arab. Coptic textiles have survived in such quantity and good condition because they were found in dry desert tombs in Egypt. Commonly these textiles, usually made of wool and sometimes of linen, are remnants of clothing, with which the dead were buried, in the period after the practice of mummification had ceased. Coptic textiles frequently display Christian imagery, as the birds were representative of the Holy Ghost, Christ, and so forth (Fig.3). Other themes were related to late Antique motifs, images of fortune and renewal or figures from mythology such as Aphrodite and the Tritons. As an example, we have the Orbiculus of a Warrior on Horseback (Egypt, 7th century), a tapestry weave made of wool and linen. Round shaped and likely from a tunic, it represents a mounted rider with a dog at the horse's feet, over a red background framed with colored dots suggesting the natural ground (Fig.4). The theme of horsemen, frequently found in Coptic iconography, is inherited from hunting scenes (mosaics, sarcophagi, etc.) of the Roman period. Such animated depictions, frequently narratives, woven on red grounds date late in the Christian era, usually from the 7th century. The motifs can also be purely decorative, such as the vertical row of donkeys – perhaps from a child's tunic (Fig.5) –, or naturalistic (the image of the hare), maybe recalling the Egyptian hieroglyph meaning «to endure». Many of these same images occur on Antioch floor mosaics, in Alexandrian art, and in eastern Mediterranean manuscript illustration, such as canon tables. The designs were restricted to the ornamental areas of the clothing, which were often in wool, because wool held the dyes better than linen. Curiously, different colours were used for different meanings: woad and indigo for sadness, red for angriness, purple for selfishness [6]. Regarding these textiles with historical and cultural significance, we can establish a bond between Arabic and Christian civilizations, by mentioning the project of the tapestry office in Mértola (Portugal), consisting of wool textiles with Arabic influences from the 8th to the 13th centuries' occupation (Fig.6).

What we see nowadays is that valuable heritage of this kind is possible to be re-designed, having in mind new technologies that either can improve the ancient or replace them in particular pertinent cases. For example, the Portuguese case shows that different aspects of patrimony can lead to cluster design conceptions, so as to increase the range of products and investments when an economic increase is needed. Consequently, this allows companies and investigation centres from different fields to follow certain directions in which they are specialized. That certainty became clear in the Designa Conference in 2011, organized by the University of Beira Interior (UBI), in which different lines of investigation were revealed, from hi-tech to eco-design and re-design. We shall mention two of them. Gianni Montagna, Helder Carvalho and Cristina Carvalho (University of Minho – UM – and the Technical University of Lisbon) showed their analysis result about the needs of the Portuguese market regarding technological and intelligent apparel, and found important clues for product development targeted to young university students, by questioning 600 of them. Marta Ferraz (UBI) presented her investigation on *Tailoring a Future in which Clothes grow from Bacteria*, showing environment friendly designs made from bacterial cellulose (attained from Acetobacter Xylinum), capable of being freely moulded as a paste, when placed on top of any shape. Likewise, at the Design Principles and Practices Conference 2012, held at the University of California, Isabel Cabral, PhD student of UM, presented *Thermochromic Filters Effect on Static Light*. She showed how temperature can change the molecular structure of the thermochromic dye in its optical properties, used alone or combined with ordinary dyes on different textile surfaces (Fig.7). She got not only fabrics that were colour changeable,

but also got relevant conclusions regarding their light filter performance, under or above their temperature variation level [15].

1.4 The preservation of the collective memory: an identity in design

The preservation of our collective memory is urgent in the context of globalization, but we see little investments being made regarding the safeguarding even of our existing material patrimony. The main square in Lisbon (Praça do Comércio), iconography of the Portuguese diaspora itself, has recently been deprived of its Portuguese Pavement. We understand the alleged economic and practical maintenance reasons, but that is not coherent with the prior investment being made in Portuguese Pavement for the World Expo in 1998. Portuguese designers try then to find solutions to preserve iconic legacy, having in mind that it can be the inspiration and foundation of a sustainable design methodology. For example, fashion designer Luís Buchinho has recently presented a collection inspired in the Portuguese Pavement at the Portugal Fashion event of March 2012 (Fig.8), and the fashion designer Alexandra Cabral has created a wearable sculpture with the same inspiration, for the I Triennial of Textile Art contest, promoted by Guimarães European Culture Capital 2012 (Fig.9). But we then question ourselves about the characterization criterion of valuable resources and methodologies of implementation in creative distinctive design, in the long run.

When we analyze independent Portuguese fashion designers and Portuguese fashion labels, we can also identify a rising trend to keep faithful to certain traditional technologies and materials, combining craftsmanship with contemporary designs. As examples, we can mention the designs of Sara Lamúrias (fig.10) for Burel (a brand that works with a traditional wool fabric with the same name, in collaboration with renowned young equipment and fashion designers), and White Tent's cutting edge design, by Pedro Noronha and Evgenia Tabakova, made of one of the most representative national materials: cork (Fig.11). Nevertheless, we can see that specific valuable materials and techniques can be reproduced by other countries, so how can we meet sustainable processes with sustainable design innovation, so as to keep our design identity untouchable and always recognizable?

We consider that the solution lies in combining traditional/hi-tech technologies either with the cultural immaterial legacy, or with conceptual approaches based on a collective imaginary related to the material legacy. The University of Beira Interior develops investigation in hi-tech fashion fabrics and bags in the same region as the Burel brand; so what is in store? The global market is crowded with «just fashion», but there is plenty of space for avant-garde fashion design, mainly when information spreads instantly around the world making a brand visible, and when a nation needs to take measures urgently. Experimenta Design, the international bi-annual Portuguese event dedicated to design is *"highly committed to the construction of [that] material and immaterial legacy"* and hopes *"that [it] can be an asset to individuals and institutions (…) for the contemporary transforming intervention and mediation."* [5].

1.5 Results and recommendations: designers role in the textile and garment sector renewal

Both Portuguese and Egyptian designers should analyse the reasons for the success of their countries' particular cases with positive impact on exportation; see why their investment in the linkage to cultural legacy (material and immaterial) in design practices turned to be fruitful, and with which design methodologies that was obtained. Besides this, there are always processes and resources that can be shared among companies, such as external distribution networks or suppliers, which they could have into consideration. Thinking globally, designers from different fields could also join efforts to provide the development of wider ranges of products based on the same materials and techniques. When fashion finds linkages with different fields of contemporary art, why shouldn't it cross-contaminate equipment design too, as the Burel brand indicates? Why shouldn't fashion also meet art in technical textiles' research and development, for the countries' promotion?

Guta Moura Guedes, director of Experimenta Design says that *"designers work with culture and with local and global values (…) thinking in a global context (…) to produce something new. Designers are probably the best decoders to do that. Because they are (…) trained in all aspects."* [13]. More, Borja de Mozotta stresses that *"designers' skills for our present world include risk taking, experimentation, teamwork ability, narrative building, holistic thinking, and open-mindedness to transcend the existing barriers of industrial «silos»"* [3]. Thus, it seems clear that solution implementations for the Egyptian and Portuguese case might involve huge efforts, but they are possible to be achieved having in mind the latent potential of the fashion industrial and creative sectors and their cultural richness.

Portugal once was the first country to start globalization through maritime exploration during the 15th and 16th centuries, building an empire that no longer exists, but that spread culture around the world. Lately it has

held events such as Lisbon European Culture Capital 1994, World Expo Lisbon 1998, Oporto European Culture Capital 2001, and finally Guimarães European Culture Capital 2012.

When we think of Egypt, we think of the golden period of the Egyptian empire, related to the Pharaohs and their great pyramids. Much of that material patrimony has been rediscovered by the British and German expeditions of the 19th century. The knowledge thus obtained from there made us value the Egyptian cultures, as we still do nowadays. The contemporary version of the Alexandria's Library (a reference library in the ancient world), built in 2002 and funded by UNESCO and the Egyptian government, shows a statement of Egypt as a cultural reference in the international scenario.

If Portuguese and Egyptian cultures are still alive and capable of generating economy in many other fields, now cultural richness must be targeted to design investment, in order to achieve sustainable progress, and most important, help them preserve their integrities as nations.

Fig.1, 2: Cairo Fashion Week 2011. Source: www.cairofashionweek.com [consult. 15/03/2012]. Amina K, 2011. Source: http://www.myeyeonegypt.net [consult. 10/03/2012].

Fig. 3, 4, 5: Bird with a Scarf (Upper Egypt, possibly Bahnasa), Tulunid period, early 9th to 10th centuries. Orbiculus of a Warrior on Horseback, Egypt, 7th century. Band (perhaps from a child's tunic) of Mounted Donkeys, Egypt, circa 7th century. Source: *L'Image Tissee: Textiles de L'Antiquité à la Renaissance* [6].

Fig. 6, 7: Arabic influenced tapestries from Mértola (Portugal). Source: authours'. Isabel Cabral, thermochromic dyed samples, 2012. Source: Isabel Cabral.

Fig. 8, 9: Luís Buchinho, Fall/Winter 2012/13 collection. Source: Portugal Fashion / Ugo Camera. Alexandra Cabral, *Portuguese Pavement-Sea* wearable sculpture, 2012. Source: authors'.

Fig. 10, 11: Burel by Sara Lamúrias, 2011. Source: Sara Lamúrias. White Tent, Fall/Winter collection, 2007/08. Source: White Tent.

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FACTORS OF INDUSTRIAL DESIGN THROUGH INNOVATION

Luis AGUSTIN HERNANDEZ,[1] Laura ABAD TORIBIO[2]
[1] Escuela de Ingeniería y Arquitectura, University of Zaragoza, Spain
e-mail: luis.agustin@unizar.es
[2] Escuela de Ingeniería, University Alfonso X, Madrid, Spain
e-mail:lavad@uax.es

Abstract
There is now a saturation of consumer products, for any type of product there is a vast number of different items made by an equally vast number of manufacturers; this fact is due to the maturity of markets and the globalization of supply. It has become far harder to come up with a unique selling point, perhaps most importantly, cost competitiveness is a lost cause in Europe; production costs are not competitive with emerging countries. However, there is a field where competitive differentiation can still be achieved that can lead to market success, and this field is innovation.

Innovation can be of different types. This paper will focus on innovation that stems from industrial design; in particular, 5 design factors will be analyzed: formal factors, functional factors, use factors, economic factors and factors associated with product value, in order to determine which of these factors are most vital and what action should be taken in respect of each in order to design an innovative product.

A framework is proposed which can be used to replicate analyses that can enable us to set up a system of continuous innovation, thereby making it possible to bring innovation to bear on the product rapidly in such a way that pirated copies cannot be made through reverse engineering.

Keywords: Innovation, Industrial design, Formal factors, Functional factors, Use factors, Product value

1. Introduction
In the current global economic context, the manufacture of consumer products is widespread in many countries; thanks to the new technologies of communications, sale transactions are virtually instantaneous from any location on the planet to the consumer's home. Means of transport are so efficient that, in a short time and at a reasonable cost, a consignment of products can be moved from any continent to any other. Methods of payment are fast and secure, guaranteeing practically all transactions between individuals and producers. This is globalization, which can in time undoubtedly lead to a level playing field of opportunities among citizens of different countries, but the risk that currently we face is the specialization of some countries in manufacturing, whose only contribution is cheap labor, in tandem with other countries that consume goods at low prices, thereby destroying their traditional industrial base and generating scant profits for the manufacturing countries.
This leads to the paradox that the products made in the manufacturing countries cannot be consumed in those countries and in the long term in the countries which do consume them, the level of consumption is unsustainable because their local industries cannot compete with the exporters and this causes unemployment and loss of purchasing power among the citizens of those countries that are regarded as 'consumers'. To prevent this self-destruction of the manufacturing base, the consuming countries must make a shift in their corporate strategy as far as consumer products are concerned, in order to preserve their productive capacity and social cohesion.

In order to preserve the industrial fabric engaged in the manufacture of consumer products, which in general are low-tech items employing techniques whose patents have expired or have been structurally assimilated, in sectors such as white goods, furniture, accessories, textiles, utensils, sports equipment etc., it is imperative to produce innovative products; the key is INNOVATION.

2. Innovation.

Everett M. Rogers defines innovation as: "An idea, practice, or object that is perceived as new by an individual or other unit of adoption." In contrast, Michael A. West defines it as: "the sequence of activities whereby a new element is introduced into a social unit, with the intention of benefiting the unit, a part thereof or society as a whole. The element need not be entirely new or unfamiliar to the members of the unit, but it must involve a noticeable change or challenge to the status quo." Regis Cabral says: "Innovation for a specific network is a new element introduced into the network which changes albeit only momentarily the cost of transactions between at least two actors, elements or nodes in the network." Frascati's manual (OCDE, 1992) indicates that: "innovation is the transformation of an idea into a saleable, new or improved product, or into an operative process, within industry and within commerce or into a new method of social service". The definition given by Morcillo is: "seeing everything that the world sees, Reading all that the world reads, hearing all that the world hears, to innovate is to make real what nobody has imagined, as yet. For B. Muñoz Seca and J. Riverola (1997): innovation is doing or making things, new or old, in new ways. For the Mondragón Cooperative Corporation, innovation is the successful exploitation of new ideas. Three aspects are considered to be fundamental:

a) The term 'exploitation' implies the notion of an end-client for the innovation.
b) 'Successful innovation' alludes to the outcome of the innovation.
c) By linking the success achieved with the source, this definition incorporates the dimension of the process that is needed to convert good ideas into products aimed at clients.

From the ground we have covered so far it can be seen that the key factors that define innovation are:

1.- Introduction of the product, process or service to the market.
2.- The differentiating feature that these products have.
3.- That this factor leads to market success, because without it there can be no innovation.

To sum up, if we analyze these various axioms we can safely state that every innovation entails at least a modification in the current situation, the way things are done within a given organisation, a re-think that results in a reevaluation of products, processes or services.

So, the meaning of the word 'innovation' varies depending on the sphere in which it is used and the period of time in which it emerges. However, it can be deduced from all of these definitions that there is a series of qualities that are inherent in the term 'innovation', among which are: creativity, change, novelty and salability, to which we might add that innovation generates intellectual property.

2.1 Types of innovation

Innovation is a whole that affects the system of production, it is an attitude that is implemented in the firm in its know-how (savoir faire, management of intellectual property and how things get done), but to apply it to each of the productive stages, it is necessary to analyze how and on which parts of the system it must act, and to this end innovative action has been segmented with respect to each sphere, giving us the following types of innovation:

- Innovation in organizational systems.
- Innovation in the productive process.
- Innovation in technology.
- Innovation in the product.
  - Innovation in organizational systems.

In this case, the change occurs at the management and organizational level, below which the production and sales efforts are developed. This is a type of innovation which, among other things, makes possible greater access to knowledge and an enhanced use of material, human and financial resources.

  - Innovation in the productive process.

The fundamental aim of the enterprise is to generate profits, this can be achieved by increasing sales, strengthening its presence in markets or developing new products; the company's aim of making or increasing profits can be pursued by focusing on two factors:

- Improving the staff's performance, thereby making production more competitive and increasing output.
- Reducing the manufacturing cost of the products.

Thus, what we are looking at is a system of cost reduction by means of innovation. Innovation of this kind consists in the introduction of new methods of production or the modification of existing methods through the

application of new technologies. Innovation here can also take as its starting point doing things in a different way, in terms of the company's processes. Redefining production processes can contribute to enhancing the added value of the end product, so the first step is to define the production processes that affect the product. This progressive redefinition of the manufacturing processes begins in the design phase, in which the materials and components must be chosen correctly, moving on to the entire manufacturing process all the way up to the packaging stage.
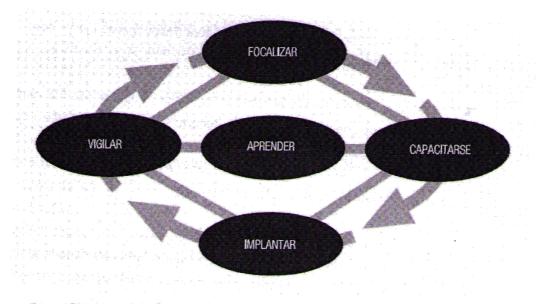
- Technological innovation.

According to the Cotec Foundation for Technological Innovation, this consists in "the utilization of technology as a means to introduce a change in the enterprise. This type of innovation has traditionally been associated with changes in the aspects most directly associated with the means of production. Technology may be created by the enterprise itself or acquired from a supplier, who may be public or private, domestic or foreign".

Two processes are involved in technological innovation, though these are not necessarily consecutive:
1.- Generating knowledge.
2.- Transforming this knowledge into a productive process, a product or a service.

The first point is indispensable, without scientific advancement there cannot be technological advancement, it is great and costly endeavor, in general carried on outside the firm, but of paramount importance for the firm. The second step must necessarily take place within the firm, but this requires an intermediary step that is of great importance for the generation of know-how, and that is the acquisition of this applied scientific knowledge. For this the firm must have a team that conducts research into emerging knowledge in the sciences and its possible application to the products that the firm produces. This team or system for the acquisition of exploitable new knowledge may be called a 'technology monitoring team'.

Fuente: "Pautas metodológicas en Gestión de la tecnología e Innovación para Empresas" (1998)

TARGET– UPSKILL –INTEGRATE – MONITOR - LEARN

Source: Pautas metodológicas en Gestion de la tecnología e innovación para Empresas (1998)

- Product innovation.

To be able to ascertain how product innovation happens and what are its key features, it is useful first of all to define what a product is; P. Kotler takes the view that "a product is anything that can be offered to the attention of the market for purchase, use and consumption, that can satisfy a desire or need, including physical objects, persons, organizations and ideas". Meanwhile, P. Bonta and M. Farber define it as: "a product is a combination of attributes that the consumer believes a particular good possesses to satisfy his needs or desires". Likewise, W. Stanton, M. Etzel and B. Walter define a product as "a combination of tangible and intangible attributes that include packaging, color, price, quality and brand, plus the services and reputation of the vendor; the product may be a good, a service, a place, a person or an idea".

To sum up, the concept of a product is the result of a creative effort that has certain tangible features (container, color, price, size, texture, ergonomics, usability, design) and intangibles (quality, brand image, services and vendor image, distinction), which are perceived by its purchasers as capable of satisfying their needs or desires. Therefore, the fundamental objective for innovation in terms of the product must be the willingness to create added value in the product; this added value will make it competitive within its segment of rival products.

In order to innovate in terms of the product, it will be necessary to know which factors characterize products and, once that is known, industrial design can be used to work on it to produce more innovative products.

3. Specific factors that define products.

According to David Bramston's definition in his manual "BASES OF PRODUCT DESIGN – FROM THE IDEA TO THE PRODUCT" : "The appearance of a product and its way of conveying a visual message is comparable to the way in which a person presents himself before others to transmit a message". David Bramston attributes quasi-human qualities to products and suggests that there exist certain factors that go to make up a product that define its essential nature, factors such as personality or appearance, which also reflect on products.

In this chapter, we synthesize and isolate the various intrinsic factors that constitute the essence of the product; many authors have written about this synthesis, dealing in depth with each of the constituent factors, but none have thus far identified the inter-relationships between them such that they can be recognized and worked with in a holistic and inter-related manner. There are however many studies that deal with each factor individually or in small combinations, and we will be referring to them from time to time throughout this paper.

As a result of our research and having analyzed an exhaustive bibliography on the intrinsic factors of products, we have identified five classes of factor:
- Formal factors.
- Functional factors.
- Use factors.
- Economic factors.
- Factors associated with the value of the product. .

Each class comprises a number of factors that have been classified in this way because they themselves are inter-related and because the techniques and tools that can make them more innovative are inter-related.

3.1 Formal factors.
The form of a product is the language that its design uses to reveal its essence. The form of the product is the symbol through which the product presents itself. Form brings together two basic concepts:
1.- Form as an element of sensorial contact (Shape, Material, Texture, Color).
2.- Form as a sign in semiotic terms (Perception of form, Aesthetic Perception, Aesthetics).

1.- Form as an element of sensorial contact is part of the physical dimension, the material world, what we perceive as the objective form of the product. Its factors are:
- Shape, contours, size, volumetry, relationship with space, form deriving from function.
- Material. As suggested by Bernd Löbach, the appearance of an industrially produced product is influenced not only by the designer's aesthetic purpose viz-a-viz its possible end-users but also to a large extent by the materials and the manufacturing processes used.
When deciding what material or combination of materials and what manufacturing process to use for a given product, there are three main alternatives, as suggested by David Bramston in 'Bases of Materials Product Design', namely:

- Classic, traditional materials.
- New materials, generally high-tech.
- Classic materials employed or deployed in new ways.

- Texture. Wucius Wong defines it thus: "Texture refers to the surface characteristics of a shape. This may be plain or decorated, smooth or rough, and may appeal to the sense of touch as much as to sight". While materials may transmit intrinsic qualities, these may be heightened or subdued by means of surface treatments; characteristics such as glossy, matt, polished or rough modify the product; polished and shiny objects such as the chassis of an automobile lead one to attempt to maintain that appearance by washing and waxing more often than would otherwise be considered necessary, and constitute an example of how texture can influence human behavior.

- Color. William Lidwell, Kritina Holden and Jill Butlerin in 'Universal principals of design', define the influence of color on the product as: "Color is employed in design to attract attention, to group elements together, to indicate meanings and to heighten the aesthetic". From this we may deduce that color is a determining factor in the form of the design, and also a tool for the development of the product.

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- 2.-   Form as an element of communication transmission. These factors belong to the realm of the intangible, of the metaphysical, to the study of the subjective perception of products; they relate in particular to questions such as culture, education, social status etc.

- - Perception of form. The principles of perception date back to Aristotle, who identified the five senses (sight, hearing, smell, taste, and touch) as the basis of perception. Christian von Ehrenfels, considered the founder of Gestalt psychology, published an article entitled 'On Formal Qualities', in which he claimed that perception is distinct from sensations. He also proposed the axiom 'The whole is greater than the sum of the parts. Ehrenfels published an article which was enormously significant for how industrial design is conceived: 'The level and the purity of form', in which he described how in each moment of a process of realization, every form is characterized by a certain level of creation. He defined the existence of higher forms in which there is greater unity and diversity (purity of form and level of the work), unity can be described as order and diversity as complexity. This led him to claim that the level of perception of form is a relation between order and complexity. Thus geometric shapes would be considered pure forms.

In the same way, in the 1960s, Max Bense developed a concept which he called 'exact aesthetics' which had as its motto "formal creation is the production of order". Undoubtedly the capacity of selection is one of the primary features of perception; it is the choice between what appears positive, negative or neutral. To conclude, we may state that in our perception of the object there is a search for balance, under the influence of previous experience, information, education and memory, elements which tend to condition our perception of objects.

- Aesthetic perception. This is an aesthetic that is conditioned by situations and users, it helps us to understand that perception is directed by the distinct personal interests of each user and their surroundings; therefore, it cannot be merely a process of perception of the projected image, but rather it is transformed by the influence of the contents of one's memory and one's interests, as expressed by the phrase "the user and his circumstances".

- Aesthetics. There are three aspects of special importance in the aesthetic relationship value – industrial design:

Aesthetic values. Aesthetic value is a measure of the aesthetic interest in the visual appearance of an industrial product by the user and is dependent on the circle within which he satisfies his aesthetic needs.

Constitution of aesthetic values as aesthetic norms. Aesthetic norms are aesthetic values recognized by a part of society.

Aesthetic rating by persons or groups within a socio-economic framework. A designer needs to know the aesthetic valuation, or rating, that users make of products or groups of products, for this market studies are required that can collect data on the aesthetic ratings of users.

3.2 Functional Factors.

Every product is designed to be used, to fulfill the function for which it was created, to live up to the expectations that have been defined and are required of it. Each product realizes its functions as it is used or utilized. Products are conceived to satisfy a main function, this function is the expectation that the user has invested in the product; if it does not meet it then the product 'does not work'. This main function may be single or multiple, in which case they are termed 'sub-functions'. The function always has as its end a benefit of some kind for the user.

There are also secondary functions, which are those that, while not the main function or a part thereof, are related to the main function and help to complete its use.

Functional factors may be classified as follows:

- Factors related to efficacy. Efficacy is the capacity of a product to perform the main function, regardless of how this is achieved, what counts is the final result, with not the slightest room for doubt as to its reliability.

- Factors related to efficiency. Efficiency is the capacity of a product to perform the main function, using the minimum of resources necessary or the most rational use of the means available to achieve that end. The resources may be materials, energy or time.

- Factors related to quality. Quality is a factor that is perceived, care must be taken to ensure that the product transmits this value as directly as possible. Quality levels may be set for the product the level of quality of the product may be assessed; there are techniques for comparing the quality of a product to a benchmark.

The level of quality of a product can be measured in terms of its reliability. Reliability here is understood to be the ability of a device to perform its function for a given period of time. The reliability of a product tells uso w long the product will function properly.

- Factors related to safety. Safety must be guaranteed for all the various uses of a product. Risks for the user must be reduced as much as possible, including the risks for the product itself. Lack of safety in a product entails responsibilities, liabilities and financial losses in the short and medium term. Safety can be operationalized as minimizing risks. To guarantee that products are safe to certain extent there are rules and regulations which compel the manufacturer to comply with specific parameters in order to ensure that products are safe. The factors of the product that impact on safety can be grouped as follows:

Safety for the intended use and foreseeable misuses.

Finishes and sell-by dates

Materials, warranties.

Instructions for use.

Warnings as to risks or hazards.

Color codings.

Protective containers, wrappers etc.

Control devices.

- Factors related to stability. A product must transmit safety, trustworthiness, durability or efficiency, but probably stability is the most indispensable value of all. All of the other values we just enumerated can be achieved with a robust design, and this transmits stability or 'ruggedness'. While stability can be basically mechanical, it also includes the ability to withstand impacts, to keep its shape while undergoing changes in temperature or humidity, to remain stable if exposed to electrical currents and to shockproof if dropped. All of these are factors which affect stability.

3.3 Use factors.

Products are intended to fulfill a function, and to realize that function they must be used. When a product is used, an interaction is established between the user and the product, in which an information exchange takes place. We may assess the ease of use of the product by looking at the extent to which this exchange is fluid, rapid and clear.

To determine the features of a product in terms of its ease of use and identify the factors that comprise them, what is known as a use analysis is conducted. To analyze the use of a product we must first of all contextualize the setting or environment in which it is to be used.

Stages in conducting a use analysis:

1.- Exhaustive inventory of the factors that stem from a diversity of situations of use. The sequence of use is defined.

2.- Additional information. All available information must be included: leaflets, catalogues, instructions etc.

3.-Conclusions. Defining one or several sequences of use. Profile and qualities of the product under scrutiny identifying strong and weak points. Comparative analysis of different models studied.

4.- Image and concept formed by users of the product on having used it.

In addition to the use analysis, it is advisable to identify the users and to create a profile of the typical user, in order to pinpoint the analysis and also to identify the various participants in the use, who are, briefly, the Designer/Value conveyor or salesperson / Purchaser / User / Beneficiary.

Some of the factors related to use are determined by what we know about the users; this detailed knowledge is the field of Ergonomics. Ergonomics is a science which brings together a set of scientific fields that are concerned with human beings and are necessary for the conception of tools, machines and devices that may be used with the maximum possible ease, safety and effectiveness. Together with ergonomics we will look

also at anthropometrics, which is the discipline that deals with the precise measurement of the various anatomical dimensions, the study of individual variation and its evolution over time.

3.4 Economic Factors.

Factors derived from economic criteria are probably those which most affect a company and consequently its product development; economic success is the result of success in the marketplace, and so if we can identify the economic factors which affect the product, we will know which factors affect the market.

Knowing the market means knowing the players as well as our own product. They are:

The consumer / purchaser.

The environment.

The competition.

We consider a consumer to be any person who is going to interact with the product and therefore this will include users, purchasers, beneficiaries, vendors, and maintenance or repair personnel. The intervention of these players can provide an enhanced brand image, an increase in sales and better positioning in markets. The mechanism used to obtain information about consumers is marketing, and within marketing we will conduct market surveys with users that will enable us to discover their expectations, their perception of our product and their degree of satisfaction with our existing products.

Knowledge of the environment can provide us with information about present and future needs of the market, the exploration of future markets and future configurations of the market. Knowledge of the environment must contribute to the achievement of objectives such as growth, profitability and stability. The environment must provide us with knowledge of four basic factors that stem from the market, namely: market volatility, technological development, degree of uncertainty in the market and growth of markets.

Competition is probably the most energizing action of markets and it is the one which involves the greatest investment in material and human resources, in order to position a product in the market. The analysis of the competition is founded on the logical basis that, in order to meet the needs of users by giving them greater satisfaction or value, one needs to have access as a frame of reference to the actions and selling points of one's competitors, since purchasers evaluate products in relative terms, comparing one with another before making their selection.

The mechanisms used to investigate the competition and their products are market surveys, re-engineering and benchmarking.

Together with these tools for the identification of factors derived from economic and market aspects we need to apply what M. Porter in the 1980s called the five competitive forces that configure the competitive environment of enterprises:

The rivalry of current competitors / the threat of new or potential competitors / the threat of products that could take the place of existing ones / the bargaining power of suppliers / the bargaining power of purchasers.

The key factors for products' success are:

The degree of superiority of products, their capacity to take a leading position.

Mastery of the principles of marketing.

Product design.

Market niches.

Branding.

3.5 Factors associated with the value of the product.

The factors associated with the value of the product are those factors linked with imponderables which are therefore unpredictable and tend to be associated with culture, education or the preconceptions of each user. These factors will be the most difficult to quantify and will be considered in a generic manner.

To investigate the decisions taken with regard to these imponderables, we will need to know how the human brain works and how it arrives at decisions. The brain has three distinct levels:

The visceral level, a layer composed of automatic systems of dispositions that are genetically determined.

The behavioral level, the part of the brain in which the processes that control our everyday behavior are carried out.

The reflexive level, where our contemplative processes are located.

It is practically impossible to design objects that are capable of satisfying all three of a user's levels and more difficult still to do so for large demographics. Nevertheless, we can establish an inter-relationship between these spheres and the qualities of the product:

Visceral Design > Appearance.

Behavioral Design > Pleasure and effectiveness of use.

Reflective Design > Self-image, personal satisfaction or memories. .
This inter-relationship generates factors such as satisfaction, status, identity, fashion – attractive objects perform better.

4. Conclusions.
The values presented in this paper are the basis for a line of inquiry which the authors are pursuing which will produce a survey that, applying these factors, will enable us to assess the level of innovation of specific products and develop a strategy to enhance their positioning.

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Officiamuseu*med*. The Mediterranean Museum System of Design and Applied Arts

Claudio GAMBARDELLA,[1] Jochen SIEGEMUND,[2] Ayşe ÖZBIL[3]
[1] Dipartimento di Cultura del Progetto, Facoltà di Architettura "Luigi Vanvitelli", Seconda Università degli Studi di Napoli, Aversa, Italia
claudio.gambardella@unina2.it
[2] CIAD - Institute for Architectural Design, Fakultät für Architektur, Fachhochschule Köln, Köln, Deutschland
jochen.siegemund@fh-koeln.de
[3] Department of Architecture, Okan University, İstanbul, Turkey
ayse.ozbil@okan.edu.tr

Abstract
With the construction, in Pompeii, of the temporary museum of enterprises and activation of Officiamuseum (the Regional Museum System Design and Applied Arts), which is the driving force, it is necessary to extend the "system" in a geographically and culturally more extensive. To really make this action strategy for the revival of craft and design - not making constant reference to the European market, especially in these years - you have to devise a The Mediterranean Museum System of Design and Applied Arts. Pompeii, once an important trading center in the Mediterranean, could become one of the centers of this system with the city of some countries such as Morocco, Libya, Egypt, Turkey, etcetera. This project is currently supported by Okan University, Istanbul. Professor Ayşe Özbil about it has made a study on craft turkish. Although there was a crisis with globalization, will be enhanced by our project. Furthermore, this work is also supported by a German university, the Cologne University of Applied Sciences. The prof. Jochen Siegemund stepped in with its expertise in the field of Corporate Architecture. The "System" - a sort of international company museums - will represent perhaps a great opportunity for development in the Euro-Mediterranean design.

System – Mediterranean – Company Museums – Corporate Architecture – Artidesign

Introduction (Claudio GAMBARDELLA)

The opening in the near future of the Temporary Business Museum in Pompeii, centre of the project "Regional Museum System of Design and Applied Arts – Officiamuseumed", marks a historic step for future development opportunities for those companies operating in the production of excellence in Campania. It is also the start of a decisive phase in the construction of design that is closely linked with local crafts – Filippo Alison and Renato De Fusco in the 1990s called it *artidesign* – with it being closer to the radical transformations, and not just economic, of our time. It is this very aspect that extends the geographic and cultural boundaries of the "System", proposing the hypothesis of a Mediterranean Museum System of Design and Applied Arts - Officiamuseumed, with it being an extension of the system developed for the Campania region, which might be of interest to other Mediterranean countries. The following contributions will highlight the two conceptual theories of the "System". Ayşe Özbil illustrates the contribution that can come from Turkey, a pillar of the design culture of the Mediterranean, in the interaction between museums and local crafts. While, Jochen Siegemund, through his work at the University of Cologne in the discipline of Corporate Architecture, defines the system as a modern business strategy tool.

It is not just a strategic project, but also a deeper restructuring of Design, collecting examples that come from a wide scientific subject area, geography and education. A design that is more suited to this current period of crisis, with it being able to restore the dialogue with the past as well as express a new idea of modernity that no longer based on the certainty of its Growth. A design that knows how to contrast the arrogance of globalization at home, opening up to new productive landscapes, peripheral rather than those of traditional industrial design.

1. Officiamuseum. Synthesis of the research

The idea of creating a *Regional Museum System of Design and Applied Arts* follows a decade that has been crucial for design in Campania (1990/2002). It is marked by a series of experimental collaborations between fifty-three designers and thirty-one local companies producing local handicraft goods (Claudio Gambardella had curated a lot of exhibitions on souvenirs like "Napoli souvenir d'autore", in 1990, or "I love Pompeii" in 2002), showing that it is possible to do design in a territory that lacks industries but is rich in local craftsmen. The study has been prepared gradually, through the understanding and elaboration of the enormous potential of the local handicrafts of Campania, carried out in Naples, in the 1970s and 80s, by designers and academics, with it also relating to a cultural environment that has a long history. «When in 1734, Charles of Bourbon re-nominated Naples as the capital of an independent kingdom, the city was already densely populated, with a population of slightly less in number only to London and Paris. However, it was not only due to its demographic size that Naples had a leading role in eighteenth century European society. The two centuries of Spanish rule, along with the brief Austrian viceroyalty period, [...] had left, from the perspective of cultural heritage, a fertile artistic, literary and philosophical ferment. [...] In addition to giving impetus to the realisation of the masterpieces by Luigi Vanvitelli, Ferdinando Fuga and Mario Gioffredo as well as other great architects of the time, Charles of Bourbon launched an enlightened approach to promoting the artistic, from porcelain workshops of Capodimonte to the hard stone carvings of San Carlo alle Mortelle. [...] The production of works of art became the laboratory of choice for the testing of new aesthetics. The excavations at Herculaneum and Pompeii fuelled the *imagery* of the search for ideas. The discovery of objects that animated life in the past – from pots to chairs to wall paintings – opened up new neoclassical horizons in anticipation of a phenomenon that would result in the British pottery of Josiah Wedgwood» [1] The idea of "System" comes from highlighting the presence of specialised museums in places where handicraft goods of Campanian excellence are produced as well as trying to bring the worlds of business and culture closer, a driver for development in the South. It also tries to involve small business owners, in a strategic project focused on design, that has a wider scope and is more long-term. Local development therefore depends on the museums. In 2002, the Second University of Naples, appointed by the Campania Region, drew up the preliminary project of a "regional museum system of design and applied arts", with it being conceived as a virtual regional network of twenty-one specialised museums, public and private, of applied art and crafts as well as temporary museum of Campanian business in Pompeii, located along a strategic tourist route in the region that connects Naples with the most important centres of products of excellence in the region (*See*: *The Regional Museum System of Design and Applied Arts*, book edit by Claudio Gambardella [2]).

2. The company museums

In the Centre-North of Italy many corporate museums have been opened over the last two decades, according to the postmodern idea of memory that favours the consecration of the product as unique and isolated from the productive life. Their low appeal, with relatively few visitors, when compared to those of other Italian museums (See: *Dossier Musei 2007*edited by Centro Studi TCI) [3], comes from the lack of clarity when defining the purposes and functions of company museums. They have become the "best living-rooms" of the companies where the family trophies are kept because their reference model is the museum *per se*, i.e., «[…] a permanent, non-profit, serving society and its development [that] carries out research relating to the tangible and intangible evidence of people and their environment; acquiring, conserving, communicating and, above all, displaying it for study, education and pleasure» (International Council of Museums - ICOM).

Is it right to conserve and communicate the tangible and intangible assets of a company and expose them for study? How can the needs of a company to promote itself be ignored and why not through its museum?

This open question, thanks to the project *Officiamuseumed*, has led to corporate museums being considered as an area of scientific interest – usually not explored in academia – and recently introduced as an *ad-hoc* course (**Company Museums**) at the Faculty of Architecture of the Seconda Università degli Studi di Napoli, the first in Italian academia. Through the research and course (with a large number of dissertations), it has been understood that there is a need to give life to a new type of free architectural principles of traditional

museum design, that are more appropriate to the profound changes of the economy and markets. The company museum is, in fact, a "museum of time", reflecting the history of the company, but at the same time registering the brand of which it is the expansion, promoting its image through a flexible design, interpreting the processes, errors, and attempts that the finished product has within its "body" covering up the invisible "fingerprints" of those invisible involved in its creation (the designer, entrepreneur, marketing expert, the advertiser, the workforce). A museum that does not display products, but illustrates the processes according to the principles of a specific "museography of business". It may even anticipate the actions of the company becoming a place of experimentation in which to develop and submit new proposals and "expose" not so much what already exists, but what is yet to be produced. In this sense, the museum becomes the "thinking head" of the company, the driver of its strategies and place of "training" of the consumer: a consumer responsible for businesses built on quality. Finally, the company museum can become a "circular museum" that takes into account the experience from the final recipient, not just guinea pigs in the hands of marketing, but the thinking and creative subjects. The temporary business museum in Pompeii wants to express such ideas through its confrontation with the historical museums of Officiamuseumed.

3. From the Regional Museum System to the Mediterranean Museum System of Design and Applied Arts

The studies carried out in the twentieth century since Fernand Braudel highlight how in the Mediterranean, in its confrontation with the political economy of contemporary events, is a highly complex area. It may be considered not only as a given history and geography, but as the «[...] reconstruction of an open area for exchange where Mediterraneans can met their neighbours» [4], says Mohammed Bennis, professor at the University Mohammed V – Agdal, Rabat. Subsequently, in the same wonderful post-face, quite rightly he states that «[...] the culture that was the basis of the past in the Mediterranean is the only one that can guide us in reconstructing the Mediterranean meant as an idea. The Mediterranean culture was the embodiment of tolerance, dialogue and openness. [...] It united what economics and politics managed to separate [...] If we consider culture as a founder, the reconstruction of the Mediterranean basin will become a new humanism, through which we deserve both the past and the future [...]»[5]. At the same time, he warns that this Mediterranean is part of a larger reality and that in reality the northern part of the Mediterranean is Europe. In 1995, the Barcelona Declaration (adopted at the Euro-Mediterranean Conference – 27-28/11/1995) [6] provides an inseparable interrelationship between the Mediterranean and Europe, because «[...] it [Europe] must regain its Mediterranean dimension, that is, its roots, that since ancient times have allowed it to undertake a beneficial exchange of political, cultural and religious experiences. This re-appropriation is, at the same time, a challenge for the future of the "european model"»[7]. The Mediterranean as well as Europe are concepts that require continuous remodelling and can be part of one big project that we can all help to build. A cultural project. An economic project. A peace project.

The "Mediterranean Museum System of Design and Applied Arts" is entirely in keeping with these broad themes and collective ambitions. In 2005, the project was drawn up and organized in a detailed proposal for EU funding with several Mediterranean partners (project presented on 29 JULY 2005 to the Regione Campania within Programme INTERREG III B – ARCHIMED). However, the administration of the Campania Region granted funding to other proposals. It was preferred to have meetings with individuals in order to transform the project idea into something consistent and definitive. International agreements, which form the basis of a modern university, promote the creation of these Euro-Mediterranean relationships. In particular, the "bridge" created with Turkey as well as Germany is thanks to bilateral Erasmus agreements drawn up with the University of Cologne in 2007 and Okan University, Istanbul in 2010.

What does the System propose to do? Specifically, it wants to contribute to a wide area of the Mediterranean (Euro-Mediterranean) in the construction of an alternative design that, despite the crisis, is multiplied with objects, furniture, things/goods that are not created for a particular world.

The alternative, therefore, in the hoped-for post-growth society which fully expresses the new values that are have been emerging for some time – such as the selective recovery of the past, authenticity, local traditions as well as cultural heritage (*See: La società della post-crescita*, a book of Giampaolo Fabris[8]) - renewing the relationship between design and craft (that was never completely severed in Italy). It is worth considering of the "third type", which was defined by Alison and De Fusco in 1991, that is placed between the crafts (even more influential and vital in the Mediterranean countries) and industrial design; *artidesign* [9], i.e., not as a southern Italy phenomenon but in a broader sense, "Mediterranean artidesign", or rather Euro-Mediterranean.

This objective will have a positive response in the knowledge of a widespread context of micro-entrepreneurial artisans and manufacturers-holders of ancient manual wisdom. With these subjects, it will be

possible to experience new dynamics (as in Campania and other parts of Italy) when introducing into the "design" moment of the craftsman a professional figure that is alien, the designer, thus interrupting the *modus fabricandi* closed between design, manufacture and sale. The Design Culture could also introduce promotion which is usually absent in handicraft production as well as modernize product distribution.

The Officiamuseumed project can save crafts from isolation by introducing them into a broader economic and productive context; promoting the transformation of small artisans into businesses, always small, but implemented by the Design; aggregating them through the existing museums of applied arts and crafts. Officiamuseumed can be divided into a series of local "subsystems" in different regions of the Mediterranean and become, with their respective central organisations – the new design museums – a "Mediterranean Museum Company" with the task of promoting the development of these new companies with excellent products of a territory so vast through the careful direction of universities, chambers of commerce and trade associations.

Fig. 1: "Diavoletti da tavola", ceramic object designed by Riccardo Dalisi for Alessi / Tendentse.
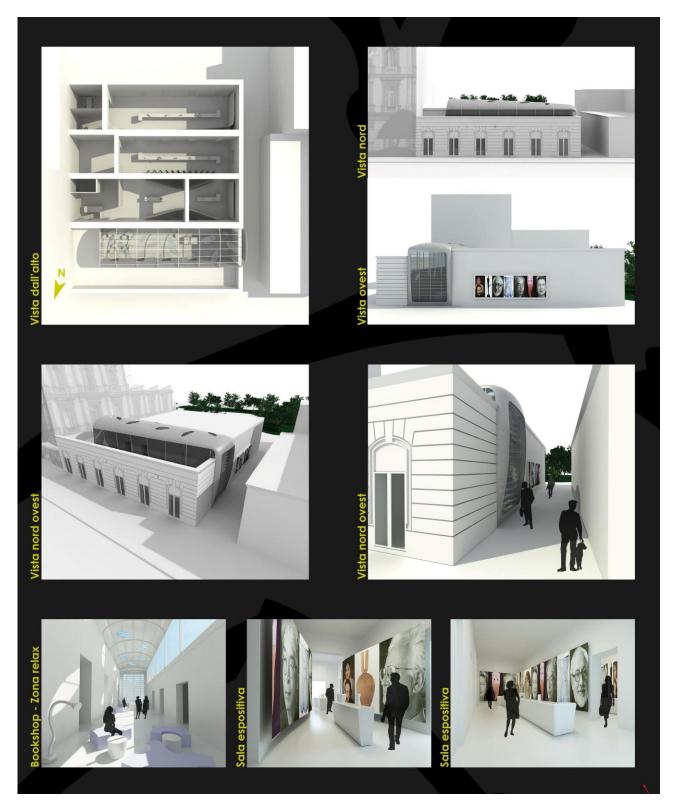
Fig. 2: The "Temporary Museum of Pompeii": the terminal of Officiamuseum.

6. Ciad / cologne institut for architectural design corporate architecture (Jochen SIEGEMUND)

Under the direction of Prof. Jochen Siegemund (architect and urban planner) in collaboration with Professors Oliver Fritz, Dr. Michel Muller, Amandus Sattler and other experts and scientists leading the Cologne Institute for Architectural Design / CIAD the Master of Arts master's degree in architecture / corporate architecture through. On this topic is in the same research focus, the Institute has its headquarters, research across faculties and disciplines. The strong labor market based profiling, as well as synergies in teaching and research, design and practice lead to the unique feature in this field of work (Corporate Architecture).

Identity through architecture

Corporate Architecture is constructed identity. The exhibitions, biennials and publications on the current architecture are influenced by projects such as Prada Stores, Niketown, the Mercedes-Benz Museum or the Allianz Arena: They are examples of an architecture that creates a certain attitude to life and creates abrandimage. Architecture is playing a communicative role, since it carries the values and self-understanding of a company both internally and externally. The term corporate architecture was coined in

the '90s, is now generally established imprinted on numerous projects and the design and conceptual design of architectural firms. The issue of corporate architecture covers not only the scenographic designed spaces and architectures as they are known in exhibitions, trade shows, showrooms, museums and theme parks industry. It is an expanded role at the interface of the disciplines of visual communication, marketing, design, IT, sociology and urban and regional development. Ever since the success of the Guggenheim Museum by Frank Gehry in Bilbao, we know that architecture can perform as a pulse motor and the development of a whole region.

Branding Architecture (form follows content)

Corporate architecture is a special opportunity for a new generation of young architects. This opportunity is the great attention paid to brands is receiving today. As brands and thus their architecture a global impact on our behavior and our society needs to make a corporate architecture that power advantage and responsibly deal with it. Through a holistic and integrative approaches, we can help architects design our future and part of the solution of global, ecological, economic, social and political challenges. With the help of corporate architecture to sustainable and meaningful projects for global development be designed and established.

More information can be found on our blog http://c-i-a-d.org/.

Fig. 3: An installation of Corporate Architecture

Fig. 4, 5: Museumsnacht Nürnberg 2003. Interactive installation curated by prof. Jochen Siegemund with is students

7. Turkish handicrafts: integrating museuming, marketing and production (Ayşe ÖZBIL)

Handicrafts reflect the characteristics of cultural identity. Unfortunately handicrafts activity and the number of craftsmen in Turkey have waned throughout time owing to multiple factors, most significantly to globalization. The world has shifted towards a single-model production as a result of globalization, which actually makes local values so important that their protection is crucial not only for the original area of production but for the entire world (Kongar 2000). This article presents an overview of Turkish handicrafts (classification and history), discusses their present day state and problems, and concludes with recommendations for their promotion and preservation.

7.1. Historical Background on the Regression of Turkish Handicrafts

Technological advancements and cultural and social transformations during the first years of Turkish Republic (1920s and 30s) had a significant impact on demographics and production activities. Starting from the 50s decline in rural population has caused rapid urbanization, with ateliers transforming into factories. Due to fast-changing social, economic and political developments encountered in the nineteenth and twentieth centuries, the terminology used in handicraft activity has been altered. Turkish culture's materialistic products named as "handicraft" during the first years of Turkish Republic. After the 30s the term "handicraft" started qualifying a larger area and was turned into "traditional handicrafts". In the 60s the concept of "handicraft" have transformed into "small industrial products". With the importance attributed to tourism during the 70s, new terms such as "touristic souvenirs/handicrafts" entered the lexicon. As such, while the materialistic products of the Turkish culture still attain their cultural and historical significance at the present day, there seems to be an increased confusion surrounding the terminology used to describe these hand made products.

7.2. Classification of Turkish Handicrafts

Anatolia, occupied by many cultures throughout the history, has been the centre of various handicrafts developed for the purposes of transportation and accommodation. Eşberk (1939) and Arlı (1990) classify the Turkish handicrafts according to the raw materials used as follows:

- Fibers as raw materials (embroidery & weaving):

Carpets, *kilims*, socks, pullovers, curtains, headscarves, any type of covering cloths, etc. Weaving materials in traditional Turkish handicrafts consist of wool, mohair, cotton, bristles and silk.

- Trees as raw materials:

Hand stamping presses, thread spinning tools, oxcarts, kitchen utensils, accessories for daily usage such as cigarette holders, walking sticks/canes, prayer beads, architectural elements such as doors, windows, locks, musical instruments such as shepherd's pipes and drums.

- Stone as raw materials:

Architectural elements such as gravestones, fountains, mosque niches, mosque doors, etc., accessories for daily usage such as necklaces, bracelets, rings, chests, etc.

- Earth as raw materials:

Vases, bowls, pottery products, ceramics, glazed earthenware tiles.

- Metal as raw materials:

Architectural elements such as door knobs, locks, kitchen utensils such as knives, wall plates, heating instruments such as stoves, agricultural tools such as shovels, jewelry.

- Glass as raw materials:

Various types of blue beads (to ward of the evil eye), *çeşm-i bülbüls*, stained glass, jewelry and accessories.

- Leather and animal waste as raw materials:

Dressing elements such as hats, boots, belts, daily belongings such as cases, cigarette holders.

- Thin branches, stalks and tree stripes as raw materials:

Basket weaving, furniture making, bags, straw mats, etc.

In addition one more category can be added to the above classifications:

- Paper and dye as raw materials:

Calligraphy which is the art of fine handwriting with aesthetic principles, and *Ebru*.

Figure 7 maps different types of Turkish handicrafts based on the location of their productions. Figure 8 shows some examples of Turkish handicrafts and their production processes.

7.3. Present State and Problems of Turkish Handicrafts

In the 21st century challenges facing Turkish handicraft production are multi-faceted. Migration from the villages to cities, increase in the machine production in accordance with the technological advancements, changes in cultural and social trends and habits, decrease in the amount and standards of raw materials, as well as the invasion of the market by the products of Asian and Far Eastern countries are some of the factors that have been influential in the regression of handicrafts (Arlı 2006). In addition, globalization affects cultural

materialistic production negatively by shifting the production to parts of the world where manpower is relatively cheaper and ample. While handicrafts used to be perceived worldwide as the materialistic dimension of the national culture and seen as part of the public economics previously, today they are evaluated as the visual products of national heritage that can be most easily globalized (Oğuz 2002). Furthermore, the absence of an integrated state policy on handicrafts results in complications in their production, marketing, collection and exhibition (Teği and Erdoğan 2008). These factors altogether have led to the diminishing of the artisans' knowledge to future generations, and thus the disappearance of handicrafts in Turkey.

In this paper the underlying problems of handicrafts in Turkey will be discussed in three headings:

Museuming (collecting and exhibiting)

In Turkey the formal institutions in charge of exhibiting handicrafts are Ethnography Museums. Table 1 presents an overview of current handicraft museums in Turkey. Museums and cultural heritage protection agencies in Turkey lack the appropriate status in which they need to be recognized as social bodies (transferring the past of the society) with political agendas (rendering conscious the society about its social and cultural structure) (Keleş 2003). The inadequate resources of museums and museuming works, lack of knowledge regarding museology, insufficient state subsidy all contribute to the deterioration and disappearance of the ethnographic materials from their environments.

Name	Nominal	Initiated	Type of exhibitions	Location
Turkish and Islamic Arts Museum	state	1913	calligraphy, tiles, stone and wooden works, and rugs as well as ethnographic displays	İstanbul
Sadberk Hanım Museum	private	1980	Ottoman and Byzantine jewelry, tiles, ceramics, sculptures and steles, glass objects, beads, coins, and coppers	İstanbul
Sakıp Sabancı Museum	private	2002	Ottoman calligraphic art and calligraphic tools	İstanbul
Yapı Kredi Vedat Nedim Tör Museum	private	1992	collections of antique coins, medallions, embroideries, cloths, worry beads, and *tombaks*	İstanbul
Pera Museum	private	2005	Kütahya tiles and ceramics (private collection)	İstanbul
The Great Palace Mosaic Museum	state	1938	mosaics from the Byzantine period	İstanbul
Topkapı Palace Museum	state	1924	examples of Ottoman architecture, miniatures, treasures and jewelry, collections of porcelain, Islamic calligraphic murals and manuscripts	İstanbul
The Museum of Turkish Calligraphic Art	state	1984	handwritten manuscripts, sheets, sultans' signatures, and miniatures	İstanbul
Tiled Kiosk Museum	state	1953	tiles-, and ceramic works	İstanbul
Kastamonu Handcrafts Museum	state		handicrafts of Kastamonu region	Kastamonu
Kastamonu Ethnography Museum	state	1997	handicrafts of daily use, ethnographic works, copper kitchenware, weaving works and traditional clothing	Kastamonu
Adana Ethnography Museum	state	1924	ethnographical works, weaving, and stone works	Adana
Ankara Ethnographic Museum	state	1928	wood-, glass-, and tile-works, calligraphy, carpets, embroidery, Anatolian jewelry	Ankara
State Museum of Painting and Sculpture	state	1930	exhibitions of painting, sculpture, ceramic, printing arts and photography	Ankara

Fig. 6: List of major handicrafts musuems in Turkey.

Marketing (initiating and promoting)

Marketing is considered as one of the major underlying challenges of handicrafts. Factors such as decrease in high quality raw materials, decline in the traditional standards of production as well as lack of the production of new designs which may create new marketing opportunities both at domestic and international scales lead to difficulties in marketing. In Turkey the marketing of handicrafts is mainly carried out by the private sector. For example, the craft of woven textile in Kastamonu, a national prominent *kilim* production

province, was doomed to be perished when a collaborative initiative was established in 1995 between the local producers and a large store with the efforts of the local government (Teği and Erdoğan 2008). Recently official institutions have also begun marketing handicrafts in Turkey. DÖSİM [10] (Operational Management of Traditional Handicrafts and Stores, was initiated as a subsidiary of the Ministry of Culture and Tourism in 1979 to provide financial support for protecting and improving the cultural entities, and to raise funds for promotion activities. Most recently, GES [11] (Traditional Hand Crafts Stores Directorate) was established in 2005 within the organization of Ministry of Culture and Tourism to support the production, promotion and marketing of Turkish traditional handicrafts. In short, if handicraft activity is to proceed serving as a source of economic income, artisans need to have access to markets, and they need to be able to compete, either in price or in quality. It is possible that an improvement in infrastructure, both physical and political, as well as increased education in the field of handicrafts could impact the handicraft industry positively, but the sustainability of handicrafts production most likely requires more and better-coordinated support than is now available for creating new marketing opportunities for these local products.

Production (crafting)

The production of handicrafts in Turkey is organized by cooperatives, local governments, and mostly small and large-scale companies. In recent years many products produced in countries where cheap-labor is ample has entered the market and harmed Turkish handicrafts and craftsmen by creating an unfair product-market competition. In order to ensure the sustainability of handicrafts and promote its market value, large workshops and cooperatives that would support high-quality production are required.

7.4. The Link between Museuming, Marketing and Production

Recent debates and studies have made it clear that even in the most highly industrialized countries handicrafts continue to exist simultaneously with industrialization, and that the progress of the latter does not necessarily suppress handicraft production. In order to promote the development of handicrafts in new forms, it is essential that different parties who deal with handicrafts should work in coordination. In Turkey some initial steps are already taken towards creating links between the market (local businesses-firms) and production (designer-craftsman). A number of well-established enterprises support the production of modernized traditional handcrafted small objects designed by known designers appreciating the know-how and qualities inherited and cultivated within tradition. These firms include, but are not limited to, the following:

- *Koleksiyon* [12] (A large store that produces and markets glass-ware accessories, and carpets/rugs using traditional handicrafts but re-interpreting them.)
- *Paşabahçe [13]* (Hand-blown glass works are designed by national and international architects and industrial designers in the firm's workshops in Denizli.)
- *Eczacıbaşı Vitra [14]* (A ceramic factory which takes its cue from the millenia-old Anatolian tradition of ceramic art, reinterpreting the the handcrafted originals and adapting them to the contemporary bathroom. It also embodies a Ceramic Art Studio that aims to encourage ceramic artists and public appreciation of this medium.)
- *Vakko [15]* (A large-scale firm that produces scarves and fabrics inspired by traditional Turkish Arts and created by the ateliers of renown artisans.)

These enterprises and many more are aimed towards bringing together arts, crafts and design, demonstrating that they have invested in design throughout, from the planning stage to distribution. In recent years another type of initiation, museum-firm pair, has emerged in different parts of the world. The goal of the museum-firm pair is to link various local product institutes, small- and medium-scale firms, and museums of applied arts. In Turkey Eczacıbaşı Virtual Museum [16] is one such initiation, which brings together multiple collections and exhibitions of traditional handicrafts (i.e. ceramics), paintings, and photography by linking various Turkish museums online.

7.5. Conclusion

To assure the maintenance and prevent the devaluation of handicrafts it is a must that different disciplines should work jointly through an integrated system. This type of a framework calls for tight links between museuming, marketing, and production of handicrafts. The cooperative venture between local firms, public/private institutions and designers/craftsmen need to be extended to include the museuming of these products as well to support the expansion of a design-culture. As the above listed firm-designer/craftsman pairs indicate this interaction between culture and business seems feasible and profitable. Hence, the idea of *Officiamuseum* –the regional museum system of design and applied arts, an 'action' aimed at forming tight links between the various local realities, interacting with similar institutions, including the future museum of

design, would provide a unique opportunity to integrate museums of applied arts and handicrafts and artisan firms (Gambardella, 2005). This kind of an integrated museum system linking firms and museums tradition of arts and crafts spread over different regions both in Turkey and in other regions such as Italy and Morocco is of the greatest cultural (design-culture) and economic (marketability) importance.
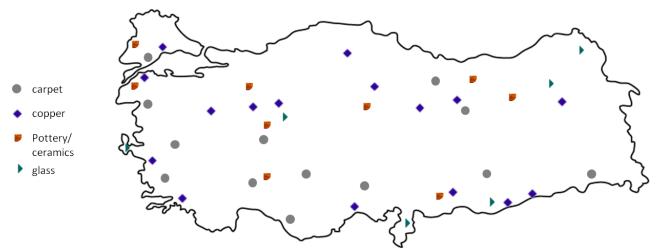
Fig. 7: Turkish handicrafts mapped based on their types and production locations

Fig. 8: Turkish handicrafts made of a) ceramic, b) glass, and c) fiber and their crafting processes.

Fig. 9: Exhibition halls in a) Pera Museum, b) Tiled Kiosk Museum, c) Turkish and Islamic Arts Museum, and d) Sakıp Sabancı Museum.

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Imagination applied to European norms in "humanized" hospitals. More research, less cost.

Anna MAROTTA[1]
[1] Department of Architecture and Design, Faculty of Architecture, Polytechnic of Turin, Turin, Italy
E-mail anna.marotta@polito.it

Abstract

The architect M. Tedeschi worked to an update project for the Department of Medical Oncology at the San Carlo Hospital in Milan (1994). It was part of a larger Humanization Project for that hospital. He compared the concept of humanization to that of *Heimlichkeit*, that means the comfort feeling, quiet, peace sensations and home warmth that everyone yearns for.

In 2001, U. Veronesi - with R. Piano - presented a preliminary *Preparatory Metaproject for guidelines definition in hospitals design* in the Italian Regions, in which patients and their needs play a major role in the humanization project. This is a theme of topical interests, characterized by a lot of researches and applications.

This paper aims to verify the colour role in the hospitals humanization process and will show, with general scientific criteria, an interesting colour restyling experiment conducted (as voluntary work) by the author for the San Lazzaro Hospital in Turin, in collaboration with ANDOS, Sikkens and Politecnico of Turin.

Thus, by combining hospital voluntary work, technical and scientific research (public and private) and creativity, an important objective for the care and comfort of patients and hospital has been achieved. It has been conducted a "pilot project", with procedures based on norms, (without costs for the public institution) replicable in other similar situations.

Keywords: humanization, comfort, design, colour, research

1. Introduction

The architect M. Tedeschi worked to an update project for the Department of Medical Oncology at the San Carlo Hospital in Milan (1994). It was part of a larger Humanization Project for that hospital. He compared the concept of humanization to that of *Heimlichkeit*, that means the comfort feeling, quiet, peace sensations and home warmth that everyone yearns for.

Unfortunately, often the formal language - and not only - of hospital architecture, informs residents, workers and visitors who stay in the hospital does not mean "dwell in the hospital," but live in another world: clean rooms, neutral colours, cold materials, furnishings anonymous, shared bathrooms and sometimes without a mirror, impersonal and depressive waiting [2].

The problems of the disease seems to add the "punishment" of a harsh environment, if not hostile, in any case not communicative and non-interactive.

In 2001, U. Veronesi - with R. Piano - presented a preliminary *Preparatory Metaproject for guidelines definition in hospitals design* in the Italian Regions, in which patients and their needs play a major role in the humanization project. This is a theme of topical interests, characterized by a lot of researches and applications.

This paper aims to verify the colour role in the hospitals humanization process and will show, with general scientific criteria, an interesting colour restyling experiment conducted (as voluntary work) by the author for the San Lazzaro Hospital in Turin, in collaboration with A.N.D.O.S. (Turin), Sikkens (who donated paints and materials produced in observance to the European norms) and Politecnico of Turin (who has granted his patronage).

Fig. 1: Visual examples: environmental comfort can determine the quality of life in place of care, influencing the therapeutic response.

An important goal for the comfort and the cure of the patients and the hospital workers has been reached through volunteer, scientific-technological researches (public and private) and creativity: a "pilot project", with no costs for the public institutions, started with the possibility to reapply it in similar contests. The results of such experiments are being analyzed through psychological tests by the Clinic of Psychology and Oncology of the University of Turin.

The term "humanization", in its broad meaning, implies, in the design and managing of the sanitary structures, the need to use other than functional criteria, also integrative approaches sensible to the psychology and the relationship system of the patient, to avoid maladjustment and improve the recovery. Particular attentions have to go on the hospital operators, doctors and paramedics, since the conditions of their job has a double outcome: on them, as workers, and on the users.

Social-cultural changes, like for example migration flows, have to be take in to account for the design part to adapt to the continuously changing reality, in order to have hospitals adjusting to the patients and not vice versa.

Many recent studies on environmental psychology show that the environment can strongly influence the behaviours and relationships of people, being fundamental for the quality of the structures. Colours and visual components can be taken as examples for what concerns the creativity.

S. Marsicano [3] highlight that in the Anglo-Saxon clinical language exist two different ways to call a treatment. Cure, more technical and used for a clinical-scientific therapy, and care, more global, which take into account all the patient's needs and requests. In the Italian sanitary structures the cure is usually excellent, but part of the effort is vanished because of the lack of care.

F. Spinelli, E. Bellini, P. Bocci and R. Fossati [4] are the authors of "Lo Spazio Terapeutico". They show how "in the public construction industry the spaces, mostly the interior parts, are considered apart from the people and the activities than later will take place in them. This general project approach generated "stranger" spaces, hard to live and costly to maintain, causing environmental discomfort, lack of participation in the activities and dissatisfaction in the public services, identified in the environment itself".

1.1 The characters

Many are the characters involved in this ambitious project: A.N.D.O.S. Onlus Foundation in Turin (President Dott. F. Pedani), the research team Policroma from the Polytechnic of Turin (Scientific coordinator Prof. A. Marotta), Hospital University San Giovanni Battista in Turin (pursuer Dott. E. Iodice), the Oncology Department of Medicine 2 San Lazzaro Hospital (Head Physician Dott. M. Airoldi and Day Hospital coordinator Dott. F. Pedani), the Director of the Psychological Oncology Clinic from the University of Turin (Prof. R. Torta and Dott. A. Varetto), the Technical Office from the Hospital S. Giovanni Battista in Turin (Geom. M. Regis), AKZONOBEL through the Sikkens sign (A. Fagotto - national coordinator for commission relationships with his team PSC arch. F. Pezzo and eng. B. Moretti).

The research team Policroma, coordinated by myself, gathers many architects – professors, researchers and

professionals - all involved in different activities, as publications and thesis, which produces a solid background to face the considered problematic. Some of them are: Serena Abello, Chiara Cannavicci, Marta Balzarro, Gaetano De Simone, Ilaria Matta, Raffaella Ricchi e Eliana Milani.

2. Chromatic restyling project

The collaboration between the research team Policroma, coordinated by myself with the Politecnico di Torino, the Fondazione A.N.D.O.S. Onlus in Turin and Sikkens, starts from the need to modify the perception of the common areas in the Oncology department of the San Lazzaro Hospital in Turin.

In the intervention of humanization the picking of the colour is never neutral and cannot be linked at automatisms: it has to be ruled by scientific-disciplinary methods.

The project is born from disciplinary and specific experiences and knowledge grew in several years. Many publications and specific studies on the colour in architecture have been made, the results of those are systematically shown in the publication from the title *Policroma. Dalle teorie comparate al progetto del colore* [5].

The original approach of the comparative theories of colour for the analysis and design are confirmed : too many times authors and general public mention a general colour theory without anchoring it to the respective cultural matrices and to identifying parameters.

The research is inserted in a wider field of humanization of the public spaces, through interventions able to find or recover the "humanity" of places. The main goal of the group "Policroma" is to study the effects that the interior and exterior environment creates on the human perception. One of the key role of the study is the colour since it is one of the important factor which characterize the spaces. Policroma aims to find a guide line to humanize the public spaces throughout the analysis and application in the Turin area. The effort of the group, that concretely operates decorating through volunteering, add affective quality to the meaning of the project and the message to the patients.

For a complete explanation of the project see the attached report made by S. Abello, C. Cannavicci, M. Balzarro.

3. Themes and goals of the project

The project took inspiration from the metaphor of Ettore Sottass (how to forget the rhetoric triad of the flores, lumina, colores) for which the architectonic language should be used in the research of an authentic relation between life and architecture. This in order to create spaces like metaphors and not only "buildings" to watch and coldly live. The project links the general meaning of the metaphor to the specific one of the floral metaphor. The thought is instead related to the garden therapy, which got many results either in the prevention and the therapy.

This is the main theme of the restyling project since the beginning, called "Rifiorisce la Vita!". The idea shaped around the awareness that nature helps and improve the recovery but cannot substitute the conventional cures; in this way gardening helps the dejected patients to smile again and the anxious ones to dissolve the urgency to do things. From this way it is possible to face the recovery constructively and to improve it.

Fig. 2: Policroma: the icon of a historical-critical method. Systematic overview of the theories compared with the respective models. In: MAROTTA, Anna. *Policroma. Dalle teorie comparate al progetto del colore*, Torino: Celid, 1999, p. 54. Only a disciplinary warning and critical approach can lead to analysis and conscious design. Unfortunately there is often a "project of colour" without the necessary process of knowledge, capable of embodying the choices to the most suitable matrices cultural, and theoretical aspects associated with its authors.

Fig. 3: The corridor of the department of Medical Oncology 2 San Lazzaro University Hospital San Giovanni Battista in Turin before the restyling of colour.

4. A sustainable Design

A big ally that the restyling project have found is the Sikkens company [6] – world polishes producer and seller, which always pay attention and respect the environment and the people. The company's policy immediately merged very good with the project. Sikkens vision contemplate the sustainable develop and trade social liability. One of the best answer for the today market since all the products are passion made to guarantee high quality results and low impact on the environment.

This contribution has been of great importance, underlining how in a multidisciplinary project is fundamental to calculate working methods "safe" for all the practitioners. Methods close to the design demands of an hygienically controlled place, which also have to be easy to clean, with low environmental impact and enjoyable. Sikkens introduced a new product specific for the medical-sanitary market following the latest European norms. The range of produces is based on the everyday needs and problems of the related sector. Specifically for the Oncology department of the San Lazzaro Hospital in Turin these following products have been adopted:

- *Alpha Sanoprotex*, water painting useful to inhibit the proliferation of bacteria(Staphylococcus Aureus Meticillino-Resistente – MRSA, Escherichia Coli, Pseudomonas Aeruginosa, Acinectobacter Baumannii, Enterococcus Hirae e Streptococcus pneumonia). The secret is in the silver ions acting on the bacteria with the addition of a particular washable and resistant film. (Classe 1 EN 13300). The efficacy increases when washed and rub, it isolates the Isobetadine and other sanitizers;

- *Wapex 660*: water epoxy product bi-composed for floors and walls. Covering suggested for locales in where the use of solvent products is not permitted. Low odour and low COV content(less than 15g/l), it has been approved by the norm ISO 8690, also applicable in locales with the presence of food (UNI 11021).

Fig. 4: 2012, Anna Marotta with Policroma group. Each function is characterized by a flower and its colour. Flowers and colours become the elements that help the Hospital users not to experience feelings of alienation from space and places of care. In this picture, the hallway of the Department of Medical Oncology 2 San Lazzaro, University Hospital San Giovanni Battista in Turin after the restyling project.

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Fig. 5: 2012, Anna Marotta with Policroma group. Illustrative examples of abstraction that led to the creation of the stencil.

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5. Colour and emotional comfort

The multidisciplinary of the project also enclose a phase of analysis and check. It is scientifically tested by psychologists from the S. C. D. U. Department directed by the professor R. Torta and from the A. O. U. Team from the S. Giovanni Battista Hospital in Turin.

The assumption is, as said, the existence of hidden messages contained in the environment that the workers and patients can interpret in different ways, consequently this can influence the final result of the cures. So, the goal is to plot the colour perception in sanitary locales related to the psychophysics wellbeing of people. The challenge is to unify the objective measurements of the emotional changes related to personal perception and codification of colour and visual field in general. The tools used are psychological tests composed by a semi-structured interview on contexts/colour. All the results are going to be statistically organized.

Rowlands, in 2008, referring to this subject wrote about three important topics: the direct view on nature and its colours can mend the stress and reduce the pain: improve the locales allocated to social purposes accommodates the psycho and physical recovery; finally sticking to the cures reduces anxiety in the patient and in the patient's family.

The research's expectations can be summarized in: a reduction in the anxiety symptoms, a correlated reduction linked to the picking of colours, an improvement in satisfaction for the cures received. The goal the will be anyway achieved is a higher attention to the humanization of the medical field and more colour in the everyday work in the hospitals.

Fig. 6: Extract from the presentation of the work with some examples of psychological tests. taken from the study proposed by Director of the Psychological Oncology Clinic from the University of Turin (Prof. R. Torta and Dott. A. Varetto).

6. Conclusions

Architects and builders cannot of course "donate" therapy, but they can for sure give quality to the hospitals: this is what our project is about.

Considering the preset goals the following are the one achieved: a concrete example to show and use for future applications, derived from a accurate research on the lowering of prices and a careful picking of chromatic aspects. This to avoid the wasting of money, mostly public, on dispersive actions not profitable for the patients, visitors and medical operators.

At San Lazzaro Hospital in Turin "Rifiorisce la Vita"

The life flowers in the sanitary system, in the prevention, in the efficiency of the therapy, in the effort, competence and passion of doctors and their helpers. In the fight of the single patient and its family and friends. In volunteering, in generosity of private companies, in everywhere, but especially in the hospital!

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less
more
architecture
design
landscape

"Life flourish again" for San Lazzaro Hospital in Turin. More sustainable colour, less stress.

Serena ABELLO,[1] Chiara CANNAVICCI,[2] Marta BALZARRO,[3]
[1] [2] [3] Department of Architecture and Design, Faculty of Architecture, Polytechnic of Turin, Turin, Italy
E-mail serena.abello@polito.it, chiara.cannavicci@polito.it, mackey9@fastwebnet.it

Abstract

In the context of initiatives, studies and investigations for the hospital humanization in Turin, the research group "Policroma", coordinated by A. Marotta (Polytechnic of Turin) has gained a large and specific set of experiences. Architect, Ph.D., Full Professor of Drawing, Marotta - author of specialized studies and publications (concerning the colour in architecture, city and landscape field) exposed in a systematic way in his publication called *Policroma* (1999) - has established a Colour Laboratory that conducts and coordinates. The research group is composed by many architects - teachers, researchers, students and professionals - engaged in various types of related publications, theses and dissertations.

The paper illustrates the latest activities involving the non-profit organization ANDOS Foundation, the Polytechnic of Turin, Sikkens company and the Molinette Hospital Direction, which began last summer with the transfer of the Medical Oncology Department of San Lazzaro Hospital in Turin. On this circumstance the promoters wanted to develop a restyling project, characterized by a high cultural level (which also included the colour), with minimal financial investment. The final goal is to create, through a carefully thought project and the application of specialist and critically selected colour criteria, comfortable environment, thus contributing not only to the psychological well-being, but also to a better therapeutic response.

Keywords: humanization, comfort, design, colour, research

1. Introduction

In the context of initiatives, studies and investigations for the hospital humanization in Turin, the research group "Policroma", coordinated by A. Marotta (Polytechnic of Turin) has gained a large and specific set of experiences. Architect, Ph.D., Full Professor of Drawing, Marotta - author of specialized studies and publications (concerning the colour in architecture, city and landscape field) exposed in a systematic way in his publication called *Policroma. Dalle teorie comparate al progetto del colore* [3]. She has established at DINSE, actual DAD department, a Colour Laboratory that conducts and coordinates.

The research group "Policroma" represents the outcome of long and extensive research in the field of color and visual perception, in this case aimed at improving the quality of life and the humanization of public and private places through projects that can found - or rediscover - "humanity" of places.

The chromatic element plays a key role in this study because it is one of the most important factors that characterize the space. In this sense, through the analysis of case studies and practical applications in the Turin area, the group "Policroma" aims to study the influence that the environment - external or internal, with its characteristics - has on the human perception, seeking to identify the guidelines for a possible and desirable humanization of public and private places, with particular interest directed to care spaces.

The research team, coordinated by the scientific knowledge of A. Marotta, gathers many architects – professors, researchers and professionals- all involved in different activities, as publications and thesis, which produces a solid background to face the considered problematic. The group is helped by a company which has a long history of chromatic renovation; R. Ricchi an E. Milani (experts in frescos renovation in epoch building) are the precious link between theory and practice, very helpful in applications and projects like the one that it is going to be introduce.

S. Abello and C. Cannavicci, graduating in Cultural Heritage at the Polytechnic of Turin, have been working with the professor Marotta for many years developing studies and theories on the scientific field of the visual perception. Experimenting through various applications, the possibility of rehabilitation of the spaces using consciously the color. In particular Chiara Cannavicci is developing a research about the use of color and comfort in the medical buildings. This will be useful in her thesis in which she addresses the problem that the color does not have enough importance especially in fields like architectural heritage and sanitary buildings.

Another important contribution is given by I. Matta, architect that from 2006 cooperates with the Regional Agency for Sanitary Services (A. R. e S.S.) in Piedmont. She is involved in projects that concern the analysis of the medical regional estate and the developing of methodologies, criteria and parameters for the evaluation, the design and management of hospitals. Additionally M. Balzarro, neo architect that evolved a thesis titled "L'ospedale a colori a misura di bambino" (relator: A. Marotta) and G. De Simone, architect, technician graduated from the Polytechnic of Turin which collaborates in didactic activities in the methodological analysis of architecture as a complex computerized procedure.

2. From theory to experimentation: the collaboration with A. N. D. O. S.

Many recent studies show how each color has its own characteristic, which stimulate an emotion influencing not only the human psyche, but also the way to it operates in locales where the color has been carefully chosen.

Too many times the Italian sanitary structures are impersonal and monochromatic locales, and added to the long time waiting, generates real discomfort like anxiety, impatience and bore.

For the OMS (World Health Organization) the environment is defined as an integrated system of anthropologic and physical factors which influence the health of the community. These factors are fundamental for the health of people in its broad meaning, not only the absence of sickness but also considering the complete physical, psychological and social wellbeing of people.

The collaboration between the research team "Policroma" coordinated by Anna Marotta and the A. N. D. O. S. Onlus Foundation in Turin begins form the need to modify and improve the just said aspects, in particular the common area of the oncology department of the San Lazzaro Hospital in Turin. The goal was to create comfortable spaces using light colors, soft shapes to avoid stress contributing to the wellbeing of the patients and the workers.

The studies and the researches made by Policroma found a wide possibility to experiment new solutions that before were just used for single projects: the collaboration with A. N. D. O. S. permitted the experimentation of the acquired knowledge and the assumed solutions. The collaboration has as main goal the modification of the visual perception of the common areas of the San Lazzaro Hospital, starting from the concept that the picking of the color cannot be linked to automatisms or be neutral: the picking of the color have to be moved by scientific and methodological approaches.

The will to deepen this theme starts from the specific and disciplinary experiences grew inside the group coordinated by the professor Marotta (*Dalle teorie comparate al progetto del colore* [3]).

The research is inserted in a wider field of humanization of the public spaces, through interventions able to find or recover the "humanity" of places. The main goal of the group "Policroma" is to study the effects that the interior and exterior environment creates on the human perception. One of the key role of the study is the colour since it is one of the important factor which characterize the spaces. Policroma aims to find a guide line to humanize the public spaces throughout the analysis and application in the Turin area. The effort of the group, that concretely operates decorating through volunteering, add affective quality to the meaning of the project and the message to the patients. For a complete explanation of scientific and disciplinary approaches of the research group see the attached report made by Anna Marotta.

3. Project description and realization phases, expected outcomes.

In the summer 2011 it was decided to transfer the Department of Medical Oncology 2 of the San Lazzaro of Turin from the second to third floor. On this occasion the A.N.D.O.S. wanted to implement an important chromatic restyling project and for this purpose has partnered with Anna Marotta, known as a leader in the field of color studies. The project has been characterized, since the earliest stage, by a great cultural depth; it could have required a significant economic investment, but the project was all volunteer, involving A.N.D.O.S., Politecnico of Turin, Sikkens and Molinette Hospital management. An initial analysis has focused on the study of functions and their distribution in the available space of the department.

Fig. 1: The corridor of the department of Medical Oncology 2 San Lazzaro University Hospital San Giovanni Battista in Turin before the restyling of color.

As usual, the theory have to meet, clash and then adapt to the bureaucracy and practice. For this reason the project had to be adapted to the reality of a department that has not stopped his activities during the realization phase and that it have organized and reorganized itself several times in the available space. The distribution of functions was determined according to the doctors, nurses and patients needs.

The design project made by the research group "Policroma", coordinated by Anna Marotta, has affected the Department in its overall image - at least in the corridor - and involved the restyling of some rooms and clinics.
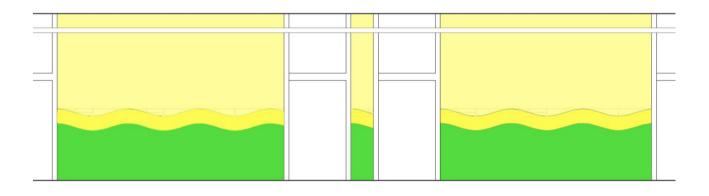
Anna Marotta was activated immediately to implement the project and, involving Sikkens firm [9], has found the donation of the necessary colors. Of course they are not generic color but products suitable for the sanitation of the hospital environment. Sikkens [9] paint manufacturer is the company that is committed to providing all the necessary material allowing "healthy" ways of working for all professionals and the environment.

The project was carried out with absolute emotional transportation and ethical commitment of all who have given their contribution; the only common goal is improving the lives of hospital patients and those living in the medical department even if only for activities of Day Hospital. The project is called from the beginning "life flourishes" in honor of all who fight their disease every day and challenge the fate to live better and with more energy. The awareness that nature helps healing but that is not a substitute for conventional care becomes a necessary condition for understanding how people with depression may find the serenity while controlling anxiety. In this context, the environmental comfort (visual and multisensory) determines the quality of life in care spaces, influencing also the therapeutic response.

Fig. 2: 2012, Anna Marotta with Policroma group. Early drawings for the project definition. On the top: the plan of the entire department and the overall design of the corridor. You can see the overturning of the two main elevations where predisposing the first attempts of communication functions. On the bottom, enlarged, a zoom from one of the walls with the first proposals for stencil: shapes, colors and communication.
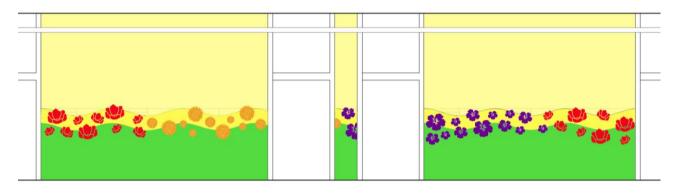
Fig. 3: 2012, Anna Marotta with Policroma group. Early drawings for the project definition. Each function is defined from a flower that characterizes, from the corridor wall portion which correspond to that particular activity.

tromboncino	– INGRESSO (31)
tulipano	– ACCETTAZIONE E ACCOGLIENZA PAZIENTI D.H. (8)
ranuncolo	SALA ATTESA AMBULATORI (7) SALA ATTESA D.H. (12)
margherita	– PRELIEVI (9)
campanula	– STUDIO DIRETTORE. DOTT. AIROLDI (4 ?5?)
ninfea	– UFFICIO COORDINATORE INFERMIERISTICO (27)
viola	STUDIO MEDICO NR.1 - DOTT.SSA PEDANI (6) STUDIO MEDICO NR.2 (26)
girasole	SALA VISITA D.H. NR.1 (32) SALA VISITA D.H. NR.2 (11) SALA VISITA D.H. NR.3 (10)
calla	– DEGENZA (14-19)
papavero	– SALA POLTRONE CHEMIO (39)
rosa	– UFFICIO TRIALS CLINICI - SALA RIUNIONI (25)
rondini	– SALA ANDOS (39)

Fig. 4: 2012, Anna Marotta with Policroma group. Each function is characterized by a flower and its color. Flowers and colors become the elements that help the Hospital users not to experience feelings of alienation from space and places of care. Figure 5: The hallway of the Department of Medical Oncology 2 San Lazzaro, University Hospital San Giovanni Battista in Turin after the restyling project.

The fulcrum around which the project develops is the corridor - a place full of activities and flows (routes) - which expresses the whole philosophy behind the intervention. They were chosen colors that bring back to nature and the warmth that every person, especially if week, want to have around him. The choice of colors and shapes is related to the natural environment and experiences of living common to most individuals, the wall decoration is characterized by a basement of lively green color (the reference to the nature, structures that give rise to flowers) reaching an average height of 120 centimeters - which includes the handrail - complemented by a sunny yellow strip that takes the form of a wave. This is meant to bring to mind the cyclical life path characterized with soft variations (as not often happens in real life). The wall is painted to the ceiling with a lighter tone of yellow (the sunlight). This coloring is the basis for proceeding with the project: the realization of the stencils as a real way finding project, allowing the identification the different department functions. A flower is assigned to each function and each flower will characterize the portion of the corridor where the function takes place. The chromatic restyling project blends and integrates with the patient way finding project within the hospital space.

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CAMPANULA

Fig. 5: 2012, Anna Marotta with Policroma group. Illustrative examples of abstraction that led to the creation of the stencil.

Fig. 6: 2012, Anna Marotta with Policroma group. Project for one of the lounges, photomontage to illustrate the feasibility of decoration and for determining the correct colors according to the same functions.
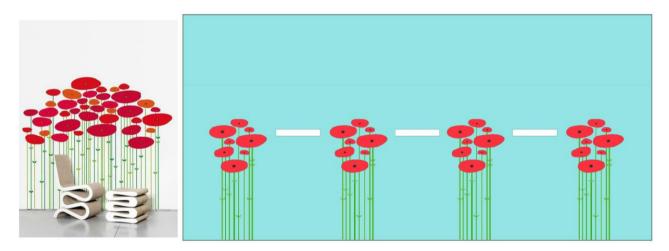
Fig. 7: 2012, Anna Marotta with Policroma group. Project of decoration of the chemotherapy room. Some poppies placed between chemo's armchairs recalls the flowers painted on the walls of corridor. The poppy is stylized and simplified.

The colors choice that characterizes the flowers of the stencil has been undertaken with the aim of stimulating the viewer in the searching for "fun" of his target, dampening the tone austere of the traditional hospital. They are colors that through different types of contrast brighten the atmosphere. All the senses come into the play: I see the flowers and I feel safe because they help me to orient myself in the space and through them I can also touch the flowers in the space for the therapy. Precisely this is considered the last step to close and complete the whole project multisectoral and multidisciplinary. The idea of involving patients, especially in summer, to take care of certain plants placed in two small terraces of the department comes from the general view of Anna Marotta, who has pledged to seek a donation for A.N.D.O.S. some pots, soil and plants.

The technical department of the Hospital has provided the general plan of the department that has been verified on the spot for the environments included in the project. For bureaucratic reasons we proceeded to

the realization of the corridor in two phases involving the decoration of seven rooms that looked out on it. It was during the realization of the first part of the project, thanks to its first positive results reported by patients, it was decided to proceed with the deployment of the remaining portion affecting even places like the dining chairs for the chemo therapy and the rooms intended for the short stay in hospital. The greatest emotional effect on patients occurred precisely in this phase, at the point at which the old and new - before and after - ward were immediately comparable.

One of the core values of this experience is the scientific field in which it originated, of course it is important to remember that knowledge is never neutral - especially never indifferent - and the results achieved are the result of long studies and analyzes conducted by Anna Marotta during her professional and academic life. The multidisciplinary aspect of the project includes the implementation under appropriate supervision as well as a phase of analysis and verification. The realization will be scientifically tested by psychologists from the same hospital. It is in progress an implementing phase of study on the perception of the intervention carried out through a large number of patients, first users of this new space.

4. Probable development

Sikkens [9] has introduced a range of products specifically for the demands of the healthcare market. In particular for this project they have donated products designed for the sanitation needs of hospitals, tested in their performance:

- *Alpha Sanoprotex*, water painting useful to inhibit the proliferation of bacteria (Classe 1 EN 13300).
- *Wapex 660*: water epoxy product bi-composed for floors and walls. Low odour and low COV content(less than 15g/l), it has been approved by the norm ISO 8690, also applicable in locales with the presence of food (UNI 11021).

These products are characterized by very short processing times that affect their application. The specialized use of these materials is then vital in influencing costs. On the other hand, the company raises the question of further research on these materials that allow the diversification of products and simplifying the process of color application .

5. Conclusions

The importance of a chromatic project can be well explained using Kandinsky's abstract: "It is clear that the harmony of the colour is based on one principle: the effective contact with the soul" (Vasilij Kandinsky, *Lo spiritual nell'arte*) [3]. The colour stimulates all our senses, starting from the eye, it brings up memories, sensations or odours linked to places, sounds, etc...

The comprehension of the perceptive phenomena in their clinical- scientific aspects is well studied by David Katz, Rudolph Arnheim, Gaetano Kanisza – different authors all from the Gestaltheorie School – and other positivists (from Roland Barther to Alexander Lurija). In the same group can be located the colour psychology studies made by Max Luscher [3]. The IACC (International Association of Colour Consultants/Designers) bear the argument that the "colour consultant" is a real job.

It has been shown that the environment in its whole vehicles important messages which can be interpreted from the patients and from the workers in different ways. This can influence the results of the cures. The goal that will be achieved in any case will be the improvement of quality in the hospital life through a focusing on aspects of humanization, like giving more colour to the everyday work.

To end a quotation from Paul Cezanne cited in the book *Policroma* (Celid, 1999) by A. Marotta[3]: if "it exists a coloured logic", then can also exists an ideal, cosmic and vital "polychrome energy" generative of a will of knowledge and comparison, desire to feel and express, curiosity to experiment and create through the colour.

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THE USE OF SAUDI NATIONAL IDENTITY IN THE DEVELOMENT OF ORIGINALITY AND CREATIVITY AMONG THE STUDENTS OF THE FASHION DESIGN DEPARTMENT AT DAR AL-HEKMA COLLEGE TO SUPPORT THE GARMENT INDUSTRY IN THE KINGDOM OF SAUDI ARABIA

Dr. Hazem ABDELFATTAH[1] , MS.DINA KATTAN, M.A[2]
[1]Faculty of Home Economic - Department of Clothing & Textile - Helwan University
[2]Dar Al-Hekma College
bravehazem@yahoo.com , dkattan@dah.edu.sa

Abstract:
The identity reflects the actual substantial features of anything that distinguishes it from others. The cultural Identity of any nation consists of the most essential, stable, and common features and general subjects that distinguish its civilization from others.
So, the identity is one of the most important elements of a successful design, which gives it uniqueness and originality. It doesn't mean that the identity should inspire a complete design, but the intent is the availability of the spirit of identity in the design. There is no doubt that the Arabic identity has been involved in the system of Global Cultural Production and that various Arabic/Islamic arts remained as one of the most essential components of the Arabs' identity.
For that reason, researchers chose to use the identity as one of the elements of uniqueness and originality in design to develop the creativity of the Fashion Design students through the development of innovative designs inspired by the Saudi identity that could contribute to the apparel industry in the Kingdom of Saudi Arabia.

Keywords: Saudi national identity; Originality and Creativity; Fashion Design; Garment Industry

Introduction:

Privacy civilization of any nation is based on several axes of the most important cultural heritage that preserves national identity of the nation and distinguishes it from others, which maintain the identity and heritage in the light of rampant globalization, a force which dominated largely, as a pretext of urbanization, and thus melt the nations and the civilizations, that has to preserve the cultural heritage and provide for its civilization, Because the fate of modernity is to return to the heritage .

So here is the question: Why study heritage, if our goal is to design the future? One answer can be found in philosopher George Santayana's famous proclamation, "Those who cannot remember the past are condemned to repeat it" . This quotation is widely used to argue that exploring the past helps us to understand who we are today and where we are going. For ubiquitous computing, historical awareness can deepen designers' understanding of the context they are designing for. [8]

Identity as a concept has social and physical connotations. It constitutes a collection of cues recognized by a group of people at a specific time and place. People and places, however, are exposed to change over time. In that sense, identity may change and people may resist this change because they want to feel that they maintain a certain level of continuity. However, continuity of identity is a very debatable concept. Every society faces a real challenge to maintain its identity for any length of time, especially under conditions of rapid economic and technological change. It is important to understand how the concept of identity is perceived by people and designers.
This raises the following questions:
➢ *What do we mean by identity?*
➢ *How do people express their personal and social identities?*
➢ *Is there any action we need to take to maintain individual and social identity?* [7],

So the identity Reflect the fact of the absolute thing which is containing substantial features that distinguish it from others ,and it is one of the elements of successful design, which gives him uniqueness and originality, doesn't mean that one is dying a complete design identity, but its intent is the availability of the spirit of identity in the design.

One of identity's kinds is The cultural identity which is one of the main elements of the national identity of Nations and one of the most important aspects that distinguishes a nation from another, because the dominant culture in a society is just an extension of the legacy of civilization and cultural heritage of the nation handed down from grandparents to their children to mix their experiences, and then they develop it according to the data of their time being. [4]

Another think that cultural Identity of any people is the stable, hard, essential common features, and general subjects that distinguish its civilization from others, it is worth mentioning that the concept of "contemporary does not mean subordination and the commitment of the other"; it means to contribute in the arena of contemporary thought to provide original and not copied. It remains the intention, to increase the stock of creative and not repeated world. While heritage is stock of philanthropy, it is not determined in time that has elapsed, but in time continuous, one to the other .

Throughout the lifetime of an individual, culture surrounds and shapes the individual in ways that are barely recognizable to him. What people know and think are the mentor acts of a culture, which includes ideas, ideals, values, knowledge, and ways of knowing and part of it would "know how to dress".

Dress includes more than clothing, it includes a wide array of other supplements and attachments to the body, such as makeup, masks, shoes, headdresses, wigs, accessories, and hair plugs. Appearance and dress often provide the most immediate and apparent visual cues about age, gender, ethnicity, social status, and social roles. Dress is more than objects and materials people put on their bodies. Dress can be a sign or symbol that refers to and stands for meanings. It expresses personal values and values of the society in which and individual lives. The physical body when dressed reflects the "social body" or surrounding societal system,so, we express much through dress, including our personal identities. A phenomenal amount of information is transmitted in one appearance. [5]

Dress is one of several modes of nonverbal communication, which means that it does not involve verbal expression through speaking or writing and it is often tends to be stable or unchanging for many hours of the day so, a wearer puts clothing, hairdo, accessories, and grooming together to produce an appearance and may assign meanings to that assembled appearance. Each observer of the appearance may agree or disagree with it. Disagreement does not mean that communication stops or fails.

Throughout much of the world during the late 20th century, dress meanings tend to be vague and hard to verbalize. A certain appearance may tell thousand words, and those thousand words are hard to pin down. In addition, changing fashion trends continually modify meanings of dress, adding further lack of clarity of meanings,in contrast to the modern attire worn throughout the world today, dress in traditional cultures tends to change slowly over time and may incorporate long-used symbols that are attached with meanings.

The idea that appearance styles or looks are negotiated as people influence each other on what to wear and how to wear it is fundamental in understanding social processes of fashion. Places and communities have identities, which is no longer restricted to geographical location. It is possible to be influenced not only by immediate,local,cultures, also by globally circulating images and commodities.

Constructing and reconstructing appearance and, in part, identity, becomes a process of figuring out how we fit in and depart from a vast array of possible looks. To some extent we want to express our inclination and ability to belong to certain groups and communities. Yet somehow we balance this desire with assertion of individual uniqueness. Identity politics are involved in process of imitation and differentiation. Issues of gender, race and ethnicity, sexuality, nationality, social class, age, and leisure time preferences all enter into the creation of the group in which we see or do not see ourselves. On a cultural level, we seem to be collectively working through ideas about what appearances say about individual, community, national, and global identities. [3]

There is no doubt that the Arab identity has been involved in the system of global cultural production and the various Arab arts remained an essential component of the identity of the Arab.

Saudi Arabia has seen a great development in various fields of life, which led to the extinction of many of the customs and traditions, especially in the clothing, which leads to the disappearance of a large part of the heritage of Saudi Arabia and there is no doubt that the art of fashion design influenced greatly, when the design style used in the Kingdom of Saudi Arabia, does not find an answer to this question of the absence of method, after what he characterized this art in the past in a unique style and privacy of an absolute.

In addition to that the Kingdom of Saudi Arabia seeking a comprehensive development in all fields, especially in the garment industry in order to raise the level of the economies of the country's sound and scientific means and methods. They gave garment industry some importance, because it is one of the necessary industries, and to keep pace with global developments, especially in design, supporting those involved in the incumbent garment industry in the Kingdom and developing the process of delivering a product with originality and uniqueness in the same line with trends in international fashion, prompting the researchers to use the identity as one of the elements of uniqueness and originality in design, supporting the development of creativity and innovation of students of the Fashion Design department - Dar Al Hekma College in Jeddah, Saudi Arabia, and through the preparation of innovative identity designs, which can contribute to the garment industry in the Kingdom of Saudi Arabia.

Hence, the research problem, which unfolds in the following questions:

1.   What is the fashion link provided in the Saudi Arabia national identity?
2.   What are the scientific steps to achieve Saudi national identity with development of originality and creativity among students of Fashion Design Department, Faculty of Dar Al-Hekma?
3.   What's the importance of the student's designs for the customers and the garment industry in K.S.A?
4.   What is the role of educational institutions to support the garment industry in K.S.A?

Research objectives:

1. The use of identity as one of the elements of uniqueness and originality in design to the development of creativity and innovation for the Fashion Design students - Dar Al-Hekma College
2. The preparation of innovative designs with Saudi identity, which can contribute to support the garment industry in the Kingdom of Saudi Arabia.

The importance of Search:

1.   Find help in providing fashion with Saudi identity and fit at the same time with the international fashion trends.
2.   Supporting of the policy of Fashion Design Department, Faculty of Dar Al-Hekma in support of the garment industry in the Kingdom of Saudi Arabia.
3.   Recognize positivity of Dar Al-Hekma College and its understanding of the role placed upon it and its mission in the overall development in K.S.A.

Search terms:
Saudi national identity:
    National identity is not formed in a vacuum, but is a composite of individual people. [6]

Originality:

1. The quality or state of being original.
2. Ability to think or express oneself in an independent and individual manner; creative ability.
3. Freshness or novelty, as an idea, method, or performance. [9]

Innovation:

1. The act of introducing something new.
2. Something newly introduced. [10]
   The researchers believe that creativity is the invention or designing something new unlike the tradition that goes behind the creative, the creator creates the design or production of something then go to be innovated in another area.

The garment industry:

    Makers and sellers of fashionable clothing. [10]

Research procedures:
Research Methodology:

    Research follows both the analytical and descriptive approach quasi-experimental approach so as to achieve objectives suitability of the research and check the homework.

The research sample and limit:

    The research has been applied on 13 female students from the Department of Fashion Design - Dar Al-Hekma College - Jeddah - Saudi Arabia - for the academic year 2012 spring semester.

Research tools:

1. Questionnaire is used to survey the opinions of the producers the student's designs.
2. Questionnaire to survey the opinions of consumers in the student's designs .

Steps of the research:

The researchers took a number of actions to reach the objectives of the research, and answer the questions of this research problem.

Procedures are summarized in the following:

1. The researchers gave a lecture to the students to define the research goals and its importance.

2. The students made brainstorming on the subject of Saudi identity without interference or influence from the researchers.

3. Each student identifies a number of words that inspire the identity related to Saudi Arabia. The researchers discuss the motives of the students in the choice of words and extent of their relationship to Saudi identity.

4. The students collect images that are directly related to the words chosen by each student to be a preference to the photos by themselves.

5. Students are identifying the appropriate images that have details which can inspire them.

6. The students prepare Mood Board to help the students to highlight the a general idea

7. The students do the observational drawing for what they see in the images as to inspire them, coloring the drawing, using different mediums.

8. Observational drawing is displayed to the researchers, brainstorming them to explore how to be inspired by.

9. The students make a customer report and choose the target market through a number of interviews with numbers of customers

10. Researchers start a discussion with the students and review the target market and clients compatibility with the product to be designed

11. Students express the target market and the client by preparing customer board

12. Students prepare fabrics designs which are inspired by the observational drawing.

13. Researchers discuss with the students the proposed designs of fabrics, and method of preparation to reach the appropriate quality.

14. Students do the real fabrics according to the preset design using different methods of fabrics preparation and decoration (such as printing - dyeing - Embroidery - beading - patch work - raw materials), and the innovations of all styles of students.

15. The students design and prepare for the fabric board.

16. The students start in the preparation of designs inspired by the observational drawing.

17. The researchers discuss with each student the sketches prepared by and how it fits the source of inspiration and their compatibility as a design with each other, and give advice and guidance if the students need that.

18. The students choose the final collection of designs and draw it neatly.

19. The students choose the color combination for their collections by selecting colors from one of the images that were collected prior and inspired by the Saudi identity.

20. The students color the designs and then select the appropriate accessories for it.

21. The students prepare the collection board and submit them for display.

22. Each student required to present 4 boards as following:
Mood Board,customer board,fabric Board,Collection Board

The research results:

After the students did the boards,The researches are displayed the Designs for a sample of consumers which is consist(30), and sample of producers which is consist (7) of producers and fashion houses in the Kingdom of Saudi Arabia, Jeddah ,and the following table will show the iterations of arbitrators **(consumers-producers)** answers and the percentage of agreement for the arbitrators **(consumers-producers)** for the students designs .

Fig.1: Noora Alharthi, Mood Board, Saudi Identity.

Fig.2, 3: Noora Alharthi, Customer Board & Fabric Board, Saudi Identity.

Fig.3, 4: Noora Alharthi, Fabric Board, Saudi Identity.

Fig.5: Noora Alharthi, Collection Board, Saudi Identity.

Collection NO	Suitable= S			suitable to some extent=S.T.S.E						Not Suitable =N.S					
	Design 1			Design 2			Design 3			Design 4			Design 5		
	N.S	S.T.S.E	S	N.S	S.T.S.E	S	N.S	S.T.S.E	S	N.S	S.T.S.E	S	N.S	S.T.S.E	S
1	2	2	26	1	4	25	3	6	21	2	3	25	1	1	28
Percentage%	%6.7	%6.7	%86.6	%3.3	%13.3	%83.3	%10	%20	%70	%6.7	%10	%83.3	%3.3	%3.3	%93.3
2	2	5	23	2	4	24	0	0	30	1	5	24	3	4	23
Percentage%	%6.7	%16.7	%76.7	%6.7	%13.3	%80	%0	%0	%100	%3.3	%16.7	%80	%10	%13.3	%76.7
3	2	3	25	0	0	30	0	1	29	1	2	27	2	6	22
Percentage%	%6.7	%10	%83.3	%0	%0	%100	%0	%3.3	%96.7	%3.3	%6.7	%90	%6.7	%20	%73.3
4	2	3	25	0	0	30	2	7	21	1	3	26	2	4	24
Percentage%	%6.7	%10	%83.3	%0	%0	%100	%6.7	%23.3	%70	%3.3	%10	%86.6	%6.7	%13.3	%80
5	1	3	26	0	2	28	1	2	27	0	1	29	0	1	29
Percentage%	%3.3	%10	%86.6	%0	%6.7	%93.3	%3.3	%6.7	%90	%0	%3.3	%96.7	%0	%3.3	%96.7
6	0	4	26	3	3	24	3	6	21	2	3	25	1	6	23
Percentage%	%0	%13.3	%86.6	%10	%10	%80	%10	%20	%70	%6.7	%10	%83.3	%3.3	%20	%76.7
7	0	2	28	2	5	23	1	3	26	1	4	25	1	2	27
Percentage%	%0	%6.7	%93.3	%6.7	%16.7	%76.7	%3.3	%10	%86.6	%3.3	%13.3	%83.3	%3.3	%6.7	%90
8	1	2	27	1	1	28	0	0	30	0	3	27	0	4	26
Percentage%	%3.3	%6.7	%90	%3.3	%3.3	%93.3	%0	%0	%100	%0	%10	%90	%0	%13.3	%86.6
9	0	0	30	0	1	29	1	6	23	2	2	26	1	5	24
Percentage%	%0	%0	%100	%0	%3.3	%96.7	%3.3	%20	%76.7	%6.7	%6.7	%86.6	%3.3	%16.7	%80
10	3	3	24	2	2	26	1	4	25	1	2	27	0	2	28
Percentage%	%10	%10	%80	%6.7	%6.7	%86.6	%3.3	%13.3	%83.3	%3.3	%6.7	%90	%0	%6.7	%93.3
11	0	7	23	2	3	25	0	2	28	0	4	26	1	5	24
Percentage%	%0	%23.3	%76.7	%6.7	%10	%83.3	%0	%6.7	%93.3	%0	%13.3	%86.6	%3.3	%16.7	%80
12	3	3	24	0	1	29	0	0	30	0	1	29	1	2	27
Percentage%	%10	%10	%80	%0	%3.3	%96.7	%0	%0	%100	%0	%3.3	%96.7	%3.3	%6.7	%90
13	2	4	24	0	3	27	0	1	29	1	3	26	1	7	22
Percentage%	%6.7	%13.3	%80	%0	%10	%90	%0	%3.3	%96.7	%3.3	%10	%86.6	%3.3	%23.3	%73.3

Fig. 6: shows Table for the occurrences of the arbitrators answers **(customers).**

The above table shows that:
Collection (1), ranging from (70% : 93.3%) and all counting rates are high
Collection (2), ranging from (76.7% : 100%) and all counting rates are high
Collection (3), ranging from (73.3% : 100%) and all counting rates are high
Collection (4), ranging from (70% : 100%) and all counting rates are high
Collection (5), ranging from (86.6% : 96.7%) and all counting rates are high
Collection (6), ranging from (70% : 86.6%) and all counting rates are high
Collection (7), ranging from (76.7% : 93.3%) and all counting rates are high
Collection (8), ranging from (86.6% : 100%) and all counting rates are high
Collection (9), ranging from (76.7% : 100%) and all counting rates are high
Collection (10), ranging from (80% : 93.3%) and all counting rates are high

Collection (11), ranging from (76.7% : 93.3%) and all counting rates are high
Collection (12), ranging from (80% : 100%) and all counting rates are high
Collection (13), ranging from (73.3% : 96.7%) and all counting rates are high.
So the previous results indicate high acceptance of designs by the consumer which is answer the research questions.

Design 5	Suitable= S			suitable to some extent=S.T.S.E			Not Suitable =N.S								
	Design 1			Design 2			Design 3			Design 4			Design 5		
	N.S	S.T.S.E	S	N.S	S.T.S.E	S	N.S	S.T.S.E	S	N.S	S.T.S.E	S	N.S	S.T.S.E	S
1	0	0	7	0	0	7	0	2	5	0	1	6	1	1	5
Percentage%	%0	%0	%100	%0	%0	%100	%0	%28.6	%71.4	%0	%14.3	%85.7	%14.3	%14.3	%71.4
2	0	0	7	1	1	5	0	0	7	0	1	6	0	2	5
Percentage%	%0	%0	%100	%14.3	%14.3	%71.4	%0	%0	%100	%0	%14.3	%85.7	%0	%28.6	%71.4
3	0	1	6	0	0	7	0	2	5	0	1	6	0	1	6
Percentage%	%0	%14.3	%85.7	%0	%0	%100	%0	%28.6	%71.4	%0	%14.3	%85.7	%0	%14.3	%85.7
4	0	1	6	0	1	6	0	0	7	0	2	5	1	1	5
Percentage%	%0	%14.3	%85.7	%0	%14.3	%85.7	%0	%0	%100	%0	%28.6	%71.4	%14.3	%14.3	%71.4
5	0	0	7	0	2	5	0	1	6	0	0	7	0	1	6
Percentage%	%0	%0	%100	%0	%28.6	%71.4	%0	%14.3	%85.7	%0	%0	%100	%0	%14.3	%85.7
6	0	0	7	0	1	6	1	1	5	0	2	5	0	1	6
Percentage%	%0	%0	%100	%0	%14.3	%85.7	%14.3	%14.3	%71.4	%0	%28.6	%71.4	%0	%14.3	%85.7
7	0	2	5	0	1	6	0	0	7	0	0	7	0	1	6
Percentage%	%0	%28.6	%71.4	%0	%14.3	%85.7	%0	%0	%100	%0	%0	%100	%0	%14.3	%85.7
8	0	0	7	0	2	5	0	1	6	0	0	7	0	0	7
Percentage%	%0	%0	%100	%0	%28.6	%71.4	%0	%14.3	%85.7	%0	%0	%100	%0	%0	%100
9	0	2	5	0	0	7	1	1	5	0	1	6	0	0	7
Percentage%	%0	%28.6	%71.4	%0	%0	%100	%14.3	%14.3	%71.4	%0	%14.3	%85.7	%0	%0	%100
10	0	1	6	0	2	5	0	0	7	0	0	7	0	0	7
Percentage%	%0	%14.3	%85.7	%0	%28.6	%71.4	%0	%0	%100	%0	%0	%100	%0	%0	%100
11	0	0	7	0	2	5	1	1	5	0	1	6	0	1	6
Percentage%	%0	%0	%100	%0	%28.6	%71.4	%14.3	%14.3	%71.4	%0	%14.3	%85.7	%0	%14.3	%85.7
12	0	0	7	0	2	5	0	1	6	0	1	6	1	1	5
Percentage%	%0	%0	%100	%0	%28.6	%71.4	%0	%14.3	%85.7	%0	%14.3	%85.7	%14.3	%14.3	%71.4
13	0	2	5	1	1	5	0	1	6	0	1	6	0	0	7
Percentage%	%0	%28.6	%71.4	%14.3	%14.3	%71.4	%0	%14.3	%85.7	%0	%14.3	%85.7	%0	%0	%100

Fig. 7: shows Table for the occurrences of the arbitrators answers (producers).

The above table shows that all the Collections ranging from **(71.4% : 100%)** and all counting rates are high.

From the previous results , we find that the almost of student's designs have the Saudi identity and in the same time match with the international trends and it suit for the Saudi women and can find a good market here, which will support the garment industry by offering new trends in the fashion market and by that we can consider that the students achieved the creativity in their designs because they could offer original and new designs in the Saudi market which is accepted and by that the researches answers the problems questions .

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Prototype design. Recycling, eco-compatibility and de-contextualization

Antonino CALDERONE,[1]
[1] Dipartimento di Cultura del Progetto, Facoltà di Architettura "Luigi Vanvitelli", Seconda Università degli Studi di Napoli, Aversa, Italia
antonino.calderone@libero.it

Abstract

Every prototype is the result of a series of actions aimed at transferring in the final output that little extra something which meets and satisfies all customers' demands. Of course, for these reasons the definitive object prototype has to be just alike the output, be it a tapping screw or a medical prosthesis, or a part of machine, or a component of engine, or a design product. As we know, the processes of original design are prototyping, testing and making. As I have tried to explain in this last seven years to my Industrial Design and Fashion Design Courses students, the product meant to the industrial fabrication, less or more automated, is the result of a series of considerations of complex nature (material and immaterial) and comparisons with contemporary homologous production, that take place during the different phases from the concept to the fabrication up to the retailing. Sometimes it's necessary to rectify technical adjustments and improve possible innovative organizational and management processes. There will be feedback relating to project reviews, method of manufacture, shape modeling, materials, practicality, manufacturing costs analysis, logistics respects, packaging, storage, quality control, up to just in time fabrication. But this is unsatisfactory: one has to bear in mind eco compatibility instances, e.g. recycling programs, issues relative to LCD (Life Cycle Design) product and sometimes those ones concerning ethical, educational and cultural plus value too. Independently of possibility to the use of fabrication machines, we have worked towards examination and cognizance of the shape and function of the prototype, the base of any additive or subtractive method of fabrication, it be handmade or automated, preferably testing recycling methodologies, or de-contextualizing materials such kevlar and carbon fiber. At the first step, the pencil sketches and, if possible, the handmade fabrication are still the best ways to realize an intrinsic contact with the embryonic concept and its initial developments. Otherwise I have remarked that even in the drawing step some students prefer the immediate use of CAD; I have to confess that sometimes the results are even appreciable. It's a new kind of sensitivity, often more standardized, but in any case able to find a synthetic fusion between formal and technological layouts. On the other hand, this is similar to what has happened in writing since the introduction of Microsoft Word, that has surely influenced it displacing creativity from the pen world to the pc keyboards one.

Key words: eco design, multi functionality decontextualization, tradition-innovation, landscape.

1. Prototyping between research and teaching

In the homework and exam work, we have tried to establish, as a starting point, the search for the optimal intersection point between shape and function, so as to ensure a good symbiosis between technological and practical aspects on the one side, aesthetic and formal qualities on the other side. For this reason, we have made it clear that those industrial aspects whose project is characterized only by a study of components and of functional and technical aspects (e.g. components of an engine, circuits of engines, pieces of machineries) does not belong at all to the field of design, in much the same way as we cannot regard as parts of design those products deriving uniquely from a search of volume or shape. In the prototype shown in Figure 1 we have experimented the manufacturing-by-subtraction procedure by removing wood shavings through a table milling machine monitored numerically and a finish with the help of a device of length/thickness 10mm. The opportunity of using a true milling machine that makes it possible to employ a subtraction process has made it appear as less relevant the problem of having to choose a material different from the one originally conceived for the bottle: glass or pet. As can be seen, it is a simple object in charge of containing drinkable
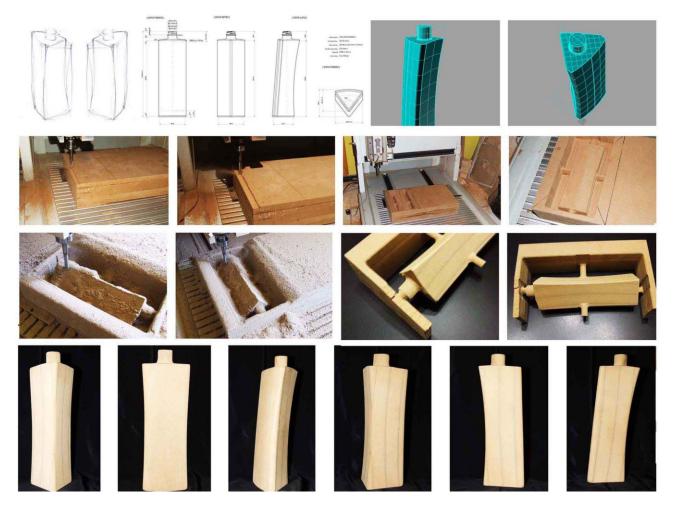
Fig.1: Design and prototyping of a wood bottle by subtractive fabrication process. Computer numeric control (CNC) milling by removal of chip and CNC finish by 10 mm utensil. (Student R .F. Nicolò)

liquids (water or fruit juice). Anyway, we have performed all actions that characterize the various phases of a correct project; we have elaborated a series of drawings to search for the best shape, so as to find the correct winding procedure for the bottle top, trying to obtain the appropriate correspondence between formal identity and affordance, while paying much attention to the size of the object. In this example we have not passed through an actual ergonomic study for the handhold, even though we have taken into account shape and size so as to obtain a bottle that can be easily handled, despite it is here clear that we are eager to achieve an essential style with a definite shape. In the subsequent stage we have replaced the preliminary drawings with technical drawings with the help of the CAD software. Last, as far as the building up of the object is concerned, i.e. its prototype implementation, before passing to the final experimentation with the help of wood, models with plasticine and clay have been built, and during such intermediate stages it has proved useful to improve the acquaintance with techniques for such materials, in particular the techniques dealing with dried clay and with dung inserted into printouts created ad hoc and later cooked at 130 Celsius temperature. It is worth pointing out that, according to different choice of material, not only is the primary role of the object completely changed, in disagreement with its nature, but also its symbolic role and its message to the exterior world get spoiled. Also in other homework, for strictly pragmatic reasons, in light of the modest tools at our disposal, in the majority of circumstances we had to perform a sort of translation in the choice of materials, distinguishing between those which are peculiar of the project and those which merely help in the effort of experimenting the manufacturing procedure, which should indeed remain the final goal of a course in Prototype Implementation Laboratory. In some cases we have paid less attention to the degree of originality of the concept, choosing to pass directly to the implementation phase of objects actually existing

on the market, or inspired by the production of great leaders (Maestri) of historical design, which is still available on the Market thanks to the proposals of Industrial Companies which, in light of the great demand of the market, have reproduced their principal models; sometimes there has been instead a true assessment of the main aesthetic components of the existing product, so as to vary or widen out its role, or to create the formal excuse for a wider operation, knowledge- and form-oriented, related to the themes under investigation. We have therefore gone ahead by following the redesign or restyling criteria, according to Dorfles, criteria followed, as is well known, by several design industries dealing with house interiors, in their effort of proposing again some cult objects first created by some great architects and designers of the past. On the other hand, in several industrial processes, for example those of car industries, the restyling has been chosen ever since so as to keep on the market, thanks to slight changes of aesthetic, functional and optional nature, the production of some models of cars, while waiting for new models that take over. Of course, such choices rely upon a series of involved strategies related to problems of economical and productive nature that should be described in a separate context.

2. Targets and aims

As far as targets and aims of the course are concerned, in all cases, in order to help developing a critical attitude on the side of the students, we have always tried to encourage them in such a way that, even just through the mere experimentation of redesign and prototype implementation, they can manage to find a good excuse for starting a sort of regeneration or semiologic renewal of the product. In some cases, the revision procedures have been able to change completely even the meaning and the peculiar properties of the product in light of new ideas and of the most recent advances in knowledge. The capability of creating so as to enhance a social and environmental action, is nowadays, even more than in the past, a distinguishing feature of the designer. Precisely for this reason it is ethically correct, on the side of the designer, to make the best possible use of his role, being aware that he can give rise in due course, with the help of industries, to an authentic sustainable reeducation of the individuals' conscience.through an evolution of taste, and making sure that the renewed needs of the consumer and hence of the market become compelling needs. In the homework, the difference between project making and experimental implementation of the prototype has been more visible in the case of objects viewed with an eye to technologies and materials of last generation such as composite materials. This has nevertheless made it possible to give rise, with greater consciousness, to deeper searches and different deductions that stand on their own, linked on the one hand to the peculiarity of the original project, and relative on the other hand to the prototype to be realized in order to pass the exam. Anyway, the investigations on problems relative to the capability of inserting or not in a production framework the object designed have not been lacking, based on consideration of its peculiar properties, nature of material, methodological and operational tools. We have delved into the various issues related to prototype implementation and industrial reproduction; with the help of ministages, and simulation of industrial scenarios it has been possible to approach cases where checks, revisions and feedback have been performed on the concept and project for a better insertion of the product in the market strategies, until its completion was achieved just in time. At the level of classroom laboratory, we have gradually added the investigations on the optimization of manufacturing techniques and on materials used to achieve prototype implementation. Having established this as a firm point, besides the material eventually used to realize the prototype, which in some cases was the result of further deepening, every project has been always and invariably inserted within a production framework and supplemented by a market analysis, devoted to costs, incomes, possible production risks, sustainable quality and environmental compatibility, emphasizing in some circumstances the deepenings concerned with higher or lower level of adherence to ethical questions.

3. Handmade prototypes and fabrication technologies

As far as totally handmade prototypes are concerned, it has been clearly deduced that, for some of them, the foundations were lacking for being able to talk about industrial production. On the other hand, it is precisely in these cases that, in the experimentations, we have preferred to give priority to manual control of form, so as to make sure that the object works properly and that the aesthetical outcome is the best possible. Several prototypes have been conceived so as to witness a symbolic cultural value, resulting from the evolution of lifestyle. Thus, their commonly accepted meaning has been replaced by a local cultural value, in the name of the southern nature and of the recovery of local traditions, while bearing in mind the renewed needs for recycling and intelligent reapplication. By the way, some class work has provided the excuse for investigating traditions of Campania region and southern Italy, our productive handmade and industrial activities, and we have tried to unify tradition and innovation, taking inspiration from working techniques of the past and adopting materials that are typical of our environmental and productive landscape. In general, for the

prototypes we have studied also packaging systems and ad hoc logos, including graphics, that might have been able to express the underlying themes of the product, its target, and could have made it easier to display its peculiar properties in case it is put on the market. Among fabrication processes and materials more frequently used during prototype classrooms one should mention laser and covered-lamp stereolythography, turning, milling, the straining of silicon rubbers in ad hoc silicon moulds, wax and plasticine, balsa wood, polystyrene, dried clay, clay, dung, honeycomb cardboard, corkboard, wood, ecoskin (law UNI 11427/2011). Recycled materials have been used such as tins, ligh bulbs, glass and pet bottles, bottle tops, clippings of cloths, wires of intimate clothes, broken vinil pieces and greatly many other.

4. New materials and new key points. The carbon fibre from airplanes to furnishing

The advanced design has always played the role of general program of vanguards. The chair is one of the most fascinating and beloved objects from designers. On it, all most important actions in the life of human beings take place, from eating to signing contracts, as Rossella Colombari, gallerist and great supporter of the work of the architect Carlo Mollino, would put it (she has recently given a plenary speech at a Conference in our Faculty). The chair has inspired experimentations also during our courses. At the end of the fifties, with the advent of the Panton Chair (1959-1960), a revisitation is made of the Zig-Zag chair introduced by Rietveld almost thirty years earlier, in 1934. The Rietveld chair was representing a sort of monument of the neoplastic design, with its roots in the van Doesburg geometries, and it is still a sort of ``manifesto'' of the new ideas put forward by that group of artists, architects and sculptors who stayed together at Leiden in the name of the ``de Stijl''. The spatial and winding coherence of the Panton Chair, named after the Danish architect who signed it, initially produced in plywood and reproduced, in the nineties, in painted glass fibre (Hermann Miller – Vitra), pushes to the extreme consequence the concept of spatial suspension of the sitting act, and softens the rigidity described by the Rietveld lines, which was realized, in addition, in a traditional material, i.e. cherry. Moreover, it moves the emphasis of the project on the side of the ergonomic study, that was instead nearly absent on the chair of the Dutch architect, who was attracted by the geometric three-dimensional misalignment of the planes, and wanted to recover in sculptural shape, through the wood, the particular decomposition that his fellow Dutch, Piet Mondrian, elaborates in painting. At the end of the seventies the reproduction of the Zig - Zag chair, revisited by Mendini himself (1978), despite being much closer to the ancestor chair as far as material and shapes are concerned, becomes the excuse for an irreverent religious theme, given by the cross-shaped back, a way to state that rules and tradition should be carefully studied and well understood before being turned upside-down without worries. Other redesign examples that come to my mind are the contemporary Pick Chair of the Dutch Dror Bensherit (produced by BBB Emmebonacina): it also reminds clearly of Rietveld, but becomes mainly the excuse for developing the multifunctionality to which it tends more than ever in an epoch during which the internal space becomes always a precious thing: it gets turned into table, cube and even panel, according to the various needs. Relying upon such examples, during classrooms, we have developed prototypes which, on the one side, were including the peculiar features of Zig-Zag and Panton chair, and on the other side were becoming the excuse for deepening the structural aspect of the carbon fibre, mainly used to strengthen composite materials, in particular plastic polymers. The various categories of carbon fibres have different elasticity parameters, mechanical resistance and density. On the chemical point of view, the technological procedures linked to carbon make it possible to drive the molecular chains along the direction of the fibre, and to create tissues (even mixed up with glass fibre, kevlar and so on) of different substance and orientation, depending on the rigidity features and pressures that the object should be able to sustain. As was learned during the various visits, with students, of excellent industries in Campania such as A-technology s.p.a., and thanks to supplementary teaching activity of one of their leaders, the engineer Angela Pozzi, expert in composite materials, invited for this purpose by the undersigned, we have at our disposal composite materials strengthened with continuous or discontinuous fibres, and they can be of oriented, random or hybrid type. The carbon is well known to be a material of great potentiality and lightness; it may display very high rigidity and resistance when subject to traction or torsion or compression. Its use is, after all, still partial within the framework of design, being still confined to industrial production in the areas of aerospace engineering and car racing. In this respect, since the year 2009, the production of airplanes for civil airlines which use largely the carbon fibres has been initiated; for example, the 787 Boeing consists, for more than 50 per cent, of carbon fibres.

5. Evolution of the shape

Despite all this, assuming as a prerequisite that the designer should know how to affect the market and
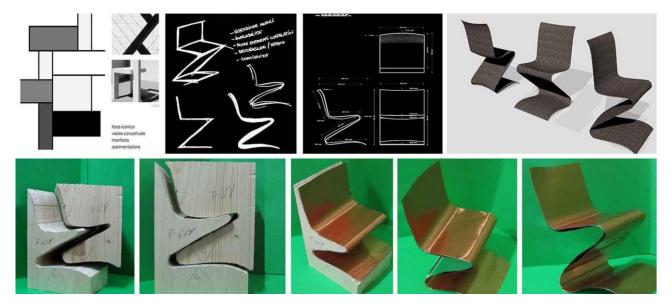
Fig. 2: The *Tape Chair 2010* Design is conceived in carbon fibre, along the lines of the *Zig - Zag* revisitation to which it adds the *Panton Chair* shapeliness, but the prototype, in reduced scale, has been realized in copper foil.

reduce costs and prices of a product as its demand grows, it is worth pointing out that the use of the carbon fibre or yet other materials of the last generation within the framework of domestic design and furnishing is really revolutionizing the taste of consumers. Logically, it is a closed loop: the new forms of design evolve on the basis of experimentations; in due course they turn into true dictat the needs and renewed desires of an increasingly large portion of consumers, which in turn enhances the demand. The surface table with ultrathin carbon fibre, created by the designer Terence Woodgate and the Formula 1 engineer John Barnard for the English industry Established & Sons, exposed at the Casa Ferrari museum as a true masterpiece, is long 6 metres and exploits the intrinsic rigidity of stratified carbon fibres. It represents an example of how far can one go in terms of technical renewal, and hence in terms of change of aesthetic taste. Even in the field of musical instruments, already at the end of the eighties, also in Italy, many viola, violin and violoncello players were using arcs in carbon fibre, regarded at that time a great innovation for their lightness and their quick response when the string is hit by the arc. I, myself, being a violinist before being an architect, I have often used carbon arcs and I have noted an elasticity that, in some sense, was making life look easier during some passages of undisputable difficulty for the arc. Reverting now to the production of industrial design, let us recall, among the many, carbon resin examples such as Hot Rider of Jordi Mila` or Din Don of Romolo Stanco, of thickness 15mm, or the Oscar Bon chair of Philip Stark (Driad); yet again, the Tite lamp, winner of the prize Compasso d'oro 2001, by Marc Sadler (produced by Foscarini), made in Kevlar, a synthetic fibre 5 times more resistant than iron or glass fibre. The Tape Chair 2010 Design (Fig.ure 2), prepared during the 2009-2010 course in prototype implementation, is conceived in carbon fibre, along the lines of the Zig-Zag revisitation to which it adds the Panton Chair shapeliness. The further reduction of thicknesses, gives to the object a greater lightness with respect to the Panton model. The structural texture of carbon fibre becomes at the same time an element of pleasant and elegant visual impact, and is a single thing with the surface of the chair, and is not a mere decorative element. The prototype realized in reduced scale has not been realized in carbon fibre but in copper foils, with the help of a handmade procedure. The wood mould and countermould have been built in reduced scale and modelled with a blade machinery (subtraction principle), after this some copper layers have been inserted (until the desired thickness was reached), pressed in between mould and countermould in such a way that they take the desired double-curve shape. Last, the sheets modelled in this way have been glued together (hybrid procedure: addition and conformation methods). As always, intermediate and final checks have been made, reflecting therefore on the shortcomings of procedure, materials and devices, in this case rather inadequate, in particular for the purpose of managing profile curves.
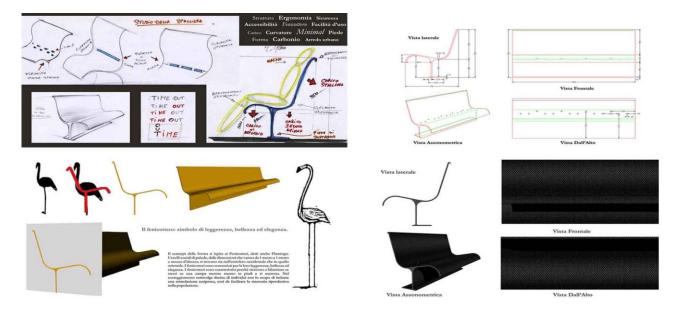
Fig. 3: *Time out.* Design of a bench conceived in carbon fibre and realized in copper foils (Student: M. Policano)

6. Polymeric resin prototypes and composite ones

In other cases it has been possible to become familiar with stereolythography processes, albeit sometimes with reduced scale prototypes. The "24 hours suitecase" (Fig. 5) has been only an excuse for testing the use of the CAM (Computer Aided Manufacturing) software, i.e. an additive production machine that makes it possible to build an object in its various parts through the stratification of resin materials sensible to light and empty bath processes, i.e. according through the so-called selective light-induced hardening procedure. In such a case, the project elaborated with a CAD software, Rhinoceros, has been directly red and printed in three-dimensional way from the machine according to the fast prototype implementation criteria (RP rapid prototyping), and hence one finds evidence of full correspondence between ``render'' and prototype. This is the clearest case where the project phase has played a secondary role with respect to production: we have a project with no innovation potential, which does not add anything to function and shape, without mentioning the lack of symbolic value that an object in the framework of design should have. Yet, it was worth pursuing it. We have also built objects for a real personal use such as the Kitesurfing table, a sport that is becoming increasingly popular among youngsters, which is played, exploiting wind speeds in between 12 and 24 Kts, thanks to an appropriate table and a kite manoeuvred through a bar linked to it by cables of dyneema, a synthetic fibre appropriate for the production of traction cables. The elaboration and research work, culminated in project making and production, consisted in four main phases, all suitably described by means of images of the various steps: analysis of what exists and informative contributions to the concept; profile of a model existing on the market (state of the art) as a reference for dimension and composition; project with development of the three-dimensional mathematical model; prototype implementation. In light of a series of considerations of technical and structural character, we have tried to pursue a thinner table with respect to the tables available on the market, mainly formed by thin layers of wood covered by resin. We have focused on the best possible properties that the product should have, giving priority to a greater lightness, mechanical resistance and flexibility. For the purpose of further and intermediate dimensional verification, we went on to realize a vinyl model. Last, after further deepenings on the features, we have built the final version of the model. The material used for the Dibond prototype, i.e. a panel consisting of two Aluminum layers of thickness 0.3 mm with a polyethylene nucleus.The Dibond is used also for the furnishing, for covering walls and columns and in all other solutions that require a material with extremely planar surface. It can have a variety of sorts of finish. For the double curvature of layers we have realized an iron template, evaluating the desired deformations. After gluing the layers, we have implemented their lateral lock and their lock with the template. To obtain a permanent deformation, the prototype has been pressed for nearly four days in the template.
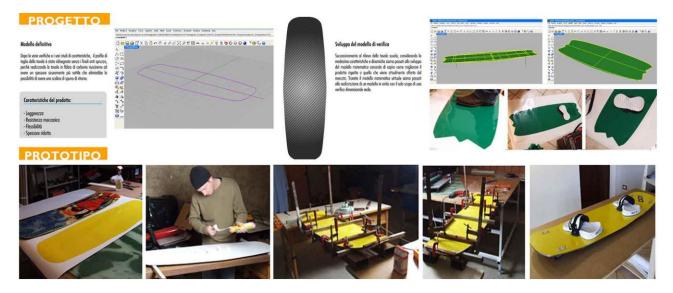
Fig. 4: Design and pictures showing work in progress and final prototype of a kitesurf board realized in Dibond (Students: R. Nocolò, A. Prigiobbo).

After such a phase, we have performed drilling and assembly of pinnules, pad and handles. To sum up, it has been a job that has forced interested students to a truly full immersion in the problems resulting from the attempt of building a Kitesurfing table, and in light of the good results obtained one can say that the aim of the classroom has been completely fulfilled.

7. Production and Eco Design. The competitiveness on the basis of sustainability

Undoubtedly, on the side of experimental manufacturing, in some home works we have taken second place the application and the problems relating to recycling matters, as LCA (Life Cycle Assestement) and its derivations, i.e. Eco Design and Environmental Design, that define the guide lines of the System – Output Design. Anyway, several works in which we have decided to apply the principles relative to eco sustainable design, low impact technologies and environmental friendly output - prototypes have not been lacking. On the other hand, on recent investigations it is possible to deduce that the increasing sensibility to themes related to degradation of environment and the raise in demand relative to goods and services in accordance with specific criterions of certified quality on the basis of international standards and laws have gradually diverted market towards natural outputs. For example a part of market has been tourning round wood ones, certainly because of their beauty, but also because of their lower ambient impact. Perhaps in this context it wouldn't be necessary to underline it, but I should like to take this opportunity to remember that their real ambient sustainability is the consequence of a concrete sustainable forest management, i.e. of the balance between the quantity of cut trees' wood and the quantity of trees that are growing in the forests, balance that it's possible to reach only if new plants are really replaced in the place of cut trees. But it's not enough! To start a virtuous circle it's necessary to safeguard habitat even through the respect of the wellbeing of workers, forests' owners, local people and promoting the local progress, being aware that these are indispensable behaviours from which the health and the survival of the same forests depends. This could be and should be guaranteed by mechanisms and external certificates related to the conformity of the management and clear rules which could be complied with, to facilitate the commerce and the increase of the output profitability. Thus the rational use of resources must necessarily become a competitivity factor for the companies on the international market just like other factors, i.e. price, quality, design. On this front Italy is still very backlog, but the virtuous examples have not been lacking, e.g. the Swedish and Canadian ones; differently, what is missing in our country is a serious programme of reforestation and, in some areas, a real education, as well as an efficient awareness campaign about these problems and measures. Having said this, besides the close examinations about "technological" materials, that often haven't a low impact on the environment, I have tried to sensibilize students' awareness about the use of natural materials, not of animal origin, such as, precisely, wood and cork boards that not only spontaneously regenerates and is a long standing material, but is not toxic, transpiring and non-flammable too.

Fig. 5: Renders and prototyping of a 24 hours suitcase in reduced scale (Stereolithography) (Student: G. D'Amico)

8. Cardboard prototypes

I have also illustrated to my students the innovative and intelligent use of cardboard, that is fully ecological, being recycled and recyclable. It combines weightlessness with resistance and it's cheap too because the final output costs less than other ones realized by different materials. Furthermore, the whole process of mounting and fitting, even during the marketing campaigns, turns out to be economical because of the pliability of this material, starting from the easy and fast assembling/ transport/ disassembly – even for not experts – to the waste disposal. Versatility, easiness of movements, strong communicative value and, at the least, but not the last, undoubted aesthetical quality, are some of the features of the cardboard. It's no accident if all that has excited the fantasy of many famous and minor designers that have fully tested the features of the cardboard, creating variously shaped objects, previously unthinkable. Among others we remember F. O. Gehry that in 1972 created the wavy cardboard Wiggle Chair, produced by Vitra. Even the students of the course in Prototype Implementation Laboratory have fervently applied themselves into the making of cardboard prototypes, often directly recycled by themselves. Following famous models or on the basis of new projects, from time to time, they have converted it into bookcases, seats, chairs, shelves, toys, jewels, gadgets; all these objects had the common denominator of showing cardboard terseness, enhancing, never disguising, its natural peculiarities. In principle and for these reasons we have been excluding non closely functional elements, or foreign to the nature of the cardboard, avoiding screws and metal junctures. In general, we have applied the criterion of the use of a single material (the only cardboard); sometimes it has been combined with another material, in concordance or dissonance, as metal, plexiglass, wood, straw. If on the one hand the use of wavy cardboard seems simple and within range of everybody, on the other hand it can offer itself to original cues for unthinkable creations, only if we deepen its mechanical characteristics based on the different kinds of "papers" that compose it, that is to say the "covers" ("chamois", "test", "liner", "kraft"), the "stretched papers", the "waves". These different layers are held out by glues deriving essentially from mize starch. It is not that in this context we would teach a lesson about cardboard, but it is interesting to underline how many focused uses can develop on the basis of considerations relative to papers' substance, to the thickness, to the number of the waves (1 wavy cardboard: E/microwave, B/low wave, C/high w.; 2 wavy cardboard: EE/bimicro, EB/microtriple, BC/triple, CC and CK/ 2 high w.; 3 wavy cardboard: BCK /triple w.). The Comfortable Chair, (Fig. 6) and the honeycomb cardboard bookcase (Fig. 7), made during the course in Prototype Implementation Laboratory, are two examples of prototypes inspired to existing products put onto the market by designers specialized in the use of cardboard.

Fig. 6: Cardboard *Confortable Armchair* Design. Specifications and prototype. On the right, details showing work in progress (Students: L. Palumbo, R. Chiarolanza).

Fig. 7: Honeycomb cardboard bookcase prototype. Details of work in progress (Students: S. Esposito, F. Sorbino).

Fig. 8: Corkboard prototypes (Student: C. Lucamante).

9. Recycling and decontextualization. Looking at the landscape

As we hinted before, In many other cases we have been working on the principle of decontextualization related to the recycling process, through experimentations that have given rise to a huge variety of projects and prototypes, often able to play many roles, ranging from "ecological" cigarette lighters to beach bags which can be turned into picnic cloths, from lamps made with canisters of chickpeas and peeled tomatoes to those created with cassettes which are no longer usable, the last traces of a technology which has become superseded only recently. In this framework the manufacturing techniques have been almost always characterized by chance, i.e. the mere experimental attempt verified and double-checked step by step. As we have mentioned in section 3, in several cases we have chosen to associate the creativity suggested by the process of recycling the Neapolitan culture, so as to transmit the importance of recovering our roots not only in terms of consciousness of belonging and additional value, but as regeneration and resource in a wider and more complete meaning. I have in mind a magazine stand built with pieces of vinyl obtained from broken records coming from the most ancient recording studio in Europe, the Neapolitan Phonotype (1903) which contains a piece of history of music through records of Caruso, and of many other more or less known artists. In particular, with the students of the degree course in Fashion Design we have assessed, as landscapes viewed as possible sources of inspiration, the old Neapolitan dressmaking and we have performed experiments on the process of recycling in another context its devices including metres, reel and buttons; or we have looked at warping and silk drawings of S. Leucio of the age of Ferdinand IV; or to the geometries of Vietri ceramics. We have taken our inspiration from colours of the landscape, ancient architecture, mosaics and marquetries of the churches of Amalfi's Duomo, friezes and columns of Pompei's Scavi, Etruria's fragments, so as to create objects, jewels, sandals and bags, revisited and conceived according to modern taste, and sometimes through matching with materials completely extraneous if not in disagreement with the sources of inspiration. What comes to my mind are all collier inspired by laces of Neapolitan pillow, made of silicon, i.e. through the straining of silicon rubber in empty moulds created ``ad hoc'' on the original drawing. Nothing borns out of nothing, and the tradition is almost always a primary source of innovation. We, ourselves, are the outcome of what we were in the past, and the prerequisite of what we are going to become.

Figg. 9, 10: On the left, a collier realized by the straining of silicon rubbers in ad hoc made mould (Student: B. Frettoloso). On the right, renders and wax models of rings inspired to campanian etrurian archeology, realized by the laser stereolithography (Student: L. Gambero).

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Less versus More; Pondering Architecture and its Embodiment of Crisis.

Gerhard BRUYNS,[1]
[1] Delft School of Design [DSD], Faculty of Architecture
Delft University of Technology,
Delft, The Netherlands
E-mail g.j.b.bruyns@tudelft.nl

Abstract

Questions of uncertainty [related to the issue of 'less'] loom larger within the global climate. Uncertainty regarding the futures of political domains, economic viability, social and human sustainability, not to mention the uncertainty related to the influence that architecture, as praxis and critical discourse, may exert as stabilizing moments within territories, environments and more importantly, humans and social sustainability.

The focus of this paper will be on the aspects of 'more', as its attempts to render visible the relations between [a] the operational logics within *competing rationalities* [modernism vs. specific] as basis for a critical approach and [b] to address by way of example the specific approaches for territorial governance and social sustainability through a highly and rather specific take on architecture and urbanism. The explorations made will reflect on the problems encountered within a post graduate [architecturally focused] education program, the aspects of environmental management and the obstacles encountered within the design work as moments of engagement within a larger landscape strategy. Examples will show the points of departure, the moments of critical inflection, and larger landscape strategy as means to produce a fully integrated urban model entirely focused on a communities assets, skills and labour qualities and housing stocks.

Keywords: Crisis, Co-production, Radical Urban Strategies.

Background

The International Herald Tribune, of the 18th March 2012, had a headline that read: "*Greece urged by European officials to do more*". Another headline stated: "*Woman bear the brunt in Austerity in Britain*", with others reading; "*Side by Side Look at Destruction and Renewal Japan*"[1].

The article on Greece quotes the director of the International Monetary Fund [IMF], Christine Legarde, though her praised of Athens for; "[…] *its tremendous efforts to implement wide-ranging, painful measures over the past two years".* She stated that despite their efforts, Greece needs to do more. She continues by saying; "*Greece's priority is to undertake competitiveness-enhancing structural reforms",* and that*, "significant further fiscal adjustment is necessary to put debt on a sustainable downward trajectory."*

News headlines dated the 28th March, of the very same newspaper read; "*In Paradise, but Closing In On Disaster*"[2]. The article elaborated on life in the Maldivian archipelago, and its ever present and inevitable crisis, as the islands is being threatened by rising water levels and constant erosion. However, the most striking headline of the day remained a smaller less visible headline. It stated; "*Borderline: War over a One Horse Town*". As a small, and yet powerful headline, it reflected on a so-called 'one horse town' of *Tsorone-Zalambessa*, situated between Eritrea and Ethiopia. The dispute in question deals with the establishment of a definitive national border, between the two aforementioned countries, all questioning *Tsorone-Zalambessa's* literal position, either as part of Eritrea, or, as part of Ethiopia. Continuous disputes between Eritrea and Ethiopia, a matter of conflict with its origins in 1889, have in recent days, once more, culminated

into a critical situation with ever more uncertainly for both *Tsorone-Zalambessa's* citizens as well as for respective nations. Although less of a 'global' threat to world stability, the headline once more confirmed the legacy of how national conflicts disregard local folk or how dsputes affect livelihoods.

This paper will explore how urban practices*, specifically those related to* architecture and urban design, continuously engage and address critical and uncertain spatial landscapes within the 'critical' paradigm. The issue under question is not as much a concern of how to identify 'crisis' or 'uncertainty', but to explore the role of design as; [a] a mediating material praxis and [b] an activity, which negotiates and directs a material and spatial reality as methods of improvement.

The text will first of all establish the **material realities** when questioning the paradigm of crisis. Explorations will establish the manner in which architecture and the city absorb critical moments at the levels of social, political and economy, which form part and parcel to the larger spatiality's of the geopolitical and socio-political crises.

Thereafter questions are posed to reflect on the **mental and conceptual frameworks**, which help frame specific attitudes that deal with crisis. A section called 'What other have said', looks at the local conditions of a global crisis before addressing the aspects of '*more*'. 'More', in terms of how a conceptual framework can possibly shift spatial praxis to maximize effects *and* potentialities. Here the focus will be on the clarification of what Low [2012] calls '*competing rationalities*' within operational logics. Exploration of the 'competing rationalities' concept and terminology will elaborate on old as well as new conceptual frameworks, whereby the architect will stand central within the process of being a 'conductor' or 'director' of urban and spatial strategies.

As a third and last step, the paper will reflect on how the concept of **'co-production'** finds embodiment. It will show how co-production is implemented by way of radical experimentation within an academic - design – research project. Specific post-graduate projects will intentionally show the possible spring-board positions from where to approach various social and political instabilities which intentionally follows radical experimentation within the Urban Asymmetries Research Program, of the TU Delft. Specific examples will explore the points of departure, the moments of critical inflection and larger landscape strategy as a means to produce a fully integrated urban model. Results will discuss the types of urban taxonomies made as part of the strategies that absorb skills, labour, materiality and existing housing stocks. Moreover, it is hoped that a debate, aided by the work, may emerge in favour of how to design with 'less', as a specific methods for territorial governance and social sustainability.

Crisis and uncertainty, a possible material reality.

Both *'Uncertainty'* and '*crisis'* have become key words for the 21st century. National and global media constantly provide live coverage of the multiple types of crises found in various parts and corners of the world. BBC World News, CNN live, El Jazeera, and France 24, as well as many other news channels, show the same images, streaming similar news 'feeds'. Live media elaborates on the conditions and causalities of crisis. Commentators discuss the influences to each crisis, highlighting a number of perspectives, fed with live and up-to-date information on the situations, as they unfold. [3]

Realities of the crisis can be found in various world regions. Crisis at the European scale, directly impacts the material realities of cities. Riots in Athens, sparked by the tough austerity measures, have had radical repercussions both in terms of how, on the one hand, a society in general deals with an economic meltdown and on another, and how individuals struggles to sustain daily life for its citizens. Greece has witnessed the alteration of political policies, the rise of social unrest, a revision of its tax systems, and most significantly of all, the spatial and material modification of its city. Elsewhere the consequences of uprising and war due the 'Arab Spring', and its wave of revolutionary moments have shown similar tendencies. The world has witnesses, in rather graphic details, the destabilization of political regimes in Tunisia, Algeria, Iraq, Jordan, Kuwait, Yemen, Libya and Egypt. Cities in each of the aforementioned countries have had to deal with the transformation of streets into places of crisis and resistance. However, uncertainty, crisis and the spaces they occupy, are not restricted to conditions of war or famine alone. Countries who are undergoing rapid and excessive urbanization also face a level of heightened and critical awareness as part of city life.

In summary, irrespective of being European, Asian, South American, African, or, a country part of the developed world or still in the process of advancing, the issues presently remains global. Whether it is a

crisis at the *socioeconomic* and *geopolitical* levels, crisis related to war, famine, human rights, gender or governance policies affecting local inhabitants, one thing remains certain; crisis and uncertainty have become part and parcel to a double edge sword continuously threatening nations' stability. More importantly, and of primary concern within the architectural and spatial discourses, is the consequences of the **material and spatial realities** any crisis creates.

What others have said.

The free dictionary[4] defines the word '*uncertainly*' as:

> "Not known or established; questionable: domestic changes of great if uncertain consequences, [b] Not determined; undecided: uncertain plans and [c] Not having sure knowledge".

'*Crisis*' is defined as:

> "A crucial or decisive point or situation; a turning point. An unstable condition, as in political, social, or economic affairs, involving an impending abrupt or decisive change, and "A point in a story or drama when a conflict reaches its highest tension and must be resolved".

Both definitions clearly delimits the open-ended and multiplicity of the *problématiques* surrounding crisis or uncertainty.

For Manuel Castells, author of the *Rise of the Network Society*[5] and the *Urban Question: A Marxist Approach*, the complexity-surrounding crisis is primarily structural and systemic, more than it is material. Essentially, Castells primary contribution to the question of crisis is in an approach that favours a financial and systemic position, before ever engaging with its material realities.

In a paper delivered to the *International Forum on Urbanism*; *the Urban Question Conference [2009]*, Castells presented a paper entitled; *Beyond the Crisis, towards a New Urban Paradigm*[6]. The paper presents a 1st world account of much required policies and strategies to address, what he terms, sustainable development in light of the 2008 world financial collapse. Design proposals used as part of his narrative was shown reflected on what one may see as mediated solutions for the 1st world. Each proposal took material shape in the juxtapositioning of newly emerged urban functions [commerce and public spaces] against already established infrastructure [roads, bridges, houses]. Very few examples provided possibilities of extreme or radical forms of intervention, or radical moments of crisis.

Castells' work in recent years has extended his position of financial instabilities, as generator for other levels of crisis. *The Aftermath project*[7], was initiated to address what Castells refers to as the 'Carpe Diem period' within social immediacy and instabilities. Interestingly enough, Castells frames the *Aftermath project* through its development and origins, only in financial terms. The 2008 financial crisis - with its financial bubbles – is historically located before teasing out the effects at the levels of; [a] the industrial crisis, [b] crisis of employment, [c] fiscal crisis and [d] governmental and European crisis. What is shown is the critical particularities and its effects on sciences, social, political warfare, tolerance and religions. Castells further draws from a range of global experts to steer the research initiative, to ultimately rethink, address and navigate the possible outcomes and way forward in the periods of crisis.

During the 33rd Lecture on Globalization[8], delivered on the 6th of December 2011, Castells orally produced an insightful overview on the possible outcomes and future prospects, as echoes to the 2008 financial implosion. According to him, various resistances against capitalism, by organizations such as 'Occupy Now', has made a clear and definitive statement by redefining the levels of uncertainly. He further stated that no social or cultural domain would be unaffected. Secondly, and of crucial importance, is the emphasis placed on the crisis seen as a '*Non-Global Global Crisis*'[9] condition, that is to say, a local and spatially specific crisis at a global proportion. Interestingly enough, what Castells presents as part of the Aftermath project, its analysis and the possible realities of the Carpe Diem periods are radically different to those proposals made as part of his *Beyond the Crisis paper* in 2009. Projects in the Aftermath scheme addressed the material significance of reactions and the levels at which social groups resist uncertainly and the levels of redress in terms of daily process, housing and individual urban realities.

Still, the solutions, terminologies, and logics Castells discuss all relate to market systems and political economies. What essentially remain missing are the conditions under which the crises unfold spatially as they take shape in a material sense.

If the crisis is simultaneously 'global' and 'local', then the counter strategies would somehow also have to relate to the local spatiality's and its material forms. From an architectural perspective, how would the spatial disciplines address crisis and uncertainly? The world has witnessed the spatial specificity with which certain urban resistance is met. The various locally specific - 'occupy now' demonstrations - the initiatives taken by individuals to move beyond the financial collapse and the countless community incentives are but a few examples of resistance. We are still left with major questions related to urbanization at times of crisis. Moreover, how would architecture contribute to, or, form part of a counter strategy to help sustain human livelihoods on a daily basis? The main question therefore endures; can architecture exert or provide stabilizing moments within territories, environments and more importantly, can architecture provide stabilizing moments to facilitate human and social sustainability in times of crisis?

In a recent interview, Low and Bruyns [2012][10] questioned the role of design within the formulation of spatial urban strategies for developing countries. Pertinent questions at the time related to; [a] to the role of the architects within developmental and urban sustainability, as well as [b] the negotiability of important and peripheral issues when considering any approach as a possible routes for feasible, sustainable and spatial development.

The questions raised were not exclusive to the Southern African or Sub Saharan context. As part of this encompassing interview Low verbally elaborated on both the consequences as well as the conditions under which architects and planners engage when addressing rural and inner city slum development. For Low, the concept of *co-production* remains the key aspects when dealing with uncertainly and crisis.

Co-production is defined as a concept whereby all parties who are directly related to, or involved with, a specific problem, collectively produce or contribute to its resolution. According to Low, the operational framework of co-production implicitly establishes *horizons of connectivity*. In other words, it is through the types of relations, how the various parties collectively collaborate and draw from resources, how they facilitate, organize and implement skills in order to accomplish a task. Only through the *horizons of interconnectivity*, through the manner of negotiation and the drawing together of individuals is a sustainable solution both possible as well as viable. The architect or designer becomes, in a metaphorical sense, a 'conductor' or 'orchestrator' of many parts, sections and variables. It is within this role that the architect becomes the mediator of chaos. From Low's perspective the question posed should be those that try and establish what variables allows for things to co-exist, and not establish a position of the 'master builder' or 'master designer'. As an alternative Low postulates that design can only take on a meaningful role through the managing of relations, by way of the agency of design itself.

Furthermore, Low stressed that co-production and horizontality is implicit of a *non-hierarchical* position. That is to say co-production is in favour of an emergent and equal process, in comparison to a top down [modernist] approach. Emphasis should therefore shift from the singular to the plural, in order to incorporate social anthropology, political economy and question marginalization as part of the designer's awareness and skills.

One of the best examples Low provides is on how to read contextual dependencies in any landscape. A comparison is made to the manner in which a medical physician would read and diagnose human illness, following a very strict medical protocol. One muscle in the human body is similar to muscles found in other humans. The generic and medical protocols become instructive, in terms of examination and cures, that is to say human diagnoses and prognosis. For the architect this is rather different. Each site, each portion of the city or landscape is different and specific. Noting is generic or neutral. It is therefore the role of the designer, to not only mediate the context, resources and use, but also to mediate the users, parties and their combined possible futures.

Other questions, such as ethics, education and valance, simultaneously step forward within the praxis co-production. Although too complex to elaborate here, the question of ethics and design implies a moral obligation within design practices. In other words, those who do the design work have to question their ethical and more values in relation to those for whom the design is meant. Similar questions are valid at the level of [design] education. What should form part of a design curriculum, especially when the merger of

socio-political, political economies and geopolitical issues are immanent and ever present, within the design discourse. How does one teach co-production as well as its awareness to mediate chaos? Finally, and in addition to the other aforementioned factors, how does one spatially engage, with a spatial problem that seeks to establish valance within its strategy, opening possibilities to engage with future financial and social possibilities. To what extent does both the architect and design have to accommodate or become flexile when thinking of future and alternative scenarios?

In summary it remains a problem of *competing rationalities*. Low refers to 'competing rationalities' in as far as two specific mind-sets, dialectically opposed to each other in terms of approach and thinking. One mind-set, which can be referred to as the modernist 'mind-set, looks and seeks out to place orders and hierarchies into the world. This is referential to the so-called top down approach. It is an outlook, which has had a tremendous historical significance, at various levels of society, politics and governance. Most colonial policies of the 18th and 19th centuries used the modern belief as a wielding instrument to govern regions, society and people. Architects are generally all too familiar with high modernism and the consequences of their architectural and spatial legacies. In contrast, the second minded is one termed as the grassroots rationality. Within its frameworks the grassroots rationality appears to be locally driven, sensitive to people, culture, program and any spatial as well as material solutions. Furthermore, it has to be mentioned that although the grassroots concept is nothing new, its power lies in the revision of its working method and how it engages with a number of grassroots level factors, making it more meaningful for zones of uncertainly or landscapes in crisis.[11] It is within this 'rhizomatic' web of power, once more a reminder of the horizons of interconnectivity, that lends new agency to the grassroots concept. A more familiar grassroots example could be found in the expression of African city places and its continuous reprogramming, based on the influence that mobility has on specific parcels of land. Grassroots level thinking would be able to access the process in which a number of users reprograms places in a temporal process as well to be able to read the importance of the vernacular structures, users and daily dimensions as part of a solutions which seeks to establish valance and meaning.

Low further describes grassroots levels concepts using the analogy of the kaleidoscope. Viewing of the kaleidoscope is nothing new. Movement in the kaleidoscope results in the collective displacement of the particles, causing them to shift and establish a new image. Essentially it becomes a product of how gravitational forces exert pressure on the collective body of glass that then establishes a reconfiguration in terms of form and pattern. Grassroots level rationalities therefore fall part and parcel within the co-production mind-set, which become fundamental to both, context and praxis. Although easy to grasp as concept, this adaptation as praxis will probably take years to germinate. Low is of the opinion that the grassroots idea remains a problematic concept for those who still seek to address urban spaces through a conventional 'western' design attitude. This has been evident in the manner with which many architects still cling to western operative logics as design process for critical landscapes. A number of proposal by famous architects have become immediate failures as designs fail to merge the rationality of a western mind with that of, lets say, an African or any critical landscape.

Spatial and design Co-production.

The following section focuses on the examination of specific approaches which question territorial governance and social sustainability through a highly, and rather specific, take on urbanism and the role architecture plays. The work shown explores the fundamental differences of how the grassroots rationality differs from a modernist attitude by showing how architecture becomes an instrumental device at the design level.

Two main comparisons, between a European and non-European landscapes, are meant to show how the crisis registers different applications as part of the same problem. These comparisons should be seen in light of the how spatial practices differ, and design intentions materialize, even though the problem remains of a similar nature.

As part of the *Faculty of Architecture*, the *Delft School of Design's Urban Asymmetries Research and Design* unit deals with radical experimentation to engage with urban and architectural problems, caused by Neoliberal attitudes towards development. As a program it critically questions a number of urban landscape, marginalized due to either financial policies or social unrest. At its basis, the DSD's core content focuses on urban and architectural strategies, in light of the various socioeconomic, neo-liberal and geo-political

mechanisms of specific urban territories, by exploring both consequences and design possibilities through a highly critical and theoretical reflection.

Within the Faculty of Architecture, the unit sets itself apart form other research programs, as it views architecture as a subservient mechanism, a technology so to say, meant to serve a specific context and community. Instead of seeking solutions at the pure pragmatic side or with an intention to design in order to create wealth and image, the DSD's projects mediate the various urban and architectural realities in order to produce solutions at a number of levels. These include the design of; social planning structures, financial strategies, self-driven improvement strategies, [landscape]architecture and community involvement.

What is more, as a graduate program, the DSD has been fortunate to have had the freedom to lecture and educate students at both the urban and architecture scales as part of its curriculum. The Urban Asymmetries Research Program [UA] commences from the premise that any interaction with the city, can only commence if it accepts the conditions of the city as being 'urban'. That is to say, that although the results may be architectural, the approach ground itself within all scales of the city in order to question the asymmetrical and uneven forms of development and how to form counter strategies at each scale. The definition of what is called *urban* is further extended to include an understanding of the city in terms of city processes, temporal urban dimensions, social compositions, political variables, economic strategies, social movements, material possibilities, labour types and possible spatial stratifications.

It is at this junction, at the intersection of the praxis and embodiment of both the architecture and urban disciplines that the UA studios critically examines, disfigures and deconstructed the variables involved with each urban moment, before any attempt is made to rethink any possible solutions. Feasible interventions are in most cases extend beyond the scope of architecture. To date, the UA design work has looked at architectural types which form part of; mobility's and other forms of 'infrastructure', financial counter strategies, socio-economic strategies, managerial and regulation policies for neighbourhoods.

The fusion of the architectural and urban design praxis and its intentionality to counteract neoliberal conditions, has concomitantly highlighted a number of obstacles. Inability to 'literally' draw limits around each disciple has proven to become an ever-larger grey domain. Students have faced great difficulty in making the transition between architecture and urbanism, the theoretical critiques and the specific interventions themselves. Where architecture ends and where the urban domain commences is not as clear and definitive as one would have thought. This is ascribed to the number of variables and the levels of critiques in which students become entangled. What commences as an architectural project quickly moves towards larger city strategies, continuously alternating between designs scales associated with environmental project and those scales of the material reality of bricks and mortar. A second aspect, one tied to the former, is the overbearing influence of research and data. Students become entangled with the statistical side of the analytical work making the transition from analysis to a formal design labour intensive. After 6 months of research students are forced to somehow engage with the possible ways forward without compromising the thorough analysis. Certain students develop design blocks the moment before proposal of a possible solution in a material sense is due. Participants are therefore always advised to continuously move between the various design levels, city scales, and construction detailing. The formalization of a possible design strategy soon enough highlights any possible weaknesses between the overall and specific strategy, theoretical critique and its materialization. On the positive side the DSD has witnessed the radical position taken by students when questioning uneven development. In their professional capacities gradated students continue to follow a critical and explorative position either within architectural practice, NGO structures or as community volunteers.

DSD UA program has successfully completed a number of Graduation studios. Up until 2012, the DSD has completed studios on Mexico City [2008], Santiago De Chile [2008], Newark, NY [2010], London [2011] and Amsterdam [2011]. The current studio re-examines the city of Juarez [Riberas del Bravo] in Mexico, due for completion in July 2012. Each studio saw the emergence of rather diverse design strategies, exposing the possibilities of how architecture becomes operative and instrumental within the asymmetrical - and highly contested - urban condition. Although similar in approach, each studio exposed highly contextual realities. A number of projects, from the Mexico and Santiago De Chile studios, dealt with the notions of 'self-help', self-built' schemes, whereas other projects looked at the possibilities to self-help financial strategies. Some project explored the possibilities of intervening at levels of urban-agriculture as revised modes of production, landscape design, and public space definition. One specific Newark design project examined the possible

and alternative strategies available to the homeless. Something as mundane as a shopping cart took on a material transformation, addressing the issue of shelter, whilst at the same time taking on a political, financial and social material form within a capitalist driven metropolis.

Co-production at the urban scale remained a key challenge. Within the Santiago studio, 3 students elected to develop and implement a coordinated effort wherein all the architectural projects had to find 'ground'. This saw the co-operation and co-production at two levels. At first students were forced to collectively contribute to one overarching strategy, coordinating efforts and proposals for the entire region, making decision on infrastructure, housing types and areas earmarked for immediate and later development. Secondly, the urban design strategies had to act as facilitators to the smaller architectural 'pockets', forcing architectural students to deliberately negotiate as well as coordinate all architectural interventions with their urban counterparts. Without proper urban frameworks, it was found that the architectural interventions were adrift amongst a sea of endless possibilities.

As a process, it was interesting observe the intense and sometimes conflicting negotiating processes between urbanism and architecture students. Students from both tracks negotiated, whilst collaborating, initiated heated debate, based on their findings; fieldwork and in-situ community work. One particular student Shirin *Jaffri*,[12] consolidates all the urban and architectural strategies into a comprehensive and congruent project operating as program and project coordinator. Project details dealt with the implementation phases, financial structures and political facilitation at the governmental as well as neighbourhood level. All the architectural interventions of the studio found resonance within this particular project. Jaffri's proposal stood as the literal embodiment of what co-production meant as well as how to tie all projects into a spatial, and more importantly, financial whole.

Although to many to mention, one can reflect on a number of other architectural projects that attempted to look at the collaboration and horizons of interconnectivity within a community, at an architectural level. The project of *Dirk Robers*[13] [2011], explored the possibility of collective co-operation between community members to extend existing single-family housing stock. As families grew, extended with 3 – 4 members at a time, the pressure to alleviate dilapidated residences was essential. Robers' project, entitled *Core,* drew from the availability of materials in local hardware stores, local building skills and a program to rotate building equipment to facilitate the scheme. The result was a design that commenced with the 'core' element as addition to the exiting dwelling. By adding the core element, the design secured structural stability for future additions, a new wet core service to the current and intended extensions, as well as delivering a new architectural typology for a very standard and monotonous single story landscape in its allowance to extend to a double story house. The building process was executed by locals who would contribute with skills, in return for similar assistance on their own future designs and homes.

Other examples of how the architectural profession may possibly address places of conflict and uncertainty through the notion of co-production are evident in the current 2012 UA studio, with its focus on the *Ciudad Juárez, Riberas del Bravo*, Mexico. Presently, the studio has just started its second semester of the graduation track, defining the final spatial and material interventions. Located on the Mexican side of the Texas border with El Paso, the Ciudad de Juarez finds itself caught in worlds of extreme. It is a city wedged between various types of violence and conflicts, between being a border condition of developed and 3rd worlds, caught within hyper-employment and unemployment, and most crucial of all, caught between being inhabited and uninhabited. Therefore, Juarez forms a perfect study case. As an urban landscape, most of its housing stock is presently empty and abandoned, thanks to the influence of economic, social and drug cartel related forces.

The studio has directly challenged the role of the architect as mediators within an elaborate meshwork of social issues. Students soon realized that the problem they are faced with extends far beyond their architectural comfort zones. Students soon had to merge important aspects related to environmental ecologies, human ecologies, political economies and social welfare into their immediate analytical as well as design scopes. The studio has, as a result, delivered a specific urban critique, teasing out a number of issues. They include issues which relate to; the impact of global events on local developments, the historical development of border conditions and landscapes, the relations of war on economy, the roles of border societies, and finally, urbanization in terms of morphological and typological development in the city.

Combinations of the various critiques, analysis, and spatial layers have culminated in, what the studio calls, 'Urban Taxonomy'. As the accompanying image [below] shows, the taxonomy includes all details and

specificities of the broader scope and definition of an urban project. It is the representation, a mapping so to say, of Low's concept of horizons of interconnectivity, positioning topics, issues, impact on urban scales, intention, objectives, urban strategies, case studies, actions and formalizations all along each other. As an urban taxonomy, crossovers between each category and all the other categories are established through the various intricate and complex relational levels. Each relation is then further examined to explore and understand further potentialities, both in relation to smaller sites within the area as well as the larger city program. Students thereafter move forward by continuously relating smaller, individual, site proposals to the larger intentions as set out by the group. It becomes a process of endlessly coordinating the various production processes to establish better levels of valence between architecture and [a] the harvesting of agricultural produce, [b] the management of natural resources, [c] planning and redesign of public spaces, and [d] the potentialities of home 'grown' financial structures.

Fig. 1: Urban Analysis and Forces of Influence: Ciudad Juárez, Riberas del Bravo, Mexico. 2012

Fig. 2: Urban Taxonomy of Ciudad Juárez, Riberas del Bravo, Mexico. 2012.

Furthermore, spatial discourses seem to have the upper hand above other disciplines that attempt to address similar context within similar questions. Students of sociology, economy and political sciences have difficulty in translating notions to the spatial and material domain. Here specifically, the role of the architect and urbanist is significant. Spatial students ruptures any obstacles through their spatial and contextual insights, in relations to a landscape's historical development, current social practices, economic variables, political constrains echoed within the material reality. One could say that the students' spatial background help develop a deep and fundamental insights into various types of complexities associated to each uncertain or instable urban moment.

Thus far the design proposals for Juarez covers a range of functions, programs and scales. Probably the most ambitious proposal thus far is a proposal which intents to address the treatment and management of water. As a project the proposal by *Sara Navrady*, draws into its scale the redesign and management of the water purification systems through passive technologies. It further includes a redesign of a present derelict water canal to become a community driven project as facilitator of a restructuring project for the Riberas del Bravo neighbourhood. The project is ambitions as the canal in question stretched the entire length of the site, with no less than 4 km of redevelopment. The project is meant to coordinate mobility, infrastructure, public space and production industries within its scope of work.

Another project of importance is the strategic planning of a new urban infrastructure system, which would connect resident to both the area as well as the larger city scales. *Revathi Pillai* has rethought transportation in and from the region, establishing bus, minivan and car 'transferium'. Like most project within the studio, this projects is established at the very edge of the water treatment project, harnessing the potentialities of the green and newly renovated public spaces into a coherent spatial structure.

Each project of the studio reconsiders the abandoned housing stock of Riberas del Bravo. Many students feel the need to rethink the possible modes for dwelling in light of the financial crisis, buy way of bringing together both issues of [a] the extended families and [b] the possibility of seeking alternative [home] sources for income. A range of smaller proposals is inserted to establish stable moments within the neighbourhood meshwork, in relation to the larger citywide infrastructure framework. Identifying specific sites as potential locations for home and neighbourhood clinics, urban agriculture and food production, educational facilities, colleges for the education of building skills and day care completes the overall urban strategy.

European context.

What happens to the role of the architect when resources become less, with the focus of achieving more? For most cases in Europe, it is not so much a crisis of warfare, but one of economic as well as material resistance. How does the European architect become instrumental in his approach to [co]producing, directing as it were, forms of social resistance? More importantly how does crisis register differently to the examples shown in Riberas del Bravo, and what spatial practices are understood as relevant for the wider notion of design development, with respect to both European and non European places?

One of the main aims of the Urban Asymmetries project is to allow students the possibility to engage with a variety of contextual issues. Material realities encountered in Mexico or Santiago De Chile is inapplicable to a European landscape. Each urban landscape represents and embodies different and various levels of control, policies and financial processes, which form the substructure to a number of highly specific *problématiques.*

Using this as background the question of 'less versus more' becomes paramount. The Amsterdam studio, entitled *Amsterdam 'Re_figured',* investigated the city as part of larger and encompassing Randstad urban megalopolis. More specifically, *Amsterdam 'Re_figured'* embodied a year long strategy which attempted to access the structural layers of the both the Dutch Randstad as well as the place and context of its capital, Amsterdam, as part of the poly-nodal, con-urbanized landscape [Bruyns, 2011]. The project commenced with reading the traditional morphological elements [Infrastructure, building distributions, settlement patterns, typological order] before inverting the traditional narrative to include other 'urban variables' [economy, social structure, labour forces and global markets]. A bilateral reading of the Randstad and Amsterdam, immediately revised traditional explanations on what the city is and how it is understood, in favour of a view that accepts a city within a historic and social narrative. What was shown in the formal analysis was a settlement 'in-formed' by way of various trade strategies [Dutch East India Company], labour forces [migrant labour], and production types [from the bulb producing region to a managerial service industry]. It further

looked at possible ways to clarify Amsterdam's social-political position within a highly specific web of political economies and consistent deindustrialization processes.

At its core, the Amsterdam Studio deliberately sought to produce alternative narratives of urban form, through exploration of the conditions, intricacies, levels of influence and praxis related to neoliberal development and its specific 'uneven' or 'asymmetrical' tendencies. Amsterdam's relatively new IAMSTERDAM urban image program reveals a partial side of the city without highlighting the sub-currents, which also make up for the city.[14] The power of the free market system, the creation of gated communities, socially driven enclaves, the influence and power of financial and global powerhouses, the influences of a social elite and gender inequality are as a group of aspects, simultaneously compared to the material realities of how lives are lived and the creation of financial inequality. Consequences of the playoff between the aforementioned aspects directly highlight power structures in relation to the 'non-global' instabilities at the material level.

One specific post-graduation project of the Amsterdam studio directly addresses the matter of socio-economic structures as part of Amsterdam's political economies. *Pınar Balat's*[15] project saw the resolution of the socio-economic discrepancy though a spatial approach. Essentially the project questioned the allotment of wealth within a specific social group of Amsterdam. Entitled "*Socio-Economic and Spatial Re-Organization of Albert Cuypmarkt: Integration of Low Income Groups into Wealth-Generating Urban Structures*", the project produced a highly social critique, taking into account wealth generating structures, social layering and temporal urban processes before even considering architecture as a material solution. Co-production was emphasized through the question of how low-income groups enter into wealth-generating economic structures. Attempts were further made to question the necessary steps in order to unpack socio-economic advantages in a spatial sense. The investigation was carried out through re-organization of the market at the urban scale as well as its internal architectural configuration. Questioning the cohesiveness of the market-entity simultaneously meant rethinking spatial quality, rental rates, working hours, work flexibility, building materials, construction costs, and income levels. The Albert Cuypmarkt was therefore seen as a perfect site for experimentation. As Amsterdam's biggest market, the Albert Cuypmarkt forms an important wealth-generating urban structure, which presently remains inaccessible to low-income vendors. By default the market structure favours middle to high-income groups, supported through its spatial characteristics, mechanization and economic organization.

The project engages with the problem by reframing the existing commercial unit types, in terms of rental rates, working hours and temporal flexibility as well as spatial quality. Within this literal reframing of the market, it is hoped that a differentiated economic force will emerge at various times of the day. In addition, it is expected that the differentiation of the various income groups in relation to the various stall types, will eventually open possibilities for low-income producers to step into a thriving market economy, implementing a self-help, self-driven process.

Commercial units are, in a literal sense, daily orchestrated to overlap with a spatial-socio-economic strategy. Spatial transformation of the market occurs at all hours of the day. Less expensive market stalls are available at early and late hours of each day. More expensive stalls are available at the peak periods of the market. Assembly and dismantling of the market is reserved for those who wish to pay less stall rent. Different income groups will therefore co-exist, operate and negotiate a similar spatiality generating individual wealth. Benefits at the neighbourhood level will be rechanneled to allow for much needed renovation of the existing buildings and housing stock. For the city, the improvement will be at the level of image and neighbourhood upliftment. More importantly, the spatial and materialization in such a project is just as important as the strategy itself, through its deliberate and forceful acts to immediately counter gentrification and capitalist tendencies.

Although Balats' strategy is focused on the alteration of the market at the local or neighbourhood scales, the question of the larger socioeconomic policies cannot be overlooked. The project therefore draws from the larger urban scales, to include within its perspective, the spatial distribution of income groups, housing stock and basic urban amenities, such as day care, beyond the market's zone of influence. What is more, the project further elaborates on 'workers' migrations, which may occur within Amsterdam. Routes to and from the market for both people and produce are defined and re-planned. It is therefore a strategy, which dialectically co-produces and directs, whilst negotiating the very local in relation to the very global.
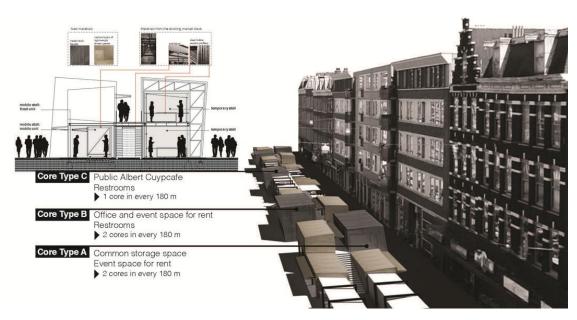
Fig. 3: Albert CuypMarkt urban layout. MSc Architecture Project. Pinar Balat. 2011.
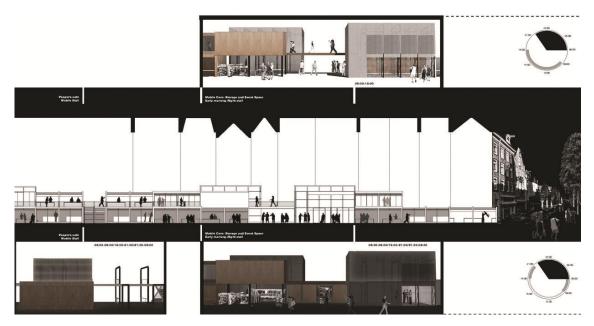
Fig. 4: Albert CuypMarkt architectural embodiment. MSc Architecture Project. Pinar Balat. 2011.

Conclusion.

In conclusion, this paper examined possible strategies through which the architectural and urban negotiate critical landscapes. It was further shown how various forms and types of crisis registers different spatial and material modes within cities.

A first conclusion has to question the types and modes that establish crossovers between the architectural and urban solutions when addressing crisis. Form an architectural perspective the solution is one of a material result, found in a material-spatial reality. It is suggested that possible solutions may be found within the spatial domain alone. In other words, intervention aimed to alleviate crisis can possibly focus on spatial strategies alone without any building or construction work involved. Reconsideration needs to be given to

the spatial-material relationships, the balance so to say, of how much a pure spatial strategy versus the use of a material strategy.

The second conclusion extends the aforementioned spatial-material question through the notion of coproduction. 'Spatial practitioners' are, through the various complexities of urban landscapes, presently forced to take ownership of a vast number of additional 'contextual' variables within their design *problématique*. It is hoped that governmental agencies will take cognisance of co-production as concept. Secondly agencies need to recognise the importance of a spatial position as part of any critical landscape's developmental process, before allowing financial and the political factors to undermine the pace of urban improvement. What is more, governing bodies should be made aware that a neglect of addressing social demands could result in the public to reclaim ownership of the city's space and its future trajectory.

Thirdly, there exists an ever-present optimism amongst the citizens of critical landscapes that a mentality shift should occur, from a *contradictory* mind-set to one that is defined through its *complementary* methodology and praxis. Over and above the ethical position of the architect to co-relate, co-produce and link factors with each other, a similar position is deemed necessary by all levels of governance, policy makers, NGO' and smaller financial institutions. Co-production should be seen as the general norm and not as a concept only applicable to moments of crisis.

A fourth and final conclusion is on the matter of crisis and technology. Technology has had a tremendous impact on how crises are dealt with in terms of much needed relief and shelter. Although technology's value and contribution remains essential, its contribution measured on the sustainable scale remains to be questioned. In most cases technology provides instantaneous relief. Communities still face despair once the technology is removed or once the aid is withdrawn. Sustainable solutions are only possible once the societal, spatial, labour, skills and educational factors are fully equated within any technological strategies.

Technology, society, crisis and sustainably, should therefore be seen as the new synonyms to all to familiar `less verus more'.

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Le Vie dei Mercanti | X Forum Internazionale di Studi

+ less
more
architecture
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landscape

DUALISM AND SENSORY AWARENESS IN ARCHITECTURE AND DESIGN

Anna Marie FISKER, Mads Harder DANIELSEN
Faculty of Engineering and Science, University of Aalborg, Aalborg, Denmark
fisker@civil.aau.dk, mdanie08@student.aau.dk

Abstract
By using the term *less* we focus on architectural heritage; can a heritage from a modernist architect show that less does not exclude *more*?
In the search for a hierarchy of relevant sustainable investment in architecture our paper focuses on the architect Arne Jacobsen.
We focus on the dualism of privacy, the layers of intimacy and private space, and interpret the sensory awareness that is represented in Jacobsen's designs.
Into the discussion we draw Mario Praz who uses the term *Stimmung* to refer to "the sense of intimacy". We focus on the famous picture of Jacobsen's chair, *model 3107*, where the controversial English model Christine Keeler sat astride, and we analyze the photography's iconic status.
Arne Jacobsen also created *the Egg*. Is the Egg bilateral? Does the back rest create an intimate universe on the inside, and interplay with the strict geometry of the SAS hotel on the outside?
We seek the architectural works ability to communicate, seek answers to which languages are spoken – can languages reach beyond the age of the works and spread to a present value? We try to relate the languages of senses and affect to the works of Jacobsen, the sensory awareness to architectural design.

Keywords: Dualism, Sensory awareness, Sensualism, Architectural heritage.

Moment by moment, as we go through our lives, we are called to respond to changes. Even on very basic levels, we are always in a dynamic relationship with the world. Architecture is one of the strongest media through which to express this dynamic condition; the perpetually changing relationship and interplay between the traveller and the travelled. This is where we may become astonished by the grandour and captivated by the smallest detail. Architecture includes scales that not only relate to the scale of the human body, but also make the body relate to its own scale. Thus, architecture does not only serve as a framework for our bodies due to its physical manifestation; it also makes room for our self-awareness in a world dominated by floods of fleeting impressions.
Life calls for presence and willingness to change. Discord sets in when we try to resist change and hold on to what we believe to be ours. Through the lens of sensory awareness, we have, in this paper, decided to explore the way architectural design interact with life. Guests walk into the lobby of the Royal Hotel in Copenhagen, expecting very simple explorations for a one night stay, for rest, for sleep, for food and entertainment; i.e. in standing, walking, sitting, eating and lying. By heart, we know that at times we very quietly attend to the subtleties of breathing; at other times we interact with other people or objects, allowing natural responses rather than imposing our will onto the world. On a late night in spring, we are entering Arne Jacobsen's Royal Hotel. The building is a salute to the modernist ideal of the unobtrusive skeleton construction shielded by a transparent membrane [1].

Let us see if we can uncover, in this place, the dualism of architecture, examine the inherent qualities of the architecture and simultaneously bring the dualism into focus and try to relate the language of sensing and affect to the works of Jacobsen.

However, inspired by the conference theme, *Le Vie dei Mercanti*, we take the first steps into the theoretic disciplines by using the tragic comedy of Shakespeare, "*il Mercante di Venezia*" with its dramatic scenes, which, still today, are so absorbing due to their wealth of human characterization and enchanting poetry. With *"The Merchant of Venice"* as our entrance, we remember our last visit to Venice, recalling how Piazza San Marco is defined as space by the architecture surrounding it. But that day, sipping our coffee at Café Florian, we also *felt* the atmosphere of the square. Seeing how people in general were able to *recognize* the surroundings as architecture, our discussion that afternoon pointed out that it is not only architecture itself that defines the atmosphere of San Marco Square. That atmosphere is also generated by the sound of the tourists, the feeling of the paving stones, the birds, the warmth of the sun and the smell of the Laguna.
The Norwegian architect, architectural historian and theorist Christian Norberg-Schultz states that a place cannot be considered by its visual appearance alone. If we want to define the whole atmosphere of a place, we must, according to Norberg-Schultz, ask ourselves the following questions: *"How is the ground on which we walk, how is the sky above our heads, or in general: how are the boundaries which define the place."* [2]
The surroundings of San Marco Square communicate with the body as you move through the space, as you feel the texture of the old, impressive walls with your hands, hear the footsteps echoing through the hallway, feel a cold breeze on your neck or walk towards the light.
As you experience scenery like this, sitting comfortably in a chair with elegant waiters around you dressed in white, it is not only the eye that creates the experience. It is the combination of all the senses together, which creates the *atmosphere* or the character of the space. In this square, described by the writer and literary critic Henry James as "*the drawing-room of Europe*" searching and understanding through the uncommonly erotic language Henry James dedicates to Venice: "*You desire to embrace it, to caress it, to possess it*", we start the journey towards a higher sensory awareness of perception in architecture [3].

One person who managed to create a beautiful synthesis of the strictly geometrical and the organic in architectural design was the Danish architect Arne Jacobsen. This synthesis is particularly evident in the Royal Hotel from 1958, and it is our thesis that we in this architecture can demonstrate a sensory awareness. It was built according to contemporary construction principles and has strong international references, yet also its very own, distinctive character [4].
At the time, the sharply cut outer form appeared as a gigantic, homogenous glass volume in the center of Copenhagen. The building consists of two large cubes, of which the uppermost stands on top of its similarly sized counterpart, which is laid down. It is a rare agreement between building and design. Both are characterized by the sophisticated version of modernism of which Scandinavia was an exponent.
By enriching the building with human concepts and experiences, Arne Jacobsen achieves something quite remarkable, which is expressed most clearly through the interior of the house; for behind the straight lines of the glass facade, Jacobsen unfolded all of his talents in the period's most consistent example of total design, comprising everything from furniture to textiles, cutlery and door handles [5].
Shakespeare was also working with sensory awareness when he wrote the comedy, *"The Merchant of Venice,"* in 1596; here, however, it is in the form of a woman who dresses up as a male lawyer, and through the act of switching the male and the female, private space is expanded. The idea of privacy, or "private space" for men or women was relatively new in Shakespeare's time compared to analyzing the issue of privacy and private space in the architecture of Jacobsen. It is difficult to predict how we will perceive the surroundings, woman dressed as a man or not, because the experience is related to our emotions and senses. Let us therefore move closer towards the language of sensing and sensuousness in architecture, or sensory deprivation. In our search for parameters for this, we study how architecture plays with the senses. We focus on how Jacobsen worked with the dualism of privacy, the layers of intimacy and private space, and interpret the sensory awareness that is represented in his designs and architecture.

One of the goals of the odyssey we were intent on completing at this mundane hotel, the Royal Hotel in Copenhagen, was obviously to stay in room 606. On this late night, the stars, intermittently visible through the dark clouds in the windy spring sky above Copenhagen, were just right. The otherwise unwavering receptionists surrendered and granted us access to this exceptional room in Jacobsen's modernist temple; a stay that began when the hall porter in his impeccable uniform unlocked the door to room 606 and stepped aside, allowing us to reach for the door handle to open the door to this unique room.

As the chairs, the Egg and the 3107, which we will introduce in our paper, the handle is one of the highlights of the unique style that Arne Jacobsen developed during the 1950s and 1960s. With its hyper elegant curves, the door handle that Jacobsen designed for the hotel is a strong reference to the furniture's organic shapes that form a playful contrast to the building's geometric, straight lines, such as the frameless door it is set into. Where the essence of the curvy, simple forms in the sweeping lines that are experienced as the handle almost fills one's hand when gripped, in effect fill the void of the movement of the hand.

The chairs and the door handle are all works that are characterized by an exact and expertly control of the double curvatures; without compromising functionality, that is. Contrary to many designs in the organic languages of the period, the handle of the door to this room in which we have undertaken our exploration, with its representation of free curves, is the organic main feature. A main feature that, in the words of the architectural theorists Thau and Vindum, is unified through a minimization of the material, constructive rationality and the demands of industrial production [6].

It was not there, in room 606, however, that we were to discuss and work out the basic elements of our research and work with the dualistic elements of Arne Jacobsen's works. This was done at the very top, almost among the rushing clouds, with a view of Copenhagen, in room 2006 on the top floor. With a certain degree of satisfaction, we put the dramatic expedition behind us and opened a bottle of champagne, sitting exactly 14 floors above room 606, the design of which, as the only room in the hotel, had been left untouched after a renovation of the interior of the hotel in the beginning of the new millennium.

The difference from the sofa set we are seated in here is that we are now beholding the bed mercilessly directly; unlike room 606 where a curtain of lace from the ceiling to the floor divides the room into a public and a private part.

Jacobsen had a remarkable aptitude for the tactile qualities of materials and their potential, and, moreover, his ability to unify image and structure was unique, which is especially evident in his work with textiles with overt references to Japanese arts and crafts [7].

We recall how, 14 floors below us, as our gaze turned to the bed, we could barely make it out; not directly, but through the sensitive and damping veil of a textile. Thus, Jacobsen, by way of the transparent curtain, half drawn in front of the bed, creates the possibility to both hide and, simultaneously, reveal the sensual lines of the body, setting the stage for a far more sensual seduction than the interior in room 2006. In this sense, the curtain urges the fulfillment of the lovers' dream of union, of becoming one. At this point, we wish to emphasize that the characteristically Scandinavian tradition for being attentive to the character of the materials, the sense of the fabric being processed properly, so it, when exposed, conjures up this world of something magical; a dualism of sense perception that oscillates between something spiritual and something tactile. This is the role of the curtain in room 606.

With reference to Tintoretto's painting *"Paradise"* in the Ducal Palace in Venice, where we had viewed this enormous and formidable painting in which action and dynamics become one grandiose whole by virtue of the painter's ability to effectively force the light into the foreground, we are making the point here that by perceiving Jacobsen through the lens of Tintoretto, and without becoming manneristic, we are viewing the elements of an optimal, animated spatiality; a spatiality created through the use of a transparent curtain where light and shadow, the naked and the covered, engender the longing for a sensual seduction.

Let us point out that Jacobsen's vocabulary and sensibility to materials owes much to his idols, Adolf Loos and Mies van der Rohe; although they, according to Thau and Vindum, belong to the aristocratic modernists, whereas Jacobsen does not express the same constructional monumentality but rather an aestheticizing lightness, a grand finesse in the "local" structures, panels, and especially the porosity of the surfaces. The constructional lightness of the building appears as an evolutionary skeleton – optimized through years of selective use of materials and shaped in the spirit of experience until the supreme lightness has been achieved, and nothing can be removed or added. The rectangular regularity of the skeleton expresses the materiality of the steel in a clarity, which simultaneously separates man from building in a contrast-filled manner and gives the building an identity that circumvents Miesian monumentality. In this process, a lightness is born, which transcends the scale of the building and relates to the human body. The paradox of this duality is redeemed in Jacobsen's interior work, which becomes a part of a whole – as the organic flesh is attached to the skeleton in the creation of a bodily whole; a whole in which room 606 is the heart still beating vibrantly in spite of its 54 years.

As the skeleton loses its body without the flesh, and the flesh loses its structure without a skeleton, the Royal Hotel is in a constant, dualistic dialogue, and the whole of Jacobsen's design can be viewed as containing two basic, contrasting cores that, solely because of each other, become more than either one could ever be on its own. In this context, we find it relevant to bring into play the interpretation of the concept of "the objective box"; i.e. the way in which a modernistic building volume can be explained through the lines of the

façade, structural transparency in the interior sequences, and, not least, the ability to emphasize one's furniture through sculptural abstraction. Thus viewed, it is evident that Jacobsen works directly as well as indirectly. In their book, *"Jacobsen"*, Thau and Vindum show how Arne Jacobsen has paid homage to his debt to Mies' conception of contemporary architecture [8].

Briefly explaining such an approach necessitates that we mention "International Style", which was the dominant paradigm of 20th century architecture, and which emerged when the architect Philip Johnson, architectural historian Henry-Russel Hitchcock, and art historian Alfred Barr organized the significant and epochal exhibition of the same name in 1932 at the Museum of Modern Art in New York. This work and mindset were also the starting point for formulating the conception of architecture, which had only arrived in Scandinavia a few years earlier. As regards Arne Jacobsen, his point of departure in this architectural conception became quite visible in his buildings and modeling in the 1950s and 1960s.

Jacobsen also became an exponent of spacing the room and its surfaces in order to achieve a balance of pure relations, often with a chromatic harmony in his use of colors. In the German periodical Bauen+Wohnen, Arne Jacobsen has stated that his fascination with Mies was related to his sense for the nature of materials and the reduction of *the gestalt* to bare necessities, not only, but in conjunction with a good eye for proportioning. Jacobsen also speaks of the stringent beauty he finds in Mies' works, in buildings, furniture and details [9].

Arne Jacobsen was able to see himself in the Miesian approach, which is comparable to an intensive intellectual analysis having found its way into an objective, clearly structured architecture.

In 1932, Henry-Russel Hitchcock and Philip Johnson described the new conception of architecture which insists on volume over mass; this, along with the addition of regularity over axial symmetry as an overall building principle, and, ultimately, that the bare aesthetics of production in standardized materials avoids random ornamentation and decorations [10].

Further, Alfred Barr has written of the modern architect working within this new International Style that he does not work with a structure of bricks and walls with thick columns and supporting walls placed heavily on the ground, but rather with a skeleton contained within a light shell. He, the architect, thinks volume – rooms framed by planes and surfaces – as opposed to mass and solidity.

International Style introduces a new language and the Royal Hotel is described by Thau and Vindum as the jade-toned super structure, which, in a magically floating way, exists in the fade between crystalline sharpness and floating clouds; a building, which, in a deliberate and cultivated way, is assimilated into the bleak, Scandinavian sky [11].

The solitary location of the building, towering in the Copenhagen skyline, is pronounced; this also applies to Jacobsen's incredibly carefully drawn diminutive mesh width in the curtain wall grid of the façade, which is almost floating due to its very thin profiles, where the hinged windows are quite small and thus contribute to creating this tight "net" that comprises the house of the volume. An effect that makes the building appear less colossal to the beholder, less "blocky", and which also, when viewed, makes it difficult to assess the actual dimensions of the box.

At this point, we would like to call attention to the fact that in a dualistic line of thought, the building is to be seen almost as a compass-less sphere, a condition without unambiguous direction, which makes the building seem lighter than it really is.

Like the curtain in room 606 allows the orthogonal spatialities of the hotel to provide a framework for sensuous magic, in the hotel lobby, Jacobsen also introduces an element sensually akin to the curtain and the door handle. The lobby is located on the street level but is separated from the traffic-related pace and dynamics of the street by a number of shops. These shops pose a physical barrier that allows for the existence of a universe that not only utilizes the said shops as a physical intermediate zone, but also exploits this boundary to create a filtered light and sound intake from the surrounding streets. The context is made partially accessible through the shops that simultaneously blocks and creates the connection. The lively, colorful streets of Copenhagen serve as a backdrop for the reality of the lobby; the movement and dynamics of the street are accessible as silhouettes in the world that Jacobsen brings to the fore in the lobby, a balance between private and public.

Thau and Vindum write of the original furnishing of the lobby that the entire service system that is created, this soft sound scenery, is characterized by a "*pervasive shore*" of light brought about by Jacobsen's grey-green range of colors in the lounge [12].

Jacobsen consistently balances private and public through several scales in the lobby. He designed the Egg in 1958 as a part of the interior of the Royal Hotel, and this particular armchair is a continuation of both Jacobsen's sensual mode of expression and his views on private and public.

In the lobby, the Egg was placed in groups around tables, and these groups of armchairs form a subdivision of the world of the lobby by virtue of the closed and static shape of the circle. The possibility for conversing and connecting in a hotel lobby, which, at the same time, functions as a main entrance for guests of the hotel, is established, and transit and lingering are contained in the same motion [13].

In each individual Egg, Jacobsen adjusts the relationship between private and public. The Egg provides shelter for the body – the legs can be drawn up, making the periphery of the shell all-encompassing. The breaks in the shell of the Egg are used to create ambiguous spaces. Viewed from the side, the forward inclined upper part of the shell reveals to the seated person even a fleeting glance from an onlooker. If complete privacy and shelter from the world of the lobby are required, the chair may be turned, and the surroundings are faced only by the woolen textures of the back, which, as a curtain, covers the view of the private space in the encounter between furniture and the human body.

Even though the Egg serves as an element of the unified spatiality that is the lobby, the chair takes on the properties of a private retreat. Within the encoded boundaries of the lobby, the chair thus encodes an almost post-structural language of dwelling. To encode means both to hide and not to hide. The message is hidden insofar as the eye cannot perceive the combined meaning with the significance of the details [14].

The prerequisite for being able to make this interpretation is that the form is not perceived merely as a silent, material, physical shape, but that it *communicates its own existence*, or, in other words, that it holds *meaning* to a group of receivers [15].

We have used semiotics, a discipline originating in linguistics, as a route towards this understanding. Semiotics is the science of signs and codes, and the point of departure is that any creation of meaning takes place through signs and sign systems. In this analysis of architecture as a meaningful sign, we are positing *function* as the focal point, and we refer to the French literary scientist Roland Barthes whose *"Rhetoric of the Image"* from 1964 presents examples of such semiological readings of images through the concepts of *denotation* and *connotation*. Barthes views *denotation* as the basic meaning of the sign, the literal level, or that which can be physically seen and felt. In turn, he views *connotation* as the derived meaning of the sign, its symbolic level; in other words, everything that is connected to the sign and which is not encompassed by its basic meaning, in this paper termed sensual awareness.

Thus viewed, the denoted message of the Egg is the *immediate applicability* of the chair, while the connoted message is related to a number of *symbolic meanings*, which have to do with this applicability. It is thereby the codes that determine the reading of architectural design as a characteristic form. The interpretation of a modernist building, a chair, a handle or a transparent lace depends on the code that is applied in the construction as well as the reading.

Jacobsen explored the relationship between furniture and body in the Egg's path towards its sculptural identity. He worked with 1:1 plaster models that were added to and ground off until the unity and the right interplay with the body had been achieved. The finished sculpture was realized as a piece of furniture in steam molded polystyrene, which was developed by Henry W. Klein in the mid 1950s. Jacobsen was critical towards the compliant nature of the material as there was insufficient resistance in it to generate tension in the double curvature, but decided to explore it anyway due to its potential to exceed the structural limitations of laminated wood, which he had previously pushed to its limits in his design of the chair, the Ant. With polystyrene, Jacobsen achieved an expression in which seat, back support and armrest were combined in one shell. The unity of the Egg must be articulated by virtue of its foot being separated from the shell by introducing a connection point that enables rotation - the footstall does not move, but the shell can be turned and tipped freely in floating movements [16].

The armchair was designed specifically for the hotel lobby but was also used in the furnishing of the rooms, which, just as the lobby, reflect the stringent geometry of the exterior of the hotel.

The sculptural nature of the chair demonstrates not only the dialogical abilities of forming – between organic curves and the systematic patterns of geometry – but also Jacobsen's sensitive accentuation of the encounter between the human body and physical objects, just like the curtain and the door handle. Jacobsen's original intention was that the Egg should be covered solely with leather, but he ultimately opted to cover the majority of the Royal Hotel's chairs with wool. *The pervasive shore* of light in the lobby is thereby also represented in room 606, as the blue and green pastel shades counter the warm, earthen colors of the teakwood panels. The Egg in room 606 is consequently covered with the original mint-green wool. Sitting in the chair, one can feel even the minutest roughness of the woolen texture; a sensual feeling that today, as well as in the 1960s, reveals the form to the seated body.

The Egg thereby embodies the handle's sensual curves and the curtain's seductive accentuation of the swaying materiality and transience in what is hidden and revealed by and behind the textural veil.

As previously mentioned, the purpose of this paper is to investigate whether it is possible to reveal an architectural dualism in the Royal Hotel through an examination of the inherent qualities of the architecture and, furthermore, try to relate the language of sensing and affect to the works of Jacobsen. We approach the Royal Hotel, first and foremost, through a semiological analysis of the work, the primary aim of which is to investigate the work on the level of *meaning*, or, one might say, its contents. It is our thesis that this analytical approach is relevant when focusing on the motif of the work, and when one wishes to investigate the implications of the motif, how *meaning* has been brought about, and to whom the work means just that. This is where the guest meets the Royal Hotel.

In such an approach, one might label the contents of a work thematic or subject-oriented, symbolically, allegorically, politically, or otherwise. Popularly, one could refer to the content as the message of the work. The content may appear highly distinct, expressing an unambiguous message, as is the case with the simple, stringent geometry of the building, or it may be of a more equivocal nature, as is the case with the organic form of the Egg. The content, however, is the narrative, which the designer, here Arne Jacobsen, expresses by way of his chosen means.

It has been interesting to examine whether the meaning of a work, here the Royal Hotel, and the architectural design that characterized Arne Jacobsen with total solutions from door handle to textile, from furniture to wall, is perceived differently by a historical and a current viewer. It has also been interesting to reflect on how meaning is actually created. Is meaning inherent in the work as a hidden core; a core that we are supposed to find? Or is meaning something that is negotiated between the work and its observer at the exact moment in which the work is experienced?

In his essay on interior decoration, Mario Praz uses the term *stimmung* to refer to "the sense of intimacy", on which he elaborates by stating that *"..for the soul, the house where it lives is nothing but an expansion of its own body.. The surroundings become a museum of the soul, an archive of its experiences"*. In the above, we have focused on this kind of intimate privacy in the works of Jacobsen, but the most outstanding example is one of the most famous pictures of Jacobsen's chair, Model 3107 from 1963, where the controversial, young English fashion model Christine Keeler sat astride the, then, future international commercial success. Mario Praz uses the term *stimmung* to *denote* the "sense of intimacy" created in the home. For Praz, a lack of *stimmung* is a lack of sensing; that is, sensing is a prerequisite for intimacy.

In the book *"The Truth At Last,"* Christine Keeler tells of her affair with the British War Minister, John Profumo; a relationship which would turn out to have serious consequences for the British government. Can we find evidence of the sensation of taste in this fulfillment of sensual appetites? Can a chair, the Model 3107, signal more than a seat? Can a sensual experience be related to architectural design?

In 1963, as Keeler was having her affair with Profumo, she was depicted with Jacobsen's model 3107 by the photographer Lewis Morley. Keeler had signed a contract obliging her to pose nude in adverts. During this significant photo session, Morley used three rolls of film. The first two consist of a scantily clad Keeler sitting next to the chair. For the third one, the producers demanded that Keeler undressed completely. Keeler, however, had regretted her acceptance of this part of the contract. Morley appeased her reluctance to being exposed in full nudity by photographing her sitting naked on the chair – and having the chair cover most of her. Everybody except Keeler and Morley left the room before Morley took 12 pictures of her, of which the last photograph is the one that achieved global fame [17].

The demand for nudity and Keeler's reluctance were an obstacle, which, as it turned out, actually paved the way for the subsequent status of the photograph. The brief, 5-minute photo session during which Keeler was undressed in addition to the contrast between nudity and cover lend the photograph a cursory balance. The erotic significance of the photograph is achieved through the awareness of the naked body, the sensuous is achieved in the contact between two elements – two archetypes: The naked womanly body against the cold back of the chair. The boundaries between the two "bodies" are erased, and from the moment the photograph was taken, sensuality became as much an inherent part of Model 3107 as of Keeler.

Some bonds are so closely tied that they are never completely broken; and while we will not put into question that Model 3107 had a relation to the human body prior to the photograph, the articulation of the photograph leaves no doubt whatsoever. The naked bodies are the core – there is nothing but the two – and for this very reason, there are no longer two bodies – there is *less*. The two are fused together; they are one. Subsequent to the photograph, the chair is *more* than before. It has *it*, the simplest, most direct and pronounced kinship between man and object.

The chair achieved iconic status for when Keeler had first sat in Model 3107, she never left. Present demands indicate that the photograph captured something that involves much more than shaping and producing a chair; also more than the story of Keeler as an extravagant personality, and the ability to depict a sensual womanly body in a photograph and, further, in a series of newspaper articles a woman's emotional

life. The exact atmosphere that is expressed through the sensuousness in the encounter between Keeler's body and that of the 3107 is something quite unique. It is our assertion that it is the story of man and this materiality that architectural design brings about in our lives.

This kind of argumentation has been made possible with reference to the iconographic method developed by the German art historian Erwin Panofsky, which is presented in the book "*Studies in Iconology*" from 1939. Here, Panofsky promotes iconography as the science of motifs, which is primarily based on literary sources. We have been able to determine that such an analytical approach deals with iconographic motifs. Panofsky's principal idea is that the *meaning* of a work can be investigated through contemporary sources, which, as in this paper, means an investigation based on articles published in newspapers and journals in addition to photographic material. It is a method which, to the best of our belief, points to the *meaning* of the work, the 3107, being approached as a kind of hidden "core" inherent in the work. Consequently, it is our thesis that this analytical approach has enabled us to demonstrate the "hidden" meaning of the work, the sensuality between Keeler and the 3107.

In our analysis of the Egg, we have taken this approach and view one step further, and by following the pre-iconographic description that may be perceived as an immediate identification of the motif, in the sense that through such an approach we have described the work, and by way of this description identified its means, its tactile and sensual address to the human body.

Thus, we have viewed the Egg both from a visual approach and from a tactile one, in the touch of the textile; but a significant dimension is obviously also related to the title of the work, the Egg, which in itself identifies its main concept. An identification of the style of the work also belongs under the pre-iconographic description. The style is thus defined by describing the formal qualities of the work. It should be emphasized that the pre-iconographic analysis contains both an identification of what is depicted and a definition of the stylistic period of the work.

The iconographic analysis is first and foremost an analysis of the conventional meaning of the work; the Egg is a chair. The word "conventional", however, also refers to the meaning that is traditionally ascribed to the work. The iconographic analysis is therefore also a close-reading of symbols, figures, stories and also allegories; i.e. an analysis based on contemporary and/or older literary sources or other works. In conclusion, one could say that the work is placed in an architectural historical tradition.

The idea of the analysis is consequently to acquire new knowledge of how the architect may have drawn upon contemporary conventions regarding the meanings of architecture. We believe that we have gained an insight into the potential meaning behind the motif. Through his fascination with the great modernist masters, Arne Jacobsen had a powerful approach to contemporary models and manifestos, other architects' statements and image material. This is a meaning that can be ascribed to his work, the Egg.

Finally, we wish to point out that in continuation hereof, the iconographic interpretation – the so-called iconology – is also an analysis of the semiotics of the work in an architectural historical context; the way in which the 3107 and the Egg can be interpreted in the light of the fact that the historical period – International Style – had a specific world view and ideology. The analytical move we are making here is to view the work as an expression of the predominant world view of the period. The architect's intention is used to explain the particular philosophical, religious or political parameters of the period in relation to its world view.

A photograph; we have observed the woman who is seated on the chair, her nudity and the fundamental truth that the essential parts remain hidden. The contact between the two bodies, the physical design, the chair and the living body that stays hidden as we are faced with the back of the chair, hiding the woman.

What happened there? We have labeled the historical development and its constitutive events as a fulfillment of the story. The iconographic analysis has enabled us to broach Arne Jacobsen's architectural legacy. We have situated ourselves in a landscape of the psyche, which houses the past and the present, the entire world of night, dreams, hopes, memories and premonitions.

We have become conscious of the fact that the past and the future share a closer connection to each other than they do to the present. We have tried to track significant events back to their historical conditions in order to trace them to today in a search for a hierarchy of relevant sustainable investment in architecture; a reconstruction that has displayed the movement of the events from the possible to the real.

We have maintained a conception of the event in its historical fulfillment, whereby the historical time has been subordinated the movement of the possible towards the real. We have attempted to uncover the iconography of the motif; i.e. its cultural, historical and design-related meaning in the broadest sense of the word. We have tried to demonstrate some connections between a period in architectural history on the one hand, and the current representation of the 3107 and the Egg within the rational, geometric framework on

the other, and we have established a high degree of sensory awareness. There is an immediate connection between the two phenomena of architectural design and sensory awareness.

To us, the photograph represented an invitation to abandon the simple, classical point of view, which tradition almost dooms us to adopt, in favor of moving freely, at least in our imagination, around the represented object, the 3107, and further about in the building in order to meet its history, the reality behind this building drawn by Arne Jacobsen.

As is often the case with modernism, the simultaneous representation of mutual reciprocity is implicit. This image, this appreciation of two separate, yet inseparable, bodies, allows for complementary attraction, and it would be contradictory to refuse such an invitation – we were invited!

And the term *less* became by our focus on architectural heritage and through the sensual awareness view *more*.

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Urban Interaction Design and other devices.

Alessandra CIRAFICI, **Caterina Cristina FIORENTINO**
ARV_ Architettura Luigi Vanvitelli
Seconda Università degli Studi di Napoli, Aversa, Italia
alessandra.cirafici@unina2.it
caterinacristina.fiorentino@unina2.it

Abstract

This article – which represents the very first step in a research process – aims to provide a general overview of the main features of the *Urban Interaction Design* project. A series of case studies will be discussed which constitute the crucial reference point for investigating the complex relationships between urban spaces and activities, generally of a spontaneous nature, undertaken by citizens. These activities are aimed at altering the physical structure and relational components of public spaces.

The research concerns the theme of *Urban Interaction Design*, an appropriate research field for defining the tools and processes of intervention. This type of design project is considered to be the result of negotiation practices and of an analysis aimed at transforming the components of the intervention sites into design proposals and decisions. These design proposals are based on the capacity to 'identify' and 'describe' the identity of urban contexts as the value that defines the places and their systems of reference. In this sense, the term *Urban Interaction Design* does not refer to the use of a specific technology, but to an approach to design which can accompany, and occasionally surpass, the actions and strategies of urban and local marketing in favour of a broader and fruitful dialogue with other disciplines. In particular, it is designed to be used in conjunction with the specific discipline of representation in order to rethink the traditional models of narrating places. Communication strategies and forms of data-gathering need to be introduced which are careful to interpret reality not as overlapping levels of information but as a collective way of thinking about living space and capable of communicating identity effectively.

The article also seeks to focus on the research of design objects, including spontaneous and/or anonymous ones, and possible ways of cataloguing them in relational terms. The article analyses the concept of a design process of urban spaces in which the communities that inhabit them and enliven them play the leading role.

The research will proceed with an application of a specific example - the urban area of *Lavinaio* in Naples - which will be examined by the Research Unit (the two authors). The research objective will be to provide guidelines and suggestions about a social interaction project which is both a repeatable methodological model and, at the same time, is capable of producing artifacts and actions related specifically to *Urban Interaction Design*.

Key words: spontaneous design, fun theory, mixitè, environmental interaction design, marketing places, social interaction design, urban interaction design, behavioral design,

1.0 _ The design process as device.

We are used to recognising efficiency according to parameters that involve minimal wastage and the minimum investment of resources; we can also define any object and/or action as effective if it achieves its objective; but what happens when the objective comes as a surprise? This is the case when the objective of the project does not lie in putting a product on the market, in transforming an idea/object into a saleable product, but rather in meeting requirements considered excessively private and restrictive by the majority of investors/entrepreneurs.

One possibility is to consider design as a discipline concerned with the invention of processes, as well as objects; this does not mean the design of a process or a service but rather the quality and ethics of the design, defined as social responsibility which contrasts with egotistical constructive narcissicism.

In this sense, it is more topical than ever to refer to design beyond the mass produced product, searching for the less and the more by shifting the contents of the reasoning from the design of a mass-produced object to

an object that is appropriate for a community, even a very small one, and even individual one-off solutions which can be repeatable but never without adequate and careful adaptations. In short, the question refers to the possibility of searching and working on processes and objects which do not define the result from the perspective of the product and the market but which take account, first and foremost, of real needs, however exceptional they may be.

It is a sort of design of rarity, which eludes the conditions of luxury in order to prioritise all threshold situations between the public and private spheres and in order to meet minority and contextualised needs, even with regard to potential solutions. This means taking account of the importance of involving the user, the culture of specific places, the possibility of social mixing and, above all, the desire to share the advantages for wellbeing of specific solutions, both in terms of social satisfaction and the advancement of knowledge. At this point, appropriateness cannot always correspond to efficiency if account is taken of the evaluation of the resources employed with respect to market profits; however, the investment of resources and the balance of profits also refer to objectives that cannot easily be evaluated or that can be evaluated in terms of social, and therefore collective, resources. Furthermore, it is always worth remembering that knowledge is the only form of matter that, when shared, is not halved but multiplied.

Therefore, considering design and research for design as shareable material also means interpreting the store of knowledge as an inexhaustible resource. In this sense it might appear horrifying to recall that know-how does have a price in business negotiations; this is not the right context for the discussion, but the issue regards the role of the design project for social policies and especially the ethical position so that the produced goods, at least in part if not entirely, should be assessed in terms of profit and collective wellbeing.

It is also necessary to reflect on the objectives of the design project and decide that there are project fields that are more interesting than others. It is therefore necessary to decide whether manufactured objects are designed to be civic devices: in other words, are they suitable devices for supporting and promoting dynamics aimed at achieving communal wellbeing, the outcome of social responsibility?

From this perspective, it is interesting to refer to the work of Joseph Alois Schumpeter (1883-1950), the advocate of an economic vision that refers to the model of creative destruction. Drawing on Schumpeter's ideas, Alberto Cottica proceeds by differentiating between accessible technologies and non-permissive technologies: «from the economic perspective, non-permissive technology has a strategic consequence; it creates barriers of artificial scarcity around the immaterial component of the price of industrial products [...]. 60 to 90% of the price of a hi-tech product consists of patents, design and marketing; in other words, in terms of bits, the hardware counts for between 15 and 30%. The bits are fixed costs and these products therefore have high margins, and the activity of producing them is profitable. At the same time, this makes it vulnerable because in principle it is possible to produce a rival product which costs much less, intervening on the cost of the bits. This requires design and engineering skills. We are used to imagining that these skills can only be found in the *Research & Development* laboratories of large companies. Nowadays, however, there is another solution: open source communities. Many individuals work together on developing a technology designed to be a shared resource [...] At the centre of these communities, there are open, enabling technologies designed to be clarifying, and therefore [...] invested by a stream of innovation» [32].

2.0 _ Urban Interaction Design _ preliminary remarks.

The premise therefore lies in considering objects and artifacts, the outcomes of the *Urban Interaction Design* project, as devices suitable for stimulating and solving actions and practices between the different players of an urban space while a transformation of this same space is proposed, together with the search and explanation of its own identity. The concept of transformation includes the well-known categories of urban upgrading and design which the urban interaction project supplements and partly overlaps with respect to the methodological approach of intervention.

From this perspective, the identity of urban spaces becomes a crucial issue, both with respect to the definition of their original context and with respect to the other parts and the whole system of reference.

There are therefore two levels of reflection and action, to which we could add a third. The first one concerns the knowledge of the urban fragment, the second regards the relationship with the system of reference while the third is related to the narration of identity to different interlocutors [06].

In this sense, the role of surveying and representing places acquires central importance in the design process. Narrating identity is the preparatory action for identifying any possible strategy and it is an action which the places of contemporary reality – which are complex places, marked much more by the fluid dimension of moving rather than the sedentary action of being – urgently require with new forms and multiple approaches. One idea that is gaining ground is to proceed with representation through a 'sensitive' survey where the emphasis is on a lateral approach to reading the landscape which presupposes a transversal analytical approach aimed at studying local areas from different viewpoints, angles and scales of interpretation and, above all, with a focus on perceptive, anthropological and sociological aspects. It is a method that derives from the well-known studies of Lynch and Cullen. However, the method now has new results in the form of dynamic maps and visual and perceptive images, in the installations of what can be referred to as the new eclectic atlases of urban spaces [23] where the physical marks of the landscape are

overlapped by the traces of flows, behaviour and lifestyles through which the processes of modification of places are made manifest. The result is a heterogeneous, representative artifact – a kind of atlas – which is created using different supports, representative strategies and different perspectives. They are provisional maps, biographies of places, ways of looking at identity and their narration in a space where the physical dimension and the dimension of mental space overlap, where the arrogance of zenithal representation leaves space for the emotional representation of places to be used as a circumstantial paradigm from which to derive hypotheses for action and shared design.

Summarised very briefly, the design process that we propose to activate is based on several of James Lerner's ideas about the selection of possible actions and the inappropriateness of acting out of necessity [08], supplemented by the role of *Interaction Design*, as defined by the *Makers' Movement* and expressed very clearly by Giorgio Olivero (a former student of Massimo Banzi at the Interaction Design Institute of Ivrea and currently co-founder of the *TODO Design Studio_Interaction and media design*, 2007, Turin): «interaction design (can be defined as) the activity of orchestrating and designing interaction between the people, spaces, things, products and services that surround us, […]; for us, design is not a static quality, it should not be restricted to the definition – however important – of the formal quality of what needs to be designed; instead, interaction design is an activity in progress with an aim and a direction; the central part of our approach to design consists of relations and experience and behaviour» [37].

The aim is also to look at existing objects and artifacts to be produced as relational devices; in this sense, it is useful to carry out research into the definition of codes related to objects. In order to prepare the research, a useful starting point could be the exhibition *Offjects, concept and designs for a change of Century* [04], as well as the various case studies described below.

3.0 _ Case studies: brief notes.

The design project for social interaction could be oriented through the close examination of a series of case studies of various kinds. These may range from initiatives of citizen activism to the spontaneous design of objects and devices, to works of environmental interaction, or of behavioural interactive design.

A series of brief case studies are described below with the aim of highlighting - despite the fact that the various examples refer to different technologies and different cultural contexts - that the involvement of the authors and the users is the cornerstone of each project that is presented.

Each of these examples, whether material or digital objects, has the enormous power to encapsulate a story, which is a relational history rather than an industrial one. In this perspective, one possibility that is gaining ground is the idea of viewing urban design as a form of design that encourages social interaction. In this case, innovation does not lie in the application of state-of-the-art technologies but rather in a combination between vision and design actions that stem from a conscious interpretation of user-feedback, deriving from a design methodology that is sensitive to the interpretations of the user-experience of urban spaces and bottom-down transformational possibilities.

In this perspective, these case studies represent the basis for a field study aimed at implementing specific investigative techniques, linked to listening and observation, taking into account that «place-making can also be regarded as a linguistic matter. To understand what urban places are and how they work, Michel de Certeau, in *The practice of everyday life* (1990), introduces the metaphor of "textual poaching" to feature a tactic (distinguished from a formal strategy) ordinary people creatively perform to resist, counter-act and make active sense of mass consumption and domination strategies in contemporary societies. Why "textual"? Textual poaching corresponds to a practice of active reading, based on the idea that, when we read a text, we're not just passive recipients of a written message, but we actively collaborate to recast and make our own sense out of it. In this metaphorical perspective, the reader is the city dweller and the book is the urban space, made of symbols, signals, linguistic codes, to be interpreted properly and quickly, in order to cope effectively with the multiple strains and unforeseen occasions contemporary city steadily offers (Lieto, 2006). Everyday life can be depicted as a constant, creative (even subconscious) dialectics/struggle between different practices, where institutions compete to address/regulate/assimilate the *everyday man*, his preferences, behaviour, movements, life style into normative and somehow pre-fixed schemes. In de Certeau's perspective, this struggle is substantially a clash between different linguistic codes» [12].

- **Homemade:** Vladimir Archipov's book, *Homemade: Contemporary Russian Folk Artefacts,* aims to study «the self-production of everyday things […] made in Russia»[1]; the author, who spent eleven years exploring rooms, wardrobes, storerooms and streets shows his collection, his *Folk Museum of handmade objects*, together with the accounts of these spontaneous designers. The objects are all basic in the sense that they express their own permanent nature that stems from necessity; they are more than useful, they are so indispensible that they were created as a result of the real need of the maker-user. The Archipov collection contains over thousand objects that reflect a Soviet culture borne out of necessity and the lack of consumer goods. Tools, mechanical objects, contrivances, toys, devices, means of transport, musical instruments tell the story of a country, of the collapse of the Soviet Union and the needs of its inhabitants.

Fig. 01: Television Aerial, Albert and Ivan Chmelyov, Kaluga region, 1999. «[…] We wrapped copper wire around two bicycle wheels […]. To get good reception we planted this kind of cylinder in the ground and nailed a stick to it so that we could turn the aerial towards the point from where you could get a better signal» [01, p. 162].

Fig. 02: Queen Bee's Hive, Sergej Charitonov, Voronez, 1996. «This tiny hive is designed to protect the queen bee from attacks from other bees […] (it is made from) one of my grandmother's curlers and a bottle cap […] the elastic band is required to hang it within the beehive so that the bees can get access to the queen. They have to feed her […]. Several years ago, I recall, my grandmother used to curl her hair but she doesn't do it anymore, so she was very happy to give us these curlers for this device» [01, p. 40].

Fig. 03: Television Aerial, Vasilij Archipov, Kolomma, 1993. «[…] it is well-known that resonators are fundamental: In this case we used forks to improve reception. […] My mother used to keep the forks in a cupboard: she had bought the forks when the country was in chaos and these were the only things sold in the shops. They were not even made of high quality material but they were perfect for the aerial» [01, p.151].

Fig. 04: Doormat made from bottle caps, Aleksej Solomkin, Vladimir 1995 [01, p. 26].

Fig. 05: Dustman's shovel, Vladimir Antopiv, Moscow 1998. «[…] I was loading rubbish into the lorry when I found this street sign. I was about to throw it away, but then I realised it was really light. Ahah! I thought. This would be fantastic for shoveling snow in winter. They gave us shovels […] that were completely useless» [01, p. 174].

- **Low cost design:** Daniele Pario Perra's book, *Low Cost Design*, is a collection of 7000 photos; it is «a search for the essence of spontaneous creativity. It is a project that stems from an extremely simple idea: we are surrounded by thousands of objects and structures that do not follow the rules of conventional design; these are not just the products of the intellect, but cultural indicators of collective design skills» [30]. «The links between people, small economies, neighbourhood relations, are characteristics that cannot be separated from the sense of a traditional community which nowadays is often being irreparably damaged by the large scale of contemporary urban planning. As an alternative […], listening to the spontaneous examples of creativity in the local area is a fundamental aspect of sensitive design» [17, p. 26].

Figs. 06, 07, 08: «These forms of experimentation arise […] from situations of necessity, on the margins of the most frenetic consumerism, in which the tradition of the art of know-how and sharing is handed down from generation to generation, and in which a degree of precariousness becomes a source of creativity, exploiting unusual resources and a search for opportunities. Spontaneous creativity, for want of a better term, can be studied as a social phenomenon because it is free from external conditioning. It is not generated by applications on the market or by a specific course of technical knowledge. The tangible demonstration of how these uses are generated by precise social relations is the discovery of similar objects and uses in places that are remote from each other but comparable in terms of the socio-environmental conditions, united by the same needs» [17, p. 19].

Figs. 09, 10, 11: «These gestures are full of a great visionary ability applied to practical experimentation. If we associate

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these observations with the history and lives of the inhabitants of a place, we can develop an infinite number of links, from sociology to design, from art to architecture, from town planning to contemporary ethnography» [17, p. 17]. The initiatives and artifacts that concern public spaces are the result of an action that «[…] also represents a more complex dimension of appropriation and of the desire to participate in the process of using the city. Football pitches drawn on the paving of our squares and piazzas, the chairs hidden in the nooks and crannies of buildings, the self-produced street signs, the makeshift repairs to public benches and rubbish skips point to the emergence of a dynamic vision of the urban context which is constantly renegotiating its own role and the use of public spaces» [17, p. 22].

-The Fun Theory Award: The *Volkswagen* company finances a project in Sweden to encourage ethical behaviour so that it becomes fun.

Fig. 12: **The Anywhere Organ:** «public installations of individual pipes connected to a central air supply through a long hose, allowing anyone to play the organ anywhere» [31].
Fig. 13: **Bottle Bank Arcade Machine**: «Many of us return our plastic bottles and cans. Noticeably fewer recycle their glass. Maybe that's because we don't get any money in return, as we do for cans and plastic. Can we change this attitude by making recycling glass fun to do? So you are not just rewarded with a good conscience, you also get a smile» [31].
Fig. 14: **The piano staircase**: «take the stairs instead of the escalator or elevator and feel better is something we often hear or read in the Sunday papers. Few people actually follow that advice. Can we get more people to take the stairs over the escalator by making it fun to do?» [31].

- Critical City Upload: project by Matteo Battaglia, Matteo Uguzzoni, Augusto Pirovano, Davide Portanome, «*CriticalCity Upload* is a pervasive game which, through a web platform, encourages players to go outside and asks them to carry out "missions" in the city. The missions are actions designed to get players to interact with the urban space in a new way which is fun, at times provocative and always unexpected» [33].

Fig. 15: **Critical City**, trademark and logotype and different versions of the trademark.

Fig. 16: **Critical City**, images of "missions".

- ***Domesticittà* _ urban actions:** *Domesticittà* (Domesti-city) is an initiative promoted by the architects Valentina Costa, Laura Di Stefano and Pierluigi Ventura. «The "Domesticittà" project started in Rome in 2005 at the initiative of a group of young architects based on the observation of a public space: it questions the effectiveness of the simple act of design since it proves insufficient for making these places work as catalysts for the collective activities which would be expected of them, both by definition and for historical reasons. In our opinion, it is vitally important to have a radical rethink of design tools and above all, the indicators used to evaluate the designs of public spaces. […]» [36] .

Figs. 17, 18, 19, 20, 21, 22: The images refer to a series of initiatives and designs by the Domesticittà group: *Lavagna Urbana (Urban Blackboard)*; *Message in a Bottle*; *Mail box*; *l'Orto Pubblico (Public vegetable garden)*; *la Mensola Urbana (Urban Shelf)*. «The 'urban shelf' harnesses the principle of overturning the concept of indoors/outdoors since it places the furnishings and fittings of a domestic space on the city walls. The shelf interprets the most practical aspect of virtual communication […] acting as the physical interface for a postponed form of barter. […] the *Urban Shelf exploits* the iconic value of the object rather than the principle of overturning the concept of indoors/outdoors. A blackboard is a portion of space devoted to writing or drawing, therefore communicating. […] The Blackboard comes with chalks and a rubber and, in this case, the instructions that explain the possibility of using it freely are also included. […]» [36].

- Urban activism: Taken from the Manifesto for urban activism in Turin, written by Alessandra Rasetti and Maurizio Zucca, January 2010: «The term 'urban activism' refers to a series of actions carried out by groups of citizens with the aim of generating a positive change in the environment of contemporary cities, in the way of inhabiting them and imagining them. These human engines for change are architects, engineers, heads of local public administrations, university professors, students, children, artists, skateboarders, cyclists, pedestrians and many other citizens. They are spontaneous actions that start from the bottom up, often imposed by necessity, where personal interests converge with the interests of society and the environment, invoking positive emotions, simplicity of action, vitality and a spirit of initiative. Nowadays, this phenomenon is gaining considerable ground in cities worldwide where the inhabitants are increasingly convinced that the traditional processes of top-down city planning are insufficient and need to be replaced by new approaches and tools which should be developed from the bottom-up» [35].

Figs. 23, 24, 25, 26: **Urban Activism Actions**: «The actions are intended to identify solutions for food production through urban agriculture, solutions for sustainable mobility, the creation of public spaces for strengthening social interaction, new forms of communication, ideas for sailing and swimming in urban rivers and any other ideas that may gradually emerge to improve the environment inhabited by citizens, giving them the freedom to interpret and have an impact on the space in which they live. These actions should be considered a resource since they represent an invaluable mirror of the real needs of the urban environment, besides having an important design significance: indeed, the variety of proposals and perspectives that stem from them could not emerge from the traditional top-down approach to design.[…]» [35].

- Environmental interaction design

Fig. 27: Dune, project by Studio Daan Roosegaarde: «DUNE is a public interactive landscape that interacts with human behavior. This hybrid of nature and technology is composed of large amounts of fibers that brighten according to the sounds and motion of passing visitors» [42].

Fig. 28: The Climate Wall, project by the Center for Digital Urban Living, Aarhus University: «During the climate conference Beyond Kyoto, citizens of Aarhus could engage themselves in the struggle for large-scale climate improvements by using Climate on the Wall, an interactive generator of climate statements that uses Ridehuset, a prominent building in the city centre, as a backdrop. The installation is part of the Municipality of Aarhus' campaign CO2030, dedicated to engaging citizens in the efforts to achieve carbon neutrality by the year 2030» [44].

Fig. 29: Serendipcity, project by Interaction Design Studio unit of the Design Computing Program at The University of Sydney in collaboration with the City of Sydney. Serendipcity is an urban exploration app for mobile devices that encourages serendipitous experiences.

Fig. 30: **Sensitive City**, project by *Studio Azzurro*, «The idea of *Sensitive City* stems from a request by the Italian Pavillion of the Universal Expo in Shanghai in 2010 and draws on the great tradition of imaginary cities, from the *Città del Sole* of Tommaso Campanella to the *Città Invisibili* of Italo Calvino, […], a literary invention which, however, is ideal not just because it still does not exist but because it could do. Siracusa, Matera, Lucca, Chioggia, Trieste, … are all different from each other and it is necessary to walk round every part of them repeatedly in order to be able to describe them. There is increasing interest in using the idea of the anti-utopian city as an opportunity to provide ideas, subjects for debate, in order to generate a vision of what a city in the near future might look like» [43].

- Audiovisual design

Fig. 31: **Risveglio (Reawakening). Allegory of figures and music**, 2011, project by *Studio Azzurro*, Videomapping on the buildings of Piazza Scala, Milan 2011 [43].

Figs. 32 and 33: **Tracce e partecipazione (Traces and Participation)**, project by *Studio Azzurro*, Videoinstallation for historic facades, whispers, images and texts, Corso Bettini, Rovereto 2008 [43].

- Behavioral interactive design

Fig. 34: **Sustainable Dance Floor**, project by *Studio Daan Roosegaarde*: «is the interactive dance floor which generates electricity through the act of dancing. The first dance floor created by *Studio Daan Roosegaarde* uses mechanisms and embedded technologies to harvest energy. Via interactive technologies a sensual and interactive environment is created in which dancers are engaged with the sustainable experience» [42].

Fig. 35: **Liquid Space**, project by *Studio Daan Roosegaarde*: «is an interactive space that becomes physically bigger, smaller, and brighter in relation to human behavior. As an organic fusion of mechanisms, embedded electronics, sound, and LEDs, the artwork creates a playful dialogue with its visitors» [42].

Fig. 36: **DWI_ Design with Intent:** «a design tool for influencing user behaviour» [45].

Fig. 37: **Lotus 7.0**, project by *Studio Daan Roosegaarde*: «is a living wall composed of smart foils that fold open in response to human behaviour. Walking by Lotus, hundreds of aluminum foils unfold themselves in an organic way; generating transparent voids between private and public» [42].

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From sustainable design to empathic design

Ornella ZERLENGA
ARV_Architecture "Luigi Vanvitelli", Second University of Naples, Aversa, Italy
ornella.zerlenga@unina2.it

Abstract

Today the global issues of ecology and consumerism impose a call to the consciousness of design to assume its responsibility with respect to the environmental sustainability of a contemporary lifestyle.

The challenge for sustainability is to limit and manage Western consumption while raising the living standards of the developing world without increasing the use of its resources as well as its environmental impact. This must be done by adopting strategies and technology that break the bond between economic growth and environmental damage.

A major obstacle to achieving sustainability is the alleviation of poverty. It has been widely acknowledged that poverty is one of the main sources of environmental degradation: «poverty is a major cause and effect of global environmental problems. It is therefore futile to attempt to deal with environmental problems without a broader perspective that encompasses the factors underlying world poverty and international inequality» (Brundtland Commission, report *Our Common Future*).

In Italy, Riccardo Dalisi (author of the Manifesto of the Compasso di Latta) promoted the first edition of the "Premio Compasso di latta", aimed at carrying out new research in the field of sustainable design in the light of human support, environmental compatibility and de-growth. While, the Associazione Designer Senza Frontiere has been working on the themes of empathic and craft design as a generator of economic and social value since its founding..

Keywords: sustainability, sustainable design, empathic design, crafts and design.

1. From sustainable design to empathic design

Today the global issues of ecology and consumerism impose a call to the consciousness of design to assume its responsibility with respect to the environmental sustainability of a contemporary lifestyle.

A "sustainable" process must use natural resources at a rate so that they can be regenerated naturally. Today, humanity is living in an unsustainable manner, consuming the limited natural resources of the Earth faster than it can regenerate them. The collective social effort to adapt the human consumption of these resources within a level of sustainable development is a matter of paramount importance for both the present and future of mankind.

Since the 1980s, the term "sustainability" has been used more in the sense of human sustainability on planet Earth and this has resulted in the most widely quoted definition of "sustainability" and "sustainable development": «sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs» (Brundtland Commission of the United Nations, March 20, 1987).

While raising the living standards of the developing world, the challenge for sustainability is to limit and manage Western consumption without increasing its use of the resources as well as its environmental impact. This must be done by using strategies and technology that break the bond between economic growth and environmental damage.

The concept of "sustainable development" is used in the context of development economics to analyze economic processes, with the concept of economic sustainability being at the core of the considerations that contemplate the future possibility of a 'hard' economic process over time. In this perspective, consumers are using their purchasing power for 'ethical consumerism' practiced through either 'positive buying' (the ethical products are favoured) or 'moral boycott'.

A major hurdle to achieving sustainability is the alleviation of poverty. It has been widely acknowledged that poverty is one of the main sources of environmental degradation: «poverty is a major cause and effect of global environmental problems. It is therefore futile to attempt to deal with environmental problems without a broader perspective that encompasses the factors underlying world poverty and international inequality» (Brundtland Commission report *Our Common Future*).

In this sense, sustainable design (also called environmentally conscious design) is the «philosophy of designing physical objects, the built environment, and services to comply with the principles of social, economic and ecological sustainability».

The intention of sustainable design is to «eliminate negative environmental impact completely through skillful, sensitive design» [1]. Sustainable design does not require non-renewable resources, minimising the environmental impact and relating people with the natural environment.

Beyond the "elimination of negative environmental impact", sustainable design must create projects that are meaningful innovations capable of shifting behaviour. A dynamic balance between economy and society, with the intent of generating long-term relationships between user and object/service as well as be respectful and aware of both the environmental and social differences.

In a memorial service held in Tucson, Arizona (on January 12, 2011), President Barack Obama called on the Americans to "sharpen our instincts for empathy" so that we can become a more civil people.

In the opinion of Jeremy Rifkin (author of *The third industrial revolution* and *The empathic civilization: the race to global consciousness in a world in crisis*), being empathic means being open to the plight of others. For Jeremy Rifkin, empathy is the emotional and cognitive means by which we express intimacy and sociability. To empathize is to experience another's condition as if it were our own. It is to recognize their vulnerabilities and struggle to flourish and be. Empathy is the real "invisible hand" of history. Today, empathy is beginning to stretch beyond national boundaries to include the whole of humanity. We are coming to see the biosphere as our indivisible community, and our fellow human beings and creatures as our extended evolutionary family [2].

In this sense, empathic design is «a user-centered design approach that pays attention to the user's feelings toward a product» [3]. The foundation of empathic design is observation, with the goal being to identify latent customer needs in order to create products that the customers do not even know they desire or, in some cases, solutions that customers have difficulty envisioning due to lack of familiarity with the possibilities offered by new technologies or because they are locked in an old mindset.

That is why the X International Forum "Le Vie dei Mercanti" *LessMore architecture design landscape* was organized. In this perspective, 'Less' does not mean less investments or cuts, but rather to identify a hierarchy of relevant sustainable investment funds based on the search for the know-how as well as the reduction of the waste of goods (raw materials, human resources, assets) and the use of heritage to create richness and workplaces, 'More'.

In this sense, starting from the cultural concept of "creativity" formulated by UNESCO, three Italian experiences will be described, "Compasso di Latta", "Designers Senza Frontiere" and "Visual Identity for the complex of late antique and early Christian basilicas in Cimitile".

1.1 UNESCO and the network of creative cities of Design

Creativity is one of the main themes of cultural interest of UNESCO. While, on the website of the United Nations Educational, Scientific and Cultural Organization, "Building Peace in the minds of men and women", the concept of creativity as well as the goals of the creative industries, of the relationship between Craft and Design, of creative cities network are well defined [4].

By encouraging diversity and contemporary creation, UNESCO endeavours to ensure that all cultures – with due respect for their equal dignity – benefit from the development opportunities opened up by creative industries by strengthening local markets and providing better access to international markets, particularly by means of North-South and South-South cooperation.
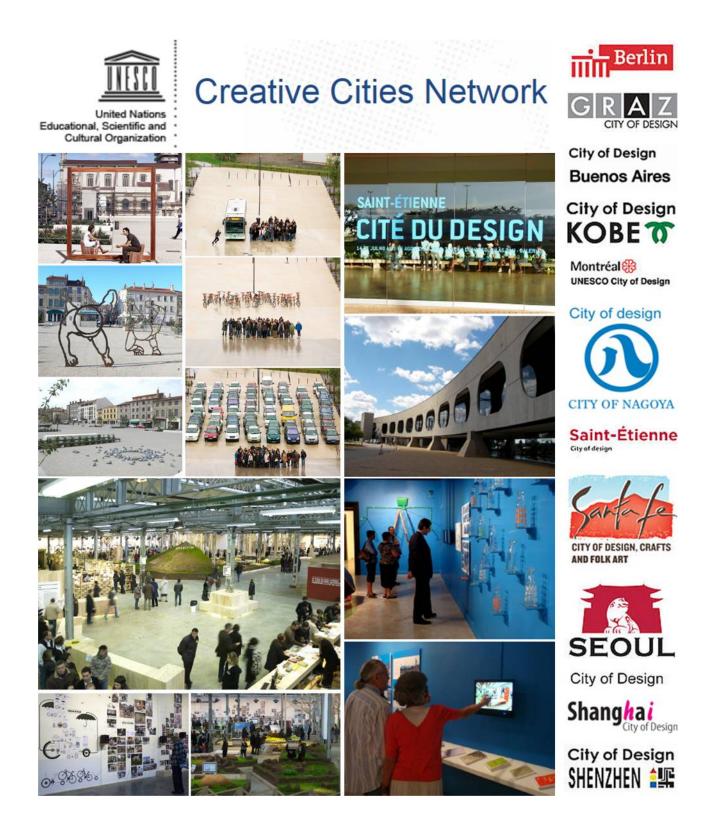
Fig. 1: UNESCO and the network of creative cities of Design. Saint-Etienne innovating in the face of social change: urban transformation; exhibition *City Eco Lab*, fifty people, three ways to move (2006 Saint-Etienne International Design Biennial); Matali Crasset, *Cohabitations* (2008 Saint-Etienne International Design Biennial).

In this perspective, the Convention on the Protection and Promotion of the Diversity of Cultural Expressions was adopted in 2005, and partnerships have been established in the framework of the Global Alliance for Cultural Diversity.

UNESCO believes that the cultural industries, which include Music, Gastronomy, Media Arts, Craft and Folk Art, Literature, Cinema and Design, have a determinant role to play in the future of culture.

The world map of these industries reveals a yawning gap between North and South. This can only be counteracted by strengthening local capacities and facilitating access to global markets at national level by way of new partnerships, know-how, control of piracy and every form of increased international solidarity.

As the only international organization with a global vision of the socio-cultural and economic role played by crafts in society, UNESCO has, for many years now, endeavoured to develop well-balanced, coherent and concerted action in favour of the sector of Crafts. The programmes devoted to crafts facilitate training and promotional activities as well as stimulate the necessary cooperation between the relevant national bodies and regional, international and non-governmental organizations. The aim of the different actions undertaken by UNESCO is to prove to the concerned authorities that the artisanal sector deserves priority in national development plans.

According to the definition adopted by the UNESCO/ITC Symposium "Crafts and the international market: trade and customs codification" (Manila, 6-8 October 1997), the artisanal products are «those produced by artisans, either completely by hand, or with the help of hand tools or even mechanical means, as long as the direct manual contribution of the artisan remains the most substantial component of the finished product. These are produced without restriction in terms of quantity and using raw materials from sustainable resources. The special nature of artisanal products derives from their distinctive features, which can be utilitarian, aesthetic, artistic, creative, culturally attached, decorative, functional, traditional, religiously and socially symbolic and significant».

UNESCO has been particularly involved in both the promotion of quality handicrafts as well as the commercialization of artisanal products on the international market. In this view, a series of activities have been carried out for the training of artisans, along with the promotion of craft products outside of their place of origin.

Moreover, UNESCO encourages regional and international cooperation by supporting the organization of meetings of experts. The aim is to improve the life and working conditions of the artisan in order to protect craft creation.

In this perspective and framework of design, with the aim of stimulating and recognizing the creativity of young designers worldwide, UNESCO implements the "Design 21" program, the International Competition launched in 1995 by UNESCO and the Felissimo Corporation (Japan) with the purpose of discovering and promoting young talent from all corners of the world, while encouraging a spirit of understanding and sharing among young creators from different cultures.

On these assumptions, UNESCO created a network of creative cities to promote the cultural, social and economic development of cities. It supports the improvement of creation poles as well as the sharing of the know-how, experiences and abilities of state, regional and local authorities.

The Creative Cities Network connects cities that not only want to share ideas and experiences for cultural, social and economic development but also support other cities, particularly those in developing countries, in nurturing their own creative economy.

The concept of 'Creative Cities' is based on the belief that culture can play an important role in urban renewal. Nowadays, more than half of the world population lives in cities and Policy makers are increasingly taking into account the role of creativity when planning economic policies. As creative industries contribute to a city's social fabric, cultural diversity and enhance the quality of life, it also strengthens a sense of community and helps define a shared identity.

In the network of creative cities, member cities are recognized as: "Creative hubs" that promote socio-economic and cultural development in both the developed and developing world through creative industries; "Socio-cultural clusters" connecting socio-culturally diverse communities to create a healthy urban environment.

Once a city is appointed to the network, it can share experiences and create new opportunities with other cities on a global platform, notably for activities based on the notions of creative economy and creative tourism.
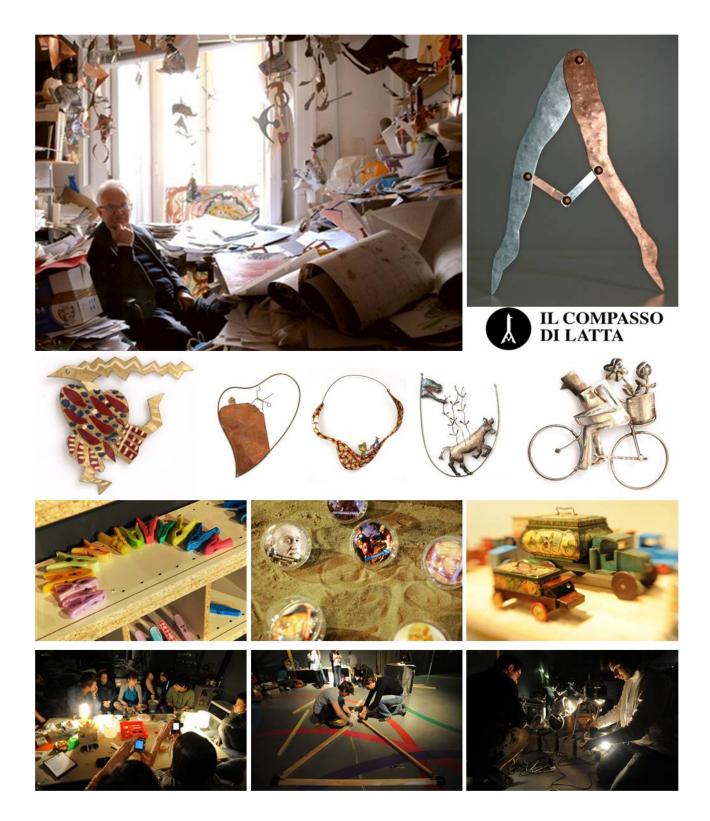
Fig. 2: Premio "Compasso di latta" (Tin Compasses Award): Riccardo Dalisi in his studio; tin compasses; sustainable jewelry; 2010 Triennale di Bovisa (Milan), collection and workshop.

As already mentioned, the UNESCO Creative Cities network includes creative cities for Design. In order for a city to be part of the UNESCO creative cities network of Design, it must adhere to the following criteria and specifications: established design industry; cultural landscape fuelled by design and the built environment; design schools and design research centres; practicing groups of creators and designers with a continuous activity at a local and/or national level; experience in hosting fairs, events and exhibitions dedicated to design; opportunity for local designers and urban planners to take advantage of local materials and urban/natural conditions; design-driven creative industries.

Design Cities include: Santa Fe, Nagoya, Shenzhen, Kobe, Buenos Aires, Montréal, Seoul, Saint'Étienne, Shanghai, Berlin and Graz.

1.2 "Compasso di Latta" Award

In Italy, after a long preparatory research, Riccardo Dalisi promoted the first edition of "Compasso di latta" (Tin Compasses) in order to promote new research in the field of design in the sign of human support, environmental compatibility and de-growth.

During the International Furniture Fair (14-19 April 2010) at the Triennale di Bovisa (Milan), Riccardo Dalisi presented the Manifesto of the "Compasso di Latta", with several significant pieces.

«The idea of a "Tin Compasses award" exists over and above any reference to the famous and prestigious "Golden Compasses" and the role that this has played in the history of international design. In the current climate of recession and the consequent changes taking place in every economic, social and cultural aspect, the aim of the Tin Compasses is to emphasize the revived need for inventions, ideas, projects, procedures and techniques in the artisan sector of small productions, embryonic, organizational initiatives and micro productions with a clear social purpose, at times even alternatives to the use of mechanical procedures and in the industrial sector at long last focused on sustainability. It may even be possible to stray into the general procedures of highly and scientifically qualified productions».

«[…] It also wants to be characterized as a dialogue that is complementary to those sectors which have always represented the inventions typical of classic design. In some cases, it may even reach out to dialectic challenges, exploring new areas for reflection and experimentation which can be combined and considered as reasons for increased knowledge and creativity and new opportunities. […] A further example of reflection, source and of stimulation has been the frequent occurrences of contamination – of bi-polar unions between different worlds, between the craftsman and industry, manual work and the machine, thought and action [5].

The "Compasso di Latta" is a symbol between the serious and fun of global ecology as well as the issues of consumerism, an experiment, a set of related disciplines by the idea that art ("Poor", says someone; "simply inventiveness", to many others) should recover its social value through the use of a more traditional method and based on the principles of sustainability and degrowth, who enliven their theoretical approach and their work.

1.3 DSF_Designers Senza Frontiere

"Designers Senza Frontiere" Association (Designers Without Borders) has worked on the themes of empathetic design and craft design as a generator of economic and social value since its founding.

In a recent interview (February 2011), Maria Pellerano, President of DSF, exposed the social-economic purposes-ethics of the Association. Pellerano has clearly expressed the objective of the mission, based on an idea of Design attentive to the micro and medium-sized businesses working in the South of the world as well as seek to achieve social and environmental economy. It is a sustainable and sensitive design attentive to these issues. The aim is to participate in a different design, that is sensitive in creating a data-base of skills to support the southern hemisphere. DSF has recently worked for a NGO (Non-Governmental Organization) with a workshop for domestically abused women, by socially relocating them. It developed and implemented a training course on the textile processing, resulting in a line of furniture for the home and Italian partners interested in selling products within a large distribution network in Italy. It is a sensitive design that deals with the issues mentioned [6].

In particular, during the interview Maria Pellerano not only mentioned the DSF projects, but also an ethical and sustainable design and architecture and conference called "Design 'other' for the southern hemisphere", in collaboration with "Bottega Solidale" and Faculty of Architecture of Genoa.

Fig. 3: "Designers Senza Frontiere" Association (Designers Without Borders): implemented development projects in Algeria, Guinea, Benin, Rwanda, Philippines.

DSF is the agreement of a group of people who have been actively engaged for years in the world of international cooperation and the field of fair trade. Over the years. DSF has matured the belief that projects in developing countries can truly generate economic and social value only when taking into account the real needs of producers under real market conditions.

The purpose of DSF is to bring together two 'worlds' that generally have difficulties in coming into contact, allowing for a sustainable and lasting progress in the development of the craft community.

Designers without borders offers the culture of design for development of the Southern world crafts. The development of technology skills passed down from generation to generation, traditional production techniques, and raw endemic is a fundamental aspect of the activity agreement of economic growth.

DSF works for poverty reduction through educational development projects [7].

DSF has proposed or implemented development projects in Algeria, Benin, Guinea, Philippines, Rwanda.

1.4 Visual Identity for the complex of late antique and early Christian basilicas in Cimitile

The project presents the results achieved by educational activities at the *Laboratory of Graphic Creations* (prof. Ornella Zerlenga in the undergraduate programmes of "Design and Communication" and "Fashion Design", a y 2010-11, Faculty of Architecture "Luigi Vanvitelli", Second University of Naples) and develops several research projects aimed at achieving identity projects which can enhance the basilica complex of Cimitile (Italy) both by identifying its distinctive features of the local culture as well as the general membership of the site to a winder geographical catchment area. It also includes tangible measures and promotion of events appropriately designed for the site which, in this perspective, is no longer interpreted as a passive 'location' but rather as a 'cultural identity' returning 'added value' to formulated projects.

During the activity of the *Laboratory of Graphic Creations,* visual communication projects, brand design, web sites, video-installations, exhibitions and events, performance art and fashion catwalks, textile and gold products for fashion have all been elaborated [8].

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Fig. 4: Visual Identity for the complex of late antique and early Christian basilicas in Cimitile. *Laboratory of Graphic Creations* (prof. Ornella Zerlenga, Design and Communication, Fashion Design, Faculty of Architecture, S.U.N.): Logotype "Cimitile" (student Anna Rosaria Capozzi); Textile design (students Maria D'Uonno, Lucia Maiello, Federica Romano, Filomena Vergara, Veronica Vitale); Jewel design (student Antonio Mauro).
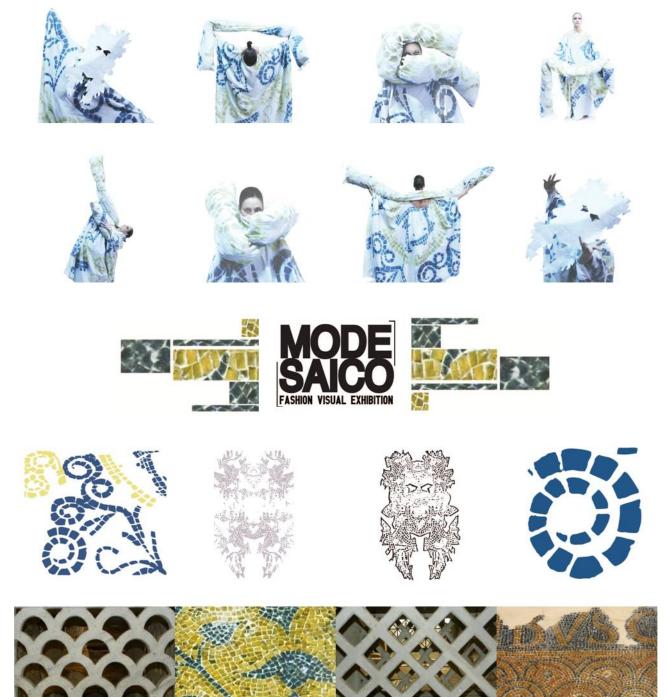
Fig. 5: Visual Identity for the complex of late antique and early Christian basilicas in Cimitile. *Laboratory of Graphic Creations* (prof. Ornella Zerlenga, Design and Communication, Fashion Design, Faculty of Architecture, S.U.N.): MODESAICO fashion visual exibition (students Flavio Ceriello, Erminio Granata, Martina Sterlino).

Le Vie dei Mercanti | X Forum Internazionale di Studi

less
more
architecture
design
landscape

Color, Culture, and Communication

Laura CARLOMAGNO[1]
[1] Dipartimento di Cultura del Progetto, Facoltà di Architettura Luigi Vanvitelli, Seconda Università degli Studi di Napoli, Aversa, Italia
laura.carlomagno@unina2.it

Abstract

Color is one of the most important keys to communication in the global market and it plays an instrumental role in attracting, capturing and retaining attention, shaping the perceptions, attitudes and opinions, and finally influencing the decision to buy or not our products or services.

Colour is architecture, object, painting, image, research, music, poetry, prose, city, landscape: it possesses physicalness, a body which requires to be analyzed both in its full shape as res extensa and in its inner being. It appears as a fundamental element in the representation of the nature and the territory, in its double immanent and becoming aspect. It is one of the main aspects to be considered in any communicative choice or in any action of analysis of a heritage to be taken in its multidimensionality, thanks to its various aspects of symbol, communicative element, graphic, anthropological and socio-cultural element.

Colour is radiation, energy acting positively or negatively on us, even if we are not aware of it, and its action has to be felt and understood not only as an optical event, but as a psychic and symbolic action as well: indeed, man perceives the colour and plans it, giving it in both activities a visible and (in)visible dimension. The limit between visible and invisible is just where the colour takes shape and what the observer perceives, with distinction, both as a recognition and as an inescapable destiny which connect him with what he observes or creates.

Even before the invention of the alphabet, primitive peoples and civilizations expressed themselves through images, signs, symbols and signals, usually with the help and support of colors, to which they attached precise meanings. So color is a means of connection between the world and its meaning, between the individual and the culture he belongs to and, according to the use made of it, transmits cultural and anthropological differences as well as codes and symbolism.

keywords: Color Culture Communication Intangible

1. Color/landscape

The landscape today, as it unfolds before our eyes, is complex and divided. It is difficult to represent and describe as it is articulated and disassembled on a complex network of semantic fields characterized by the coexistence of heterogeneous elements and overlapping signs and traces. This makes it difficult to display a synthetic image that can express its meaning in a clear and readable manner. The local networks that describe reality for us and are themselves networks of information overlap and create sometimes unexpected visual and symbolic relationships between objects directly produced by man and traces of natural processes preserved in the ground.

The secrets, signs of the passage of time and interpretive schemes that originate from fragments of history are layered and overlap, and, over time, each new element overlaps the other without completely erasing the earlier signs. This landscape, understood as a complex system of spaces, forms, signs, sounds, colors, symbols and traces, is the link through which we access the history and memory of places, environmental and cultural values and their inherent dynamism. Through a careful multidimensional analysis and interpretation of the elements discovered, understood as reflecting the material culture of the territory, the

past, present and future unfold before our eyes: in fact the traces of past and present events give us a glimpse of the possible futures of the places.

The earth reveals itself every day with an endless array of colors, signs, symbols and nuances. It enthralls and catches our eye daily: and what our senses perceive is a mixture of feelings and emotions that are nothing more than the harmony and balance created between artifice and nature, both past and present. What we observe in fact is not a simple summation of natural, architectural and symbolic elements, but a comprehensive package of all the constituent units in our territory. Man and nature have contributed to the ongoing definition of reality, pursuing a delicate balance that has led to the articulation of the scenarios as we perceive them. This synergy between man and nature has often led to the definition of images and views as articulated and detached as frames of a single narrative; identifying and representing a very specific place.: The many aspects of a territory or a location that we investigate therefore define the identity of a place and at the same time jealously guard its memory.

2. Color/traces

The tools available to individuals for communicating and interacting within the tribes and primitive forms of civilization, have always been among the most important aspects of human life and the primary requirement for survival. Even before the invention of the alphabet, primitive peoples and civilizations expressed themselves through images, signs, symbols and signals, usually with the help and support of colors, to which they attached precise meanings. Color is a means of connection between the world and its meaning, between the individual and the culture he belongs to and, according to the use made of it, transmits cultural and anthropological differences as well as codes and symbolism. Man has always used color as a symbol and in ancient times, the more a society was strong and organized the more color was used and its symbolic meanings were defined.

The indelible traces of the communication links established between individuals went beyond physical locations. They spanned geographical boundaries and established spatial-temporal relationships between seemingly distant generations. All these apparently unrelated signs, shapes, colors and these graphic traces to be collected and re-established belong to the DNA of the territory [2]. They were created in a particular environment and assume a semantic value in accordance with the evolution of the place to which they belong. They are mainly the product of a sometimes contradictory usage of land by very different social groups.

Every place is in fact an expression of a particular society that is strong there and that strongly identifies with the context in which it has evolved: this context has an identity, a material and immaterial order and symbolic meanings that reflect its norms.

Measurement, therefore, is at the root of all knowledge and representation of the physical and intangible values and the recorded traces of the location and its biological evolution based on its environmental context. Measuring and capitalizing on the infinite reasons of nature, as Leonardo suggested, is to recognize the genetic heritage, the names of places, the foundation of this continuous process of restoration and regeneration as a modification against any prospect of change. To understand, therefore, the general organization of places, but especially also to prefigure their protection and regeneration, requires an innovative methodology to study the area that, starting with the identity of places, returns to them and represents them as a homogeneous set of elements in order to restore them with a meticulous representation or discretization and measurement, capable of expressing tangible and intangible values [1].
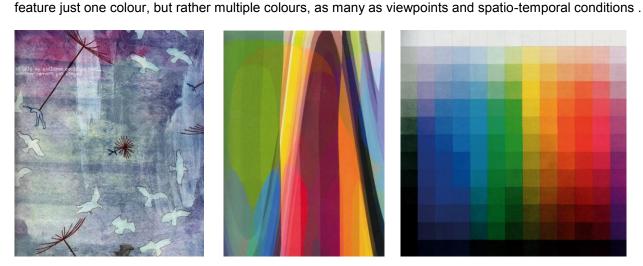
Human beings have always regarded colours as symbols, associated as they were to the natural elements lying at the heart of the primeval conception of the universe. Ever since prehistoric times, human beings have manipulated what they were given by nature every day, mixing clays, squeezing plants, grinding stones, in the attempt to leave a coloured trace testifying their presence on earth, recording moments of their lives. The remains discovered in Altamira (Spain) and Lascaux (France) together with the parietal paintings in Hierakonpolis (Egypt) prove that ancient painters were skilful and clever at finding and blending colours. At the beginning they only collected them from the places where they settled down, but afterwards they managed to achieve a wider and wider range of colours thanks to accurate researches and experiments that slowly led to a scrupulous and refined chemical composition of pigments.

From these early experiences of the individual with nature and the environment around him, the concept of color was conceived and developed in our mind and created an image of itself. Each color adheres to unconscious themes, acting on emotion with attraction and repulsion, expressing mental and emotional attitudes in preferences or in rejection, it displays intense and ambivalent language, reflecting the individual and the image of the world and becomes a place of real and unreal. And its understanding is born of conventions dictated by experience, that the color is between two poles and stems from the tension that is generated between identity and misunderstanding. Color, in fact, originates in a particular environment and

becomes a semantic value in accordance with its evolutionary process. Depending on different cultures, the symbolic meaning of color changes on the basis of different religious philosophies and on socio-cultural factors. For this reason, based on our experience and our evolutionary process, certain colors do correspond to certain names and characteristics that endow them with a precise identity and inevitably cause misunderstanding, because in another setting, in a different context, or in different time-space conditions, our assumptions may prove invalid.

3. The *n* dimension of the color

Going through city streets, passing by places where artificiality and nature get mixed up, we gaze upon more or less details depending on the level of our attention; in doing so, our gaze turns into an act meant to acquire some knowledge of the urban sceneries that surround us. In fact, at first we tend to notice the appearance of the things that catch our eye, the "skin" of buildings and objects, and then we further and skillfully analyze the beauties created by nature and human beings. Colours, like a thin veil that seems to hide objects and artefacts and is often ignored and underestimated by observers, actually contain a great deal of material and immaterial information. We are unconsciously used to believing that colours cover objects, thus concealing their essence, their core, and then fade away slowly beyond appearance (the word "colour" – "colore" in Italian from the Latin "colos" – has the same etymological root of the Italian verb "celare" meaning "to hide, conceal, cover"). Nonetheless, colours do not conceal, they actually unveil and reveal what is sometimes apparently invisible. In order to uncover the many facets of colours, we need to view them as complex systems to be represented in their *n* dimensions. Therefore, while regarding colours as complex systems, we also need to take into consideration every science in which they are involved: when dealing with physics, optics, chemistry, acoustics, anthropology, etymology, symbolism, psychology, digital, a methodological approach is necessary to fully understand such an articulated world. In fact, within each colour, many different semantic levels and languages coexist and interact, which we do not generally find in other visual variables: material/immaterial, analogical/digital, anthropolgical/biological, material/symbolic, physical/metaphysical. These elements seem to be in contrast with each other, but their interaction determines both the intrinsic and extrinsic qualities of the colour itself, in the infinitesimal space on the border between the physical and the psychical where sensations and perceptions merge into one another.

In order to distinguish a colour, we need to see it close to other colours and other elements within the visual field, but, above all, we need to view it on a(n) (in)visible conceptual background where all immaterial components converge. Indeed, colours only exist insofar as they are viewed and experienced by human beings. They originate from the synergy and synthesis between natural and physical components, the physical and material properties of objects, the observer's mood, the general conditions, the cultural context, the social status, the biological conditions, experiences and aspirations, which jointly affect the way you see and represent the world. As a matter of fact, all objects, even those that are apparently monochrome, never feature just one colour, but rather multiple colours, as many as viewpoints and spatio-temporal conditions .

Fig. 1: Clare Perkins, *drawing*.
Fig. 2: Peter Saville, *End of year*, Christmas card (2005).
Fig. 3: Johannes Itten, range of colors.

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[SMART]²: Sustainable Smart Innovation in Industrial Ceramics for Custom Multi-Product Design and Fabrication Strategies

Stefano ANDREANI
Design Robotics Group, Graduate School of Design, Harvard University, Cambridge, USA
andreani@gsd.harvard.edu

Abstract
Ceramics as building material in architecture has been widely used for centuries, yet its speculative applications in avant-garde design are limited by either current established fabrication methods or expensive and inefficient customization techniques. The presented research explores one of the most widely used industrial production processes of bricks and tiles – the extrusion – for hacking and combining it with advanced computational methods in order to propose a new way of designing and fabricating ceramic building components. In particular, by CNC controlling the cutting process of extruded clay and by slightly modifying the wire-cutting tool, it is possible to generate custom-shape components through an efficient, sustainable, and multi-production fabrication method. In fact, ruled-geometry bricks, tiles, and shading elements can be generated in the same production line by separating extruded clay bodies with a numerically informed and specifically treated wire. The envisioned industrial scenario is here emulated through the development of a systematic workflow that starts off by digital modeling custom ceramic units and ends up by fabricating a series of prototypes with the use of robotic technologies. In virtue of this sustainable serialized mass-customization process, a variety of design and market opportunities opens up, eventually producing a new language for architecture in which innovative bricks, tiles, and shading systems are logically implemented. Tradition and innovation are thus combined under the objectives of material efficiency, industrial processes optimization, new market opportunities, and novel design strategies.

Keywords: Industrial Ceramics, Robotic Fabrication, Sustainable Architecture, Mass Customization

1. Introduction

Design customization in architecture has recently become a prominent feature, in terms of both trend- and performance-driven design. In fact, variation in architecture not only allows for achieving appealing design solutions, but also increases the building's response to environmental aspects. Although computational design techniques now substantially facilitate the customization of building components in the digital domain, their material counterpart often requires expensive and articulated methods of fabrication. In fact, the production of unique, highly differentiated elements involves the use of non-standard supportive materials and special tools, such as complex moulds or special bending machines. On the contrary, industrial production processes are characterized by production lines or highly efficient methods that allow to fabricate building units in a serialized and cost-effective manner, making customization extremely complicated though.

Production lines constraints, packing principles, and transportation systems, in fact, deeply affect the possibility of customization, often preventing design speculations that involve differentiation. In this context, the role of ceramics is emblematic, being a material widely used in architecture with a high level of standardized fabrication processes and final products. Ceramic building components are indeed deeply characterized by well established production methods that leave little room for design customization. Instead,

ceramics embed certain properties that make it an ideal material for product differentiation. In particular, as this paper demonstrates, its plasticity in the pre-firing state offers enormous possibilities for the creation of complex-shape building components – opportunities enhanced by contemporary computational design and digital fabrication techniques.

2. Industrial clay extrusion

Industrial clay extrusion is a process in which ceramic components are produced in a serialized and continuous linear manner. During the process a helical extrusion mechanism forces clay through a die that imposes a continuous shape on the material. The extrusion dies represent one of the only integrated mechanisms for custom shaping in industrial ceramic production, although their cost and implementation requirements make their number of different shapes highly limited. During extrusion, components are supported by a conveyor or roller system that carries the extruded elements through several automated production cells that dimension, fire, finish, and package the ceramic parts. Dimensioning of individual linear elements is often accomplished by automated and exactly coordinated wires or blades that make cuts perpendicular to the extrusion direction. In the case of bricks' production, the process is so that the extruded clay body is cut at regular intervals separating the body itself into fixed-length units, which are then separated with successive cuts creating the single elements. This row of bricks are then piled up by a robotic arm and carried on a conveyor that take them through the drying and firing rooms. Finally, the elements are properly packed for optimizing the shipping process. Most of these phases basically characterize the production of extruded tiles too.

3. Multi-product sustainable customization

The presented research proposes to revise the industrial extrusion process, being one of the most common and established fabrication methods of clay bricks and tiles. In particular, the study investigates two aspects of the wire-cutting mechanism: the first one deals with the way in which the wire is controlled, whereas the other speculates on particularly treating the wire itself. The objective is to demonstrate that by slightly modifying only the cutting process out of the entire production line, a remarkable series of design opportunities emerge.

3.1 Ruled-geometry wire-cutting

The proposed process intervention adapts the integrated dimensioning cell to incorporate a numerically-controlled wire-cutting tool designed to enable shape customization of single elements during linear processing. In this scenario robotically-guided wires are programmed to cut each component along ruled surfaces. Part dimensioning during industrial extrusion is in fact characterized by wire-cutting that, when numerically controlled, could achieve complex ruled surfaces if the wire's extreme points move vertically. By addressing differentiation in a single production cell within the larger extrusion system, this process would thus enable the manufacturing of mass-customized ceramic elements defined by ruled geometries.

Fig. 1,2: Industrial processes of clay extrusion and cutting.

In this envisioned industrial scenario the wire-cutting process would separate the extruded clay body in two different elements. One of the main assumptions of the presented research is that these two complementary elements would not be detached, but would rather maintain this same configuration till the final packing and shipping phases. In this way, the production lines principles would remain exactly unaltered: robotic arms could pick the pieces up for ordered piling, and packing mechanisms would follow the same logics of efficiency and optimization. However, in order for this process to take place, the two separated elements need to not stick during the firing phase. Although the industrial extruded clay is usually very dry, a simple cutting metal wire might be not enough for preventing the two pieces adhering to each other. For this reason, the Design Robotics Group at Harvard GSD has been elaborating several strategies for manipulating the wire to the treat the interface in such a way that sticking would not occur. In particular, one method involves the use of a hot wire that would burn the two facing surfaces sufficiently to create very dry layers of material. Whereas the other method concerns the deposition of hydra alumina powder in the interstitial surface – a technique widely used in the world of ceramics, though never applied in the wire-cutting mechanism.

3.2 Multi-product method

For the purpose of keeping unaltered the established industrial principles of production lines, the fact of not separating the two cut, facing elements is thus essential: customization would be easily coupled with industrial fabrication resulting in economic and efficient   design variations and complex-component production. In particular, this research proposes a multi-product fabrication method that involves the use of either one or two numerically-controlled wires that would cut through an extruded ceramic element, thus producing digitally-informed, all-different units. In the imagined process, a clay body would be first cut with CNC wire/s for a fixed length, then vertically separated from the rest of the extruded body, and finally cut with traditional vertical wires for creating the different, multiple ceramic units. This series of components could be labelled either at the beginning or the end of the extruded element in order to be easily recognized during the on-site assembly process. In this way, each row of components would be identified with a clear noting system that would follow the assembly logic defined by the designer. This same assembly logic could be used for defining both the packing and shipping processes: rows of elements could be piled up in relation with the assembly order, thus defining the shipping mechanisms, times, and procedures accordingly.

As further illustrated later on, with this process different types of custom elements would be produced at the same time, exploiting the existing logics, systems, and tools of the ceramics industry. In addition, this multi-product method would embed advantages related to sustainability, economy of production, and efficiency. First, the envisioned process would not waste any material, but rather the material itself is optimized to create different products out of the same extruded element. Second, this fabrication technique would be cost-effective, because only a slight variation of the wire-cutting mechanism would be changed – the entire production process being unaltered; in addition, ease of customization would be an asset for the industry, eventually gaining more profits. Third, the combination of logics of customization and industrial principles of production would result in highly efficient ways of design variations and easy assembly on-site procedures for complex projects.
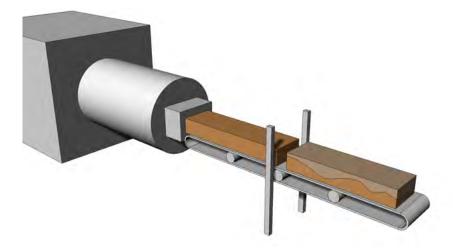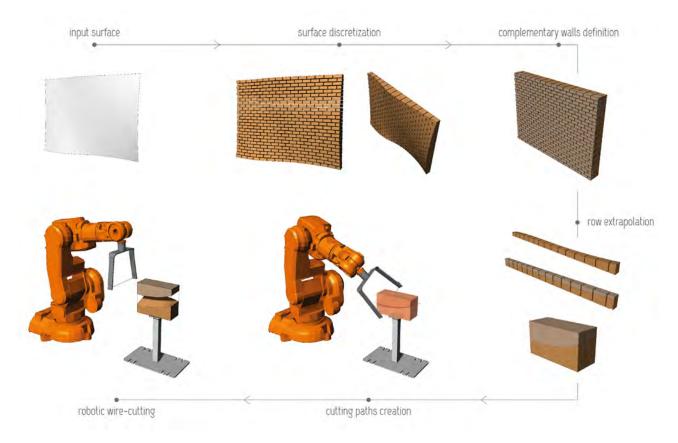
Fig. 3: Envisioned industrial method of automated wire-cutting.

4. Design and fabrication robotic workflow

The envisioned industrial scenario is emulated through the development of an integrated workflow [1] that combines computational design techniques and robotic fabrication methods to foster innovative ways of conception, implementation, and production in the context of ceramics for architecture. [2] Integrating top-down and bottom-up approaches, this workflow starts off with the digital generation of the overall building system – e.g., walls, cladding solutions, shading systems. After that, a coherent logic of fabrication and assembly procedures needs already to be implemented in this design phase; in this way, consistent sequences of units can be properly organized. From the digital model, the geometric information regarding each ceramic element is then extrapolated for driving the automated wire-cutting process. In particular, for each component the developed algorithm outputs wireframe data that serves as guiding lines for the ruled-geometry wire-cutting method. The objective is to derive machine codes from the digital geometries within a *Rhinoceros^{TM}*-based digital design platform. Industrial numerically controlled wire-cutting was simulated during prototyping by a 6-axis industrial robot used to guide a custom steel cutting wire. Automation of robotic programming was facilitated by the *Hal^{TM}* plugin for *Grasshopper^{TM}* which was used to generate, simulate, and optimize each of the cutting paths. In particular, for every individual component the workflow progressed by processing the input data derived from the digital model: the wireframe geometries describing the unit's edges were used to define ruling lines and generate the wire-cutting information for the robot. Once positioned relative to the robotic work cell, these lines served in the generation of cutting paths for each element. To further verify the cutting paths, each robotic movement was simulated in proprietary ABB simulation environment *RobotStudio^{TM}*. Finally, to facilitate maximum robotic freedom, a custom steel fixture was created to support the wet clay block during cutting.

Fig. 4: Integrated robotic workflow: from design to fabrication.

5. Design strategies and market opportunities in architecture

The presented custom multi-product strategies in the world of ceramics open up a series of design and market opportunities in the realm of architecture and building solutions. The objective is to combine the tradition of ceramic materials with the potentials of technological innovations. In fact, if fostered by computational design and digital fabrication techniques, the tradition of ceramics could be remarkably enhanced acquiring new meanings and architectural languages. Looking at both design needs and industrial constraints, this research focuses on three different – though related – types of products for a variety of applications in architecture. The first line of research investigates new types of bricks for creating complex doubly-curved building walls. The second study proposes the design of kinetic shading systems made of curved louvers. Finally, the third application concerns building cladding and panelling with the use of complex tiles. These potential ceramic building systems were tested through the development of a series of prototypes fabricated with robotic technologies. Due to its inherent properties and aesthetic qualities, the material used was in particular terracotta.
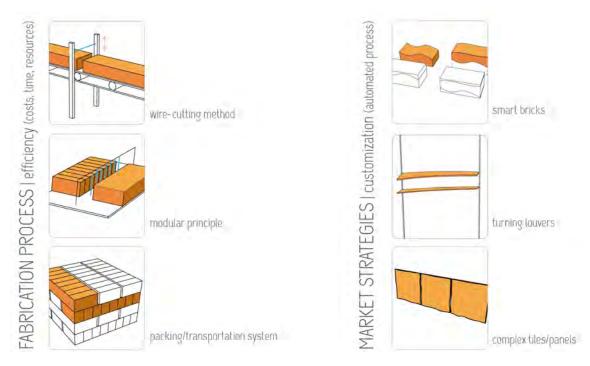
Fig. 5: Research strategy: production development + design opportunities.

5.1 Smart bricks for complex walls

Although their conception and digital representation has become relatively straightforward with current computational techniques, doubly-curved building walls still present inherent difficulties related to fabrication and assembly aspects. [3] This is particularly true when dealing with standardized ceramic units, whose assembly for achieving complex wall systems require either skilful craftsmanship, intricate guiding devices, or on-site robotic techniques. The presented solution aims to combine the advantages of industrial fabrication and transportation mechanisms with traditional on-site assembly methods. The result is an innovative use of ceramics through custom – though easy-to-aggregate – units for enhancing the aesthetic qualities of differentiation in doubly-curved surfaces.

For creating these complex walls, the design process starts by modelling a custom input surface, then moving to the creation of two complementary walls the share the complex surface; the thickness of the two walls is achieved based on fabrication constraints – specifically the dimension of the extrusion die; after that, the surface is discretized in the different units, following the structurally-efficient staggering principle; at this point, fabrication and assembly optimization rules are applied by selecting proper series of elements – e.g., a row-by-row principle; from these geometries, wireframe data are extrapolated for the automated process of wire-cutting; finally, the cutting process itself is performed.
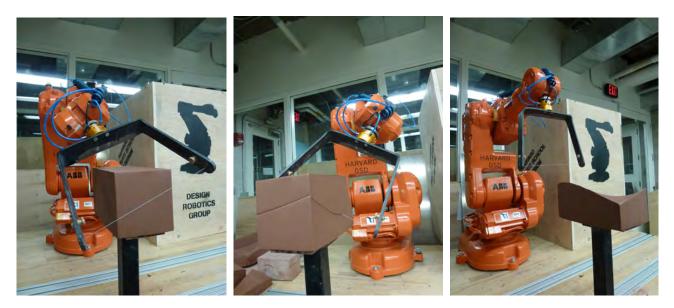
Fig. 6: Robotic fabrication of ruled-surface ceramic units for doubly-curved wall systems.

5.2 Turning louvers for kinetic facades

Shading systems play a dominant role in contemporary architecture morphologies, yet their design mostly relies on conventional horizontal louvers – made of a variety of materials. The proposed solution offers an innovative approach not only for screening building glass facades, but also for adding unique aesthetics values to the overall project. In fact, this system is composed by a steel vertical frame that supports curved ceramic louvers at their extremes – these joints having the possibilities to rotate around their horizontal axis. The developed design strategy begins by using an image as input for creating a certain pattern for the facade through the shading system. This image is then overlapped with the frame of the facade and processed for mapping the angle of rotation of each louver's joint. Once the angle range is set for a desired visual effect, the geometries of the louvers are then finalized. Due to the kinetic properties of the joints, a variety of different pattern solutions for the facade can be explored and dynamically changed over time. Concerning production procedures, each louver would be fabricated through an extrusion mechanism in which two CNC-controlled wires would be implemented. With the overall purpose of zero-waste production principles, the leftover material – the top and bottom elements – could then be used for panelling and cladding solutions, following the presented multi-product fabrication logic.

Fig. 7: Single components of unfired (green) terracotta and assembly simulation of a doubly-curved wall section.
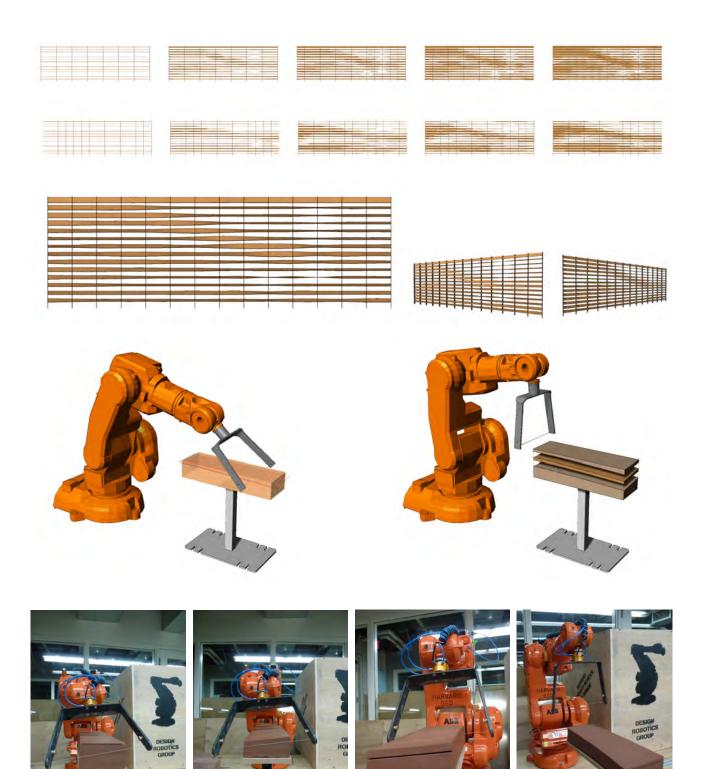
Fig. 8: Pattern design and robotic wire-cutting of curved louvers for kinetic shading systems.

5.3 Waving tiles for cladding systems

Ceramic tiles have a long tradition as cladding material, with an almost infinite range of solutions offered by the market. However, the ubiquitous flat tile is here innovated by adding complexity in the shape of its exterior surface. By applying the same principle of wire-cutting through an extruded element, it would be in fact possible to produce tiles that, once assembled, create a continuous pattern. In this way, for example, an ordinary space could achieve unexpected spatial qualities by adding "vibrating" elements to its wall's surfaces.
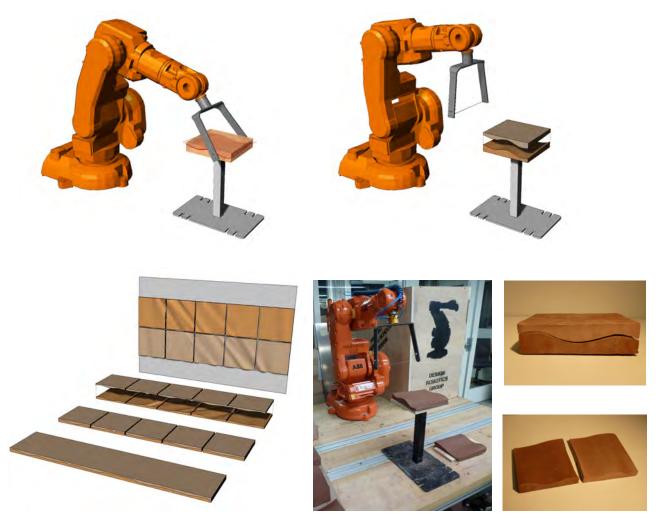
Fig. 9: Design speculations and robotic fabrication of complex terracotta tiles.

6. Conclusion

The presented research investigated one of the most widely used industrial production processes of bricks and tiles – the extrusion – for a meaningful integration with computational and numerical methods in order to devise innovative solutions for designing and fabricating ceramic building components. In particular, an automated cutting process of extruded clay implemented in the production line would generate ruled-geometry components through an efficient, sustainable, and multi-production fabrication method of mass-customization. This envisioned industrial scenario was emulated through the development of a systematic workflow that linearly linked design conception and digital fabrication, resulting in the development of a series of terracotta prototypes with the use of robotic technologies. In the logics of this sustainable serialized mass-customization process, three different lines of research have been investigated: smart bricks for complex walls, turning louvers for kinetic facades, and waving tiles for cladding systems. Pursuing design technology research in the world of ceramics in architecture, tradition and innovation are thus combined

under the objectives of material efficiency, industrial processes optimization, new market opportunities, and novel design strategies.
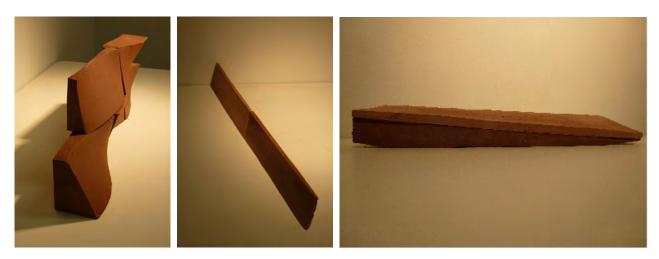
Fig. 10: Prototypes of a doubly-curved wall section and curved louvers made of wire-cut green terracotta.

Acknowledgments

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less more landscape

"PLUVIOGRAMMI" WITH HIGH TIME RESOLUTION

Giuseppe D'ANGELO,[1] Maria Cristina MIGLIONICO[1]
[1] Dipartimento di Cultura del Progetto, Facoltà di Architettura, Seconda Università degli Studi di Napoli, Aversa, Italia
E-mail: giuseppe.dangelo@alice.it; mcristina.miglionico@unina2.it.

Abstract

The knowledge and variability of rainfall system, fundamental for the catchment management and planning, of an agricultural crops, of the civil and industrial water requirements and of hydroelectric energy production, are strictly linked to the climatic variations. The climatic system, not only, is affected by environmental factors: solar radiation, volcanic ash and aerosol, but also by anthropogenic factors, as greenhouse gases emission and the improper usage of the ground with intensive farming, urbanization and waterproofing. Any change of the statistical distributions of the weather variables can have a significant impact on the nature and humanity. Between most important weather variables for the water balance, plays a fundamental role the space-time of the precipitations, fundamentally, in characterized areas by a complex topography such as the Italian. Among many aspects, related to the observation and modeling of the hydrological cycle phenomena, is particularly interesting the definition of the appropriate critical "pluviogrammi" for the drainage networks design. In design practice, in fact, except for the occasional cases, it is assumed uniform spatial-time distribution of the critical precipitation and, respect to it, it is possible to do the sizing of the network hydraulic manifolds. The present work develops an experimental study of "pluviogrammi" with high time resolution, obtained by processing the observation recorded by a specific weather station, installed at Aversa (Caserta) on March 2006. This station is capable to acquire various information on various weather conditions: including, rain height, temperature, humidity, atmospheric pressure, wind direction and its speed. In this study have been analyzed, principally, data of the rain heights, acquired with a sample time of two minutes.

Key words: rain; pluviogrammi

1.   Introduction

As it is well known in the literature, the term "precipitation" is indicated all liquid and solid products of the water vapor condensation that reaches the ground falling from the clouds. The precipitation, once started, is supplied by the contribution of water vapor, with an ascending movement, that rises to high altitudes and condenses in the form of small drops, reconstituting the cloud. The dynamics of rainfall is therefore linked to the movement of large air masses. The precipitations, in fact, occur when the air rises and it cools adiabatically below dew point, generating not only clouds, but, also, rain, snow and hail.

2.   Measurements of the height of precipitation

The quantity of water that reaches the earth's surface can be valuating, locally, with measurers capable of detecting the height of rain or precipitation. In the time interval t can be defined as the ratio between the rain volume $H_{t,S}$ precipitate in t on a portion of the Earth's surface and the area S of the horizontal projection of this surface area:

$$h_{t,S} = \frac{H_{t,S}}{S}$$

This measure is, in practice, the height of the liquid layer that would be to deposit on the ground, where all the downfall water remain stagnant without being subject to evaporation, infiltration and outflow.
The precipitation height has dimensions of a length and is measured in mm or m. During a rainfall event the height of rain punctual varies in space and time:

$$h = h(x, y, t)$$

where x and y are spatial coordinates and t is the duration of the rain event.
The readings of the height of precipitation can be performed with the aid of two different instruments, the rain gauge and pluviograph.
The intensity of average rain is the ratio between the precipitation height h, expressed in mm/h (or m/h), and the corresponding duration t:

$$i(x, y, t) = \frac{h(x, y, t)}{t}$$

The instantaneous intensity of rain is the limit which tends to average intensity when the time t goes to zero:

$$i(x, y, t) = \lim_{t \to 0} i(x, y, t) = \frac{dh(x, y, t)}{dt}$$

For a given duration of observation the histogram that represents the height or the average intensity of precipitation in each elementary time interval Δt is said "ietogramma".
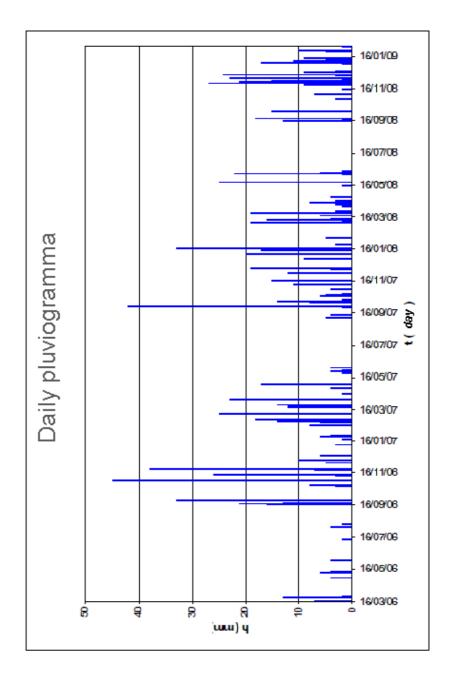
3.   Elaboration methodology of rainfall observations and acquisition data
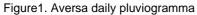
The rainfall data acquired with a weather station are used for the analysis of rainfall with small time scales, concerning the Aversa territory. The work has been developed in two following phases: the acquisition and subsequent data processing. The observation period and data acquisition is lasted about three years; the records have been made every two minutes.
Data processing has been carried out by determining, in the first phase, the number of rain events; the identification of these events has been carried out by selecting, as a criterion, to match each rainy day with a single event of rain. Within each event has been identified the different showers, which, have been characterized with appropriately chosen parameters.
In the next diagram (Figure 1) is shown the daily Aversa pluviogramma. It is important to underline that, in the period under study, have been registered 143 significant rain events. The most significant event has registered a rain height of 45 mm, occurred on 01 November 2006, followed by the event registered on 27 September 2007 with 42 mm of rain. In particular circumstances most significant rainfall has been registered, for example, from 15 September 2006 to 18 September 2006, or, from 24 January 2009 to 27 January 2009. Thereafter for each individual event will be detected showers that compose it. For every shower will be route the diagram of accumulated rain heights and to ietogramma with high temporal resolution.

Figure1. Aversa daily pluviogramma

4. Showers selection

Identified rain events, successively it has gone in search of the showers to analyze. This phase has been, preceded by a preliminary work performed on the returned data from the station. In fact, it has created a table (Table 1) where are inserted only the date column and the absolute height.

Data	Absolute height [mm]
17/09/2009 14:32	1759
17/09/2009 14:34	1760
17/09/2009 14:36	1760
17/09/2009 14:38	1760
17/09/2009 14:40	1760
17/09/2009 14:42	1760
17/09/2009 14:44	1760
17/09/2009 14:46	1760
17/09/2009 14:48	1760
17/09/2009 14:50	1760
17/09/2009 14:52	1761
17/09/2009 14:54	1761

Table1 – Rain height data

Regarding the minimum duration of a dry interval (idm) between two consecutive showers it has been established to consider the following cases:
Case A with idm = 15, ie, with a dry interval of 30 minutes;
Case B with idm = 30, ie, with a dry interval of 60 minutes;
Case C with idm = 90, ie, with an interval of 180 minutes dry.
For the other thresholds, it has been decided do not vary them, in order to highlight the dependence of the minimum number of showers in a dry period.

5.   Data processing

Each shower has been characterized by plotting both the height of rain h [mm], as a function of time t [min], and the rain intensity [mm/h].
To examine the diagrams above depicted, it has been calculated a number of parameters properly selected (Cernesson et al., 1995).
The calculated parameters are:
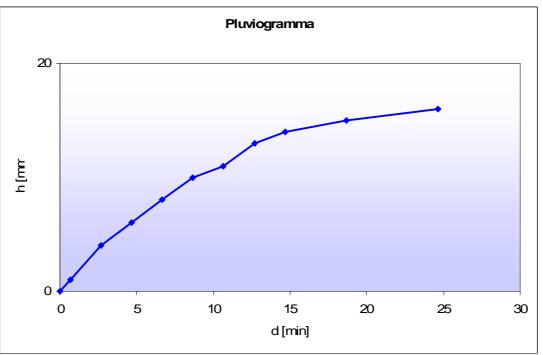
- number of peaks of each shower [peaks number];
- total height of rain - h_{tot} [mm];
- total duration of each shower - d_{tot} [min];
- average intensity - i_m [mm/h];
- maximum peak intensity - i_{max} [mm / h];
- IMAX/i_m ratio;
- maximum peak duration - $d_{maxpeak}$ [min];
- ratio between the duration of the peak and total duration of each shower $d_{maxpeak}/D_{tot}$;
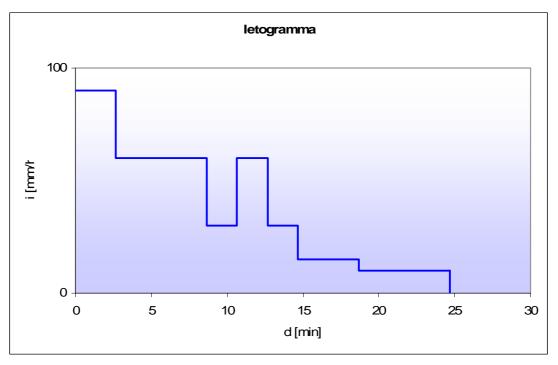
- the position of the peak (minutes) and the total duration ratio of each shower –$t_{maxpeak}$ / Dtot.

In the case, where more than a shower is present on two or more successive peaks of equal intensity, has been conventionally considered the second peak. The processing was carried out for all the three identified cases.

➢ **Case A**
✓ **15.09.2006 Shower**
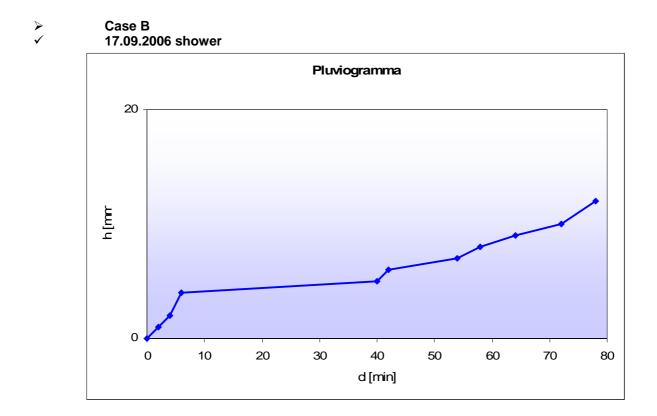
n° picchi	h_{TOT} [mm]	d_{TOT} [min]	i_{MAX} [mm/h]	i_{media} [mm/h]	i_{MAX}/i_{media}	$d_{picco\ max}$ [min]	$d_{picco\ max}/d_{TOT}$	$t_{piccomax}/d_{TOT}$
2	16	25	90,009	50,501	1,782	3	0,108	0,054

Figure 2 – Pluviogramma, ietogramma and shower parameters: 15.09.2006

➢ **Case B**
✓ **17.09.2006 shower**

n° picchi	h_{TOT} [mm]	d_{TOT} [min]	i_{MAX} [mm/h]	i_{media} [mm/h]	i_{MAX}/i_{media}	$d_{picco\ max}$ [min]	$d_{picco\ max}/d_{TOT}$	$t_{piccomax}/d_{TOT}$
4	12	78	60,000	20,926	2,867	2	0,026	0,064
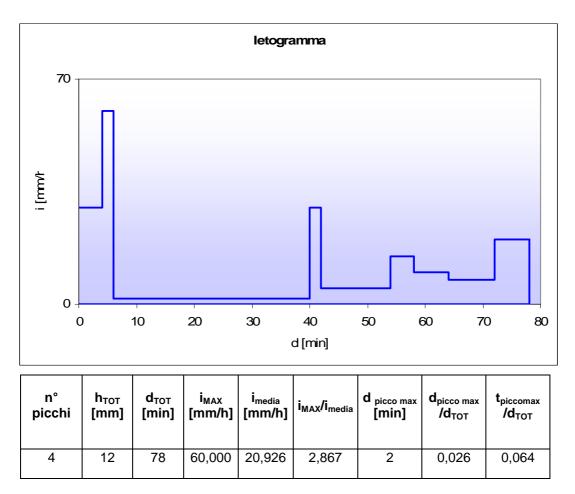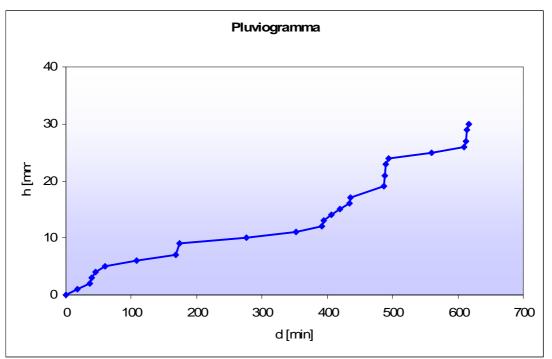
Figure 3 – Pluviogramma, ietogramma and shower parameters: 17.09.2006

n° picchi	h_{TOT} [mm]	d_{TOT} [min]	i_{MAX} [mm/h]	i_{media} [mm/h]	i_{MAX}/i_{media}	$d_{picco\ max}$ [min]	$d_{picco\ max}/d_{TOT}$	$t_{piccomax}/d_{TOT}$
6	30	616	60,000	15,766	3,806	2	0,003	0,995
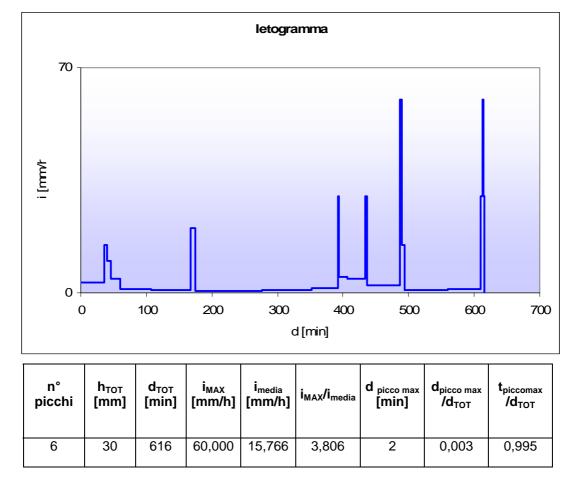
Figure 4 – Pluviogramma, ietogramma and shower parameters: 12.11.2006

6. Conclusions

In the first analysis have been considered rain events of the whole registration period through the tracking of a daily pluviogramma, have occurred totally 2425 mm of rain.

Identified rain events, successively has been searched the showers for the analysis. This phase has been done, with a preliminary work performed with the returned data from the station. It has been necessary to fill any periods in which data were missing with the zeros. This operation has been necessary to know, precisely, the date and time corresponding to each height value of the rain, from a predetermined starting point that, in the following case, is represented by 10:20 on 09 March 2006.

For the minimum duration of a dry interval between two consecutive bursts it has been considered three cases:

Case A with idm = 15, ie, with a dry interval of 30 minutes;
Case B with idm = 30, ie, with a dry interval of 60 minutes;
Case C with idm = 90, ie, with an interval of 180 minutes dry.

For the case A are present 706 showers, but from this quantity must be eliminate 443, which are preceded by showers or a hole. They do not to allow the knowledge of how the rain falls, or, the showers having duration less or equal of the data scan time acquisition that produce 1 mm of rain in two minutes: have been analyzed 263 showers.

For the case B are present 540 showers, but from this quantity must be eliminate 292, which are preceded by showers or a hole. They do not to allow the knowledge of how the rain falls, or, the showers having duration less or equal of the data scan time acquisition that produce 1 mm of rain in two minutes: have been analyzed 248 showers.

They are either the showers that are unchanged compared to the previous case, both those arising from the sum of several showers, first, separate from one another. The cause of this union is the increase the dry between consecutive showers.

For the case C are present 351 showers, but from this quantity must be eliminate 136, which are preceded by showers or a hole. They do not to allow the knowledge of how the rain falls, or, the showers having duration less or equal of the data scan time acquisition that produce 1 mm of rain in two minutes: have been analyzed 215 showers.

They are either the showers that are unchanged compared to the previous case, both those arising from the sum of several showers, first, separate from one another. The cause of this union is the increase the dry between consecutive showers.

For the case A, the values of the parameters of the 263 showers allow to make two observations:
1) from examination of the assumed values by the ratio between the intensity of the maximum peak and the average intensity of the same shower. It is possible to observe that in three circumstances (22.03.06, 19.03.07 and 03.05.07) the intensity has occurred more of 4 times of the one average. In 80% of cases, this ratio varies between 1.00 and 2.00, the examination of the assumed values by the ratio between the maximum peak duration and the total duration of the shower. The 78% of the precipitations, object of study, have of the maximum peak duration less than 20% of the total duration. In 18 cases the peak lasts for the half or more of the shower;
2) from examination of the assumed values by the last parameter taken into consideration. The ratio represents the position of the maximum peak intensity of rain respect to the total duration of each shower. It has been observed that 62% of the precipitation, object of study, had the maximum intensity at rain beginning, precisely less than or equal to 25% of the total length, while only 8% of the showers had the highest intensity at the end of rain, greater than or equal to 90% of the total duration.

For the case B, the values of the parameters of the 248 showers allow to make two observations:
1) from an examination of the assumed values by the ratio between the intensity of the maximum peak and the average intensity of the same shower. It is possible to observe that in 8 circumstances the assumed density is more than 4 times of the average intensity. In two circumstances the density is more 5 times of the average and in one case is more than 7 times (16.01.2008). In 70% of cases, this ratio varies between 1.00

and 2.00. The examination of assumed values by the ratio between the maximum peak duration and the total duration of each shower, shows that 82% of the precipitations, object of study, have a duration of the maximum peak less than 20% of the total duration. In 16 cases the peak lasts for the half or more of the shower;

2) from an examination of the assumed values by the last parameter taken into consideration. The ratio represents the position of the maximum peak intensity of rain respect to the total duration of each shower. It has been observed that 60% of the precipitation, object of study, had the maximum intensity at rain beginning, precisely less than or equal to 25% of the total length. Only 9% of the showers had the highest intensity at the end of rain, greater than or equal to 90% of the total duration.

For the case C, the values of parameters for 215 showers allow to make two fundamental observations:

 1) from an examination of the assumed values by the ratio between the intensity of the maximum peak and the average intensity of the same shower can be seen that the intensity in 11 observations occurred is more than 4 times the average, in 3 circumstances more than 5 times, in 2 over 7 and 1 more than 9 times (27 January 2009). In 54% cases this ratio oscillates between 1.00 and 2.00. The examination of the assumed values by the ratio between the maximum peak duration and the total duration of each shower, shows that 85% of the precipitation, object of study, the duration of the maximum peak is less than 20% of the total duration, while in 8 cases the peak lasts for half or more of the shower;

2) from the examination of the assumed values by the last parameter taken into consideration, the ratio indicating the position of the maximum peak intensity of rain with respect to the total duration of each shower. The 56% of the precipitation, object of study, had the maximum intensity at rain beginning, namely less than or equal to 25% of the total duration. Only 15% of showers has had the highest intensity at the end of rain, specifically greater than or equal to 90% of the total duration.

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Amman's Land Typology: The Importance of Site Characteristics on the Delivery of Sustainable Buildings

Wael AL-AZHARI[1], Sonia AL-NAJJAR[2]
[1] Department of Architecture, Faculty of Engineering & Technology, University of Jordan, Amman, Jordan
E-mail: w.alazhari@ju.edu.jo
[2] Department of Architecture, Faculty of Engineering & Technology, Applied Science Private University, Amman, Jordan
E-mail: najjarsonia@hotmail.com

Abstract

Amman's land typology is characterized by hilly slopes, and this presents challenges and opportunities for architects and designers aiming at delivering sustainable buildings. The research focuses on the importance of any site's given criteria; mainly its slope and topography on the delivery of sustainable buildings.

Amman city consists broadly of two main types of buildings; apartment buildings and villas, by studying each type of building with regard to its environmental context on a given site in the city; the research seeks to identify the sustainable variables that site topography delimit or facilitate, using a set of attributes for each building type.

The main objective of this research is to highlight the sustainable approach for building on sloped sites throughout the building project life-cycle in general, and to set a sustainability framework for designers during the initial design phase in particular. A number of case studies for both types of buildings are studied and analysed, and conclusions are given based on syntheses of available data from literature review or case analysis.
At the end, the research provides a mechanism for the development of guidelines for sustainable and passive viability on preferred buildings orientation in hilly areas with regard to local climatic data..

Keywords: Sustainable Building, Topography, Slopped Sites, Sustainable Design Guidelines.

1. Introduction

Sustainable development issues and environmental concerns continue to gain interest as demand within Jordan"s residential construction industry escalates. Current construction practices adhere to traditional methods of construction, with inherent weaknesses such as high labour costs, negative environmental impact during and after construction, and minimal technological advancement.

Sustainability in buildings and urban design is a regional issue, and quite specifically site- related. In this regards, Amman is a city characterised by its hilly topography. The slopes represent challenging constraints for designers, especially when considering sustainable building measures. Therefore, to construct and maintain a sustainable building is to choose the suitable site and to allocate the building

to site correctly. Design decisions in the initial phase would affect the building layout, and eliminate negative impacts associated with negative construction practices.

This research deals with designing and building residential buildings in Amman, the capital of Jordan, with emphasis on two types of building, the apartment building and the villa. The research seeks to outline a framework designing residential buildings, especially, villas and apartment buildings, for designers in the early stage of the design process on the best layout, orientation, and functional layout on sloping sites in Amman city.

1.1 What is Sustainability

Oxford Dictionary defines sustainability as the ability "to be maintained at a certain rate or level: sustainable economic growth or conserving an ecological balance by avoiding depletion of natural resources: our fundamental commitment to sustainable development"

The most common definition comes from „Our Common Future", also known as the Brundtland Report: „Sustainable development is development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs" [1]. This definition contains three key ideas: development, needs, and future generations. According to Blowers (1993); development should not be confused with growth. Growth is a physical or quantitative expansion of the economic system, while development is a qualitative concept: it is concerned with cultural, social and economic progress. The term „needs" introduces the ideas of distribution of resources: „meeting the basic needs of all and extending to all the opportunity to satisfy their aspirations for a better life"[1]. Moughtin (2005) thinks that the pursuit of a sustainable future for the human race will require the design of effective policies and programmes which directly address the related problems of unsustainable activities and environmental degradation. Any sustainable development at the building and neighbourhood level should ensure that the needs of the current users are met without compromising resources or the quality of built environment on the long term.

1.2 Sustainability in Buildings

Buildings account for 40% of global warming emissions [2]. Sustainable building management has received much attention in recent years. Many communities throughout the world are struggling to develop efficient and effective tools for assessing sustainable buildings. However, there is no universal method or tool yet. Sustainable buildings are at the core of any sustainable development, for the sustainable building, the objectives of decreasing both adverse environmental impact and cost are in conflict. In addition, even though both objectives may be satisfied, building management systems may present other problems such as convenience of occupants, flexibility of building, or technical maintenance, which are difficult to quantify as exact assessment data.

In Jordan, sustainability is a new concept still, and many of the very few aiming-to-be sustainable buildings are not quite mature yet. With the first building to gain a LEED silver certification in 2010, figure 1, Jordan is still long way away from developing a strategy for sustainable building industry.

Fig. 1: Dutch Embassy Building- First Green Building in Amman- Jordan with LEED Silver Certificate (www.archined.nl, 2012) .

1.3 How is Sustainability Measured

To some, sustainability is a matter of numbers, scores and graphs. The ESI clearly probate that we live in an era of numbers. In many realms, decision making has become increasingly data-driven. But the environmental domain has curiously lagged in this regard [3].

On the large scale, there's the ESI, see figure 2. The 2005 Environmental Sustainability Index (ESI) provides a composite profile of national environmental stewardship based on a compilation of 21 indicators that derive from 76 underlying data sets. The ESI offers a tool for shifting pollution control and natural resource management onto firmer analytic underpinnings. In this regard, the heart of the ESI is not the rankings but rather the underlying indicators and variables. By facilitating comparative analysis across national jurisdictions, these metrics provide a mechanism for making environmental management more quantitative, empirically grounded, and systematic [4].
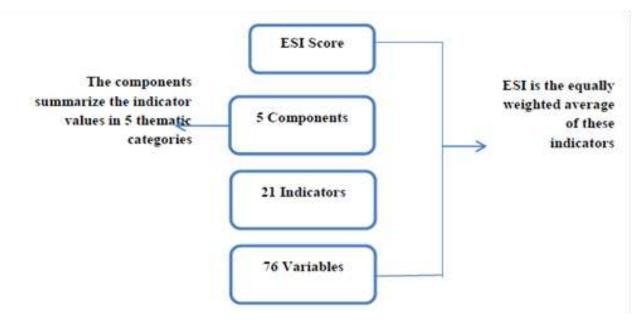
Fig. 2: Constructing the ESI Score [4].

The higher a country"s ESI score, the better positioned it is to maintain favourable environmental conditions into the future. The five highest-ranking countries are Finland, Norway, Uruguay, Sweden, and Iceland – all countries that have substantial natural resource endowments and low population density.

Table 1 shows Jordan"s position on the 2005 (ESI) world score. Almost two points lower than world median and behind leading countries like Finland. Jordan is a world standard performing country when it comes to energy resources and impacts on the environment. As a developing country, large part of its residential building activity contributes to the country"s overall performance on the ESI scale.

ESI Rank	Country Name	ESI Score
1	Finland	75.1
45	United States	52.9
55	Tunisia	51.8
65	United Kingdom	50.2
75	Indonesia	48.8
83	Oman	47.9
84	Jordan	47.8
136	Saudi Arabia	37.8
World MEDIAN	-	49.7

Table 1: Jordan on the (2005) ESI World Score [5].

1.3.1 How is Sustainability Measured in Buildings

There are many tools developed in the field of the performance assessment of the buildings sustainability. Starting from the 90s, many different evaluation systems and tools of environmental performance assessment for buildings have been developed, as BREEAM in the United Kingdom, LEED in the United States (prompted by the US Green Building Council, Energy rating in Denmark, ECOPROFILE in Norway, ECOEFFECT in Sweden, ESCALE in France, TOTAL QUALITY in Austria and the DGNB procedures in Germany [6]. These tools are applied for different purposes like combining the energy problems with economic and social concerns; enhancing relationships with urban plans; applying the appraisal procedures in the different stages of the building life-cycle; including the urban context and site features in the evaluation and involving different stakeholders and shareholders (as designers, evaluators, users, investors and researchers) in the evaluation process while promoting the performance approach.

1.4 Sustainability in the Arab World

The Arab world is faced with many urban challenges; in "The Revolving Arab City", [7] suggests that regional policies (pan-Arab unity) and social security are not a priority anymore. Rather, the private management of public property is becoming more prominent. The creation of private development companies backed by banks or hedge funds, like Al-Abdali in Amman, figure 3, Solidere in Beirut,Saphia and Bou Regreg in Rabat, Tunis" Lake are examples of the new globalised spaces that aims to provide high returns on investments for firms like Sama Dubai, Emaar, Saudi Oger and other national developers (Mawared in Jordan and Caisse de Depot et de Gestion in Morocco) [8].

Fig. 3: Al-Abdali represents a new vision of High-rise development in Amman (www.abdali.jo, 2012).

Arab cities demonstrate multiple layers of development through history. Over long periods of development, land uses have been adapted to suit inhabitants. Conventional urban configurations were based on densities, mixed uses and bottom-up urban growth, reflecting people's daily needs. Modern Arab cities demand an accelerating increase in transportation mobility pursuant to inappropriate land use distribution. These requirements do not consider the current spatial morphology of the urban fabric, nor its role as a stimulus in successful locations. The differences between traditional and modern extensions for Arab city centres on the basis of sustainable land use location

should be re-assessed to evaluate current land use distribution and forecast the success of any future intervention.

The traditional methods of sustainable buildings in traditional Arabic context were mainly focused on techniques that enhanced indoor quality in hot and arid climates. Hassan Fathy was a pioneer in incorporating traditional methods of building into rural areas of Egypt. However, these traditional methods do not solve today"s problems for buildings. Many modern day architects have used successful symbolic precedents in modern architecture by means that convey nostalgic reference rather than careful study of these symbols as effective sustainable solutions. The works of Rasem Badran and Abdelwahed Al-Wakeel bear witness to such attempts.

The Arab region geographical typology varies extensively from east to west, and so is the building technology used in every region. In Jordan a variety of geographical typology is also present, and that also adds to variety of building techniques.

1.5 Sustainability in Jordan

The scientific community expects that the world will start to face critical shortages in its supply of fossil fuel in the near future, with the expectation for most oil resources to vanish within the next 50 years [9]. During the past decade, and as a result of the significant increase in the population in Jordan, multi-apartment buildings became the most dominant building format, especially in Amman the capital. The lack of well-developed passive heating, cooling and energy saving solutions, made the reliance on central heating in winter and air conditioners in summer the prominent choice for residents [10]. Jordan is a developing non-oil producing country. Jordan imports 95% of its energy from neighbouring countries. In general, large cities in Jordan are comprised of multi apartment buildings, usually about four storeys high. Energy consumption for residential purposes accounted for 18% of the total consumed energy in 1999. By 2009, energy consumption for the residential sector jumped to 30% [11], and is projected to increase if energy saving techniques are not implemented.

1.5.1 The City of Amman

Amman, the capital of Jordan, is experiencing a significant urban and economic growth. The fast increase in population and the growing economic demand for business growth have increased the need for comprehensive planning agendas, see table 2.

Census	1994	2004	Increasing %
Buildings	504,000	636,000	26.2
Housing Units	832,000	1204,000	44.7
Households	672,000	946,000	40.8
Persons	4,139,000	5,323,000	28.6

Table 2: Population and Housing Census in Jordan in 1994 and 2004 [5].

Amman as a city has developed 8000 years ago, due to its suitable climate and availability of water. In the year 1200 B.C it became the Ammonite"s capital, and ever since then it has been in the central attention of many civilizations, until the time it became the capital of Trans-Jordan in 1921 [12]. Amman now is a city of nearly 2 million inhabitants, see table 3 - it is becoming a mega-polis. With the city aspiring to grow and advance - in a world of many environmental concerns like climate change and sustainability – the challenges facing city planners, architects, designers and decision makers are overwhelming. Globally, urban population have increased much faster than rural populations [13]. The ecological footprint of a city can be many times larger than its physical size. Urbanised areas cover 2% of the earth's land surface, but account for 78% of carbon emissions. Similarly 60% of water use and 76% of wood used industrial purposed occur within urban areas [14].

Governorate	1994				2004			
	No. of Buildings	No. of Housing Units	No. of Households	No. of Persons	No. of Buildings	No. of Housing Units	No. of Households	No. of Persons
Amman	144491	337071	271604	1576238	182961	498085	382674	1939405
JORDAN	503894	831799	672472	4139458	636088	1204398	945806	5100981
Amman's Percentage	29%	41%	40%	38%	29%	41%	40%	38%

Table 3: Population and Housing Census in the City of Amman Compared to the Total in Jordan [5].

1.5.2 Residential Buildings Types in Amman

Amman's typology is defined by hilly slopes; the topography of the city consists of a series of steep hills and deep and sometimes narrow valleys. Most of the districts of Amman take their names from the hills or jabals on which they are situated, figure 4. Whilst initial development was principally on the upper slopes and crests and the lower slopes of this hill-valley system, the upsurge in urban development over the last sixty years has involved extensive development on the frequently steeper mid-slope locations.
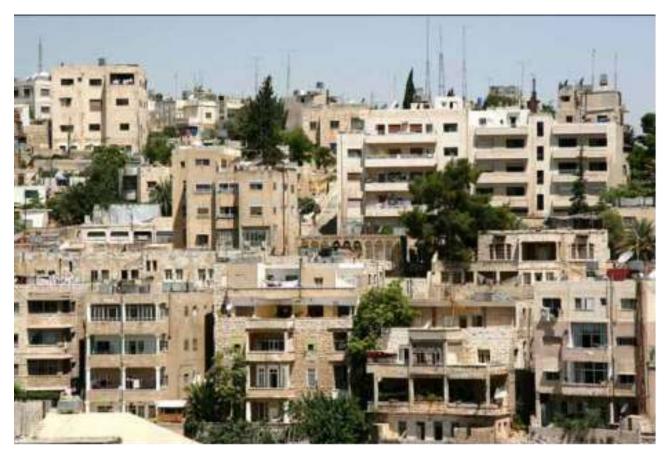
Fig. 4: View of the Old City – Jabal Amman Hill.

The original site of the city of Amman occupied seven hills or „jabals" around the Wadi „Ras el Ain" which flows north-east from the plateau towards the River Zarqa basin. The original central part of the city was at an altitude of between 725 and 800 meters, figure 5.
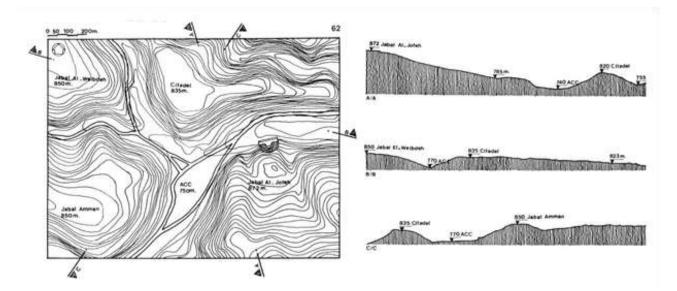
Fig. 5: Topography of Amman City Centre (ACC) and surrounding hills or Jabals [15].

Expansion of the city in the past twenty-five years has resulted in the occupation of some nineteen hills in total with an altitudinal extension to above 875 meters. Given all information about Amman typology and geography, it is inevitable that builders and designers in Amman are faced with many challenges. Sustainable building design places significance importance on site, and the relation between building and site that best serves aesthetic, climatic and economical sustainability values. In Amman, construction practices that adhere to traditional methods are obsolete when it comes to serving environmental issues. They are mainly based on wrong design choices at the beginning of the design process. They are also neglecting building orientation and functional layout that contribute to effective passive design.

1.5.2.1 Apartment Buildings

Up to the 1970s, it was very common for people in Amman to build freestanding, one-story, single-family houses. Such houses most often would later be expanded vertically to reach two or three stories. The owner of the house would build these additions for the use of his or her children (usually sons) for when they grow up and have their own families, or to rent out as a source of additional income.

During the late-1970s, the apartment building emerged as a more prominent residential building type in Amman. By the 1990s it became the predominant building type. In fact, of the 2.18 million square meters of construction permits granted in Jordan during the first four months of this year, 1.8 million square meters were for apartment buildings [16].

The impact of the spread of the apartment building has been tremendous on Amman. It definitely has raised the density of habitation in the city, figure 6.

Fig. 6: Computer Visualization of an Apartment Building in Amman.

The typical four-story apartment building, which usually includes two apartments on each floor, will have about eight families inhabiting it. Of course, there are the more luxurious apartment buildings with one apartment per floor, but there also are apartment buildings that have additional living units because of their location on a sloping site. Many apartment occupants, especially in western Amman, have cars, and the construction of each additional apartment building puts further pressure on the movement of traffic in adjacent streets and on the availability of parking spaces. Also important is that with the exception of ground floor apartments, the inhabitants of apartment buildings do not have access to gardens. At the same time, apartment buildings in Amman are too small to support communal open recreational spaces. The problem is exasperated by the fact that Amman still suffers from a shortage of public neighbourhood parks, see figure 7.

Fig. 7: Apartment Buildings Occupying a Hill in a North Ammani Neighbourhood.

1.5.2.2 Villas

Villas represent the high-end single family dwelling option for buildings in Amman, especially in its western part; they usually comprise one or two floors, figure 8.

Fig. 8: A Modern Villa in Western Amman.

1.6 Sustainable Design Criteria

Site selection and building orientation come at top priorities in any sustainability assessment tool. Therefore, the site typology - especially its slope and natural topography is of great importance to the sustainable design decision. If a site is flat, the topography may not influence the location and layout of the building, but on a sloping site, the topography is likely to be a significant design factor. The slope of a site or the slope of adjacent sites may affect access to sun and views; the need for excavation or fill – as well as increasing costs [17]. Large-scale earthworks increase the risk of erosion by altering soil stability and water run-off patterns, and significantly affect natural biodiversity by removing soils and plants.

The significance criteria lie in the fact that when designing in Amman, designers cannot overlook the typology of its most vacant sites. The hilly slopes of Amman are challenging sustainable design by delimiting passive cooling and heating for buildings if the building is not correctly placed on site [18]. Construction works that are contributing to negative environmental impact can be minimized if more site consideration was done during the initial design phase, and the building layout, orientation, etc. was based on more sustainable decisions.

Design should foresee that during construction the amount of site work and disruption is at minimum, the visual impact of the building form on the landscape is not disturbing and the orientation of the building is optimizing the passive heating and cooling of the building [19]. Non-sustainable current construction practices in Amman have visual and cost-related negative impacts on the environment, see figure 9. The excessive use of retaining walls to solve severe slope cuts is very common, see figure 10- a practice rendered sustainably nonviable, besides its failure with regards to visual and aesthetic aspects.
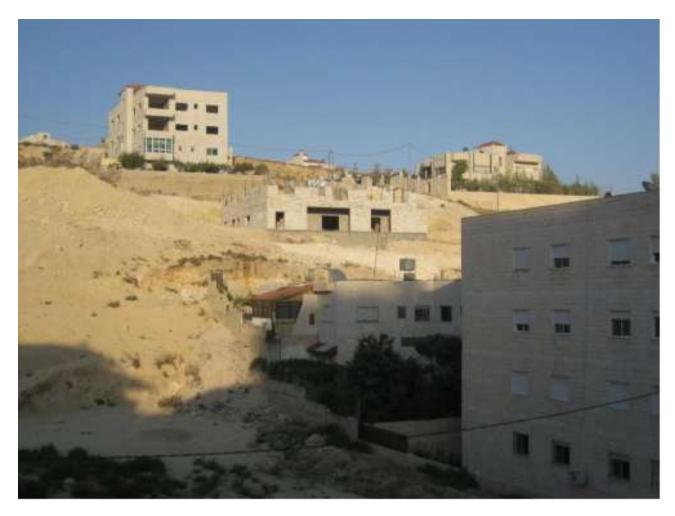
Fig. 9: Current Practices of Building on Slopes in a North Ammani Neighbourhood.
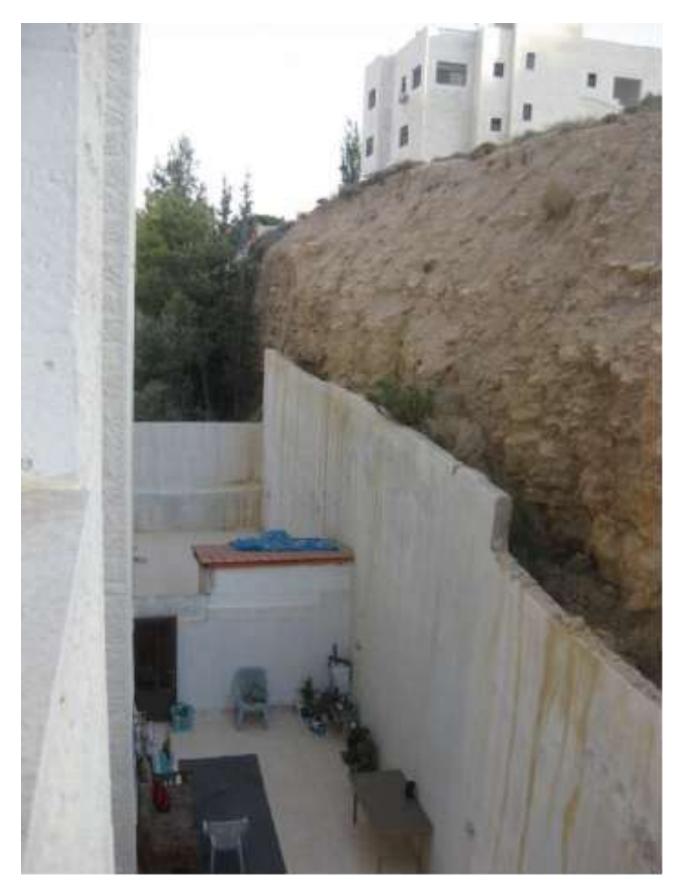
Fig. 10: Retaining Walls on Severely Cut Slopes.

1.7 Conclusions

The paper addressed several issues, and these issues are:

Analysed the challenges and opportunities provided by land topography in Amman and its effect on delivering sustainable buildings.

Provided recommendations about how the outcome of this research can help planners and designers in the early stages of the design process to have an insight into best strategies for passive housing layouts on sloped sites.
Provided a mechanism for the development of guidelines on preferred buildings orientation in hilly areas with regard to local climatic data.

Outlined major disparities between the two main residential building types in Amman, the Apartment Building and the Villa, and the best design guidelines for sustainable and passive viability on sloped sites.

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Minhocao Multiples Interpretations

Eliana BARBOSA[1]
(1) Architect and Urbanist, Master in Modern and Urbanism Contemporary Urbanism and Master in Human Settlements. Professor at the Architecture and Urbanism Department, Universidade Nove de Julho, Sao Paulo, Brazil.
   E-mail queirozeliana@hotmail.com

Abstract

The paper discusses the 'top down' planning approach used nowadays on urban redevelopment projects in São Paulo versus spontaneous manifestations regarding the meanings of the space of the city, using the new Urban Operation Lapa-Bras brief document and Minhocão's demolition plan as a case study,

Minhocao is an elevated express avenue that crosses the center of the city dividing districts and neighbourhoods, causing a huge impact on the landscape. However, unexpectedly, it also has a different meanings and interpretations – apart from being an equipment of road infrastructure– for the different groups that lives in its surrounding areas. For them the space is seeing as a park, an art gallery, a market and many other functions, as it is spontaneously appropriated in different ways during the moments of the day and night when it is closed for cars.

The paper debates different meanings from different stakeholders involved in the project for the area. Its shows how do the surrounding inhabitants live and relate to this specific space of the city, apart from the planers point of view, and, most important, how do they transform it, from a heavy and aggressive piece of urban infrastructure to a public space, an important social infrastructure that is part of their daily life.

Minhocao is, in one hand, from a' top down' perspective, a terrible loss of value for the land and building owners and a damaging and replaceable urban infrastructure for the planners. Meanwhile, for others, from a 'bottom up' point of view, it can also be considered as a social infrastructure for the inhabitants of its surroundings that, due to its appropriation, claim the space as their "place".

A "non-place" (Auge, 1995) or generic space for some, a part of their "piece" (Magnani, 1996) for others. These are the multiple interpretations that Minhocao has and this paper aims to discuss.

Keywords: *Urban Development, Infrastructure, Public Space, Sao Paulo*.

1. Introduction.

During the late 60's and along the 70's, a period of important economical and geographical growth in São Paulo, a decade in which the city's number of inhabitants grew 56% , strategic planning was used for the first time in a cohesive way, to organize the city's expansion.

One of São Paulo's master plan was being discussed and a number of road interventions took place in order to control the chaotic congestions that started to appear, due to lack investments on public transport, increasing incentives for private transport – in order to promote the car industry, back then the main economic driving force of the region on the 50's, 60's and the 70's - and an uncontrolled urban sprawl, causing an expansion of the urbanized area not predicted and never foreseen.

One of these interventions is the objective of this analysis. Commonly known as Minhocão , it is an elevated express way that passes thru the center, responsible for improving the car connection between the west and east part of the city.

It was part of a series of interventions at the center that did not aim to improve its urban space, only establish connections between the city´s different zones, using the central region as a crossing point, without any mechanism that could attract people or economical activities to the area. In this process, a fragmented and disjointed region was left behind, with very few private or public investments with the aim to enhance its urban environment.

Within this context, Minhocão is one of the most discussed interventions of the period. It is a 3,5 kilometres, 4 track express elevated avenue that crosses 3 central and highly 'verticalized' neighbourhoods of São Paulo. Constructed passing over existing avenues, in which high rise buildings were already placed without any retreat, it passes only 5 meters distant from some of the facades. Due to its size and profound impact on the urban landscape, it calls the attention of the public ever since its construction in 1970, during the military dictatorship.

Fig. 1,2: Minhocão views from below and above. Images from the author.

In its 40 years, several proposals were made in order to minimize its negative impact on the surrounding area, and since the 80's, after Peter Hall has chosen it as one the "positive great planning disasters" , its demolition it has been discussed.

In 2006, the municipality and its urban development agency EMURB, announced a plan to bulldozer the elevated express way. A range of discussions took place, many of the main actors involved were listened to – except the population that lives on the surrounding area – and a competition was launched by the municipality to generate design proposals, in order to envision different solutions for the area.

The designers could propose anything, as long as the structure was not thrown apart or completely disassembled, neither the use as a car connection should be disregarded. The brief of the competition was questioned by the participants, the actors and the Brazilian Architects Institute (IAB), that ceased supporting it, causing many architects to cancel their application. Nevertheless the competition continued.

The final design proposal, through an extensive analysis of the region and the daily life of the surrounding neighbourhoods, took advantage of the 'informal' uses and people's spontaneous social, economic and artistic appropriations of the site, making them the starting point of the design process.

This detailed and considerate look showed that Minhocão, apart from being a road, has another very important function. Since 1976 it is open only from Monday to Saturday, from 6h00 am to 10h00 pm, in order to minimize the noise effects on the adjacent buildings. This resolution, however, brought an unexpected use for this unpleasant urban infrastructure, that could not be disregarded. The lack of an adequate public space in these neighbourhoods triggers a surprising appropriation of its four tracks during the night and weekends. As soon as the tracks are closed for cars, they become available for the surrounding building's residents.

1.1 Minhocão's informal uses

Artistic Interventions: Both the spaces above and below the elevated are used by street artists, putting up temporary installations (as seeing in the two first images) and graffiti panels.

Fig. 3,4: Artistic Interventions on Minhocao. Images from the author.

Economical activities: Street sellers often occupy the space on the weekends, taking advantage of the floating population. Bike rent and fix "shops", foods and drinks tents, along with arts and crafts tends are the most common informal economical activities during the weekends.

Public events: A range of public events take place at the site. An open movie session, a path of a street race and a runway fashion show are some of the events that it hosted in the last few years.
Linear Park

Fig 5,6: Minhocao as a Linear Park. Images from the author.

Fig 7,8: Minhocao hosting Baixo Centro Festival. Images from the author.

Fig 9,10,11: Minhocao hosting Vodoowoop party. Images from the author.

Taking advantage of these informal uses, the proposal kept the elevated tracks and covered them. The space above was turned into a linear park open every day for the population. On the spots that Minhocão faces existing squares and open spaces, glass-made extensions were put, functioning as the entrances of the park (through lifts and stairs), as well as art galleries and popular shops for the users.
Final Design Proposal by Frentes Arquitetura - Sections:
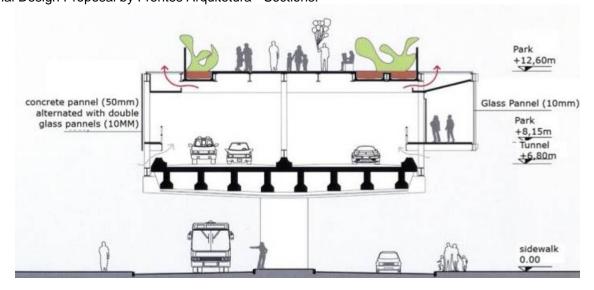
Fig. 12: Generic Section of the project, showing the tunnel with a gallery on one side. Source: Frentes Arquitetura.

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Along the 3,5km of the park the section adapts itself, according to its urban insertion, the height and occupation of the surrounding buildings.

Fig. 13: Photomontage of the project. Source: Frentes Arquitetura.

The design also won the first prize of the 7ª International Architecture Bienal of São Paulo in 2007, and was shown in the 10th Venice Biennale of 2006.

Time passed by, the municipal administration changed – from a right wing party to a centre-left party – but maintained its neoliberal orientation. Now, the master plan is being revisited and some special areas are being stimulated, in order to organize the spatial development of the city, with the aim of increase density in the sectors and districts that already have urban infrastructure, generating new dwellings and job opportunities.

Part of this process, the brief for a new plan of redevelopment was launched on May of 2010, containing an adjacent neighbourhood of the elevated highway. The plan consists on creating a new road and a linear park along the existing rail line, as a way of increase its density and stimulate real estate development of the area. This way, once the new road system is finished, there will be no need for the elevated express way as a car connection between the west and east zones. Therefore the plan suggests to destroy it, at the estimated expense of R$80 million (approximately 35,5 million euros).

This paper intends to discuss, crossing the different interpretations of this place, if this demolition is really necessary as part of the new redevelopment plan and if all Minhocão's functions (formal and informal) are being taken under consideration.

It is, in one hand, from a' top down' perspective, a terrible loss of value for the land and building owners and a damaging and replaceable urban infrastructure for the planners. Although, for others it has different meanings. From a 'bottom up' point of view, t can also be considered as an opportunity to some less wealthy inhabitants to live in a gifted area of the city and a social infrastructure for the inhabitants of its surroundings that, due to its appropriation, claim the space as their "place" .

A "non-place" (AUGE, 1995) or generic space for some, a part of their "piece" (MAGNANI, 1996) for others. These are the Minhocão's multiple interpretations.

2. Top down: The owners and planners point of view.

Minhocão is often seeing as a negative urban externality. Considered as a necessary infrastructure to avoid urban chaos when it was conceived, it immediately caused evasion of the middle class, until than predominant, of its surrounding blocks, due to its degrading factors (noise, pollution, visual barrier, among other). The process itself induced a downfall of rent prices, which eventually caused major property devaluation. Many of the buildings remained empty for some years, until the market value was balanced, at a

point when many owners had put their properties "on sale", allowing people from different social backgrounds to rent and buy apartments, beginning to live in the area.

Since its proximity to the center, to Paulista Avenue and to several wealthier – but saturated – neighbourhoods, the area still has the potential to become attracting again to the private investors, but Minhocão has always been 'standing in the way'.

Now, with the real estate market acting frenetically all around the city, in some cases developing housing and office buildings in areas that are not as well provided with urban infrastructure as this, the site called again the attention of the planners.

The current master plan of the city was approved by the city council in 2002 and it specifies several areas to be improved and stimulated – redeveloped – by public and private investments, through the offer of differentiated parameters of construction.
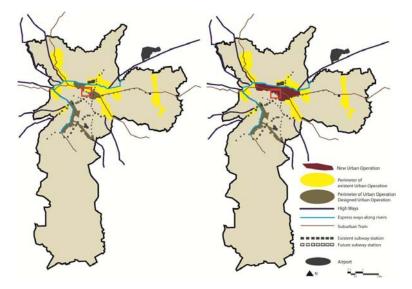
Fig. 14, 15: Urban operations and New Urban Operation. Maps from the author. Source: EMURB.

These areas share a lot in common: they are relatively well located in within the city, are close to existent urban infrastructure and have a history of being occupied mainly by industrial facilities, an economic sector that is decreasing its importance inside the city since the 80's, in a process similar to the European and North American experiences, but with a slower rhythm.

In a system of public auctions, an amount of extra squares meters are offered to real estate developers and land owners, in order to increase density and collect private money, applied latter in urban renewal and infrastructure enhancement and construction. It is supposed to be, according to the city planners, a virtuous cycle:

"(generates) more investments, increasing value, increased value attracts private investments, more private investments generates more resources and more public investments in that region of the city" .

Ten Urban Operations were established by the plan of 2002 and until today, only four were developed. Changes in the political administration, the lack of sufficient staff members in the urban development agency and secretary to develop new specific plans, the necessity of the approval by the city council of these specific plans and an economic crisis in 2002 – leading to a Real Estate crisis – are some of the reasons why none of the other Urban Operations got off the ground. Meanwhile, the real estate business - mainly on the housing and small offices sector – experienced an expansion cycle after 2006, due to some federal resolutions and economic policies, process that not even the 2008's global economic crisis was able to break.

Many critics have being made to this planning system, mainly by academics – some planners, architects and urbanists - regarding its tendency of increasing social exclusion, the lack of public participation and the control of the urban redevelopment process by the private investors, along with the European-north American mainstream urban geography and sociology analyses that highlights that the renewal schemes in developing countries are, in practice, "undertaken for commercial reasons rather than for social-welfare objectives" (PACIONE, 2001. Pg.539).

In this panorama, a new area called Lapa-Brás was proposed, adding three existing Urban Operations, summing up around twelve linear kilometres. The main goals of the new operation are:

> "achievement urban transformation, structural and social improvement, environmental enhancement, especially enhancing public spaces, arranging transport, deployment social housing programs and improvements in infrastructure and road system in a given area, the optimization of areas involved in urban interventions, divide and recycle areas considered underutilized, recovery and creation of environmental heritage, historical, architectural and cultural landscape, and stimulation of areas in order to generate jobs".

Fig. 16: Perimeter of the new Urban Operation - Lapa Brás . Map from the author. Source: Google Earth.

The aims are very bold. If accepted by the city council, this will be the bigger urban intervention of the city's history, especially considering the size of the project and its strategic position. Proposed to be the unification of several interventions and plans, its brief document contains the parameters of the studies to be hired, that eventually will put the plan together in order to be approved by city council.

The necessary studies for the new plan, according to the brief document, concern urban design, mobility infrastructure capacity, economic evaluation, environment studies and communication plans.

Public participation is not intended to be part of the process. Some public meetings, as a bureaucratic requirement, are planned at the end of each study, to show the results to the population, in a scheme of informative session, not participative construction.

Two major interventions are already determined: The necessity of changing the level of the rail line, allowing the north and south parts of the neighbourhoods to be reconnected and the demolition of the elevated highway – Minhocão – to be yet confirmed by traffic and mobility simulations studies.

The first resolution can easily be connected to the major aims listed above. These areas between the rail line and the river's express way are disconnected from the urban fabric, suffering of an island effect, causing massive damages to the urban environment and landscape. The main functions existent are soft industrial uses and logistics facilities. Due to its proximity to the center and valued neighbourhoods, eliminating the border set by the rail line is an important step towards achieving a better use and occupation of the area, attracting more coherent functions as residential, commercial and service.

Aiming to become eventually, instead of an isolated "in between" zone, a sequence of the existing urban fabric. According to its main goal, it aims to:

"Overcome the barrier of the rail line and the redevelopment of its edge, presented as an important structural element to order the territory, covering improvements of mobility and accessibility, the restoration of the urban fabric, the continuity of the circulation system, the possibility of occupying empty or underutilized areas, the induction of the occupation of areas already urbanized with new standards based on the increase density of population and built areas, balancing the supply of housing and jobs, the increase of soil's permeability, vegetation, and public spaces for socializing and leisure.

(…)

Starting from the complementary concepts of Landscape – set of natural and built elements that are seeing from a certain area of the territory) and Space (the accumulated result of society's actions – such as production, dwelling, leisure, or, summing up, the life that animates the objects that composes the landscape), the improvement of urban conditions and environmental quality may be understood as measures to diversify uses and functions, increasing built and demographical density consistently with the existent and planned infrastructure, increasing green areas an public spaces, improving drainage, adapting typologies, accessibility, mobility, properly converted in spatial terms and translated in urban form."

Regarding Minhocão's sector, the aims seam different from the main goals. The following sentences, withdrawn from the brief document, set the tone of what is intended by the project:

"[The removal aims] to promote the urban and landscape recovery of the areas close from the elevated avenue. (…)Recovering the urbanity of Amaral Gurgel avenue and Padre Olímpio da Silveira(…) Recovery of vast well located areas."

"[The removal] should allow the sprawl of the Higienópolis's qualities to this [Santa Cecília] region (…) shall provide the reinsertion of the blocks along its path. This re-qualification should be seeing on Vila Buarque and Barra Funda, besides it can, potentially, bring new features to public spaces of great meaning to the city, as República Square, Arouche, Santa Cecília and Marechal Deodoro Squares."

Apart from mobility, there is no consideration about the other functions – mainly as a social infrastructure – of the elevated high way. There is also no explanation on how to propitiate the urban "recovery", "reinsertion" and "requalification" desired neither the project of new areas that could possibly replace its social use.

The existent blocks are already connected, since the Minhocão does not interrupt mobility between its surroundings, as the rail line does.

Fig. 17: View from Rosa e Silva Street.Image from the author.

Two of the sentences listed above, however, begin to explain the intentions behind the removal. When the municipality's plan mentions "sprawl Higienópolis qualities" and "new features to [existent] public spaces" it does not only implies its spatial characteristics, but also social and demographical. Higienópolis is one of the richest neighbourhoods in the city. Its typologies are not the same as the ones in its surrounding neighbourhoods. This innocent qualitative sprawl means, in practice, erasing and upgrading existent housing typologies, without creating conditions to keep the inhabitants in the region, a process similar to what already happened in other Urban Operation's areas.

Different from the other underused areas that need "improvement of urban conditions and environmental quality" as the plan aims, the mentioned neighbourhoods and adjacent blocks of the elevated already presents "urbanity" enough.

What could be the problem? Which kind of "recovery", "reinsertion" and "requalification" are really aimed?

The humanist approach on Urban Geography, according to PACIONE (2001), recognizes two different structures in which urban space occur: Physical and Cognitive. If so, the same urban space can be seen in different ways, according to its individual and personal meanings, its users life styles and different background. To be able to construct or - using the planning term - develop urban space it is necessary to recognize both realities of the city: "the city as a concrete construction (thing) and as an abstract representation (idea), and examine how each influences the form of the other". (PACIONE, 2001. Pg. 22)

The author distinguishes the significance of "space" and "place", emphasizing the importance of the "construction of places" while restructuring contemporary cities, differentiating top down approaches as the ones that construct "generic spaces" and bottom down approaches when the attempt is to construct, develop, keep and transform "places".

The Structuralist approach relates the production of space to the economic relations, rooted in Marxist thought and class antagonism. According to this stream an important distinction has to be made between "representations of space" or "conceived space" made by planners and designers and "spaces of representation" or "perceived spaces", when they become appropriated by people, similar to the Humanist notion of "space" and "place". Therefore, part of the inability of São Paulo's planners to acknowledge the fact that Minhocão is a "perceived space" in the city originates on the fact that it was never a "conceived" social space.

Still through this stream, the different interpretations of city space rely on the antagonism of public and private space along with "city life". From one side one can find, on the public realm, "public culture", a space to socialize with others and where "shared citizenship is created", and in the other the "fear of other". According to Pacione, some contemporary urban groups (mainly middle and upper classes) don't usually appreciate the "encounter with difference", replacing open public spaces by closed and "sanitized" spaces, where "out of place" individuals can be excluded (PACIONE, 2001).

Architecture and planning are, according to structuralism, a product of dominant social groups. They reveal the power of these groups influencing the urban structure. In a way, the absence of recognition of Minhocão's area vitality comes from the fact that it's inhabited by those considered "out of place", a different interpretation from its users.

The post-modernist approach however differs from this perception:

> "The different urban landscapes are the result of this dialectic relationship between social practices and the physical. The same urban space can therefore have a different meaning for different social groups, a situation that can lead to conflict over the appropriate use of land (…) the urban landscape is the product of both culture and economy, and a proper understanding of urban environments must be based on explicit acknowledgments of this complexity" (PACIONE, 2001. Pg.162).

A point of view similar to the social science's regime theory:

> "regime theorists represent something of a synthesis of the two outlooks (Pluralist -liberals and Marxist-structuralists), control of capital outweighs other sources of power, but development process cannot be understood simply through examining a 'logic' of capitalism, since that logic is itself fabricated through human activity, including the resistance by other groups to capitalist aims." (FAINSTEIN, 1994. Pg. 264).

According to these two streams, in order to understand the urban environment in the proposed Lapa-Brás diagnosis and contradicting its traditional top down planning approach, it is necessary, as much as the economic study, a broader social study, identifying – not assuming – the region's inhabitants needs, their "perceived spaces" and the existent urban spaces' meanings and potentialities, in order to include them in the master plan and projects.

Not exactly an easy task for a neo-liberal oriented Urban Development Secretary. The discussion of "urbanity" – as the plan refers – or "liveability" – the equivalent urban geography term – should be employed in both objective and subjective evaluations: "the city on the ground and the city on the mind" (PACIONE, 2001. Pg 397). This accomplishment São Paulo's city planners are apparently still far from achieve.

3. Bottom up: Urban infrastructure appropriation and the making of urban Piece and Place.

"The one actor in the urban development process not yet considered is, in some settings, the most influential" (PACIONE, 2001. Pg.161)

Elevado 3.5 is a documentary wrote and directed by the architects João Sodré and Paulo Pastorelo; and the politic scientist Maíra Bühler, first prize winner of "É tudo verdade" Film Festival of 2007.

Alternating a sequence of images and scenes of Minhocão and its surroundings; with personal testimonials of twenty characters, inhabitants of its adjacent buildings, from different ages, social and demographical backgrounds and living in different positions in relation to the elevated high way: first floor, middle floors and last floors of the buildings, but all with something in common: a window or a terrace door facing the Elevado.

The delicate film reveals the complexity of the area's figures, but also several different typologies, building densities and possible urban relations and interpretations. To each of them, the elevated high way has a different meaning, with multiple relations between their urban space and "place". The words "pride", "life", "need", "leisure", "place", "home", "memory", "happiness", "sadness", "dream", among others permeate their imaginary, in contrast with the asperity of "recovery", "reinsertion" and "requalification", the planning terms mentioned.

When asked about what the window (or terrace door) facing the elevated high way means to them, many related the view with positive sensations. About the demolition, none of the characters that addressed the subject were in favour.

The close relation of the surrounding inhabitants with Minhocão as their "piece" and "place", along with the appropriation of it by, not only them, but by all the surrounding neighbourhoods residents, and – through the popular events, street art manifestations and happenings – by the whole city, raises an inevitable question: demolition for whom?

4. **Conclusion**

"The struggle over collective urban spaces and the representation of differences in them are indispensable elements for the advancement and spatialization of democracy. They introduce new political subjects and new rules into cultural and social life, and create possibilities for widening the exercise of citizenship, from the abstract realm of nation-state to the concrete realm of urban spaces" (PALLAMINI & LIMA, 2007)

Fig. 18: Minhocao and its users. Images from the author.

The present paper, through alternating São Paulo's current planning statements and resolutions towards urban redevelopment, with different theoretical approaches on Urban Studies (Urban Anthropology, Geography and Sociology) and a record of its inhabitants' testimonials, discuss the "top down" character of planning policies historically applied in the city and, in spite of it, the creativity of its population concerning urban informal and unexpected appropriation.

By architects, urbanists and planners Minhocão is, by consensus, an urban aberration. Product of an authoritarian act that "privileged the circulation of cars over pedestrians, and efficiency over socialization" , its construction by no means could be considered a good solution for the area.

But the city embraces the good and the bad planning practices. It forgives drastic design proposals and overbearing approaches; it adapts, copes with it and eventually accepts it as its own piece. People transform and appropriate urban space in unexpected ways that, in urban renovation processes, cannot be disregarded.

As a final revenge, what was a negative externality for some – the formal actors, land and building owners – became a positive externality for many – accidental figures that, because of Minhocão's existence, have the meanings to live in one of the most well served areas of the city in terms of job offer, public transport, educational and health facilities, overcoming decades of territorial exclusion and "peripherization". A spontaneous demographical process caused by economic dynamics, that the new plan itself intends to induce: the increase of inhabitants in the central area.

> "While many cities and citizens are linked into an electronic 'non-place urban realm', place – based relational networks that rely on propinquity and physical interaction – the key characteristics of urban places – remain central to the experience of human social, economic and cultural life" (PACIONE, 2001. Pg.24).

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Le Vie dei Mercanti | X Forum Internazionale di Studi

less
more
architecture
design
landscape

Drawings for Engineering

Laura INZERILLO[1]
[1] DARCH, Facoltà di Ingegneria, Università di Palermo, Palermo, Italy
laura.inzerillo@unipa.it

Abstract
In the representation of knowledge can not miss all those geometric, static, functional, and specialized notions in infrastructures that characterize the shape of a Civil Engineer. We take this opportunity to show how complex the representation of a hydraulic overflow, how bold is the company wanting to bring the cross sections, the view from above, the longitudinal section. And, yet how essential is the knowledge of descriptive geometry to determine the intersections of complex surfaces, the application of engineering has great feedback.
An engineer must know how to read and know how to make a drawing, must learn to identify the main characteristics, must be able to focus on the goals and be able to identify the reading of the representation of another author. An engineer must be able to express in terms of own project idea without has any limits of freedom of thought. Sometimes, in fact, a drawing doesn't have the fundamental informations about the representation and that is the limit of the project.
This study intends to show some drawings of civil works project requiring the knowledge and understanding of the fundamentals of descriptive geometry, without which the expressive potential of the author would inevitably be compromised.

Keywords: Civil Engineering, drawings, homology, sections

1. Introduction

Within the Civil Engineering and Environmental and Territorial Engineering training, the area of the Representation have sometimes a sacrificed and marginal role. Only from few years, in the Civil and Environmental Engineering Degree of Palermo has led the Drawing from 3 to 9 credits giving back to the graphic area a more suitable and dignified cultural position. In the educational difficulties of approach to class of students foreign to representation techniques, results essential to place the Drawing as primary tool for the divulgation of the project idea and not, like fundamental language in the professional engineering sector, as starting base in the communication of complex realities and structural integrations.
The professional approach predisposes the learners to a more careful listening, sure of relapse in qualitative terms of their figure of Engineers in the field work. The potentialities offered by different representation techniques become, in this way, a not only divulgative tool but also cognitive, of analysis and survey which completes either the moment of the reproduction of the real either the ones of design of the virtual. Appropriate the graphic restitution methods, confers to the learner the skill to be able to express the results of a study executed with diligence and attention, and with the mastery of the graphical means is possible to transmit to who will use that heritage as knowledge, as service fruition, as community heritage.
The applicative experience of a project material enthusiasms the learner which had to find himself to must possess the representation methods to tell that project of which isn't author, but of which could potentially be.

1.1 Representation of an hydraulic overflow

It's reported below the experience of an hydraulic overflow, of which the learner had to interpret the constructive and functional values for then translate them in graphics that would consider the different intersections, the different projections of the complex surfaces that make it up.

The overflow in hydraulic engineering is a particular artwork, which is being used to move away, or otherwise to separate part of the water from a canalization to an opportunely identified direction.

In general way its operation is in relation to a threshold, above which begins the water conveying to another conduit.

Exists different types of overflows: the weir overflows, the dischargers subject to saturation (chalice, etc.), the siphon dischargers and the dischargers with floodgates.

In the case of the exercise we had available documentary for a chalice overflow.

The flood drainage should be entrusted the predominant part to the surface dischargers, which will be arranged out of the body of the barrage.

The profile of the top of the facing downstream of the overflowable dam must be chosen so that the overflowing vein clings to it, without depressions, on all the height, namely that detach oneself after the summit threshold, providing in this case, with adequate devices, the ventilation below. In any case have to do, usually with the aid of models, the protective provisions from erosions at the base of the structure.

As a rule is to exclude the overflowability. If, in special cases, it is considered of having to have recourse, shall not be allowed the free fall of water among the buttresses, to support the overflowing vein for all the height the fall and it will be followed by the energy dissipation devices, protective from erosions of the bedrock.

The maximum flow rate to unload for the heaviest flood event expected must to be evacuated only by the surface dischargers. They may be constituted by one or more free thresholds or by thresholds equipped with automatic floodgates. In this second case, considered the hypothesis of non-operation of the floodgates, the flow rate of at least half the maximum that is provided to unload for the most burdensome flood event, must be evacuable with the free thresholds, provided, however, that in this condition the sharp clearance is reduced to values less than half of those listed above, subject to minimum of one meter. Where such surface overflows is meant to take the chalice type or similar, subjected to saturation, the size of them must be such that the level of saturation was higher than the maximum flooded increased by two-thirds of the net franc. Overflows of this latter species will be subject to specific tests on model.

In any case must be equipped with large ducts for the air supply to the passage of current from the vertical or subvertical shaft to the subhorizontal gallery and to any other point of singularity of the current.

The project flood flow rate of the surface discharges and all other associated works is assumed equal to the sum of natural flow and maximum flow into the reservoir from any waterworks in its tributaries (gutters, etc.).

The natural flood flow of the basin underlying the barrage is assessed by reference to a return period of not less than 100 years (T ≥100) for barrages with a height up to 10 m, giving rise to total volumes of reservoir up to 100,000 m3, and with reference to a return period of not less than 500 years (T ≥500) for the barrages with a height greater than 10 m (and up to 15 m) or that give rise to total volumes of reservoir above 100,000 m3 (and up to 1,000,000 m3).

The possible effect of lamination played by the reservoir should not be taken into account for the purpose of determining the said project flow rate, except for the reservoirs made specifically for the flood lamination.

The dischargers of surface must be made with fixed thresholds appropriately shaped, without moving parts of interception or regulation. The dimensioning of the overflows must be such as to permit disposal of the project flood flow rate with a maximum load (defined as difference between the height of maximum flooded and the top of the overflowing edge) witch respect the prescribed clearance. For new designs are not allowed dischargers of the chalice type, autoluring siphon type or any other type however subject to saturation (operating in pressure).

The barrages in loose materials must be non-overflowable and their surface dischargers must be made of masonry construction independent from the survey; in case they are adjacent to it or interconnected, must be made with linking techniques to the survey such as to prevent the triggering of siphoning along the contact surfaces.

For the masonry barrages the surface discharge can be made on the same body of the barrage (barrage partially overflowable).

If however, applying this criterion, the length of the overflow proves more of the same length of the crowning, it may be assuming that the barrage is fully overflowable; in this case the maximum hydraulic load on the overflow must present a clearance from the intrados of any service walkways equal to half the prescribed clearance. It's still to be aware of the danger of clogging due to the floating bodies, also in relation to the particular characteristics of the vegetation existing in the basin directed upstream of the barrage.

The overflow artefact must in any case be dimensioned so as to avoid that downstream of the threshold arise current depression phenomena and/or cavitative phenomena, also for the maximum values of the flow discharged.

The restitution of the discharged flows must be studied in order to avoid underminings or however not correct dynamic behaviours of the current to the foot of the barrage body, as well as dangerous erosions of the bed or of the downstream evacuator channel.

All these considerations of specially typological nature of operating and design are of fundamental importance for the realization of a graphic paper in which doesn't appear substantial geometrical differences compliance with the rules that serve as guide.

Fig. 1: View of an overflow in full-water condition.

From the Fig. 1 one can infer the importance of this hydraulic element always placed near close to a dam. It would be more opportune to speak about fundamental element of operation of a dam in the check of the water progress for a proper water operation of the natural landscape and man-made environment.

The operating conditions must to ensure a proper effectiveness both in the summer and in the winter. The temperature change undergone by the overflow, require a careful analysis of the elasticity range of the material deformation and the effort resistance of the safety valves and linking structures more generally. In this view, results of fundamental importance an accuracy in the representation, a precision in the sizes indicated and in the sections individuated in order to make some tests of seal which ensure a proper operation of the overflow. The responsibility, therefore, of the representation rises to a primary role in which cannot separate from the scientific both analytic-mathematical and geometric-physic. The representation become communication, but at the same time surveying and intervention tool, if necessary.

In the view from above of a graphic paper is of fundamental importance the apparent contour of the artefact. In fact, thanks to the representation of its view on a horizontal reference plane, we perceive the maximum

encumbrance and, particularly, being the inlet of the overflow an horizontal circumference, the apparent contour will be given just by its representation along the radius (Fig. 2). To make graphically that it is a "clove" surface, from a well-defined section profile, would enough to subdivide the profile curvature, made by the cross section of the artefact, and projecting in first projection the references for the representation of concentric and equidistant circumferences. These, in first, would closer and closer as you approach to the vertical inlet, up to be superimposed.

The longitudinal section in Fig. 3 is made at the height in which the overflow run through the underwater layer indicating, therefore, the behaviour of the underground waterworks of discharge and charge of the waters.
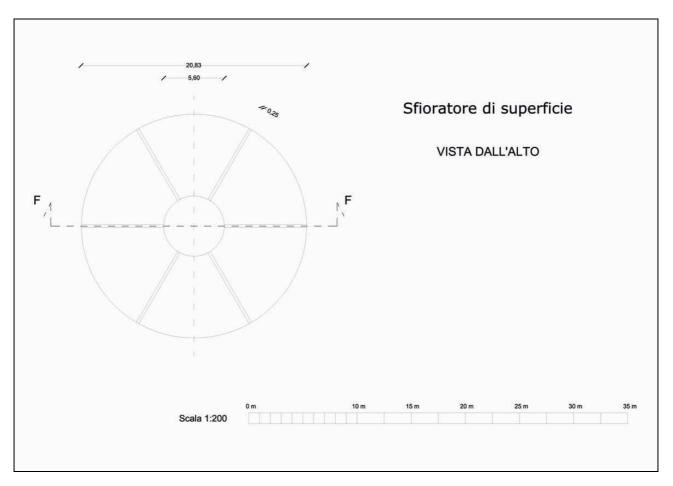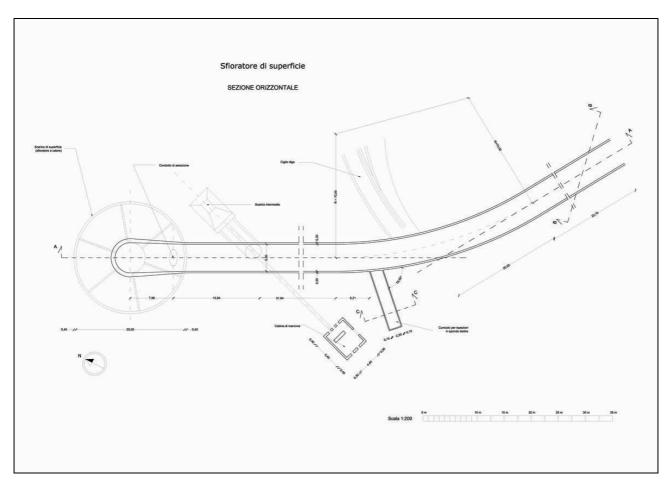
Fig. 2: Surface overflow: view from above

In reading the graphic paper evinces the projection of the apparent contour of the inlet of the overflow. This view turns out to be indispensable for a proper read of the artefact to comprehend both the proper structural and water operation and to read the correspondence of representation. Just for what was said, it reads the projection of the view from the above, as projection of something that is above the plane of section.

The tunnel for inspection, along which is made a cross section, is connected to the walls of the principal collector and this determines a connection of the section lines which does not permit the presence of triple points that would denounce a lack, under the knowledge profile of the science of the representation, unacceptable though frequently found.

Often, in fact, we witness to approximates sections, in which the section line is suddenly interrupted by others section lines, in which the planes of section are inexplicably staggered over other planes, in which the passage from material to empty space is fictitious and where the mix between projection and section is state of the art!

The interpretative clarity of the section mark is fundamental for a proper and in unambiguous reading of the real or the project idea, to start a study of renovation both material and structural.

Fig. 3: Surface overflow: horizontal section

Equally important is the precise indication of the sections that are realized and are presented as others project materials, often in representation scales different from the graphic paper one in its whole set. The graphic paper becomes communication, and the graphic communication make use of the sign conventions, and the sign conventions are based on logic and coherence of the indications that one represents in the various graphic papers. Often, in fact, one encounters in inconsistent graphic papers, where not always the information reported in a drawing are concordant with to what is reported in other views of the same artefact. This concerns the historical graphic papers, but also the contemporary ones.
Another element that deserves attention is the graphic scale. We see all types, large, small, white and black squares, in outline as frame, with numbers in bold or italics, in special fonts or not… in short, the creativity of the drawing seems to take shape when we arrive to the graphic scale! Ascertained the importance to report a graphic scale that will undergo the same deformations of the graphic paper, you come to the choice of a proper graphic scale, that is in harmony with the graphic paper and with its own explicit function. I mean that the graphic scale has the objective to give to the reader an immediate reach, in terms of volumes and encumbrances of the spaces represented. Therefore, without invading too the graphic paper itself, should be an element of aid and support to the reader or the user more generally. Should, essentially, be a "something" to consult if one needs it; should not be the first thing that attracts the attention of the viewer because in this case would rise to a starring role at the expense of the artefact itself, confusing the interpretation.
Graphic scales, then, yes, provided that sober and essential. Even in the shape of the frame of the graphic paper, but with fine mark and numbers in a font smaller and less noticeable than any other font in the service of the graphic paper (dimensions, references to section, etc.).
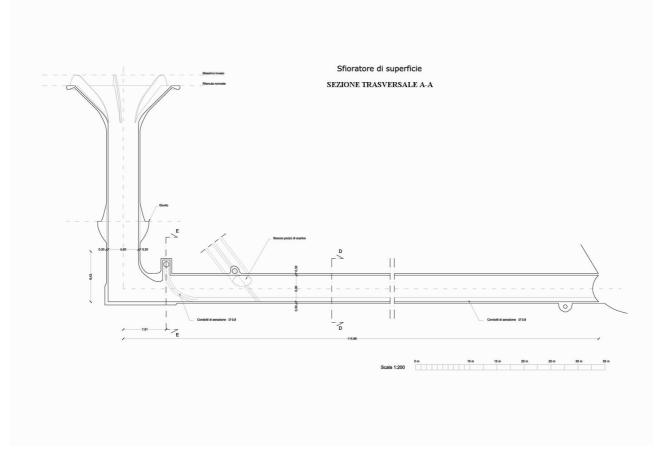
Fig. 4: Surface overflow: cross section

So, here we are to the cross section that cuts our artefact along the vertical axis and stops at the intersection with the underground linking cylinder (Fig. 4). The cut that we make should be indicated clearly, through a section line that then is referenced with its correspondent name; in our case it's the section A-A.

The cross section take account of the fundamental geometries of contour. Through a first analysis is perceived the geometrical form of the funnel, and the cylindrical bores that intersect in the various operating routes. The section line is identified clearly compared to the projection one; no triple point are identified and this is guarantee of accuracy and drawing responsibility. Are identified the thicknesses and are intercepted the reach entities with regards to the radii of the section.

The representation of further cross sections made at significant points, in order to transmit significant information about the profiles and on basic geometries, is a support of quality and scientific of the graphic paper in its entirety. The representation scale of this elements may also differ from the overall graphic paper but more often one follows to the project or contest instructions.

In Fig. 5 are reported the profiles of the sections made in different point of the artefact. The choice of these points requires a thorough knowledge of the artefact itself.
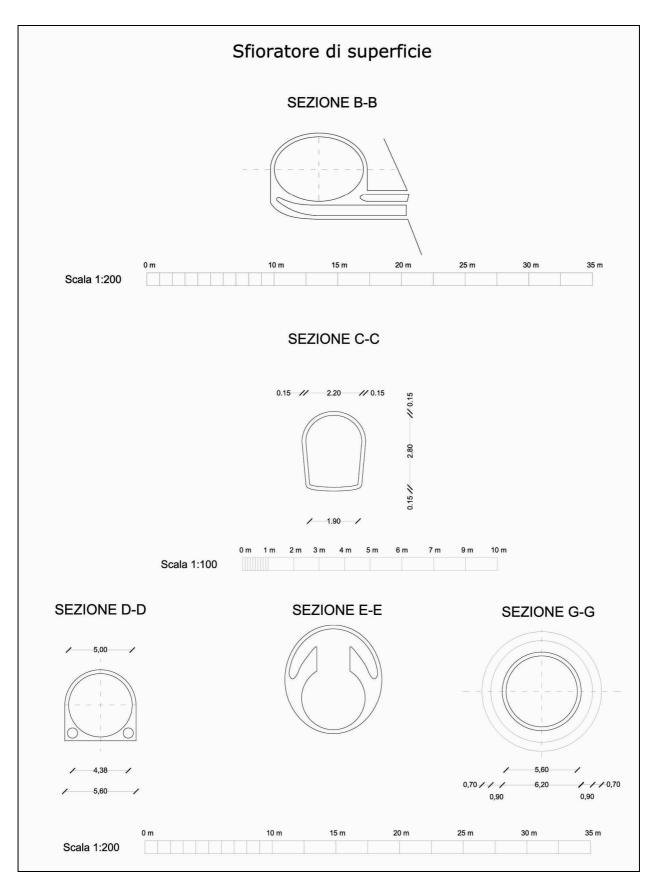
Fig. 5: Surface overflow: cross sections

Cannot miss in a representation of an artefact the three-dimensional view that males, more than multiple orthogonal ones, to an untrained eye, the overall geometry of the element.

The orthogonal axonometric view well lend itself when one represents a graphic paper of relative size like ours, in which one doesn't want to give a visual impact established in the territory, impact that would instead require the use of the perspective.

But, as in every representation, it's important to know to do but also know to read. In Fig. 6, for example, it's clear that we put with the upper inlet on a plane parallel to xy and the upper circumference becomes, in projection, an ellipse whose major axis is parallel to the t_{xy} track, and the minor axis is affected by the shortening of the maximum inclination line of the xy plane. Read this, it's easily reconstructible the belonging homological relationship of the xy plane and, consequently, it's possible to trace the real form and size of the geometrical forms also not having them in the multiple orthogonal projection graphic papers.
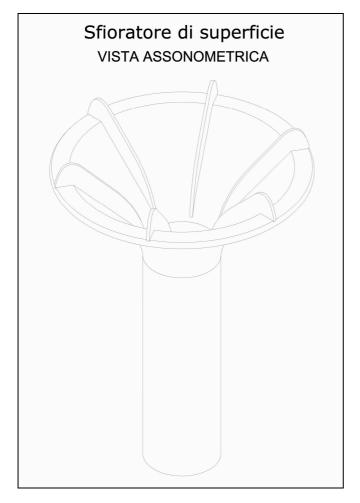
Fig. 6: Surface overflow: orthogonal axonometry

Finally, isn't negligible to pay attention to the form in which all this is being explicated. Often, in fact, the various graphic papers are unrelated to each other and, even if in Monge's projections, the correspondence between the first and second projections are completely neglected. Often we witness to graphic papers in which the plan (or view from above) over π_1 and the cross section (or front view) over π_2 aren't aligned along the development of the rotation of one of the two planes of reference but are one beside the other.

Is reported below the example of assembly of the graphic papers examined so far, as well as should be indicated in an overall project.
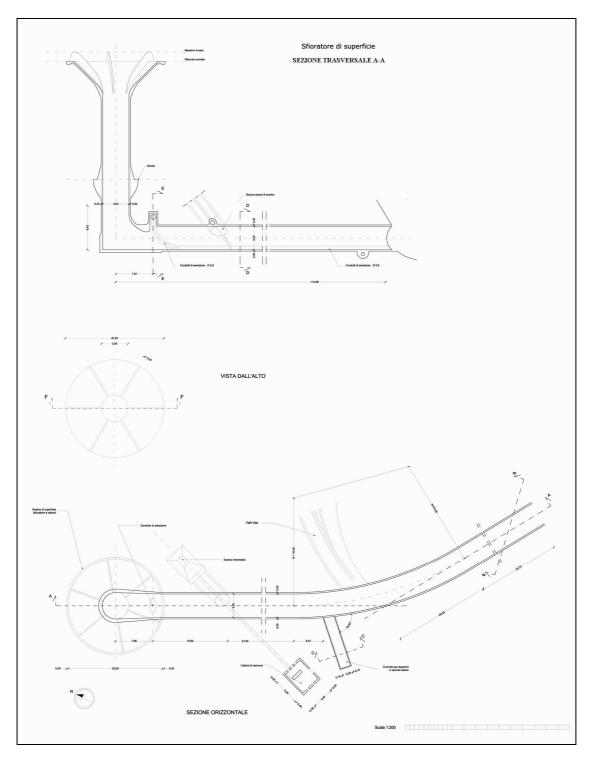
Fig. 7: Surface overflow: view from above and sections

Conclusions

We can conclude that the representation of an artefact is the more complex the more detailed and articulated is composed in its own externalization, the more complex is the artefact geometry, the deeper is the knowledge of the discipline. The absence of an objectification that makes it universalizable, on the contrary, the subjectivity of the choices that distinguish it, gives to the science of the representation a difficulty more and more extensive as the largest are the irresponsibilizing behaviours. Since from the choice of the representation technique rather than another, the scale rather than another, views, rather than others, the sections rather than others, makes the drawing a versatile and sometimes hostile discipline, but more than ever fascinating and of primary need, when one knows from deep, within the professions of engineers and architects.

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Environmental Planning: Case Study for Cocoa Coast Tourism Area – State of Bahia - Brazil

Cristina Pereira de ARAUJO[1], Marco Aurélio GATTAMORTA[1], Veridiana de Aguiar Coelho PINTO,[1] Fernanda RHEIN[1], Elisangela Ronconi RODRIGUES[1], Sérgio Bernardes da SILVA[1].
(1) Faculdades Metropolitanas Unidas, São Paulo, Brazil.
E-mail: crisaraujo.edu@gmail.com; mgattamorta@uol.com.br; veriaguiar@hotmail.com; fernandarhein@hotmail.com; elisronconi@gmail.com; sergiobernardes@gmail.com.

Abstract

This paper is intended to present an environmental planning methodology for small and medium scales based on the presuppositions set forth in Federal Decree No. 4.297 of July 10, 2002, which establish criteria for the Brazilian Ecological-Economic Zoning– EEZ.

The compilation of social-economic data related to the determination of the potential and emerging environmental fragility, in addition to the legal regulations, renders possible the performance of an ecological-economic zoning considering abiotic, biotic, social and economic variables (ABC method) intended for the ordering and development of any given region.

From this interdisciplinary point of view, the environmental planning precedes and supports the Brazilian municipalities upon the performance of their Master Plans, as its more comprehensive view of the set of variables of a territory for that specific municipality corrects any distortions and promotes the compatibility between development and environmental conservation.

To exemplify the method, we will work with the South coast of state of Bahia like case study. This region is a touristic zone called Cocoa Coast, near Salvador city, the capital of Bahia.These cities are tourism hot spot in Brazil and they are target of real estate speculation. The ABC method turns possible to define areas to the touristic use as well other land uses and preservation.

Keywords: environmental planning, economical-ecological zoning, sustainable development.

1. Introduction

Territorial planning in Brazil is considered something new, and even nowadays is considered as part of a general plan. Planning, through this point of view, is also considered as one of the subjects connected to the growth of the cities, even under a strong ideological content, and it explains the revitalization of the theme. For Villaça (1999), between 1940 and 1990 - the Brazilian Urban Planning, which had the idea of a master plan, hasn't minimally achieved the proposed goals.

Essentially agricultural until the 50s, Brazil would experience large urban and industrial outbreak due to the Fordism expantion of industries all over the world. Countries like Brazil at that time had an intensive industrialization as well as a national redisigning of territory, much because of Cepal (Latin America Economical Commission) reccomendation, created in 1948 by UN (United Nations), which had as its main objective the economical diagnose the causes of economical delay in Latin American countries. Industrialization had been the alternative proposed, in a nun animous decision, aiming to accelerate development.

In this context, the Federal Government was responsible for the infrastructure implementation and legislation to make industrialization possible. Under the slogan "50 years in 5" President Jucelino Kubitschek (1955-

1961) implemented the "Plan Goals for Brazil," and thus, the Brazilian process for road constructions was undertaken in the following decades as the automobile industry was implemented. It was the replacement of an agro-export model for an industrial model in association with foreign capital, which would let worldwide companies enter into the country. It was through this developmental and structuring plan of spaces that the Brazilian cities started becoming more and more urban and needing regulation and discipline for land use, housing problems olutions, clandestine subdivisions, sanitation, transportation, etc. If until the 30s, the planning of cities represented only beautification and the opening of avenues, during the 60s the urban problems would get more serious with the population growth. The Brazilian population rose rapidly from 41 million in 1940 to more than 190 million in 2010.

Considering those aspects, two questions should be clarified: the inclusion of environment as a parameter for the planning and the order of planning, gaining a connotation, from the national to the municipal vision. It's this way that after one year the Ecological-economic Zonning Decree was approved, introducing a new planning and land order concept, totally opposite to what was adopted earlier in the century, when the cities used to have their development from the city center to the outskirts, forming, pretty often, a patchwork like territory.

1.1 The Ecological- Economic Zoning as an instrument for an Environmental Planning

If Urban Planning in Brazil was just known by its ideological meaning, the Environmental Planning would only exist as a new vocabulary by the end of the XX century. This new nomination of planning was a result of the new environmental wave, which since Stockholm Conference, in 1972, started gaining a new format and midia space on territorial design planning speeches. The apex of discussion would only happen when definition of sustainable development had its classical definition: "sustainable development is the one that provides the needs of the present time without imparing the possibilities of future generations to provide their own" (CNMAD, 1991). The concept introduced by Brundtland Report, in 1987, became the preparation stage for the United Nations Environment and Development Conference, known as Eco 92, which took place in Rio de Janeiro.

Eco 92 contributed for a greater difusion of the environmental problem and introduced new planning paradigms involving the adoption of environment into the planning processes and territorial order. Through out this view, spaces would not be managed by anthropic interventions, but considering the interaction between biotic and abiotic and the human presence.

Many laws in Brazil were approved to ratify state actions with the adoption of an environmental sense and public policies. The 6938/81 Federal Law, which stablished the National Environmental Policy was certainly the first step in this direction (as part of the result of the Stockholm Conference, in 1972) which brings in its 9th Article the definition, that years later, would come as law regulations, stablishing quality environmental standards and evaluation mechanisms of environmental impact (Conama Resolutions - which publications started in 1986) or through the creation of protected territories (National System of Conservation Units – Law 9.985/2000) or through the Ecological Economic Zoning – ZEE – promulgated by Decree 4.297/02.

ZEE brought some news in its planning conceptions and territorial ordering, starting by the obligation to be followed when implamenting plans, constructions, public or private activities (2° Article). In its sole paragraph of the same Article it is stated that the ecosystem limitation and fragilities must be considered while distributing space for economical activities, which means an enormous space intervention advantage.

The contents, that contemplates the definition of each area, data for diagnosis as well as general and specific guidelines is expressed in Chapter III of the refered Decree. However, the lack of obligation in considering ZEE as a planing instrument in public, federal, district, state and municipal institutions make this powerful tool still neglected as a primary instrument for territorial zoning.This assertion finds support when consulting the Ministry of Environment electronic page it's possible to find out that the ZEE development process, in its macro or state scale, is moving ahead slowly and that there are hard difficulties to prepare the technical dignosis, to get to general and specific guidelines and then transform the entire contents in a decree.

In short, we can ensure that understanding the environmental planning through an Ecological-Economical Zoning is extremely important so that we can get to a turning point in the Brazilian planning history; which means understanding the territory through out the interaction of its abiotic, biotic, social, economical and cutural attributes that are essencial for sustainable territorial development.

2. Methodology

The area named Costa do Cacau (Cocoa Coast) lies in the south coastline of the State of Bahia, Brazil. The region concentrates the municipalities of Itacaré, Uruçuca, Ilhéus, Una and Canavieiras. It's the region that most preserved the Atlantic Forest, the most threatened tropical forest in the world due to anthropic action.

This happened, in part, because of the cocoa plantation (*Theobroma cocoa*), typical plantation of the region, that grows in the shades of big native trees. Because of natural beauty and its landscape value, the region is considered one of the Brazilian coastal tourist poles. For the preparation of the ecological-economic map of the region, the "ABC" methodology was used, considering the biotics, abiotics and socioeconomic variables, which are focused in this study.

2.1 Building the potential fragility chart – the variable A of envorinmental planning.
The methodology to determine the potential fragility of its natural environment and/or modified by human action was made by Ross (2001) about the morphological dynamics of its landscape, considered as eco-dynamic units, seen through the understanding of its natural dynamic between the environmental variables: climate, topography, rock formation, soil, vegetation, land use, etc.

Starting from these assumptions, building the potential environmental fragility chart on this study, we considered an overlay from the geomorphological mapping, as well as from the soil types organized by the Radam Project Brazil, in 1988, in which it was possible to identify homogeneous areas with types of topography and soil, assigning scores and weights according to the classification proposed by Ross (2001). After this mapping, we proceed to the classification of environmental units that resulted from the geographical processing of cartographic information in SIG (Geographical Information System), and the complention of the potential fragility chart, which brings, for each polygon, presents two different indexes: firstly for topographic variables and secondly for the soil variables. Through these information it's possible to valuate the fragility, if hard or light, of the units that make up the Cocoa Coast (figure 1).
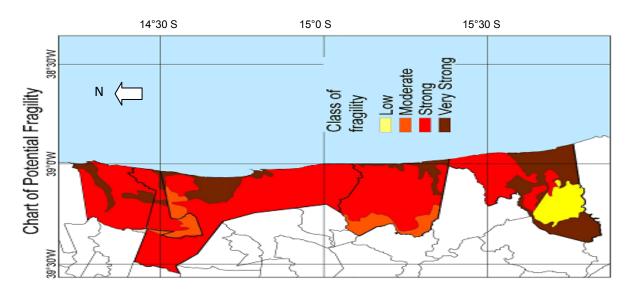
Fig. 1: Potential Environmental Fragility of the Tourist Zone of Cocoa Coast, Bahia, Brazil – produced by overlapping images of the geo-morphological and exploration of soil maps.

2.2 Understanding biotics data and legal regulations - variable B of the environmental planning
Understanding the biotic variables that envolve planning and the creation of protected areas in a territory, aims biological diversity conservation and its ecological interactions, as well as the maintenance of ecosystem for ensuring human welfare and effective participation of society in the process of creating and managing these areas.

Especially in Brazil, where its possible to find various kinds of biomes and an ample diversity of fauna and flora, which characterizes the country with mega biodiversity, planning becomes fundamental for protecting its biological and ecosystem services in local and global scale. However, human activities, particularly the ones related to economical and political subjects, exert strong pressure on ecosystems, that results in environmental degradation and human welfare reduction.

The variable B of the environmental planning involved the principles of the conservation biology. The basic principles of this science are based on important theories, like island bio-geography, geometry of the landscape, population and community ecology and, particularly the landscape ecology (Forman and Gordon, 1986) which allows understanding the spatial patterns of landscape and landscape scales. This science also

considers development and spatial heterogeneity dynamics as part of the biotic and abiotic processes and the management of its spatial heterogeneity for the benefit and survival of society (Odum and Barret, 2008; Risser et al., 1984).

Using SIG tools and the official data of vegetation (and its sucessive levels) of the focused area, we also created a map that provides the understanding of distribution of the landscape biotic constitution. As we are able to understand the scientific guideline aspects for the protection of natural environment, particularly the Forest Code – Federal Law 4771/1965 and the The National System for Units Conservation – SNUC – Federal Law 9985/2000.

It's important to mention that it's being discussed, in the National Congress and in the Chamber of Deputies in Brasilia – Capital City – changes to be introduced to the Federal Law 4771/1965, considering the aspects brought in 1999, with participation of the National Federation of Agriculture, which proposes flexibilization of use for Permanent Preservation Areas, as well as in some percentage of the Legal Reserve. However, both the Brazilian Society for the Progress of Science and the Brazilian Academy of Science, consider the proposals "without a solid scientific basis", as their proposal goes against planning and conservation principles, the main subject of this Case Study.

2.3 Building the socioeconomic diagnosis – variable C of the environmental planning
The historical and socioeconomic survey comes from the demographic census issued by IBGE – Brazilian Institute of Geography and Statistics. Through data compiling it was possible to get to the diagnosis of potentials and fragilities, from the socioeconomical point of view, for this group of municipalities. Here are the statistic information considered for this research. (Table 1)

Subject	Information	Goal	Possible Actions
Synthesis of Information	Population in 2010 Territorial Area Unit	Checking the population growth Population density Urban and rural population	Public policies of population control
Polulation and Housing	Income Years at school Age group	Population percentage with a formal working contract Educational level of the population Age pyramid	Educational public policies for the generation of employment and income
Agricultural Census	Area destined for rural zone	Percentage of useless or degraded land at countryside	Management of land use capacity and function and environmental fragility
Gross National Product - GNP	GNP by sector	Municipal economy predominance (primary, secondary or terciary)	Incentive for highlighted activities

Healthcare services	Beds and hospital facilities	Comparison of existing beds in hospital facilities with the number stablished by World Health Organization (WHO)	Investment in hospital network and health equipment
Education	Enrollment	Comparison of school-age population with the number of enrollments by level of education	Creation and management of vacancies in different educational levels.
Civil registration statistics	Infant mortality	Comparison with reference numbers published by World Health Organization (WHO)	Sanitation actions and breastfeeding
Temporary and Permanent crops Vegetation and forestry extraction Sylviculture	Municipal Production	Identify municipal primary production and its production value	Management of production according to the Environmental Fragility
Poverty e inequality map	Gini Index	Check the level of inequality	Employment and income generation

Table 1: Parameters analysed for socioeconomical data of variable C of the Ecological-economic Zoning and considered for this Case Study - Cocoa Coast – Bahia.

3. Results and Discussion

By the analysis and the overlapping variables A, B and C of the environmental planning, a Map of Ecological-economic Z oning (Fig 2) was pr oduced i n S IG e nvironment f or t he T ourist Z one u nder t his analysis. By doing that, five different zones were established for the information framing: (i) zone 1: maximum pr otection zone – with the f rame i n w hich t he d iagnosis had already p ointed out t he ex isting conservation un its of high pr otection, permanent pr eservation un its or areas t hat w ere considered w ith fragility strong and very strong (the variable A). They were considered bio-diversity priority areas; (ii) zone 2: buffer zone or transition zone between a maximum protection zone and a zone for other uses, as established by Federal Law 9985/2000; (iii) zone 3: for rural use of the municipality, due to its rural production, as well as for possible management according to the capacity of land use, where its prioritized for this kind of use the eutrophic s oil, m entioned by t he C hapter of E nvironmental F ragility; (iv) zone 4: c onsisted b y urban zone expansion, or c ontrolled u se z one t hrough t he pr oposal of A PAs (Environmental P rotection A reas, und er Federal L aw 9 985/2000), a v ery common s trategy i n c ase of c oastal ar eas, where it's necessary urban expansion control over intensive environmental fragility; (v) zone 5: consolidated urban area, demarcated on map of ex isting c ity. T he c haracteristics, per mitted us e, gu idelines and t arget f or t he Ecological-economic Zoning proposal is described on Table 2.
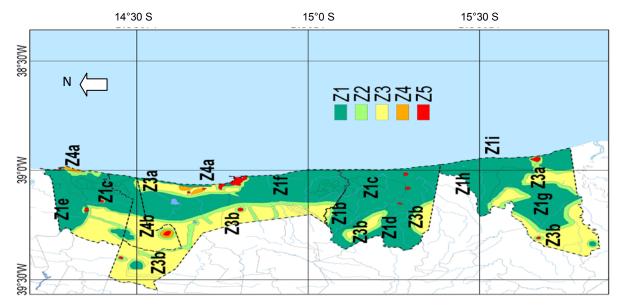
Fig.2: EEZ Map proposed for Tourist Zone of Cocoa Coast, Bahia Brazil.

Zone	Socioenvironmental	Guidelines	Permited Use	Goals
Z1	*Variable A* Coastal tableland – Pre Coastal; Red, Yellow Podzolic Soil. *Variable B* Ombrophilous Forest, from dense in advanced stage to medium in regeneration; Restingas (natural coastal vegetation) Mangroves. Presence of endemic species, which have restrict geographic distribution, like *Bradypus torquatus.* *Variable C* Small human pression due to tourism in the region.	1. Maintenance and extension of Conservation Units aiming the preservation of beauty and nature ecosystem of ecological relevance, defragmenting forest areas and increasing habitat for rare species or the ones being threatened by extinction. 2. Coastal Ecosystem Maintenance in its integrity. 3. Ensure and protect the style of living and the culture of traditional inhabitants, guaranteeing sustainable use of natural resources.	1. Achieve scientific research. 2. Development of environmental education and ecological tourism in accordance with the management plan and the conservation unit category (Federal Law 9985/2000)	1. Expropriation of plantation and rural housing areas with payment of indemnities and in connection with an incentive program for relocating people who live on palm fiber production *(Attalea Funifera).* 2.Elaboration a management plan. 3. Full Integrity maintenance of biodiversity and ecosystem. 4. Defragment the Atlantic Forest generating ecological aisles in the landscape.

Z2	*ABC variables* Zone that presents alterations in its original ecosystem functional organization, but it is able to keep the balance of a group of organisms in different degrees of diversity, even with the occurance of human activities with low environmental impact.	1. Vegetation recovering and enrichment in Permanent Preservation Areas. 2. Allow the connection between fragments and Conservation Units. 3. Protection and recovering of Permanent Preservation Areas	1. Housing and economical activities are under specific rules and restrictions according to the objectives of Conservation Units. 2. Family farming with agroforestry systems; 3. Restrict the vegetation edge effect.	1.Promote the recovering of the area. 2. Avoid edge effect in agricultural areas that use agroforestry systems.
Z3	*Variable A* Soil type Alic Latosol sites belong red and hydromorphic sites belong. *Variable B* Remnants of native vegetation due to agroforestry activities for cocoa production *(Theobroma cacao)* and fiber palm *(Attalea funifera).* *Variable C* Rural population	1. Increase the agricultural GNP (Gross National Product) and incentive perennial production. 2. Keep the population into rural areas.	1. Agricultural activities with incentive for Agroforestry system.	1. Develepment of rural cooperatives
Z4	*Variable A* High pontential fragility. *Variable B* Remnants of native vegetation *Variable C* Human settlements in expansion and not well structured.Touristic use.	1. Promote tourist urbanization along the coastal highway through the creation of an environmental protection area (APA) in accordance with Federal Law 9985/2000. 2.Home construction for low population density 3. Provide this zone with sanitation conditions.	1.Use for residential, commercial,service providers and hotels. 2. Touristic urbanization	1.Doing the project about management plan of this area (an APA) considering aspects of conservation between the other land uses, specially for hotels and resorts.

Z5	*Variable A* Topography: coastal plain. Soil: quartz sand and hydromorphic soil. *Variable B* Vegetation: full suppression of native forest *Variable C* Consolidated urban area	1.Expansion of the healthcare chain. 2. Expansion of school and college opportunities. 3.Expansion of treated water supply and sewage for the whole urban area.	1.Shops, residences, factories, institutions and parks	1. Improvement in health services, education and sanitation. 2. Generation of job and income for local population.

Table 2: Characteristics, Guidelines, Permitted Use and Goals to the ZEE proposal for the Tourism Area of Cocoa Coast, Bahia, Brazil.

4. Conclusion

ZEE is a powerful instrument for territorial order and planning of medium and small sized areas, however, the lack of an adequated cartographic scale, in association with the lack of updated information from census, allows just a planning project which needs reasearch and visits to the focused area. We understand that, for its accomplishment, not only the Federal Government, but State and Municipal as well, would need a considerable mobilization, in consortium operations with private inniciative to prepare the basis for a cartographic material which would enable knowledge, in SIG environment, for definitly provide information about the area preconized by regulations for ZEE in the Federal Decree. Every four years, updated data from socioeconomic census will bring more clear information about the socioeconomic dynamics that the country is experiencing.

It is time now to achieve that the Brazilian Government consider Environmental Planning as a priority, because Ecological-economic Zoning, as an instrument for territorial order, becomes more and more indispensable for the achievement of sustainable and well-balanced development.

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IN THE SHAPE OF A HOUSE. Recycling the wastes of the city on the Neapolitan coast

Fabrizia IPPOLITO[1]
(1) Facoltà di Architettura Luigi Vanvitelli, Seconda Università di Napoli, Aversa (CE), Italia
E-mail fabrizia.ippolito@unina2.it

Abstract

This contribution refers to a design research on discarded landscapes and buildings in the Neapolitan area carried on within the Laboratory of Architectural Design 1, prof. F. Ippolito, at the Faculty of Architecture of the Second University of Naples [1], on the basis of some previous researches on these issues and place [2]. Testing ground is the Domitian littoral zone, field of inquiry is the urbanization of the coastal landscape and its being mainly made of houses. As in Italy urbanization advances on the coast 30% faster than on the rest of our territory, as 60% of this urbanization is due to houses, as - on the other side - 20% of these houses is empty, testifying that the building process and the consumption of the land are not commensurate with the real inhabiting demands, and 10%, particularly in the South, is illegal, testifying the distance between the planning and the reality of the territory, to work on this city of houses, from the perspective of recovery and recycle, seems to represent an urgency for the requalification of the landscape and for the culture of design.
In Varcaturo, Giugliano in Campania, in the past decades a city of houses was born, an urban landscape where every building is in the shape of a house. In such a place, where the nature dissolves itself into built areas and the public space into private space, where an uninterrupted edification produces landscapes of waste, a design-oriented look deals with the houses and urban wastes. A three steps project – project of description, project of strategy, project of architecture – works at reinterpreting this territory and these materials, recognizing the value of waste and imagining actions of recycle and techniques of reinvention. Starting from the houses and getting in-between the houses, sprawl projects work at subverting the sense of what is here.

Key words: sprawl town/illegal housing; urban/architectural waste; public/private; description/project; strategy/tactics

1. Sprawl. The city of houses

Varcaturo, on the domitian coast, is a ghost of urban sprawl. The town of houses that has grown since the 80s from a freeway junction up to the sea is crumbled, interrupted, partially abandoned, and new presences fill in its interstices. After the advance of the cement and the movement of the population from the dense cities towards this coastal town, the territory seems to be in a shrinking phase [3]. Still latent, the city is getting empty, while in what is left from the withdrawing of urban life a landscape of uncertain spaces, uncultivated lands, residual activities and precarious inhabitants is advancing. It's the landscape of remains that urban culture is discussing in these years [4]; it's the mirror of a destiny that many Italian sprawl urbanizations share, blighting expectations and showing original faults; most of all, it's the result of a sum of daily building tricks, which reveal obtuse visions in the long time. If for some years we have been relying on the city of houses, which was born as a satellite of the main urban centres, depending on highways, resulting in a landscape of widespread individualisms counting on their supremacy on everything else, today this city shows its limits and its contradictions. Along with the crisis of an urban form that wastes the land by means

of infrastructures and buildings, there come the crisis of a way of living that produces marginalization and separation by means of enclaves, and the crisis of an urban system that is founded on occasional individual interest, on deregulation, on private appropriation of public space and landscape. Around here, the issues on which the diagnosis of the suburban crisis [5] is founded all over the world acquire specific connotations, traceable in the features of these places.

Varcaturo has nothing special if compared to other neighbouring sites, which are more resounding for better or for worse. It is a common piece of this coast, urbanized starting from a junction, marked out by an axe leading to the sea trough the plain, the pinewood and the beach, crossing the Domitiana and Coastal roads and the ruins of the ancient Appia Road. Nothing to do with Coppola Pinetamare Village nearby, well-known as an eco-monster, built for the Americans of the NATO in Bagnoli, protagonist of a complex affair of building speculation and legal battles that went on between permissions and prohibitions up to a symbolic intervention of demolition, emptied of the inhabitants, the locals after the Americans, today committed in buildings again, for the construction of a new port [6]. If a reference for the investigation of these landscapes may be ordinary landscapes studies, Varcaturo stands to Villaggio Coppola as Levittown stands to Las Vegas [7], and for this reason it may have a more general relevance.

This research proceeds from an investigation that was carried out on this same place ten years ago, when urban sprawl, whose devices of growth are set out by a multitude of individual enterprises, was still under exploration in the Italian territory, and when its declension in the Neapolitan places could contribute to demonstrate the false generic of sprawl town and its dependency from site specificities. Around here the town of houses is mostly illegal, it deals with a landscape of dunes and special vegetation, with archaeological ruins, with the sea, with the presence of American settlements and radars. Around here in the 80s there was the expectation that the way of inhabiting that produced the sprawl town would sediment, within a city which was made of sum of houses, fed by the displacement of Neapolitans to north-west, but also by the economic growth, the investment in buildings and the effect on concrete's entrepreneurship of the post-earthquake extraordinary funding. Around here many houses were built outside of the procedures of the Municipality Plan, which is dated to 1981, they passed trough three amnesty for infringement of local building regulations, moved through the constraints of building regulations, protection laws, regional landscape plan and military security. Around here, within the game plan of the territory, the matches of the inhabiting took places, being played by variations on a few main moves concerning the construction, the widening, the adaption of the only element of the house. In a game time that is the daily progressive time, which insinuates in the long time of planning, a variety of private players matched against the only public player, slower and more distracted, playing parallel matches, pursuing individual interests, sometimes looking for alliances in order to maximise the advantages. Every so often the game is interrupted for the breaking of rules, the player is eliminated or, paying forfeit, returns with the amnesty. The game moves concern the five steps of the building process, the delimitation, the foundation, the elevation, the covering, the wrapping, and the five correspondent elements, the fence, the ground, the skeleton, the roof, the envelope, being declined in lots of ways, influenced by compromises between specificity and standardization, capable of innovation and rebellion. Every so often some help is needed, such as the imitation of the neighbourhood, the memory of a material culture, the suggestion of an imaginary drawing from time to time on local, modern, exotic or ancient examples, the instructions of the do-it-yourself magazines. The result of the matches' sum is a town made of houses, where the house is the shape of every building, available for hosting any use, delegating to additional signs any specification [8]. To describe the construction of the city as a game, focusing on the house, aims at schematizing the moves of the everyday inhabiting, revealing its tactics [9], in the hypothesis that in this landscape the house can be read starting from the tactics and the territory starting from the house [10]. For effect of daily tricks, the fences are devices of appropriation, of both the ground and the pinewood, devices of aggregation of many houses along a private road, devices of shielding of buildings growing behind the walls; the ground is excavated, increased, moulded to gain cubage, drawn by gardens; the skeleton is prepared for elevations and raisings, it's turned into generic architectures, in the shape of a house, or it's naked, in stand-by; the roof is inhabited, under the pitches or over the floor; the envelope is articulated with fillings of balconies, addiction of volumes, variations on a cluster structure reflecting the expectations of growth of the family.

Today these expectations seem to be contradicted. Here and elsewhere these devices, after being investigated, revealed, vivisected and then summarized in the portrait of the landscape of a multitude busy earning cubic metres on nature and on empty spaces, show an unexpected sterility. Here and elsewhere, the territory shows the contradiction of the sprawl model – exemplified by Los Angeles in the literature [11] -, the limits that are implied in the superimposition of an interpreting model to the territory. Here and elsewhere in the South Italy, the effect of a building that went on outside from rules and plans show the ineffectiveness of both a consenting and law-abiding approach – submitted to a revision in the literature –, the limits of an only

legal approach to the territory as it is. While in the last years the urban investigation was engaged in searching for points of view and narrative ways that could be suitable for representing the landscapes of sprawl, being grown in Italy without any care, these landscapes kept on transforming, imperceptibly dissipating as imperceptibly they had grown. The observation, satisfied with itself, risked to get stuck in a mannerism of description, to forget its object and its very reason: catching the mutation in the city [12]. Yet that investigation had the merit of unhinging the interpretation of the territories by zones and quantities, of catching the devices and phenomena beyond the urban form, of promoting a lateral look which is capable of overcoming the pretension of objectivity of both zenith visions and data. Today the same approach, which produced among its side effects the falling in love with sprawl and self-construction, can exercise the same look in following new mutations.

1. Fading. The landscape of wastes

To go back to Varcaturo, and to Italian sprawl town, years after its revelation, discloses a new condition, and maybe also newly oriented interpreting eyes. After the sprawl, the issue of economic and environmental crisis, the urgency of an inversion of tendency and of a project of recycle affect, in their many declensions, the urban debate. The paradigm of sprawl is replaced with that of shrinking, the model of Los Angeles with that of Detroit [13], and the suburbs are indicated as the place of evidence of the crisis and of necessity of repair. The view from inside the inhabiting dynamics catches the processes of abandonment, disuse, and the residual materials of these mutations. The view from above returns overall pictures of the suburbs at their tipping point, succeeding the previous close view's detailed pictures of the materials of the sprawl town in its making [14]. The going across places shows houses for sale, disaster houses, wild gardens and abandoned productive and commercial buildings. The statistics report data about loss of inhabitants, extinction of productive and commercial activities, pollution, consumption of ground. In Italy the warning includes the degradation of the landscape and, especially in the South, the unauthorized building. In this framework sustainability and recycle [15] replace development and expansion, and the densification of the built areas and the protection of empty spaces are suggested as a recipe to stop the sprawl.

In Varcaturo the tangle of unheard expectations and not programmed, in great measure illegal, choices, along with the protracted distraction for this littoral zone, which has been excluded from both a local and a wider planning vision, show their effects. A common destiny binds Varcaturo to its territory, wasted landscape and mass of wastes, place of speculation and illegal actions, of short-lasting visions whose outcomes are already implied in their assumptions. If this landscape can be interpreted, through the houses, on the basis of the inhabiting tactics, the long-lasting vision is excluded from its beginning: the tactics respond to occasional demands and circumstances; they're deep-routed into the present and don't look at the future, so that even in the most immediate future they find their intentions exhausted. Today the inhabiting tricks that animated the matches of building the city of houses stop, suspending the game, in front of their own contradictions.

The houses, which have grown bypassing rules and plans, adopting expedients to conquest ground and volume, are depreciated, penalized by the quality of the contest and the lack of permissions, and turn out to be illusions of real estate goods – two levels single family houses, between 200 and 300 square meters surface, garden, medium-price 1500 euro for square meter, building permission as not granted surplus value, a more and more declining market, besides the crisis because of the uncertainty of amnesty for illegal building and the recent judicial attachments and demolitions [16]- ; the town, which has grown taking advantage of empty spaces, inventing building lands, privatizing roads and hiding behind walls, reports the absence of infrastructures and services, and turns out to be a simulacrum of a real town – lack of primary urbanization works, electricity, hydraulic and gas network; lack of garbage collecting and road maintenance; insufficient services, 1 nursery school, 1 police station, 1 church, 1 bank, 1 postal office, for the number of inhabitants, around 6,000 registered in Varcaturo, around 30,000 on the coast; polluted grounds belonging to the nature reserve of the domitio-flegreo coast, one of the 6 polluted areas on 55 Italian nature reserves [17]; the population, which has grown by individual movements, some of which are clandestine, complains about administrative negligence and asks for local autonomy, turning out to be the latent form of a real community – in July 2009 the Municipality of Liternum citizens' Committee was born, with the goal of a referendum for the autonomy from the Municipality of Giugliano in Campania of Licola, Varcaturo and Lago Patria hamlets, to be merged into the Municipality of Liternum; in the September 2009 the proposal was presented, with more than 5,000 signatures, Regional Council's favourable opinion, Town Council's negative opinion and following swing of opinions; the referendum, which is scheduled for the next Spring, will not be binding [18]-. While the urgency of an urban reparation emerges, the buildings depreciate, the fabric crumbles and the inhabitants bring themselves into question: the houses are available to other uses; the town vanishes

towards another condition, the community goes through abandonments and replacements, and new tactics activate new imperceptible transformations.

In a three steps project, the first step, project of description, collects these observations in a critical map of the places, including spaces, materials, people and uses and representing the fading in its many variations. Some images can work as examples: in the urban core the public space disappears among the fences of the houses; on the main road the density of the commercial street vanishes into the hinterland and coastal landscapes; in the agricultural plains the green dissolves under the buildings, in their turn dissolving into the uncultivated green; the pinewood is eroded at the borders, as well as the Mediterranean scrub, by buildings being engaged in compromises with vegetation; the Roman road, appearing for a stretch, disappears among the houses of a village, which crumble in front of it; the public beach vanishes among the private lidos, themselves disintegrating from North to South, and it's populated with evanescent inhabitants, who follow the seasonal and daily cycles of use of the coast. If fading, by definition, is the effect of a progressive disappearance or appearance of images, the fading, even more than the waste, can be the landscape's interpreting key, which leads to include in the project the wasting process.

Kevin Lynch's interpretation of the wasting as part of the urban life resurfaces, along with his representation of the world without wastes and the world flooded with wastes as two opposite and extreme nightmares [19]. In that interpretation the sprawl town, more easily than other urban forms, can regenerate from its end, thanks to the quantity of open spaces, the fragmented quality of the buildings, the incidence of the connections. This vision, probably more than those of the new regeneration manuals for the suburbs in crisis [20], looks at this town in a perspective of mutation. Another perspective is the reparation, meant as an opportunity for innovation rather than as a re-establishment of lost functions [21]. Densification, rarefaction, grafting, re-naturalization are some techniques of intervention, which work on the existing subverting the relations, re-inventing the form and the sense of town and architectures. The design debate moves between the two opposite intentions of fighting or accepting the sprawl, by turning it into urban centres or dissolving it in landscapes. Re-edition of public spaces and monuments introduce cores of recognition and resistance in the suburban generic [22]; multitudes of addictions extensively densify the sprawl town [23]; the ground is a plot for new urbanities that can be obtained by grafts of public micro-spaces in the private town, contaminations of urban fabric with agricultural one, land reclamation turned into landscape design [24]; urban residues and buildings in abandonment are ground for not codified projects and actions from below [25]; interrupted works are monuments, in memory of mistakes [26]. Named *drosscape, junkspace* or *third landscape*, the landscape of waste finds its way through the urban culture [27]. Yet the waste is still uncanny in a world that claims for recycle, for an ecological third industrial revolution [28] and a design process that resets to zero the production of discards [29]. The contemporary global call for sustainability seems to go closer to the Lynch's cacotopia, setting against the present world of wastes a future no-waste world.

In Varcaturo, the landscape's weak traces raise questions on its future, which refer to the debate on repairing sprawl, but most of all refer to low definition as a condition of this place [30]. If this territory is neither city nor countryside nor nature, demonstrating the fading of these notions, according to the urban debate, this condition could be a focus for the consideration on the site. And, what is more, if this city is illegal and it is grown up with no common perspectives, illegal housing is a feature that specifies the low definition here. The different perspectives of turning the latent city into a modern one, of working on it with a weak and sprawl approach, of accompanying its wasting away, which have been stated by recent studies on the illegal town [31], could as well concern the sprawl town, which is going through a crisis all over the world, and could all the more concern such a place like this, where sprawl and illegal town are joint. Whether the hypothesis of self-government for this coastal city is approved or not, the hearth of the matter concerns its character and its vision: if it is named city, which idea of city it represents. In this sense the population's internal debate, to be carefully evaluated, may be significant: whereas the demanding of infrastructures and services to the administration fits with the idea of distance between politics and practices that produced the illegal city, the shifting of the debate from the demand of facilities to the proposal of self-government may turn the reflection to an intermediate level between politics and practices and to a much more complex interpretation of the relationship between public and private space.

Within the design research, the strategic design phase, applied on some sample areas, takes as a background the fading of the territory at its different degrees and works on intermediate levels between politics and practices, public and private, open and closed space, nature and building, recognizing fraying, dissemination and contamination as opportunities for the project. Therefore, if to provide with the basic facilities the inhabited core of the town is a necessity, to infill with sprawl public spaces the porosity of the settlements and the textures of agriculture and nature, or to accommodate the lacking services in the abundant abandoned buildings, or to include ancient ruins and new discards in landscape plans, or to relate with each others the residual public spaces of the privatized shore or, finally, to consider the dissolution of

part of the building, imposed by the demolition ordinances, as a process in progress and an occasion to accompany the wasting away are all possibilities to get indications from the existing, giving form to a collective space which can house the fragments of the sprawl town and the desires of the multitude that gave birth to it. In such a frame, the centrality for the urban core, the respect zone for infrastructures, the total preservation for agricultural, natural and archeological areas, set as imperatives, seem to be outdated and, above all, the urban categories they refer to seem to be obsolete. Their fading away, both in the reality of the territory and in the theory of the city, suggests a design scenery where rare high-definition points allow wide low-definition areas.

The low definition concerns architectural design as well as urban design, when architecture deals with variability, incompleteness, lack of means, when it works on time, on accidents, on possibilities, trying to make the most of the least. Recent design experiences suggest an adaptive attitude, which everyday inhabiting landscape unwittingly exemplify [32]. From that landscape, all the more in the face of abandonment and crisis, architectural culture learns the pragmatic and subversive approach, the aptitude for doing with what it has got, imagining what it could become. The project works by steps, bets on a few main things, foresees progression and variation; it feeds on the existing, forces its uses and forms, gaining new spaces and functions by small moves, taking advantages of the spaces of open-endedness of the rules and uncertainty of the plans; it intercepts bottom-up actions, recognizing population as an active multitude. Keeping away from any rhetoric, participation as well as recycle, it faces their issues through the action. It is a tactical project, either not being able to establish strategies, or accepting that strategies are carried out by not prearranged steps.

In Varcaturo the skeletons, the waiting frame structures, the houses that are available for other uses anonymously ask design questions about interrupted work, progressive project, relationship between denotation and connotation, within a context of sprawl uncertainty. In Varcaturo, the city that has been produced by private actions asks questions about public space and landscape, within a conflicting context. In such a context, the tactical aptitude for deviation, dispensation, exception, which allowed the private city to advance at the public city's and landscape's expense by sums of individual moves, could turn into a last resource for the public city itself, constrained to regain terrain by sneaking into the buildings, forcing the fences, occupying disused and empty spaces, aiming at total transformations by sums of single actions.

Within the design research, the architectural design phase goes along with the strategies through punctual interventions, which gather from inhabiting practices the aptitude for varying elements and moves, according to necessities and intentions, so as to restart the interrupted game of the territory's construction with opposite goals. Therefore, the fence, the soil, the skeleton, the roof, the envelope, which were the protagonists of the houses' composition, reappears in countless versions in the composition of spaces and architecture, which, starting from the houses and getting in-between the houses, trace a collective frame. The fence is confirmed, broken, cancelled, as to manipulate the boundaries between open and closed or public and private spaces, by delimiting rooms in the landscape or fluidifying the intervals between the buildings; the terrain is reclaimed, asphalted, cultivated or re-naturalized, worked in its depth, turned into spaces of hybridization between city and nature; the skeleton is naked, partially or completely filled in, repeated, magnified, taking advantage of its elementary structure and its condition of open work in order to accommodate systems of services within architectures turned into a system; the roof is base for controlled additions, container of interiors, last floor, providing habitable spaces and additional viewpoints on the landscape; the envelope is articulated, pierced, shaped, as to insert spaces and performances, converting existing buildings through carrying mutations parasites. Once uncovered the game, the public city looks for its revenge on private city by borrowing its moves.

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The documentation of cultural information used as vehicle for regional sustainable development: the case of olive culture

Spyridoula ARATHYMOU
Department of History, Archeology and Management of Cultural Goods, School of Humanities, University of Peloponnese, Kalamata, Greece.
E-mail: pipiar@gmail.com, pipiar@yahoo.com

Abstract

This paper is about a three- year research program funded by European Union and partly by Greek funds under the title: "The documentation of cultural information used as vehicle for regional sustainable development. The case of olive culture". The research is carried out by the author and hosted by the University of Peloponnese, School of History, Archeology and Cultural Management in Greece. It will be realized by the end of 2014.

Olive culture has been part of the Mediterranean culture for centuries and part of the global culture, as well. Olive oil has been a wealth - producing factor of the areas where olive grows. Unfortunately, through time the rest of olive's culture elements seem to vanish, knowledge, practices and techniques of hundreds of years are likely to be lost. Also, the olive cultivation areas face severe financial problems and seek for solutions. The reuse of the elements of olive culture in a new perspective has the potential to give to these areas the solution they look for.

The project's aim is the recording and documentation, in accordance with existing standards, of the whole of the scientific information of olive's culture (recording and documenting traditional and modern methods of cultivation, the olive groves, production techniques, products, production facilities, tools, and written testimonies, local traditions related to olive) in the prefectures of Messinia and Corfu (which includes the island of Paxos and Diapontia Nisia), oil producing areas of the past and present with different socioeconomic backgrounds, and using its results by their representation in electronic environment with open access for the public via Internet and by various methods such as seminars, workshops, study visits to strengthen social and economic development of local communities, but also to their use in areas with similar socio-economic characteristics.As far as it concerns the project's originality, it is the first attempt to document all the cultural elements associated with olive culture in Greece and abroad. It is not only confined to the documentation and promotion of technical culture but combines folklore and intangible heritage with cultural landscape heritage to promote regional growth. Although, the culture of olive is attached to Mediterranean culture, in the World Heritage List no olive oil cultivation areas are included as cultural landscape heritage although vineyards and other cultivations are. So far, across Europe and especially in countries where olive is cultivated, the documentation of cultural elements associated with it is limited to a partial or patchy record of the technical culture of olive such as machinery and production tools, and factories, mills, soap factories as architectural monuments of modern heritage. The olive museums in the Mediterranean countries have documented the technical olive heritage and some of the offer also educational programs for the traditional methods of oil cultivation and production and have historical archives, library and art departments specialized in olive culture. There are also recordings of archival material relating to oil production and the traditional olive oil soap. Occasionally, the production techniques of olive oil and traditional olive oil soap are documented as intangible cultural heritage by official government agencies and scientific instruments. The cultivation methods of olive trees, traditional and contemporary, have not been documented as intangible cultural heritage and the olive groves have not been documented as cultural landscape heritage according to scientific documentation standards, techniques and practices.

This project intends to suggest how areas of these local economies could improve with the help of the total documentation of olive culture. It is the first time that cultural documentation aims at enhancing local economy and proposes development models.

TECHNICAL / SCIENTIFIC OBJECTIVES

- Recording and documentation of all cultural goods associated with the olive in these areas, in accordance with international standards of documentation for each category of cultural goods. The recording will be done through field research.
- Evaluation of the documented cultural information. Methods' design for its dissemination in society.
- Promoting the documented cultural information to society, via Internet. Organizing the documented cultural information in an electronic environment (databases, electronic directories, multimedia, etc.) which will be accessible via Internet for users' information and education.
- Application of cultural information promoting methods (except for Internet) to a variety of socioeconomic groups in order to educate and improve local economies. Possible methods are: seminars, workshops, study visits, conferences, contributing to the content of courses at all levels of education
- Review of the first results from the transfer of knowledge to users

Keywords: documentation of cultural heritage, olive groves' cultural landscape, Mediterranean region

Section

Olive culture has been part of the Mediterranean culture for centuries and part of the global culture, as well. Olive oil has been a wealth - producing factor of the areas where olive grows. Unfortunately, through time the rest of olive's culture elements seem to vanish, knowledge, practices and techniques of hundreds of years are likely to be lost. Also, the olive cultivation areas face severe financial problems and seek for solutions. The reuse of the elements of olive culture in a new perspective has the potential to give to these areas the solution they look for.

This research aims to record and document the whole olive civilization and its use as a factor of social and economic regional growth. It is a long lasting, multilevel and interdisciplinary research which involves information, social, economic and environmental sciences. It also includes tangible, intangible and cultural landscape heritage.

The first innovative element of this research is that it will attempt to record and document, as cultural goods, in terms of cultural landscape heritage, the olive groves of two Greek regions, Corfu (which includes the island of Paxos and Diapontia Nisia) and Messinia, the local olive tree cultivation, production of olive oil and traditional olive oil soap methods as intangible cultural heritage. In 1992 the World Heritage Convention became the first international legal instrument to recognise and protect cultural landscapes. The Committee at its 16th session adopted guidelines concerning their inclusion in the World Heritage List. Although, the culture of olive is attached to Mediterranean culture, in the World Heritage List no olive oil cultivation areas are included as cultural landscape heritage although vineyards and other cultivations are, like the Lavaux Vineyard Terraces in Switzerland, the Alto Douro Wine Region and the Landscape of the Pico Island Vineyard Culture in Portugal, the Rice Terraces of the Philippine Cordilleras, the Agave Landscape and Ancient Industrial Facilities of Tequila in Mexico, the Tokaj Wine Region Historic Cultural Landscape in Hungary and the Viñales Valley in Cuba.

The olive groves of Corfu- Paxos and Messinia have a long history. In Corfu region, their first appearance is lost in time but in the time the island was under the occupation of D' Anjou (1267-1386) the island's olive groves were highly appreciated by the regime although they had not yet acquired the importance they had under Venetian rule (1386-1790) which encouraged the planting of olive trees and rewarded with twelve golden coins anyone who planted one hundred olive trees and so, in the last years of Venetian rule, the island had two million olive trees. Today, it has about four million olive trees. In Messinia region olive groves have a long history, as well. They have been cultivated from ancient times until nowadays but most of the contemporary olive groves of Messinia were replanted after a disastrous fire put by the Ottomans, in the time of the Greek revolution of 1821. Olive groves have been a wealth- producing source for both regions. Unfortunately, in the case of Corfu, a large percentage of the olive groves have been neglected due to the region's tourist oriented economy over the last three decades. Protection of cultural landscapes can contribute to modern techniques of sustainable land-use and can maintain or enhance natural values in the landscape. The continued existence of traditional forms of land-use supports biological diversity in many

regions of the world. The protection of traditional cultural landscapes is therefore helpful in maintaining biological diversity.

It will also be the first time that totally the pre- industrial and industrial heritage related to olive oil, local traditions related to olive and the written documents, such as archival material, will be recorded and documented in these two regions. So far, across Europe and especially in countries where olive is cultivated, the documentation of cultural elements associated with it is limited to a partial or patchy record of the technical culture of olive such as machinery and production tools, and factories, mills, soap factories as architectural monuments of modern heritage. The olive museums in the Mediterranean countries have documented the technical olive heritage and some of the offer also educational programs for the traditional methods of oil cultivation and production and have historical archives, library and art departments specialized in olive culture.

  The second innovative element is that the results of this research will be used to promote social and economic growth in these two regions. It will be the first time that documented cultural information will be used to improve regional economy.

The total recording of the cultural goods which constitute olive civilization will be fulfilled with on the field research in the regions of Corfu and Messinia. Information will be retrieved from formal authorities related to the olive cultivation, Technical Chambers, Historical Archives Repositories, private and public, libraries but also from local administration services. The recording and documentation of olive oil mills, soap factories, their machinery and other equipment will be fulfilled according to the international documentation standards for architectural and industrial heritage and with the aid of architects where that will be needed. The recording and documentation of olive cultivation methods in these two regions, as cultural intangible good, will be done with the support of scientific evidence which is provided from authorities such as the Olive Institute in Corfu, from bibliographic and archival material and from the recording of olive tree cultivators' and workers' interviews and the recording of their field work on video.

The recording and documentation of the olive groves will be done with information from formal scientific authorities of the Ministry of Agricultural Development, the Prefectures but also with photographic, topographic and multimedia documentation and the addition of oral testimonies of olive tree cultivators and workers.

The recording and documentation of local traditions related to olive tree will be carried out with the use of archival and bibliographic material but also with the recording of oral testimonies and video recordings of folklore happenings.

As far as it concerns archives, until now, there have not been located olive oil mills' historical archives in these regions but only the historical archive of a traditional 19th century soap factory in Corfu. This research will probably bring to light new archival material but it will surely include archival material produced by authorities related to olive cultivation and exploitation.

The collected material will be classified and catalogued. After that, the methods for its dissemination to society will be named and scheduled. The first step for its promotion will be realized with the creation of an electronic thesaurus which will be available through Internet and a second step will involve educational and information actions.

The collected documented cultural information will be organized in electronic environment in data bases, electronic catalogues, multimedia, etc. according to the international standards for the representation of documented cultural data in electronic environment, which will be available through Internet and in other media such as DVD-R.

This thesaurus will have an immense usability for various user groups such as farmers, scientists, students, researchers, businesspeople and its usability will be multiplied by its electronic form which will be accessible through Internet from the node of the University of Peloponnese. Users will have the chance to search in it with the use of word- keys, by subject, alphabetical, chronological search and have full access to the whole of the recorded and documented material.

The aim for this thesaurus is to be first available in Greek and English and in the future in the languages of the peoples of the Mediterranean as it is estimated that this material will be valuable for them.

A close range educational and information approach of all possible user groups, which can be benefited from the total documented information of olive tree civilization, is vital as it will give them the chance, apart from becoming familiar with the collected material- which can be done through the Internet- to be trained by the team, which conducted the research, for the possible ways they could use this material for the educational, social and economic benefit of each group.

These actions will probably be: seminars, galas, congresses, educational visits, and educational programs for formal authorities which are related to olive tree on how they could use the collected material in benefit of the users, participation at the educational procedures and the teaching material of all educational levels in the regions where the research took place.

Priority will be given to information and training through seminars to the authorities which are related to olive tree and olive oil scientifically and commercially, such as the formal authorities of the Ministry of Agricultural Development, the Commercial and Industrial chambers, the Agricultural cooperatives to inform and train their staff and members, and also to farmers, olive cultivators and producers, olive oil soap producers and all the people working in these fields. In addition, there will be seminars for the authorities of local governments.

The thesaurus' use gives the possibility for the enhancement of activities of enterprises active in agricultural tourism in these regions but it can also suggest the development of new forms of agricultural and cultural tourism in them and in other regions with common socioeconomic features in Greece and in the Mediterranean region, as well. Therefore, educational and information actions will take place, concerning businesspeople of this field.

Besides user groups which are directly involved with olive tree civilization, there is a broader audience to be informed and potentially benefited, in various ways, from this information.

The economies of these two regions have changed their orientation through time and several mistakes have been made on the implementation of new economic activities. In the case of Corfu region, agricultural production and local industrial activity have been vivid until the 80's when there was a sudden turn to a mass and completely anarchist tourist economy. But as, tourist activity has noticed continuous decline since the mid 90's, a demand for change has arisen, to take advantage of the neglected wealth- producing sources of the islands of Corfu and Paxos, which are their olive groves and culture. Tourism as monoculture resulted into the vanishing of local industries, agricultural professions and neglecting the creation of job positions for the maintenance and promotion of the many centuries, rich region's civilization.

The case of Messinia region, has, up to a point, many common features with Corfu- Paxos region. In that region, agricultural production, an intense commercial and industrial activity and also a mild tourist development have taken place until recently. Agricultural production is still vivid and region's olive oil is famous all over the world as it is exported. However, small scale producers face severe financial problems, the region has a quite high unemployment rate and it cannot develop totally its capabilities through various forms of entrepreneurship.

Having in mind this situation in these two regions, the information and training on the research's results of a polymorphic audience such as, new scientists, entrepreneurs seeking to change their business activities, unemployed people, can be inspiring for them and lead to the creation of new economic activities. Proposed information and training methods for these groups are: seminars, galas, and educational visits to olive groves, olive oil mills, and soap industries with the participation of people involved in these fields.

Possible users coming from all educational stages form an audience which has the potential to contribute, in the future, to the change of development policy and is open to information stimulus when these are clearly communicated. Therefore, the proposed research program aims to target to school and university students' user group. Apart from the organization of seminars and educational visits, there will be an attempt to incorporate parts of the research into the teaching material of school and university courses of schools and universities which are based in the regions of Corfu and Messinia, to establish a permanent contact of young people with olive culture.

In the context of the information and training of a broader audience, international scientific congresses will be organized by the University of Peloponnese.

It is presumed that in long time scale, users' information and training will have the substantial results. Therefore, the proposed research aims for a continuous interactive relation with users for a potential improvement of their information and training and the research's results exploitation methods in socio-economic level.

An evaluation process of the first results on how users estimate they have been benefited from the research's results and how they could use them will follow the information and education actions. A recording of these first results will be done via printed and electronic/ on line questionnaires and galas where users will have the chance to present their impressions. This early evaluation is considered of high importance on how the research's results could be used by new user groups, if there will be a changing need in information and educational methods and on how they could be useful for other regions in Greece and in the Mediterranean region

Subsection

Photographic Material
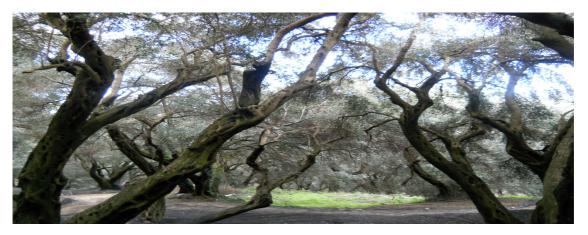
Fig. 1: Olive grove in northern Corfu

Fig.2, : Olive grove in Messinia

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Testing Urban Landscapes

Katrin KOOV
Department of Architecture, Chair of Landscape Architecture, Estonian Academy of Arts, Tallinn, Estonia
katrin.koov@artun.ee

Abstract

In this paper I will analyze the tactical potential of small-scale architectural interventions in urban landscape and illustrate it with the collection of installative projects that have been realized in Tallinn during last ten years.

As dutch architecture theoretician Hans Ibelings has pointed out, adaptive re-use, sustainability and building for demographic decline are the strategies for the coming years in western countries. In Estonia the ultra-liberal governmental policy is combined with the left-wing democratic planning structure. The mismatch of private-public interests has produced a hectic planning practice. While there are no clear big-scale planning visions, several creative people have found other ways to test urban potentials. This small country - with moderate natural resources, small number of inhabitants and harsh climatic conditions, where even simple solutions need more effort - works well as a flexible 'test-field'.

I would like to show how small delicate architectural interventions in abandoned places have changed the atmosphere of the places and created new physical and mental links in urban context. These small material changes bring along much bigger changes in people's values and habits. We may imagine renewing the planning system so it could be more viable when considering with the small successful tactical tests.

Keywords: urban landscape, installation, planning, test-field

1. Marking as spatial practice

Marking places with the installations can be interpreted as our natural biological behaviour. Marking the territory is well known among animals, in order to protect their home territories and food sources. Territorial behaviour aims to avoid more serious battles among representatives of the same species. Sophisticated rituals are carried out daily according to the needs. For human beings the marking has also complex reasons: invitation or restriction, highlighting, surprising, warning statement of the power. Marking is the tool for communication. The fence around the building announces about the territory for the selected persons, white lines on asphalt are regulating the traffic flows, red-and-white tape refers to a danger zone, flag on the moon acknowledges the completion of the mission impossible...

Fig. 1: Marking act of Man on the Moon

The complex structure of the cities produces besides the "normal" marking behaviour also another kind of manifestations. Graffiti is one of the alternative indications, where next to the message there is also important the territorial factor. Norwegian architect Sverre Fehn has written that graffiti is the reaction to anonymity and illustrates his argument with an example from architecture: when modernism cleaned the facades from the ornament and left behind the empty surfaces - buildings "without the faces", then, by the theory of Fehn, urban artists started to cover these surfaces in order to give back the identity to the buildings. The earliest graffiti artists were probably professional sailors who tattooed their bodies: since they didn't have home in the traditional meaning, they marked their bodies as homes. Urban graffiti works also as a social valve - it is an alternative manner to signalize about certain problems, a media form where the author of the message is difficult to identify and for what reason it is possible to express oneself incisively.

2. Strategical planning versus tactical interventions

As many authors have indicated the traditional urban planning system is in crisis and there is need to look for new methods to react adequately to the rapid urban and environmental changes in our cities. Of course there are different local actors in different countries and regions. I will shortly speak about Estonia - a small ex-soviet country that has worked itself up to an equal member of European Union.

On one hand Estonian successful economy has been driven by right-wing liberal policy after the liberation from the soviet occupation, that means less taxes, less administrative obstacles and governmental supervision that has promoted the economical growth. The strategy of "less government" has been working well during the years of transition for the young state and brought along a remarkable economical jump. Former soviet time has been left behind and has become a distant history.

On the other hand many other areas of the society are underdeveloped in the condition of the economical hegemony. Culture, education, social welfare as well as the urban life has not taken part of the blooming, with some exceptions they rather operating in survival mode. Coming closer to the subject - the planning process has been delegated to private developers who can fluently realize their business-plans. This has been stimulating the building market but at the same time brought along greater fragmentation of the cities because of the lack of overall visions. Private developers naturally follow their own purpose to make profit and very often they just ignore the other needs of the city.

Planning system, like the economy, meets the political strategy of "less government". Here that means a constant shortage of well-educated specialists in administration. The system that has been taken over from northern countries requires a large high-level planning office that we simply don't have. At the same time the amount of bureaucratic structures, standards and requirements grows and therefore there is always a risk that the original objective and content will become confused in the supervision of the respective project. Ever more energy is expended in plans as well in architecture to achieve the predescribed standards and exact conformity with procedure, whereas the aspect of content often does not even seem to interest anyone anymore. There are number of institutions that set the rules of the game in their sphere as well as the other interested parties, who argue among themselves to come to the solution that suits to everyone. This is often the content of the planning and the more detailed design that follows. It is as if none of them aspire to a broader and more general view, to building the country and the city. Ideally the municipal planning department should do this but mostly this remains a positive ambition without sufficient institutional power. [1]

Fig. 1: Street festival in Uus Maailm

Fig. 2: Open air concert in Uus Maailm

After twenty years of independence, we have to ask ourselves: where are the visions of how the state and the city should be built and developed for its people. As a reaction on urban level many grass-root organizations and communities have been activated and started different initiatives of vitalizing the city life. First communities started clearly as reactional - they were formed mainly for fighting against some arrogant develompent plan. Later the communities changed to a more proactive groups, started positive programs like for instance the community of the quarter named Uus Maailm ("new world"), formed by the inhabitants of the old wooden buildings' district, mainly younger generation, who are promoting ecological lifestyle, bicycle culture, organizing public events like street market, street festival, open air concerts, etc.

Parallelly with communities' human-scale activities there has been always alive the will to promote the visionary spatial thinking at general level among professionals. Content-rich city planning is utmost objective during the education of architects and urban planners and therefore the processes of urban fragmentation have been frustrating to observe. Few years ago the Tallinn's planning department promoted the political vision to turn the city's face towards the sea. That is still the only spatial declaration that has not yet realized but it has brought along many interesting phenomenons.

Fig. 3: Map of Tallinn's underdeveloped waterfront

The abandoned coastline in the city has been a unique "polygon" for non-planned activities far before the official statement to broaden the city centre towards the sea. During the soviet time the waterfront was mainly closed. It was the restricted zone, occupied by military structures, prison, heavy industries and closed harbours. When the soviet industries left, the territory got a status of no-man's-land and therefore filled soon with new kind of self-organized life. Local people started to use the wild beach for grilling, promenading, fishing, drive-in sunbathing, dog-bathing - all these were so-called illegal activities but the local government didn't intervene much since the land belongs actually to private owners. In addition the area was also observed and used by artists. Naturally the waterfront has been the subject of studies for architecture students for many years. On this polygon one could observe the viability of the non-planned city-life. Small social groups formed their own territorial rules: fishermen took an old half-drowned wooden shipwreck as their "private" territory and didn't let anybody else on board when they were fishing. Another group - dog owners - gathered there to swim their pets. People themselves stayed at the beach while their dogs were bathing. Naturally some homeless people set their homes in the small caves near the beach and had their fireplace in front of their "door" - this area was also "privatized" like the fishermen's deck.

Fig. 4: Fishermen on the shipwreck

Fig. 5: Unofficial "dog bathing beach"

3. Waterfront landscape as test-field

In earlier years the urban landscape interventions have been mainly small-scale "wild" tests. As one example KAVAKAVA architects arranged a landscape installation named "Found Pleasures" at Kalarand's waterfront. This place offers different pleasures that are not officially proposed but the waterfront is actively used as described above. To see the hidden beauty of the wasteland, visitors have to use their imagination and senses. The area that used to be a fishing factory in soviet time now waits for the new development plan. Until the new developments start to be realized the place continues its wild life as a test-field.

Fig. 6: Fragments of landscape installation "Found Pleasures" 2002 in Kalarand ("fishermen's beach").
Authors Katrin Koov, Kaire Nõmm, Siiri Vallner, KAVAKAVA architects

Last year brought along the shift in the scale and the span of the promotion of urban installations. Tallinn carried the title of European Cultural Capital 2011. During the other activities city government launched the festival of urban installations LIFT11 that turned out to be utmost popular. An open competition held in autumn 2010 resulted in 129 projects, of which 10 works were selected to be set up in summer 2011 as part of the festival. These site-specific works created at various locations in Tallinn highlighted the specific sites and angles in contrast with the 'postcard' image of Tallinn, addressing local residents as well as visitors. On a wider scale, LIFT11 attempted to break down prejudice towards public art in Tallinn and draw attention to the ample array of opportunities for using city space. [2]

Not very surprisingly a large amount of proposals were offered for the waterfront area. That was even easier to arrange since the city's transportation department had been built a temporary pedestrian road after removing the old rails from the coastline. The new "culture kilometre" gathered together many potential places and buildings: former power plant that is under reconstruction to be transformed into a culture factory, squatted alternative museum for modern art, former hangars for waterplains - now maritime museum, former prison - now unofficial prison museum, former ship-building yard - now temporarily used for modern operas. And between those solid large-scale buildings small and smart human-scale installations were built and several events took place. As follows some examples of the installations will be described that were built along the waterfront.

Fig. 7: Pier installation. Before and after. Summer 2011. Authors Siiri Vallner and Indrek Peil

Pier
The pier located by the Culture Kilometre has weathered and deformed over decades and become unfit for landing boats. However, it would be perfect for sitting, relaxing and having a good time. It can be made usable in its present condition with just a few touches, by conserving and reinforcing the slanting concrete faces and covering them with terrace boards. The boarded surfaces will reflect the shapes of concrete slabs created upon disintegration. This way, a derelict and crumbling object can be revived as part of the modern city space, opening up the seaside area of Tallinn for local people and for visitors. [2]

Fig. 8, 9: Fishermen's Beach installation. Summer 2011. Authors Toomas Paaver, Teele Pehk and Triin Talk

Kalarand

Fishermen's Beach is located on a stretch of shore between the Linnahall and the Patarei fortress, is an improvised beach which has become a popular bathing spot among local people. Regardless of the widespread assumption that the site is polluted, practice has shown the water to be clean and the location naturally suitable for bathing. This is the closest bathing site to the city centre of Tallinn.
In summer 2010, the authors of the installation did a pilot test, setting up a changing cubicle at Kalarand.
This marked the place out as a bathing site and the bathers began to use the cubicle right away.

In summer 2011, this urban intervention in public space was repeated on a somewhat grander scale by building a more solid cabin and adding some other elements of a beach, like bench and terraces. The beach area was cleared and the scrub trimmed. Dustbins were provided for the summer season. The seabed of the bathing site was cleared of rubbish and pieces of concrete; water samples were taken and analysis results were posted on a notice board. Regardless of the refurbishments, Kalarand was not listed as an official beach, and people going into the water there were doing so at their own risk. There was no lifeguard service.

These urban interventions like 'sit-or-swim-at-your-own-risk' attempted to draw attention to the plans that concern the entire area and are aimed at developing a large residential and port area there. The residents of Kalamaja contested the proposed plan and it has not been adopted so far. The use of seashore as a beach and public space will not preclude the development of residential buildings or port facilities because that area of land and sea is quite large and holds various opportunities. The use of city space as a beach could also enrich and revive the development plans and help the owner of the property improve the image of the area, the quality of its future environment and its use. [2]

Fig. 10: Linnahall in the year 1980

Fig. 11: Installation "To the Sea". Author Tomomi Hayashi

To the sea

The Linnahall, built for the Tallinn Olympic Regatta held in 1980, was the first and only place offering common people access to the sea within the centre of the city during the Soviet era. The area by the Linnahall used to be closed, and therefore people had to walk across the roof. Nowadays the sea is also accessible from elsewhere in the city centre but the unique location of the Linnahall combined with its architectural design produce a viewing platform for unforgettable experience along with a system of stairs and areas for strolling. The low mastaba-like structure of the building was so designed to preserve a view of the Old Town from Tallinn Bay. The design of the Linnahall, by Raine Karp and Riina Altmäe, still appears fresh and modern.

However, because of poor construction quality and some functional peculiarities, such as the absence of an orchestra pit and the fly tower being too low, the concert hall is in hibernation today, waiting for the winds of change and for investments. The stairs and the roof are still open to the public and the Linnahall continues to be a popular meeting place, especially in the warm season. [2]

4. Different scales and materials

Fig. 12, 13: Temporary Straw Theatre NO99 at Skoone bastion. Summer 2011. Authors SALTO architects

At the same time with installation festival another temporary object was erected not far from waterfront - on top of the Skoone bastion. A relatively small theatre called NO99 built a quite large theatre hall from straw for just one summer. Theatre hall that was built for a specific purpose, programme and location, operated from May to October, worked as a landmark and catalyst for the former military area that has been abandoned for years. The idea of building a theatre-installation that has a meaning not only by its function but also by the idea and material, has been afloating in many heads but this time the young leaders of the alternative theatre Ene-Liis Semper and Tiit Ojasoo made it real. The project was conducted by young architecture office SALTO. The rectangular main volume of the theatre is situated exactly on the same spot as the former navy summer theatre, and one descending flight of stairs of the latter is used as a covered walkway and entrance area to the Straw Theatre. The dramatic appeal of the building stems from its contextual setting on the site and its black, uncompromisingly mute main volume contrasting with a descending „tail" with an articulate angular roof. And of course one cannot escape the effect of the material – uncovered straw bales, painted black. The Straw Theatre is a unique occasion where straw has been used for a large public building and adjusted to a refined architectural form. [3] For the initiators the outdoor activities were as important as indoor program: the bastion was full of life daily due to the cafe and different playgrounds. This temporary complex wisely made use of the given manmade landscape form.

Fig. 14, 15: Light installation "Garden of Eden". Wilhelm Kühnert's forgotten dendropark in Tallinn.
Authors Yoko Alender and Indrek Leht. Tallinn Light Festival 2004

If to look back to the independence years we may see that the tradition of installations has been most vital in the immaterial area: light installations have been built during the yearly Light Festivals for more than 10 years already. The darkest time of the year has been marked with magical light, bringing people outdoors to defy the freezing weather in order to explore the city's hidden values. As one example here is presented the

lighting project named "Garden of Eden" where the passers' eyes are turned towards the old rare trees, that date back to 19th century, a lost garden of Wilhelm Kühnert who was one of the establishers of Estonian forestry culture. With delicate lighting this valuable historical layer of this particular city quarter was revealed. Light has the magical power to change the atmosphere and besides it has distinctive survival meaning for the northern people - it gives light and warmth in the cold darkness.

5. Conclusion

Ideally the cities should be developed in both ways: top-down (by visionary planning) and bottom-up (by local initiatives and temporary interventions) simultaneously. By doing so, there is hope that plans and needs could meet in real life. It is almost impossible to make field tests for the big-scale planning proposals in order to check the solution's durability or the social impact. At this point small-scale installations could be suitable tactical tools for testing some specific part of the planning proposal in minimized or concentrated form. Temporary interventions have proved itself to be especially good in testing the social acceptance. Installations are also economically highly efficient: they can test social, environmental or economical potentials of the particular place by mostly very low cost of the installation itself. On the other hand installations can still remain as independent landmarks that embody the urban freedom. Urban installations are either objects of art, architecture, landscape architecture or design, which are, in conjunction with their surroundings, intended to offer a spatial experience or to comment on the urban environment in a critical or humorous manner. Derelict urban landscapes are perfect test-fields for the site's future potentials and therefore temporary interventions could be used more courageously next to the visionary planning. Only within the continuous dialogue of different methods the content-rich and human-scale urban spaces can be developed.

I would like to end up this paper with landscape ecologist Anne Whiston Spirn's poetical words: the language of landscape is our native language. Anyone with a keen sensibility can recover that language. We are architects of our environment and we need work with people as well as with natural processes to create places that are functional, sustainable and meaningful. [4]

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Technical and architectural integration of a solar cooling system in a historical building

Pasquale FALCONETTI[1], Antonio ROSATO[2], Sergio SIBILIO[3], Efisio PITZALIS[4]
[1] [2] [3] [4] Dipartimento di Cultura del Progetto, Facoltà di Architettura, Seconda Università di Napoli,81031 Aversa (CE), Italy

[1] E-mail: pasquale.falconetti@unina2.it
[2] E-mail: antonio.rosato@unina2.it
[3] E-mail: sergio.sibilio@unina2.it
[4] E-mail: efix@katamail.com

Abstract

Solar heating and cooling technology is a plant engineering technique which uses hot water of solar collectors for building air conditioning during both winter and summer. Recently the interest for this technology has grown constantly especially due to the fact that it allows to reduce carbon dioxide emissions, save energy, and assure a local supply of energy thus more reliable.

A critical point of discussion begins when solar collectors are installed in historical buildings because the protrusion formed by solar panels and mounting structures transforms the shape of the building, thereby altering its architectural aspects. In these cases, respect for historical heritage, protection of the landscape and the employment of renewable energy must be conciliated. As a consequence the design of the installation must be performed in order find out a good balance between technical and aesthetical requests.

In this paper a solar heating and cooling plant designed for the Architecture Faculty of Second University of Naples with the aim to promote solar cooling and heating installations that facilitate the discovery of visual integrations and good compromises between technical and architectonic features is depicted in detail.

Keywords: solar cooling, historical building; architectural integration.

1. Introduction

The energy demand in the residential and tertiary sector represents the 36% of European final energy: 25% for households and 11% for services [1]. This amount of energy is mainly used for air conditioning indoor spaces, heating water, electrical appliances and lighting. The energy demand for heating is projected to increase until 2030 and then stabilize. In contrast, energy demand for cooling is projected to increase rapidly over the current century due to the climate warming [2].

These world energy demand trends are the catalysts calling for the creation of new models in energy conversion; encouraging strategies with renewable energies and higher levels of efficiency to reduce the energy input and pollutants emissions.

With regard to renewable energy sources, a number of innovative renewable technologies are emerging. For example, new building-integrated wind turbines [3], cogenerative solar photovoltaic collectors [4], solar heating and cooling systems [5-8] are currently under investigation both by industry and academia.

Among these emerging technologies, solar heating and cooling (SHC) is probably one of the best choices. A great advantage of such technology lies in the possibility of using solar radiation to provide space heating during the winter and space cooling in the summer, by using a heat-driven chiller. SHC systems are very profitable particularly in summer operation mode, when the maximum demand for cooling coincides with the maximum availability of solar radiation. SHC may significantly contribute to achieve the goals in terms of energy savings, greenhouse gas emissions reductions and increase of use of renewable energy sources, including those goals stated by EU in the Directive 2009/28/EC [9].

A solar heating and cooling system has been designed for conditioning during both summer and winter the nineteenth-century portion, called in Italian "Corpo Ottocentesco, of the Architecture Faculty of Second University of Naples, located in Aversa, a municipality 20 km far from Naples (Italy). The project has been performed also with the aim to facilitate the discovery of visual integrations and good compromises between technical and architectonic features.

The Architecture Faculty of Second University of Naples is located within the Abbey of San Lorenzo ad Septimum. The abbey complex has been 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 has been raised around 1080: it has a nave and two aisles and shows several stratifications. The bell tower has been rebuilt around mid-fifteenth century as a consequence of the earthquake of 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 at the hands of the architect Ferdinando Fuga; eastward there is the nineteenth-century portion that has been completed during the time when the abbey has been designed as College and Real School of Arts (Figure 1). Additional details regarding the Abbey of San Lorenzo ad Septimum can be found in [10].

Fig. 1: Plan of the San Lorenzo ad Septimum abbey (on the left). View of the nineteenth-century portion of the Architecture Faculty of Second University of Naples (on the right).

In a SHC plant the solar energy required for heating (winter season) or for operating the heat-driven chiller (summer season) is recovered by installing several solar collectors. In case of historical buildings the protrusion formed by solar panels and mounting structures transforms the shape of the building, thereby altering its architectural aspects. The design of the air conditioning for the Architecture Faculty of Second University of Naples has been carried out in order find out a balance between technical and aesthetical requests.

The main aim of the project is to emphasize the respect of local biological cycles adding environmental value thanks to the production of clean energy. The design concept is then developed through the study of natural organisms and their life cycles by integrating all the elements of the SHC system. In this paper the architectural solutions adopted to achieve the best compromise among respect for historical heritage, protection of the landscape and the employment of renewable energy are illustrated and analyzed in detail.

2. Solar cooling and heating plant description

The portion of the Architecture Faculty of Second University of Naples, named in Italian "Corpo Ottocentesco", is a three levels building containing three classrooms, with a total volume equal to 4533 m^3

and a total surface area of 842 m^2. This portion of the building is currently heated by using both hot water and hot air, while chilled water is currently used as the cooling medium during warm season:

- hot water is produced by an oil fired boiler with a nominal capacity equal to 349 kW;
- chilled water is cooled by an electrically driven vapour compression refrigerating system, with a nominal capacity of 79 kW using R407C (a mixture of greenhouse gases) as refrigerant;
- air is heated up by means of an Air Handling Unit (AHU) with 6500 m^3/h as nominal volumetric flow rate.

Water is heated up by the boiler up to a preset temperature and circulated throughout the building by means of a pumps by way of fan-coils, while air distribution into the three classrooms being air conditioned is performed by using air vents at high level.

A new air conditioning system has been designed with the main aims to save energy and reduce greenhouse gas emissions. The design of the system has been carried out in order to get the best integration between the plant components and the architectural constraints. The new proposed air conditioning system is composed by two main subsystems:

1. a solar cooling and heating plant with absorption chiller;
2. a solar cooling plant whit desiccant wheel.

The main components of these two subsystems are:

➢ two fields of flat-plate solar thermal collectors with evacuated tubes (the first one with an open area of 167 m^2 and the second one with an open area of 130 m^2), horizontally installed on the roof of several hexagonal cells positioned in the garden of the faculty;
➢ a single-effect LiBr /water absorption chiller of 70 kW cooling capacity;
➢ an air handling unit with desiccant wheel;
➢ a peak-up boiler fuelled by oil (one of the three already installed for heating the faculty);
➢ two hot water storage tanks with different volumes (the first one of 4000 liters and the second one of 2000 liters);
➢ a cold water storage tank of 1000 liters.

Nominal cooling capacity of the absorption chiller has been defined by estimating the cooling load of the "Corpo Ottocentesco". This estimation has been performed by using the software Thermus [11].

The number of solar collectors has been defined by assuming a value of 0.7 as coefficient of performance for the absorption chiller and an average solar irradiation equal to 900 W/m^2.

In figure 2 a schematic view of the system during winter operation is reported, while Figure 3 shows the main components of the air conditioning plant during summer operation.
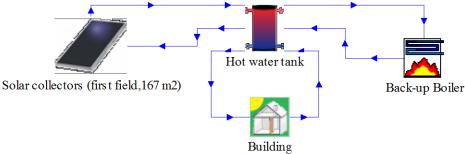
Fig. 2: Schematic view of the system during winter operation.
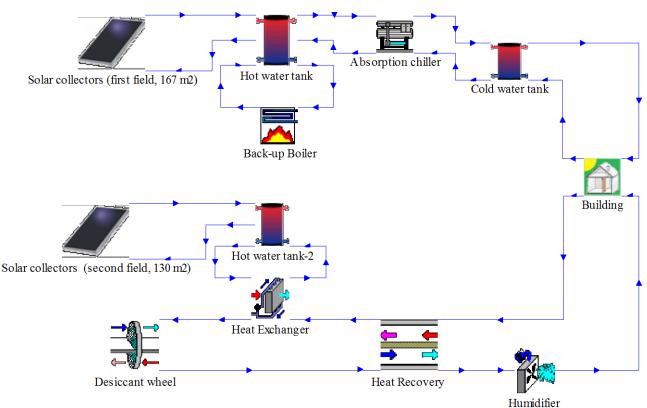
Fig. 3: Schematic view of the system during summer operation.

During the winter the heat recovered from the first field of solar collectors is stored in the 4000 l tank till reaching a preset hot water temperature; due to the fact that the solar energy striking the Earth's surface is poor during the cold season, a peak up boiler has been considered in order to guarantee at any time the desired water temperature in the hot storage. The hot water stored in the tank is then used for heating the building. During the winter both the absorption chiller and the solar cooling plant whit desiccant wheel do not operate.

During the warm season, the sensible cooling load of the building is balanced by the solar cooling plant with absorption chiller, while the solar cooling plant with desiccant wheel balances the latent cooling load of the building. System operation during the summer can be summarized as follows:

• heat recovered from the first field of solar collectors and stored in the hot water tank (4000 liters) is transferred to the absorption chiller; when supplied with hot water, the absorption chiller is a system able to provide cold water; the provide cooling power coming from the absorption chiller is transferred to the cold water tank (1000 liters) and then used for balancing the sensible cooling load of the building;

• heat recovered from the second field of solar collectors is used to regenerate the desiccant wheel (regenerating the desiccant wheel consists in removing its humidity). The outside air is dehumidified in the desiccant wheel; it is then cooled in the sensible heat regenerator by the return cooled air before being further cooled in an evaporative process; finally, it is introduced into the building. The operating sequence for the return air is as follows: it is cooled by evaporative cooling and then it cools the fresh air in a rotary heat exchanger. It is then heated in the regeneration heat exchanger by solar energy recovered from solar panels and finally regenerates the desiccant wheel before exiting the installation.

Compared to electrically driven vapour compression bivalent heat pump system, the proposed system can be considered environmentally friendly thanks to the fact that electricity is only used in the auxiliaries (pumps and fans), heat is obtained from solar energy and water is exploited as refrigerant. An energetic, economic and environmental analysis has been performed in order to compare the designed system with the system currently installed and so to better highlight the advantages of the proposed air conditioning plant [12]. The analysis showed that the solar cooling and heating plant with absorption chiller allows to reduce the primary energy consumption by 18364 kWh, the operating cost by 7981 €/ year, and the carbon dioxide emissions by 17685 $kgCO_2$. Similar results have been gathered by performing the same kind of analysis in relation to the solar cooling plant whit desiccant wheel: 47428 kWh as primary energy saving, 5702 €/ year as operating cost saving and 12010 $kgCO_2$ as reduction of carbon dioxide emissions.

3. Solar cooling and heating plant integration

The new air conditioning system designed for the nineteen complex of San Lorenzo Abbey is located within the rear yard, between the existing ortho and an arboretum quadrangular.

The environmental and perceptual integration with the monument was evacuate: for this purpose a new hexagonal frame structure in a lightweight and precast material has been defined in order to minimize the impact with the ground. The hexagonal structure has been designed with particular attention paid to the environmental and perceptual integration with the abbey and has been made with dry, reversible prefabricated elements, to be assembled on site. In particular, the frame structure of the hexagonal cell is in cold rolled steel mounted in place, ballasted with the ground. Its structure allow avoiding concrete foundations, without any impact on the soil resources devoted to the cultivation of the garden.

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Fig. 4: View in context of the hexagonal cells.

The plan of the new system consists of multi-cellular aggregation in hexagonal matrix that runs along the sides of the hexagonal base. In this way it is possible to see pieces of the historical pre-existing building alternating between full and empty spaces. The whole project is designed in order to avoid any obstruction of the view of the abbey, so the texture of the new forms provides a complete visual permeability.

A structure, shaped like a honeycomb, establishing a reciprocal relationship between ancient and modern has been so realized.

The perimeter walls of the hexagonal cells have been made of glass and branch. They allow to glimpse the votive lights in order to weld the religious origin of the ancient building complex with the actual scientific destination of the place. The single hexagonal element consists of a wooden platform placed on the perimeter walls anchored on cement block buried in the ground for a depth of about 40 cm. A hollow central pillar for the collection of the rainwater works with the statically perimeter system. Solar panels have been placed inside the ceiling: in this way they aren't visible from the garden.

One cell has dimensions greater than the other ones because it accommodates the machines composing the solar cooling and heating system.
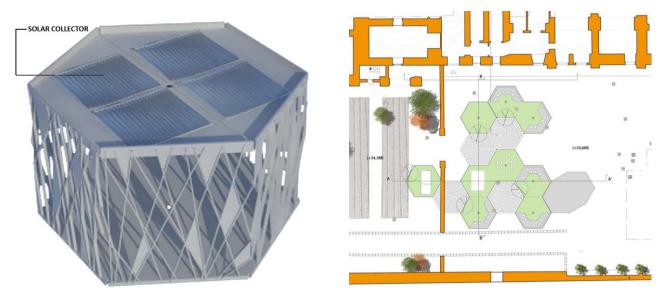
Fig. 5: 3D model of the hexagonal cell (on the left). Plan of the new multi-cellular aggregation inside the Garden (on the right).

Each cell has a three meter high walls. They are suspended from the ground of about 10 cm. These modular elements can be easily reproduced in other contexts for promoting the adoption of solar cooling and heating systems within historical building.

Finally it can noticed that the project is fully compatible with the historic-artistic monument complex pursuant to art. 20 par. 1 of Decreto Legislativo 22 January 2004 Number 42. It don't damage the distinctive character and material of the site.

4. Conclusions

Solar cooling and heating technology is a solar energy based technique for building air conditioning which is potentially able to reduce carbon dioxide emissions, save energy, and assure a more reliable local energy supply.

In this paper the design of a solar heating and cooling plant for the Architecture Faculty of Second University of Naples located in a abbey complex built at the end of tenth century is depicted in detail.

Taking into account the historical and architectural content of the building hosting the faculty, the air conditioning plant has been designed in order to conciliate the employment of renewable energy with both respect for historical heritage and protection of the landscape. The main aim of the paper is promoting solar cooling and heating installations that facilitate the discovery of visual integrations and good compromises between technical and architectonic features.

Several solutions has been adopted to achieve a good balance between technical and aesthetical requests as the development of a new hexagonal frame structure installed in the garden made of a lightweight and precast material; solar panels have been installed on the roof of each hexagonal cell in order to avoid its view from the garden itself. The whole project is designed in order to avoid any obstruction of the view of the Abbey, so that the texture of the new forms provides a complete visual permeability.

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Archaeology and nature: hyblean cultural landscape and territorial regeneration

Franca RESTUCCIA,[1] **Venera GRECO,**[2] **Mariateresa GALIZIA,**[1] **Cettina SANTAGATI**[1]
[1] Department of Architecture, Facoltà di Ingegneria, Università di Catania, Catania, Italia,
franca.restuccia@alice.it; mgalizia@dau.unict.it; cettina.santagati@dau.unict.it
[2] Head of Department of Cultural Heritage of Catania, soprict@regione.sicilia.it

Abstract

This study is the result of an interdisciplinary cooperation among specialists, scholars and different skills aimed at the requalification/regeneration of the archaeological park of Kaukana in Santa Croce Camerina (RG). It is a wide area along Mediterranean which becomes the driving for economic and functional growth of territory, along with landscape valorisation and environmental restoration.

This area is one of the best Sicilian well preserved late antique period settlement. Over there archaeology and nature merge in a cultural landscape which is unique in its genre and that has been studied by means of innovative cognitive tools (3d laser scanning, photomodeling, and so on) which constitutes the first step towards a conscious territory government.

By acting without big distortions; by supporting the vocation to transformation through actions aimed at the restoration of the past; by qualifying spaces and reinventing green fruition actractive paths; then the archaeological area becomes a resource, regenerated and inserted into touristic distrects, which produces work and both material and immaterial richness.

It represents a regenerative model founded on virtuous values of nature and biological models, which are able to carry out a development "founded on the reduction of the waste of raw materials, human resources, assets". That is a conscious intervention which through the survey, the re-drawing and the analysis of existent places generates less wastes/more life improvement, less environmental impact/ more essentiality.

Keywords: laser scanning, archaeological landscape, 3D modeling, territorial regeneration.

1. Introduction
Franca Restuccia

Today's globalization destroys the history and the identity of places and it causes deep changes not only to society but also to economy and "cultural territories" development. Very often the state of neglecting and degradation of archaeological assets obscures the landscape and environmental values of territories.
Through processes of creative regeneration and new government methodologies these assets and/or sites could be culturally rescued. The purpose is to add more value to regions and places so that they become competitive in the image of the territory and in the promotion of local economic development [1].
By the requalification of spaces and the re-invention of attractive paths of green fruition, the archaeological site can be regenerated without big changes and according to the vocation of place. Moreover as it is embedded into a touristic district, it becomes a resource of work and richness both material and immaterial.
This is a way to provide regenerative patterns based on virtuous values of nature and biological models, which are able to realize a development "based on the reduction of the waste of raw materials, human resources,

assets". Thus it is necessary to aim at coherent and conscious interventions that - through survey, re-drawing and analysis of existent places – create less waste/more life improvement, less environmental impact/more essentiality, less aesthetics/more essence. These interventions contribute to landscape enrichment, to the environmental recovery together with the economic and functional growth of the territory itself.

The archaeological site of Kaukana in Santa Croce Camerina (RG) is a good example of that recovery policy aimed at the regeneration of what already exists. This site is a wide territory along the Mediterranean coast in the area of Ragusa in which archaeology and nature merge in a cultural landscape unique in its genre: it represents one of the best Sicilian well preserved late antique period settlement. It is a place of deep Mediterranean identities, which offers wide opportunities of cultural and economic investments.

Fig. 1: Aerial photography of the state-owened area of Kaukana where the three contiguous areas cut by the littoral road are highlighted in red.

This study is an extract of the cooperation work between the Department of Cultural Heritage of Ragusa and the Laboratory of Architectural Photogrammetry and Survey "Luigi Andreozzi" of the Engineering Faculty of Catania. Through innovative cognitive tools (3d laser scanning) the interdisciplinary study provided the basic elements for a conscious government of the territory. As a matter of fact, this work has been a good opportunity to face with a wide extension and complexity theme due to archaeological, naturalistic and environmental values of the site. Actually this is a park of archaeological interest, a place of attraction and study where the culture inhabits the landscape. The potentialities of the place grant to it an active role in the project of cultural and environmental quality: it could be the driving force for economic and functional growth of territory.

The need to accurately document this archaeological asset and the relations which, during the time, it has established with the natural environment of the park – rich of landscape suggestions between the sea and the Mediterranean vegetation – has required the use of an operative methodology which renovates ways of documentation, perception, analysis, representation and management by using informatics technologies. Indeed, they have been applied renewed "models of doing" able to "catch" nature and built in a unique cognitive model aimed at the project of valorisation and fruition. It is a model of digital synthesis that prefigures the revaluation project founded on the global qualitative change and the identity of the area - as required by the Department of Cultural Heritage who manages and maintains the "hyblean" archaeological park.

The Department plans to organize the area with operative interventions aimed at the quality and sustainability according to the existent resources. The purpose is to have a virtuous recovery of the site; to transform the heritage into a resource in favour of economic development and of cultural growth, avoiding morphological and structural changes of the natural area. That is, to act a reuse that - keeping readable the traces and the memories of the past - will recover them for collective fruition, according to a productive synthesis of nature and history: "less waste/more quality, research and ideas; less waste more ethics/more investments and sustainability".

2. Kaukana project: territorial regeneration between nature and archaeology
Venera Greco

Kaukana was a small village placed in the territory of the town of Santa Croce Camerina (Ragusa) which was used to be very important during byzantine age.

The Greek name (Kaukanae) was used to describe a series of villages in which Kamarina exiles in 258 b. C. found refuge. As a matter of fact, they choose this site thanks to its natural landing places, the fertility of the soil and the richness of water. In 535 A.D. the General Belisario left from Kaukana in the direction of Malta, during its campaign against Vandals [2]. In those years the settlement had an important urban development and its seaport growth in importance until it was destroyed by Saracens. It was an important commercial anchorage, very active between the IV and the VII century A. D.

The cover-up of the coast protected the late roman settlement with a layer of sand so that the walls of the buildings have been almost fully preserved. Today Kaucana hosts a large archaeological park that has discovered one of the best preserved late antique age settlements in Sicily.

The recovered complex consists of 25 buildings of different kind among which a small church (with three naves) which belongs to a burial area. Reported and studied by Paolo Orsi, the complex was brought to light in the '80s by the team headed by Dr. Paola Pelagatti, despite the strong contrasts of the private owners of the land, who planned to build very profitable touristic residences [3,4].

Fig. 2, 3: The remains of Kaukana late-roman age settlement (pictures by Giunta).

Definitely the entire surrounding area was already saturated by a lot of abusive constructions, the so-called "tourist" villages, realized during the building "boom" of the '70s and '80s. The excavations have reported an archeological complex of great value due to the rarity of the temporal dating and of the completeness of the settlement that, even if small, contains all the key elements: the small church, the "emporium", the public space, the stores, the houses, the dock buildings [5].

The peculiarity of being in a recent building fabric, asphyxiated and of poor architectural quality, together with being located in the historic palimpsest of late antiquity and the period of vandals raids, turned it into a main resource/good cultural archaeological and landscape. As a matter of fact, it represents a resource on which it is possible to found the process of requalification of the entire area, which is also enhanced by a beautiful beach recently nourished by the Regional Province of Ragusa.

Nowadays the archaeological park of Kaukana is one of the strategic and focal points of the community of Santa Croce Camerina, that considers it as belonging to his own territory and uses it for the best cultural events of the summer season. Thanks to the conjugation of the protection of archaeological goods together with the landscape one, the common notion of "public green" has been replaced by the specific meaning of identity of places.

The area of the archaeological park belongs to the regional Sicilian state property and it is managed by the Department of Cultural Heritage of Ragusa who has handled in these years the management, the fruition and the maintenance.

Over the last few years, in this area several excavations promoted by the university of Vancouver has been done: the team headed by prof Robert Wilson has excavated some parts highlighting rooms, furnishings and human remains that have confirmed both the dating and the religious cults celebrated in the village, even after it was abandoned [6].

Due to the strategic importance of the park of Kaukana the Department of Cultural Heritage has drawn up a project for enhancing the state-owned area that was financed on the chapter "freed-up Resources" of the previous POR 2000-2006 program.

The project forecasts a series of operations aimed at giving back the area to the fruition according to a clear didactic path that should give to visitors the reading key to interpret the archaeological ruins. This way it is possible to identify the ruins in a wider historic vision reconstructed according to rigorous Scientifics criteria and combined with the comprehension of the place, the contest and the naturalistic park.

The park completes its natural vocation of public space of the community through the realization of: a small but essential parking at the entrance; wood paths that drive visitors along the archaeological excavations; a space equipped for public open air shows; a restructured roof of the little church. This last offered the opportunity for an architectural reconfiguration that might give back to the public fruition the typological and spatial qualities of the church together with the new lights that emphasize its key role inside the whole complex. Furthermore, the new fence in fiberglass gives a vegetal boundary that partially hides the new roof. Moreover the vegetal component has been deepened too: the dangerous or sick plants have been cut and removed; autochthonous species such as carobs, almonds, wild olives have been re-planted. This way the allochthonous species could be gradually restructured and, during the time, the floristic-vegetal component will get closer and closer to the native one. The scope is to re-construct a piece of the historic landscape, which is of great value and unfortunately now it is readable only in few fragments. Moreover, in the didactic indications large emphasis will be given to the archaeological and historic components as well as to naturalistic and vegetal the ones.

Fig. 4-5: The renewed roof of the little church merged with the vegetation (pictures by G. Manganello).

3. Less waste/more research for the knowledge and documentation: the project of the archaeological park of Kaukana between perception and dimension.
Mariateresa Galizia

The enhancement project of the state-owned area of the park of Kaukana is part of a regenerative policy focused on investments in local cultural heritage.

The planning intervention drawn up by the Department of Cultural Heritage of Ragusa is mainly founded on a plan that counts "less waste/more quality of life and places"; a plan where culture is the driving force for places development, saving them from devastating speculative projects.

The scope is to have "less environmental impact/more environment requalification" in order to improve economic, social, environmental and cultural forces that could give back this area to local inhabitants and to tourists.

The careful and accurate action of the Department of Cultural Heritage required a rigorous survey of the site aimed at "more knowledge and documentation/less imprecision" into planning choices.

The characteristics of the site – based on the indissoluble relation between landscape and archaeology – required a kind of survey aimed at the project of reuse of the park. This survey should be able to catch and represent, in their shape and measure, the late-roman settlement together with the natural features that during the centuries have modified the state of the places.

The main goal of the planning intervention is to give back to the community a proper interpretation of a piece of history told through the archaeological ruins as well as through the traces of an historic landscape with a peculiar floristic-vegetation component.

As a matter of fact, the archaeological park represents a wide and diversified presence of the human intervention and it's the memory of the changes undergone on this characteristic area of the "hyblean" territory. Therefore, there is the need to analyze and interpret the hierarchy of the elements which characterize the place – terrain morphology, autochthonous and allochthonous vegetation, the constructive tools – in an unique model of representation through which it is possible to properly identify the paradigms/models, natural and not, of the hyblean archaeological area. The study has been an applicative experience aimed at the creation of a possible "extended museum" according to a settlement connotation on which it could be possible to develop significant disciplinary elaborations (archaeology, architecture, history, conservation, geology, economics, agriculturalist).

The Department of Cultural Heritage of Ragusa required a cognitive survey which would combine and support the planning choices focusing both on the recovery of the preexistences and on the new project of fruition of the park as resource/cultural assets, archaeological and landscape. This process of requalification has economic and cultural effects on the whole ragusan area.

We choose to use 3D laser scanning methodology in order to obtain an integrate representation made of analysis and measurements, survey and representation. Thus, a survey appropriate to understand and document the object in its completeness: from the morphology (territory/altimetry) to the geometry of the archaeological complex, to the topology of elements, to the state of conservation of the stones of the settlement.

The 3d laser scanner survey provided a product/model of the surveyed reality through which it is possible to carry out a diachronic and synchronic reading and to convey an analytic and synthetic evaluation already during the survey phase. A 3D model objective – inspected in the virtual space of the computer where it is possible to intervene and operate with subjective evaluations - has itself the fundamentals of the project.
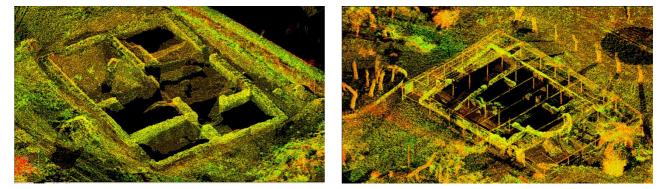
Fig. 6-7: Views of the cloud of points near to the remains of a house (on the left) and of the little church (on the right).

As a model of representation, it is a media of exchange of visual feelings and spatial descriptions and it allows to be observed according to the "perspicere" of the tradition. The coexistence of the perceptive feature and the metric-objective one represents the innovative component of the digital survey that allows, thanks to data correlation, the integration and the interaction of the specific disciplinary expertise.

This way the role of the traditional graphic representation - seen as interpretative media of the different languages and specialist expertise involved in the planning activity – is placed side by side to the model of digital synthesis. Through the model the following ideational phases of the planning process, the new shapes and the new volumes are inserted into the virtual scene of places, embodying the 3D digital space.

The visualization of the model – that for its intrinsic potentialities enriches the process of scientific discovery because it improves the hidden interiorities of the place – allowed us to transfer all the planning reasoning into digital form [7].

The elaborated product is not only a simple prefiguration that relates drawing and design but also a manipulable system that simulates the reality simultaneously to the work of the designer.

This model embody a hierarchic structure which allows, in the planning phase, a dynamic approach which goes from the critical analysis to the visual impact of the intervention, to the simulation of alternative hypothesis for restoring the materials and the vegetation. Moreover, the representation by means of 3D digital models gives the opportunity to create a "virtual museum" which has its dimension and which is able to host the whole archaeological site according to an efficient and attractive interdisciplinary didactic path.

The use of 3D scanning in the field of cultural heritage contributes to the elaboration of a new communicative and visual grammar which allows to combine the cognitive rigor of the metric investigation with the need to be an effective tool for understanding values, as well as to convey the meanings of the site making easier the integration among culture and economics, tourism and territory development [8].

Thanks to the processed model it has been possible to activate the project of requalification of the park that – preserving the memory of the past and the respect of the nature – would develop more growth and, at the same time, "less impact on the historic/cultural, floristic/faunistic, socio/economic environment".
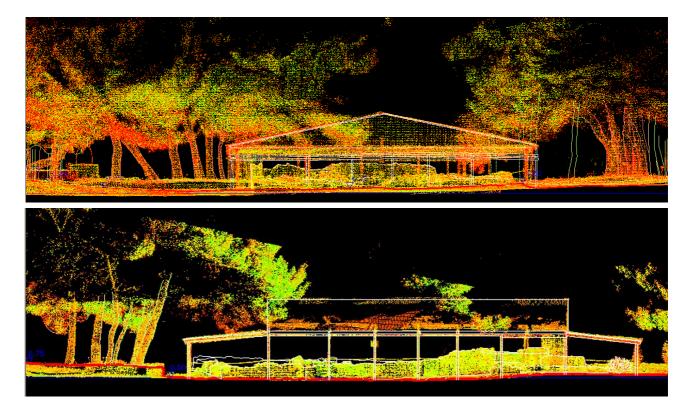
Fig. 8-9: Suggestive representations of the model among shape, measure and perception.

4. Less waste/more knowledge of Hyblean archaeological landscape: survey and representation of the archaeological park of Kaukana
Cettina Santagati

The archaeological park of Kaukana stretches for about 3 hectares and half into the construction fabric built during the economic boom of the 70s and 80s.

The ruins of the late-roman settlement are plunged into a thick woody density (about 1170 trees among autochthonous and allochthonous species) in an indissoluble union between nature and archaeology generating a cultural landscape of remarkable historic-naturalistic value.

The knowledge process of this archaeological area – nowadays fragmented by the littoral road into three adjoining areas, one of them along the coast – required a selective methodological approach, alternative to the traditional investigation methods. As a matter of fact, the survey of the site has taken into account the archaeological emergencies issues together with the naturalistic element in order to develop a requalification project of the park aimed at "less wastes/more knowledge" by planning fruition and enhancement paths along the ruins and the green.

It has been investigated on the field the 3d laser scanning technology which is, until now, the most suitable for measuring and documenting the reality in terms of acquisition speed, quantity and accuracy of measured data and capacity of providing, in real time, the 3D representation of the surveyed object [9,10,11].

The Time of Flight 3d laser scanner HDS 3000 by Leica Geosystem, belonging to the laboratory of Architectural Photogrammetry and Survey, has been used.

Through a conscious pre-knowledge of places, some innovative operative protocols have been tested on the field. That was essential to fully understand the complex and multiple issues of the cultural asset we were about to study and of the whole environment, anthropic and natural, to which it belongs.

The procedural logic, experimented and adopted during the data acquisition steps, supplies to the peculiarities of the site, to the need to document the trees, to integrate and to geo-reference the surveys of future excavations. It has been conceived and arranged an almost regular grid of station points (34), arranged at about 30-50 mt one from each other, so that each station is connected to the previous and the next one. This way, besides a good overlapping between the scans, a better error compensation in the following phase of the model alignment is granted.

In the absence of well recognizable reference points, the chain between each station and the following is assigned to a set of 3D targets (69 polystyrene spheres with 12 cm in diameter) univocally identifiable and well visible. The targets are uniformly arranged in relation to the station points so that from each station point it is possible to acquire at least 4 targets in common with the direct adjacent stations.

The choice to use polystyrene spheres instead of pre-calibrate 3D targets (more expensive) has been based on some tests performed in our laboratory. These tests gave good results about the alignment of adjacent stations. The only condition is that a redundant number of spheres should be used so that it is possible to balance the error due to their un-calibration [12].

Fig. 10: Experimentation on the field with 3D spherical target.

Particular attention has been paid to the visual connection between the passage stations from one area to another one and - even if adjoining – they are cut by the littoral road and the surrounding buildings: thus, intermediate stations have been planned when the points were too far.

The in situ survey for each station provided: a fully 360° scan with a density of 1 cm to 15 mt; a thickening in presence of the archaeological ruins and the 3D targets (4 mm). In total, 34 scans have been performed and 185 millions of points have been acquired.

Before merging the overall model, raw data have been cleaned and spherical targets have been recognized and identified by creating, in the embedded software, the corresponding spheres (through proper fitting algorithm) and by assigning them an ID label.

The assemblage of the 34 scans into a unique reference system – in order to have a close mesh of connected scans – has generated 77 chains (cloudmesh).

The alignment error has been reduced to 1,5 cm by optimizing the computation parameters. This result can be considered more than acceptable because of the wind which introduced a strong disturbing element in the survey of trees leaves (essential for an accurate documentation of the foliage overall dimension). Moreover, considering the required scales of representation (1:200; 1:500) this value fits the graphical error.

The obtained 3D model is a digital document that holds the morphological, geometric, natural, environmental and perceptive characteristics of the homologous real model but only with a later manipulation-interpretation it might become an intelligible space.

The overall model constituted the base for the following elaborations aimed at obtaining a full documentation of the condition of things. Thus, they have been represented: plani-altimetric relief of terrain (by contour lines at each 25 cm), the ruins of the settlement, the arboreal species (localization, foliage overall dimension and denomination), the walls, the fences and all the elements useful for the comprehension of the spatial and

environmental contest of the archaeological park and very important for the enhancement project of the state-owned area.

Finally, to document the plani-altimetric relations between nature and built area –essential for the project of fruition of the park – they have been performed some sections of the model aimed at the elaboration of representations which give the perception of the state of places.

The digital survey of the park has constituted a valid analysis tool for the comprehension of the cultural, natural and landscape worthiness of places, allowing a "less static/more dynamic methodological approach" to the regeneration project of the Hyblean territory.

Indeed, the possibility to be able to extract at any time new information, to compare with the planning solution being formulated, allowed a better control of the project through "less wastes/more quality choices".

 "Less randomness/more ideas" would contribute towards the development of a sustainable project based on the strategies of enhancement of the archaeology and of the related landscape.

Fig. 11: Plan graphical restitution of the archaeological park where is highlighted the project of survey.

Fig. 12-13: The archaeological landscape between natural and built environment.
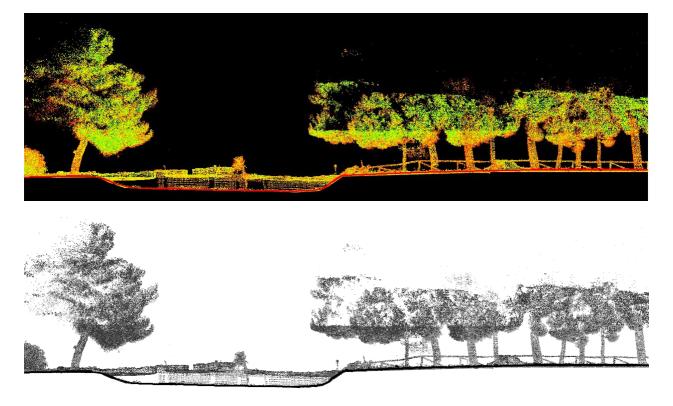
Fig. 14-15: The remains of Kaukana settlement in the environmental contest of the park.

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Industrial heritage, collective identity and eco-museums: the case-study of Floristella-Grottacalda mining site

Antonella VERSACI[1], Alessio CARDACI[2]
[1] Faculty of Engineering, Architecture and Motor Sciences, University of Enna "KORE", Italy
E-mail: antonella.versaci@unikore.it
[2] Faculty of Engineering, University of Bergamo, Italy
E-mail: alessio.cardaci@unibg.it

Abstract

Lack of values and sloppiness characterize our territories, even if they are full of cultural resources, as in Enna. A spread heritage often left to itself, no longer or only few integrated into the active life of places. However, dispersed in a landscape of rare beauty, significant examples of an important chapter in the Sicilian history, connected to the historical exploitation of its large sulfurous deposits, rise. Among these, the Floristella and Grottacalda mining site, located not far from the UNESCO World Heritage site of the Villa Romana del Casale, is one of the most expressive examples of industrial archeology in Southern Italy. In this area, still visible and dramatically evocative are the signs of several ages as well as the systems and methods of mining and sulfur melting. Only partially located within protected enclosures and managed by a park governing body that should take care of its safeguarding, this place appears quite "distant" from people who do not "recognize themselves" in it. Nevertheless, if properly protected and promoted - i.e. in the framework of an eco-museum structure - and connected to the territory; when studied for scientific and educational reasons, in close collaboration with the community and in synergy with the Institutions, such heritage would be a very useful tool for the reinforcement of identities among the population. It will also help to increase cultural and environmental heritage awareness, collaborating for its preservation.

Parole chiave: cultural heritage – industrial heritage - eco-museums - Sicily

1. Introduction

Looking towards the existing city - in general, fully built, dense and chaotic - the gradual fade of those values that give meaning to a physical location, allowing its transmission to future generation, is becoming increasingly evident. This loss of identity can be seen in many historic cities, often characterized by atopic landscapes in which stand contemporary edifices built according to homologating processes, unrelated to the morphological and/or constructive relationships with the environment and the permanence of memory. Moving away from the old town, the sense of disorientation is even more understandable: plunged in the urban sprawl, extraordinary signs of the past remain silent and solitary. Used also in relatively recent times for productive purposes and finally forced to abandon the old tasks and the original functions - they are looking for new opportunities to transform and adapt to contemporary needs. These industrial areas, now neglected, deserve to be rediscovered, restored and reconnected to the real world, because they are expression and reflection of those technological, economic and social values that have characterized the so-called "machine age"; of that culture of work that has deeply influenced the course of the 20th century, providing a substantial contribution to the development of human civilization.
Nowadays, they represent the promise and the challenge of intervention possibilities to be undertaken for the sake of future generations [1]. They can also be considered a response to the needs of adaptability and flexibility, increasingly rare in highly structured cities, often degraded, crystallized and congested.

Considered as "empty" spaces because lacking their primary function, they are instead usually "full" of architectural artifacts of a certain local historical significance; rich in symbolic values, meanings, traditional practices and informal uses [2]. These marginal realities actually possess a heritage of great interest: they are a vital resource as their recovery would allow to not use more open areas; in addition, usually already equipped with urbanization works, they are easily accessible and well connected to existing infrastructure system. The return of these spaces to the city may therefore constitute an important opportunity to reshape the urban fabric in which they are located, helping to mend the fragmented peripheral tissues, partly compromised in recent decades by an uncontrolled urbanization [3].

In Sicily, currently in a state of "almost resigned standby" the landscape of sulfur mines, after having fed both the economy of the region and the inspiration of its poets and writers is waiting - as most of the submerged assets of this land - to be unearthed and, above all, valorized as a place of extraordinary individual and collective memory.

2. The important role of mining industry in Sicily

The provinces of Enna, Agrigento and Caltanissetta are the most important and largest areas concerned by the ancient production of sulfur in Sicily. If between the 19th and 20th centuries the parable of the practice of sulfur extraction begins and ends, its history, however, has ancient origins and an evolution strongly linked to the succession of rulers and the resulting political control in the island. Since the Bronze Age (2500 B.C.) an intense activity in the field is, in fact, documented. It reaches its climax at the end of 18th century when the Sicilian sulfur cycle became fully part of the chemical European industry. The consequent need to recover the sulfur in large quantities led, in 1808, under British protection, to the decision of government to give Sicilian aristocracy, the permission for the subsoil exploitation. The opening of mines, begun at the time of British occupation during the Napoleonic wars, then gave life in Sicily to a particular industrial revolution that progressed in parallel to the contemporary English and French experiences [4]. The sulfur produced will be requested from the European market, especially by those nations, as the basic element of the transformation processes in the emerging chemical industry. Because of this, between 1830 and 1835, the number of *cantari* (tons) exported, doubled rising from 380,000 to over 660,000. In 1835, the most of exported sulfur will be directed in Great Britain (325,793) and France (262,774); the remaining amount will join other northern European countries and the United States of America.

However, Sicilian mining was characterized by a high labor exploitation, especially among children: the so-called *carusi* (as recorded in Pirandello's literature, for example, in *Ciàula scopre la luna*). Boys aged between six and fourteen years for a few handfuls of money, were handed over by their parents to the *picconieri* (pick-axe workers) to be used by them to bring to the surface the sulfur ere extracted. Numerous were the laborers who preferred to leave the camps to work in the mines, even in inhuman conditions; the exodus from agriculture was important and greatly influenced the fall in cereal production of large landed estates. Although the establishment of a great "industrial proletariat" for those times (the first statistics, dating back to 1860, show the presence of a job working in the mines of approximately 16,000 units) the "exploitation" of sulfur was a mechanism in colonial style. The whole raw product was destined for foreign market and mainly sold by foreign operators, mostly British, who also took care of credit aspects ensuring a prepayment on delivery.

Such a race to low-cost production often led to overproduction crises which the Bourbon government, in 1835, tried to stem, by entering into a contract with the French company owned by the industrial Aycard and Taix. Thus opening the way for the foreign capital to obtain concessions for the purchase and sale of sulfurous Sicilians deposits. This agreement committed for ten years the company to purchase all sulfur produced in Sicily at a set price. The production had to be contained within certain limits, but they ensured the immediate payment of half of the sulfur delivered. In addition, the Taix & Aycard C. had promised to build a local industry for the preparation of caustic soda and sulfuric acid, and to build sixteen miles of roads per year [5]. In 1840, following the English dealers protests who accused the government of Naples having specifically guaranteed a corner for France, the contract was terminated and with it the ambitious project of creating a Sicilian chemical industry vanished.

In 1850, the discovery of *oidium tuckeri*, a fungus that causes powdery mildew of grape, the demand for mineral increased, making Sicily a leader in the mining sector. A role that it held until the early 20th century and that was closely linked to the strong atmosphere of renewal that concerned Sicily after the unification of Italy until the end of World War I and again between the 1920s and 1930s, especially in the transport and development of regional rail [6]. Depending on the needs of the sulfur, the major mining centers of the island were connected to the main Sicilian ports, then creating the so-called "sulfur-ways".

The crisis in the Sicilian sulfur industry began in the late 19th century with the introduction of the Frasch process, a method of mining deep-lying sulfur named after its inventor - used in U.S. mines with consequent

vertical reduction of market prices. In 1896, in an attempt to reverse the negative trend, Sicilian producers decided to form the Anglo-Sicilian Sulfur Company, promoted by British entrepreneurs and Ignazio Florio, the heir of one of the largest Italian business dynasties of the time [7]. This allowed to stabilize the prices of sulfur and large mines improved facilities and increased the equipment, thanks to the arrival of technical and entrepreneurial middle class from northern Italy. The attempt, however laudable and delivering good results, failed after only ten years: the pressure of American competition meant that the price of sulfur drastically lowered.

Later, the beginning of World War I made it increasingly difficult to supply the mineral causing that sulfur American grabbed much of the world market. The ensuing crisis period affecting Sicilian industry became serious in the 30s, when the global economic crisis strongly penalized the sulfur mines in Sicily until the total collapse of output during the second conflict. The Sicilian sulfur production recovered slightly after 1943, when the war ended and only until the early 1950s, a period in which America, engaged in the Korean War, channeled into the war industry, all its resources.

However, the subsequent revival in U.S. industrial production raked again, all the markets; the competition by then too strong, led to the final decline of the Sicilian sulfur industry and to the gradual closure of the mines.

Since the mid-80s, these places, whose importance for Sicily, the associate territories and people is unquestionable, set off for tragic destinies, made of abandonment and desolation. The economic speculation, the forced removals of these important expressions of the economy and culture of this land, caused the subsequent deletion of expressive traits of its cultural identity that only much later, people will try to reconstruct.

With the Sicilian Regional Law n. 34 of 1988 finally closed, in Sicily, sulfur mining production. In the aim of preserving the memory of the mining industry and culture in the region and to preserve and protect, at least in part, the unique environmental heritage and industrial archeology of sulfur, personages from culture, trade unions and other representative sectors of the society and politics, worked in order to Sicilian legislature approves another law, the n. 17 of 1991, who identified some mines and mining sites to be transformed into mining parks, regional museums of the mines and mine-museums.

In the three major sulfur provinces were chosen for this purpose, the following mines: Gessolungo, Trabia-Tallarita and La Grasta in Caltanissetta; Ciavolotta and Cozzo Disi in Agrigento and, finally, Grottacalda and Floristella in Enna, one of the most expressive settlements of industrial archeology in southern Italy.

3. The history of place

The Floristella and Grottacalda mining site is located in a large area on the outskirts of the town of Enna. Surrounded by a remarkable landscape, it forms an equilateral triangle with two other important polarities: the Pergusa Lake and the Nature Reserve of the Ronza (Fig. 1). The mining site is also located in a basin where cultural and environmental heritage of international interest seat, such as the Villa Romana del Casale in Piazza Armerina and the excavations and the archaeological museum of Aidone, where the famous Venus of Morgantina, returned in 2011 from the Paul Getty Museum in Malibu is hosted. Until 1971, the mines areas were crossed by the disused railway Dittaino-Piazza Armerina-Caltagirone which stopped for the traffic of goods and workers in Mulinello, Floristella, and Grottacalda Valguanera (Fig. 2). Next to the now disused Grottacalda station, 647 meters above sea level, there is a forest green that extends over 1.5 km.

The complex brings together two abandoned sulfur mines with a total surface of 400 acres: of these, one half, the core of Grottacalda is a private property and the other, the nucleus of Floristella, is owned by the Sicily's Regional administration (fig. 3).

As documented by the archives of the Royal Corps of Mines of Caltanissetta, Grottacalda started its mining activities in 1815, even if the sulfur research in this area is thought to date from a period between 1700 and 1750 [8]. Sebastian Mottura, creator and first director of the first Mining School of Italy, founded in 1862 in Caltanissetta, traveling between 1868 and 1875 to design the first official geological map of Italy commissioned by the Government, when surveyed areas in central Sicily, wrote that the *solfara* (sulfur mine) *Galati* in Grottacalda was one of the oldest in Sicily. The land belonged to Romualdo Trigona, Prince of St. Elias, who in 1886 granted the right to carry out extraction activities to Trevella & C company maintaining it for several years. In 1919 the *Società Solfifera Siciliana* acquired the concession for extraction and, subsequently, after its fusion with the *Montecatini - Società Generale per l'Industria Mineraria e Chimica* (later *Montedison*), a perpetual license was required and granted in 1943. The events immediately following the war caused serious problems in the ordinary development of activities. Due to the lack of electric current, it was impossible to perform the mine drainage water procedures. A few years later, the Montecatini decided to abandon the industry and to convert it in an agriculture business, dividing the area into several farms, of which still remains some witnesses on the façade statements of certain buildings.
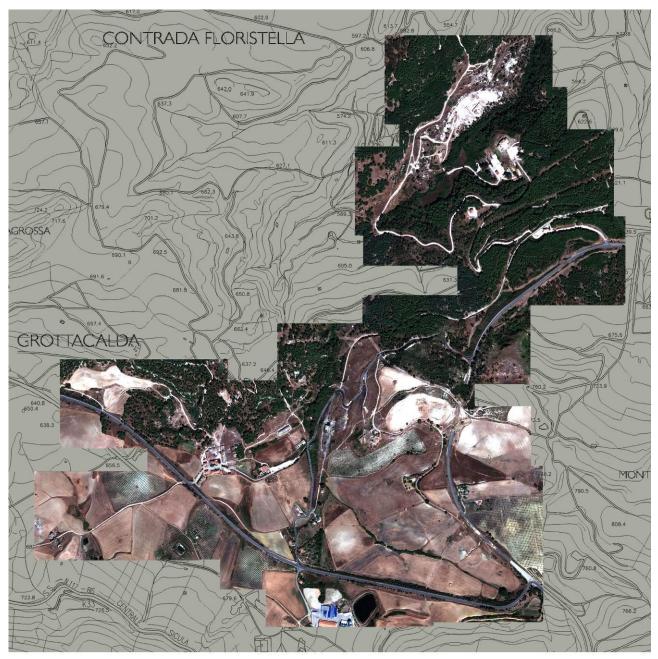
Fig. 1: The area of Grottacalda and Floristella mining site.
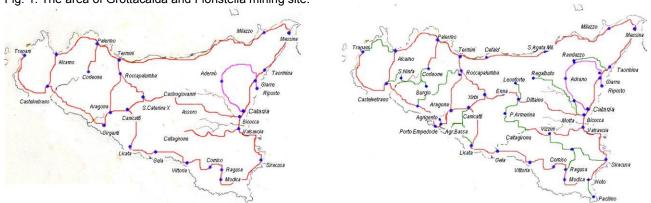
Fig. 2: Railway system in Sicily at the beginning of 20th century and in the 1950s (courtesy by Alessandro Ensabella).
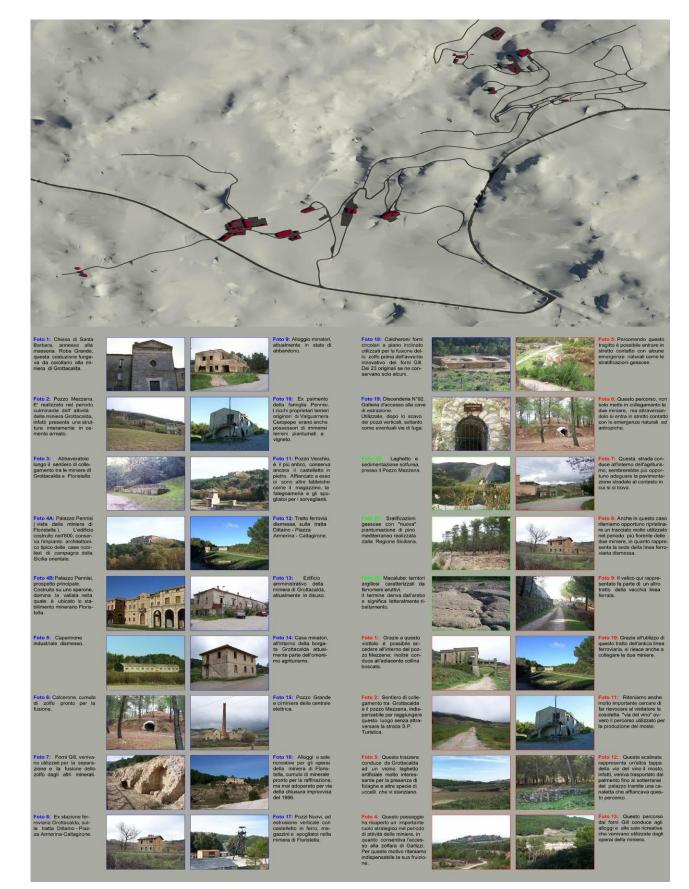
Fig. 3: The mining site of Grottacalda and Floristella and its cultural heritage (courtesy by Alessandro Ensabella).

In accordance with an agreement established between the company and the Grottacalda's miners to exploit the high areas of the mine, activities continued until 1963, the year of expiration of the concession. Of this important mining activity (among the largest in Sicily) now remains a vast as degraded heritage: castles in masonry, concrete drop structures located near the extraordinary Mezzena Well (Fig. 4 and 5), the so called *Pozzo Grande* built in 1868, the *calcaroni* (masonry furnaces), several buildings, formerly used as housing for the miners and the administrative staff, the former power station, a cinema, the buildings of the former railway station. Recently, some of these buildings have been converted to farm holidays structure by the current owners [9].

On the other hands, with regard to the mine Floristella, the permission opening was granted on April 11, 1825 although the extraction of sulfur happened even earlier, after the discovery, in 1791, of the method of manufacture of soda obtained by treating with sulfuric acid, the common salt. This field was one of the most important mining district of Caltanissetta, not only for its productivity but also for the quality of the sulfur that was extracted: so high as to constitute a standard of excellence in the market.

The mining area of Floristella preserves the typical landscape of the Sicilian *zolfiera*. Like a great open-air museum, the huge mining complex provides a true "stratigraphy" of different eras and related systems and techniques of sulfur mining and smelting. Inside, in fact, are present and clearly visible countless galleries and about 180 *discenderie* (shafts) from where the sulfur was knocked down by the traditional pick to be then transported to the so-called *calcarelle* (a sort of circular ditches with a 1.50-2 meters diameter with an inclined plain so to allow the casting of the molten sulfur towards an opening called *a morte* - death - where it solidified) that are still preserved in good condition, near wells and galleries. It can also be seen what remains of industrially masonry furnaces, several examples of the so-called Gill furnaces (invented in 1880 by Robert Gill), of castles complete with winch (the oldest dating back to 1868), in addition to the ruins of service buildings arisen in the vicinity of the wells (nursing, accommodation for the miners, including the room used as a recreational club for workers).

On a hill stands the imposing *Palazzo Pennisi*, former residence of the owner family, which dominates the entire mining area of Floristella of which it represent the real heart (Fig. 6). Built between 1870 and 1885, initially only until the ground floor by Baron Pennisi, nobleman from Acireale, it was intended as a summer residence for the family. The *Palazzo* was later raised to two other plans to meet the need for accommodation of the mine manager and employees, and for setting up office facilities. It was designed to be an impregnable fortress: unable to be taken by the miners in the event of strikes and riots. For this reason, the numerous openings were equipped with louvers and inside - in addition to housing, offices, chambers of operation, an octagonal chapel, the coal cellar, barns, cellars - there are some secret safety exits that, through the cellars and two small galleries, allowed to escape from the Palace in the ridge below. The magnificence of the building and its architectural value, generate a kind of contrast with the austerity of the place, providing an immediate and exciting image of what should be the extreme social gap of that time.

Fig. 4: The Pozzo Mezzena.

Fig. 5: Laser scan 3D of the Pozzo Mezzena.

Over the years, and with the exponential growth of mining industry, the building became the headquarters of the mine until its definitive closure. Following its sale, the building has long been abandoned. Because of its poor conditions, urgent consolidation works have been recently carried out, looking forward to finally be restored to one day be transformed in a museum of industrial archeology. Worth mentioning are also water catchment system structures situated therein, the millstone of the Pennisi's family and the so-called via del mosto: a trail, originally built for the purpose of enabling a quick connection between the winery and the Palace, flanked by an ancient gutter made by Sicilian tiles who brought the must to fall directly into the cellars.

4. Prospects for the future

Floristella was one of the last Sicilian mines to close the door in the late 1980s. The abandonment of structures, however suddenly happened, led to a period of great destruction, vandalism and theft that have largely compromised an unique heritage, consisting of buildings, equipments, warehouse stock, often irreversibly damaged or disappeared. To overcome these problems, unfortunately common to all Sicilian sulfur mines, regional government promulgated on May 15, 1991 the law n. 17 that established in this area, the *Ente Parco Minerario* (Park Mining Authority) in order to defend and protect the natural and human landscape. By taking appropriate safeguard measures, this tool would be able to stop the degradation of this rich set of cultural assets. Nevertheless, despite the commitment of its administrators, it has not allowed to completely prevent the rapid destruction and decay processes that characterize today a large part of the former mining site. If a number of "recovery, protection and restoration" actions were executed in the Park, and as much are foreseen (waiting for funding), an objective data is source of concern: the almost total indifference of the local population who do not know, do not understand it and/or it does not recognize itself in this place. In part, privately owned and difficult to reach due to the absence of practicable roads and to the presence of fences, the goods of this important industrial heritage, now fragmented, seem to move towards the complete annihilation and with them the memory of the place and people who have populated it. Not taking advantage of special attention from architectural critics or the interest of younger generations, this site lies unexplored and isolated, although it deserve to be recovered.

In recent years there has however been an increasing interest in the requalification and valorization of the Sicilian dismissed sulfur mines, which occurred mainly at the institutional level. This renewed attention is now accompanied by the possibility of developing reasoned and concrete actions of protection and promotion. They would certainly be helped by the presence of the *Parco nazionale geominerario delle Zolfare di Sicilia* that a regional bill proposes to establish. This initiative aims at strengthening the provisions ensuring the defense of the extraordinary industrial heritage of Sicily and to implement that "subsidiarity" principle that appears necessary to allow the enhancement of the specific cultural, economic, historical and natural values of the social and territorial realities involved.

In Italy, the experience of Geoparks has now reached a good level of maturity, in particular, with the creation of the Geo-mining Historical Environmental Park of Sardinia and the implementation of other important initiatives that merit to be studied and investigated. The meaning and the cultural contents of these realities are by now concrete matters of record which a proper management policy of the historico-morphological resources of the territory would necessarily refer to. They reflect an interest no longer being limited to the respect and recognition of the natural values but that is part of the broader concept of "cultural heritage". To the deep meaning of nature to be preserved is thus added the need to also consider the value of human presence and that of all the signs of working activities and land transformation connected to it. In this context, the concept of cultural heritage has gradually freed from the aesthetic values to include today the social aspects, even the intangible or virtual ones, once considered exclusively the subject of specific and exclusive studies [10; 11]. This should not be understood as a new complication, but, on the contrary, the testimony of a broader and generalized awareness of the meaning of human presence, of the role of the work, which could become a powerful catalyst capable of triggering processes of growth and improvement of the quality of life in the concerned places.

The establishment of the *Parco nazionale geominerario delle Zolfare di Sicilia* is part of this worship process and is focused on the idea to create a *museo diffuso*, a kind of extended museum at regional scale, really considering the whole island as such, seeking at improving natural and ethno-anthropological qualities.

Will this project (clearly top-down based) achieve the results aimed by Politics? Will it succeed in facilitating the rediscovery of that authentic local culture that is needed in order to preserve and affirm people's identity and to highlight the differences for the purposes of an overall socio-economic development?

Probably not, unless of first rebuild the "reasons" of such settlements, giving them a "sense", at present lost. This, in the conviction that only what is understood and of what are known the true motives and

Fig. 6: Palazzo Pennisi.

meanings, can be properly maintained: "in a few words, the history that is deposited in them that, through the memory of each of us can be passed on to others because they make appropriate use" [12].

Only by implementing forms of coordination referring to the complex system of natural, cultural and landscape values of the individual local entities, based on a specific relationship with the existing institutional protection instruments and in close connection with local people and research entities located in the area, such as universities, these places will become very important resources for the territory and its community.

In this context, it may be useful to have recourse to the concept of eco-museum, actually a pretty well established reality at international level but that only in recent years has come into common usage in the Italian context [13]. On the basis of the eco-museum approach, the territory should not be considered as the physical place where monumental isolated elements are located, but as a complex system of goods and people that interact to compose the whole structure. The desire for innovation, born from the belief that museums should not just collect, display and tell the story of objects in them stored but talking about people and ideas, has contributed to the design of new organizational systems aiming at retracing and describing the history of physical contexts, places and landscapes of the spirit, facts, atmospheres, works, legible forms, all also signs of a past history. The eco-museum can be seen as the possibility that the museum's idea could be extended over an entire area, involving in the process the population, finding a new sense to old settlements, obsolete objects and methods, reusing them for new productive and cultural purposes: "It is, in particular, for the local population that the eco-museum should be established. So that they would recover lost traditions and, simultaneously, preserve cultural heritage - tangible and intangible - and the environment, promote sustainable social, recreational, touristic development and through it, valorize resources and create new or more skilled jobs [Boriani]. The success of these initiatives, however, highly depends not only on economic factors, will and management abilities, but also on the quality of the restoration, reuse and enhancement activities carried out on the goods involved in the projects or thereto related. To this end, it is essential to focus on the issue of conservation of anthropological, natural, environmental, landscape, historical and architectural characters in the area, starting from (finally!) implementing those basic processes of direct knowledge (metric, material and environmental) directed not only to the buildings of major importance but also to the so-called "minor" heritage often, still, incorrectly underestimated.

5. Conclusions

These are the principles that should motivate the material and spiritual rebirth of the Floristella Grottacalda mining site and with it the whole territory. In an era dominated by changes brought on globalization processes and on the increasing risk of homogenization, the only possibility of distinction and self-affirmation of different places should be entrusted into the recovery of their identity. Only by the endogenous strengthening of these characters it is possible to find the reasons of a desirable self-healing.

Since some time on, the presence of many urban and peri-urban "empties" characterizes most Sicilian big cities. Areas mainly resulting from industrial decommissioning processes, remained largely ignored by the urban development strategies that, at least until the mid-90s of the last century have preferred new forms of expansion, mainly directed to the residential sector [14]. These pieces of land, made unproductive for purely economic reasons and now emptied of meaning, can become, if properly rehabilitated, the ideal places where osmotic processes between past and present, human activities and nature; between the man and the city where he lives and in which he should be able to identify and find himself, would be reactivated. These

sites could serve as a stimulus for a re-evaluation of the city as a whole, reconsidering years of segregation and zoning policies, reactivating virtuous processes of local governance aimed at rehabilitating the many wounds inflicted on the landscape, places and people's identity.

It seems clear that the economic and cultural recovery has now become necessary and urgent in order to allow the reuse of these areas for productive and social purposes, allowing their re-appropriation by the local population which has the legitimate right of consumption.

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Le *tanneries* di Barjols: uno spazio costruito da reinventare

Laura BLOTTO
Dipartimento Architettura e Design, Politecnico di Torino, Italia
E-mail: laura.blotto@polito.it

Abstract ID034 The *tanneries* of Barjols: a space built by reinventing
The spectacle of abandoned factories is a fairly common phenomenon, the old factories reduced to empty containers become places of memory, evidence of intense and sheer hard work, which for centuries has involved generations, distorted and modified through the initiatives of individuals, the environment and the territory. Although apparently they all look alike, on closer inspection they reveal different realities starting in the places in which they live, their winds along the water supply sources and their planimetric and typological development and who do not respond to the same quantitative and qualitative parameters.
Certainly these buildings define and confer, with their silhouettes, the identity of a territory.
The case examined has focused attention on the reality of a post-industrial town in the central Provence where the activities of Tanneries have influenced over a long period of time the life and choices of a population. Faced with this scenario, composed of disturbing manufacts abandoned, but still present and very close to the heart of the local people, one wonders what will be their future, we will investigate the measures taken and what the intentions are planned with a view to sustainability global.

Parole chiave: Barjols, fabbriche, riconversione, ambiente

Lo spettacolo delle fabbriche abbandonate è un fenomeno piuttosto frequente, le antiche fabbriche ridotte a vuoti contenitori diventano luoghi della memoria, testimonianze di intenso ed alacre lavoro che per secoli ha coinvolto generazioni di famiglie, stravolto e modificato attraverso le iniziative dei singoli, l'ambiente e il territorio. Anche se all'apparenza sembrano tutte eguali, a ben vedere esse rivelano realtà diverse a cominciare dai luoghi in cui sono inserite, il loro snodarsi lungo le fonti di approvvigionamento idrico ed il loro sviluppo planimetrico e tipologico che appare diverso nei parametri quantitativi e qualitativi. Certamente questi fabbricati conferiscono e definiscono, con la loro silhouette, l'identità di un territorio.
Il caso preso in esame ha focalizzato l'attenzione sulla realtà post-industriale di un paese della Provenza centrale dove l'attività delle *tanneries* ha influenzato per un lungo lasso di tempo la vita e le scelte di una popolazione. Di fronte a questo scenario composto da inquietanti manufatti abbandonati, ma pur sempre molto presenti e vicini al cuore della gente del luogo, ci si domanda quale sarà il loro futuro, si indagherà sui provvedimenti adottati e quali intendimenti sono previsti nell'ottica di una sostenibilità globale.
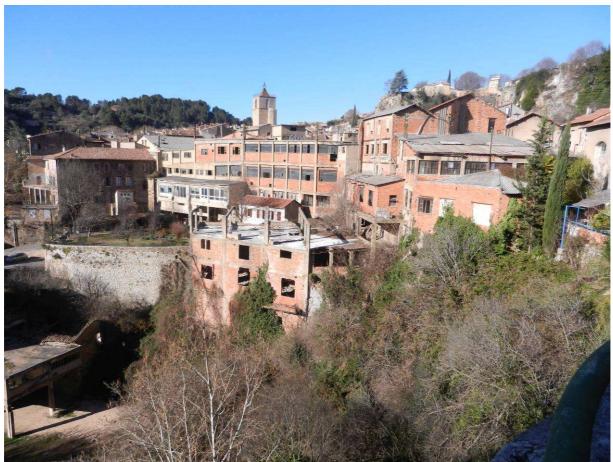
Fig. 1 - Immagine d'insieme delle tanneries di Barjols (foto di L. Blotto)

Situato alle porte dell'Haut Provence, nell'alto Var, il comune di Barjols è l'epicentro di un cerchio di interesse i cui estremi si identificano nei poli di attrazione di Marsiglia, Tolone, la Costa Azzurra e il Parco Naturale Regionale del Verdon. Esso si trova all'incrocio dei grandi assi di comunicazione di Aix-en-Provence – Nizza e Marsiglia – Sisteron. Si presenta come un villaggio tipico della Francia del Sud, con un centro storico attraversato da ripide viuzze che sfociano in piazzette ombreggiate da platani centenari e le sue fontane disseminate sul territorio che costituiscono motivo di interesse turistico.

Barjols deve la sua notorietà alle concerie già presenti dall'inizio del XVI Secolo, le quali hanno costituito l'unica risorsa economica del paese fino alla seconda metà del Novecento.

Esse sono ubicate in un vallone all'ingresso del paese e si snodano lungo il corso del torrente Fauvery, il loro stato di abbandono offre ai visitatori un'immagine del luogo molto negativa pur essendo inserite in un contesto ambientale naturale rimarchevole.

Lo sviluppo planimetrico del paese è orientato da est a ovest, nel quartiere delle concerie si osserva una dilatazione della scala delle particelle catastali. In pianta è ben visibile il contrasto tra i due spazi urbani: il centro storico e la zona delle *tanneries* sono addossate l'una all'altra, semplicemente separate da un muraglione di sostegno.

La questione della riconversione di queste strutture è complessa ma essenziale per lo sviluppo di Barjols. Si rende necessario, anche in funzione dell'estensione del sito un progetto globale dell'intera area che la ridinamizzi e la restituisca agli abitanti.

Passando quindi ad un'attenta analisi della situazione attuale, emerge che il quartiere è composto da quattro fabbriche principali che appartengono alle famiglie Vaillant e Plauchud, con una superficie variabile dagli ottomila ai diecimila metri quadrati ciascuna. Per via delle differenti date di costruzione, aggiunte e riadattamenti, si osserva una disomogeneità architettonica che fa pensare ad una mancanza di logica costruttiva. La difficoltà di lettura dell'intero complesso industriale è accentuata dalla forte pendenza del terreno.
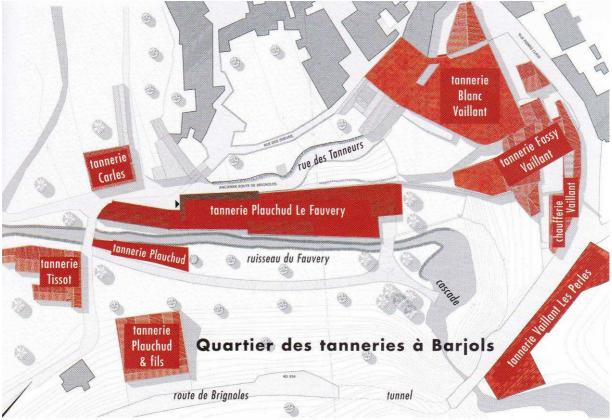
Fig. 2 - Piano del quartiere delle concerie redatto dall'Arch. Nicolas Coquillas

Provenendo da sud sulla strada dipartimentale di Brignoles ed oltrepassato il tunnel all'imbocco di Barjols, ci si ritrova su uno strapiombo dominante le *tanneries*, che si rivelano come un intreccio di volumi incastrati gli uni agli altri con una tessitura estremamente eterogenea.

Le *tanneries* Vaillant sono di proprietà privata e fanno parte del Patrimonio industriale nazionale. Il fabbricato si sviluppa su più piani in verticale con ampi spazi atti ad accogliere il voluminoso apparato della lavorazione. Come per tutte le altre concerie questo sistema costruttivo è in funzione alla successione dei trattamenti che dovevano subire le pesanti e voluminose pelli. Il tipo di lavorazione si basa esclusivamente sull'acqua per le diverse operazioni. In mancanza di spazio si è dovuto ampliare e ricostruire sulle preesistenze, così le nuove trame di pilastri in cemento armato si sono sovrapposte ai vecchi muri tradizionali.

Le nuove concerie Plauchud & fils sono ubicate nella parte bassa di Barjols, si presentano in buono stato e non necessitano di misure conservative. Per contro le dimensioni e l'impatto visivo male si integrano nel contesto paesaggistico. Costruite dopo la II guerra mondiale, all'incirca nel 1950, dovevano contenere tutte le fasi di lavorazione, per cui ne risulta un edificio di gigantesche dimensioni che domina l'intera zona. Il vecchio complesso Plauchud è situato lungo il torrente Fauvery ed attualmente è in parte occupato da artisti ed artigiani. La sua divisione in lotti operata dall'amministrazione comunale nel 1980, ha determinato numerose modifiche plani-volumetriche e di distribuzione interna, conferendo ulteriore eterogeneità alla costruzione. Addossato al muro di sostegno orientale del centro storico ha subito durante il XX secolo numerosi rimaneggiamenti effettuati su una pianta settecentesca.

Attualmente, in gran parte, queste fabbriche si presentano in grave stato di degrado e abbandono e ci si domanda quali possano essere le strategie di recupero, rifunzionalizzazione e riconversione di quest'area dismessa, ma con enormi potenzialità soprattutto in termini di spazio e valori intrinseci di memoria storica, territoriale e culturale. Alla voce "manufatto storico" che qui ci interessa il vocabolario parla "un oggetto fatto dall'uomo e realizzato in altri tempi spesso con altra destinazione e finalità, appartenente ad una realtà oggettivamente accertata e alla storia quale seguito di avvenimenti" sul territorio antropizzato.

Il monumento storico rappresentato dalle *tanneries* di Barjols può e deve essere esaminato secondo i parametri della sua storia delle vicende pregresse, della spazialità originaria, della collocazione sul

territorio, della durata temporale delle sue funzioni primordiali e di quelle diverse assunte nei secoli. Di fronte alla necessità di recuperare alla piena funzione un concreto manufatto storico, per lo più – come già si è detto – in condizioni di degrado per la perdita della propria funzione originaria -, occorre un indispensabile processo di riplasmazione della infinita offerta di spazi interconnessi dei quali non debbono venire alterati i rapporti, se non con la massima cautela e in misura tale da non sconvolgere assolutamente l'effetto della spazialità globale.

Le vestigia, le fabbriche, macchine, archivi ed attrezzi sono testimoni insostituibili delle condizioni di lavoro e del modo di vivere di un'epoca e rappresentano un valore patrimoniale nonché didattico. In ragione del loro passato prestigioso, del loro carattere estetico e del loro valore simbolico un certo numero di edifici meriterebbero di essere valorizzati. E' proprio attraverso lo studio dei valori intrinseci ed un approccio rigoroso che si potrà intervenire sulle antiche concerie di Barjols.

In merito al tema della riconversione constatiamo come spesso magazzini, mercati coperti, caserme, fabbriche edificate ai fini della produzione industriale o commerciale si siano trasformati ed adibiti a nuovi usi anche mediante l'intervento di un determinato movimento artistico e cittadino, nato dall'incontro tra gli spazi abbandonati e l'impegno di artisti.

Nel paesaggio urbano in Europa dalla fine del XX secolo molti dei luoghi simbolo di un'era industriale hanno cessato la loro ragione d'essere e si sono trasformati in vuoti contenitori. Attraverso la creatività artistica e culturale, la popolazione locale, mettendo in opera le proprie competenze, ha riqualificato queste aree di memoria trasformandole in spazi di lavoro orientati a tutte le discipline artistiche, ateliers, luoghi di incontro e svago. Si è resa possibile una formidabile inversione di marcia nell'utilizzo di questi fabbricati, altrimenti destinati ad un inesorabile declino, avviandoli ad un futuro di rinnovamento. Questi nuovi centri di cultura rappresentano i simboli di un'evoluzione positiva e costruttiva del territorio, questi luoghi fortemente intrisi della storia di un mondo in movimento sono diventati "i nuovi territori dell'arte", le "artfactories" del legame tra creatività artistica e creatività sociale, essi sono il fulcro delle riflessioni sul ruolo dell'arte nel contesto della nostra società.

Fig. 3 – Le tanneries Plauchud sul torrente Faubery (Foto di L. Blotto)

Fig. 4 – Sviluppo verticale anni cinquanta – sessanta (foto di L. Blotto)

Il caso esaminato di Barjols si inserisce nel contesto, ormai piuttosto frequente a livello europeo ed extraeuropeo, di riconversioni di manufatti dismessi. Tra gli innumerevoli esempi di riconversione ricordiamo la UfaFabrik di Berlino, dove negli antichi locali della Compagnia cinematografica UFA, su un'area di 18.500 mq. ha preso vita un'associazione a scopo non lucrativo che si occupa di musica, danza, teatro, circo, comunicazione e percezione visiva, cinema, formazione artistica, e progetti ecologici.

Ed ancora l'Èchangeur a Fère-en-tardenois in Francia (ex magazzini di cereali), l'Hangar di Barcellona (ex depositi), il Centro K@2 Liepaja in Lettonia (ex quartiere militare), le Fonderie Darling di Montreal (Canada) ed infine la Friche de la Belle de Mai a Marsiglia, antica manifattura dei tabacchi dove su una superficie di 45.000 mq. la struttura polivalente e pluridisciplinare ospita tre sale di spettacolo, uffici, cybercafè, gallerie d'arte, scuole di danza, 18 ateliers, bar e spazi modulabili.

Se però confrontiamo la struttura di Marsiglia a quella di Barjols, si constata che non ci sono similitudini sia per quanto riguarda la forma architettonica che per quanto riguarda il contenuto del progetto, oltre che la differenza di scala a livello urbano e della popolazione residente. Inoltre, a Barjols le vecchie concerie presentano la particolarità di offrire più fabbricati contrariamente a la Belle de Mai, ed agli esempi citati che si concentrano in un solo blocco. Inoltre queste concerie appartengono per lo più a diverse famiglie di imprenditori, da qui la difficoltà di portare avanti un progetto sostenibile condiviso da tutti. Soltanto le fabbriche Vaillant, dopo la cessata attività, hanno cercato di inserire nell'area degli artigiani, soppiantati verso la fine degli anni ottanta da un gruppo composto da una trentina di artisti che pian piano hanno organizzato i loro ateliers riabilitando l'immagine del luogo. Gli abitanti, d'altro canto, sono grati a loro per aver conservato il patrimonio architettonico e di non averlo snaturato nell'opera di restauro, inoltre grazie al loro lavoro e ai contatti esterni si è inserito Barjols in un reticolo più vasto di immagine culturale del paese, supportato il tutto da una attenta divulgazione tramite internet.

La loro presenza ed attività di recupero culturale e formale si è focalizzata con successo solo su una parte dell'intero complesso. Dopo questo primo lotto di interventi si guarda con entusiasmo e determinazione, non priva di cautela, verso il futuro delle *tanneries*.

Fig. 5 – 6 L'alimentazione idrica delle tanneries e le cascate del Fauvery (foto di L: Blotto)

Osservando da vicino, passeggiando tra questi vuoti contenitori, sbirciando all'interno, ci si accorge che c'è sempre qualcosa da scoprire, soluzioni architettoniche che non mostrano mai lo stesso aspetto, ma cambiano ad ogni passo, uno spazio dinamico che suggerisce idee e progetti.

Tra gli studi presentati ritengo di particolare interesse quello degli architetti Elise Michel e Nicolas Coquillas relativo alle concerie Plauchud. Il tema affrontato è quello museografico e si esplica nell'Ecomuseo delle *tanneries* e la *Maison de l'Eau* che investono due settori differenti ma complementari tra di essi. Il progetto per utilizzare al meglio le qualità dell'edificio si organizza in tre comparti di cui due dedicati ai musei ed il terzo è costituito dai servizi destinati al pubblico e agli spazi di circolazione e parcheggio.

L'elemento acqua è il filo conduttore che ha caratterizzato e accompagnato tutta l'evoluzione storica di quest'area sin dai tempi remoti del Medioevo quando lungo il torrente Fauvery, su impianto monastico, si stabilirono le concerie le quali, a loro volta, si moltiplicarono fino alla saturazione degli spazi esistenti. La sua presenza costituisce un valore aggiunto in positivo nella lettura di questo paesaggio: sgorgando a nord di Barjols, il corso d'acqua forma delle rumorose cascate che si immergono in un piccolo laghetto dall'aspetto un po' selvaggio per poi dileguarsi a valle dopo aver lambito i fabbricati oggi abbandonati. Valorizzare questo elemento così vivo in un contesto ridotto al silenzio, con l'istituzione di una *Maison de l'Eau* significa non solo sottolineare il valore della sua utilità e impiego, ma soprattutto dare nuova immagine sia al sito industriale che al contesto generale.

Molto lavoro è stato fatto ed il percorso è ancora lungo, ma appare evidente che esigenze ed interessi dovrebbero convergere verso una ricerca nei confronti del "patrimonio", sia esso contenuto che contenitore, ambientale paesaggistico. Le metodiche di gestione è necessario che siano coerenti nel raggiungimento di un rapporto sia pure dinamico per la mutazione del contesto culturale ma sempre protese all'istanza di conservazione. Diventa importante dunque saper cogliere in ogni fase del processo intrapreso quelle che possiamo definire duttilità prestazionali dei singoli elementi, vagliando presenza e valori delle potenzialità ancora latenti o appena timidamente emergenti: le più difficili da definire con esattezza ma forse le più delicate e importanti.

Possiamo dire infine che ogni ricerca ricostruttiva, dalla più libera e possibilmente alla più rigorosa deve tendere a creare un sentimento emozionale tale che le orme e la memoria di un passato ritornino in tutta la loro complessità ed estensione con vitalità quasi virtuale.

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The design of the urban centers of the Amalfi Coast

Maria Archetta RUSSO
Dipartimento di Restauro e costruzione dell'architettura e dell'ambiente, Facoltà di Architettura "L. Vanvitelli", Seconda Università degli Studi di Napoli, Aversa (CE), Italia
e-mail: mariaarchetta.russo@unina2.it

Abstract

The Amalfi Coast is made up of towns having different organisation, more or less in contact with the sea. While to the west of Amalfi agglomerations consist of centers located at different altitudes, often on top of coastal cliffs, the city and the east side are arranged at the mouth of streams, on sandy shores, and take advantage of the same side of the valleys, with houses on the hillsides, served by flights of steps, sometimes extremely steep. The main elements are represented by small villages, gathered around a church and connected by pedestrian streets, almost always stepped in to bridge the existing soil, arranged in terraces. Centers in the east, the narrowness of the implant site has produced the initial welding sets, resulting in a compact urban structure, however, in the western and interior areas, the different terrain and the absence of constraints have allowed the preservation of isolated small centers.
The conservation of this unique environment, recognized World Heritage Site, cannot ignore the preservation of the ancient urban structure of the Amalfi Coast.

Parole chiave: Amalfi Coast, village, road.

1. Environmental features

The territory of the Amalfi Coast is marked by high, jagged mountain peaks, interspersed with deep valleys in which flow streams to torrential regime. It overlooks the sea with breathtaking cliffs, here and there interrupted by short sandy coasts.

Through painstaking work, between X and XIII century, the soil, originally much steeper, was tilled and terraced, obtaining narrow strips of land, contained by stone walls, which allowed agricultural development. The work led to the transformation of the environment in a hospitable context, creating at the same time, a system for the control of irrigation water. A dense network of roads, mainly tiers, was drawn, providing the overarching framework for urban settlements, in the full merger of the natural landscape with buildings [1].

The same principle of the terraces was adopted for buildings that, resting on a lower level, develop in height, becoming thicker as that the withdrawal of the slope allows the expansion of the sub-base.

The different villages, of medieval origins roughly contemporary with the aforementioned large territorial transformation, are placed both on the coast, and inland areas, at different altitudes between them.

Celebrated for their beauty and panoramic views, and especially for the valuable historical and artistic heritage preserved, they are the result of ingenious adaptations to tectonic conditions often prohibitive and of maximum use of scarce resources available. Each one is a unique example that, although in different combinations, modulates a common matrix. Originally a small group, formed around a church and attested on a road that provides internal communications and, prolonged, as with other centers more or less close.

By examining the different areas it can be seen that, as far as the coastal areas, agglomerations west of Amalfi - Positano, Praiano, Furore and Conca dei Marini - are located at the top, above the cliffs that plunge into the sea. Instead, the cities the eastern side - Atrani, Maiori, Minori, Cetara, Vietri - are at the mouth of streams, beaches and looked forward to using the system the same sides of the valley where the waters flow. The narrowness of the sites has resulted in the progressive welding of primitive aggregates, giving rise

to compact settlements, in which the housing, distributed over the strokes made smooth and attached to the heights, overlap one another. Instead, if there are no constraints to the expansion, there are different villages, more or less apart, as in the villages of Amalfi, in the municipalities of the western slope and in those mountains of Scala, Ravello and Tramonti.

As we anticipated, the connective element of this complex system is the road texture, developed together with the redefinition of the territory operated in the Middle Ages. The routes, remained almost unscathed through the first half of the nineteenth century, assured communications within the Coast and outward, to the area of Naples and Sorrento, the Agro Nocerino-Sarnese and at Salerno. In the rough paths, passable only on foot or by mule, to recognize a hierarchical role: the main, delineated using the lowest possible lines of lesser steepness, welcome secondary steep slope, almost always steps, which extend up to furthest reaches of the settlements.

Despite the many alterations of the original topography, produced over time by natural events such as landslides and floods, or the construction of roads suitable for vehicles started in the early nineteenth century, you can still read the old distribution which overlapped and joined by the modern stage. The new routes are cleared, interrupting and overlapping in many of the earlier, and have completely subverted the traditional approach to the territory with their pace on the edge of the coast, galleries, winding roads and bridges to overcome mountains, hills and valleys frequently [2, 3].

The area is served by the national road of the Amalfi Coast n. 163 and n. 366 of Agerola, whose trace has a major influence on the original urban design, with deep and irreversible upheaval in some of the countries traversed. The first, which runs from east to west along the coast, joined in the first half of the nineteenth century, Amalfi and Vietri, last quarter, with Meta di Sorrento and Positano, in the same section was begun the latter 'other, direct from Amalfi agerolino plateau and from there to Castellammare, only ended in 1930.

The economy of this discussion only allows a rapid excursus on the organization of individual centers, each of which deserves a long and detailed examination impossible here. Therefore we will focus especially on the common characteristics and distinctive features present in each of them.

Fig. 1: Amalfi.

2. Amalfi and the eastern side

The image of Amalfi is emblematic of the towns eastern side of the sea, which summarizes all the features, interpreting them in the most noble and complete. The view from the sea shows the similarity of their system, strongly influenced by the size of the valley in which are situated: very close to that outlined by Dragone Atrani, wide to Maiori, where Reginna expands increasingly in descending Tramonti [4].

The former capital of the Duchy stands in a majestic setting, surrounded by high jagged peaks: Mount Aureo east, crowned by the Tower of Ziro and ending at the sea in Cape Atrani said, improperly fitted the tower called "Saracen", to impassable west and rugged peaks, steep, which seems to cling to the complex of the Capuchins, now a hotel. Behind the beach, separated from the mouth of Canneto, stood the village, located inside the gorge for the full depth of the stream and collected on the side slopes, the East dominated by the long colonnade of cemetery monuments - the largest nineteenth-century architectural creation of the Coast - culminating in the opposite quarter Vagliendola, who closed the city from this side. The shape of the blocks is determined mainly by the need to adapt as best as to the orography of the land and enjoy the most advantageous exposure. The narrowness of the site generates an aggregate very concentrated - at first sight, chaotic - in which the volumes are superimposed along the slopes that line the main road, creating small neighborhoods interspersed with forest and terraced by sharp jumps and natural. In a well articulated together play a vital role connections, trust in the way hierarchical connotation. The central axis, which crosses the city from the ancient north gate to the cathedral, was obtained between the thirteenth and fourteenth century with the coverage of the stream, defining the main director of commercial expansion, the new route roughly parallels that replaced the old, satisfying the lines of lesser slope, running toward the north, at higher levels. Dark, winding stairs climb up the sides cross the hills, often becoming galleries underpassing buildings, reaching the highest areas, even reaching to the neighboring centers.

This network, which includes monuments of great importance - on which this is not the place to linger - and small buildings, is dotted with Medieval, Baroque, nineteenth and early twentieth century and even more qualified by the recent discovery of structures traced back to Classical times.

In the dense urban network remains the original appearance of Amalfi, on which we have settled the next steps, to this day. Unlike most of the common neighbors, thankfully, modern infrastructure was affected only on the band immediately behind the coast, leaving almost unchanged the back, though seriously disturbed by tampering or by altering and incongruous growths contemporaries.

Eastern centers reproduce on more or less reduced scale the same structure. Atrani, which follows, enters the valley of the Dragon, which, extending to the north, separated from Ravello Scala. The agglomeration, enriched by important artistic and architectural emergencies, draws further suggestion by the presence in the field of higher rock chapels and large natural cavities. Unfortunately, it is irreparably altered the sight overboard with multiple spans of the viaduct on which the carriage passes, erected on the beach, in the first half of the nineteenth century, to connect the logs of road from Amalfi and Minori.

Continuing his journey, the artery bursts in Minori, cutting through the western area and proceeding parallel to the beach, up to the altitude of which stands the tower Mezzacapo ledge that marks the border with Maiori. The original village stood on slopes, almost perpendicular to the west. Behind the coast lies the

Figg. 2-3: Atrani.

Fig. 4: Maiori, plan 1848.

Fig. 5: Maiori, plan today.

important archaeological site of Roman villa, not far from the basilica of St. Trofimena point of convergence of the old pedestrian from small villages, to the high position and the rugged terrain and convoluted, retain most of their plant. Instead, in the valley, the national road has driven following settlements, encouraging, especially in the second half of the twentieth century, a mainly speculative housing.

The contiguous Maiori, second city of the area after Amalfi, extends over a wide area facing a long sandy beach, enclosed by headlands, each with a tower - the western transformed into the castle Mezzacapo, the East called 'Normanna'. In the middle of the beach leads to the Reginna, who, descending from Tramonti, divided the territory for the full depth, drawing on the sides of a flat band, which expands more and more, as it approaches its mouth, until, in last sector, roughly the width of the beach.

The first settlements were on the banks of the river - around which, in the northern areas there were numerous factories - and on the steps that wound along the side slopes, the West topped by medieval Church St. Maria a Mare. Large architectural complexes are still present, both religious and civil, facing the last stretch of the river, whose coverage generates a kind of long square, condition almost unique to the Coast. The interior and the sea areas now saturated with buildings, most of which show recognizable interventions of the last half century, which concluded the work of urbanization of fertile arable land between the houses and the coast, started to mid-nineteenth century, together with the stock, with a workforce program by architect Pietro Valente. The idea, a real town redevelopment project the image in order to demonstrate the economic Influence experience, led to the revision of the western sector, drifting the mother church and reversing the orientation, opening the entrance to the valley, above an imposing staircase that emulates that of the cathedral of Amalfi. Being into the valley, the village becomes more and more scarce, giving way to numerous plants, both served by modern provincial road Maiori-Chiunzi, which runs on the eastern edge, is the stretch that goes on the opposite shore, coinciding with the way driveway of age Bourbon, Tramonti direct and Sarno Valley, then abandoned, opting for the route along the coast to Vietri. At the high, you will find the villages of Vecite and Ponteprimario, perched in the foothills overlooking the gorge, on the border with Tramonti.

The small fishing village of Cetara, distorted by today's port facilities, forward sinuously into the gorge defined by the stream, covered in the urban section, which ends on the beach, dominated to the east by the Angevin tower, increased age viceroy. On both sides of the river, there are the most ancient areas, between the eastern and defensive garrison church of S. Peter, from the western plot thinned, gathered around the former convent of the Friars Minor, now Town Hall. The road runs behind, above the main road with a bridge and creating a striking effect to almost touch the majolica dome of the church adjacent to the communal house; but unfortunately not as pleasing buildings are decidedly out of scale, which rise on its margin.

Vietri sul Mare, which marks the edge of the Coast, lives a unique condition, related to the proximity to the

Fig. 6: Cetara.

Salerno, the large number of these industries and, especially, its position central to road, rail and sea networks. It is placed in a spectacular location on a sort of plateau, contained by high walls that plunge into the sea and Molina in the river - which flows to the west - to the mouth of which lies the village Marina, on long beach, protected by towers of Albori, of Marina and of Crestarella. While treating the common characteristics of the countries considered so far, starting with the picturesque, perched in the most high and dotted with domes, bell tower and buildings with facades ornamented with elaborate baroque plaster, has expanded wildly downstream, resulting in an aggregate compact that covers the entire slope.

3. The western side

Starting again from Amalfi Coast to the west of the section, we can easily see the complete change in the topography. Beyond the valley of the Blind - the deep depression that closes the city from this side - extending the five fractions, Pastena, Lone Vettica Minor, located atop high cliffs overlooking the sea, and Tovere and Pogerola, in the mountains. Except the latter, which is accessible from the trail that climbs the gully or directly from the city center, the villages have a plant in a line on road Maestra dei Villaggi, the most

Fig. 7: Vietri.
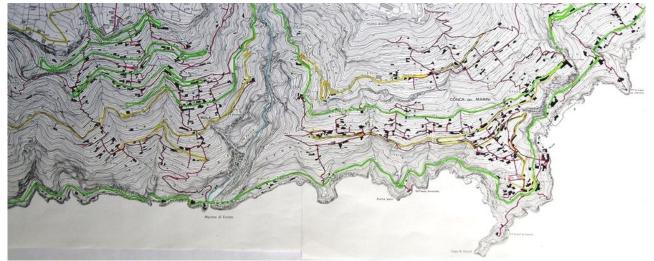
Fig. 8: Furore,Conca dei Marini and Tovere (Amalfi), plan.

important medieval road this side, on which stand the greatest architectural episodes religious and civil [5].

The road winds with ramps, curbs and rare flat sections, complying as much as possible the lines of lower slope and, after crossing the maritime towns, shall be directed to Tovere and from there to Agerola. It brings together on steep routes, which cut perpendicular to contour lines, from the mountain and the coast, stretching up to the furthest reaches of the settlement. Even here, the plot is still legible traditional road, despite multiple impairments introduced by vehicular arteries, first of all, the Amalfi-Agerola, which penetrates Vettica Minor with straight line segments and curves.

Those villages have mainly concentrated on the main road blocks and lower transverse or parallel in some cases, denoting the linear form is typical of this area.

The first one, Conca dei Marini, repeats the same orography. Arranged according to an ancient chronicler, "on the face of a steep mountain", is bolted to the north by high cliffs, steep cliffs to the south and from east and west by deep valleys. The conformation fostered the creation of small groups scattered in the most hospitable (m 180-280 above sea level) and a tiny nucleus of the sea, where he was a natural harbor, until the mid nineteenth century among the few sheltered harbors near Amalfi [6].

The town assumed an elongated configuration on the edges of the road - now almost entirely made carriage - which, by accounting for the slope, through the whole municipal area from east to west, receiving from the upstream and downstream laborious steps, called "petigni" and touching around which the three parishes in the Middle Ages settled urban cores: St. Maria of Grado - be abolished and incorporated at the end of the seventeenth century in the conservatory of St. Rosa - St. Antonio and St. Michele Arcangelo. The walk, starting from the far east of Grado, placed in the highest, was heading west to Penna, bordering Furore. About half of the course, met the square of the Elm, the only open space land, from which started the link with the largest settlement, extended on the promontory called "Vreca" and relating to the fourth parish, St. Pancrazio. From there, it branched off to the Cape, where later was erected the tower, Viceroy, and from the Navy. Fortunately, the Amalfi-Agerola interferes little with the villages, and remained almost as high, however, has made the village Grado, once the most isolated and inaccessible, accessible directly by car.

Furore extends west, beyond the deep ravine where the stream flows Schiatro, which flows into the famous fiord, on which, in the late nineteenth century, was built the bold single-span bridge of today's SS. 163. The soil, which rises from the sea to share about 600 meters of the plateau of Agerola, is characterized by an exceptional southern exposure and a strong steepness, which makes it extremely difficult journey [7].

Despite the deep changes brought about by the Agerola-Amalfi, you can still recognize the old distribution scattered in small sets, which is associated with that of last century, set along the road and in the immediate vicinity, as far as possible in order to facilitate the approach [2]. From the few houses at the mouth, the steep staircase climbs the ridge to about 300 meters, after which it divides into two branches. The first goes north and then west to the houses surrounding the church of St. Elijah (about m 250 above sea level), continuing to the north with steep straight lines and zig zags, orthogonally facing the ascent to below Agerola. The second was the same way the slope, leading to the three villages belonging to the churches of St. James, St. Michael and St. Maria of Pieta, linked by narrow longitudinal parallel and continues up to the plateau.
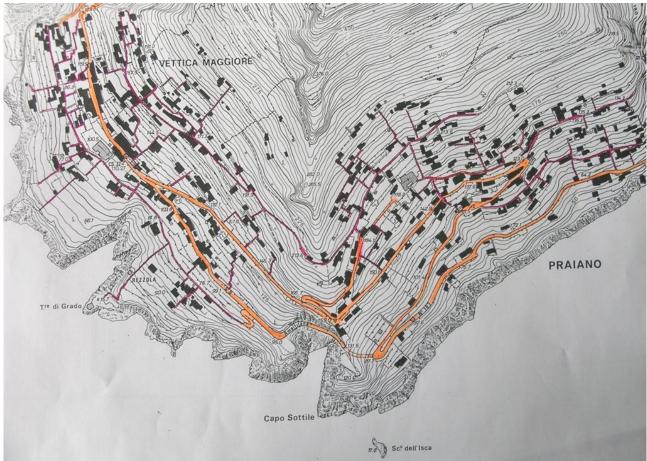
Fig. 9: Praiano, plan.

The following villages, Praiano and Positano, fall into a different type, being distributed on the slope next to vertical relationships, without reaching the compactness of the East.

The first consists of Praiano and Vettica Maggiore, which are arranged on both sides of the promontory which ends at the sea with the Capo Sottile, and are therefore directed to the east and west. Praiano, situated at higher levels (between m 70 - 220 approx.), lapping just downstream from the highway 163, along which line the more recent expansions. The country, through the whole extension of a road that leads to the square in front of the parish of St. Luke, is divided into two groups belonging to the church just mentioned and in S. John, to the south-east.

Following the slope, the town is spread across multiple arrays, which make up a very compact, but highly organized and served as a link to terraces, which cut a 90° contour lines. Similar organization is found in Vettica Maggiore, which is between 70 and 170 meters, coming from the leading edge of the coastal cliffs.The village, whose center is the parish of St. Gennaro, is penetrated by the SS. 163 for its entire length. Roads that take advantage of the lower slope, connected by straight perpendicular uncomfortable stairs, connect the buildings, located at different altitudes.

Positano, however, extends along the gully, which acts as the main road. The eastern side, which goes on the beach called "great", is more gentle and welcomes homes nearly 100 since the height occupies; the opposite sides of the small hill that rises between the beach and the center of Fornillo, extending to the summit (222 m approx.).

The primitive set-up, even if it is not disturbed by the state road, that the perimeter upstream with a sinuous path, however, appears varied by transformation into carriage of some old tracks. Nevertheless it is still identifiable the ancient road pattern, which sees the main longitudinal streets, connected by perpendicular secondary ridges that climb up to the summit, to serve the residences, the bedrock upon himself, constantly changing direction.

Fig. 10: Positano.

4. The mountain towns

The inland villages are covered by other types, being composed of scattered groups of very large territories, for different altitudes.

From the northern area of Amalfi a winding ascent to the top of the ridge overlooking the valley of the Dragon, on which stood Scale, consisting of an aggregate principal and several villages, which are arranged longitudinally from north to south, on roads which follow as much as possible the level curves, with buildings upstream and downstream. The first group has met Pontone, whose soil, markedly steeper, a plant uses to wrap around the ridge, on whose southern limit emerge from the impressive and spectacular ruins of St. Eustace to 275 m s.l.m. The laborious steps continues northward, passing the 100 meters that accompany the tiny village of Minuta, gathered around the Church of the Annunciation.

From here continue up to the largest center (m 400 approx.), aligned along the fairly flat - now made passable to cars - that leads to the Cathedral of St. Lorenzo, one of the major emergencies of the Amalfi coast. The trail continues up to hamlets S. Peter and S. Catherine, gaining about 450 meters, after which, back toward the south, with trends roughly parallel to the center, reaching Campidoglio to over 500 meters, and meet at the junction of Minuta.

The environment is highly suggestive of the presence of churches and medieval buildings, some still adorned with traces of inlaid stone decoration and Arab baths. Among them stand the palaces Mansi-d'Amelio, Verone, Romano, D'Afflitto, the Bishop's House and other anonymous remarkable episodes of Pontone [8].

Ravello, overlooking the other side of the valley, reflecting a different condition, with nuclei aligned along the direct routes from north to south and east to the sea and to Minori. The largest town is situated on a plateau about 350 meters tapering on top of a massive rocky outcrop rising from the valleys of the Sambuco and the Dragone, in which almost vertical walls there are interesting phenomena that give rise to numerous karst
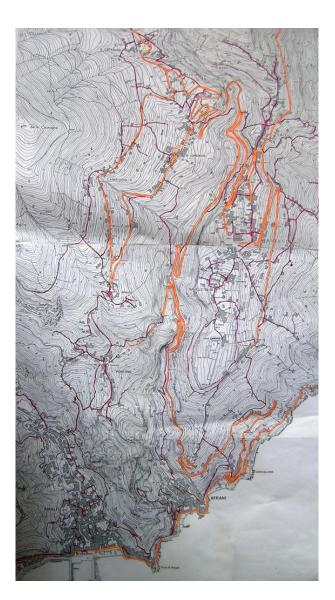
Fig. 11: Amalfi, Atrani, Scala, Ravello, plan.

Fig. 12: Tramonti, area Pucara-Polvica, plan.

caves. Gathered around the cathedral, is famous for the presence of emergencies religious art - churches and convents - and palaces of the Middle Ages, the most important of the Coast - as the known Villa Rufolo - that stand out with their wheels in town. Still retains its original shape from elongated oval, with only pedestrian streets, ending on the sheer cliff on which stands Villa Cimbrone. The context is qualified by the widespread presence of ancient structures in which are preserved, even more than in Scala, inlays, elements of plunder, Arab baths, etc.. Long flights of steps, perpendicular to the contour lines branch off to the north or down to the sea, embracing the different fractions on their edges.

The natural continuation of Maiori, in the basin Reginna, consists of Tramonti, the country from the analogous ancient origin but characterized by a consistent picture late Renaissance. The municipality covers a vast territory, with alternating steep share with others of moderate steepness, with a complex and unusual combination, being composed of thirteen villages more or less similar, arranged in extremely varied, almost in opposition to those seamen, neighboring Maiori, others that go to 800 meters of altitude crossing Chiunzi.

Smaller agglomerates, usually modest in size, ranging from south to north on both sides of the valley through which flows the river and its tributaries, forming small villages organized around a church, using roughly flat areas and connected by a dense network of streets, largely increased in the late nineteenth century, today, made almost entirely vehicular, evening the modest inclination [9].

The position on the heights overlooking the gorge creates amazing effects in some places, green for nature - the forests, which take over as you go up - the waterfalls that are followed and the remains of old factories,

which the driving force derived from the water, finally abandoned after the flood of 1954, or converted to new uses. The lack of territorial constraints has allowed the persistence of the initial isolation of the villages, although the provincial road Chiunzi-Maiori - remake of half a century ago, the stock drawn at the end of the nineteenth century - is abnormal, the last director of expansion [10]. Numerous episodes of strong suggestion, is religious in nature - such as the Cave Chapel of St. Angel of Gete and the church of St. Elia of Paterno - that civil presenting buildings among the most qualified of the Coast to the Late Renaissance, which is noted between the houses of Conte and Pisacane in Pucara and Cardamone to Gete. The centers of the western slope wind along the primitive road that traced after 1811 it was abandoned about twenty years later, continuing from Maiori along the coast to Vietri.

As it can be seen from these brief notes, the preservation of the ancient urban structure of the Amalfi Coast was largely ensured by the almost total isolation in which the area lived until the mid nineteenth century. Since then, a series of modernization initiatives, increasingly linked to tourism and increasingly compelling, has put a strain on survival of the original urban structure. The conservation of this unique environment, recognized World Heritage Site, cannot ignore the value of all its components, first of all the design of towns that populate it, which merges inseparably with the celebrated natural features and landscapes. It is hoped that this reflection may be the input to operate in this regard.

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Cuma Archaelogical Park: a communication strategies to improve public enjoyment

Mara CAPONE
DICATA, Archiecture, University of Naples Federico II, Naples, Italy
mara.capone@unina.it

Abstract
The ancient city of Cuma is one of the most important of the Phlegrean Fields. It was the first settlement of the area chosen for its strategic position. Today, the appearance of the area is very different from what it looked like in ancient times, in fact natural and anthropic actions have modified landscape over the centuries. The objective of the communication project is to promote knowledge of Cuma Archaeological Park and to define a new way to enjoy Archaeological Heritage for a large audience.
The archaeological finds are generally only a "piece of matter" and to reduce the communication gap we can reconstruct what is missing.
The use of digital media and 3D modelling opens new perspectives in archaeological research, it let us to document the passage of the history, but it raises new questions about the way of representing the archaeological heritage.
The branch of representation is called into question, especially for issues related to visualization of 3D models and design of the structures of knowledge. Animation is always been the best way to show the evolution over the time of monumental buildings and landscape but it is lack interactivity.
We think that 3D PDF could be an user friendly interface to access additional information. So we are testing the possibility to use 3D PDF to improve the access to cultural resources to all users, and to improve the exploration of 3D model.

Keywords: Virtual Archaeology, 3D PDF, 3D modelling, Representation, Archaeological landscape

1. Cuma and the ports system in the Greek and Roman age.
The ancient city of Cuma is one of the most important of the Phlegrean Fields. It was the first settlement of the area chosen for its strategic position.
Cuma is the oldest archaeological sites and it is the oldest Greek colony in Italy, today, the appearance of the area is very different from what it looked like in ancient times and it is very difficult to understand the meaning of archaeological finds from different eras.
The first Greek colony of Kyme took place on the hill, where the Acropolis had the role of stronghold and sacred place of the polis.
During the Archaic Age the Acropolis takes on a monumental look, in fact, the two known temples, one in the lower terrace (dedicated to Apollo) and the other in upper terrace (known as Jupiter's temple) are dated to the end of VI century. B.C. The construction of the wall fortifications of the acropolis dates back to the ambitious political projects of Aristodemus. In this period the city borders reached the maximum extension and this is proved by the discovery of some remains of fortifications still existent.
According to the theory of archaeologists the wall fortifications encircled the Acropolis, the hills on the west side and the area of Monte Grillo on the east side. The southern wall fortifications followed a line on the southern side of Monte Grillo and on the north side they separated the city by low marshy plain of Licola.

The urban development of the lower city, the center of city life, begins in the Samnite Age (IV-III century. BC). In this period are certainly built the temple which will be the Capitol (III sec.) and other buildings, not a sacred character, such as the so-called Central Termal Baths (III-II century BC.) [1].

During this period, the Samnites put in place a plan of adjustment of defensive fortifications to meet the demands caused by to the difficult coexistence of Samnites and Romans.

In the Augustan age, Cuma lived its heyday. Cuma played a major role in the troubled events that accompanied the transition from Republic age to the Empire, the aspect of the ancient city, that looks like to the modern visitor, is determined to the massive works built in this period: here, in the period of civil wars, Octavian, the future emperor Augustus, had its base.

In Greek and Roman times the importance of Cuma related to the strategic role assumed by the Port.

In ancient times, the Phlegraean area, characterized by volcanic craters and a coastline with deep bays, was considered a safe harbor. Both in Greek and in Roman times, the port of Cuma was located in a natural bay, near the center of the city, in an area morphologically perfect.

The analysis of the sources shows that the Greek port was located on the north side of the Lake of Fusaro, where it was in direct communication with the sea .

The Greek port was gradually disappeared for the silting up and the bradisism phenomenon that modified the coastline over the centuries. Today, the ancient coastline is covered by vegetation, and from the top of the Acropolis it's possible to see the sign of the ancient bay.

On the north side the coastline is characterized from a long and straight beach, which separated the sea from the lagoons and lakes there were inside of territory, as we can still observe.

Today, there is the Lake of Fusaro within this natural dam, the ancient swamp Acherusia, formed after the movements and pressures related to the arrangement of the Mediterranean basin during the third geological era.

Piaget [2] hypothesized that there were two ports in Cuma in Greek time, one was located in the bay on the north side of the lake of Fusaro and the other one was under the acropolis (Fig.1). This place was used from Agrippa, admiral of the Roman fleet, to built the roman port.

In fact, in 36 d. C. the admiral Agrippa took charge of operation against Sextus and so he needed a naval base in the Phlegrean area.

At first he placed the naval base in the Lake of Lucrino, that was very different from what appears now, because it was more extended than now, but the lake was not deep enough for Roman ships and so Agrippa used it for military training only (fig. 2).

Moreover, unlike the Lake of Fusaro, the Lake of Lucrino was separated from the sea by sand dunes exposed to sea currents and to winds. For this reasons, Agrippa decided to place his naval base in the Lake of Averno, called Porto Giulio, and he built a canal to connect it with the Lake of Lucrino.

Porto Giulio and the Lake of Lucrino were entirely occupied by the shipyard and training military activities and so it was necessary to find another place near to Porto Giulio, for these reasons Agrippa decided to use the ancient Greek port of Cuma [2].

He built a connecting tunnel between the Lake of Avernus and the city of Cumae, called Cocceus Cave, and a tunnel under the Acropolis, the Roman crypt, to create a link from the acropolis to the beach.

Agrippa addressed the problem of the silting up of the Cumae ancient port and he dug what it was covered over the time. Later he built a connection canal with the lake of Fusaro and closed the original entrance of the sea with a pier (Fig. 3).

At the end of the war against Sextus the port had no more reason to exist. In fact, in the Gothic period of Justinian, Cuma was only a well-fortified place. The Roman naval bases were reorganized in others places and the port of Cumae was completely destroyed: the sand transported by the wind into the area and the phenomenon of bradisism were the reasons of the total destruction of the two ports. The agricultural settlements have erased the traces of its existence over the time.

The choice of the study case allowed us to address a number of unusual issues especially related to reconstruct of archaeolgical landscape, very different from what we can see now, to develop a strategy to communicate the story of the place and to define a different level of enjoyment of archaeolgical heritage.

Our work is to translate into images, an iconic language, what is traditionally communicated using written language to improve the public enjoyment.
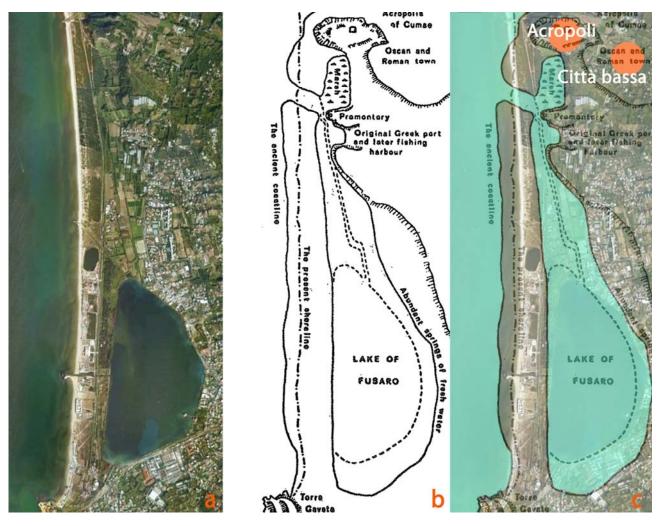
Fig. 1: Greek time, a. satellite image, b. the reconstruction hypothesis by Paget, b. overlap Paget hypothesis\present

2. A communication strategy to improve public enjoyment

The translation of scientific data into popular data is one of the problem that we have to address to correctly define a communication project. The aim is to understand the meaning of the archaeological finds, to reconstruct the archaeological landscape and the relationship with the existing landscape.

The spread of archaeological knowledge is very important for citizens, first users of cultural heritage. To have awareness of the role, that citizens can play in conservation and valorisation of the territory where they live, it can be more powerful than any law to preserve the archaeological heritage.

From a methodological point of view the stages that characterize a communication project designed to increase the value of archaeological heritage are: analysis of the sources, data acquisition in archaeological sites with different technology, data processing and the definition of the communication project.

We are more interested in the theoretical framework for defining the communication project than to the problem related to the acquisition methods and data processing.

Message can generally be decomposed into two components *content* and *media* and to develop an effective communication project it is very important to know the information you have to send (content); only in this way you are able to operate the simplification necessary to provide an accurate information and to select the appropriate media (form of communication).

In our case the content to transmit is the story of a place, Cumae, transformed over the time from nature and human actions. The selected *media* to transmit information is digital media an the *recipient* of a communication project is a non-specialist audience, so it is necessary to submit all disclosures to help them to decode the "sign" are still present.

Fig. 2: Roman time, overlap Paget hypothesis to present look

We think the "virtual rebuilding" can help to understand the meaning of archaeological finds and the most important problem is to define *what* to rebuilt, *how* to represent the reconstruction and what technology to use.

The archaeological finds are generally only a "piece of matter" and to reduce the communication gap we can reconstruct what is missing.

The use of digital media and 3D modelling opens new perspectives in archaeological research, it let us to document the passage of the history, but it raises new questions about the ways of representing the archaeological heritage[3].

The use of 3D models to represent hypotheses of reconstruction is a powerful tool that promotes communication and dissemination of cultural content to a wide audience.

The 3D models allow us:

- to access to monuments at risk of damage, and therefore closed to the public;
- to document what the history has erased;
- to create new way of enjoyment of archaeological heritage without boundaries, in a virtual space;
- to obtain a dynamic view, from different points of view in space and time;
- to build an information system where we can access to data collected;
- to organize a database linked to the models and to territory[4].

In this field there are some different issues to deal and some needs to fulfil:

- we have to solve the problem of the credibility and validity of reconstruction models of object, monuments, sites or landscapes partially o totally modified or destroyed, and virtually reconstructed based on archaeological interpretation;
- we have to define a communication code to show the traces of philological work in 3D model to show elements corresponding to reality from hypothesis;
- we have to chose what kind of representation to use: structural or hyperrealistic
- we have to design the interface for an interactive use of the models.

A problem often overlooked is the difficulty that the *end user* meets by using technological tools.

Sometimes, we used very complex systems and the interface isn't *user friendly* and it is very difficult to understand for those who are not familiar with technology. In fact, we aren't willing to spend our own time to learn how to use a tool that is only a means to acquire further knowledge. Moreover, a user, who feels inferior, backward or inadequate respect to the proposed product, irritates and he renounces to use cultural product.

Therefore, the interfaces must be designed with particular regard to the users, by ensuring their intuitiveness and limiting as possible the technology interference.

3. The rule of representation

To define a communication strategy for enjoyment of Archaeological Heritage it's very important to work in a multi-field team of experts made up of architects, archaeologists, computer specialists and communication. experts.
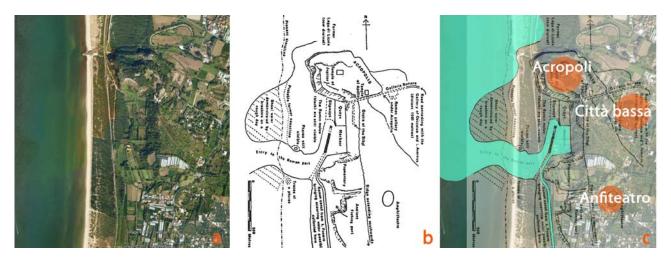
Fig. 3: Roman time, a. satellite image, b. the reconstruction hypothesis by Paget, b. overlap Paget hypothesis\present

The reconstruction does not represent the unique final result but the aim is to define an open system which can be further developed or improved.

The area of representation can play a key role especially in matters relating to the visualization of 3D models and the design of communication systems.

We have to address two fundamental issues: the first is related to the definition of a communication code appropriate to the *receiver* and the second, no less important question, is how to make clear in visualization of the 3D model the reconstruction hypothesis.

The concept of communication requires the transfer of information from a *transmitter* to a *receiver*, to do that we have to use a *code* an a *medium*.

We mean for code all the signs that make possible a communication and it is important to use signs that are able to send the meaning correctly.

The communication must respect the cognitive process which occurs by incorporating the sign with the knowledge previously acquired or deemed necessary. In the case of Archaeology the sign is always an iconic one, and additional information needed to understand this sign has traditionally been transmitted using a verbal language into written form (pannel) or oral (audio guides or guides) [5]. In the first case we obtain a communicative stress because we have to decode either the iconic sing and the verbal one, and so we force the viewer to "read" or to "look". In fact the viewer has to switch between modes based on a cognitive analytic process to another one of gestalt kind. The result is that the viewer has to leave one of the two cognitive system. Of course, the conflict is less if verbal information are transmitted orally in a conversational way. This conflict can be eliminated by using a visual language an minimizing the verbal comment that "separetes" us from the sign.

So, an efficient communication system for archaeological heritage is based on using of an iconic code.

Regard on this question we are involved in discussion about the kind of representation, when we have to use a realistic image and when we have to use a conceptual one.

In fact a lot of communication projects are based on the simulation of reality but we think that the main aim is not only Virtual Reality, rather than the representation of knowledge and the Reality is just a part of it.

So, we think that is very important to define a code to communicate "uncertainty", to emphasize the difference between real finds or landscape and the hypothesis of reconstruction and so full range of 3D visualizations options must be considered, photo-realism or structural visualizations.

In any case, a winning strategy is to simplify: to give a clear message, and then universally readable, it doesn't mean to make obvious what is complex but it means to remove everything is not necessary to give accurate information rather than complicating with adding information.

The use of 3D digital models is one of the best way to show the reconstruction hypothesis.

We can use 3D models to produce:
- images
- animations
- 3D PDF
- 3D database
- virtual reality
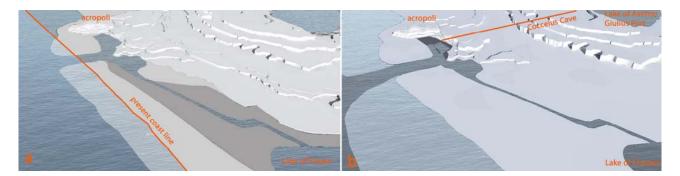
Fig. 4: 3D model, a. Greek time, b. Roman time.

Static images can be used to make photomontages whose aim is never to achieve a photorealistic simulation of reconstructive hypothesis but rather to contextualize it in the real landscape.

The contextualization represents a key element that allows to spread the cultural content in an adequate way.

One of the main innovations offered by digital technology is the possibility to interact with 3D models independently from software used to produce them .

It is possible to generate a 3D PDF from a 3D modelling program and interact with it using Adobe Acrobat Reader, put it in a presentation in Power Point or in a PDF text [6]..

The aim is to explore the communicative potential arising from the possibility to interactively explore the 3D model. Interactivity gives the user a level of knowledge certainly different from the video or the images that show the object The experimentation in this field is to produce models where it is always possible to recognize the datum from the hypothesis by using different forms of visualizations.

3D models can become a *user friendly interface* to access other information related to it, through the three-dimensional display system is it possible to visualize different views of the model, you can link them to text or some others information, such as images photos and so on.

It is possible to generate a 3D PDF establishing different types of visualizations (opaque, transparent, wireframe ...) that can be easily viewed by the user using Acrobat Reader. 3D PDF isn't a photorealistic model but it allows the user to acquire a greater awareness through the interaction with the 3D model.

4. A dynamic representations.

The possibility of representing motion images is one of the most important innovations linked to the use of digital media. The animation is a very powerful narrative tool that allows us, through the conscious use of different visualizations options of the 3D model, to explore the 3D model visible characteristics and to go beyond what is visible in a dynamic way, revealing the structural characteristics of buildings and landscape.

Video is the media best suited to communicate Archaeological Heritage because it offers the possibility to combine, thanks to technological development, real elements with virtual reconstructions and contextualize the findings in space and time.

To produce the video we can mix static images with animations appropriately designed, to transmit the cultural significance of archaeological finds.

In a video we can hybridize different systems of representation, static images in filmed sequence to make clear the relationship with the current landscape, animations to represent the dynamic transformations of the site over the time.

Communicate the cultural significance of the place and not just represent it, to relate the reconstructive hypotheses with sources to make explicit the path and assess its reliability.

5. Case study: Archaeological Park of Cuma

The Archaeological Park of Cuma is characterized by the presence of finds from Greek and Roman times, the layering makes reading very complex and understanding of finds very difficult, now panels placed along the tour show the meaning of them.

First of all we analyzed the documentary sources, the studies of archaeologists and reconstructive hypotheses, so we defined the content of communication project.
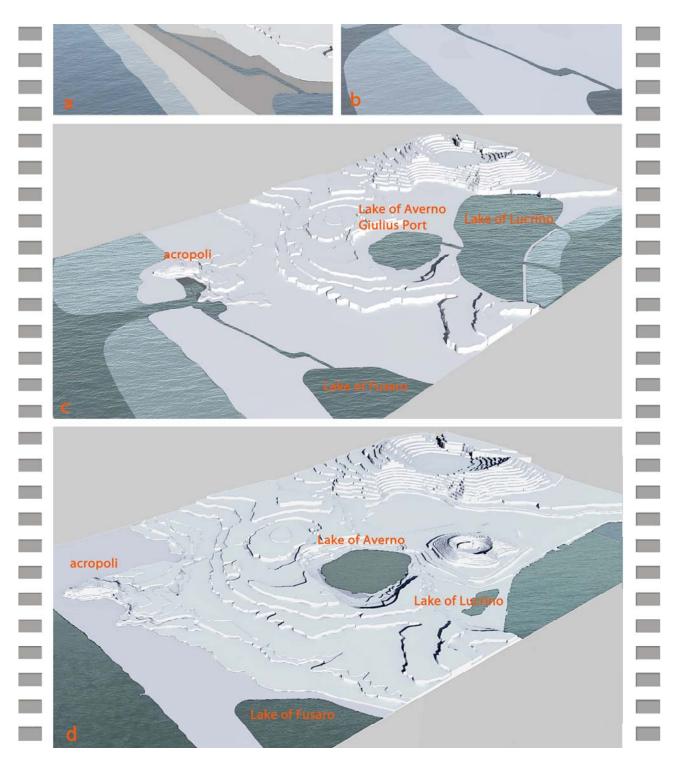
Fig. 5: A dynamic representation of landscape to show evolution over the time. a. zoom on the Lake of Fusaro in Greek time, b. zoom on the Lake of Fusaro in Roman time, c. landscape in Roman time, d. current landscape.

We identified three key issues: the representation of territorial transformations, the representation of urban transformations and the representation of the monumental buildings transformations.

In the first part of the work we dealt with issue of the Cumae's ports and the transformation of the territorial system. The hypothetical reconstruction is mainly based on the interpretation of Piaget, he summarized his hypothesis about the configuration of the Greek port and the transformations in Roman times in a series of sketches.

Fig. 6: Acropolis of Cuma

Overlapping the Piaget's schemes to the aerial photo we can reconstruct the main territorial changes and compare them to the present look (figg. 1, 2,3).

Based on this information we built a 3D model of the territory during Greek and Roman times and the 3D model of the territory how it looks today.

The comparison between three models allows us to show the spatial transformations of the area study.

One of the problem to solve is the exploration of the model of a large part of territory, static images aren't enough to show the transformation of landscape because it is too large and too complex.

Animation is the best way to solve this problem, in fact video allow us to visualize the 3D model from different point of view, in different ages in a dynamic way and it is possible to use static images mixed to some others sources such as photo, iconographic sources, but in a video luck interactivity (fig. 5).

A new way to explore 3D models is the possibility to interact with the 3D model, to do that it is possible to use a 3D PDF files

3D PDF is very convenient when the object is too large or too complex, when we want to show evolution over long period of time of cities or landscape. If we reconstruct landscape the amount of 3D data that we'd like to visualize exceeds by far the capabilities of the complex user.

So, we can cover all 3D visualization using 3D PDF and video files. The use of 3D PDF let us to link to 3D model some others data.

There are some other providers that use other technology based upon WebGL supported by Chrome Firefox and Safary but we are interesting in 3D PDF because it is supported by Internet Explorer.

In fact, 3D PDF file is [7].:

- avaible on every computer platform system;
- easy to use;
- readable on all computer by Acrobat Reader.

Now 3D PDF can't be used on mobile device but it will possible in the next.

We are testing the possibility to use 3D PDF files to public on web 3D resource linked to the Archaeological park of Cuma and its use in cultural heritage application. The new communication strategy will let us to spread the results of our research on web to improve public enjoyment and to show the landscape and monumental buildings evolution of Cuma over the time.

From a methodological point of view the most important steps of our workflow are:

- to convert 3D model in a 3D PDF file;
- to define a visualization code by texturing and mapping;
- to link information to 3D model by layering, named views, action and so on[7].

First of all we are testing different methods for texturing [8].:a 3D object to define a visualization code and to choose the best way to spread cultural content for a wide audience. To link information to 3D model using a 3D PDF file we are testing layering options [7]. In the conversion process from 3D model to 3D PDF file it is to improve to show landscape's transformations by turning on and off the part of 3D model that represent landscape in different ages. We are going to use this method to compare 3D model of archaeological finds of monumental buildings with their virtual reconstruction hypothesis. To do that we had to structure the 3D model in layers related to the transformation process from Greek and Roman time to current time.
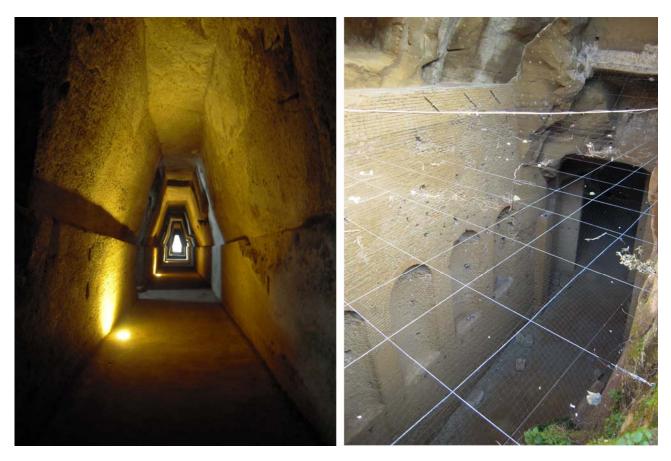
Fig. : Antro della Sibilla, Cripta Romana

Another important possibility it is to guide the user and to link, for example to a text, some particular views to visualize the object in a certain way to emphasize some property of it. We created special named view such as top, front, left right in perspective or in orthogonal mode, to improve the public enjoyment of 3D model by interactivity. We decided to show the model not only in a render mode, where the hidden lines are invisible, but we chose to visualize the model showing its structure.

We carefully planed the named views that we considered more useful for visualization and interaction.

We are testing the best way to link to 3D PDF file some other information to compare the original look of Cuma's monumental buildings and landscape with they look today.

We have done this by using action options, they let us to create a conceptual link between 3D model and some other information. We think this is an useful alternative to classic animation. However, this kind of representation is a dynamic one, in fact, when we change from one named view to another, the 3D PDF visualization mode automatically creates an animation[7].

There are a lots of benefits to use actions, first of all we can update and expanded the database linked to 3D model in an easy way and we improve the access to 3D exploration of the model for people who no experience of 3D.

So, one of the most important target of our research is to test a new strategy to improve public enjoyment using 3D PDF files.

Another problem to solve is to simplify the 3D model to create 3D PDF file. We have to reduce the complexity of the 3D model choosing details, texture in an adequate way.. The target is to have a 3D model file not too large without losing its communication characteristic. In this case it means that less could be more.

6. Conclusions

The videos represent one of the most powerful tools to communicate the story of an archaeological site.
Animation are always an alternative for visualization of 3D model but lack interactivity.
The availability of platform such as the iPad and iPhone has improved the way we deal with digital data.

We think that 3D PDF could be an user friendly interface to access additional information such as text, photos, iconography and so on. So we are testing the possibility to use 3D PDF to improve the access to cultural resources to all users., and to improve the exploration of 3D model and linked sources.

7. Acknowledgements

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Road Infrastructures: methodological approach for the research of value added.

Michele CULATTI
Phd at Department of Structure Engineering, Faculty of Engineering, University of Trento, Italy
michele_culatti@fastwebnet.it

Abstract

Even though the treatment of road infrastructures (bridges and roads) assumes the subject of quality as a goal, it is rarely developed in a propositive way. Among numerous forms of quality, there should exist a technical performance quality level which infrastructural promoters and supporters aim for, there is also a perceived quality which is hard to detect because of, in some instances, its intangible value. When comparing road infrastructures that are typologically homogeneous, one realises that during the planning, the dominance of the technical performance quality leads one to think about a value subtracted from the territory, determining an overshadowing of the perceived quality. Nevertheless, when observing the best planning results, it turns out that the perceived quality can assume different forms amongst which is "conceptual quality". Should this latter one be defined as a *whole of value added deduced from the connection of components within the plan and the territorial context,* it enables the project to satisfy a series of requirements not directly requested by the performance goal but essential for the function of the infrastructure. A methodological approach can take place in order to define this value added approach which provides the appraisal of already existing road infrastructures according to its fruition, thus the form-function perception and its meaning (or importance or significance). All of the subjects arising from the perceptive reading of the projects, can provide a sort of checklist which is useful to support the improvement phases of new infrastructural plans, determining the composition of value added and place renovation.

Key words: infrastructure quality, value added.

1. Quality forms of infrastructures

In times of restricted financial resources and in vulnerable territories which arise because of objections to a planning proposal, the growing quality required of linear road infrastructures (urban and extra-urban roads) and all types of bridges and their relationship with the immediate environment, focuses the attention on the evolution of the meaning of road infrastructure quality. There has been an evolution in the road infrastructural plan, from a quality addressed only to the plan which has as technical-performance goals, to a quality relating to the environment where qualitative criteria refer to the environmental protection, specifically environmental impacts and more recently or landscape ones. Yet, what is lacking is a quality external to the plan, concerning its relationship to an urban and territorial context used by the community. This is due to many factors: on the one hand a cultural "emptiness" which has its roots in the history of Italian infrastructures during the post second world war period. On the other hand, a normative "emptiness" which will be analysed later. In addition, the determination, measurement, and evaluation of the road infrastructure quality during its many phases, such as planning, getting into operation, maintenance, and their relationship with the environment , can be detected through complex quality-quantitative indicators. Then again, the quality of the work which complies with the function in the context and its interaction with the fruition, is too often without a far-reaching concept that leads to the discussion about the meaning for the community of

having an infrastructure in a certain territory. To state it more exactly, the expression "conceptual quality" appears in the Italian regulation for public works (D. P.R. 544/99 and further modification – Art. 46 Verification of the preliminary plan [...] 2 . The verification aims to ascertain the *conceptual quality*, as well as the social, ecological, environmental and economic quality of the chosen plan solution and its conformity to the specific functional, performing, technical dispositions enclosed in the preliminary plan document, and it aims to optimise the chosen plan solution). However, because the expression "conceptual quality" is never defined, its plan application has always turned out to be generic and of little meaning. Recently, the D.P.R. 05/10/2010, n. 207, regulation of enforcement and actuation of DLgs 12/04/2006, n. 163, about public works, under "verification of the plan", the expression "conceptual quality" has disappeared and has never been substituted by any other parameters referring to the external quality. This situation has determined a normative "emptiness" which limits a documented consideration and represented in *genius loci* with the risk of increasing the existence of infrastructures lacking in a intangible as well as indispensible quality.

Thus, the intention to grasp this "conceptual quality" as a way to reflect about its meaning, becomes concrete in order not to lose the comprehensive awareness which is able to improve the harmony in the infrastructure-human being connection.

2. The appraisal of the projects: a survey

To better understand how added values existes in a road infrastructure, it is necessary to dwell upon the features which are part of the complex connection between the plan and the territorial context. The main features of such correlation are: the *user*, who perceives the road infrastructure work and its context according to a specific cognitive process, the *work* (roads and bridges) and the *territorial context* (the plan area). To start with the first feature, the human aspect is included in those environmental factors both biotic and abiotic though with an interpretation addressed to the protection. Should we consider the human aspect from an anthropocentric point of view, which has to do with people's everyday life, this aspect assumes many different connotations depending on who uses those road infrastructures, through its perceptive and interpretative faculties, becoming thus the *user*. According to this point of view, the *user* becomes the most important for both using road infrastructures and for living with them. From a cognitive point of view, the *user* stimulates a perceptive as well as a representative process which produces an evaluation – positive, negative, indifferent - regarding all that activates our attention. Briefly, "the perception is always part of valuation criteria, - more or less self conscious, intuitive or automatic – which becomes the appreciation about the shape, meaning and function of something"[1]. Even though the shape, function, meaning and features of the object refer to the cognitive activity of the user and according psychologists they are interrelated, in this survey they are separately analysed and seen as an interpretation key for infrastructures. As far as the perceived shape is concerned, there are two main categories: the first one belongs to the context, be it territorial, peri-urban or urban. The second one regards the road plan as a linear system of roads and bridges. The growing awareness about safety measures and acoustic impact meant to reduce road accidents as well as human and biotic impacts, leads both the designer and the buyer to incorporate safety measures such as increasingly higher guard-rails and sound proofing barriers which make the infrastructure looks like a enclosed lane. Consequently, it happens that the technological structures of roads and bridges dominate over the road and bridge shapes. From the point of view of perception, when the work is finished, its shape can either be lost in its context or become more prominent but it is always inescapable within all that surrounds it. The perception of the work shape is always incorporated with its context. The second feature, the function, is also to be considered in a different way. As far as the work is concerned, the function is the reason of a road infrastructure's existence which allows the transport of people and animals or the clearing of a obstruction in the case of bridges. Culturally and strategically speaking, the large quantity of infrastructures in our country is due to the maximization of the means of transport and to safety measures. There is also the function relevant to the area, such as the rural or urban one, with different ways of connection with the road infrastructure. The third feature, the meaning, described as "the content of any means of communication as it is translatable into concepts, notions, references", or as "importance of a fact, in consideration of the reasons which have motivated it and their possible consequences", leads one to understand that both a territorial context and a road infrastructure can have many meanings. A bridge, with its formal and chromatic features, can be the main symbol of a town, for instance the fourth bridge in the Canal Grande, Venice, by Santiago Calatrava or the highway access in East Padua where the former is a outright monument, the latter an access to the town. In the same way, agricultural land means not only the production of bounties of the earth but also the representation of cultivation techniques, an urban context can

Pic. 1 and 2 Fourth bridge on the "Canal Grande" in Venice (2008) and new junction in Padua near the motorway exit "Padova Est" (2008)

be the place where you live, eat, sleep, work, that is the place where different human relationships happen. (It is necessary to point out that the subject of the *place* has been examined by the anthropologist Marc Augé who talked about the Non-Places, giving a representation of many infrastructures; though this is not part of this essay, it is important for the consideration of the *meaning of the context*). So far said, when the road infrastructure is in its context, shows itself through its shape, it becomes the carrier of a function (means of transport) and of a meaning (the way to reach a place or clear an obstruction either natural or artificial). At the same time, it can give the opportunity to enjoy a view or to go across, probably with some distaste, a degrading urban site. The working of the function, shapes, and the meaning of the road infrastructure plan means to interact with the shapes, functions, and meanings of the area. Should such plan be properly done, it can create added value, emphasizing the conceptual quality. The infrastructures are usually associated to their use (means of transport) though the "shape" and "meaning" are often left aside, with the consequence of a degrading of the urban site. Thus the conceptual quality, seen as a value added, is characterised by the increasing of the *function* and the *meaning*. According to this opinion, it stands to reason that relational, identical and symbolic factors come into play and even though they seem intangible, they are necessary in order to have a planning awareness. In terms of *shape, function,* and *meaning,* it can be affirmed that the added value occurs when one or more of these factors are deepened and go beyond the plan's main purpose, which is generally connected with the utility idea. In other words, each time a road infrastructure shape doesn't follow only functional needs, but also the meaning of the plan in a territory, then you can find the perfect circumstances to have a value added. At the same time, the creation of added value happens when, besides the function of the plan, there are other factors which add more levels of functions to the plan, such as the way to use it. If the purpose of the road infrastructure is a technical-performing one, it is when the shape, the utility and the meaning both of the plan and the context are taken into consideration that we can have a double level of added value: the interpretation of solving a transport problem and the interpretation of an urban site lived by the users.
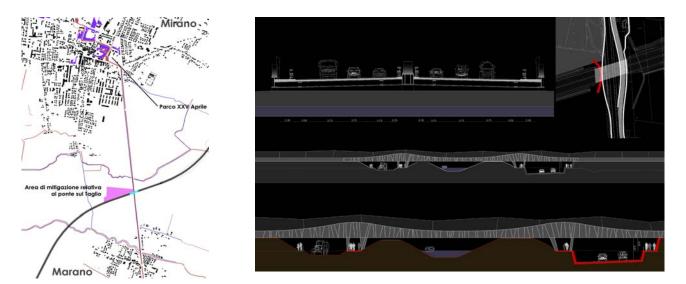
2. An example of reading according to *shape, function* and *meaning:* the bridge on Taglio channel in Mira (Venice)

1) Description of the intervention reason

The "Passante of Mestre" is an infrastructural work which totals app. 32 Km and has seen the realisation of numerous bridges, overpasses and underpasses. One of the necessary bridges to guarantee the road continuity is the crossing of Taglio Channel.

Pic. 3 Territorial context of the intervention area – aerophotogrammetric view

Pic 4 Left: positioning of the bridge in respect of the built-up area. The purple color shows an area which will become a park and is connected to a green area in the centre of Mirano through the passage under the new bridge. Right: section, planimetry and prospects.

2) Description of the territorial context.

Shape: the context is a level district mainly agricultural where some industrial areas stand out. The bridge is near the banks of Taglio Channel, which connects Mirano and Marano.

Function: Taglio Channel is an old good transport infrastructure waterway: a channel that, because of functional needs and due to the flatness of the district (Pianura Padana) crosses the territory with a linearity that is the most constant and recognizable feature in such context. On one of its banks there is the road which connects Mirano and Mira, on the other there is a cycle-pedestrian way which is used to the utmost by the local people to go for walks.

Meaning: the historical value of the channel, besides the fact that it has turned into a place where people spend lot of time at, has assumed a collective identity which will be surely menaced by the impact the visitors will produce in such context.

3)Description of the work and possible alternative solutions

Shape: the bridge is 80m length. It has three bays, two side ones of 30m. and a central one of 40m., it is 35m. wide , with two carriageways, each of three lanes. It has an almost entirely steel structure, with glass sound proofing barriers and its characteristic is the built on the Taglio banks, making it not too high. In addition, the road continuity of Left Taglio and the cycle-way of Right Taglio have been kept, making them pass along the banks to go under the bridge. The bridge fabricated in metal, with the front made by a series of inclined bars with the function of hardening the core of the longitudinal girder.

Function: the bridge has a double function. The main one is the continuity of the "Passante di Mestre" with the crossing of Taglio Channel; the second one is the continuity of the road which goes along the Taglio

Channel under the bridge. The bridge is also situated near a redevelopment area which will become a park and is connected, through a cycle-pedestrian way, up to the Park "XXV Aprile" sited in the centre of Mirano. Meaning: the bridge, meant as a crossing of the channel by the road, has been interpreted as an element of the landscape with its own role and identity but at the same time it is part of it through the connection between the elements present in the context. To find out the role that the bridge should have in this context, we have analysed the landscape, isolating some elements in order to discover the mechanisms which regulate their connections. We have imagined what impact the structure could have and from which point of view it was better to view it. The result of these studies has led to the insertion of the bridge between the banks, where there are already existing strips of green (poplars, small woods) near the bank, so that the sight of it from far away makes its dimensions appropriate to the context. As one approaches the bridge, gradually descending the banks, exactly when the bridge is showing its real and unavoidable dimensions, one's attention is drawn towards a green area near the motorway which works both as a mitigation of the motorway itself and as a facilities area for rest and leisure. It also includes a small refuse which will be renovate. The bridge is also inserted in its context according to the following consideration: there is a daylight landscape which we are used to taking into account according to our cultural dimension, however there is also a night landscape to which little attention has been drawn especially those structures which are a reference point for the community, such as bridges. In a certain context, the visibility of the bridge at night contributes to create an extended landscape portion which can be coherent with the daylight view, depending on the artificial lightning. During daylight, the movement of the metallic bars, perceptible as an alternation of recess and protrusion, creates a play of light and shadow that gives depth to the front, reducing the visual impact. Even from the very first planning phases, the depth effect was kept also in the night-time view. Just like in the negative of a picture, during the night the play of light and shadow has been achieved bringing out recesses and protrusions through lights put inside the many inclined bars which make the front of the bridge. The artificial light emphasizes the presence of the bridge in the dark background of the night, creating a recognizable reference point in the same way as it happens during the day.

Results:

a) Interpretation of the means of transport solution:

Clearing of the barrier given by the Taglio Channel, so as to have a transportation continuity thanks to the new infrastructure "Passante of Mestre".

b) Interpretation of the territorial context

The features of the bridge are connected to its functions which is both the crossing of the Taglio Channel and a reference point for the continuity of the road network. It has been thought that the perception of motorway drivers, given their speed and consequently lack of attention to the landscape, should have been of a more abstract sort: the crossing between the roads of the Passante and the Channel is a clear sign perceptible even at speed, thanks to the curves of the extrados of the girders. The plan has also taken into account the night landscape through the artificial light.

c) Added value

i) The lightning of the bridge has been taken into consideration as a form of night landscape continuity.

ii) Keeping of the road continuity under the bridge and connection of two homogenous functional areas.

iii) Concealing of the traffic in relation to the visibility of the bridge.

iv) Bridge visibility due to its proximity to the park, whereas the traffic will be hidden by the structure's height.

v) Arrangement of the residual areas due to the achievement of the new road and of the conditions for the creation of a park.

3. An indicator list of conceptual quality

From the reading of the relationship between the work and the context which are applied to a wide number of road infrastructures, it is possible to take out those themes which have contributed to the creation of added value and make a list of some indicators of general validity.

In the same way as in the procedure for the writing of the SIA (Study of Environmental Impact) where there are some checklists proposed as questions, here it is a checklist with the transposition of added values into arguments which can be treated also in other planning cases. The indicators have then been grouped together taking away the repetitions, in terms of shape, function and meaning. Of course, the checklist below does not exhaust all the possibilities for the creation of added value, however it can be considered as a reference point for the checking of the plan external quality.

Shape:

1. *Bridge dimensions and shape*: Either in the overpasses and in the bridges, is it necessary to keep a reduced deck dimension in order to minimize the visual impacts? Has the bridge typology been studied together with construction techniques which allows a drawing able to keep a reduced deck dimension?

2. *Context shapes*: Does the bridge/road take into account the functions and shapes of its surroundings? Is it in connection with them?

3. *Visibility of the infrastructure and by the infrastructure:* Have the various alternatives been evaluated about the bridge/street positioning in relation to its view from the bridge/street and of the bridge/street? Can the bridge/street offer optical cones towards worthy landscapes and at the same time conceal the view of the traffic?

4. *Formal coherence between the product and the context:* Is it necessary that the bridge/street drawing follow a formal coherence with the other elements of the territory?

5. *Lighting:* How does the bridge/street work at night? Is there any lighting which shows its presence, enhancing its shapes? Does the night lighting give a formal result which is coherent with the day-time view?

6. *Vehicular traffic view:* Is it necessary to conceal the traffic view of a bridge/street?

Function

1. *Flexibility:* In the future, can the bridge/street be enlarged in order to achieve new traffic needs?

2. *Economical contest:* Does the bridge/street take into account the economic development of its surroundings?

3. *Interchange:* In the network nearness, is it possible to exchange the various transport ways?

4. *General economy:* Is the working of a road infrastructure compatible with the structural needs of the population budget?

5. *Interdisciplinary program:* Do the program documents grasp the potential and vulnerability of the territory functions, shapes and meaning both on a great extent and on a local rank?

6. *Traffic category:* Does the bridge/street take into account the different traffic categories?

7. *Functional intersections:* Which functions do the bridge/street seize? For instance, if in the nearness of the bridge there is the possibility to create a park, can the bridge have functional relations?

Meaning

1. *Characterization:* can the succession of overpasses with similar features be the expression of the stereotyping of a road?

2. *Identity:* Which images of the territory are possible after the infrastructural intervention? Which territory's identity is possible after the infrastructural intervention?

3. *The symbol:* Does the bridge/road have a symbolic value?

4. *Renovation:* can a bridge/street renovate places?

5. *Doorway/access/transit:* can a bridge/street express, where it is necessary, the access to a town? Or as the crossing of a place?

6. *Limit:* can a bridge/street be a geographic reference point which marks the crossing from a territory to another?

7. *Grades:* Are there any recognizable functions in which the bridge/street is in connection with? Which grade of function is recognizable?

8. *The old and the new:* in case of a functional adaptation of an old bridge/street, are there any rules which regulate the old and modern relations? Will the intervention be on both sides or on only one? Will a reversible technology be used? Will there be a hierarchy to highlight?

4. Results

The infrastructural road plan can be the chance to create a conceptual quality which is able to establish a relationship between the functions, shapes, and meaning of the road/bridge and the functions of the context. Supposing to define the "*conceptual quality of the infrastructural roads as a whole of value added deduced from the connection of components within the plan and the territorial context that enables the project to satisfy a series of requirements not directly requested by the performance goal*" [2], it stands to reason that the conceptual quality can differ in many ways and can be expressed through a multiplicity of meanings. The followings are to be underlined.

The determination of a conceptual quality is a cultural fact.

The conceptual quality of a road infrastructure is the result of the communication between the client and the designer; it is territory knowledge; it is multidisciplinary or better trans-disciplinary, as it follows a process of mutual exchange and of mutual enrichment between the designer and the client as well as it tries to catch the population requests. The infrastructure, characterized by a higher grade of conceptual quality, will be

able to synthesize coherence between the functions of the road and of the work and the functions of the territorial context through an architectural plan which is able to interpret the meaning of the places. The conceptual quality of a road infrastructure is the organization of the place density variation and the competence to use it; it is the chance to handle the threshold between road infrastructure and context, where identities are attested and differences are reinforced, at times belonging to the world of the street, at times to the world of nature (it is necessary to think about the noise barriers obtained through the insertion of greenery or to the technological barriers through sound proofing panels).

The conceptual quality is the chance to re-organize the space where the plan documents haven't been able to grasp the value of the places.

The conceptual quality consists also in foreseeing the variation of the territory functions and of the infrastructural network which can happen within time.

The conceptual quality is the approval of several points of view which are able to outline the complexity of the relationship between the infrastructures and the territory; it is the analysis of the depth of time and the depth of field which allows one to perceive both the street and the landscape with a reduction of the contradictions, where not only the travel acquires a meaning, but also the parking and the stopping off.

The conceptual quality also consists in the power to detect the area where an economic development is possible, through the connection of the road infrastructure to the territory's functions; thus, the road infrastructure can be seen not only as a centre of attraction of the traffic, but also as o centre of attraction of tourism and economy. Last but not least, the road infrastructure can be the place where new landscape plans materialize.

The conceptual quality needs to be examined, studied, explored and represented. It deals with the close examination which can be found in other disciplines amongst which there is psychology, landscape, geography, representative, anthropology, sociology, urbanity and of course structural and architectural ones.

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Productive Landscape Design, a case study in southern part of Tehran

Maryam SADEGHI[1], Zahra SADEGHI[2]
[1] Department of Architecture and Built Environment, School Of Landscape Architecture, University Of Putra Malaysia,serdang, Malaysia
E-mail: maryamsadeghi1362@gmail.com
[2] Department of Architecture, School Of Landscape Architecture, University Of Shahid Beheshty, Tehran, Iran
E-mail: zahrasadeghi38@yahoo.com

Abstract
Urban productive landscape is a process of production in urban green space, which involves production of vegetables, herbs, ornamental flowers and fruit trees .The production process begins from small units in private yards, to the larger scale in the farm lands. Productive landscape is beneficial to the society and people.
Agricultural lands in southern Tehran have been selected as case study, in order to be reorganised hence, part of these agricultural land is selected to be designed, in local scale. The selected site is considerable from two main aspects, firstly, the residential fabric which is penetrated in to the agricultural land, caused various types of pollution in the environment, and secondly, its establishment in the southern edge of Tehran.
Increasing conversion of agricultural lands to residential and industrial construction occurred, while the importance of productive landscape has been ignored in the selected site. productive landscape's restoration, will empower various changes in residential fabric, it improves social interactions and it will restore and enhance environmental quality.
Urban productive landscape is capable to empower and improve the environmental, economical and social aspects of the city. It will revitalize natural and cultural landscape and it will improve the interaction in between man and nature, as well. Preservation of productive landscape as an urban land use is periphery requirements to create a sustainable landscape. Thus, productive landscape describe as a conversion, from an entire consuming green space to a productive green space.
Therefore, the paper will discuss productive landscape design as solution to work out issues within this particular site.

Keywords: productive, landscape, agriculture, southern Tehran, design

1. Definition of urban productive landscape
Urban productive landscape is the process of producing agricultural goods such as vegetables, legumes, mushrooms, even meat and dairy products, within the city or its suburbs. These products may also include medical plants, shrubs and ornamental plants [1].
Urban productive landscape is defined by the specific requirement and necessities in different urban regions. The main purpose of urban agriculture is to plant and produce food through simple procedures despite limited facilities [7].
According to the above definition urban green productive landscape can be regarded as specific urban land use which in turn may include private territory such as one's backyard or it can consist of larger scale functions namely parks, urban green spaces, travel and recreational spaces. Urban policies regarding

productive landscape design restrict urban fabric transformation, yet it will restore urban open spaces through multifunctional landscape [1].

In order to change urban landscape, Urbanites' life style and the urban policies need to be reconsidered, that could be achieved through different interaction with urban green space. For example, residents will begin to cultivate fruit trees, variety of vegetables and ornamental flowers by working on the fields.

2. Urban productive landscape significance

Landscape is not only a field for human activity but it is a field of visual perception and it associated with all human senses. Aesthetical, perceptional and emotional characteristic of landscape could be experienced by all man's senses [2]. Various plant species, in the adjacent parcels, with different textures, colors, sizes and fragrances during different seasons, will stimulate human senses and it will create a different experience for the residence in the urban landscape. Different plant species with diverse rate of productivity causes urban landscape to continuously change, hence, urbanite's life quality and their contact with the urban environment will be affected by these alternations.

Breeding agricultural crops in local scale urban green space is a creative opportunity, in that unique ideas of design and management are practiced within the city, while, any two productive lands are not adorned similarly. People central urban productive landscape provides a different method of design and management which includes various individual reactions, and is not achievable through static comprehensive plan.

The urban productive landscape is able to gather people, revitalize missing sense of society, act as a source of education, and it provides opportunity for the public participation, which in turn leads to local economic development. People will be bounded to their environment through agriculture; they will become sensitive and curious about environmental pollution and consumption of their local resources. Moreover by educating urbanites with necessary skills, they will be able to manage their own local environment [1].

Urban productive landscape is a conversion of the urban landscape which is significant not only due to its physical characteristic, but also due to concepts of productivity and memorable experiences. What has been manifested in urban landscape is a sense of place, which is achieved by means of public involvement. Productive landscape inspires memorable mental images through Public participation in the process of breeding crops in different season and various days of the year.

Urban productive landscape distinguishes local differences in each region, which could be seen as distinct types of planting as a result of different cultural choices. Different plants grow in different climate, therefore the planting season is important and need to be considered in productive landscape [4].

Another significance of urban productive landscape is moving towards sustainable environment .Due to the lack of resources, landscape designers are required to reconsider their consumptive perception in order to design urban green spaces [3].Urban green space could be designed based on productivity rather than energy consumption. Since it supplies urbanite's required products within the city or in the suburbs without the need of transportation, it will provide job opportunities as well [1].

3. Urban Productive landscape planning, a case study of Tehran Southern agricultural lands

Tehran's nature is vast territory in between Alborz Mountain and central desert; it is limited to Alborz height in the north. Mountain located in the east and the sought east edge defines its territory in the east. And the residential cores and the cultivated lands occupied west's and south west's lands (Fig.1).
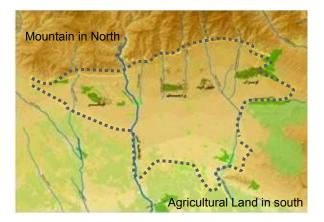
Fig.1: Tehran natural structure

3.1. A brief history of Iranian productive landscape

Throughout different periods of time gardens have been deemed as sacred places, where techniques of farming and gardening had been practiced. Survival of ancient Iranian cities depended on the presence of gardens, at the city's entry [6].In ancient times cities were regarded as garden-city in that farming and agriculture were an inseparable feature of those cities.

The city was surrounded by large scale farmlands that reduced into private courtyard when entering into the city core. Farming is part of Iran's economical and production system, which promotes self –sufficiency. Iranian cities have lost their identity during years and they sought to imitate western culture ,hence farm land had been replaced by parks during centuries.

Tehran is surrounded by agricultural lands and gardens (Fig.2). The city's wall was removed in 1270 for the first time and it was expanded in four directions. As the city developed a remarkable part of it remained in the form of gardens, farmlands and green spaces. And the new developed city spreaded out to fertile fields in the outskirts [5]. The Gardens gradually transformed into roads and buildings without any visual and conceptual harmony (Fig.3).

3.2. Site inventory and analysis

Tehran's agricultural land, is both located within the city and in the city's outer range .productive landscape in the outer range considered as rural area and were designed according to a specific structural plan(Fig.4).The inner lands are located in three different regions and they have been structured according to their specific regional policy plan(Fig.5). Hence, there is not a coherent and unified approach regarding agricultural land design in Tehran.

Although an urban freeway acts as a border in between the metropolitan and the rural area, there is not any hierarchical process to segregate the rural and urban area. Due to Lack of integrated approach to agricultural land design and planning, agriculture as an important urban function is neglected. This leads to unauthorized construction, destructions of agricultural land and exploiting agricultural lands for other uses.

3.3 Proposed productive landscape's arrangement pattern in the selected site (regional scale)

Converting agricultural lands and gardens into urban and industrial land use, leads to environmental and economical consequences, which is threatening to the productive landscape's preservation. Therefore the Importance of productive landscape development and preservation are as fallowing:

- Tehran's southern agricultural lands perform as a visual land mark on entrance to the city.
- Urban gardening and agriculture revitalized the native landscape and is considered as Tehran's valuable heritage.
- Sustainable approach, accentuate productive landscape preservation and development.
- Productive landscapes are urban ecological zones, and their preservation ,will strengthen biodiversity and the life cycle
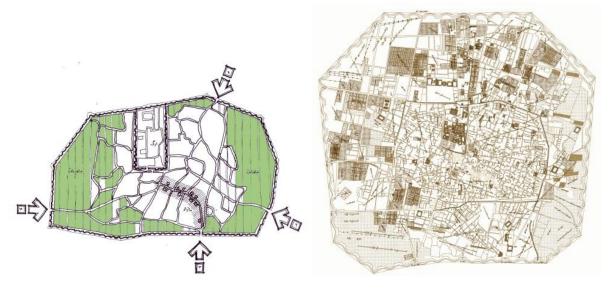
Fig. 2, 3: Tehran map in 300 years ago, Tehran map in 200 years ago

Fig.4, 5: Agricultural lands located in Tehran's outskirt, agricultural land located within the city

Due to the importance of natural and productive landscape within the city and in the suburbs, various solutions have been presented, in order to integrate the urban development and the surrounding nature to protect and preserve green spaces and productive landscape.

A key objective of Tehran's productive landscape design and planning is to create a unified environment which is coherent internally and it conducts a seamless transition from natural environment to the urban environment. Through implementing this method productive landscape penetrated in to the urban context through a hierarchical process.

The specific characteristic of this design is to concern the economical, cultural and environmental importance of productive landscape. Moreover agricultural activities will be implemented as part of urban life and unauthorized construction prohibited in the agricultural lands (Fig.6), as result:

- Existing agricultural landscape at the city edge provides the opportunity to revitalized productive landscapes in the city. The agricultural land and gardens are territories where developed rural landscape penetrates in to the urban context.
- The agricultural lands located at the terminal point of the three (south to north) axis and the productive landscape enters through these channels into the city.
- Three agricultural zones linked together through development of green productive network that generates green productive zone in southern Tehran.

In this respect, to achieve this goal, long-term planning is required in order to improve environmental conditions to change the polluted land use.

Fig.6: Proposed agricultural landscape development pattern

4. Productive landscape design in neighbourhood scale

As stated above, based on landscape preservation's significance, agricultural lands and gardens in southern Tehran have been selected for the present case study. The main aim is to design and reorganizing the selected site which is surrounded by urban freeways both in the south and in the north. It should be mentioned that the site area is 140 hectares.

The selected site is located in the southern edge of Tehran, and it acts as a medium between the residential fabric and agricultural land in the south. The social and cultural factors and the visual characteristics are inappropriate, in this area (Fig.7).

This study intends to implement, productive landscape design as the proposed solution in order to work out issues within this particular site. The discussed issues consist of two aspects. Firstly, the internal aspects include" solving productive landscape problems that are associated with the residential context ,appropriate quality and integrity of the landscape ,appropriate accessibility and establishment of infrastructure facilities. Secondly, the external aspects include" creating strong linkage between productive landscape and the whole perception of Tehran and improving its functional role (Fig.8, 9, 10). Therefore, the fallowing objectives are suggested:

- To define the site's functionality in both North and south
- To create an appropriate interaction between the two sections
- To design northern sectors in local scale and in relation to residential context
- To design southern sectors in regional scale, and to meet the needs and requirements of tourists and visitors

Fig.7: Inappropriate social condition in the site

Fig.8, 9, 10: Design approach (external and internal aspect), residential context penetrate into agricultural land, agricultural land in south west entrance

Appropriate interaction among urbanites and designed productive landscape, improves the quality in residential sectors and it encourages, urban landscape's revival in the district. Productive landscape's preservation is a process of quality reproduction, which integrates old and new values. And it protects natural relations among man and his environment; also it is an attempt to achieve local identity. Additionally, the productive landscape is capable to provide job opportunities and is a solution to social and economical challenges.

The overall population of the designated area is 8524 people, where 75% are the employed population and 16% are unemployed, hence 1022 people are active job seekers. Each hectares of productive landscape, is able to provide required vegetable needs of 200 people [8]. Since 60 hectares is under cultivation, the required veritable amount, for 1200 people is already provided, despite the fact that this amount is greater than demand (Fig.11).

Based on the calculations, 246 people could work on the areas under cultivation, although other occupations such as greenhouse transplanting, nursery maintenance, agricultural education, local recycling management, sales production management and monitoring livestock, are also available.

Considering the fact that 4.1 people can work on one hectare of land, 2500 m^2 can be cultivated by one farmer. Farming on an agricultural land with the area of 2500m^2 is profitable and could be regarded as their main job [8]. In smaller scale; agriculture activity is a part time job which supplies family food necessities.

4. Proposed productive landscape's land use, in neighbourhood scale

Based on the site's potentials, proposed land use has been designed (Fig.12). The entire site is a garden city; the northern part is designed in a local scale, and moving towards the southern edge, urban functions are implemented. Therefore, parcel size is becoming greater from north to the sought and the land use will gradually meet local needs to greater urban requirements (Fig.13). The General approach is to design and plan based on productive landscape which distinguishes the designed site from other urban communities.

Fig.11: Excess of product over demand in the site
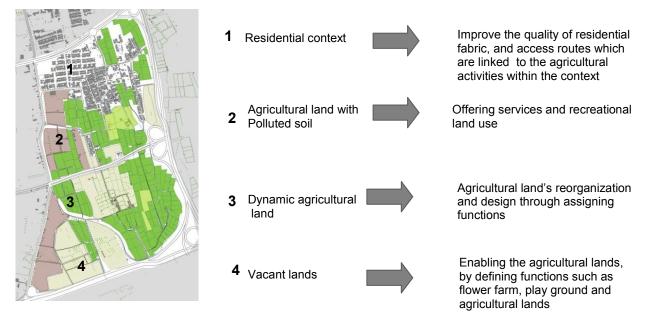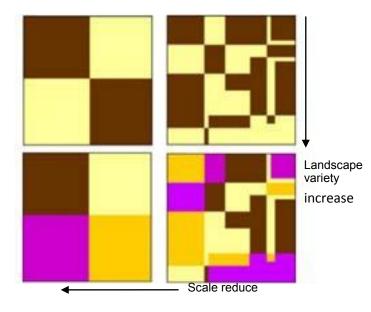
Fig.12: Proposed function related to the site potentials

To achieve the concept of garden-city design, urbanites and municipalities should be educated to become aware of the importance of productive landscape's revival and to to motivate public involvement. Site's Implemented plans, are applicable models in other part of the city based on their required specific characteristic. By implementing the concept of garden city in productive landscape, preservation of energy resources, environmental sustainability and environmental management will be achieved through public participation.

Due to the site's potentials, fallowing land uses are proposed:

Family farm : low density residential complex will be built in the site's west-east axis, and it will hold population of almost 1200 people in the area. According to published statistics, family size is 3 to 5 person in this area (4person in average). Each hectare of land can supply the required vegetables for 200 people; therefore to accommodate the needs of 600 people three hectares of agricultural lands should be allocated. Consequently a family of four will need 200 square meters of land surface to supply their own required fresh vegetables and to become self-sufficient .As a result 10% of food expenses will be saved in the family.

The proposed plan is, to maintain agricultural land adjacent to residential complex functional. The Agriculture land will become as garden for the residential units and the residents will farm in private space surrounding the residential areas (Fig.14).

Fig.13: Scale conversion and landscape diversity from urban farm to private garden
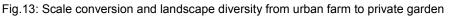
Fig.14: Proposed designed area for the family garden

Allotment garden: is designed for the purpose of providing job opportunities and also as a source of income for the residents. Due to land limitations, it is estimated that 35 persons will be employed in the community. Allotments farms evolve among the residential blocks (Fig.15). The remaining agricultural lands located in between residential complexes would be allotted to the residents. Allotment farm land is a manifestation of private garden in the public area. This will incorporate resident's individual characteristics so that residence will become designers of their own green spaces. Thus Landscape features are constantly changing while different owners will change field structure each year (Fig.18).

Neighbourhood farm: includes child play ground, places where residence spends their leisure time, sport fields and green productive fields. 2/5 hectares is devoted to play grounds and sport field, with the intention of employing 20 people, agricultural lands with the area of 1 hectare is provided (Fig.16). Hence, neighbouring farm is a public garden for everyone, where agricultural landscape and recreational spaces are integrated (Fig.19).

Farm-institution: includes educational, religious and health care centers in the selected site. These institutions have the ability to interact effectively with the productive landscape. Agricultural education could be considered as part of school's curriculum. As a result adjacent agricultural parcels become part of school yards where teachers and farmers guide students to cultivate crops, in action. Similarly religious institution, perform training courses to educate volunteers urbanites. Such approach is the agricultural landscape's management through public and private sectors' participations, while it increases sense of responsibility toward surrounding green space (Fig.17).

Fig.15: Proposed design area for allotment garden
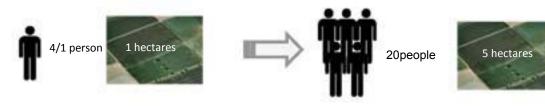
Fig.16: Proposed design area for neighborhood farm

Fig.17: Proposed design area for farm-institution

Urban farm: it is located at the site's southern edge, the urban farm contain agricultural lands, which includes agricultural facilities (storage) and resting areas for the urbanites. Total areas of the southern part is 60 hectars,8 hectares of which is not appropriate for the cultivation due to soil pollution ,and its estimated to provide job for approximately 190 peoples in the urban farm (Fig.22). Urban farm is designed in regional and urban scale, is located adjacent to urban freeway with the intention of providing the required needs of transits visitors, Such as tourist or travelers. It's preferable for the urban farms to be managed by the local residents so that they would be able to host the travellers and tourists (Fig.20).

Bazaar garden: is supplying Direct, fresh healthy production. Bazaar gardens, will offer the farmers the potential of directly selling their products in local market (Fig.21).

Fig18, 19: Allotment garden, neighborhood farm

Fig.20, 21: Urban farm, bazaar garden

4.1 people   1 hectares   190 people   60 hectares

Fig.22: Proposed design area for urban farm

5. Conclusion

Restoration of biodiversity is an important benefit ,which is derived from productive landscape As result, various species of plants entered to the urban green space, various form of life cycle has been formed.

Urban productive landscape   encourages people to learn new life style in the hope of increseasing their self confidents, in addition to food production. Crops production in the urban context encourages community members to work and to produce collaboratively for achieving a unique and common goal ,without any discrimination. Furthermore, public health will be enhanced by working on the farm lands.

It is worth mentioning that if the cost effectiveness of productive landscape can be demonstrated the restoration of which is more likely. For this reason a remarkable percent of the population will consist of farmers who will produce urbanites' agricultural needs resulting in the self sufficiency of the city.

In the selected site, agricultural lands and community landscape are integrated. This involves a hierarchical process of development from private space to public areas in the city .Agricultural landscape offers various land use   and identity   in form of   urban farm, neighbouring farm, allotment gardens, family farm, and productive landscape will become part of urbanites lives.

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LANDSCAPE OF NEW ENERGY

Alessandra PAGLIANO,
Dipartimento di Configurazione e Attuazione dell'Architettura, Facoltà di Architettura, Università degli Studi di Napoli " Federico II ", Italia
pagliano@unina.it

Abstract
The domain of technical knowledge has led to a deconsecration of the beauty that traditional cultures associated for centuries to the landscape, so allowing selfish and indiscriminately use of it, and therefore abuses: contemporary landscape is covered with all sorts of infrastructures, arbitrary in shape, location and size, without any reference to the image of those places.
Barely tolerated by virtue of their necessary function, mobile repeaters, antennas and iron pylons of the power lines are domineering presences, unable to interact with the landscape.
In the same way, it was shown that, although in general there is a substantial support to renewable energies, local communities often perceive them negatively because the installation of such systems is greatly impacting on the landscape. The strong perception of the solar panels is now the biggest problem.
This paper addresses the problem of a visual integration between infrastructures and landscape, based on morphological elements, color and materials, with a particular attention towards new technologies for the production and distribution of energy, both traditional and photovoltaic, focusing on contemporary research of companies that base their philosophy on the desire to combine innovation, technology and design for sustainable development of energy production and transmission networks, in respect of the landscape. In particular, is here presented a new method, based on perspective studies, that allows to place the new infrastructure in accord to the shape of landscape.

Parole chiave: landscape, perception, perspective, infrastructure

1. Infrastructures and landscape: a different point of view
The aspect of a place is determined by its consistency of expression, by the complex units of meaning, both symbolic and aesthetic, that characterizes unequivocally that piece of land. A set of characteristics defining the irreducible singularity, the specific physiognomy of the place, its recognizable expression, are signs not reducible to pure aesthetic appearance. Do not forget, in fact, that same area, same as in morphology, climate data, vegetation, geological structure, etc.., can be interpreted in diverse ways by different cultures: the objective data of the geographic lands set only the conditions of a possibility that can come, within certain limits, emphasized differently, depending on the culture of the society that takes that land as its own landscape.
The multidisciplinary considerations of recent years about such issues have led at last to distinguish, and specifically characterize, terms and concepts such as "territory", "land", "environment" and "landscape", which are not synonyms: in particular, the definition of landscape provided by the European Convention (2000) clearly specifies that landscape is always a cultural construct, related to the sensitivity of the perceiver, while the term "environment" thus define an objective natural and ecological condition.
In particular, the Convention of the European Council extends the concept of landscape to all places, thus overcoming the traditional aesthetic sense, certainly reductive, and so defining it as the place and the

irrepressible expression of a cultural identity. Every landscape, both natural and cultural, both excellent and degraded, represents a life framework for the affected population, which has a profound effect on the quality of live.

In this perspective we emphasize the importance of the coherence that every territorializing act must have to not potentially dissolve the unity of expression of the place. When a series of inappropriate interventions, and dissonant transformations takes place on a land, the image of the landscape related to these places end up to be gradually unreadable, with the consequent failure of recognition by the community. This produces consequent effects of further deterioration, such as vandalism but also disintegration and social distress.

Much of the responsibility of the irreversible destruction or degradation products on our contemporary landscapes is a consequence of the indisputable primacy of economy, ideology conceived as an immediate profitability, regardless of intangible meanings like beauty or preservation of memory, and myopic in respect of long-term effects of today's actions.

The domain of technical knowledge has led to a desecration of centuries-old aesthetics culture of nature and landscape, allowing self-centered and indiscriminate uses of it, and therefore abuses: our contemporary lands are covered with all sorts of infrastructure, settled with arbitrary shape, size and location, without any relation to the image of those places, stratified for centuries.

Heroic symbols of modernity in the first half of the XX century, the infrastructure has today become the mainstream support for a process of technical and technological upgrading of the territory to the needs of our contemporary society.

Barely tolerated by virtue of the essential function performed, the mobile repeaters, antennas and pylons of power lines, is an arrogant presence, unable to communicate with the landscape.

In a similar way, it was demonstrated that, although in general there is considerable support for the dissemination of renewable sources of energy, at the local communities often perceived negatively the installation because of their strong impact on landscape.

Like everything related to the physical modification of a territory by man, the infrastructure must necessarily go back to be a topic of architecture.

An urgent and necessary discussion can be carried out from understanding the progressive distance that is currently emerging from the infrastructure projects, on one side, and the tradition of urban design on the other. The principle of identity and recognizability of the infrastructure plan, that provides to prefigures the degree of compatibility and transformability of a territory, must necessarily be acquired awareness by the designer: what pertains to the perceived size of the landscape must plays a decisive role in the plan, like the functionality, cost and safety of the works: the infrastructure design must adapt itself to different landscapes traversed, as an essential prerequisite for assessing the quality of a plan.

2. Landscape of new energies

The research for a balance between energy needs, the landscape and the environmental safeguard, has recently characterized a new line of experimentation for Terna S.p.A., company responsible in Italy for the transmission and dispatching of electricity on the grid at high and highest voltage throughout the country, in finding appropriate solutions to ensure the country the power it needs with optimal reliability, cost and environmental sustainability.

They have adopted several methods of modern bioengineering, by exclusive use of native species of bushes and trees, to mask the sites of power stations, especially of new edification, as well as the attempts to camouflage the pylons of power lines. All these expedients, however, clearly indicate how much unrelated the infrastructure is into the landscape. The reasons for the dissonance between landscape and infrastructure are often structural and irreconcilable with the simple mitigation measures.

Terna S.p.A. has also recently cast an interesting competition for ideas, to conceive and to plan new pylons, with low environmental impact, by combining innovation, technology and design for a sustainable development of the transmission grid, in order to satisfy both the needs of the electrical system and the respect of the landscape. In fact, the functionality may be declined in various forms through the aesthetic research, such as happens with the new high-voltage pylons which are intended to renew progressively kilometers of old high voltage power lines.

The high-voltage pylons are perhaps the most difficult objects to be reinvented in the name of creativity; hardly tolerated according only to their utility as scars in the landscape, in this perspective are reinvented as landmarks, proud signs of modern technology able to dialogue with the land forms, in order to contribute to characterize the image of those places.

Punto visuale 2:   Situazione attuale

Punto visuale 2:   Simulazione fotografica della costruzione della sola stazione

Punto visuale 2:   Simulazione fotografica delle risultanze visuali degli interventi a verde previsti

TERNA – Lodi-Maleo

Fig 1: Terna   new proposals for   electrical   infrastructure, photographic   simulation of mitigation for   a new power station construction, by the acts of congress: *Environment, landscape and infrastructure*,Rome,October 2009.
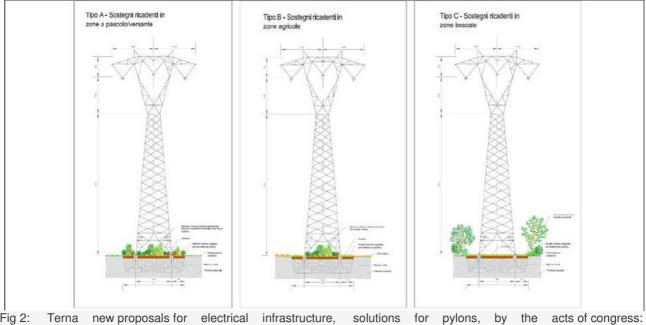
Fig 2:   Terna   new proposals for   electrical   infrastructure,   solutions   for   pylons,   by   the   acts of congress: *Environment, landscape and infrastructure*,Rome,October 2009.

The competition titled Pylons of the future, banished by Terna S.p.A. in 2007, was won by the Studio Rosental, leader of the group composed by the architect Hugh Dutton with the companies Cegelec Centre and Gozzo Equipment.

The new generation of support, after *Monostelo* (which has the pylon base of only five square meters) and *Foster* (named after the architect Norman Foster, who designed them for the power line recently built on the hills of Scandicci, near Florence), is intended to progressively renew miles of old high voltage power lines from one side to the other of the peninsula.

Lightweight but resistant, flexible but stable the *Rosental-Dutton* pylons are inspired by the shapes of trees, but using advanced materials and according their design to the attempt to reduce high contrasts, even between light and shadows.

Fig. 3: *Foster* pylon

Fig. 4: *Monostelo* pylon
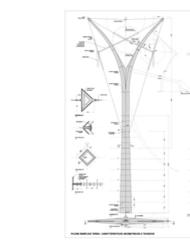
Fig. 5: *Rosental-Dutton* pylon

3. The landscape design as an instrument of analysis and prediction of the transformation

On the basis of the considerations so far reported on the contemporary landscape sensitivity in the infrastructure design, the development of a scientific methodology for assessing landscape impact is the product of a series of researches I have conducted experimentally during the last years, on a large number of case studies, scattered throughout the country, whose aims is to provide Public Administrations an important tool to read the landscape.

In fact, is important but not enough, to design new shapes for pylons if their disposition will finish to ignore their strong relationship with the forms of the surrounding areas.

The objective was to formulate particular tables of visual impact, specific to each category of large infrastructure, such as roads, grids for producing and distributing energy, telecommunications towers , etc…

The main purpose of these guidelines was to direct the designer in taking conscious choices in order to avoid the major critical points in each individual category of works. In terms of approaches, our guidelines aim to prepare active policies based on the correct identification of the those values that we must be preserve or implement by the infrastructure, through the transformation induced.

We provided to create a sequence of images and tables, an iconographic repertory with operational instructions, that offers an open path to multiple uses, not as an abstract methodological protocol but as a tool to allow the designer to find the most suitable approach, leaving him the task of identifying the best solution, with respect to a given problem in a particular area. They play an interpretation service of landscape, identifying features of those recognizable signs which contribute to form the image of those places, adaptable to different situations, so having a guidance function, especially during the preliminary draft, because they facilitate the identification of problems and suggest new interpretations of landscapes.

In the images presented below, the first table intends to lead the designer in the analysis of the landscape most recurrent forms, providing graphical examples of simple interpretation in order to correctly analyze the condition *ex ante*, to be compared to the situation of the same place *ex post*.

Fig. 6: An iconographic repertory of the most frequent and recognizable forms in the landscape, images of Fulvia Riccardi.

Figg. 7-8: Natural examples of REGOLARE - ORDINATO (regular - ordered) and CASUALE (accidental).

Fig. 9: An iconographic repertory of the most frequent and recognizable scale of relationship between builted elements and landscape forms.

Fig. 10-11: Real examples of EFFETTO RIPETIZIONE (Repetition effect) and FOCALIZZATO (focused).

Figg. 12-13: In the first example is represented a infrastructure in a decentralized position respect to the point to which the lines of the road focus the attention. In this case is possible to implement simple measures to mitigate the visual impact, on the contrary of the second scenery in which the presence of a tall element is perceived as a strong presence, whose impact cannot be mitigated with bushes and trees. The dominant position suggest the designer to adopt a suitable shape for his pylon or tower, in order to create a new landmark, whose aesthetic aspect could implement the value of the transformed landscape. Images of Fulvia Riccardi.

4. A question of point of view: landscape and perspective drawings

In order to analyze, evaluate and foresee the visual effect caused by the inclusion of a new infrastructure perspective drawing must once again become the preferred method of representation, due to its similarity with the visual Images physically perceptible by the human. You cannot assess the forms of landscape analyzing a plan or orthophotos, however useful in the organization of the territory, whose point of view is infinitely far away, and thus inaccessible.
Landscape is strongly characterized by its visual dimension that needs to find a correct representation.

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Camillo Sitte meets Robert Venturi at Berlin Südkreuz

Jorg SIEWEKE,
School of Architecture - Landscape Architecture Department, University of Virginia, Charlottesville, USA
sieweke@virginia.edu

Abstract

How can a peripheral high-speed transit hub be reconsidered as a collective public space. Sitte's idea of significant gathering places is scaled and accelerated in Venturi's spirit of flows to contrast the romantic replica of the European city with a contemporary dimension of trade and commerce. The proposal of a hybrid space that, is on one hand based on the urban planning tradition of bracketing space by means of a coherent geometry of place (Camillo Sittes' European city) and, on the other hand, attempts to civilize the neoliberal "space of flows" (Venturi's Las Vegas): an open square measuring eighteen hectares bridges the beltway and creates a pedestrian path from *Berlin-Südkreuz* train station to the adjoining residential and commercial neighborhood. The center of the square creates a void measuring 800 by 225 meters, dramatizing the surrounding traffic flows. The crucial idea is to update the place of exchange, of trading, of action. The proposal suggests a market square for the twenty-first century that does not negate the dimensions and speed of recent flows, but rather embraces and civilizes them. *Südkreuz* is dynamic; a programmatic passé partout frames already existing as well as anticipated future uses.

Keywords: Public space, urban design, periphery, beltways, public infrastructure

How can the idea of public open space of an inner-city market square be translated to the world of motorways and big box real estate? The paper critically discusses the recent development and offers an alternative hybrid derived from both, Sittes' and Venturis' ideas.

Whereas in the center of Berlin the historical layout of the "European city of the flâneur" is being reconstructed with great care, on its outskirts things are happening on a sizeable scale and at a different speed. The rift is found just a few meters south of the compact neighborhood of James Hobrecht's Schöneberger Insel. *Südkreuz* is an essential rail-hub in Berlin with great potential for development. The ring expressway, the beltway line of the commuter railway, and the new high-speed train connections form the infrastructural backbone for this highly dynamic site. Due to the late insertion of the hub, the Südkreuz site is spatially isolated from its immediate urban environment. Enormous corridors of infrastructural corridors slice through isolated residential and commercial neighborhoods - typical for peripheral milieus. Ideological antitheses of the urban condition are colliding here that can best be illustrated by comparing Camillo Sitte's and Robert Venturi's concepts of the city.

Sitte can best be characterized by the concept of *places*, meaning sites of identity and living, framed spaces with perhaps irregular structures but with recognizable boundaries marked by stability. These places are suited to lingering; they are "gathering places under the open sky" with a "strong influence […] on the human soul."[1] By contrast, in his analysis of the Las Vegas Strip [2], Venturi stands for flow, for places of

movement marked by symbols of passage. Venturi's city is a neoliberal one; its symbolic architecture in the "space of flows" [3] is primarily perceived from a moving car.

The predominant ideology of preserving the morphology of the nineteenth century city excludes its manifold contemporary everyday aspects. Often the infrastructure of our time is neglected hidden or pushed to the margins. The urban space should be protected from being drowned by the rush of automobile traffic. For example, the delivery of goods to the "marketplace" on Potsdamer Platz was buried, at enormous expense, in five underground levels, along with the Tiergarten-Tunnel. The proposal to connect the Südkreuz train station discussed here[4] is an effort to update these two approaches; it suggests the ideological antithesis of *places* and *flow* as an opportunity for hybridization. Until now each of these antagonistic concepts of space negated the other, avoiding the negotiation of their boundaries—and hence any chance of finding the symbiotic potential of its antithesis. The plan presented here, by contrast, strives for an innovative interface that is sufficiently open to integrate the "space of flows" without neglecting the "sense of place" that living in a neighborhood makes desirable in the first place. Sitte's idea of the importance of places as architectural gathering places is scaled and accelerated in Venturi's spirit in order to contrast the romantic replica of the European city with a contemporary alternative that today opens up onto the flows.

The proposal [4] of a hybrid structure that, is on one hand based on the urban planning tradition of bracketing space by means of a coherent geometry of place and, on the other hand, attempts to civilize the neoliberal "space of flows": an open square measuring eighteen hectares that bridges the beltway and creates a pedestrian path from Südkreuz train station to the adjoining residential and commercial neighborhood. The center of the square creates a void measuring 800 by 225 meters, dramatizing the surrounding traffic flows. The crucial idea is to update the place of exchange, of trading, of action. The idea is to create a market square for the twenty-first century that does not negate the dimensions and speed of recent flows but rather embraces and incorporates them. Südkreuz is dynamic; it is captured architecturally in a programmatic passe-partout that serves to frame already existing with further anticipated patterns of use.

Negotiation between these programs, provoking their confrontation, collision, rather than discretely avoiding it, characterizes the principle of the urban condition. Imagine the people returning home from the southern lots of the garden colony offering their fruit and vegetables on the parking lot of the Moebel Kraft furniture store. IKEA customers cross the square as they bring their purchases home from the market hall on the circle line of the commuter light rail. The residents of the Schöneberger Insel neighborhood fill the arches under the railway with day-care centers and cafés à la Savignyplatz. LIDL can fit into this passe-partout; we have already accommodated its need for space, including open parking spaces meant to suggest open cash registers. The needs of the residents for their everyday living environment ensure the square will be lively. The collective activities civilize the "space of flows". The headstrong appropriation reacts to a wide variety of speeds and dimensions and suggests Südkreuz to transform from a peripheral transfer hub to a lively urban place in a metropolis. This reconfiguration allows connecting the seemingly incompatible. Rather than discretely avoiding opposites, their encounter is seen as an enrichment. The inclusive approach avoids the museum quality and stagnation of Sitte's idea of the city and civilizes through daily negotiation Venturi's "space of flows" against its un-aesthetic neglect.

Fig. 1: Berlin southern beltway at Südkreuz with recent big box retail development adjacent to historic core.

LOOP AND VOID   DAILY CIRCULATION   FLEXIBLE PROGRAM
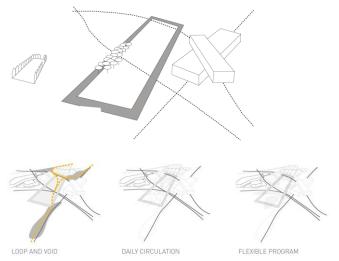
Fig. 2: disparate Scales: S vs. XL: Sitte's historic market square and proposed Pass partout to accommodate space of flow

Fig. 3: Diagrams suggesting us of space, flow and program along pass partout

Fig. 4: Pass Partout accommodating "spaces of low" and "places" of neighborhood life. The void mediates between allotment gardens and big box retail. Illustrations 2/3/4/ Competition design entry for Europan9, Berlin Südkreuz, 2007 Team: Anna Viader, Joachim Schultz, Jorg Sieweke; assistant: Ben Gutsche

Fig. 5: Lidl obeys to Amsterdam zoning code (photo by Author)

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[2] VENTURI, Robert / SCOTT BROWN, Denise / IZENOUR, Steven: *Learning from Las Vegas.* Cambridge, MA 1972

[3] CASTELLS, Manuel: "The Space of Flows," in: idem: *The Rise of the Network Society.* Malden, MA, 1996, pp. 407–459.This concept from Manuel Castells, who coined the phrase "space of flows," is highly abbreviated here to the material nodes of a global network in which transnational flows of capital and information are the focus but which is also dependent on appropriate physical infrastructure. The distinction between *flows* and *spaces* made in this essay is also taken from Castells, which the aforementioned qualification.

[4] Competition design entry for Europan9, Berlin Südkreuz, 2007. Competition team: Anna Viader, Joachim Schultz, Jorg Sieweke; assistant: Ben Gutsche

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The design of sustainability in relation to innovative modernity and identity features of place

Giacinto TAIBI[1], Rita VALENTI[1], Mariangela LIUZZO[2]
[1] DARC, Facoltà di Architettura, sede di Siracusa, Università di Catania, Italia
[2] Facoltà di Ingegneria Architettura e Scienze Motorie, Università di Enna "Kore", Italia
E-mail: giacinto.taibi@gmail.com, ritam.valenti@gmail.com, mariangela.liuzzo@libero.it

Abstract

The lack of a deep sense of responsibility and respect for the distinctive features of place, to which the production of practising architecture must make reference, very often produces designs of compositional morphologies that are not fitting and inadequate to the geographic nature of the *topos*, with heavy repercussions of environmental degradation on the sustainable ecosystems.

The entire apparatus of signs that the territory manages to express must be constructive and strongly determining in the definition of the strategies that should guide and support the whole procedure of the stages of creative thought.

In this sense, proceeding from the first intuitions that have come about through the accurate representative transpositions on paper, the entire successive process revolves around the compatible *ratio* with the eco-sustainability of the place, that unites the planned intervention with the area of land.

The materialization of innovative modernity, through the volumetric control of the parts and in relation to a framework of systemic congruence, is realized in a *frettage* of iterative relationships between what is full and its contrary.

Accordingly, given the close bond between design and plan, precisely that we are today experiencing a moment of profound instrumental changes, the complexities of the outcomes of innovative designs, seen within the evolution of the creative processes, become qualities to investigate and understand, in a systemic way, with an introspective eye.

Keywords: Environment, *Topos*, Morphology, Sign, Sustainability

1. The design-concept process and the signic imaginary as impulse of the creative act (M. Liuzzo)

Today more than ever, the life of the human species is conditioned, besides by the course of natural phenomena and impact of forces of a higher order, by consequences that are not always governed by political-decisional logic, which, from the global to the local and individual scale, are unfortunately not always accompanied by a conscious assumption of responsibility.

Inevitably, at the manifesting of needs and requirements, in the first instance Man resorts to instinct and cultural resources, able to trigger that logical-ideational process taking place in the complexity of the articulate functions of the brain.

Here, a fascinating and to a certain extent still mysterious, organizational structure is housed, made up of different interacting reticular areas, heading up on one hand a logical mind, situated in the left hemisphere, rational, sequential, mathematical, that organizes information and communications, and on the other, an emotional mind, that occupies the right hemisphere, irrational, intuitive, creative and oneiric. [1]
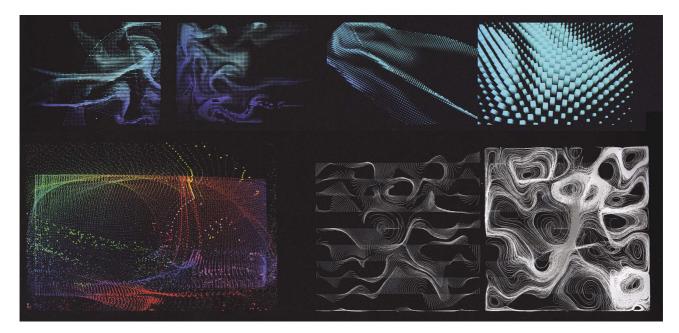
Fig. 1: Ideational accelerations of the creative process. Zaha Hadid, *Parametricism Research*.

Understanding such mechanisms of the cerebral apparatus allows interpreting the articulate creative path that is triggered each time one intervenes on a *topos* in order to transform it according to a determined framework of human aspirations.

Beginning from the primeval idea, it becomes necessary to define heuristic strategies toward the search for equilibrium between markedly different elements that are ascribable to the identity features of the place, to the fecundity of forms, to functional, cultural instances and to technological innovations.

It is a kind of journey without a definite route or pre-established destination and, perhaps, without any effective conclusion, which is undertaken through stimulating all the systems and mechanisms of our cerebral apparatus, also those of our unconscious, with implied and latent potential.

The inherent danger in this type of journey, each time new and different, is that it may trigger a certain inhibition of creative capacities, almost a kind of 'ideational apraxia', due to various causes, among which attitudes of passive adaptation to technological innovations, at times extreme, or a certain satisfaction in the unconditional repetition, often unjustified, of recognizably autographic forms, seem to prevail in contemporary production.
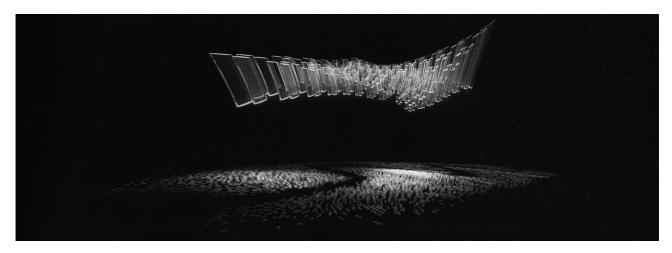
Fig. 2: Empirical logic and heuristic strategies. Zaha Hadid and Patrik Schumaker, *Parametric Urbanism*.

To safeguard fertile, dynamic and active creativity, it is therefore determining to use that part of the operating memory that may access and critically elaborate the sensitive, perceptive and emotive factors linked to the *topos* and previous experiences, to enrich the resources of the imaginary, abundant in signs at times merely functional, at others prevalently poetic or utopian [2], which are translated, after a logic-evolutive pathway into structured and coded project signs.

All the stages of design-concept thinking are characterized by alternating phases of releasing creative energy, of comparison and rational verification and of production and reception of impulses and stimuli in the sensorial parts of the brain. These are processes of design-concept acceleration, which beginning from the recognition of the actual configurative state of the site and existing structures, interpreted through specific orographic, territorial and cultural values, set off a continuous development of reasoning and possible prefiguring, congruent with the givens of the problem, with the expectations of the system of the asset, with the updated technological progress and with the contents of the apparatus of already experienced and thus acquired knowledge.

This apparatus of signs cannot but be proactive and strongly determining in defining the lines of force that must guide the entire procedure of an ideational thought that, with a deep sense of respect for the identity characteristics of the place, feels responsibility to produce designs of composite morphologies that are not only fitting to the geographic whole of the *topos*, but that can also positively affect the environmental quality of sustainable ecosystems.

With this responsibility, the morphological complexities of the project interventions represent a magical moment and a crucial workbench in which the process of manifesting the articulated systemic coherence of ideas is put to the test.

Ideas that, from the action of the first manifesting as impulse of elaborating sensitive and perceptive factors, to the fulfillment of a logical-evolutionary procedure that may clarify all the parameters of reference, remain closely connected to the concepts of freedom and complexity.

All this leads to a profound consideration on the choice of procedures that have a fundamental and not simply instrumental role, in the expression of the design-conception process in all its stages.

Suffice it to think, for instance, of the architectonic creations by Zaha Hadid who, with regard to the importance of the choice of suitable tools to shape the idea, states: "*From the start, I thought of architecture in a different form. I knew what I wanted to make and what I wanted to design, but could not make it in the conventional way, because with the traditional methods I didn't manage to represent it. The traditional tools of representation were of little aid. Thus, I began to search for a new way to design, in order to try to see things from a different point of view. Then, with time, those designs, those perspectives and those paintings have been transformed into my true instruments of representation*". [3]

So design creation defined by strongly characterizing signs, or by apparent morphologic epidermic simplicity, combined with the complexity of inner lines of force, compel serious reflection on the innovative methodologies of representation of the product of architecture at the service of the primeval idea.
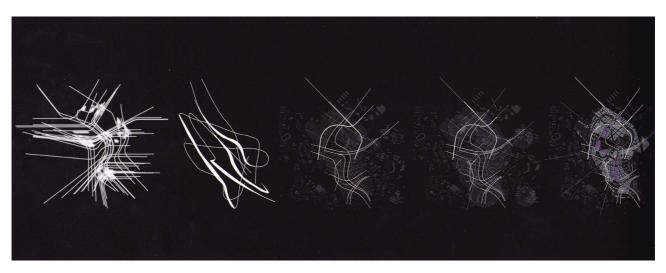
Fig. 3: Strength lines drawn by the *topos*. Zaha Hadid, *One North Masterplan*, Singapore, 2001-2021.

2. The sign of the place and its mathematical rationalization (R. Valenti)

Care for the environment, in a broad and articulate conception, comprises all those aspects of life that lead towards respecting and safeguarding nature, seen in its fullest meaning, in which it is possible to include the human component through its combining into communities.

The cognitive approach, preceding the project and its representation, is based on models that tend to simplify the complexity of the interacting components that, in their arrangement in system, constitute the problem to tackle and resolve. These initial considerations mean that there is a consequential effect between architecture, place and thought; namely that every architectonic choice, that takes the complete and complex panorama of a site into serious consideration, must, given the peculiarity of the task entrusted, start off from intense thought and interconnect, unavoidably, with the problematics connected with the site's sustainable development.

Since it is known that a place conditions and influences the formation of man, and since man with his ideas makes the project evolve, which its turn conditions the place, it follows that the preliminary reports and researches that consider the site a complexity to be interpreted and used, are grounded in this continuous cycle.

From the viewpoint of composition, the approach should tend towards a form of union and synthesis of the contemporary with tradition, oriented towards research in which innovation is combined with the specificities of the tangible and intangible signs found in the situation in which the intervention is being made. Rational thought, of functional and constructive logic, is nurtured and supported by the intuition of the overall sense of the environment. Overall, because a single idea may give resolute answers in different fields, from the economic to technological, to the social and environmental.

Indeed, regarding stabilized urban contexts, the social structure, in a given temporal and geographic frame, expresses, in the context of specific productive and economic conditions of the building process, the requirements and the ways of life of a determined group.

In this context, with reference to design and project creation, it is important to ask what the spatial and material limit is in which the process of growth and living world can coexist without coming into conflict.

It is a widely shared concept that architecture reflects and expresses civil and social life in which it operates, in continuous evolution and heavily influenced by the digital revolution. This latter has produced determining effects on the aspects of aggregation of daily life, among which one that is closely linked to design, namely the dissolution of the concept of space, in its strictly physical sense, which also entails a model of individualistic society, tending towards the globalization of expectations and desires.

The virtual dimension, wherein different cultures find a common denominator, on the other hand, implies the risk of a composite approach that renders architecture a separate issue from the physical space with which it interacts, with the consequent process of developing an *a-topos* that translates built realities into unknown and non-characterizing elements, dissolving, from a social point of view, that fiduciary relationship between the inhabitants of a place that in the societies preceding us and in the present small communities proves to be a substantial component of human life.

Fig. 4: ODBC – Odile Decq, Benoît Cornette, *Museum of Liaunig Collection*, Neuhus, Austria, 2004.

"The loss of place, asserts Christian Norberg-Schulz, *proceeds at an equal pace with the loss of the basic language, of building customs and styles. Having impact above all is the loss of the basic language that, independently of the local language, renders an architecture as close to life as possible. [...] Since the formal language is based on qualitative knowledge, the prevalence of the measurable cancels it out"* [4]

It therefore follows that a qualitatively appropriate understanding of the place is the binding foundation for the realization of architectures in concord with aesthetic, existential, social and also symbolic values; the design of the *topos* with its continuous transformations, in turn, must allow expressing the senses and meanings, as well as the essence of city and social living, with the store of knowledge and traditions, acquired and passed on.

The fascination exercised by the possibilities offered by progress in the scientific-mathematical field, spilling over into technique, contributes to giving form to an expressivity that makes the curved line evolved and fluid, apparently free, the emblem of the possibilities of contemporaneity.

Graphic elaboration, through digital manipulation with the continuous transformation of flow lines, besides achieving a captivating aesthetics of images, transfers and explicates content and meanings linked to the essence of places, to their history, to their traditions. Topology is the geometric science that allows managing the soft forms of contemporary expression with rigorous algorithms; it *"is the discipline of the relationships that occur in the place and the space surrounding the place and does not recognise metrics"*. [5]

The digital, with all the tools deriving from it, also offers the opportunity to translate what we thought exclusively conceptual in plastic models; three-dimensional printing, multi-axis milling machines, are instruments that, thanks to appropriate software, are able to give tactility to any form.

Consequently the representation, having expanded its expressive capacity, from the traditional to digital, whose software, founded on mathematical algorithms, enable an articulated dialog between thought, hand and project design, has acquired a wealth of elaborative possibilities that are close to natural processes.

Non-Euclidean subtended geometries, in this way, explicate complex structural forms, above all in the contents, and therefore their potential is still to be researched in configurative-qualitative aspects rather than in quantitative ones.

The ensemble of all these aspects, acting together on the random order of the process of planning the future and with which we are confronted in the moment of cognitive exploration and graphic elaboration, are determining in devising the process of developing the idea. They are precisely those which, identifying the signs of the specificity of a place, allow, through the project configuration, to maintain their complex and chaotic identity.

This approach to the problem, allowing architectonic form to emerge from the understanding and reflection on the surrounding environment, in turn, may take the aspects linked to building techniques, to materials usage and the morpho-typological features of the basic residential building of a determined context into serious consideration. The relationships that, in this composition pathway, are established between technological specificity and architectonic thought, tend towards experimentation that transforms intuition into innovation. The environment system breaks in irrepressibly, no longer in defining sinuous forms, as in nature, or conceptual, in relationship to the expectations of the social-economic system, but in the careful and respectful attitude of a heritage that may not easily be renewed.
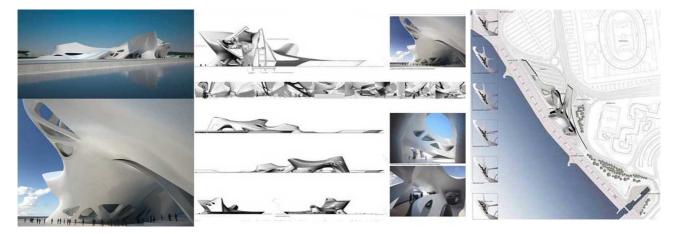
Fig. 5: Zaha Hadid, *Competition for museum of Nuragic and Contemporary*, Cagliari, 2006.

Therefore, the particular concern towards those materials whose reasoned employment, enhancing their features of resistance, enables an unusual use for contemporaneity, even if strongly rooted in the past, contributing to the realization of architectonic structures that are easily disposable and recyclable, and therefore eco-sustainable.

The research work by Shigeru Ban is undertaken in this direction. Ban addresses his structural research towards paper and cardboard, materials of the Japanese building tradition, re-evaluated not only for obviously functional creations, but also authentically formal ones, based on a contemporary aesthetic that counts on the rationality of geometry and that is grounded on the affirmation *"all that is logical is possible, and I can realize it if I manage to show it"*. [6]

 "The use of paper structures led to a very free system of thought about composition and methodological research. Ban affirm: this freedom is what allows me to take so much pleasure in what I do, allowing me to search for lightness in architecture through the study of structures, materials and all can be reduced and diminished in quantity.

This demonstrates a great deal of trust in man's critical abilities, in the ability to offer incentives, united with the skills of rationality that are typical of man as engineer, who builds in order to respond to needs, not only functional, but also a search for a new aesthetic that is forever filled with great enthusiasm and a positive attitude". [6]

Once again, they are possibilities bound to reason, allowing the transversal exchange between the idea and the *signs of environment* and that are realized in architectonic objects that stimulate human perception and the relationships with the context, triggering verification processes and activating a development based on human potential that is closely interrelated with the environment.
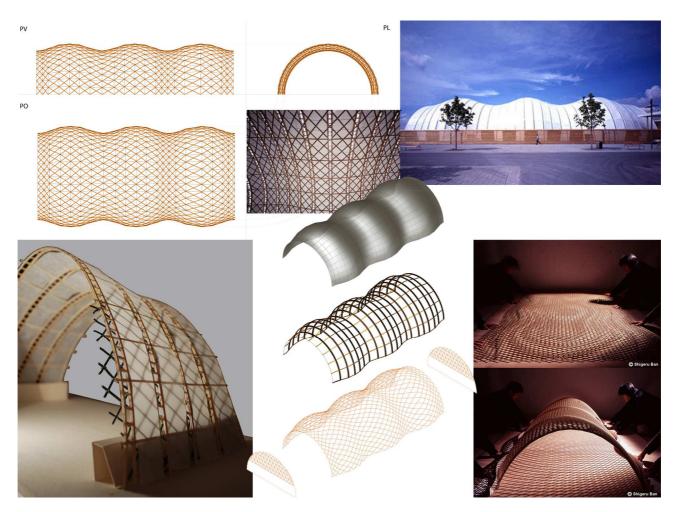
Fig. 5: Shigeru Ban, *Japan Pavillon*, Hannover Expo 2000.

3. Sustainable morphology as integral to the signs of iterative and matrix phenomenal realities (G. Taibi)

Very often it happens to have to take account of the consistency of widespread phenomenal realities, the fruit of the creative process of man that is manifested in a simple and spontaneous way.

Such are cases ascribable to the translation in architectonic terms of required apparatus, crudely expressed by those describing in practical terms that which represents necessary needs.

The mind engages in this fertile activity, carrying out a system of appropriateness between necessity and areas, planimetric and volumetric, according to the space available.

In all this, the human mind unconsciously also takes account of external factors, such as accessibility from the outside and the relationship of visual communication with the surrounding environment, which unequivocally tend to affect the articulation of his habitat.

We thus witness an expressive freedom that is, with certainty, detached from the competence of operators in that field, experts in the morphologic composition of making architecture.

In reality – it being understood that innovative processes and transformations that determine progress in the various fields of knowledge, art and technique are surely the outcome of those constructive qualities of the imagination, of fantasy - the product of creativity must be interfaced with the reality of the reference context.

Fig. 7: The site suggests. Emilio Ambasz, *Schlumberger Research Laboratories*, Austin, USA, 1982.

Everything must be brought into play in a very broad and shared concept, namely with appropriateness to the typology of the *topos*.

In practice, one faces a situation attributed to the systemic entirety of the complexity that plays a certain and determining role in the issue of sustainability in the morphologic order of architecture; sustainability that, generally, concerns a subject, whose interpretation is by vocation very broad and surely very close to conservation and the prospects of compatible development of the territory.

"*It must in any case be recognized that at every historical moment, human activity, notably that of building, has set out to satisfy present requirements, implanted in some way in the groove of the former ones, but only where it could acknowledge their permanent validity, and projected towards the future, but only where it might augur a real expectation of advantage.*" [7]

We must fundamentally reflect on the conditions with respect to which the human being, in expressing himself by producing morphologies adapted to the needed apparatus of the individual and grafted onto the

features of his family structure, are manifested in intuitive and instinctive forms of spontaneous architectures, but marked by testimony and a sentimental memory of the past.

We may, for a moment, consider that the intervention of man, in light of the concept expressed by De Rubertis, instils the canons with an intrinsic natural quality, so much so as to be considered formidable and certainly channelled among the interventions of a strong nature, of continuity with the past and with a powerful chromatic, pictorial and aggregating content.

And so these considerations, ironically, allow a reflection, namely that those individual and successively concerted interventions, may deserve reference to a general fabric and to have some value of note if seen in a context in which appraisal, comparison and competition must or may be regarded as a stimulus and spur to achieve results that have features of a certain quality in the panorama of artistic production.

But these spontaneous, sincere and impulsive formulations, reassessed in the light of opportune stylistic interpretations, face and are confronted with the distinguished interventions by those who, operating in the field with profundity of intention, bring into play a composure of forms studied in accord with the vigorous and forceful lines of the *topos*.

They are interventions that leave a mark, with decisive and significant character, upon the territory, sanctioning rigorous relationships with the site, in which one acts, with determination, in full accordance with the lines dictated by the morphologic configurations of the places.

In this sense, the perfect synchronous behaviour between the distinct features of particular interest suggested by places and acting according to the dictates of a meticulous rigor that envisages cultural preparation and sensitivity of those operating in the field, is successful and of certain efficacy in the outcomes of the interventions on the territory and in the increasingly dynamic, singular and articulated morphology of the projected compositional whole.

They are interventions that, precisely in being fully integrated in the environment, manifest morphological logic, sometimes sinuous, sometimes fragmented and subdivided, which in their evolutionary development, imply a coherent set of iterative and matrix processes.
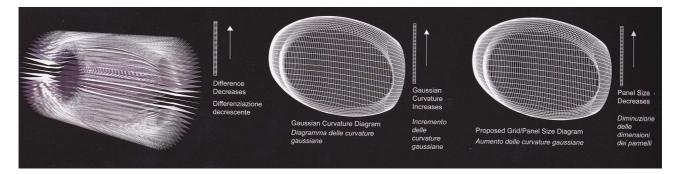
Fig. 8: Zaha Hadid, *Dividing Curvature is a method that creates curvature sensitive mesh.*

They are interventions that express the intention of being liberated from the rigidity of Euclidean geometric schemes in order to arrive at decidedly more evolved new systems.

They are interventions that in a structural *unicum* of form, fuse art with nature, evoking "sharp, incisive and memorable images", in a word "vivid"; an "*inner need should characterize every image, as form and as meaning (…) as a wealth of possible meanings*". [8]

They are interventions in which the choices and treatment of materials, the relationships between solids and voids, the transparencies and the epidermic folding of the skin of the building, in relationship to the definitions of volumetric complexity of the architectonic organism, are determining.

It would be fantastic today to be able to reason in terms of transformation and flexibility in instantaneous time of the material and therefore of the morphological configuration of our volumetric layout.

The intelligent man-structure relationship, in which the space is deformed and adapts in real time in rapport to the needs of man, may certainly be a stimulating search, but in the utopian current state of things, it would seem at best to be able to combine with the dynamic and virtual qualities of an electronic game and certainly not with the problematics of real space.

In truth, we are witnessing today - and we are in a condition to be able to supply ample documentation on these lines - the propulsion and wealth of design-concept thinking, strongly dynamic, in which a robustly expressive freedom moves instinctively in interpreting the place, nature, environment and landscape.

Cities, without setting any brake on progress and development of our civilization, must emerge with determined intensity and succeed in the intention to allow favourable opportunities to the true concept of innovation in the processes of versatile creative fertility.

In this sense, we must apply local understanding to the developments of those territorial models and those architectonic morphologies that may give vitality and renew the productive life and processes of communication, on which the carrying out of our activities depends.

One possible response may be found in the composite expressions of form, generated by iterated and matrix systems, the indisputable locus of complexity theory.

Certainly, it would not be utopian to think of programming the growth and transformation of the city as in a morphogenetic systemic unity, which is self-regulating and that moves through procedures of calculation consisting of genetic algorithms that entail generative processes and selective criteria.

And so the domineering character of the production of doing architecture emerges.

We are in the presence of strong, well-defined signs and concepts in which sinuosity and undulation, fragmentary forms and broken lines define the lines of force of morphologic complexity.

In all this, there is also the concept and closeness to digital liquidity and fluidity of the designed forms that are inevitably linked to the stylistic trend of parametricism that, albeit moving in the direction of the non-rigidity of forms, in the non-serial repetition of elements, in the search of complexity as varied order, seems however to have failed to relate to the physical and ergonomic nature of the human being.

"*Whereas all architecture of the last 2500 years was constituted from the arrangement of a small number of ideal geometric figures – cubic volumes, cylinders, hemispheres, and pyramids – Parametricism rejects these figures in favour of splines, blobs and NURBS surfaces. All the elements of architecture become parametrically malleable. (…) Innovation in architecture proceeds via the progression of styles (…) The style consists of methodological rules: some tells us what paths of research to avoid (negative heuristics), and others what paths to pursue (positive heuristics). The negative heuristics formulates structures that prevent the relapse into old patterns that are not fully consistent with the style, and the positive heuristics offers guiding principles and preferred techniques that allow the work to fast-forward in one direction*". [9]

In the hope we may arrive at the theorization of the variability in real time of the order of the material-spatial configuration without further delay, bringing into play the automatic malleability of the constituent material, we are witnessing today, with greater determination, increasingly evolutive processes, in which composing in terms of architecture moves through systemic elaborations of complexity. It is the outcome of iterative procedures, wherein the fusion between the shapes of architectonic work is achieved through different modes of spatial interconnection, blurring, opportunely and softly, the borders between the forms of the versatile unity of the design-concept imagination.
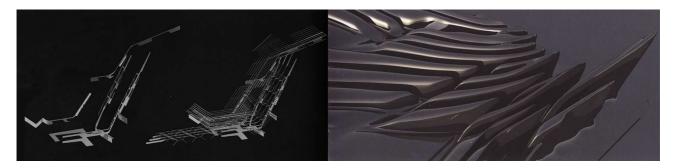
Fig. 9: Morphologies of parametric research. Zaha Hadid, *BMW Central Building*, Leipzig, 2001-2005.

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Recognizing Cultural Heritage for Social Sustainability: A Spirit of Place Perspective

Juliana FORERO, Liangping HONG[1]
[1] School of Architecture and Urban Planning, Huazhong University of Science and Technology, Wuhan, China

Abstract

This article discusses how through the acknowledgement of the spirit of the place for cultural heritage preservation, within the social sustainability context, it is possible to achieve sustainable development processes. After a brief review of these theories, the analysis of the creation of the urban park Mirador de los Nevados for the renewal of the downtown of the district of Suba in Bogotá - Colombia, give some ideas on how the link between social sustainability and cultural heritage preservation, can bring up a set of processes and practices for the enhancement of sustainable cultural and urban heritage preservation, without leaving aside the environmental and economic elements.

Keywords: cultural heritage, spirit of place, social sustainability, sustainable development

1. Introduction

Theories for Sustainable development principal dimensions –economic, environmental and socio-cultural- have not been equally developed and thus their relationship remains unclear. Academic and political approximations have generally been limited to economic and environmental sustainability, while literature about social sustainability is still inchoate. Indeed, social sustainability is still an under-theorized and oversimplified concept. Nonetheless, in the recent years, social sustainability has been slowly recognized as a fundamental component of sustainable development. Consequently, it has started to play an increasing role in urban planning and to be included in the governments' agenda (9) (23).

Urban cultural heritage is an essential element of city sustainable development. Nevertheless, research concerning the relationship between sustainable development and urban cultural heritage plays almost no role in social sustainability debates (34). Most studies ignore the social function of the cultural heritage and focus on two main fields: sustainable tourism and environmental degradation affects on material heritage; other studies list monuments, buildings and conservation areas, implying that the worthiness of cultural heritage only relates to the tangible objects (33).

To find new ways to interpret the relationship between cultural heritage and sustainable development, the debates regarding cultural heritage should be framed into the social sustainability studies. From this perspective the importance of the social function of cultural heritage would be recognized not only in the theory but also in the practice, while at the same time it would be a tool for the social sustainability development. The Spirit of Place theory, which embraces the essential categories for heritage studies - identity, memory and territory- and its sustainability, offer a model to integrate cultural heritage into sustainable development paradigm.

Under Spirit of Place theory for cultural heritage preservation, material and immaterial components cannot be divided, as well as the cultural, social, economic and environmental elements are required to be understood from an integral perspective. This condition is considered essential for the preservation of the communities' identity that has been protected and passed along from generation to generation (18) (30).

In addition, it is important to contextualize cultural heritage preservation under the sustainable development and urban planning conservation and preservation fields, in which the preservation and conservation of the historical and cultural places concerns not just to the importance of the object (the built heritage), but the protection of the social function of the heritage and its cultural representation in the space (25).

An analysis of the creation of the urban park Mirador de los Nevados, as part of the renewal of downtown Suba District in Bogotá, Colombia, give some suggestions on how the link between social sustainability and cultural heritage preservation -under the umbrella of sustainable development-, can further suggest a set of practices for the enhancement of sustainable cultural and urban heritage preservation without ignoring environmental and economic elements.

The case study presented in this document is not about an urban renewal project executed through the restoration of historical buildings or the implementation of sustainable tourism processes. This is an example of how governmental policies for social sustainability were implemented congruously with the cultural and social needs of a specific community, through the recognition of the cultural heritage preservation and its social function. This approach was foundational in developing the Mirador de los Nevados Park and explains why it has become a strong example of a sustainable cultural heritage preservation project. This is an urban renewal intervention project out of which the theory of the Spirit of Place was applied in pursuit of the rescue of the cultural heritage for the sustainable development the city of Bogota is looking for.

This paper analyzes how through the acknowledgement and use of Spirit of Place theory for cultural heritage preservation, within a social sustainability context, it is possible to achieve a sustainable development process. In this regard, cultural heritage is protected because of its cultural significance and social function in a specific territory and for a specific community. The strengthening of the local identity, linked to the past "not just in the continuity of the built heritage and urban spaces but also in the living culture that created, and is still shaping, the district townscape, or genius loci, that characterizes the heritage places" (25 p. 468), has no other consequence than the construction of the sustainable development processes based on cultural heritage

2. Spirit of place, sustainable development and social sustainability

Heritage is "the indivisible and valued creation that comes from people, culture and place together. It is tangible and intangible, not one or the other" (8 p.2). Heritage refers to the set of assets inherited from the past and directly related with the identity and memory of a specific culture in a specific territory (29). Problematically, perspectives on heritage have historically been divided into the material and the immaterial, giving rise to confusions about the meaning of heritage and its social function (8). The social function of the cultural heritage concerns social cohesion, integration and education, as well as the social and cultural distinction processes in multicultural societies (4). Presently, besides the preservation and restoration of the cultural heritage, people in charge of cultural heritage management must give attention to the social function of the heritage (29). Hence, the Spirit of Place perspective has emerged, without dividing or classifying the heritage and involving the community into its practices. This perspective has evolved into a tool for cultural heritage managers to promote social sustainability.

2.1. The Spirit of Place

The importance of the Spirit of Place perspective lies in its functionality. The recognition of the material and immaterial components as essential elements to preserve the communities' identity is driven by identifying the Spirit of Place for a specific cultural heritage preservation process.

Place and spirit are constituted by three elements connatural to the human being dimension: identity, territory and memory. Identity is the set of features of a person or a community that defines what we are and what we are not. Territory is the recognition of the place where we are born and inhabit. Memory is the way we

remember our past. The relationship of these three categories takes place in the construction of the community, which is considering the essential environment for interrelation of every human being.

Contemporary scholars argue conceptions of Place are premised on memory, identity and the relation of people to their territory. Thus, Place can be understood as the consequence of the multiple discourses, subjectivities, interactions and power relations in specific time and space (26). It is also defined as a singular fact determined by its space and time, by the topographic dimension, by its form and by its memory (10). Place is where social relationships occur, where everyday life is unwrapped, where the people celebrate, make rituals and other cultural and social constructions necessary for their life (7).

The notion of "spirit" corresponds to the immaterial elements of a person's relation to Place, composed by the "social and spiritual practices, costumes, traditional knowledge and other intangible forms and expressions" (19). Spirit also encompasses the relationship between tangible and intangible social and cultural mechanisms.

"The Spirit of Place is ultimately the intensity of wholeness one experiences in the place" (6). This wholeness is related to unique and distinctive aspects of a place and its habitability, but only because of the soul of the human being that inhabit each place (5). It involves "aesthetic, historical, social or spiritual value of cultural significance" (30 p.2). Spirit of Place is the language that becomes material but dynamic, tangible but ephemeral, is the expression of the memory, the identity and the cultural heritage.

2.2. Sustainable Development and Social Sustainability

Sustainable development and heritage planning face a constant struggle between preserving cultural heritage and achieving economic growth and modernization. Currently, approaches for sustainable urban planning are focused on creating liveable built environments, disregarding a holistic perspective for community developments and specifically culture. This absence of social and cultural perspectives is evident in heritage planning research where the physical forms are the main focus (25). For the viability of sustainable urban and cultural heritage planning it is necessary to emphasize the interaction between citizens, physical environment, social organization and public policies (13).

Social sustainability "concerns how individuals, communities and societies live with each other and set out to achieve the objectives of the development models that they have chosen for themselves, also taking into account the physical boundaries of their places and planet earth as a whole" (9 p. 24). It involves specific cultural or social relationships, social structures, customs and values, which represent the social constrains on development. In this context, social sustainability combines the traditional social policies (equity, health, poverty reduction, livelihood, etc.) with emerging concerns about participation, social capital, needs, economy, environment and "more recently, with the notions of happiness, well-being and quality of life" (9 p. 24). These last issues, more intangible and less measurable involve concepts such as identity, social networks and most importantly Spirit of Place. Furthermore, these issues have become more and more important within government and policy maker debates (9) (23).

Analyzing sustainability requires addressing four principles: equity, inclusion, adaptability and security. Equity refers to the opportunities of access to sufficient resources to participate in community; inclusion relates to an individual's opportunities to participate in community processes; adaptability refers to the resiliency of communities to respond to change; security includes both the communities' economic security and confidence that they live in environmentally safe and supportive places. These principles are guided by seven dimensions of action: living, working, playing, engaging, learning, moving and importantly, Spirit of Place. Compared with traditional methodologies and perspectives for measuring welfare, the interaction between those principles and dimensions bring alternative social sustainability parameters of measures, where "soft themes" such as happiness and Spirit of Place, among others, can be also qualified (9).

Cultural heritage can contribute to the well-being and quality of life of communities, while also can mitigate the impacts of cultural globalization, becoming an incentive for sustainable economic and environmental development (15). In this light, "the loss of a sense of place in communities became a factor of vital concern in the context of cultural globalization and the main aspect striving for sustainable communities and sustainable historic environment" (15 p. 75). "The notion of sustainable includes understanding of need, in the true sense of necessity (…) [that] requires that needs be met within our social, economic and

environmental capacity" (16). In this light, it is reasonable to understand preservation as the action that allowed the manifestation of the spirit, as established by the Foz Do Iguaçu declaration (2008).

3. Mirador de los Nevados Park

Fig. 1

Fig. 2

Mirador de los Nevados Park is a metropolitan urban ecological park located a few blocks away from the downtown of Suba District in Bogotá and belongs to the Muisca Indigenous Reservation Area. The Park was created in 2002 as an attempt to give recognition to the Muisca Indigenous culture and its efforts to survive in the face of colonization and urbanization in Bogotá during the last century. It was built in a place that for more than fifty years served as a quarry and now is an environmental and ecological protected area. The park's name literally means "Snow-capped Mountains Watch point", due to the fact the place is the only spot in the city from where it is possible to appreciate three of the most important snow-capped mountains of the Colombian central Andes ridge: their names are Tolima, Ruiz and Santa Isabel.

The site is one of the cultural and natural heritage places of the city and its architectural design is based on the Muisca Indigenous cosmology. Because of it historical, cultural, environmental and scenic values, the Mirador de los Nevados is an icon of the public space of the city. Furthermore, because of this minority's cultural beliefs regarding nature's protection, this park also became a platform for environmental conservation and education of the citizens. The development of non-formal environmental education strategies through the implementation of the program "Environmental Classrooms", aims to empower the citizens and make them able to intervene and promote social actions on behalf of the improvement of their life quality and the environmental conditions of their territory.

Is important to understand the context within which the park Mirador de los Nevados was created. This site has a direct relation with the first inhabitants of the city in the district of Suba and their memory of the region. The historical and the socio-cultural dynamics that infuse the park are expressions of its Spirit of Place. The advent of a broad cultural heritage preservation ideal was the key to make the park part of the city's sustainable development process.

3.1. The context of the Park: Suba District history, Muisca community and their cosmology

The district of Suba is located at the northwest border of the city. It dates back to pre-Hispanic times when the great Muisca family of tribes inhabited this place. These groups subsisted through an agricultural-based economy, in which a commercial bartering system helped them exchange their products with other communities within the region. Their territory had a rich natural environment covered by forests, rivers and lakes. In 1537, during the Spanish colonial period, the economic and political structure of the native population was dissolved and their lands were expropriated. Centuries later, in 1954, Suba became a district of the city of Bogotá and six years later, due to its location, one of the engines of city's development. During the 1980s, Bogota suffered a strong influx of immigrants and people from all over the country came over to Suba looking for better opportunities. This created a great cultural and ethnic diversity, but also the exacerbated complex social, cultural, economic and political tensions. Additionally, this area has the largest

State's social offer (health, education, welfare), yet there are high levels of inequity and inequality (1). The district's downtown is the historical location of ancient urban Suba, where the architectural heritage, history and identity remain visible. For Bogotá's Territory Management Plan, this place is considered an area of cultural interest and thus, its surroundings receive special legal preservation (20).

Suba is one of the most densely populated areas of the city. The ethnic population accounts for 4,5% of the total population of the district, out of which 0,75% are indigenous. There are two principal indigenous groups: Kichwa and the larger called Muiscas. The community of Muisca is divided into two groups: Cabildo Indigena and the "Muisca Nation". Although only the first one has been officially recognized by the government, projects for cultural minorities in the area of Suba often include both of them (2).

For this indigenous community, Suba symbolizes their home: a place full of green spaces, where friends and families meet. This is the place they understand; here they know where are the stores, the parks, the spots where they can find peace: the park Mirador de los Nevados, the Planada, the central square, etc. It is the place where they were born and live; there, they have the feeling of being someone living somewhere (22).

The Muiscas, in pursuit of being acknowledged as an indigenous population, celebrate meetings, forums, cultural activities, and other forms of demonstrations, in which they express their own identity, their projects and struggles. They inhabit the city while including the nature according to their cosmology and living notions. For them, mountains, lakes and wetlands are some of the most important elements of the relationship between earth and human beings (22). In the park, the contributing factor for all of these expressions to be possible is that the Muisca spirit is printed in the space. There the social function of the cultural heritage contributes to the renovation and reproduction of the communities (14).

An important characteristic of social sustainability is that instead of being understood as a static process, it is interpreted as a dynamic socio-historical process (23). The park is the expression of this understanding, where the social sustainability is promoted on the bases of a place and its communities' continuous historical and social processes.

At the same time, the community and neighborhood are the heart of the analysis. This is, the importance of community participation resides in the space given to its members to express their needs and aspirations while acknowledging their conception of the place they live (9). The participation processes that take place in the park are part of the social sustainability framework, in which it is possible for the Muisca people to maintain a contemporary urban, but yet indigenous, identity and memory.

4. The spirit of place, social sustainability and the park

Under the social sustainability approach, the governmental policies have to be articulated with traditional and more recent social policies involving the economic and environmental sustainability, but also the community participation and intangible elements that enrich the soul of the communities (9)(23).

As part of the national constitutional laws, the Colombian Government is bound to recognize cultural minorities. The government must promote spaces for the minorities to practice and experience their own cultural, political, environmental and economic path. The creation of the park and its designation as a natural and cultural heritage site for the city are part of the national efforts to meet this requirement (14). At the same time, policies for urban planning have been developed by national and local governments under the rubric of "sustainable cities": where cities should integrate environmental protection, economic development and individual welfare and social development, without depleting the natural resources for future generations. The policies for land use, occupation and expansion aim to prevent the expansion of the city into rural or protected areas. Sustainable conservation, restoration and natural resources use will support social welfare and economic development (24).

Although within this governmental policies framework it seems that once again the environmental and economic issues have prevailed over the social ones, as a matter of fact, the social sustainability principle has played a leading role in the instauration of the Mirador de los Nevados Park. Since conceiving of the park, the community of Muisca was fully involved. The planners, designers and promoters of the project, have consistently worked with community leaders to decide how to protect of the Muisca's cultural heritage

and restore an environmentally degraded area. Thus, the Muisca's indigenous beliefs about nature guided the "expert knowledge" of the planners for the design and construction of the park. At the same time, the main elements of the design and composition of the space, such as the trees and fauna, were also determined by the Muisca cosmology. The park's environmental educational programs were also developed by scientists jointly with indigenous expertise. Since Suba has been the home of the Muisca, during the park's creation and implementation, all the aspect related with the recovery, renewal and promotion of the environmental elements of this area were imbided with cultural principles of this minority. Thus, the environmental protection was framed in the memory and identity of its indigenous inhabitants.

The park follows Garnham (1985) proposals to link people and space, including elements as diverse as architectural style, natural settings, memory, metaphor, image, spatial relations, cultural, history and societal values, public environments and daily and seasonal activities (21); these are also social sustainability elements. Further, the park is analyzed as a materialization of the social sustainability and the Spirit of Place relationship.

4.1. Materializing social sustainability and Spirit of Place for cultural preservation relationship

Urban renewal projects and the way they manage to recreate the space are fundamental tools for the materialization of the Spirit of Place and social sustainability relationship. This relation have to be printed in the urban space for it to be recognized and used by the people, for it to make the cultural heritage an essential foundation of sustainable development processes. Mirador de los Nevados park is the place where the tangible and intangible Muisca cultural representations interact with social sustainability elements that Colantonio (2011) has called "soft elements" (happiness, well-being and importantly Spirit of Place).

The design of the park is one of the expressions of how, the exaltation of the esthetic, social and spiritual value of Muisca cultural significance, make the park a place for the improvement of the quality of life of the Muisca and Suba inhabitant. The park and each of its sections inside are places that correspond to the understanding of the Place as a specific space characterized by its singular identity (18). It has as a consequence the representation of the Spirit of Place as the sense wholeness where the parks visitants will not only feel in a natural environment, but also in a place where they can feel connected to what they are. In this context, the seven dimension of the social sustainability become active thanks to the Spirit of Place for cultural heritage preservation materialized in the park Mirador de los Nevados,

Its six circle-shaped hectares, 3 obelisks, 7 rounded squares and several natural trails called "astrologic paths", cross the park representing the cosmic space as the Muiscas understood it. The obelisks are placed in the highest parts of the park, representing the sun's equinox and winter and summer solstices. They also symbolize the way the indigenous understood the relationship between the Earth and sun. From the obelisks it is possible to see the districts of Suba and Engativa and the town of Cota. The squares names honor Muisca culture: Clock, Astral, Sun (Sué), Bochica, Chiminigagua, Bachue, Moxa Squares. They are further classified according to specific cosmological functions: 1. Central Squares where the principal attraction is the water mirror which emphasizes the ancient riverbed that disappeared hundreds of years ago; 2. The Observatory Squares the aforementioned snow-capped mountains can be viewed, symbolizing peace and the greatness found in the Mother Earth by the Muiscas; 3. The Astrologic Squares embodying the astral map used in ancient times by the indigenous; 4. The Entrance Square surrounded by trees and plants, is a welcoming to the "Muisca Temple of Nature" (11)(3).

Fig. 3

Fig. 4

Besides, the achievements of this urban renewal project are not only represented in the landscape and design issues. It also contributes to the social tensions and problematic of the area. Under social sustainability approaches, urban renewal is defined as an integrated vision, addressing urban problems by improving social, environmental, physical and economic conditions of the area (9). Mirador de los Nevados, as an urban renewal project, was premised on social sustainability as an integral part of urban regeneration. This project took into consideration the social tension and cultural exclusion experienced by the community of Muisca and attempted to contribute to this situation's solution through the improvement of the environment and landscapes in the district, based on the spirit of the Suba community. Up to 2010, the park has served as a space for social, cultural and educational participatory processes for more than 240.000 people, giving them the opportunity to explore other alternatives for working on social problematic they are having in Suba and so in their personal live processes. At the same time, through the promotion of the non-traditional pedagogic environmental protection programs, the people interested in that subject incremented 40% in the area (2).

4.2. Spirit of Place for cultural heritage and social sustainability: Memory, identity and territory

According to the Spirit of Place theory for cultural heritage preservation, the place is understood from to the relationship between the human being and the space natural or man-made settings, integrating the memory and the identity of a particular community in a specific place (19)(31). This is also linked to the recognition of the social function of the cultural heritage, which connects the memory, the identity and the heritage (4).
In the park Mirador de los nevados, the social function of the cultural heritage corresponds to a citizen construction where heritage is not an expression of what is beautiful to show, but the memory saved as a reference of urban manners (32). Here the cultural heritage is appropriated and represented by a contemporary community, which determinate the sustainability of the project. From this point of view, people's well-being is based on the recognition of their memory, cultural needs and cultural particularities, thus they will protect the place as a non renewal material (34). Suba was the meeting point for the ritual meetings of the indigenous groups of the region. It was the place where they tried to conserve the Muisca lineage, by performing rituals for the moon and the water (1). It is where they have chosen to live and that is why these urban indigenous residents will continue taking care of their territory and their collective memory. This place embraces the social sustainability principles of equity, inclusion, adaptability and security.

Collective memory concerns a social group's conceptions, cultural transmissions and use of the past. It is use to reconstruct the image of the past according to the time and social discourses (14). When the sustainable development improvements are based on collective memory representations, the cultural heritage preservation will be done from a qualitative rather than a quantitative outlook, thus it is possible the "understanding of humanity's place on the planet" (17 p.40). Muisca community has found their sacred mountains, lakes and wetlands reduced because of urban expansion (22). The Park constitutes a sustainable alternative to the conservation of the nature required by this minority.

For the Muisca people their identity is linked to their territory. They have adapted and transformed their way of living, but not the way to understand their Muisca heritage. They live as any other citizen does: they study, work and take part of the economy. But, at the same time, within their daily life they also uphold their cultural traditions, games and rituals while in contact with nature (27). The Park has become a place where the social aspect of their cultural heritage is experienced. It is a place for re-creating their cultural tradition through the development of cultural and political activities according to their indigenous beliefs. Mirador de los Nevados is the scene for activities like the Turmequé game, Andean dances, traditional dances, concerts of traditional music, bartering, indigenous sports, mingas, indigenous week celebration and "environmental classrooms", among others. Here, cultural heritage is part of the definition of social sustainability, which is related to the relationship between individual actions and the created environment, individual life-chances and institutional structures, and the creation of social cohesion and participation and justice (23).

Further, Canclini established that the modern city is not only a place to live and work; it is also a place where cultural heritage expressions become a part of daily life. The park is a heritage site integrated into the city's public space framework. The public spaces make the cities; it is there, in the open space, in the streets, squares, parks and edifications, where the citizens experience being social individuals, developing their cultural identity and the strategies for public participation (28). These places constitute the physical support to satisfy the urban collective necessities that go beyond the individual interests. On the local scale, places

like the Park are fundamental for the construction of the identity and sociability. That is, therefore, a sustainable contribution to the areas of the city with social problems (12).

The sustainable development processes for cultural heritage preservation requires an understanding of communities' multi-variants (16), where the territory embodies the heterogeneity and complexity of urban live, which in turn requires multicultural recognition (28). A territory that embraces the historical landscape of a minority's culture, its aural and its visual memory, is a landscape that can be seen, smell, heard, full of colors, full of remembrance. Then the functions of the urban space are also cultural heritage (4) and its sustainability is understood as a socio-historical process (9).

If the cultural heritage is taken as a component of the sustainable development through the social sustainability approach, it would be a huge step to go beyond the traditional cultural heritage preservation approaches. At the same time, it would let the heritage to be stand into the socio-cultural components of the sustainable development in a comprehensive way.

5. Conclusion

The Spirit of Place theory for cultural heritage preservation converges with social sustainability by linking the people, its natural and created environments and their "chances of life" in the space. So, when it comes to cultural heritage preservation, both theories lean on the protection of the existent relationship between humanity and its surrounding nature and space, rather than on the material elements and the physical objects resulting from this connection. This means the traditional perspective for cultural heritage preservation is inverted: before it was first the recognition of the object (material features) to then recognize the subject (community). Now, framing the cultural heritage into the social sustainability approach for sustainable development, the subject (community) is recognized as the first component, thus the social function of the cultural heritage lies in the recognition of the subject to then heed the object.

The case of the park Mirador de los Nevados is an example of how an urban renewal project for cultural heritage preservation, rather than starting from the recovery of a physical object, it can began dealing with the socio-cultural representation of a specific community, and then make it tangible through the materialization of the Spirit of Place. Namely, the perspectives for cultural heritage preservation do not necessarily need to be based on the material heritage. Instead, this process must be done based on the cultural and social needs of the people living in the area that is going to be protected, preserving the Spirit of Place without splitting the tangible and intangible components of the heritage.

Social sustainability establishes that to make tangible the immeasurable Spirit of Place for cultural heritage preservation, it is necessary the inclusion of the community. The cultural heritage existence is not represented only by its materiality. The reason of the existence of cultural heritage lies on its constant revitalization through the daily usage given by the community. The inclusion of the community into the cultural heritage preservation process has to be focused on the social function of the cultural heritage which contributes to its renovation. Not considering the habitants, their experiences and values, lead to what Van Der Hammen (2009) calls "shell heritage", cultural heritage conservation processes fragile like an eggshell: if there are no people willing to live and preserve heritage in their everyday life, it would be very easily broken. Another important alternative to shift the traditional cultural heritage preservation to contemporary ones, where the heritage becomes an essential foundation for sustainable development, can be found in the social sustainability "soft themes" which are also totally linked to the perspective of Spirit of Place. Although there is a lack of methodologies to assess the intangible expression of the social sustainability, that does not mean these "soft themes" are not fundamental elements for the placement of the cultural heritage into the social sustainability approach. Well-being, happiness, memory and identity seem to be subjective and immeasurable, but when they are connected to cultural heritage processes, they become expressions of equity, inclusion, adaptability and security. The park has become a fundamental scene for equity and inclusion for the Musica and the Suba inhabitant to participate in community as cultural and social groups or as individuals. Also, this site is also a tool for the people's adaptability to social and urban changes, as well as offers a safe and supportive environment.

When the communities' identity is recognized and printed in the space, its infrastructure and in urban policies, those themes are notorious in the way the inhabitant uses and experiences the space, as well as it can be noticed how the social tensions are reduced. In the case of the park Mirador de los Nevados, it is

evident the impact the park had on the improvement of the quality of life of the community of Muisca and Suba. It not just brought public recognition to this minority in the city, but also through the implementation of environmental programs and cooperative associations. It is true the park itself cannot eradicate the social inequity in the district; however it offers a space for cultural and political participation where the power and control orders can be questioned, where the social and cultural empowerment is possible.

The social sustainability also concerns to the recognition of the particularities of a specific society in a specific place into the contemporary globalization processes. The Spirit of Place for cultural heritage preservation is a vehicle for the recognition of such particularities and the authenticity of a society. The Spirit of Place acknowledges the memory, identity and territory of a specific culture and its relation with the space. This guarantees the possibility of having sustainable cultural heritage preservation processes, where the modernization and the economic growth are promoted through the social and cultural needs of a community, promoting then social sustainable development. In the park Mirador de los Nevados, the implementation of non-traditional pedagogic tools for environmental education, as well as the recognition of the cultural heritage as an expression of an urban indigenous and urban minorities not only makes sustainable the park itself, but also brought a sustainable approaches for Suba district and the manage to this area social and environmental problematic.

When sustainable development is founded in conventional approaches from traditional social policies, considering that economical and environmental oriented sustainability policies are enough to reach social welfare and without including particular communities' conceptions of the space, neither its memory nor identity, it do not imply social sustainable process. The Park is an example of that. Social and Environmental sustainability of the park is nowadays a reality thanks to: 1. to the inclusion of cultural heritage, through the spirit of the place theory, into the social sustainability framework; 2.the coupling of this perspective with the national and local sustainability policies. In other words, cultural heritage and the recognition of its social function was the key of the success of social sustainability and rest of sustainable development processes that consequently derived after this urban renewal project at Mirador de los Nevados.

Through the approaches of social sustainability it is possible to promote development processes within which the principal goal is not the ultra-modernization of the space, but the development of solutions with cultural and identity contents to solve local urban problems for specific social and cultural urban space.

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Teaching landscape architecture for the brain

Miguel A. MEDINA
Medina Architects
miguel@medinaarquitectos.com

Abstract.

In the Basin of Mexico, where it is today Mexico City; in the fifteenth century, the most brilliant of the ancient Mexican kings, Nezahualcoyotl Acolmiztli transformed the natural landscape of his territory to fulfill its mandate as a ruler and record the progress and greatness of his culture and his people. The site is now a cultural landscape of great importance whose study is an enriching lesson in landscape architecture, sustainable development and environmental planning. The site, in addition to the unique beauty that holds, shows human thoughts and actions that produce the processes that lead to sustainability: after five hundred and sixty years 40% of that land is still cultivated and the site is heraldry of culture of ancient Mexico.
The study here has led me to consider the prevalence of thinking about the action, therefore my research work focused on trying to establish how the architect configured his brain to think like and secondly to introduce new aesthetic categories in landscape architecture teaching.

Fig 1. The Lordship of Nezahualcoyotl seen from the eastern basin of Mexico.

Keywords: Think, configure, learn, awareness, teach

1. About the site and its current meaning.

The place we know today was the result of several circumstances and decisions: In the basin of Mexico during the years 1447 to 1453 AD, had an untimely frost followed by a prolonged draught that dried to two thousand square kilometers of lakes and disabled the crops leaving a natural catastrophic event that nearly wiped out the population of 300000 inhabitants.

Fig. 2. Location of basin of Mexico   Basin of Mexico in 1447   Basin of Mexico today

At the time in the basin was dominated by three Lords (or kings) who ruled the manors of Tenochtitlan, Tezcoco and Azcapotzalco. They were joined in the Triple Alliance, the most powerful empire on the continent at that time. The lord of Tezcoco he was Nezahualcoyotl, Lord Totoquihuatzin reigned in Azcapotzalco and the great Moctezuma in Tenochtitlan. Given the emergency food lords emptied the royal granaries, their header cities were over populated and when famine struck Moctezuma decided to go to war against the people of South, following by Totoquihatzin to collect taxes. Nezahualcoyotl instead chose to locate water sources in the high mountains of eastern basin and channel water to his city by creating three irrigation systems to produce food. This decision was a radical change in the natural landscape of the city, region and in the life of the inhabitants of his dominion and whole basin.
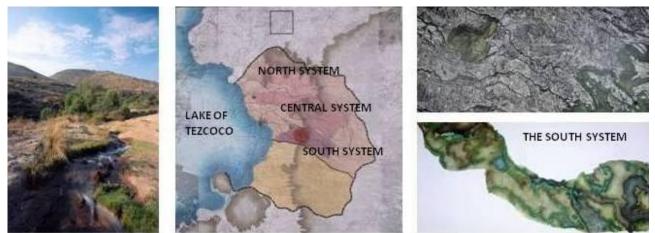
Fig. 3. Tezcoco landscape   The three irrigation systems of Tezcoco   South system called Tezcotzinco system

This region consists of long ridges of piedmont, short valleys, and in that time, a long narrow strip of plain lake. The ancient lake was brackish due to the influence of saline soil. It is a semi-arid region of dry warm weather, twelve hours per day of sunlight with average temperature of 18° C., rainfall of 500 mm. annually during the summer and freezing winter. The soils are shallow, dominates the horizon B of basic mineral and vegetation that occurs along the altitudinal gradient includes riparian plants and *Halophites* in the plain,

grassland, xerophytic scrub and weeds in the foothills and forests of *Juniperus*, *Cupressus*, *Quercus*, *Pinus* and *Abies* in the mountains.

To channel water from the springs located at an altitude of 2600 meters to the plateau at 2200 meters channels were carved into the rocky surface of the mountains, following the contour lines, surrounding peaks and crossing the fords with embankments of which were built stone canals. The path of the channels, twelve miles on average, has a 2.8% of constant slope. Water velocity was regulated by increasing or decreasing the channel section and varying in depth to avoid turbulence. The main channel derived secondary and tertiary channels of distribution with a width ranging from 50 to 2.5 centimeters.

Fig. 4. The paths   The spring zone   Channel carved   Mouth of the canal   Domestic dam

Nezahualcoyotl awarded the construction of the channels through appropriate tax card, then entrusted its maintenance and management of water supply to the entire region as the Nahuatl agricultural calendar of 260 days per year.

Fig. 5. The longest embankment   Embankment of Caño Quebrado   Current production terrace

Simultaneously with the construction of canals were built hundreds of thousands of square miles of stone walls to contain about one hundred and fifty million cubic meters of fertile soil formed by silt dredged from the bottom of the dry creeks mixed with humus from the montane forests, these were provided in the 30000 hectares of productive terraces enabled.

This region produced amaranth and corn to feed the population of the basin by solving the famine, promoting the repopulation and subsequent glow of the whole basin due to biophysical symbiosis generated with the works of environmental adaptation and production management in time.

The underlying reason for the decision of Nezahualcoyotl was his intimate knowledge of its history as a nation, as a culture, as king his personal obligation and no doubt his knowledge of the geography of the state and its relation with their worldview: In the worldview of Mesoamerica was believed that two solar deities to be dismembered a monstrous being called Tlaticpac. A species of lizard fish whose back the earth's crust was created and whose belly aqueous created haven. Once created the earth, the deities place four cosmic

trees to prevent the two parts of Tlaticpac back to join. However these trees allowed the flow of the overworld and underworld deities that were beyond earth and sky. In my opinion we are talking about the energy exchange in the trees flows through their vascular system, aspect that the ancient Mexicans were well aware and identified as the flow of energy which the plant life depends.

According with my interpretation the idea of the back of a lizard as the origin of the earth it is because throughout of Mesoamerica is full of mountain ranges that define their physiography. Also is this the reason why its inhabitants thought their deities inhabited hills archetypal. The idea that the sky comes from the aqueous belly of the monster derived from the fact that Mesoamerica region occupies a large subtropical fringe of the continent where rainfall is abundant, there are great jungles and mighty rivers, therefore, a high percentage of humidity.

It is relevant in a story like this to point out that the ancient knowledge this cultures had about the natural environment was deeply associated with the construction of their worldview. And in that construction saw themselves as custodians of the creation of the deities to ensure its perpetuation. I cannot elaborate more on this paper to explain the extraordinary manner in which their worldview influenced the lives of these people, but I can comment that the responsibility imposed on them by the traditions led them to study, conserve and were possible to reproduce the ways in which nature generates itself and is self.

In the case of Nezahualcoyotl say that when the situation resolved and recovered the prosperity of the state, built on the sacred hill of Tezcotzinco his magnificent royal palace whose conception is an outstanding display of talent from the king to transform the environment to living space with an specific end considering the worldview of his time, the biophysical characteristics of the site, human knowledge and aspirations of a ruler.

Fig. 6. The sacred hill of Tezcotzinco

The hill was considered sacred because Tezcotzinco was noted by Nezahualcoyotl great grandfather King Quinantzin, as the guardian mountain of the founding of the city of Tezcoco. The ancient Mexicans believed that the Ometeotl primeval god, the god dual (ome-two, teotl-god), live in the cave of a hill called archetypal Tamoanchan and from there blew the breath to life he deposited in the belly of pregnant women. It was a myth about the divine origin of life, why pointing to a hill as Tamoanchan of the founding of a city giving it a

status of divine origin which ensured the protection of god for their existence and development. With this background Nezahualcoyotl had to take stock of wisdom and intelligence to take the hill and physically dwell therein without offense to his people, it went like this:

Nezahualcoyotl was the seventh king of his line. The Acolhua people Kings. When his first ancestor, the King Xolotl, arriving in the region of Tezcoco around 1100 AD, he and his people still dressed in animal skins who were hunting and living in caves, but they knew pervert the course of streams and small rivers to irrigate the land they began cultivated to produce corn.

The king Quinantzin introduced the cultivated of cotton which began to manufacture their clothes, he built the first stone palace and organized the lordship as a perfect socioeconomic and cultural structure governed by an absolute monarchy responsible for the fate of his subjects. Turn preserving its land, values, customs and worldview. Nezahualcoyotl known himself as heir of this concept of a ruler, he knew the technical, scientific and cultural development of his people and the wisdom and power of their worldview. So when he saw himself before the environmental disaster, used the only resource he had, people who had gathered in Tezcoco, not to take them to die in the war but to build in the slopes of the mountains the most important productive landscape of the fifteenth century. Creating a great example of what is now environmental planning and sustainable development.

Fig. 7. Andesite rock   The Tezcotzinco (in center)   Productive terraces

At the time of Nezahualcoyotl built his palace at the hill of Tezcotzinco, Tlaloc Water God had become to be the most important and influential in the life of the inhabitants of the basin, of course as result of the drought from his vision had been decreed by the god. It was believed that god Tlaloc lived an archetypal hill called Tlalocan in which there were many bodies of water in all its manifestations: rain, rivers, lakes, waterfalls, underground streams, all forms that produce fresh water on the earth. They believed that for this reason the Tlalocan was full of jungles and forests inhabited by countless numbers of archetypal insects, birds, fish and mammals. The Tlalocan it was a paradise such that he only arrived the warriors killed in combat, mothers dying during the childbirth and misshapen people who was considered sacred too.

It is important to mention this background because Tlalocan became the legendary destination of the most valuable people in basin of Mexico. With this knowledge Nezahualcoyotl set out to recreate in the hill of Tezcotzinco the earthly image of Tlalocan, merged the two myths: Tamoanchan, the divine origin of Tezcoco and Tlalocan, fate of his people. This was the way the King could legitimately take the sacred hill.

To represent the Tlalocan in the hill of Tezcotzinco, Nezahualcoyotl made a master piece of what we now call landscape architecture:

Nezahualcoyotl knew the territories of today´s southeast of Mexico and Central America because there came to his Kingdom and decided that the earthly image of Tlalocan it should resemble that of the land in which mostly rain, rivers, lakes, fish, wildlife and forests, so he built in the hill an analogy of that landscape.

To achieve its objective would have to modify the characteristics of a semi-arid area in warm dry climate of a place of warm humid climate, to transform a site of poor and shallow soil on a site of moist soil, fertile and deep, enter in an ecosystem of bushes and scrub vegetation needed to reproduce the characteristics of the jungle and finally introduce a suitable wildlife.

Then he first decided it was to occupy the southern slope of the hill that had an inclination sufficiently fit to be terraced. On the north slope of the hill there is a relict forests of *Quercus* adapted to the slope of 45° on average. The south side also has the best sunlight during the whole year and is sheltered from the wind by the same shape of the hill that creates a shadow of wind.

Fig. 8. Watersheds   View from the west of the hill of Tezcotzinco   Tezcotzinco map

On the hillside was terraced floors of 1.50 meters deep, were planted two tree species, *Schinus molle* and *Eysenhardtia polystachia*, to create an open forests with the following quality: the *Schinus* is a large ever green tree of very fine texture in foliage and *Eysenhardtia* it is a small deciduous tree also fine-textured, this combinations helped to create translucent shade during the summer and partial shade during the winter to take advantage of the sunlight.

Building the infrastructure of the main water channel, water was carried up the hill of Tezcotzinco making led to the eastern "noise" of the same. At that point it was built a collector and from there, a perimeter road carried water to three sides which built three stone structures, carved in rocks, called pools representing the way the people Acolhua ran from the arrival in the basin of Mexico to their settlement in Tezcoco.

Fig. 9. Slopes   Stone canal   The collector   The perimeter road

Once the hill was equipped with water, small dams were built along the south side of the perimeter road these were stored in water and then drop it on the andesite rock, that way the water was sprayed and created enough moisture to modify the microclimate of the slope. At the same time were built waterfalls, fountains, ponds and canals filled with bodies of water to the hill.

When the slope south is obtained the right conditions the King ordered transplant all kinds of tropical plants at the site and enter the wildlife of the forests thus recreating a microcosm representing his idyllic worldview of Tlalocan.

Fig.10. The pools (west and south), the collector and the foundation of the royal apartments air views

Fig. 11. The southern pool (of the King)   The western pool (of the Queen)

Fig. 12. Views of the current flora of Tezcotzinco

2. Thinking about landscape architecture.

The above story is the vision of a planner and landscape architect on the work of a King and his people. For many years I taught this example of landscape architecture to my students and introduce in my teaching some aesthetic categories arising from this research such as: a) Compositional conceptual scheme and subordination of elements into the overall scheme. b) Cosmogonic development of compositional discourse. c) Three-dimensional space. d) Movement as a dimension on space. e) Physical and environmental manipulation of space. f) Integration of science and art in the design. g) Polyvalent handing of vegetation. h) Total production of a landscape model represented by global composition patterns. i) Controlled geometric landscape distinctive. j) Naturalism and livability. k) Erotic sensuality and design.

However in recent years I have seen growth in the work of landscape architecture a tendency towards the reproduction of iconographic "successful" models, this worries me a lot and led me to wonder the question of why such a situation occurs both at universities and professional work and I think that it is because we have lost sight of architecture students when they go to college what they should learn in a conscious manner is to configure their brain to learn to think like an architect and it is possible that professors we have been more concerned with teaching a design technique that enable them to produce, or unfortunately play architectural aesthetic models that will undoubtedly come from creative minds but not necessarily from the knowledge, culture, worldview, expectation and needs of the people and possibilities of treating or processing the environment to solve the problems of subsistence, habitation and development of the people.

This concern has come to me when I realized that the work I have been studying, describing, characterizing and explaining as example of environmental planning, sustainable development and landscape architecture, and it is, is not the work of a planner or landscape architect but a wise man who knew how to think, like

anyone in his time, how to transform the land to create a better place to live. So while his work we should be studied his thought and learn from him. Also I think our first responsibility as professor is to teach the students to think and for that they must learn to set up their brain that, even before entering college is simply of a student in the brain of an architect. I must say I consider the human brain as a tool that is configured to think a certain way.

How to accomplish this in case of our interest? Still do not know absolutely and it is a long way to investigate but I have traveled some ways in which we could begin to move. There also explain briefly the proceeding of the King Nezhualcoyotl if we can find relations.

The first way I raise relates to creativity. It seems crucial to make clear that creativity is believed to be an essential condition in the practice of architecture is not from a single, small gift in the world. According to experts, there are three types of creativity: biological, cultural and specific.

Biological creativity is innate in all living things. Enables an organism to survive and is expressed in the homeostatic organization of the individual described by American physiologist Walter Bradford Cannon in 1932.

Homeostasis is the ability of a multicellular organism to self-generate and regulate themselves in a self-balancing internally and externally. In the case of human beings implies that such a balance in their biological and psychological organization there is a kind of skill inherent existence that allows life in any being. In the biological aspects homeostasis implies internal adjustments necessary to stabilize your body substances to the constant changes produced endogenously (by the body) and exogenous (external factors) during development. And in the psychological aspects it means to adopt the most adequate behavior to meet their needs in relation to the specific circumstances that arise in their environment. It is this ability to achieve an inner balance that allows the survival of a human being what we call biological creativity and it exists in every one of us.

With regard to cultural creativity will say, in principle, I assume the primary notion of culture (there are many notions) as the lifestyle of an individual or group of individuals. Therefore, form these sense, every human being has necessarily a culture. It means all of us we have a way to interact with our physical and social environment learned of our ancestors, our elders and our contemporaries that allows us to belong, be expressed and stay in our group or society. I call this cultural creativity. Whether if It is an independent social group or away from the overall process of civilization for some reason, or most cosmopolitan society "developed", culture or way of life that share occurs in each of their individual a perception of reality tempered by an informed perspective and/or formed from environmental wisdom and knowledge accumulated by the company, that leads him to make decisions about environmental and social survival, according to their capacity for analysis and learning of that knowledge sharing with the others. This call in the individual, become aware of their cultural creativity.

So that every human group, and every individual belongs to one is developing what we normally call their worldview, their customs, beliefs or philosophy. Stages represented by its experience of the world and humans, it is transmitted to each individual in the group so circumstantial and that enables you to practice life, that is instructed in the use of knowledge and cultural creativity.

This cultural creativity, then lies in the correlative building society and make their own individual person as such, from birth to death, accompanies form throughout his life and can change, evolve, transform and enrich themselves according to the interests, decisions and efforts of each individual. The level of awareness that the person has of the existence and use of cultural creativity that owns it is the sole responsibility.

This brings us to the specific creativity. In this regard recall that, as we know from ancient times all human activity preceded by the primal fact of having carried out a specific action to solve a basic need. In such a way that to the extent that humans have been able to recognize and codify the actions, increasingly complex we have taken from the "stone age" to "cyber age" professions that we have invented exercise of "a certain way" to solve "certain problems" specific in nature. Such is the case of landscape architecture, like so many others that are studied in universities.

What happens in the universe of professions is that humanity has built itself as "thinking being" reflecting and theorizing about the techniques and methods that practiced initially by trial and error, then by complex method prospecting problems, prior definition of procedures and use of technology to meet their needs and aspirations. Such reflection and theorizing over time of human practices has enabled the knowledge produce by mankind can be compiled, explained and taught to those who want to learn to exercise some of these practices in a specific way.

Thus, at some point in human history have been created and developed the professions that make up the specific content knowledge to be acquired to exercise them. This has worked in universities. More over the activity carried out by professionals in reality it is building the world in which we interact and so is taking shape in society a relative culture on that specific activity. In the case say that humanity shares an

architectural and landscape culture with ancient roots and branches that cross today look towards a future that seems, for now, endless.

Oriol Bohigas says in his seminal book of 1978 "the creation of useful forms is inherent to human progress" we might add here that sustain critical and conscious reflection, and learning about the real usefulness of these forms, in other words in how real people use and appropriate qualities and meanings of these forms, architectural and landscape in this case, and the processes by which they were produced is what is really at the substance of what we call progress.

In this regard and in relation to landscape architecture, we know that the discipline required for the exercise, according to the specific problem to solve to integrate into their production process intellectual and physical knowledge by the science of the earth, environmental science, human science, environmental planning, urban planning, architecture and technologies. All of which is learned and implemented through a design methodology and a technique for producing architectural and landscape forms, to the extent that it exercises over and over again in each problem is solved produces a feedback set in landscape architect's mind his own idea of the activity that occupies, how is it constructed as an individual and their relative importance to society.

So at this point I will say that it takes creativity to practice landscape architecture but it is a specific creativity that comes with the culture of Landscape Architecture. What first draws knowledge and awareness of what this profession "is", after of the experience of "making it" in practice and at the end of the depth of which each individual is able to build their thinking about her.

I think it is a fundamental topic in the teaching of landscape architects to help student build their landscape architectural thinking objectively and away from the myths of spontaneous creativity or "enlightened". He also says Oriol Bohigas, full of reason "there is no inventions from scratch". Thus in this, landscape architecture and any activity that human beings spend their time. In the end it is all part of human works as Borges said, and as such is perfectly accessible to others as we are all biologically constituted as homeostatic living through our creativity. We all belong to a group of people which have acquired cultural creativity we exercise daily to "life process". And we are all able to acquire specific creativity produced by those who do landscape architecture in the world today and those who think about teaching and studying at universities.

Another fundamental topic it is referred to the ways of learning. I think we should try to acknowledging the way our students and ourselves learn. Clearly not all learn the same way and has been studied that according to the way we learn is the way we understand and express ourselves. I said that the acquisition and development of creativity as the foundation has a specific learning activity, therefore and because the practice of landscape architecture is essentially an intellectual activity, it is important to introduce here a note about how it happen learning in our brains.

Will include a brief note here on this issue as there is a vast literature on the subject and invite teachers to delve into it. The experience of authors like David Kolb and Catalina Alonso has led them to consider that there are four different types of learning: active, reflective, theoretical and pragmatic. In their experience everyone has a profile "favorite" of learning. I would say our cultural creativity has been gained from the exercise of this profile is the one we received in our education or is at once the one that best suits our biological and psychological skills.

Learning profiles have three primary psychological elements that make up: an affective component, it is feeling. A cognitive component, it is to know. And a behavioral component, it is doing. These components configure or structure the particular way in which person builds their own learning process, by which also produces their own learning strategies. This process affects all activities of an individual because the integration of components and the profile shape their attitudes, skills, understanding and level of depth learning. Hence the important of know your profile and do an exercise in introspection to recognize how you learn and how you express yourself. From there you will have to purchase a particular understanding of landscape architecture as an activity and human experience, and from there, surely you have to exercise it as your own means of expression. I make a brief description of the profiles:

a) The active profile. Form this page you learn when there is a direct and obvious link between a problem and an opportunity to address. When using specific techniques to do something with practical advantages. When you experience and practice with tools for effective feedback or under reliable supervision. When you have an immediate opportunity to apply learning.

b) The profile reflective. From this profile is learned in situations when you can see, think, reflect about an activity. When you can think before you act and assimilate before commenting or participating. Where the individual can take distance from the events and listening to or watching before acting. Where you can exchange experience with other within a clear framework. Where you can reach conclusions or decisions without pressure or time requirements.

c) The theoretical profile. From this profile is learning when the person is offered a part of a system, model, concept or theory. When you have time to explore methodically the associations and relationships among ideas and/or events. When you have the opportunity to question and test the basic assumptions or logic behind something, through questions and answers or by checking the consistency of some event, for example. When you feel pressure to pass test intellectually challenging in your analysis or teaching people that requires complex answers. When you are in structured situations with a clear purpose. When you come in contact with text or conversations logical, well structured and informed. When you can analyze and then generalize the reasons for success or failure.

d) The profile pragmatic. From this page you learn when you face new experiences, problems or opportunities which can include anything other than what is already known. When there is interest, drama, crisis, to bring about changes for various chores. When a person is allowed to generate ideas without political constraints, structural o viability. When left alone facing a difficult task to consider, which means you face a challenge with inadequate resources and under difficult conditions. When "try" things is the most appropriate.

When you know the profile to learning to use it, you should know that there is a "cycle" of learning that goes through four stages: concrete experience, reflective observation, abstract conceptualization and active experimentation. We all learn by the profile of our abilities and stage from which we can face the knowledge. There is a possibility that an individual scroll through the four stages in the learning process to traverse or partially. In the case you need to clarify in your mind what is your own process.

Let's say something about stages:

1) The concrete experience is based on the personal involvement eminently emotional. The person who learns from this stage tends to favor the feelings and creative abilities on a systematic approach to problems and situations. Learning in this stage is characterized by learning from specific experience related to people and their feelings. I would add that this people learn by commonly called intuition or empathy.

2) Reflective observation characterizes people who discussed ideas from various viewpoints, are careful in their assessments, persevering and trials intended to express "objective". From here we analyze the thoughts and feelings to form opinions based on learning the meaning of things from different perspectives.

3) The abstract conceptualization is learning stage involving the use of logical and systematic approach to understanding the problems and situations. Excludes the feelings of the individual may have in relation of what is studied and is based on trust that the person has on systematic planning processes, development or theories and "formulas" to solve problems, and their intellectual or understanding. From my point of view, these people build on a particular practice, thinking, concepts o theories, which then will allow the transmission of knowledge of the practice.

4) The active experimentation stage is closing the "cycle" and its quality is that the person learns thoroughly "something" just until you run it and experience how this "something" actually works. In this phase learning is obtained by evaluating the individual makes about things made by their results. The person who reaches this stage have the ability, first, to make things, then to risk them and through that influence people and in different situations through specific actions.

One more aspect I would like to mention with this intention of helping students to configure their brain of architect is the subject of the invention. Given that the landscape architect is a developer of spatial forms is expected of him who owns a limitless capacity for invention. I agree with this expectation, I think every architect "mature" which has acquired a vast architectural culture and learned to use a technique of projecting structured in a conscious process of creation has an unlimited capacity for invention, of course he will be compelled to exercise only when confronted by his own interest or for the needs and aspirations of the "other" to a specific problem of habitable space. Now I will clarify what I mean by invention and try to bring a new perspective, aided by some other authors.

According to José Ortega y Gasset dwelling is unprecedented by humans. I understand that for him human beings we are ontologically (thinking about physical existence) a limited life to the possibilities of pragmatic field. I would say a pragmatic field is in my opinion the living space that human being produced or constructed as a result of its action on the physical reality of the world. This means that humans are not found in nature as such ideal conditions just for "live" as most of the animals which find their habitat in the region of the world they occupy. Human beings actually occupy all world regions to build their "habitat" with technological resources cities are the typical example of this. Therefore what supports the development of human life is the ability of humanity itself has taken to transform and adapt the natural conditions of the land to its desire to inhabit specific ways. We call this environment. From this perspective I fully share the life of human beings is a multiple articulation of pragmatic fields and priority of building comes from the deepest desires that people have to live a certain way and not another or any randomly.

Another thinker, Martin Heideger, he refers to architecture as poetry of the use of space. He said this is made by modeling the spatiality of something when it is ready for use. So I think that in landscape architecture exist not only the human need to carry out life in living space and all the experience that humans have accumulated after centuries to shape the land to inhabit, as well as specific knowledge in that field landscape architects have produced. There are also the qualities of the space will be transformed, these are of various kinds: natural, environmental, cultural, historical, urban, architectural, and cannot be ignored when thinking about its transformation, on the contrary it is these unique qualities of each space indicates that it is "ready for use" and exhibited in its materiality. This specific materiality of each space guides us on the use of technology, media and processes to coordinate the various pragmatic fields through modeling and transformation of that materiality. Throughout, as Heideger would say, of the poetic experience of the individual on the area, throughout the poietic invention of the landscape architect. So I would say in the process of formal invention of the landscape architect his responsible is manifested in the time he sees an opportunity to transform the world, and his limits at the time he is holding his purposes to the achievement inescapable habitability.

According to Arthur Koestler in our perceptions of the world there is a phenomenon of inconsistency form the biological and cultural perceptual called bisociation, this explains why at times, to a specific space that we intend to "use", "feel" like something is wrong, something is missing or something on the materiality of that space is nor right therefore requires an intervention. This is where the landscape architect finds the opportunity. However, the need to transform the space is not a necessity without purpose or direction. I said about human aspiration is to enable the physical space to inhabit. To meet this "purpose" and resolve the bisociation required, then a new construction. How landscape architect thinks the transformation of space expose his talents and limits as a creator. So following Koestler and summing up the above, I would say that creativity and invention are the result of maturation of the landscape architect in three stages: Biological maturation, it is expressed by the architect in his ability to adapt himself to his working environment, always changing where he acts circumstantially. Cultural maturation, it is the result of care and lifelong learning work by various means the architect carried out in relation to the world and his work. It is expressed in the evolution of his understanding and building of his idea and practice of landscape architecture. Personal maturity, this allows the architect to visualize his activity as a continuous process of synthesis and change that produces adaptations and transformations that humanity needs to make the planet habitable. That is, the maturation process of the architect gives to him access to knowledge and wisdom. This qualities manifest at the time to "catch" an architect, his ability to transcend its biological and cultural boundaries to become formally an inventor.

Finally I want to point another issue nodal in the formation of architecture students, is the practice of the review and critique of the concept of landscape architecture. I see repeatedly landscape architecture is taught and learned from a perspective focused on to worship and play a kind of "archetypal idea" of landscape architecture whose influence "inspires" a series of "prototypes", or what I call "iconography of architectural aesthetics", also widely evidence in the architecture of buildings which seems caused by a "mastermind" that "illuminates" the most famous architects and "dictates" them the forms should be created, the forms that everyone "should" follow. I think through this procedure has been emptied of meaning the landscape architecture. Far from what one might believe, this unthinking repetition of an aesthetic model or "style", as doing in present It is not consolidated it in the collective imagination and lasts, but it sells out quickly makes it "kitsch" and banality, disposable, fashionable, whose final destination is to be replaced by the "following".

So, in my experience, I have said there are many schools more focused on the architectural object than in the individual being that is forming as an architect. Then I invite you don't try to find the landscape architecture model but better build landscape architect's mind which it is the substance that produced landscape architecture in the world.

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Le Vie dei Mercanti | X Forum Internazionale di Studi

less
more
architecture
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The landscape design between sustainability, heritage and new economies

Maria Gabriella Trovato,
OASI Dipartimento di Progettazione per la città, il paesaggio e il territorio, Facoltà di Architettura, Università degli Studi *Mediterranea* di Reggio Calabria, Reggio Calabria, Italia
E-mail mariagabriellatrovato@yahoo.com

Abstract
In the north and in the south, in small and large realities, entire portions of land quickly recompose themselves rewriting new landscapes that are no longer rural and not yet urban: **rur-ban.** These are new territorial typologies, in which residual gardens, at times fenced and guarded, edge towards built-up areas, and remnants of the agrarian landscape between the new infrastructure systems design a new landscape characterised by the accumulation of waiting areas. The management of this spatial organization is particularly complex. One issue that arises concerns the pre-existing structures and the attitude to adopt with regard to their conservation, substitution, reuse, abandonment. The agricultural landscape of this sprawls area has many inconsistencies and it is difficult to interpret. Layers of activity and different temporality overlap and flank themselves by creating a Hybrid landscapes in which live together more or less visible traces of an agricultural past still recent and elements of new forms of expansion. These are spaces/depot in the complex system of values, knowledge and social relations that have characterized the agrarian world and its history [1] and for this reason they are a vehicle to promote and strengthen local identity. Imaginary landscapes that as designers our task is to interpret and reconstruct to trigger a process of appropriation of land by those who live in and to give dignity and identity back to areas that have lost it.

Parole chiave: Peri-urban landscape, sustainability, landscape heritage, agri-urban landscape, landscape value

1. Introduction
From North to South, in small and large realities, entire sections of land quickly recompose themselves hence rewriting new landscapes which are no longer rural but not yet urban: **rur-ban.** Margin territories where land uses and transformations, the result of unresolved conflicts between different interests, continue to create a varied landscape, but sometimes chaotic, confused, where open spaces still resist with historical connotations linked to the traditional agricultural activities in the face of advancing settlements that meet the needs of the greatest exploitation of the land. Often considered marginal parts of the territory, these peri-urban areas are spaces /depots for the complex system of values, knowledge and social relations that are characteristic of the agricultural world and its history [2] and also enclaves of naturalness and the presence of environmental ecology. These spaces, frayed and contaminated by urban living, represent chances for cities. It's here that the future will measure the ability of cities to compete on a new proposal of sustainability, for which the economical use of resources does not exclude the possibility of reproducing such resources, a project of urban and agri-urban and that, in addition to proposing cultivated fields, ..., clean energy parks, it also suggests blocks of city life. [3]

Planning strategies are therefore needed which are capable of managing the transformations focusing attention on the identity, economic and social values of the peri-urban spaces and the relationships between urban and rural areas which provide the quality of our landscape. Because quality is a territorial capital that is impossible to relocate, but which can instead be easily trivialized and stripped of its cultural and natural values.

2. Landscape and quality of living spaces

The awareness of the value and the importance of the quality of living spaces for the welfare of the population is a recent revelation. The landscape, for many decades, has been wasted or overlooked. So today we find ourselves having to deal with realities in which the processes of urbanization have led to anonymous territories and urban realities which are anything but sustainable, without paying any attention to environmental quality and the balance between the various components of the territory. In particular, when we focus on the coast, it is evident that the relentless pressure of mass tourism has transformed the coastal landscapes, resulting in phenomena of impoverishment and environmental degradation (pollution, coastal erosion etc..), the development of settlement models which are inconsistent with the existing characteristics, problems of accessibility and the utilization of substantial parts of the city, etc. ...

In Sicily, in the last 30 years, the Ionian coast of Messina has undergone profound changes in its urban structure and settlement induced and reinforced in part by the construction of new infrastructure parallel to the coast Fig. 1. New linear urban configurations have been developed which extended for miles, with a comb-like structure along the axis of the coastal settlements Fig. 2. Linear cities that have supplanted the structure of this region, known already known since the nineteenth century as "the land of evergreen gardens" due to the abundant lemon orchards whose presence influenced the economy, the habits, the social composition, the culture, the rituals, and the traditions of this place Fig. 3. Urban bodies that have cancelled the formal relationships identity, the history and the social economic system of the traditional style agriculture of this coastal area.

The pressure for building, the social and cultural changes and the globalization of the markets have dimensionally reduced the agricultural area, now almost in a state of neglect and not sufficiently supported by development policies and protection. Rural areas, which are now almost completely unproductive, which up to 50 years ago formed a landscape of citrus fruit, fruit trees, and olive groves.

"… An evergreen landscape, based on an intensive irrigated agriculture, among the most prestigious and productive in Sicily, and supported by human communities devoted to the primary activity which marked the economy of the two sides of Peloritani mountain chain .... and which was at its best and of its highest geographical importance on the Ionian coast between Messina and the mouth of the Alcantara." [4]

An environmental / landscape heritage of which only fragmented pieces remain.

Today the big manufacturers and merchants of citrus fruits have almost entirely disappeared along with the sorting and packaging factories, and seasonal employment, particularly of women, which up to the 1960's constituted the backbone of the economy, no longer exists. Niches of cultivation and highly specialized crops that are seeking a commercial space in the global market still survive, by focusing on the quality and uniqueness of production, such as the *Interdonato lemon*, perhaps one of the few *cultivars* of the Ionian coast of Messina, together with the *verdello*, to survive the farming crisis." [5]

All this has led to the creation of landscapes in which the progressive changes in the economy and society in urban areas have ended up distorting the social identity of the community to the point that it can no longer be identified by the aspects of the places for which it was representative for a very long time.[6]

Along this coastal strip it is, however, still possible to find, in the interface between the urban and the rural areas, episodes of naturalness and identity that are important resources for re-creating this landscape which has been ruined by the logic of, all built-up. And the landscape can represent the starting point and the "value" on which to base any future projects for this community.

3. The suburban landscape of the Ionian coast of Messina

The suburban landscape of the Ionian coast of Messina represents an important area of transition between hillside and coastal ecosystems Fig. 4. An area heavily affected by several streams which over time have become receptacles and repositories for urban waste, and often the illegal home to craftsmen activities, small shipyards, weekly markets and seasonal fairs, car parks and camping areas, car washes, etc.. A landscape in which natural elements and the permanence of the traditional agricultural landscape

are still present, as well as historical and architectural features, both military and religious. It is considered as an external "green belt", a crown that in reality has different gradients of impairment and fragmentation in relation to the different areas Fig. 5. Circumscribed and partly cut off by the infrastructure system of the motorway, the railway line, pipelines and aqueducts, which open up to the rural area at the beds of streams where they appear to be a system of ecological networks connecting the sea to the mountains Fig. 6.

Its main problems are:

- Strong development pressures,
- Perceptual and functional degradation
- Residual nature of farming,
-Fragmentation of the agricultural areas caused by the presence of incongruous activities or infrastructure,
- Very high Hydraulic Risk with tendency of flooding,
- Presence of neglected natural features,
- Fragmentation of ecological corridors.

These areas on the border of the city, no longer countryside, but not yet city, form a landscape which is still defining itself whose main characteristic is that of uncertainty, instability [7]. Despite being subjected to high anthropogenic pressure they have essential functions of environmental compensation and protection which are essential to regaining an eco systemic equilibrium as a potential for education, recreation, cultural and historical identity. While not considered particularly valuable in themselves, since they are not economically productive, they have now become an important strategic value for their position in the middle of the in between, places on hold, suspended between urban, suburban and rural. They are represented in various urban plans as a blank space, to which a role has not been allocated and/or recognized except for that of future expansion, an empty space, the suburban area fringe between built up areas and open space, cut and crossed by both natural and anthropogenic infrastructure (streams, motorways, railway lines, waterways, etc...) is a place of opportunity for this linear city under construction Fig. 7. It is seen as the only large open space of the city, a reserve of greenery and naturalness, producing material goods which can be sold along the short-circuit chain of the local market, an infrastructure of regions with varying population densities [8]. A biological, landscape and historical heritage, which although strongly depleted and disjointed, does not deserve to be deleted, but which is waiting to be rediscovered and appreciated, as it is an integral part of the past and culture of this area and which could be considered the testing laboratory for a less destructive, more balanced and conscientious relationship between the demands of human activity and those of the territory, giving a specific function back to these areas within the lifestyle of this linear city Fig. 8. But to become a real possibility it is necessary on the one hand to change the agricultural policy of the area through an innovative cultural and economic project that can succeed in attracting a young workforce, and on the other hand to create a development project that takes into account all the characteristics of the area and that uses its natural resources in a prudent and thrifty manner.

4. Strategies for the enhancement of the surrounding areas

The fringe areas are characterized by excessive fragmentation and privatization which make the definition process difficult for politicians to formulate policies to integrate their protection and preservation through the dynamic and active management as required by the CEP (European Landscape Convention). These characteristics have in part led to a stagnation in planning which in turn has corresponded to an accelerated housing boom that has transformed these areas into the urban spaces they now are.

Landscape knowledge, more inclusive than the urban one could be an alternative in the management of these territories. It's flexible, relational, participatory, knowledge. It creates a mediation between the needs of identity and naturalness of places and the needs of the people and those of production and economic activities without neglecting the aesthetic aspects that are the subject of perception and appreciation of local communities. [9]

The peculiarities of the landscape are crucial to identifying intervention strategies and guidelines for the surrounding areas by promoting awareness and knowledge, protection, management, innovation, experimentation strategies.

These areas which are not occupied by urban functions offer a potential which should not be underestimated as regards land protection, reformation of ecological relationships, the construction of green spaces, the creation of new decentralized polycentricity which goes beyond the state of being periphery. [10]

The construction of a green infrastructure network, which reorganizes all of the green, peri-urban, agricultural, fallow, and structured green areas ...., through the activation process of recovery, requalification and regeneration which would allow a greater availability of peri-urban open spaces to be achieved including them as part of a network and hinge system between urban, suburban and rural areas.

4.2 The agricultural value of the surrounding areas

In recent decades the need for recognition of the agricultural value of the territory as well as its historical and cultural value has emerged, a sign of willingness to proceed with building the defence of their territorial identity. The measures undertaken by the Department for Agriculture and Forestry of Sicily, under the Rural Development Programme (PSR 2007-2013) [11], the n° 322 "Village renewal and rural development" or the n° 323 "Carrying out the restoration of the cultural elements of traditional agricultural landscapes", are evidence of a change in the way of looking at the rural world. I quote from the objectives of the measure "recovery of the rural heritage in its various constituent elements to improve the quality of life in rural areas and the attractiveness of the latter for the local population, visitors, tourists and entrepreneurs." But preserving the individual elements of the rural heritage cannot be considered sufficient. It 's necessary to insert them into a network to create a system to ensure continuity over time of the individual actions. Structuring a system that is able to give value to the elements as part of a common history. Designing a strategy to approach the area as a whole and not only through its individual components. It will be necessary to take action in the recognition of the relationships and the elements, which will enable a compatible recovery and reuse of such elements. On the other hand, these measures are targeted at rural areas and not the peri-urban agricultural areas, areas in which agriculture is currently conditioned by the urban environment that develops around it and tends to spread, threatening the same agricultural activities that need to be retrieved and promoted through a process of social involvement, in the knowledge that the earth is a common asset and the exigency not to further consume the land which is a non renewable resource. The peri-urban agricultural areas are "still poorly protected from the political sector, despite the virtuous synergies that some experiences between the edge of town and the countryside can generate, for example in terms of short chain eco-system services...." With regards to this, it is reminiscent of the projects, of direct sales, managed individually within a company or collectively through farmers' markets, or "vegetable plot" projects in which the individual cultivates produce on their own, or even urban agricultural parks, or rather park models intertwine the preservation and protection of the territory together with the defence of the economic function of agriculture and jointly respond to the increasingly urgent demands of the urban community in terms of open space, which are accessible and rich in cultural values and new forms of consumption. In Italy some reference experiences (with different levels of implementation) are the South Milan Agricultural Park, the Agricultural Park of Asti, the Agricultural Park of the plains in Tuscany. [12]

4.2 Landscape design as a development strategy

The logic of the system of green green-belts, agricultural parks, greenways, green wedges, could be a way forward if the territories of transition are considered as an opportunity for development of the whole community and not as a limitation of the unlimited urban expansion. So these areas are considered an asset in environmental, ecological, cultural and identity terms, in the principal scenic areas of the territory. It becomes necessary then that the peri-urban agricultural areas are "recognized on a social, political and administrative level and that they are protected by actions and specific laws aimed at this type of agriculture", as outlined in the Charter for the peri-urban agriculture, developed in 2006 by the Italian Farmers Confederation (CIA). But right now this is exactly what is missing. Planning instruments of Sicily are too old to be able to manage the changes that the social and economic reality of our territories have experienced in recent years. The management of the land is delegated to the Prg which continues to demonstrates how ineffective its tools are in the management of change, far from the changing nature of the reality and too abstract and not very attentive to the multiple indications that come from daily life experiences. The territories speak through the signs that daily human activity produces constantly making and remaking the face of our living environments Fig. 9,10,11. And knowing how to listen and recognize the latent characteristics of a place often becomes the basis for proactive and targeted planning. A plan that is capable of focusing on the material and non-material aspects of this territory that "no longer considers the landscape as an added value compared to the processes of transformation and development .... But rather an inherent value in those processes that should be assessed and disclosed appropriately. " [13] A value that has also been reiterated by the Pac - Community Agricultural Politics - which identified the conservation and enhancement of the landscape as one of the main objectives to be

achieved. There is still no project of the rural territory aimed at harmonizing the economical, social and environmental aspects that produces the agricultural landscape within an overall strategy that can be integrated with land use planning [14]. And above all there is a need to structure processes and policies regarding the commissioning value of the peri-urban and agriculture land through collaboration between government bodies, farmers and residents.

The European Landscape Convention, emphasizing the need for governments to be become involved in the whole territory, of all landscapes, not just those of particular interest, defining the actions as being able to ensure the management of the landscape in order to guide and harmonize changes which are brought about by the processes of social, economic and environmental development. It provides dynamic management of the territories that should seek to improve the quality of the landscape according to the aspirations of the populations, through measures to enhance, restore or create landscapes. It also points out that the planning of landscapes concerns the formal process of study, design and construction by which new landscapes are created to meet the aspirations of the people concerned.

The Charter for the peri-urban agriculture, which partly reflects the principles set forth in the opinion of the EESC - European Economic and Social Council, which is another useful reference tool in regulatory matters. In fact it outlines the principles of conduct to which the public administration should aspire in order to define the planning and management criteria of the peri-urban areas aimed at protecting, upgrading and enhancing those particular areas, considering both the landscape and cultural characteristics and the agricultural-productive values, and the potential economical and social issues related to the concept of the multi-functionality of agriculture.

5. Conclusions

It is only in recent years that we have gained the knowledge that peri-urban open spaces are important to citizens who are increasingly searching for "landscapes" of open spaces and places where agriculture plays a renewed role in the production of goods and food near to the inhabitants, but also educational and multi-functional in a balanced relationship between development and sustainability.

With the entry into force of the CEP, the landscape was regarded as a tool to solve the problems of contemporary planners. The landscape has been laden with the mixed expectations of contemporary society and its development. Different definitions have been associated with the landscape in an attempt to catalogue a complex object which due to its polysemic character defies a single definition. In its preamble, the CEP emphasizes how the landscape is a cultural acquisition related to the perception of the people and as a result it is bound to their *uses and customs* and is closely dependent on the manner in which a population develops, lives and perceives their own territory. The landscape, then, as a palimpsest, like the continual writing and rewriting of a text that is the story of a society that by living in a space creates its own living area. Assuming this definition, there is a need to fix the meaning of landscape design. The landscape project cannot be an act of beautification and rectification of problems from the past. It's an act of planning the development of an area which manages to bring together the physical, economic, cultural, aesthetic, quality and social components. A project, that is not based on a finished pre-figured drawing, but a flexible development process that incorporates multiplicity and mutability [15]. A project that is based on knowledge and the rediscovery of values in order to build sustainable processes of re-designation of territories and the restoration of identity and dignity to the landscape. Which sees communities as protagonists in the transformation process and hence active partners in the planning strategy [16]. Only if the residents feel a part of where they live better will they be able to feel involved in the active plans and proposals to enhance and / or redevelop the suburban landscape with acts of shared protection.
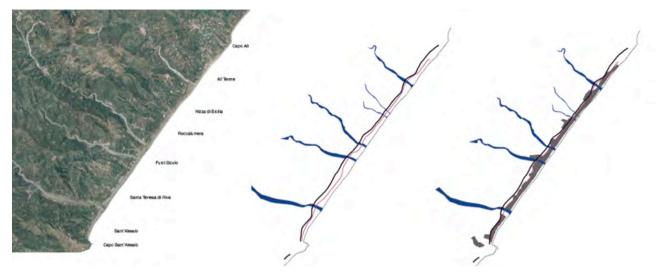
Fig. 1: The structure of the Ionian coast of Messina

Fig. 2: The new linear urban configurations

Fig. 3: Since the nineteenth century this territory was known as "the land of evergreen gardens"
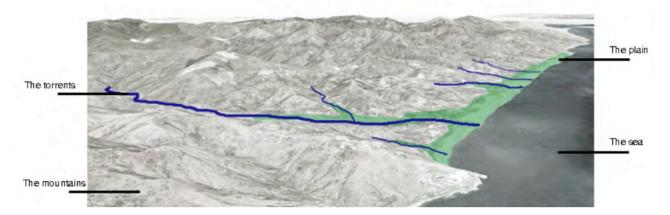
Fig. 4: The Ionian coast of Messina represents an important area of transition between hillside and coastal ecosystems

Fig. 5: The suburban landscape can be considered as an external "green belt"

Fig. 6: The peri-urban area is circumscribed and partly cut off by the infrastructure system of the motorway, the railway line, pipelines and aqueducts

Fig. 7: The residual nature of farming

Fig. 8: The fragmentation of the agricultural areas caused by the presence of incongruous activities or infrastructure

Fig. 9: The territories speak through the signs that daily human activity produces constantly making and remaking the face of our living environments.

Fig. 10: The multiple indications that come from daily life experiences.

Fig. 11: The latent character of a suburban area

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Drawings, signs and codes in landscape representation

Stefano CHIARENZA
Dipartimento di Progettazione Urbana, Facoltà di Ingegneria, Università degli Studi di Napoli "Federico II", Napoli, Italia
E-mail: stefano.chiarenza@unina.it

Abstract
The landscape representation is a complex process based on the acquisition of a whole range of aspects of perceptible reality and their transposition by significant graphic signs. This process can be considered as a graphic system of transcription, logically ordered that, by means and methods diversified, becomes a form of communication essentially visual and universally recognizable.
The impossibility to always use accurate mathematical projections as well as the need to express circumstances and peculiar properties of natural or anthropogenic elements - in fact independent of the projections - raises the problem of appeal to a class of conventional signs. In this domain of the sign, functions, syntax, meaning and practice are delegated almost completely to the designer who has to face a challenge epistemological and interpretative.
The management of complexity through the use of new media makes it possible today the renewed design of perceptive-spatial codes, able to make tangible the knowledge of the territory through signs that although a graphics reduction refer to broader meanings. As to say *less is more*. In light of these considerations, the paper tries to establish itself as a moment of reflection and synthesis of research activity still under development, aimed at testing visual-graphic signs and forms that explain a communicative function straddling the traditional themes of mapping and the innovative approach offered by the graphic-design.

Parole chiave: mapping, cartography, infographics, graphic design, graphic methods

1. Landscape representation as a complex process

Landscape representation is, historically, a complex process that involves a set of different problems. Indeed the creation of a map, at any scale it is produced, on one hand should overcome the inability to accurately represent the variety of natural or anthropic characteristics that constitute and characterize the topography of land; on the other, to solve cultural problems involving the proper interpretation of information. In other words, in reading a map it should be possible not only put the represented phenomena in proper spatial relationship, but also understand the role they play in events and human actions (socials, political and economic).
In the definition process of a map, that represent the graphic transposition of the land, then comes into play a complex chain of choices that moves from a real data selection - choosing only those true and reliable - to the definition of graphic choices, which must combine methodological rigor and readability, taking into account also semiological aspects.
In conclusion, the landscape representation is not referable to a mere instrumental realization but rather to an intricate path ideation, graphic design and processing control.
The performance of informative functions of the territorial map, at any scale and with any techniques it is made, being the visual translation of the knowledge synthesis from various disciplines (geography, geology, botany, architecture, etc..) binds so inextricably to a series of cultural aspects that govern the choices made and that involve multiple areas of science, also art and design.

Through such a cultural representation, the landscape takes shape and becomes perceptible and storable, allowing a thorough knowledge of all its tangible and intangible values: cities, countries, roads, monuments, hydrography, orography, etc., as well as flows of invisible relationships, human and social dynamics, and intangible phenomena. A complex reality, then, that is translated through a graphical organized in mental images, showing what no eye can see. The landscape representation, through an inevitable abstraction process, puts in front the magic of the concept and the charm of reality in a representative image in which being and appearance, the real and the reality concept become specular. Seen in this, the map "is transparent because it is a signified without a signifier. It vanishes in the visual and intellectual operation that unfolds its content. The map spreads out the entire world before the eyes of those who know how to read it. The eye does not see; it constructs, it imagines space. The map is not an object but a function. Like a microscope, a telescope, or a scanner, it is a technical prosthesis that extends and redefines the field of sensorial perception, or, rather, a place where ocular vision and the "mind's eye" coincide. As a mediation, an interface, it remains hidden" [1].

The act of interpretation in the cartographic representation is fundamental both in the definition phase which in the reading. To draw a map it is necessary to know the mental mechanisms of perception and interpretation that govern the response of the image in the mind of the reader. Instead, in decoding the map comes into play the individual culture: the territorial and spatial reading becomes a subjective interpretation of the viewer, albeit streamlined and oriented. In the modernly understood process of construction of the landscape's representation is therefore necessary to relate tightly two different forms of logic: that of the designer, based on scientific rigor and objectivity, and that of the spectator and his freedom to roam freely with his eyes and his thought. This means, as poignantly writes Jacob, to reconcile two ways of looking at the map, two points of view: one that considers its power of seduction "its status as an image, its oneiric and mythic implications, the reverie it suggests to the gaze whenever the viewer's eyes slip freely over its surface. This type of representation would seem to constitute a privileged space of projection for the viewer's desires, aspirations, and effective and cultural memories. The other thread follows the map as a rational construction an intellectual construction ruled by geometry, symmetry and the requirements of geographical knowledge: the map is an intellegible model, a device to be read, interpreted, and questioned as much as it is to be viewed" [1].

It then breaks the constrictive and exclusive bond between reality and representation, seen as a bijective correspondences of objective data. In mapping there is not mimesis. However the map has the power to reveal reality through a graphic log of correlations between two spaces - the real and the map space - apparently simple. It is in fact not only to represent measurable and mathematically defined spaces, but also intangible, real or desired. The mapping process is "creative, sometimes anxious, moments in coming of knowledge of the world, and the map is both spatial embodiment of knowledge and a stimulus to further cognitive engagements [2]. So, the map is a model of the real world made with a language that expresses the outlook of a social group and its interpreters. No representation can then be considered neutral, but rather focused on the choices that the coders make in the selection of various aspects related to the specific work aims, explicitly taking into account the perspective of the viewer. A representation that must be functional to the needs of users, now pointing to specific pathways, now going beyond other aspects or details.
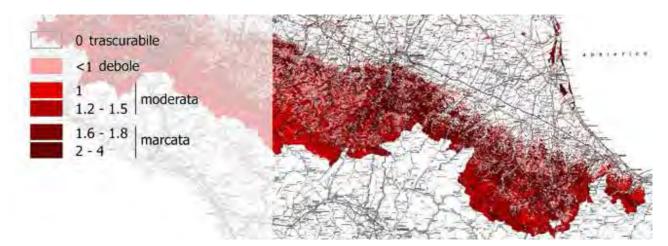
Fig. 1: Mapping of fire risk areas in the region Emilia Romagna. Highlighted in red, the potential fire hazard on the basis of territorial and phytoclimatic characteristics. Graphic from the Regional plan of feorecasting, prevention and active struggle against forest fires.

It is also impossible to distinguish the expression of spatial knowledge from its representation, and of course the recovery of this knowledge in unique ways.

If the metric properties are the basic mathematical character of a map, they represent only a small part of this, the visible expression of a more complex and dynamic set of relationships. In other words, the representation of the true size and shape of the world becomes the only objective data of a map that uses a set of abstractions - frames, letters, signs, scales, indexes, codifications etc. These forms, with their inevitable inconsistency, transmute the mental image into a spatial imagination far from objective.

In this sense, the process of research and identification by those who read the map goes far beyond the simple correspondence between symbols and key to symbols, coming rather true the recognition of model distinctive features, related to forms, spatial arrangements and mental associations.

2. From drawings to conventional codes and symbols

In the mapping process, it is therefore particularly important a semiological approach. In the chain from the empirical vision of the world to the mental schematization, abstraction plays a crucial role.

Places, paths, routes, distances, orientations, along with descriptive data, make the map a real database of relationships, that are simultaneously offered to read.

Among the consistent features of mapping are scale, framing, selection and coding. And metric scale is one of the fundamental aspects. Enlarging or reducing the space occupied by phenomena, alters a set of relations of meaning between them, their significance, underlining or making them even invisible. As noted Consgrove "scale selection and manipulation is thus a powerfully imaginative and generative act which at once records and sets in train chains of meaning and association in an active process of knowing" [2].

Framing and scaling are part of the map's mathematical projection that translates the three-dimensional real space onto the two-dimensional surface of the drawing.

And the abstract lines of the projection grid, visible or invisible, represents the first semiotic link between sign and signified, or between map and territory. Selection and encoding occupy this abstract space. The close connection existing between the metric scale of the map and the objects represented makes it impossible, in many cases, the use of exact projections, as well as, on the other hand, it is difficult to express graphically the peculiar properties that are independent of projections. It is therefore impossible to achieve a complete representation of phenomena (natural or artificial) without resorting to a set of conventional signs, even if it were possible their projection in true form and size. Even more evident when in a large scale, the gathering of information in small spaces would make the map - processed according to traditional projection methods - completely unreadable.
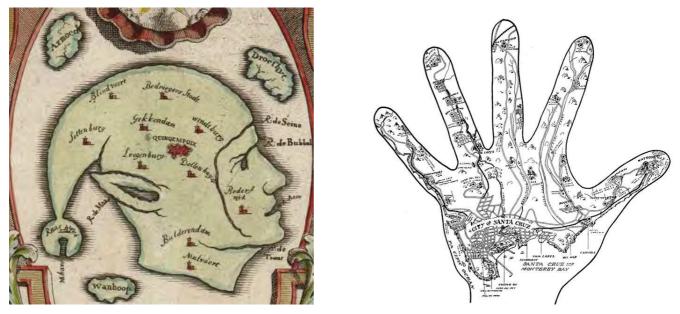
Fig. 2-3: The *Fool's Head Map*: a Fossil of the Financial Bubbles of 1720 (Amsterdam 1720) - Topical satire. It is not based on existing political or natural borders. The signifier and the signified are identical.
On the right: a pentadactylous map shows us '*A Handfull (sic) of 17 to 25 Mile Drives From Casa Del Rey and Casino Santa Cruz*'. Designed by Polly Hill (1912)
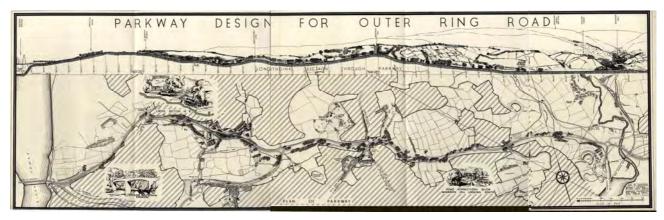
Fig. 4: Traditional plan and section of the parkway design for outer ring road – City of Plymouth 1943

The attempt to replace the multitude of words or drawings with representative signs that would be needed to explain exhaustively the character and qualities of the territory is already clear in the ancient and historical cartographic representations.

However, these are graphic reductions, sometimes in perspective, whose arbitrariness, directed to clarify specific conditions of the represented territories, was far from defining conventional signs. The necessity and undeniable convenience that such signs have proposed in the representation has determined their increasing use over time leading to further refinement and study of a wider symbology. A graphic reduction through signs that in the centuries has become a language, a real writing, easy, convenient and above all well-founded. An essential aid, but a real complement to the drawing, incomparably more appropriate to translate the intrinsic properties of objects, or of contexts represented, into mental images.

This language, although based on the reduction, however, is able to offer a set of information that sometimes the direct knowledge even can not give, and its semantics shareability defines the character of conventional code. The conventional signs, coded on an abstract and geometric basis, combined with evocative and symbolic signs, define together the interpretative key of the mapping and have gone through various ways throughout the history of representation.

The achievement of these results, in terms of communication, however is related to the depth of the relationship, in a rational level of visual perception, not only between the sign and the reality, but also among the signs themselves. Although the semantic language has always been historically and culturally determined, currently it is related to more rational signification's systems, is purged of cultural and ideological (political, religious, etc.) references, is studied and connected in order to achieve effects of readability and meaning's attribution that, while appealing to the emotional perception's sphere, with the expressive power that derives from it, leads to more appropriate understanding of the message, with a large ratio between the code and the message.

Fig. 5-6: Lay-out showing the growth of New York City from the beginning of the 19th to the beginning of the 20th century. Two examples of map produced by the Isotype Institute in 1944. (Images from the site www.fulltable.com)
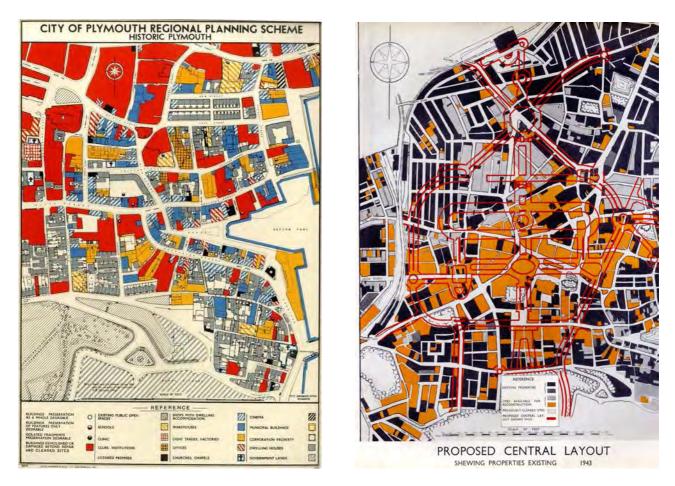
Fig. 7-8: City of Plymout. Historic center. Regional planning scheme 1943. On the right: proposed central layout. Shewing properties existing 1943

The experience of reality is so transformed through a semiotics which links the space represented to a possible image of the real one. And the translation possibility through signs and symbols represented on the drawn map's space are surely limitless, only bound by the effectiveness in terms of readability and comprehension. The map thus becomes not a simple graph, to be read diachronically and sequentially, but a visual document, which has precisely the character of the synchronic vision.

The cultural assumptions, including on the basis of a more efficient coding, however, appear crucial to the proper interpretation and map reading. However, today the graphic transposition of phenomena pursues the objective of allowing a reading that, even if subjective, cannot be considered arbitrary. In this regard, the expressive codes must take into account the laws of perception, ensuring that the signs have either the connection with the meanings, or a correct expressiveness towards users, them ensuring, through conceptual logic operations, to comprehend the represented space. Compared to the painted or photographic representations, which immediately lead back to what is depicted, the map, with its own signs system, is an elaboration that, to support utility and meaning, must necessarily be abstract. And this is the strength. The cards are "mental constructs, ideas that produce and make it possible the change."

3. New ways in representing the space of territory. A research perspective: graphic design and digital media in cartography.

The importance of cartographic language as a set of signs that can direct visual interpretation of reality to the point of redefining the system of relations between the elements that compose it, assume today even more weight. By the development of new media and infographic representation's technologies it is necessary not only to rethink the role of the observer-user (often specialized), but, at the same time, the role of the cartographer as interpreter of an increasingly globalized culture.

Fig. 9-10: On the left hand: the 1972 MTA New York City subway map designed by Massimo Vignelli. On the right: The 2007 kickMap of New York City subway by Eddie Jabbour

Without disregarding science and scientific method, in fact, innovative representation's processes of the territory are emerging. The mutation of the relationship between design and knowledge related to the use of new media, opens the possibility of combining the use of different resources from different domains, such as sounds, animated graphics, and images. The role of design - expanded to information design - is significant in its ability to reduce the cognitive complexity. And this not only in the production of knowledge, but also in the processes of diffusion and assimilation of the same [5].

The representation's process of the territory, intended as wide communication system, requires a theoretical and experimental work in which those involved are both designers and users.

The transposition of a large set of data into information is - as widely noted - one of the implicit aims of representation. The internalization, interpretation and use of such information by the user, transform it, instead, into knowledge.

It is then fundamental the way in which this information is presented. In this sense, the research's field related to the way of representation of the territory must extend to computer-based interactive visualizations. These can, in fact, convey a more complete understanding of a set of processes generally invisible. In particular, the graphic design based on the interactive presentation of information on digital media appears as a new frontier in cartographic representation. Interaction as "a manner of presenting information to a community of users in a non-linear way, i.e. as hypertext or information in form of branched structures composed of semantic nodes with choices for the user to move through this net of nodes" would enable new methods of presentation and understanding of the territory.

Perception studies in cartography, linked to sensorial stimuli, were applied, so far, mostly on print-based, using static resources (typography, illustrations, etc.). Their application in the domain of interaction design through new media would lead to an innovative design approach, which could be called "global". In this process, graphic design fits in a propitious way, because an effective communication depends on the use of resources intrinsically linked with the aesthetic.

A function that has been defined by Gui Bonsiepe as audiovisualistics or visual rhetoric [5] able to keep and maintain a high level of attention and curiosity of the users, contributing, through the clarity of communication, to the reduction of cognitive complexity.

Fig. 11: Innovative ways of fusing data and geography in dynamic, multidimensional maps. Carbon Emissions Map. (Diller Scofidio + Renfro, Laura Kurgan, Mark Hansen and Ben Rubin with Stewart Smith and Robert Pietrusko)

Fig. 12: *Just Landed*: Processing, Twitter, MetaCarta & Hidden Data. Analysis and display of data flows using *processing* software. (Image by Jer Thorp)
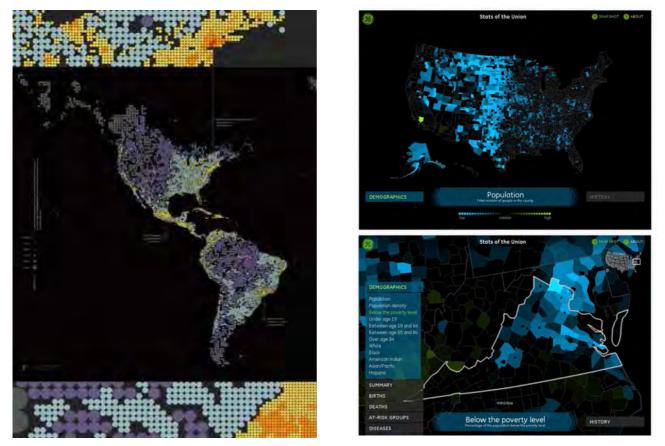
Fig. 13-14: On the left hand: *Dencity* - maps population density using circles of various size and hue. Larger, darker circles show areas with fewer people, while smaller, brighter circles highlight crowded cities (Produced by Fathom Information Design). On the right hand: *States of the Union* - iPad app for exploring data from the Community Health Status Indicators report. (interactive map produced by Fathom Information Design)
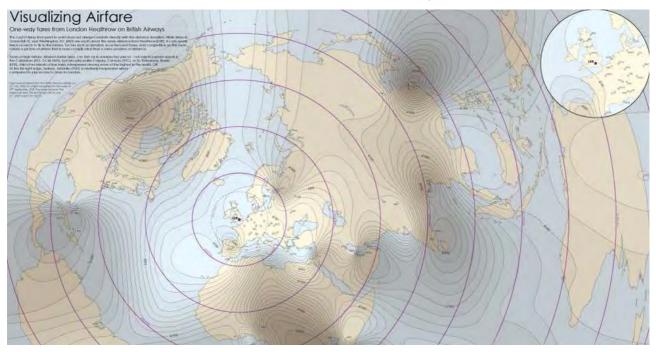
Fig. 15: *Visualizing airfare*. In this caGIS map design, Daniel P. Huffman collected fares for all 100+ direct international flights on British Airways out of Heathrow airport in London, interpolated a global surface, and threaded isolines.
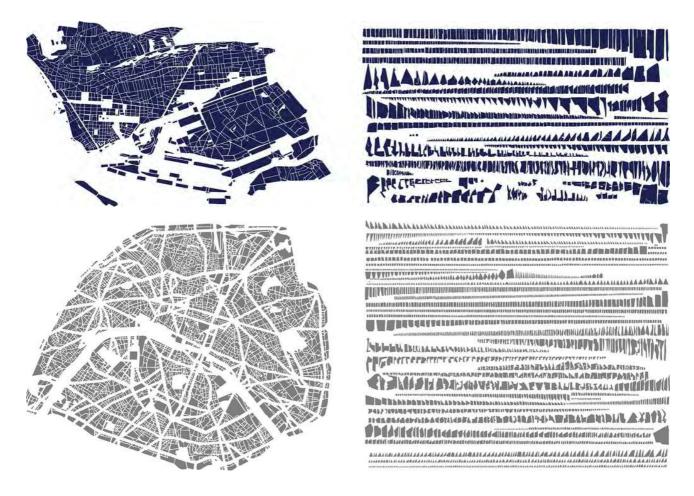
Fig. 16-17: Anagrammes graphiques de plans de villes. The city map is deconstructed, then reassembled in a taxonomical tableaux. From the top: La Harve and Paris cityscapes. Images produced by the French artist Armelle Caron.

An epistemological and interpretative challenge that graphic design faces by means of a cognitive mapping, structuring a set of information in form of text, sketches, videos, voice recordings, photos, illustrations, diagrams and animations using an interface that can be perceived, well understood and implemented by the end user. Obviously managing this complexity is a design problem. In the last two decades many researchers have turned their attention to the problems of visualization (however an old and familiar problem to cartographers). New research is also based on the animation, in the process of map design (eg. Di Biase, etc.) [10], and many related issues also involve latest research in GIS.

However it should be emphasized that that the characteristics related to the graphic design are largely disregarded in the cartographic approach and the projectual designer's experience is often considered insignificant, if not rejected, only giving preference to engineering aspects. By contrast, an integration of knowledge and experience, which takes into account the enormous aesthetic values implicit in the mapping process, would lead to a strengthening of cartographic product. An intellectual migration from the scientific to the artistic domain and vice versa, of considerable extent.

The aesthetic representation side, in fact, greatly influences the way in which this is able to be perceived, strongly influencing the readability. The researches by Bertin and Ostrowsky [9] represent, in this sense, pioneering examples of studies focusing on the profound relationship between graphic and mapping, the first in semiological sense, the second in the artistic connotations.

Established this relationship it is clear that the use of new media, by now become settled habit in graphic design, plays a crucial and innovative role in the representation of territory. The use of GIS programs, paradoxically, pulls away from more specific research applications, consolidating wrong aesthetic habits.

Certainly, a correct representation requires a scientifically rigorous design, but in mapping process it is necessary the balance of science, art and technology.

In light of these considerations, the present paper - without claiming to be exhaustive with respect to the issues addressed - then tries to establish itself as a moment of reflection and synthesis of research activity still under development, aimed at testing visual-graphic signs and forms that explain a communicative function straddling the traditional themes of mapping and the innovative approach offered by the graphic-design.

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Open Spaces of Public Use. Proposal of Methodology for their Classification

Aylin PASCUAL[1], Jorge PEÑA[1]
[1] *Faculty of Architecture, José A. Echeverría Politechnic Institute, La Habana, Cuba. Urban Studies Center of Habana, Cuba*

E-mail: apascual@arquitectura.cujae.edu.cu
jorgep@arquitectura.cujae.edu.cu

Abstract

Currently the presence of Open Spaces of Public Use (OSPU) becomes more and more diverse and gets higher relevance. The elevation of the qualification of the OSPU contributes to promote well designed, comfortable inhabitable areas and of high environmental value, contributing in great measure to the development of sustainable cities. The present article proposes a methodology for the classification of the Open Spaces of Public Use on the base of an integral approach. It conceives: the morph-typological, functional, socio- psychological and ecosystem based (urban ecosystem) dimensions. The starting point is placed in the established relationship between man and his environment which are defined by the interacting physical, psychological and socio-cultural elements. Additionally a theoretical model for the classification of these urban spaces is structured. The setting in practice of this methodology would allow the planner having the necessary analysis tools in order to determine the vocation of each OSPU. The paper presents the methodological focus of the present investigation which develops the proposal of a spatial model of relationships. It also reveals the interrelations between them. As a result, an optimal association of the elements is achieved. It integrates man's relationship with its environment in the analyzed spaces.

Keywords: Open spaces, typology, spatial model of relationships, man's relationship with the environment.

1. Introduction

The importance of cities has increased significantly over centuries. The spatial dimension of population growth during the recent decades has contributed to today is seen as critical for the future of the 7 000 million already registers the humanity on Earth. According to (Aboulnaga, 2011), is considered that 70% of the population lives currently in urban areas. This situation, influenced among others, by the migration process to urban centers, entails significant changes in relation to energy, water, food and materials consumption. They are also associated with increased levels of pollution arising the electricity generation, the creation of urban waste and transport emissions and other processes associate to urban complexity. They constitute additional causes of ecological and social tension important. For these reasons, cities are among the sectors of greatest influence.

The predominant trends of metropolitan expansion introduced contrary to the sustainability guidelines in the form and composition of the city. The presence of "megacities" is an example of this.

At the same time, the city starts to get distorted traditional compact compared to the pressures of urbanization. The "diffuse city", with an opposite structure to the previous, consumes potential areas for cultivation, generates an increase of distance and infrastructure and rises the demand of transport and energy. As a result, the urbanized area extends and modifies the surrounding natural areas and their life cycles, coupled with a deterioration of social cohesion.

The city as a collective is the place par excellence of exchange and encounter of its citizens and visitors, particularly in public spaces, which began to materialize and modified from the beginning in the socialization of men and progressive specialization of labor along the story. No one could speak without considering the city itself in its entire dimension because the public space is inherent to the conception of the city.

Fig. 1. Open Spaces of Public Use. Corner of Obispo and Aguiar Street, Havana, Cuba, 2012. Source: Authors.

Moreover, the public space is of secondary importance in the international public agenda. However, each day increases the demands of the inhabitants for incorporation into the city where they live, of outdoor spaces that allow for interaction between them. The city is committed by an upgrading of public spaces to solve the needs of raising the quality of life for its inhabitants. Following the established development patterns, contemporary societies are facing severe social and ecological crisis.

Therefore, the problem of habitat enhancement is one of the main challenges facing by the city. In that effort, clear understanding of the potential and limitations of the territory, especially against the subject of the various types of open space of public use, is one of the key challenges.

2. Materials and methods

The paper shows the results of an extensive literature review. It is part of a larger research that approaches the issue of open space planning and contemporary urban design.

The analysis draws attention to the activity of planning and urban design, linking it to the dimensions, variables and indicators considered. We designed a tool that facilitates the interpretation of open space systems as a promoter element of sustainability. The proposed theoretical model summarizes this vision of integration.

In the first stage we analyzed a set of definitions relating to urban open space and existing methods for its classification. The selected elements were structured systemically, for which multiple dimensions were registered by the authors. This theoretical and methodological base is transferred to the synthesis process, from the elaboration of a matrix that interrelates the issues identified. The matrix study correlates the elements of the proposed methodology for classification of Open Space of Public Use. The methodological approach points to the proposal of a Spatial Relationship Model, which integrates a set of dimensions, variables and indicators. Also has been possible to graphically illustrate the different aspects selected for analysis, and the interrelationship between them.

3. Results and discussion

Public space is a place of connection and identification. In addition to physical features, public space set the field for the deployment of imagination and creativity. The quality of public space can be mainly evaluated by the intensity and quality of social relations that facilitates its ability to receive and mix different groups and behaviors, and their ability to stimulate the symbolic identification, expression and cultural integration.

In the area of definitions, modern public space coming from the formal separation (legal) between urban private property and public property. However, the dynamics of the city and its inhabitant's behavior create public spaces that are not legally, or were not designated as such.

It is possible to develop different activities in open spaces that can be carried out in different types of buildings. Therefore, in this investigation the open space is handled as an property type, which basic physical characteristics, that distinguish it from other existing buildings in the city, are essentially it has no walls or ceiling.

Although the authors differ in the use of terminology, they agree that the open spaces contribute positively to urban areas. In addition, these types of spaces contribute significantly to three areas of urban sustainability, from social, environmental and economical point of view.

In this investigation the Open Space for Public Use (OSPU) is defined for all open space is intended for public use, accessible to all citizens and its legal conditions are considered public property.

3.1 Methodology for the classification of OSPU

Identification of the morphotypological dimension

The urban development process currently manages the buildings as isolated objectives in the landscape. Generally, the decision making process related to urban growth, is made from land use plans in two dimensions, without considering the three dimensional relationships that exist between buildings and open spaces, neither a real knowledge about the behavior of people in these spaces.

The grouping of urban open space into different categories has been occasionally addressed as a planning tool. Generally these groups have been managed on a typology or hierarchy of these spaces.

The best known of definitions related to the use of urban open space was developed about thirty years ago by (Newman, 1972). At that time, different categories for open space were listed: public, semipublic, semiprivate and private sectors.

Moreover, a study has been presented that address the visual and spatial aspects of urban environments, which are determined by the components: route, site and location. The route corresponds to the street and

can be considered as a space oriented to the movement. However, portal refers to the thresholds and transitions between spaces and between public and private areas (White, 1999).

There have been identified six elements related to the visual component of the urban environment in general. Therefore defined: locate, focus, scale, proportion, rhythm, and materials. (Cantacuzino, 2000).

In this regard, recent studies conducted by Spacesyntax Laboratory, relate the behavior of individuals and the use of space to the spatial properties of space, given by their morphological characteristics and visibility. This approach suggests that the best locations for stationary use unscheduled, are independent of the attractions or facilities of the space, however, could be associated with the visual properties of the person experiencing this stationary. It is argued that the configuration of space, particularly its effect on visual permeability, it is important for the generation of movement.

Other research on open spaces defined a hierarchy given by the size or the area it occupies. This includes small local park, local park, district park, metropolitan park, regional park and linear open space (Llewelyn-Davies Planning, 1992).

Some authors have argued that a hierarchical approach to the provision of urban open space fails to recognize the potential of smaller open spaces ensure to the experiences of different users and people who want to use the open spaces near their homes.

In physical terms, open spaces for public use are key components of functionality and ways of life in town. This shows the roll that carry out these spaces in the urbanization and in the quality of social life.

The network of public spaces is the component of urban space that allows the connection of one point to another in the city, spontaneous communication between citizens and the perception of the urban. The city as a collective is manifested primarily through its network of public spaces. The concept of open space should be conceived as a system.

Incorporating the spatial concept of Continuous Landscape, combined with the theoretical concept Productive Urban Landscape sustainable (Viljoen, 2005) proposed a new perception of urban scale landscapes, offering the city a wide range of lifestyle benefits of the population. These advantages will be marked in environmental, sociological and economic.

Referring to the open spaces in this research approaches the network of public spaces and others, which increase its public character through its incorporation into a coherent landscape strategy. It essentially depends on the level of access that these are granted.

Although sources differ on the use of terminologies, the authors presented propose a classification of open space from morphotypological concepts. It follows that the proposal is based on the classification of a first morphotypological dimension for the study of open space for public use.

Identification of the functional dimension

From a historical perspective, the space in cities has complimented three vital functions over time: a meeting place, market, and connection space. As a meeting place where the city was the scene going on exchange of social information of all kinds. As a market, the open spaces of the city were the territory where they carried out the exchange of goods and services. Finally the streets of the city supplied access and connections between all city functions (Gehl, 2001).

One of the most important concepts for the achieving of accessible spaces is the mobility. It involves the systematic application of the accessibility principles to those areas of the external environment enabling the development, use and enjoyment of it. In this century develops a more comprehensive concept of accessibility to the physical environment, which takes into account the removal of physical barriers, and also the psychological and social barriers (Cazanave, 2007). Studies show the public or private character of a space according to their degree of accessibility. In this case it doesn´t refers to accessibility in relation to disability, but the qualities that have the space to invite or not the individual's participation (Hertzberger, 2005). Figure 2

More recent studies conducted by (Llewelyn-Davies, 1992), suggest that the open spaces have seven functions: recreational, structural, comfort, environmental, social, cultural and educational.

It is important to point out that the multifunctionality of open space is its ability of functional transformation. A greater concentration and diversity of activities in an open space generates a greater radiate of influence. Therefore its position within the open space system becomes hierarchically more important because a multipurpose trip is always more attractive to the user.

The open space is related to other land uses from its functional interaction with the rest of the property, which is a determining factor in their locational logic (Ayala, 2007). It can take two forms. The first one is when the open space has a specific purpose, for example, its function isn´t directly related to land uses that surround it. The other case occurs when the open space is part of the functional relations of surrounding

land uses, then could be affirmed that open space is an extension of architectural space because its function is to vestibular others land uses.

The Continuous Productive Urban Landscapes (CProUL) assume open spaces used for urban agriculture as the main element, and they influence in a direct way on the development of the food system of the city. Thus, they increase the productivity of these not only in the economic order, but that they become multifunctional spaces, providing areas for recreational activities, with the ability to function as urban green spaces, access routes, and others variants.

These examples sustain that the authors make the classification of open space from the functionality, which corresponds to the functional dimension of our proposal for the classification of open space for public use.

Fig. 2. Urban center. Space of exchange of flows, services, information and communication. Barcelona, Spain, 2011. Source: Authors.

Identification of the socio-psychological dimension

The city is the society registered on the land [...]. (Lefebvre, 1968)

Since early 1960, many researches have been conducted that have focused their study in the field of environmental perception, and specifically in the perception of people in the urban environment. Early studies took into account the environmental image. These results reinstated the elements related to the experience of sense of place and lived, as experiences associated with the urban environment. Also explores how people perceive the environments and experience the places. Coupled with the concept of sense of place emerges in parallel the phenomenon of no place and other concepts such as invented or reinvented place, authenticity and values of the spaces.

The boundary between public and semi-public space is often difficult to determine, as a result of privatization, globalization and development of communications. It is important to pay attention to accessibility within the urban area. Also it is recommended for urban designers focus studies towards the concept of public life, which indicates an enhancement in the activities related to the sociocultural aspect of public life. The concept of social space (spaces that support social interaction and public life) have been identified, without consider if the public space or private space are actually publicly accessible. While planners have linked public spaces with public life, traditionally increasingly public life is related to private places (cafes, books stores, etc.) (Banerjee, 2001).

Fig. 3. Symbolic space that builds identity under the forms of ownership and roll. Mercaderes Street, Havana, Cuba, 2011. Source: Authors.

More recent studies show that this field has been supplemented by work on the symbolism and meaning in the built environment. Figure 3

(Lynch, 1991) first reflected on the legibility, where he studied on the base of direction and movement (mobility) of people within the city. Later he placed special emphasis on the issue of the mental image of the city. He proposed the concept of imagineability and the five physical elements that make up the city were identified: (path, edge, region, node and landmark).

(Choay, 1965) stated that "... from a social point of view, [...] is the quality of public space, its charm, accessibility, what counts, more than its gross dimensions."

On the other hand, (Gehl, 1996) advocates a typology for the classification of urban open space that organizes the activities carried out in public in three categories: required, optional, and social. It proposes a typology that takes into account the user as a fundamental element. The analysis focuses on the aspect of accessibility to these open spaces from housing. It´s determined by three sets of open spaces: residential, neighborhood and civic. The clustering in this type takes into account the physical distance which are the spaces from the housing. The second factor relates to the people with whom one might interact in these spaces, whether in order to spend time, meet or just observe. About the transition between these three groups of urban open space (for residential, neighborhood and civic urban open space) there is an increased likelihood that users will know every time a smaller percentage of other users. The experiences of these three groups of urban open spaces offer three levels of society: familiarity, sociability and anonymity. This classification pays attention to the study of a typology of urban open spaces from the user point of view.

People are important elements within the urban landscape, the roll they play as users of the city contributes greatly to the visual interest of urban spaces. That is why the movement and population diversity is an important part of the texture of the open spaces. It´s provided by the colors, sounds, smells, feelings, perception of space, the use and the appropriation.

Moreover, the public space should regain its rightful place within the structure of the city. In order to achieve this goal, (Carrión, 2007) proposed a classification taking into account the constraints that define these spaces: symbolic, symbiotic exchange and citizenship.

The importance of public spaces as a natural social control has been addressed by different planners as Oscar Newman and Bill Hillier. The first states that the social control of public space (defensible space) is essential to solve the problem of vulnerability of residential space, families and of the person.

A key issue to consider open space of public use at the scale of the city is the inclusion. A key strategy to ensure the use of these spaces by all is the heterogeneity, including the presence of different functions and users. This ensures safety.

Although most authors have considered important to the work from the dimensional point of view, urban design has four dimensions, where the time factor is the fourth dimension (Carmona & Tiesdell, 2007). This important aspect is linked to almost all aspects of urban design. Among them are the manner in which the environment is perceived, the manner in which the spaces incorporated meanings, how the new spaces are adapted to the urban context, and how robust are considered, the form in which case the transformation of the spaces over time, and duration in time that the design process might take, are aspects to consider.

As a result of this observation, we can say that many authors point to the study of urban open spaces from the viewpoint of social and psychological. In this sense, this research defines the sociopsychological dimension to the study of open space for public use.

Identification of the urban ecosystem dimension

According to (Rogers, 1999) to transfer the sustainable development paradigm to the problems of the city, which is understood as a particular ecosystem (urban ecosystem), we adopt the category of urban sustainability. The adoption of such category involves understanding the city as a complex system where multiple processes interact with their respective flows of energy and materials, giving it a metabolic character.

Moreover, the microclimate, the morphology and urban open space are interrelated. This correlation is of increasing importance because the levels of population growth, coupled with the processes of migration to urban centers leads to significant changes in relation to energy use, air pollution occurs in urban areas and therefore the effects of urban heat island tend to increase. Another determining factor in the current problem is the growing concern of contemporary societies prevalent product of environmental degradation and unsustainable development patterns that have been established.

As the city becomes more complex, for example when increasing the likelihood of contact between different carriers of information, internal organization increases and decreases the energy required for operation. Thus, the efficiency of the urban system significantly improves time to maintain or increase its structure requires less energy input. This situation is favored savings from complex models and compact city.

However, regardless of land use is an essential principle for urban sustainability, the best urban models from a holistic approach, not just those based in more compact patterns, because in such conditions, the ventilation and lighting interior is naturally difficult to solve. Urban models with land use coefficient between 0.25 and 0.6, using tall buildings mean (average between 2.40 and 4.10 floors) allow densities between 270 and 470 people per hectare and at the same time, promotes appropriate environmental conditions inside buildings (Gonzalez, 2011)

Without doubt, the most important concern is related to the indicator or green open space per capita today and tomorrow. In all cases it is estimated that their proper proportion contributes to solving the existing problems between urbanization and nature. This indicator provides the following benefits: involved in the rescue of aesthetics, landscaping, sanitation, hygiene and physical and psychic well-being of the inhabitants. Their determination is closely related to appropriate densities for each urban area, taking into account that the density should be directly proportional to the open space. Its calculation varies depending on the scope adopted in relation to the concept of open space and the elements that compose it. International standards provide a range of 8 to 12.5 square meters of green area per capita at least. Some authors consider that, at least 20% of the urban area should be green. However, even in the absence of an applicable standard for calculating the minimum urban green area on the basis of ecophysiological concepts, so some sources propose to take as a criterion psychosocial and cultural surveys in relation to green spaces for public use.

Are invaluable benefits of vegetation. The vegetation cover in urban areas ensures the regulation of its microclimates, noise and atmospheric pollution, air velocity, humidity and solar radiation. In this context, green infrastructure, which open spaces are a vital element to be their key container can be a way to mitigate these impacts through the local water catch basins to groundwater, the use of innovative technologies to limit runoff, among other precepts of ecological design.

Similarly, the positive effects are seen in the immediate context, depending on the morphological and physical and environmental conditions. Furthermore, according (Gonzalez, 2011) evapotranspiration capacity of the vegetation has, moreover, an effect on the conditions inside the buildings. Therefore, the microclimate control depends on the global and systemic vision of open space of public use.

In the man environment, sensory processes play a role. The effects and manifestations of physical environmental factors and their interactions are received through the senses as stimuli, producing sensations that are classified and interpreted according to individual characteristics of people. These perceptual judgments are assessments that are expressed as feelings of comfort or discomfort. Define the parameters involved in the evaluation of environmental comfort conditions, including comfort from the standpoint of visual, thermal, auditory, physical and social. It´s complex due to the multiplicity of factors interact, which feed the sensations perceived by humans. Among the variables are: to glare and light levels involved in the light environment. Furthermore, the insolation, air temperature and heating, the wind speed and direction affect the thermal environment. Influence the sound stage, vehicular and pedestrian volume, source-receiver distance, font type, noise level and type of pavement, while intervening in the environment geobiological air quality. Finally, mediate the physical behavior and social networks and mobility techniques, both pedestrian and vehicular (de la Peña, 2011).

It can be argued that the extreme environmental conditions affecting the welfare of the citizen. From this study warns that if these conditions are unfavorable, the capacities of people tend to diminish. Otherwise, if these are favorable, its capabilities will be developed.

The research findings show the close relationship between the perception of the natural environment and human health. It shows that people perceive green spaces in terms of specific dimensions, where some are considered more relevant with respect to the rehabilitation of people in a situation of stress. According to (Grahn & Stigsdotter, 2009), identified eight dimensions results in relation to sensory perception. In general order of preference set: serene, followed by space, natural, rich in species, shelter, culture, and social prospect. Shelter and natural dimensions have been related more to the stress. From a planning perspective, the results show that green spaces can be considered as contributing to the welfare of mental health.

This analysis helps to perceive the human as a being reactive to physical environmental factors, primarily in open spaces for public use. For this reason it is important underlying the Urban Ecosystem dimension to the study of open space of public use.

From the analysis of the published definitions regarding open space and existing methodologies for their classification can be stated that the types studied did not take into account a holistic approach to the study of OSPU. This provision suggests that a large proportion of the types studied were defined from the position of the planner. However, this research supports the view that the quality of urban life is related to the human dimension that takes the city for its own people.

As a result, are defined for the study of the Open Space Public Use, morphotypological, functional, sociopsychological and urban ecosystem dimensions, the variables and associated indicators, and the interrelationship between them.

3.2 Identification of dimensions, variables and indicators

Defining the spatial pattern of relationships

To survive, man must live in balance physical, mental and social environment (de la Peña & Díaz, 2010). Provided as a whole environment of physical and natural factors, aesthetic, cultural, social, legal and economic interacting with the individual and the community in which they live.

The man environment relationship is manifested in three areas: physical, psychological and sociocultural (Collective of authors, 1991). The first, as a place to live, consume resources and eliminate waste, psychological, and relationship established through the senses and allows the man to be aware of its existence and its meaning, while the sociocultural acts in shaping individual identity and social group.
From the exposed foundation, we propose a Spatial Model of Relationships integrating a system of dimensions, variables and indicators, which has been identified graphically, the different aspects selected for analysis, and the interrelationship between them. (Fig. 4)
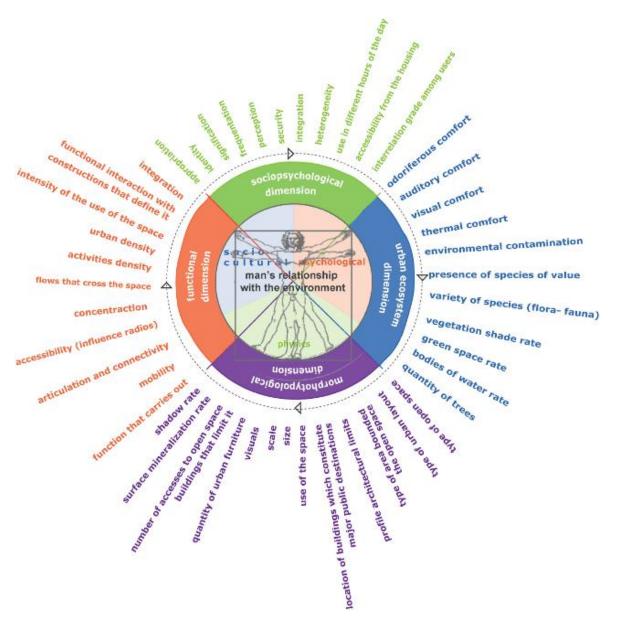
Fig. 4. Spatial Model of Relationships. Source: Authors.

4. Conclusions

Raising the qualifications of OSPU helps to promote well-designed living areas, comfortable and high environmental value, contributing greatly to the development of sustainable cities. The proposals presented in this paper are an analytical tool to better understand the classification of open space for public use in urban areas.

The model developed to graph the relationships established between the different dimensions, variables and indicators proposed in this classification. It contains a particularly attractive conceptual, visual and didactic. Especially emphasizes the systemic links between the issues discussed. It achieves an optimal association of the elements of man's relationship with their environment in these spaces.

In view of the continuity of research, the proposed methodology for the classification of OSPU will be applied to a case study. Its implementation will implement and evaluate the analytical tools necessary to determine the vocation of each open space of public use. On this basis we can analyze the contribution of this methodology for the planner to achieve greater assertiveness in decision making from the standpoint of planning and urban design.

Aylin Pascual González
Architect. Professor of the Faculty of Architecture at Polytechnic Institute José A. Echeverria, ISPJAE, Havana, Cuba.
E-mail: apascual@arquitectura.cujae.edu.cu

Jorge Peña Díaz
Architect. Doctor in Science. Professor and Dean of the Faculty of Architecture at the Polytechnic Institute José A. Echeverria. ISPJAE, Havana, Cuba.
E-mail: jorgep@arquitectura.cujae.edu.cu

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An example of integrated management of an heritage site : Bibracte – Mont Beuvray (Burgundy, France)

Vincent GUICHARD[1]

[1] General Director, BIBRACTE – Centre archéologique européen, F-58370 Glux-en-Glenne (France)
vg@bibracte.fr

Abstract

Bibracte is the name of the former capital of the Aedui, the powerful Gaulish people who occupied a vast area between the Saone and the Allier rivers during 2nd and 1st c. BC. Abandoned shortly after the Roman conquest, the site of Bibracte was rediscovered and intensively excavated during the second half of the 19th century. It thus became one of the key Celtic archaeological sites. Bibracte is also an emblematic place in French national history, as several major episodes of the Gallic Wars took place there. Bibracte has been the subject of an ambitious international research programme since 1985. The programme was lucky to benefit from the new dynamic in archaeology in France over the past twenty-five years, as well as the interest shown by François Mitterrand, a major public figure, in this historical site set in a stunning natural environment. Today, Bibracte is an original research and cultural setting, with high quality facilities established as part of the state's large-scale public works policy. Bibracte manages a European archaeological centre, hosting researchers and students from a dozen or so European countries. The centre is also a cultural venue and receives large numbers of visitors. This article aims to introduce the centre, which is unique in the sheer scope of its research, cultural and economic missions.

Keywords: archaeological heritage, cultural landscape, integrated management

Introduction

The concept of integrated management emerged at the same time as the idea of sustainable development, with the two concepts being considered mutually dependent. For obvious reasons, they have both been applied predominantly to environmental issues, with a symbolic milestone being reached at the 1992 Rio Summit. Since this time, these concepts have increasingly informed environmental policy and law, as is the case with [1], for example. Applying these ideas to cultural heritage would seem to be both obvious and necessary. Explicit mention of integrated management in normative documents relating to cultural heritage remains extremely rare, however. The founding documents of UNESCO concerning cultural heritage, for example, mainly drawn up before the 1980s, have not yet been updated to include this concept, and in French law, only landscapes (seen as cultural objects par excellence) are subject to integrated management under environmental regulations which will, from now on, be combined with town planning legislation.
Twenty years on from the Rio Summit, integrated heritage management is mentioned only rarely and inconsistently in the management plans of some of the sites on the world heritage lists, for example (c.f. some case studies in [2]), or in non-normative documents issued by international consultation bodies (such as the European Council in particular). This organisation has, in fact, been integrating the concept into the heritage arena since the 1970s and makes constant reference to it (c.f. The Faro Conventions [3]), advocating a systemic, integrated management based approach to heritage sites [4].
On a much more practical level, integrated management is rarely mentioned when management plans for heritage sites are being drawn up. The fact that the concept is not specifically referred to does not, however, mean that these policies do not advocate integrated management in practice; it is, for example, the underlying principle behind the French *Grands Sites* policy [5]. From a practical and operational point of view

this allows us to define as integrated management a formalised and planned management style which has as its primary objective the long-term preservation of a site's authenticity, based in particular on the knowledge and involvement of local communities on all levels.

The particular political context of the time meant that the management structure implemented at the Bibracte heritage site in the mid-1980s corresponds very precisely, in our opinion, with integrated management criteria, even though the concept is not specifically mentioned in the founding documents of the organisation's management. We hope that this report of our experience will contribute to raising awareness among heritage site managers of the potential of this concept, which guarantees a site's long term sustainability, while safeguarding the interests of community stake-holders.

Bibracte's triple identity: a site, a research centre and a museum

Bibracte is unique in that it brings together three complementary elements: a natural and historic site, a research centre, and an archaeological museum, which are all managed by one public body [6, 7].

Located in the heart of Burgundy, on Mont-Beuvray in the Morvan mountains, Bibracte was founded at the end of the second century B.C. by the Aedui, a Gallic tribe who had their capital here for a century. With its 12km of fortifications and buildings spread over 200 hectares, Bibracte is one of the best preserved and most characteristic of the late Iron Age fortified towns or oppida. It is also a site of historical significance, where Julius Caesar settled after his victory at Alesia to finalise his work on his Commentaries on the Gallic War.

Mont-Beuvray is a remarkable natural site, rich in beech forests and panoramic viewpoints which open onto protected landscapes (fig. 1, 2, 3). Since 2008, Bibracte / Mont-Beuvray has been listed as both an historical monument and a Grand Site de France. This title is awarded by the Minister of Ecology to organisations managing major natural sites in an exemplary way. Above all, the site as a whole is suffused with a site-specific atmosphere, experienced by all who visit.

Bibracte is a reference site for archaeological research on the Iron Age, benefitting from an ambitious research programme involving several European universities. Thanks to these archaeologists, the town of Bibracte, abandoned two thousand years ago and all but forgotten, is finding new life. Bibracte functions both as a place of fieldwork for researchers and students from a dozen or so countries, and as an archaeological park which is constantly evolving, allowing us to discover an unknown chapter of our history (fig. 4, 5). Bibracte also endeavours to operate as an experimental site for archaeological work, both in terms of museography and research methodology. Welcoming artists to the site is the result of a desire to explore new forms of cultural programming.

As the main introduction to the site, the Bibracte museum exhibits the results of the archaeological research which takes place here, and puts this work into perspective (fig. 6). Its aim is to demonstrate, using the example of Bibracte, that the inhabitants of 'middle' or 'temperate' Europe reached a major developmental milestone just over 20 centuries ago, by inventing an urban model unique to this area. The museum was built by Pierre-Louis Faloci in 1995. The materials used (stone, steel, glass and concrete) were chosen to embody the stages of human progress. The repeated motif of the square, visible in the building's fabric, evokes the criss-cross pattern of excavated landscapes. The deliberate choice of strong and simple geometric shapes, cinematically framing the landscape, definitively places the architecture in the modern era.

The site and its audiences

As a result of its triple nature, Bibracte is host to a very diverse set of visitors. First, we receive researchers, students and heritage professionals participating in scientific programmes at the European Archaeology Centre. These visitors are recruited on a Europe-wide scale, principally through partnership agreements with scientific organisations such as university institutions, public laboratories or museums which participate in the Mont-Beuvray research programme (fig. 7). They include several hundred individuals and complete around 8,000 working days at Bibracte per year.

The museum, meanwhile, welcomes over 44,000 visitors per year [8]. School trips account for a significant proportion of this number, with 8,000 children and teenagers spending at least one day at Bibracte. The remainder is made up mainly of family visitors, of whom 40% come from the local area, 30% from other regions of France, and the rest from other countries, primarily the Netherlands and Belgium. Among our visitors, those attracted to the Morvan area by its landscape are as well represented as those who come because of a love of heritage and history. In this regard, the breakdown of visitor numbers at Bibracte is somewhat different from that of museums in urban settings. We have demanding visitors who appreciate the quality of our environment as well as its archaeological content, and who are open to new initiatives.

The particular breakdown of our visitors can be explained by Bibracte's geographical location, and our location also means that we have to bear in mind a particular set of social obligations. Bibracte is located in a poor, mountainous area which has suffered from massive depopulation since the mid-nineteenth century as

a result of the combined effects of emigration and the carnage of the First World War. A region of landscapes clearly scarred by agricultural decline, where austere pine plantations have replaced the old pasture system, Morvan could be tempted to become more inward-looking. The Morvan identity, based on traditional music, language and customs has been reinforced over the last few decades. Paradoxically, newcomers from outside the region, including some from Nordic countries, who have settled in the region in large numbers since the 1990s have contributed a lot to this. Within this context, Bibracte exists in the role of a cultural centre for a local population with very few other cultural opportunities, which is why the museum's programme is not restricted to archaeological exhibitions (fig. 8). A concerted effort is made to produce alternative events related to artistic creation or contemporary issues, to welcome artists in residence, run multi-disciplinary festivals and arrange sessions with scientists, etc. This cultural openness also helps to demonstrate that archaeology is not a passive approach which can be counted on purely to feed into a traditional view of the land, but is rather an approach which can be used as a resource in support of current issues.

An organisation in charge of the integrated management of the site
Bibracte's recent history helps to explain the uniqueness of the organisation charged with the running of the site. In 1981, just after his election as President, François Mitterand initiated the launch of an archaeological research programme at this highly symbolic site of a short-lived Gallic union in 52 B.C., where Julius Caesar wrote the first history of the land which would eventually become France. There was another argument in Bibracte's favour; the site is located in the constituency which, 35 years previously, had returned Mr. Mitterand to parliament.

These exceptional circumstances explain why Bibracte received particular attention from the national authorities and why such a unique management structure was implemented here. The resumption of excavations in 1984 came about as a result of the involvement of various European countries such as Hungary and Czechoslovakia which had until then been isolated behind the Iron Curtain. At the same time, this new activity at the site was attracting an influx of visitors which needed to be managed. The site was eventually included on the list of *Grands Travaux de l'Etat* in 1989. A management structure in the form of a semi-public company having private legal status (*société d'économie mixte*) was put in place, bringing together state and local organisations to implement a significant programme of investments consisting of arranging the financial management of the site by setting up a public property of 950 hectares, and creating the facilities which were inaugurated by François Mitterrand in 1995.

The *société d'économie mixte* was replaced in 2007 by an *établissement public de coopération culturelle* (EPCC). This new type of public organisation was established by legislation passed in 2001 to allow significant cultural facilities such as museums and show venues to be run as partnerships. Under this system, the facility itself is managed by an independent organisation, with policy and financing arranged by a governing board which includes representatives from the founding bodies. This type of management structure has two principal advantages in combining the policies and resources of all the different bodies involved, and in creating a management structure where roles and responsibilities are clearly distributed between the elected representatives (who define overall strategy and direction) and the director (who has responsibility for the operational running of the organisation). In Bibracte's case, the establishment of the EPCC only reinforced the existing management structure which had been in place under the société d'économie mixte system.

Today, "Bibracte" is the name of a public body which simultaneously coordinates and manages:
- the Bibracte archaeological site,
- the European Archaeological Centre, and
- the Museum of Celtic Civilisation.

The main members of the organisation are: the French state, the Burgundy Regional Council, the General Councils of the Nièvre and Saône-et-Loire départements and the Morvan Regional National Park.

Bibracte directs all operations, including conservation and study of the site, as well as development and visitor management. This structure allows us to avoid the problems often encountered when a large number of institutional bodies are involved at the various stages of this process. Often, there are ministries in charge of ecology and culture involved in the legislation concerning protected sites, other ministries in charge of research and higher education involved in the management of researchers and students, yet more ministries in charge of culture, education and tourism who are involved in the management of public access, not to mention the different levels of local administration in a country where tens of thousands of public authorities share management of national policy.

In order to deal with the many roles fulfilled by the organisation here, the thirty-strong Bibracte team covers a very wide skill-base.

The Director General, an archaeologist by training, is responsible for research, training and cultural development. In addition to general administrative tasks, his three main roles are to coordinate the research programme, to plan cultural events such as exhibitions, and to develop collaborative partnerships. He has two assistants, one in charge of the operational management of the research programme, and one dealing with the cultural programme and communication. His team also includes a collection manager, a restorer, a librarian researcher, a photographer, a topographer, an education team comprising two permanent members of staff and 15 or so temporary/seasonal guides, as well as two administration assistants.

Logistics and landscape management is covered by 5 maintenance technicians, 2 purchasing and public marketing officers, 4 front of house staff, one person overseeing tourism advertising, one commercial assistant and one administration assistant. The logistics director also has the support of around 15 members of staff from sub-contracted companies who, between them, provide 10,000 nights' accommodation and 30,000 meals per year, site maintenance and forestry services, with around 5000 m3 of wood sold annually.

The staff is completed by a 3-person administration team.

The Director General is supported by 3 advisory committees.

- The scientific council comprises eight international experts who help to set scientific and cultural policy and ensure that this evolves as required.
- The site management committee takes decisions regarding site management and development and includes representatives from the relevant administrative bodies, such as the Ministries of Culture and Ecology.
- The site operating committee brings together all the local public operating groups which partner Bibracte in the area of tourism.

A sustainable management plan

The development plan drawn up for the site is the result of a process of trial and error [9]. The in-situ evocation of Gallic towns is always a challenge. Remains are never imposing and are extremely fragile, particularly in the (very common) case of the elusive remains of wooden constructions. In addition, the Bibracte site is spread over a large area covered by a very dense forest. The best time to see the town's remains, therefore, is when archaeologists are working in the field in the summer. This is why we have always favoured guided trips of excavations on the 'industrial tourism' model, demonstrating archaeologists' working techniques as well as the results of their work.

Following the restoration and development of various remains carried out in the 1990s, in particular that of the Porte du Rebout, one of the principal entrances to the town, it was quickly understood that these piecemeal interventions would not be enough to demonstrate the scale of the ancient town, or to communicate the characteristics of its layout. Consequently, a pilot research study was carried out, with the assistance of a landscape architect, with a report issued in 2006 under the somewhat provocative title La Mise en valeur des sites archéologiques invisibles [10] (Developing Invisible Archaeological Sites).

The study starts from the principle that, as the few visible historical architectural remains are spread over such a wide area, the 'natural environment' needs as much attention as the archaeological remains, with the forest, a significant feature of the landscape, being responsible for the 'magical atmosphere' of the site. There is a focus on the motif, or 'features', which should be the key detail of the context (the 'templum'), with the whole constituting a 'place'. There is, therefore, an emphasis on the following elements:

- The 'legibility' of the relief plans (the geographical scope);
- The clarity of the significant areas of archaeological interest. Each set of remains (motif) should be comprehensible without aids, should absolutely illustrate the precedence of the remains in relation to the elements which make up the modern landscape, and in relation to the development.
- The attractiveness of the 'spaces'. Each set of remains should be placed in a visually attractive setting.

These guidelines led to the establishment of a long-term forestry development project with the aim of opening up the topography of the town and creating a set of development scenarios (fig. 9). These development plans were all integrated into the programme, regardless of their size, from minor landscaping projects to excavations, consolidation of remains to the installation of more large-scale protective measures (fig. 10).

Summary

While Bibracte came about as a project conceived at the highest state levels, it is useful to remember that the current organisation and facilities are the result of largely empirical development, and of a history which has not been without its debates between the state, local politicians and archaeologists. The latter have often seen their plans restricted by the ambitions of politicians to the point where, at times, it could have felt as if the management of the site was slipping from their control. We should remember that the archaeologists who carried out the first excavations here in the mid-1980s could never have imagined the eventual scope of the organisation. Bibracte has benefited from a happy set of circumstances, and the excellent intuition of particular individuals. The research programme was lucky in that it was forced to internationalise (due to a lack of French specialists in the field) just at a time when the European project was on the lookout for symbolic initiatives. The management structure which was meant to be a short-term solution while building work was completed proved to be sufficiently robust and efficient to be sustained for 15 years.

This atypical journey has created a unique facility, which is paradoxical in that it combines elements which are usually, if not opposed, then certainly dealt with separately. These include:

- The local and the international - A strong link to the Morvan heritage site and operations based on resolutely European scientific research networks.
- The cultural and the rural - Bibracte is the only example of a cultural facility conceived at the national level and established in such a rural setting, with fewer than 50,000 residents within a 50km radius.
- Cultural heritage and the environment - Bibracte / Mont-Beuvray attracts as much attention for its environment, with its ancient forest, in a protected hedged-farmland setting, as for the archaeological remains of the largest Gallic settlement of Caesar's time.
- The scientific and the economic - Bibracte is a complex organisation which combines the conservation, study and development of a site with cultural and educational aspects and whose research activities contribute to the constant revitalisation of the tourist experience.
- Local and national politics - The state and the Ministry of Culture are, without question, the most significant of Bibracte's public partners, but local organisations such as the regional, departmental and regional national park bodies are also closely involved in its management.

We can view Bibracte as a sort of laboratory, where we experiment on ways in which to deal simultaneously with archaeological research, heritage management, international cooperation, and reinvigorating a rural area, using an integrated management structure linked to a symbolic heritage site. The experiences of the past 25 years at Mont-Beuvray, including successes as well as difficulties, have produced a valuable knowledge base which, in our opinion, bears witness to the value of this management structure, considering conservation needs, the knowledge of experts in the field, and the ownership needs of the local community.

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Illustrations

Fig. 1: Mont-Beuvray (Burgundy, F), the site of the ancient Bibracte (© René Goguey)
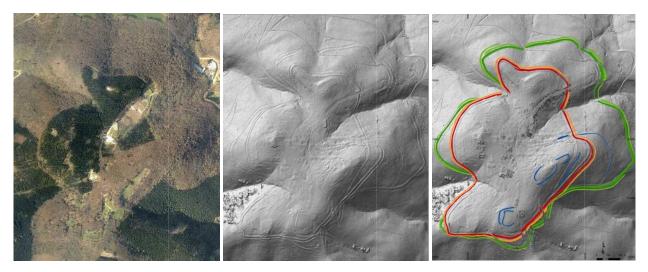
Fig. 2: The main archaeological features of ancient Bibracte are its two lines of fortification, well visible as limits of vegetation and as topographical anomalies on LIDAR survey.

Fig. 3: The forest covering the remains of ancient Bbiracte (here the steps marking the location of the inner line of fortification) creates a unique atmosphere which contributes to the attractiveness of the site.(Antoine Maillier ©BIBRACTE)

Fig. 4: The *Centre archéologique européen*, with the construction site of its extension devoted to the central store of archaeological finds from Burgundy (architect: Pierre-Louis Faloci ; Antoine Maillier ©Bibracte)

Fig. 5: The site of Bibracte is organized as an archaeological and natural park, with the museum located foothills operating as an entrance.
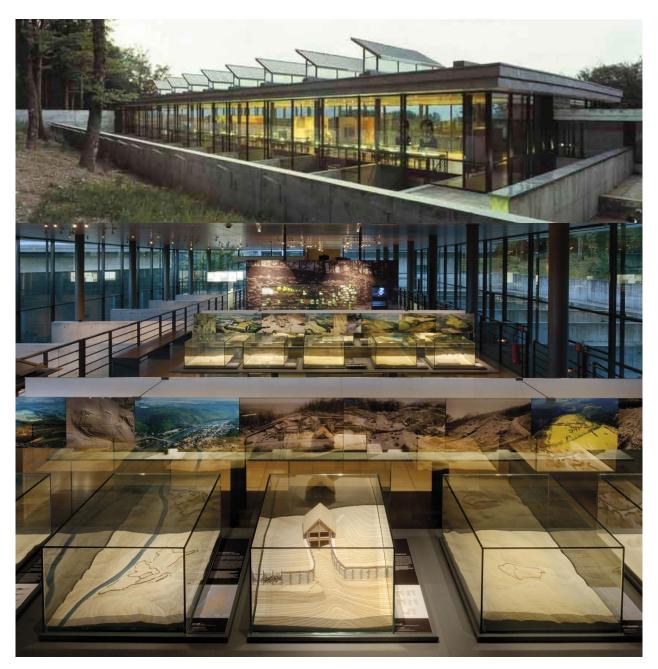
Fig. 6: Outer and inner views of the museum of Bibracte (architect: Pierre-Louis Faloci ; ©Daniel Osso & Antoine Maillier ©Bibracte)

Fig. 7: The archaeological research project on Mont-Beuvray brings together teams from ca. 10 European universities (Antpine Maillier ©Bibracte)

Fig. 8: The cultural program of Bibracte comprises archaeological temporary exhibitions, artistic performances and a biennal festival, *Repérages*, bringing each time artists from a different European stage (Antoine Maillier ©Bibracte)

Fig. 9: The evolution of the landscape of Mont-Beuvray from the original situation (2005) and as it is planned in 2012, 2025, 2090 (©Claude Chazelle / Bibracte)

Fig. 10: The shelter designed to protect an area of architectural remains of major importance – those of a mid-1st c. BC forum – built without foundation and made of a frame whose pieces weigh only 42 kg each (architect: Paul Andreu ; Antoine Maillier ©Bibracte)

Mythical landscapes: The Garden of the Villa "Ariadne" at Knossos.

Zanon Flavio, architect, Ph.D.
Ministry of Culture and Tourism, Heráklion, Greece
skoutzan@otenet.gr

Abstract

In this essay is presented the construction of the residence and garden of the man who revealed the Minoan civilization to the world. A discovery, done by Sir Arthur Evans, which was undoubtedly a multifaceted cultural occurrence; a total of events touching upon archaeology as well as architecture. The house, once likened to "an English bungalow from British India transported to Crete", has been analyzed in full interrelation with its particular Victorian-Edwardian garden, being one of the few examples old Mediterranean gardens in Greece.

The building's construction has been presented through the architect's diaries and drawings, comparing the endeavor against the hermeneutic definitions of his German colleague H. Muthesius, on what constitutes a British home. At the same time the most important trees and plantations of its garden have been catalogued and examined in the light of the exotic, pictorial and mythic influences emanating from the discovery of Knossos; as suggested by the house's name 'Villa Ariadne'.

Subsequently there is a short reference to the actions taken recently towards establishing the Villa Ariadne's garden, as a listed monument; a process that for long time has been neglected in Greece but recently has found the way to confirm itself.

Keywords: Greece, Historical gardens, Myth, Paintings.

1. Sir Arthur Evans and Knossos

The Villa Ariadne and its garden were constructed from 1906 to 1907, adjacent to the Minoan antiquities of Knossos. The general planning was carried out in accordance with the wishes and suggestions of Sir Arthur Evans; the area's principal archaeologist. The building's implementation as well as the technical drawings (Fig. 1) was made by the English architect Christian Doll. There are also architectural drawings detailing the irrigation system with its water reservoirs, but there are none to indicate the precise location of the trees, shrubs and paths. This fact allows for interpreting this design shortfall as the result of an accepted and established perception of landscape design, where different depiction techniques in descriptive geometry prevail.

Reference is made here to perspective drawings or pictorial representations as primary tools for garden/landscape design, as established from the picturesque era. Thus in designing gardens the
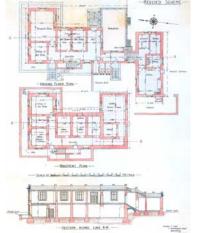
Fig. 1: C. Doll, Plans and section of the Villa "Ariadne", 1905.
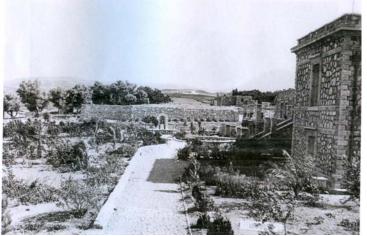
Fig. 2: View North of the main façade of Villa "Ariadne", after 1907.

architectural plan was deemed not as suitable as the perspective representations which often manifested as paintings.

Yet in the case of the villa there was in addition on behalf of the owner – possibly in the sweep of a naturalistic attitude similar to that of William Robinson – an approach of a more personal nature. Evans' recorded experiences with regard to the flowers of Crete prove exactly what could be characterized as a late-romantic inclination with almost ecological overtones towards nature. [1] Such tendencies have apparent affinities with the studies of Gertrude Jekyll. Well known are her often geometric flower beds where by employing free movement and color combinations, placed plenty of plants and flowers, in an attempt to embrace as many species as could be encountered within a natural setting. [2] Approaches similar to either Robinson or Jekyll, without the help of architectural drawings were employed under the instruction of Evans, consciously or not, in realizing the general concept of the villa "Ariadne" (Fig. 2). The above can be claimed with enough conviction, taking into account his purposeful personality evident in other matters where he could have simply put his trust in expert professionals. Besides, there are several testimonials about his difference towards the decisions of his engineers. [3]

This particular element of Evans's personality corresponds to the interpretations of the German architect Hermann Muthesius. At approximately during the same period as the villa's construction by Doll and Evans, Muthesius argued that each Englishman constructs his house for himself. As a general rule no elements of grandeur are added. Moreover, the last goal of the construction process is to render the house and its garden as a whole. All three characteristics correspond exactly to the conception and construction of the villa "Ariadne". The fact that the villa, beyond Doll's professional involvement throughout, was the product of the owner is evident by the alteration, for example, – the architect called it a *distortion* – he demanded in the kitchen floor. For this reason the greater weight in the conception and selection of the trees could justifiably, according to Muthesius, fall upon Evans himself. The whole endeavor for the British villa confirms the views of the German architect; especially the notion that the British owner does not wish to break from a morphological rule in fear of eccentricity. The only decorative elements could manifest only in a renaissance fashion, often seen on columns and their upper moldings. Doll, true to this tradition, would become involved in Cretan themes: for the upper moldings of the villa "Ariadne" he would measure the moldings on the walls of Candia, attributed to Michele Sanmichelli, and work them into his own design. [4]

2. The garden of the villa 'Ariadne'

At this point we revisit Evans' intervention in the Garden. In fact the first noted intervention by the categorical owner with regard to the garden's design is his alterations concerning the circular flower-bed by the entrance and the road/path for accessing the garden. Subsequently prior to his departure for Rome, Evans would pass on instructions to the architect regarding the kinds of plants that were to be ordered from Athens. These would become, besides the strict observations of his client, another source of unease in the life of the overseeing architect in Crete. The plants arrived on the island in March 1907 by sea after a difficult journey that caused him even greater unease. [5]

The basic species of great trees that were planted soon after, belong to the genera of *Cupressus, Pinus, Phoinix.* The *Cupressus sempervirens orizontalis, C. verticalis* and the *Pinus brutia* pines essentially functioned as windbreakers on the northwestern and eastern border respectively. Singular exception among the latter species are three impressive examples of *Pinus canariensis* planted in the planting-beds of the main entrance.

In the same planting-beds lie most of the garden's tree 'protagonists': the palm-trees. This family is represented by the species *canariensis*, *theofrasti* and *dactilifera* along with the impressive *Washingtonia filifera* (Fig. 3).

Fig. 3: View from South - East of main façade of Villa "Ariadne", 2004.

Most of them have been planted in the largest ellipsoid planting-bed, delineated by a hedge of *Pittosporum tobira*, where opposite the main entrance Evans placed a statue of the roman emperor Hadrian. These hedges' role in the original design was just this: to accentuate the plant-beds' outline. This morphological decision, confirms the aforementioned tendency to design in the manner of W. Robinson or G. Jekyll; that is, determining points in the garden where within the confines of geometrical planting-beds seasonal and non-seasonal plants alternate. Unfortunately the singular reference to be found concerning their species lies with D. Powell. [6] Her account though is general and descriptive of a state of the garden during a much later time than when it was closely overseen by the famous archaeologist. When the film critic, was describing the planting-beds, the garden had already begun to show the signs of poor maintenance. The most sensitive plants (herbaceous plants and bulbs) in Evans' time, which may have been either anemone or tulips, admired by him during journeying in the Cretan countryside, have not survived. [1] The sole plant, again with ideal references to G. Jekyll's favorite plants that impressively survives without watering during the summer months is the species *Vinca major* that blooms in early spring.

In conclusion this Victorian garden's essential character is mediterranean: a place with shaded pathways made of cobblestones, instead of the large areas of grass typical of English gardens. Even the *pittosporum* hedges, purposed to encircle the planting-beds and which grew into large shrubs once free from the limitations of pruning, today offer valuable shade to the rare visitors. For this reason the areas for rest and outdoor gatherings were the villa's western and eastern verandas. In the first of the two there is indeed one of two grandiose examples of *Bougainvillea*, providing protection from the sun. The other climbing plant has completely covered half of the so called 'pool' area.

Again, from the testimonials of D. Powell we can find references to some other species of plants that she observed during her first stay at the villa, in 1935. At first she identified hibiscus (*Hibiscus ssp.*) and jasmin (*Jasminum officinalis*) on the eastern veranda. These species sadly are no more in the garden's present state. Also lost from the flowerbeds by the entrance, as shown in photographs from the Ashmolean Museum, an *Araucaria bildiwillii* and at least two *Yucca gloriosa*. Further along her book Powell makes note of pomegranate trees (*Punica granatum)* and *Plumbago*, present even today. Among the clusters of palm trees, in growth at the time, Powell observed rose bushes (*Rosa ssp.*) and *Lonicera caprifolium*, although there is no reference to the areas where irises (*Iris ssp.)* grow today. These were widely spread at the time due to the preference shown towards them by the Turks during their presence on the island. Despite the fact that, as evidenced by the correspondence between himself and his half-sister, Evans loved irises either wild or cultivated there is no testimonial on whether their planting was the archaeologist's choice. [1]

3. Mythical landscapes and painting

Undoubtedly, in the conception of this garden there was a strong element of naturalism as well as an innate exoticism with regard to the uncommon, for an Englishman, Mediterranean species that were chosen. Yet the mythical component in its creation was probably the basic theoretical and aesthetic foundation. In fact the first direct correlation in this hypothesis is the name of the mythical king Minos' daughter, given to the villa in the midst of the garden. As for the inspiration which informed the selection of the palms, pines and plants in general, one could suppose that it originated primarily, beyond mythology, from painting, literature and Evans' own travels.

Initially, there will be an isolated examination of the following pair of trees: palm trees and cypress trees. This pair has been, since the renaissance a codified image, a symbol of the flora of the East. For example, one can refer to the paintings "St. Mark's sermon in Alexandria" and "Venetian ambassadors in Damascus" by Giovanni and Gentile Bellini respectively (Fig. 4). These were representative of many eastern models – to be transmitted to the west – within a very wide group of paintings which stand out on account of their artistic excellence. In the first painting to the right of the church, which resonates possibly with that of the "Twelve Apostles" in Constantinople, one can see a palm tree. In the second painting – with reference to the vertical architectural elements of the minarets – appears another palm tree next to a cypress. In both Bellini paintings the species *Pinus* and *Cypressus*, which are characteristically correlated with the surrounding built space, represent the exotic flora.

It is the exact association with the names recalled to memory by the paintings, along with the corresponding far away travels: the names Alexandria and Damascus. The references from mythology and literature to these two species are innumerable. The focus here is painting because despite the non existent mythical and literary evidence in the case of the villa, it is our belief that Evans was a visual type. Thus the stressed point becomes clearer: garden design of the era in question was based on painting. A further supporting element to the present thesis is the archaeologist's love for his collection of paintings kept back in Britain. Such was a passion he was unwilling to be deprived of in Crete. In fact, his insistence to install railings for the display of canvases, in a house designated for archaeological research, confirms his devotion to paintings and by extension to art. [7]

Fig. 4: G. Bellini(attributed), Detail from "Venetian ambassador in Damascus in 1511", Louvre, Paris.

Fig. 5: J. W. Turner, The golden bough, 1834. Clore Gallery, London.

Essentially the theme of palm trees and pines provides us the opportunity to confirm an interesting spiritual dichonomy in Evans' personality. Reference is made here to the mutation of elements from the official, actual History into his own. This is has been noted in reference to the historical archaeological area of the Minoan palace, with the example of the naming of the 'Royal Villa', which of course refers to the villa 'Ariadne', and consequently also confirms the rule. A similar identification has been made in the case of the two species of trees. There is a relevant description on Minoan planting in a passage within the first tome of Evans' foundational book "The Palace of Minos" (1921), years after the initial plantation works at the villa (1907). The passage relates that near the "North Entrance" of the archaeological area, in Evans' opinion, there were terraces on multiple levels like in Babylon. In consistency with the popular exotic-orientalist frame of reference, the terraces were planted in the manner of the fabled hanging gardens. The hypothetical trees which he envisioned were palms and cypress; the same species that he had planted at his villa. Evans considered the terraces by the North entrance to be planted according to the temperament of the Minoans which in fact coincided with his own. [8] A personal identification which in the case of the palm trees had an actual historical connection: the palm tree – possibly *theofrastii*- depicted in the fragments of the "Throne Room" fresco, one of the first important finds to be unearthed during the first excavation at Knossos, in April 1900.

The other large group of trees that figure prominently alongside the palm and cypress trees are the pines. Concerning the symbolic correlations which determined their selection, the particular Greek species planted mainly along the principal road leading to the main entrance to the villa as well as at the area of the "Taverna", there will be relevant reference made. The hypothesis here is the potential design of a romantic garden in the world of French-English painting of the 19th century. In presenting such correlations it is important to stress that a defining factor in the unfolding of events, including archaeological ones, was the particular zeitgeist; regardless of whether such influences were perceived or not by the persons involved.

The *Pinus brutia* which were planted on the edge of the main road and in the space surrounding the "Taverna" are very similar, owing to their umbrella – like crown, to the species *Pinus pinea*. They are remembered from the time of Lorrain, in the landscape paintings with their well known silhouette invoking the "Mediterranean country where lemons bloom". Such a symbolic at first, image later found response in English painting; specifically in the following paintings by Turner: "The golden bough", "Landscape: woman with a tambourine" and "Child Harold's pilgrimage". A defining example for the use of these 'key' trees, charged by their symbolic significance or for their reference in literature, also relevant to the theme of travelers to whom Evans belonged, is the aforementioned quotation from Wilhelm Meister. In fact, since the renaissance lemon trees along with the other citrus fruit were trees that recalled to memory Arabia and the Indies from whence it originated. Following this list of trees in painting, from the shiny illustrated orange leaves of Botticelli, through the dark forests of the 'reformers', we arrive at the luminous pines of Turner (Fig. 5). These trees were used as symbols in the Renaissance; now they have acquired a new dynamic relationship with the landscape of Romanticism.

Fig. 6: The *Pinus brutia* trees leading to the main entrance to the villa.

If this image of the 'Pines of Rome' – or the Roman fields and by extension of the Mediterranean – was the debtor for the aforementioned linear planting along the main road, as sole evidence we have Evans's journey to the 'Eternal City' just a day after he gave his instructions regarding the trees of the villa. It is appealing in some way to combine the prospect that images from the landscape and gardens of Rome may have contributed at a later time in informing the design of the road in question. With the method of induction, this design hypothesis would yield the following information: the linearly planted *Pinus brutia* (Fig.6), compared to the plantation of 1907, found their place in a later period than the other plants. Either way the correspondences with Rome in the garden would become more apparent and glorious in the instance of the Roman artifacts uncovered by the English archaeologist and arranged there. Instead of placing, for example the orientalist chinoiseries of the common large parks, here were the archaeological artifacts found in situ; because Evans's references gained strength from the same exotic – as an English traveler and archaeologist – material of the area.

Rightly following the description of the archaeological fragments one couldn't omit mentioning a more casual although equally decorative element for such a garden, such as the exotic bird cages. Indeed placed under the giant *Bougainvillea* to the north there are empty cages that possibly housed the first peacocks which today roam free and reproduce within the archaeological space south of the residence. Beyond the naturalistic meaning that peacocks exude, the value of their presence in the garden of "Ariadne" had once again connections with painting.

In general, from Roman times until the Renaissance, the peacock form would decorate reliefs and paintings. Originating from the Indian forests, its presence in works of art was justified due to its incredible beauty, but also due to the multiple levels of interpretation which the peacock made available to the artists. Reference has already been made to the Bellini Venetian family of painters in relation to the theme of palm and cypress trees. For many of Evans's compatriots – such as Ruskin – Venice was a part of the East in the West. Therefore concerning the popularity of the peacock in paintings we have adopted the example of the "Barbarigo Altarpiece" by Bellini, as being the most germane to the British enthusiasm for the 'Most Serene'; without forgetting later, and more contemporary with Evans, works featuring peacocks such as the "Grand Odalisque" by J. A. D. Ingres or the "The Visit of the Queen of Sheba to King Solomon" by E. Poynter.

4. Conclusions: Historical gardens in Greece.

In conclusion, in the overall case of the Knossos archaeological space – a life's work for the traveller – archaeologist Evans, exemplary
of the cultural and political class in which he belonged – the restorations, reconstructions, the designs for the villa and its garden, are elevated to a compete work; A work of archaeology, architecture, landscape and, with the appropriate differentiations, of Art. We have seen the determinative influence of painting upon the concepts of design for the garden of the villa 'Aridne', as well as on the issues of restoring the Minoan antiquities or on Evans's references in the archaeological content of the four volume "The Palace of Minos". Most of these refer to the management of painting terminology; specifically to "rosso veneziano" or the art style of certain artists such as Tiepolo and Longhi, for example. [8]

Along with the naturalistic trend and pictorial attitude, in designing the Victorian-Edwardian garden of "Ariadne", one detects another long-standing link: the selection of flora based on the prehistoric myths which clothed it; as in the instance of the palm and cypress trees, the hypotheses surrounding the discovery of the 'Throne Room' fresco, or the descriptions of hanging gardens.

At this point, regarding prehistory, we will make a final reference; this time to the book by the great anthropologist James Frazer: "The Golden Bough". The book was published in 1915, a few years after the grand restoration – reconstruction of the "Grand Staircase" in Knossos. [9] The title of the book, which analyzes events or themes "shrouded in darkness and mist" such as the structure of Magic and rituals or sacrifices, refers to the myth recounting the descent of Aeneas into the realm of shadows while bearing a golden bough. In this example, in Turner's painting, a symbolic merging of all the basic elements of this garden's design takes place. The case of the ancient fresco featuring the palm tree, belonging to a room in which possibly initiation rituals tool place, could be an object of study in Frazer's "Golden Bough". With the painting in question, the present paper's account is amplified by the presence of *Pinus pinea – Pinus brutia* which frame the scene (Fig. 6).

With the aid of the short story by Virgil via Frazer, we could bring our hermeneutic analysis to completion, with the following metaphor: in the eyes of Evans his garden assumed the appearance of the *golden grove nemorense*, though in Crete. The balanced placing in a pictorial spirit of the large trees, such as pine and palm trees, was linked to their mythical allusions not to the name of Diana but to that of Ariadne.

Considering all the involvement of literary mythology and painting in the design of this garden, the serious issue of its protection needs to be put forward. In Greece the presence of historical gardens is not quite substantiated. Firstly one observes their total absence from the landscape. In my almost fifteen-year stay in Greece, I have only come across five instances of gardens which truly fulfil the term 'historical'. If we focus on the state of the "Royal Garden of Athens" – arguably the worthiest example of a Greek historical garden – the problem that stands in the way of all important gardens being listed as 'historical', according to the postulates of the Carta di Firenze, will become apparent.

The "Royal Garden of Athens" was built by the Queen of Greece Amalie in 1839. Until today only the architectural sections within its enclosure, have been listed as national monuments: small buildings, pergolas, paths etc. Yet, there hasn't been a detailed survey of the trees and shrubs – the *green* elements – which are essentially an integral part of the garden's architectural fabric. The same was true for the villa 'Ariadne' until 1994 when together with architects Nikolaos Skoutelis and Firuz Habibi Minnelli we surveyed all elements of the garden; from the building itself to the smallest shrubs. But until 2009 there was not a tried legal framework within which such precious material could be put to use. This changed with the submission of material for the declaration of a perennial *Crataegus* and a grand *Platanus,* as "monuments of Nature"; both in Crete. The first lives next to the important archaeological site in Zominthos, under mount Psiloretes, and the other in the village Krasi. Just that was the missing tool for articulating the notion of the historical garden. The trees in themselves are perceived as living monuments. In the case that they are part of a garden which is correlated with cultural material, the processes of protection takes place with the contribution of two ministries: The Ministry of Agricultural Development and the Ministry of Culture. The name for projects of such kind is Special Environmental Study.
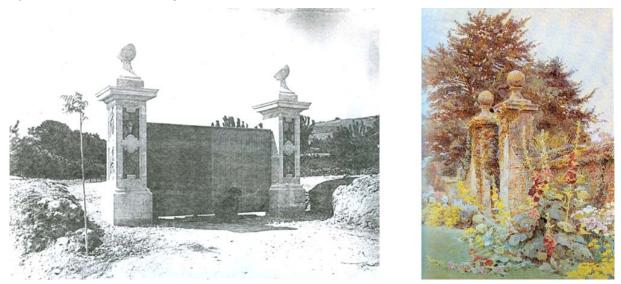
Fig.7: View from West of the central gate of Villa "Ariadne", after 1907 with a watercolor by G.S. Elwood from the G. Jekyll book 'Making of a garden'.

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THE CITY BORDERS: NEW OPPORTUNITIES FOR THE MEDITERRANEAN CITY

Raffaela DE MARTINO, Luigi FOGLIA
Dipartimento di Restauro e Costruzione dell'Architettura e dell'Ambiente, Facoltà di Architettura,
Seconda Università degli studi di Napoli, Aversa (CE), Italia
raffadema@libero.it, luigi.foglia@gmail.com

Abstract

The model of a suburban growth, in its continuous and messy expansion, erodes the rural territories that characterize the Mediterranean area, creating processes of modernization, where the consolidated models of development are undermined by regressive phenomena. The condition of being a border area can produce many critical knots with a strong environmental impact on the territory. In order to promote a sustainable growth of the Mediterranean city, therefore, rethinking the city border, meant as a crucial interface among the complex relationships of interchange between the urban/rural system, play today a key role in restoring the levels of liveability in the "sensitive" zones. In these areas, interventions of environmental rehabilitation and design of common spaces represent functional tools to define innovative methods for the control of the territorial transformation and management, able to directly affect the changes of the environmental micro and macro-systems. Through aimed actions the constitution of an ecological peri-urban network is configured, which can allow the restoration of the ecosystems compromised by now, the constitution of new natural units and, above all, the progressive recreation of the connections among such units as essential condition to the preservation and improvement of the values of territorial biodiversity.

Keywords: border contexts, regenerative processes, ecology of the border.

1. Introduction

The model of a suburban growth, in its continuous and messy expansion, erodes the rural territories that characterize the Mediterranean area, creating processes of modernization, where the consolidated models of development are undermined by regressive phenomena. The condition of being a border area, evolving towards *rurban* hybrid sceneries, can produce many critical knots with a strong environmental impact on the territory, for which it is necessary to intervene through aimed actions, that act as regenerating factors of the original orders. In order to promote a sustainable growth of the Mediterranean city, therefore, rethinking the city border, meant as a crucial interface among the complex relationships of interchange between the urban/rural system, play today a key role in restoring the levels of liveability in the "sensitive" zones, that is in the contexts characterized by a high rate of construction and low values of environmental and social comfort. In these areas, interventions of environmental rehabilitation and design of common spaces represent functional tools to define innovative methods for the control of the territorial transformation and management, able to directly affect the changes of the environmental *micro* and *macro*-systems. Through aimed actions the constitution of an ecological peri-urban network is configured, which can allow the restoration of the ecosystems compromised by now, the constitution of new natural units and, above all, the progressive recreation of the connections among such units as essential condition to the preservation and improvement of the values of territorial biodiversity.

With this contribution a method of critical reading of the *border system* is proposed in order to support the integration of technological/planning solutions with strategic choices aimed at the maintenance of the

ecological and environmental qualities. Through the application of a synthetic model to a case study, an interpretation of urban regeneration is delineated that offers an alternative to the new models of development delocalized, aiming at the environmental rehabilitation of the existing area and strengthening the ecological peri-urban networks instead of the *ex novo* construction of the settling systems.

2. The nature of the border in the Mediterranean city

Speaking about urban development, it is evident how today it must be defined the strategic role that the city border design can assume in restoring the unstable balances established in the Mediterranean city: from "sensitive" zone of verifiable environmental and social degradation, to potential reservoir of areas with an unexpressed quality, able to welcome renewed urban and territorial evolutionary configurations.

In order to make such a semantic translation we need to define the new spatial and relationship dimensions that can be found in the interpretation of the urban border. From the definition by Kevin Lynch [7], according to whom the border is an element of linear interface between two separate units, the image of an urban limit can be configured endowed with a "thickened" spatiality, a deep fringe, also some tens of kilometers deep, where the housing dispersion is compared with the fragmentation of the agricultural ground and the creation and dismissal of productive activities. As a corollary, the phenomenon of the spatial expansion of such areas often comes to conform *rurban* evolutionary sceneries with a strong systematic hybridization, where the contiguity with the urban centre of reference is disregarded. The destiny of the fringe areas of the Mediterranean city must often face the carelessness of the places, the environmental and landscape degradation, as well as a progressive dereliction of the human-made places leaving on the territory a quantity of unused construction that is not proportionate to the housing density.

Nevertheless, latent potentialities to start regenerative processes are contained really in the character of vagueness of the border surrounding the Mediterranean city and it can be a real *buffer zone*.

Mentioning Gilles Clément [5], *"the limits - interfaces [...]constitute, in themselves, biological thicknesses [...] their wealth is often higher than that one of the environments that separate."* Borders can be interpreted, therefore, as some spaces of potential evolution, some real places of centrality of a latent city. Similar areas can be configured in a complex system of permeable and "multisignal" environments, where traces of the original settlements intersect with what has remained of the rural organization of the territory, including areas of survival or regenerated spontaneous nature. Such elements, if interconnected according to a strict systematic logic, can constitute in their whole the occasion for the reconstruction of identitary processes of the places and cohesion of the settled communities. At the same time, the role played by each of them of the qualitative-quantitative level of interaction with each element, can represent some effective references on which planning integrated strategies of environmental and ecological rehabilitation, aimed at recomposing an urban border landscape and its relative values of fruition.

2.1 A tool of reading

Rehabilitating the border areas of the Mediterranean city and letting them intervene in the urban and territorial regenerative processes means to define integrated strategic approaches, able to influence the economic, social and environmental aspects of a hybrid system of "border", recovering its complexities at the same time. Within such processes, the control of the environmental quality through *low-tech* interventions, aimed at the restoration of the values of comfort outdoor and fruition of the connective spaces – with full respect of the specific characters of the place –, assumes a decisive role today.

In order to make a proposal of methodological approach able to rationalize the interventions of environmental rehabilitation and conjugate them with actions aiming at preserving/increasing the ecosystematic complexity, the configuration of tools of analysis is necessary, able to decode the *typological invariants* of the border areas.

In the scheme below (fig.1) it is described our proposal for an open and implementable conceptual model, carried out on the base of the *urban transect* proposed by the New Urbanism in the Smart Code and of the *pattern language* conceived by Christopher Alexander [9]. Such a model – even though still with an experimental character – wants to make the first moment of study for a systematic development of an approach based on the shared knowledge of the territory. In such an approach the *pattern language* by Alexander, in the perspective to involve third operators too, is simplified and declined to the structure of the Mediterranean city border, to give an agile and fast tool of immediate reading.
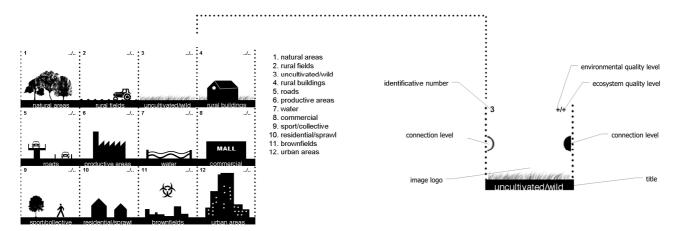
Fig. 1: Model of composition of the typological invariants of the border and structure of the patches.

The typological invariants individualized up to now are described in graphics in the "patches" to which both a synthetic dealing of the "problem", and a brief enunciation concerning the possible planning strategies to be undertaken (such indications are not mentioned in this paper) are referred. Each patch, besides the identifying number, the title and the image/logo, has got a value (expressed in qualitative scale with a gradient varying from – – to + +) that represents the level of environmental quality in relationship with the level of ecosystematic quality of the whole described section. Such a value makes reference to what was found in the whole area. In the border areas, that is in the ecotone areas (whose description is postponed to the following paragraph), the level of the connections/interactions is indicated – on the base of the values related to the environmental/ecosystematic quality of the area of study – in comparison with the adjacent patches. Such values are indicated by a dot set between the two units considered: when the dot is full it shows a good level of connection, when it is empty it shows either a scarce level of connection or a problematic systematic interaction. Through the free composition of the patches of the model to form either a monodimensional or a bidimensional pattern/grid (according to the complexity of the analysed system), the possibility to simulate the different systematic configurations of the border areas is offered, on whose base it can be elaborated an investigation, aiming at the individualization of criticity elements and their relative repercussions on the environmental and ecosystematic comfort quality. Considering the characters of connectivity and systematic hybridization of the Mediterranean city borders, the landscape can represent a new paradigm of reference, no more only formal, but of process: we can hope, therefore, that from the planning creation a new environmental scene can be made, able to integrate equally naturalness and artificial construction. The planning choices, localized on either "area " or "border" patches of the model, will desirably be able to orientate towards an ecological dimension, according to a design plot overlapping the preexisting natural networks, creating new "signs" characterized by a high biological and environmental complexity: a green space network able to assure a real integrated development of the urban/landscape interface.

2.2 The ecosystem border

The city represents a complex artificial ecosystem and equally to any other ecosystem, it is made up of ecotopes with different levels of naturalness: artificial (buildings, industries, infrastructures), semi-artificial (small gardens, trees, urban gardens), semi-natural (agroecosystems, urban forests, parks, etc.). The urban ecosystem degrades from the city centre towards the suburbs, changing into agroecosystems and natural ecosystems. From the ecological point of view the border, meant as a peripheral, unimportant, secondary, abandoned figuration, is not correct. The border spaces are rather places with a precise role established by the communities' reciprocity links with the environmental context. So the border condition is conceived as wealth, reciprocity and interchange among different and adjoining ecosystems, strongly interrelated among them and among which energetic and building material and construction streams are established.

The reading of the border, from the ecosystematic point of view, involves the recognition of the *structure* and *function* of the elements, it is made up of. The structure recognizes the spatial characteristics, therefore shape, dimension, number of the biotopes that compose the country *pattern*; while the function of the landscape defines the relationships (energy streams, building material transfers) that are established among

the elements of the analysed environmental system. A system able to be in a balance of structure and operation, and to react, therefore, to possible perturbations of natural and human origin, can be defined as *stable*. The possibility that an ecosystem has to develop a certain stability is strongly linked with its biodiversity, that is with the richness and homogeneity of species present in it. Moreover the reading of the border must consider the ecotone areas. The ecotone is a border or a transit area among different environments and it develops important ecosystematic and ecological functions, as a place characterized by a high biological difference. *"These areas of configuration among different environments are structurally and functionally areas where energy, material, organisms streams are very high, because they are conjunctions among different ecological niches"* [3]. The ecological approach to the border leads to individualize territorial realities characterized by energetic values, so that they can be considered as "reservoirs of naturalness" within the urban landscape (*core areas*). Such areas function as shelter and sustenance of the fauna, so favouring the safeguard, preservation and increase of the flora-fauna biodiversity. In order to make the biodiversity safeguard be effective, it is above all necessary that such territories are connected among them, according to a network logic. Within the peri-urban area, therefore, you must look for the possibility to carry out an ecological connection between the layers of rural territory, characterizing the urban border, and the green space present in the compact centre tissue. Such corridors will allow the animal species to move from an environment to the other, so avoiding confinements in closed biotopes.

3. An application: the case study of Marcianise

The analysed area for the methodological application, located in the fringe tissue in the south of Marcianise (CE), shows features of variegated complexity: situated in the transit area between the widespread suburbanization and the agricultural landscape of the *Ager Campanus*, it is surrounded by the area of industrial development, the infrastructural network and the area destined by the urban planning to welcome tertiary and sporting services, on which it has already been hypothesized the realization of a *green ring* acting as a limit and a filter for the urban expansion.

On the area (fig.2) there are permanences of remarkable historical-landscape interest that configure a complex system of permeable and multisignal environments. We want to analyse the environmental section A-B (proceeding from the south to the north) of the considered area, proposing a reading of the typological invariants of the border, made for a linear approach of the patches of study, according to a pattern of monodimensional structure. In the considered section, the values of the levels of environmental comfort (read on the base of the paremeters of the *thermal comfort*, *visual comfort*, *acoustical comfort*, *fruition of the spaces*, *conditions of environmental hygiene*, *perceptive integration*), appear to degrade according to a gradient that has its maximum peak in the natural and agricultural areas and its minimum peak nearby the industrial area and the infrastructural system of connections *a raso* and superelevated connections.

Fig. 2: Border area of Marcianise: environmental section.

3.1. The reading of the border

The analysed territorial section has been schematized, according to the methodology previously exposed, in the monodimensional pattern (fig.3). The reading and interpretation of each patch need a double consideration: one of environmental and ecosystematic character, that is linked with the structural and functional characteristics of the ecotopes, the other related to the potential role that the single parties can have for the construction of a territorial ecological network. İt's evident, besides, the necessity to analyse and appraise the conditions of the transit areas between two patches, the ecotone areas (represented in the model by dot lines), on which it can depend the highest or lowest environmental permeability of the analysed system and its consequent territorial fragmentation.

The reading of the section A→B from an ecological / ecosystematic point of view can be interpreted this way:

- The patch 10 represents an urban territorial part where the massive construction and the waterproofing of the grounds have brought to a strong ecosystematic impoverishment and the impossibility to "link" with the local ecological network;
- The patch 2 represents an agricultural ground characterized by horticultures in open air. The lots are mainly developed in length and the ecotone areas are often made up of either grapevines or poplars. Despite the bioenergetic value of the seeded areas is not very high, the presence of the rows guarantees higher stability to the area and above all it has an important function from the ecological point of view, as it constitutes a widespread connection composed by micro-corridors and small units of habitat;
- The patch 3 of the analysed territorial section represents an uncultivated area, where a grassy-shrubby spontaneous vegetation developed. In this case, both the stability of the environmental system and its ecological role can be notably improved through, both area and linear, small interventions, aiming at increasing the level of naturalness and establishing the ecological connections again;
- The following patch belongs to the typology 2 and has the same characteristics in qualitative and aggregating terms as the previous one. A difference is nevertheless verifiable in the ecotone areas 3/2 and 2/9 characterized by a higher level of naturalness in comparison with that 10/2 one;
- The patch 9 shows the presence of a sporting space: a velodrome. A sporting structure like that one present in the area, from an ecosystemic point of view, can represent, despite its high level of human-made, a natural nucleus. The role, that the ecological mosaic – made up of the green spaces of the sporting structure and rows of trees present in the parking area – can play, is that one of *stepping stone* in comparison with the territorial ecological network;
- The patch 1, natural areas, represents a changing area. It is a *green ring*, an area about 200 meters wide, made up of trees, hedges and cycle-pedestrian tracks that will surround the city for a length of 10 kilometres. Once the works of rehabilitation will be completed, this green ring will be configured as a real ecological corridor, able to connect the natural basins present in the city border to the network and favour the diffusion of vegetation and movement of the animals. So the viewpoint of the green ring won't be only that one of the preservation of the residual nature, but also and above all the restoration of new ecosystemic units able to have polyvalent effective functions for a model of development with a lower impact on both natural and human-made environment;
- The patch 5 highlights the presence of 3 linear infrastructures of communication: a superelevated state highway, the high-speed railway line, superelevated too, and finally a farm road at grade. The multiple infrastructural axes cause noteworthy impacts on the ecosystems (pollution, disturbance, destruction of habitat, etc.). The most devastating effect is the interruption of the environmental continuity and the consequent fragmentation of the natural habitats;
- The patch 2, even having the same characteristics of those ones found in the first part of the section, results strongly damaged in bioenergetic terms by the presence of the multiple infrastructural axes;
- The patch 6 shows the presence of an industrial area. Considering its environmental features, the area results very weak from an ecosystemic point of view and now it can't play any role for the construction of an ecological network.
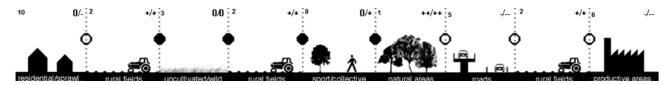
Fig. 3: Modelling the environmental section A-B, referred to the case study of Marcianise
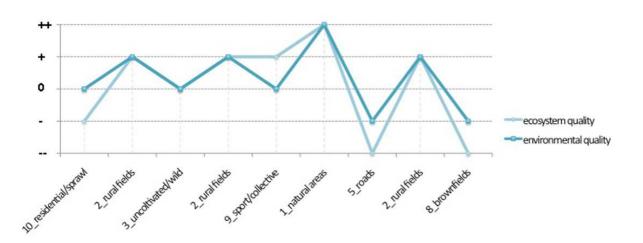
Fig. 4: Trend of the values found in the model applied to the study case.

4. Conclusions

In the processes of the border transformation and safeguard, meant as an incubator of the new evolutionary urban and territorial dynamics, the Technology of Architecture can be an interpreter and a promoter of integrated ways of intervention able to protect the delicate ecosystemic balances and establish best forms of relationship between the man and his own environment. The reading of the data related to the application of the model proposed on the case study of Marcianise shows (fig.4) how the quality of the connections / interactions related to the ecotone areas can meaningfully influence the levels of global environmental and ecosystemic quality of each patch. It can be hypotized, therefore, that the regenerative interventions located on the ecotone areas can produce improving effects verifiable in the whole described system.

From here the configuration of a complex and variegated picture emerges. It is necessary to reiterate the application on new cases study to link the tool with the legibility and usage, so that the model can fully interpret such a complexity, even keeping an agile and speedy character. For this end it is delineated the possibility to start spreading the data related to the mapping of the Mediterranean city border, stimulating a sharing of the third person who doesn't belong to the staff, through an information interchange shared on web platform and social network.

Notes

The paragraphs 1, 2.2, 3.1 and 4 are edited by Raffaela De Martino, the paragraphs 1, 2, 2.1, 3 and 4 are edited by Luigi Foglia.

Raffaela De Martino and Luigi Foglia are both Researchers in Technologies of Architecture and Environment (ICAR 12) and they lead activity of research within the environmental planning with the Research Department of Restoration and Architecture and Environment Construction of the Second University of Naples_SUN.

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Environmental Control Of Toxicity Of Urban Territories Using Biological Monitoring Methods

Andrey VASILYEV, Leila KHAMIDULLOVA, Liliana HYUKHTINA
Institute of Chemistry and Engineering Ecology, Togliatti State University, Togliatti, Russian Federation
E-mails: avassil62@mail.ru; hamidulova@tltsu.ru, eko@tltsu.ru

Abstract
Presently urban territories are significantly impacted by different kinds of pollutions. Such impact may damage the landscapes and cause negative impact to the man and to the environment. Among of the other pollutions, toxicity is one of the most dangerous. The kinds and sources of toxicity of urban territories are analyzed. The main of them are different waste components, as industrial as domestic. For example, lubricating cooling liquids may penetrate into soil and into ground water and cause significant damage to environment and to the man's health. That is why it is necessary to provide high quality environmental control of toxicity of urban territories. Methods of control are investigated. It is shown that the most convenient to use are biological monitoring methods. Results of environmental control of toxicity of urban territories using biological monitoring methods are described on the example of Samara region of Russia. As biological testing objects crawfishes *Daphnia magna* Straus and algae *Chlorella vulgaris* Beijer were used. Results of biological testing showed that some of often used waste components have high degree of toxicity. Methods and means of minimization of negative impact of toxicity of urban territories are considered. Approaches to toxicity reduction and to rehabilitation of contaminated sites are suggested.

Keywords: Urban territory, Environmental control, Monitoring

1. Introduction

Rapid increasing of world population causes significant growth of urban territories. Present urban territories may be characterized by higher population density and vast human features in comparison to areas surrounding it. Urban territories are including cities, towns or conurbations, as well as settlements such as villages and hamlets. Environmental pollution is a serious problem of urban territories. Impact of different kinds of pollutions may damage the landscapes and cause negative impact to the man and to the environment. In general all urban territories impacted by man may be defined as "Built Environment". The sources of environmental pollutions are differs depending on the kind of territory. Among of the other pollutions, toxicity is one of the most dangerous.

Toxicity is the degree to which a substance can damage a living or non-living organism. Toxicity can refer to the effect on a whole organism, such as an animal, bacterium, or plant, as well as the effect on a substructure of the organism, such as a cell (cytotoxicity) or an organ (organotoxicity), such as the liver (hepatotoxicity). Thus, toxicity is ability of some chemical or other substances to cause negative influence to organisms and to damage it.

Environmental control of toxicity of urban territories is efficient way for gaining the precise information about the degree and danger of toxicity as well as for it forecasting and further reduction.

This paper is devoted to environmental control of toxicity of urban territories by using of biological monitoring methods on the example of Samara region of Russia.

2. Analysis of Sources of Toxicity of Urban Territories and of Its Negative Influence

The sources of toxicity of urban territories generally may be subdivided to three main types: chemical, biological, and physical.

Chemical toxicants include inorganic substances (e.g. lead, mercury, asbestos, hydrofluoric acid, chlorine gas), organic compounds (lubricating cooling liquids, organic waste, methyl alcohol etc.) and poisons from living things.

Biological toxicants include bacteria and viruses that can induce disease in living organisms. In many cases biological toxicity can be difficult to measure because the "threshold dose" may be a single organism. Theoretically one virus, bacterium or worm can reproduce to cause a serious infection. However, in a host with an intact immune system the inherent toxicity of the organism is balanced by the host's ability to fight back; the effective toxicity is then a combination of both parts of the relationship. A similar situation is also present with other types of toxic agents.

Physical toxicants are substances like coal dust, asbestos fibers etc. Due to their physical nature, physical toxicants interfere with biological processes.

In general, the most significant sources of toxicity of urban territories are: transport (mainly automobile transport), industry, agriculture. But sometimes influence of domestic sources may be also rather significant.

The sources of toxicity may cause negative influence to the man's health and to environment. It is possible to subdivide negative influence of toxicants to the different scales: large-scale (global) pollution of environment caused by many different sources; regional (territorially restricted), local (e.g. town territory), and single sources influence.

The sequences of toxicants negative influence are widely differ depending on the kind of toxicants, the scale and the time of impact, the object of impact.

Negative influence of toxicity to the man's health may cause different illnesses. Toxicity of a substance can be affected by many different factors, such as the pathway of administration (whether the toxin is applied to the skin, ingested, inhaled, injected), the time of exposure (a brief encounter or long term), the number of exposures (a single dose or multiple doses over time), the physical form of the toxin (solid, liquid, gas), the genetic makeup of an individual, an individual's overall health, and many others. A substance which is a skin sensitizer causes an allergic response from a dermal application. Carcinogens induce cancer, or increase the likelihood of cancer occurring. Reproductively toxic substances cause adverse effects in either sexual function or fertility to either a parent or the offspring. Specific-target organ toxins damage only specific organs. Aspiration hazards are solids or liquids which can cause damage through inhalation.

Environmental impact of toxicants is tend to be focused on degradability, bioaccumulation and aquatic toxicity. E.g. penetrating of toxicants into ecosystem leads to it propagation in atmosphere, water, soil, food and for further pollution. Evaporation of toxicants may cause its penetration into large distances. Thus, a significant part of urban territory may be polluted.

3. Methods and Results of Environmental Control of Toxicity of Urban Territories on the Example of Samara Region

Environmental control of toxicity of urban territories is a complex procedure including estimation of sources of toxicity, determination of the most potentially dangerous zones of toxicity of urban territories, selecting of methods of estimation of toxicity, analysis of results of estimation of toxicity, conclusions about the degree of toxicity, and, finally, development and implementation of methods of reduction of negative impact of toxicants.

Toxicity can be measured by its effects on the certain target (e.g. organism, organ, tissue or cell). Because individuals typically have different levels of response to the same dose of a toxin, a population-level measure of toxicity is often used which relates the probabilities of an outcome for a given individual in a population [1, 2]. One of generally accepted target of such measure is the LD_{50}. When such data does not exist, estimates are made by comparison to known similar toxic things, or to similar exposures in similar organisms. Then, "safety factors" are added to account for uncertainties in data and evaluation processes. For example, if a dose of toxin is safe for a laboratory rat, one might assume that one tenth that dose would be safe for a human, allowing a safety factor of 10 to allow for interspecies differences between two mammals; if the data are from fish, one might use a factor of 100 to account for the greater difference between two chordate classes (fish and mammals). Similarly, an extra protection factor may be used for individuals believed to be more susceptible to toxic effects such as in pregnancy or with certain diseases. Or, a newly synthesized and previously unstudied chemical that is believed to be very similar in effect to another compound could be assigned an additional protection factor of 10 to account for possible differences in effects that are probably

much smaller. Obviously, this approach is very approximate; but such protection factors are deliberately very conservative, and the method has been found to be useful in a deep variety of applications.

Assessing all aspects of the toxicity of cancer-causing agents involves additional issues since it is not certain if there is a minimal effective dose for carcinogens, or whether the risk is just too small to see. In addition, it is possible that a single cell transformed into a cancer cell is all it takes to develop the full effect.

It is more difficult to determine the toxicity of chemical mixtures than a pure chemical, because each component displays its own toxicity, and components may interact to produce enhanced or diminished effects. Common mixtures include industrial waste, gasoline, cigarette smoke etc. Even more complex are situations with more than one type of toxic entity, such as the discharge from a malfunctioning sewage treatment plant, with both chemical and biological agents.

Biological monitoring is the kind of environmental monitoring allowing to estimate efficiently the degree of the toxicity of different sources. Presently many scientists have carried out research devoted to using biological indicators as test-objects. For example, it is well known that for estimation of quality of water it is using Woodiviss index. For estimation of degree of the toxicity of water medium green protococcus algae Chlorella (*Chlorella vulgaris* Beijer) and craw fishes *Daphnia magna* Straus are often used as test-objects.

Peculiarity of developed method in comparison with existing methods is complex consideration of the main toxicological values of toxicants (e.g. lubricating cooling liquids) on the basis of it point-rating ranging.

The following toxicological characteristics have been taken into consideration:
- irritating impact to eyes;
- skin-resorptive impact;
- sensitizing impact;
- toxic particles assignable under exploitation of lubricating cooling liquids (number of singled out toxicants and it class of danger);
- toxicity during inside-stomach injection.

In table 1 the scheme of points of distribution during estimation of degree of toxic impact of lubricating cooling liquids to the man and to environment is presented.

Table 1

Distribution of balls during estimation of degree of impact of toxicants to the man and to environment (on the example of lubricating cooling liquids)

Name of indicator of estimation	Parameter of estimation	Points
Irritating impact to eyes	Do not cause of impact	0 points
	Causes weak impact	1 point
	Causes irritating impact	2 points
Skin-resorptive impact	Do not cause of impact	0 points
	Causes weak impact	1 point
	Causes irritating impact	2 points
Sensitizing impact	Do not cause of impact	0 points
	Causes weak impact	1 point
	Causes irritating impact	2 points
Toxic substances assignable under exploitation of lubricating cooling liquids (for estimation the substance corresponding to the most high class of danger is selected)	I class of danger	4 points
	II class of danger	3 points
	III class of danger	2 points
	IV class of danger	1 point
Toxicity during inside–stomach injection (medium mortal dose (LD50) under injection to stomach)	LD50 ≤ 5000 mg/kg	2 points
	LD50 > 5000 mg/kg	1 point
	Toxic impact is not determined	0 points
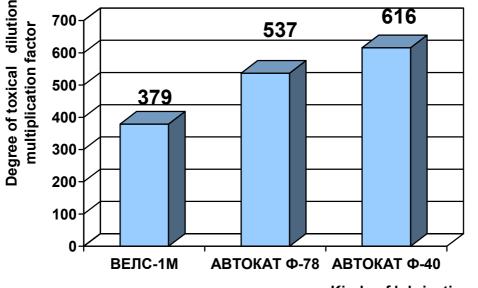
Points gradation is distributes as follow: classes of toxicity of substances, singled out during exploitation of lubricating cooling liquids are estimated using 4-point scale, and toxic characteristic of impact to man – using 2-point scale.

Total rating point is determined by summing up of components of points of estimation. Total rating point has 5 gradations, illustrating the degree of negative influence of lubricating cooling liquids to the man and to environment. Scale of estimation of degree of impact of lubricating cooling liquids to the man and to environment by total rating points is presented in table 3. Additionally with the purpose of improvement of visualization the scale may be ranged by using of different colours.

Table 2

Scale of estimation of degree of impact of lubricating cooling liquids to the man and to environment by total rating points

Total rating points	Degree of impact of toxicant	Suggesting for coding
10-12 points	Hyper impact	HI
7-9 points	Strong impact	SI
4-6 points	Moderate impact	MI
1-3 points	Weak impact	WI
0 points	Do not cause impact	NI

Figure 1. Degree of impact of different kinds of lubricating cooling liquids to test-object *Chlorella vulgaris* Beijer
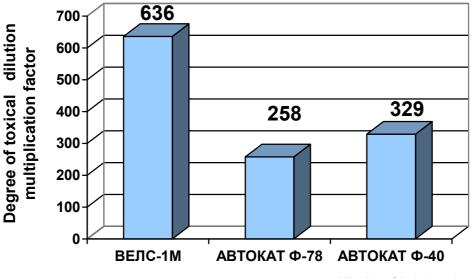
Experimental research were carried out in Russian State accredited R & D laboratory NIL-9 "Vibration, Acoustics, Ecology and Life Protection" of Togliatti State University according to the requirements of accredited methods of determination of acute toxicity of probes of surface fresh, ground, drinkable, sewage waters, water extractions from soil, sewage sediments and wastes in laboratory conditions by variation of optic density of test-culture green protococcus algae Chlorella (*Chlorella vulgaris* Beijer) according to methodic ПНД Ф 14.1:2:3:4:10-04 16:1:2:3:3.7-04 and by determination of mortality of craw fishes Daphnia (*Daphnia magna* Straus) according to methodic ПНД Ф Т 14.1:2:4.12-06, 16.1:2:3:3.9-06.

As experimental samples 1 dm^3 probes of wastes of the most widely used marks of lubricating cooling liquids used in "AVTOVAZ" Enterprise were investigated: ВЕЛС-1, Автокат Ф-78, Автокат Ф-40 etc.

For achieving of water extraction the mixture of water and of lubricating cooling liquids in proportions (1:27 and 1:243) was agitated during 1 hour and stored during 24 hours. Than resulting suspension have been centrifugated during 10 minutes under rotation number 5 000 rotations per minute and supernatant liquid have been used for biological testing.

Results of biological testing are presented in fig. 1 and 2. Toxicity of different marks of waste lubricating cooling liquids have been determined. It is shown that a number of the most widely used marks of lubricating cooling liquids have hyper toxicity and strong toxicity.

Figure 2. Degree of impact of different kinds of lubricating cooling liquids to test-object *Daphnia magna* Straus

By using of suggested method of point-rating ranging of lubricating cooling liquids results of complex estimation of toxic impact of different kinds of lubricating cooling liquids to the man and to environment have been achieved (table 3).

Table 3

Results of complex estimation of toxic impact of lubricating cooling liquids to the man and to environment on the basis of point-rating ranging

Name of indicator of estimation	Kinds of lubricating cooling liquids						
	АВТОК АТ Ф-78	АВТОКА Т Ф-40	ВЕЛС-1М	ТОСОЛ ОИЗ	ТОСОЛ ОИЗ «НК»	ТОСОЛ - АМ	ТОСО Л ТС
Irritating impact to eyes	2	1	2	1	2	2	2
Skin-resorptive impact	0	0	2	1	2	2	2
Sensitizing impact	0	0	0	2	2	2	2
Toxic substances assignable under exploitation of lubricating cooling liquids	3	2	2	2	2	2	2
Toxicity during inside–stomach injection	1	1	2	1	1	1	1
Total points (summarized)							

By using of suggested scale of point-rating ranging graphical visualization of degree of negative influence of different kinds of lubricating cooling liquids to the man and to environment have been developed (fig. 3).

Kinds of lubricating cooling liquids
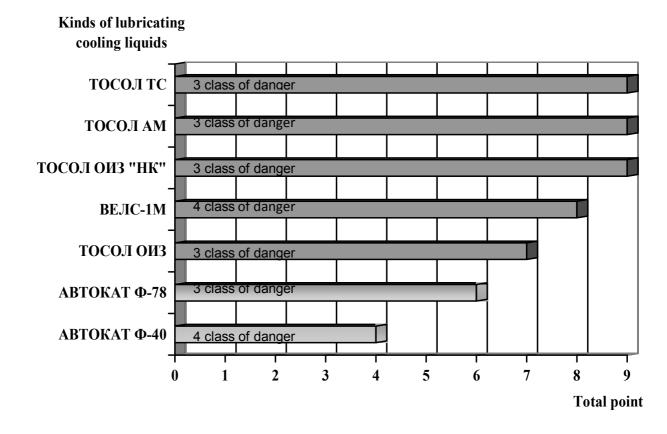
Figure 3. Degree of ecological safety of different marks of lubricating cooling liquids determined on the basis of results of complex estimation of toxic impact of lubricating cooling liquids to the man and to environment

As the next object of toxicity investigation the territory of former industrial plant "Phosphorus" was selected. The problem is that when the plant was closed the toxic wastes on the territory of the plant were remained, at its presence causes significant potential negative impact to environment.

More than 30 probes of organic wastes of former industrial plant "Phosphorus" were analyzed. Results of analysis are showing that the most of wastes are hyper-toxic. For example, the results of biological testing of wastes in cisterns located in railways on the territory of former industrial plant "Phosphorus" are showing that waste probe causes hyper-toxic impact to text-object *Daphnia magna* Straus. The impact of waste was tested in range of concentrations 0,011%-1,0. Death rate of test-object was 100% during the several minutes. The same results were achieved for to test-object *Chlorella vulgaris* Beijer: hyper-toxic impact to text-object was observed even for maximal dilution proportion.

Thus, the most widely-distributed toxicants of urban territories may have hyper-toxicity and cause significant negative influence to man's health and to environment.

4. Methods and Means of Minimization of Negative Impact of Toxicity of Urban Territories

It was shown before, that some products (like organic waste, lubricating cooling liquids etc.) have high toxicity levels and may cause significant negative impact to urban territories population health and to environment. That is why it is necessary to develop efficient method and means of minimization of negative impact of toxicity.

Main methods of toxicity reduction in urban territories conditions are shown in figure 4 and including:
- using the materials without toxicity or with low toxicity;
- implementation of industrial technologies with reduced using or with total absence of toxic substances;
- utilization of toxic waste;

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- arrangement of system of collection of toxicants in urban territories;
- cleaning of urban territories from toxic substances etc.
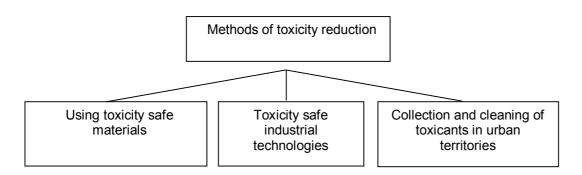
Figure 4. Main methods of toxicity reduction in urban territories

Detailed methods and means of minimization of negative impact of toxicity of urban territories are differs depending on the kind of toxicant. For example, for reduction of negative impact of lubricating cooling liquids it is reasonable to use ecologically safe technologies of treatment without using of lubricating cooling liquids (so called "dry treatment"). Such technologies are presently used in some advanced enterprises, e.g. in AVTOVAZ [3]. There are some well known methods of organic waste treatment (e.g. biological composting). One of the prospect methods is automated design and modeling of technological processes without application or forming of toxic substances.

Significant problem is rehabilitation of contaminated sites from toxicants. In urban territories conditions the most often case of toxicity contamination of soil is oil pollution. The complex methods of soil rehabilitation should be used: monitoring of degree of contamination, localization of polluted areas, collection of oil, soil treatment by different technologies: thermal treatment, physical-chemical treatment, biological treatment etc.

It should be noted that methods of toxicants control are very important not only for receiving the precise information about the degree and danger of toxicity for the health of inhabitant of urban territory and ecological safety, but also for toxicants forecasting and further reduction of it negative impact.

Thus, only complex using of different methods and means allows efficiently reduce toxicity in urban territories conditions.

5. Conclusions

Toxicity is one of the most dangerous sources of pollutions of urban territories. Analysis of kinds and sources of toxicity of urban territories shows that the main of them are different waste components, as industrial as domestic. For example, lubricating cooling liquids may penetrate into soil and into ground water and cause significant damage to environment and to the man's health.

Provision of high quality environmental control of toxicity of urban territories is very important not only for receiving the precise information about the degree and danger of toxicity for the health of inhabitant of urban territory and ecological safety, but also for toxicants forecasting and further reduction of it negative impact.

It is shown that for environmental control of toxicity of urban territories the most convenient to use are biological monitoring methods. It is described using of green protococcus algae Chlorella (*Chlorella vulgaris* Beijer) and craw fishes *Daphnia magna* Straus as test-objects for estimation of degree of the toxicity of urban territories toxicants.

New method in comparison with existing methods is complex consideration of the main toxicological values of lubricating cooling liquids on the basis of it point-rating ranging. The following toxicological characteristics have been taken into consideration: irritating impact to eyes; skin-resorptive impact; sensitizing impact; toxic particles assignable under exploitation of toxicants (number of singled out toxicants and it class of danger); toxicity during inside-stomach injection.

The scheme of points of distribution during estimation of degree of toxic impact of lubricating cooling liquids to the man and to environment is presented. Points gradation is distributes as follow: classes of toxicity of substances, singled out during exploitation of lubricating cooling liquids are estimated using 4-point scale, and toxic characteristic of impact to man – using 2-point scale.

Experimental research of wastes of the most widely used marks of lubricating cooling liquids used in "AVTOVAZ" Enterprise were carried out in Russian State accredited R & D laboratory NIL-9 "Vibration, Acoustics, Ecology and Life Protection" of Togliatti State University. Results of biological testing are showed that a number of the most widely used marks of lubricating cooling liquids have hyper toxicity and strong toxicity and thus may cause significant negative impact to urban territory inhabitants and environment.

By using of suggested method of point-rating ranging of lubricating cooling liquids results of complex estimation of toxic impact of different kinds of lubricating cooling liquids to the man and to environment have been achieved. Degree of ecological safety of different marks of lubricating cooling liquids is determined.

As the next object of toxicity investigation the territory of former industrial plant "Phosphorus" was selected. Results of analysis are showing that the most of wastes are hyper-toxic.

Methods and means of minimization of negative impact of toxicity of urban territories have been described. Only complex using of different methods and means allows efficiently reduce toxicity in urban territories conditions.

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Experience And Prospects Of Environmental Planning Of Towns Of Russia Taking To Account Noise Factor

Andrey VASILYEV, Vlada ZABOLOTSKIKH, Olga BYNINA, Julia TERESHCHENKO
Institute of Chemistry and Engineering Ecology, Togliatti State University, Togliatti, Russian Federation
E-mails: avassil62@mail.ru; V.Zabolotskikh@tltsu.ru; eko@tltsu.ru; ulchik1989@yandex.ru

Abstract

Environmental issues are becoming more and more important during the procedure of planning of cities. Noise impact may cause significant discomfort for inhabitants and health damage. That is why it is necessary taking into account noise factor during environmental planning of towns. Noise sources of urban territories are considered. It is shown that for the towns of Russia transport noise is the main source of acoustical pollution of the territory. The most serious problems and reasons of increased transport noise levels impact to the population of Russian cities are discussed. It is pointed out that in many Russian towns the living areas are situated close to transport highways and to industrial enterprises. Results of experimental noise investigations for the different towns of Samara Region of Russia shows that there are exist some zones of urban territories with increased noise levels. Peculiarities of cities environmental planning taking to account transport noise impact are considered on the example of Togliatti city of Russia. Approaches to environmental planning of existing and new districts of Togliatti city to provide the required sanitary norms of noise impact are suggested, including architect solutions, sanitary-protective zones provision, different kinds of noise barriers installation, restriction measures of high traffic movement near to the hospitals, schools etc.

Keywords: Environmental planning, noise, towns, sources

1. Introduction

Rapid growth of towns causes many ecological problems. Among of them are energy consumption growth, increasing of water, air and soil chemical pollutions, rapid growth of domestic and industrial wastes etc. All these and other factors are causing negative influence to the man's health and to environment, that is why during towns planning it is necessary to take into consideration ecological issues.

In total ecological state of towns of Russia is estimated by the complex of factors. Among of them are volume of negative emissions to atmosphere and to water reservoirs, soil pollutions by chemical substances, levels of physical factors, indexes of atmosphere pollutions etc. Taking to account ecological conditions, all towns of Russia are subdivided into 5 categories of ecological state: 1 - problem-free, 2 – satisfactory, 3 – moderate-intensive, 4 – intensive, 5 – critical. Approximately 100 towns of Russia are having 5th category. Almost all large towns of Russia are having intensive and critical ecological state.

Significant parameter is the presence of zones of ecological impact of towns which are differs depending on the concentration and kind of industry and geographical position. These zones are especially large in major industrial agglomerations with combined impact of industrial and transport pollutions: Moscow agglomeration with more that 200 km length, Saint-Petersburg agglomeration with more that 150 km length. Some industrial & transport regional centers of Russia are also have distinguished zones of ecological impact. E.g., large towns of Volga region are traditionally have significant zones. Samara region is one of the industrial centers of Russia having the zone length more than 100 km.

The problem of physical pollutions (acoustical pollution, infrasound, electromagnetic fields, ionization etc.) negative impact probably not so evident as water and air pollution. In a meantime, half of inhabitants of towns are presently affected by increased noise levels. And the town's noise level is trend to be increased. Noise level in large cities is growing every year approximately up to 0,5 dBA. Increased noise impact may cause significant discomfort for inhabitants and health damage. 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. That is why it is necessary taking into account noise factor during environmental planning of towns.

This paper is devoted to the questions of environmental planning of towns taking to account noise factor on the example of Samara Region of Russia.

2. Analysis of Main Noise Sources of Towns

Noise sources of urban territories may be subdivided into two main groups: separate noise sources and complex noise sources. As separate single vehicles, exhaust systems of ventilation, single mounts of industrial enterprises etc. may be considered. Complex sources are transport flows, industrial enterprises, stadiums etc.

As the main noise sources of urban territories the following sources may be pointed out:
• noise from separate automobiles, motorcycles;
• noise of automobile transport flows;
• noise of railway transport;
• noise of aviation;
• noise of trams;
• noise of open lines of subways;
• noise from industrial enterprises and transformer substations;
• noise from different kinds of building works;
• noise inside of residential settlements (waste-transportation machines, sport games etc.).

Sound levels or equivalent sound levels, dBA of the main noise sources in living area are shown in table 1.

Table 1

Sound levels or equivalent sound levels, dBA of the main noise sources in living area at the distance 7,5 m

N	The kind of noise source	Sound levels or equivalent sound levels, dBA
1	Passenger trains	80-87
2	Freight trains	85-95
3	Sorting and cargo stations	95-100
4	Cars	75-85
5	Tracks	83-95
6	Buses	82-92
7	Automobile flows	75-98
8	Motorcycles	81-100
9	Open lines of subways	80-93
10	Transformer substations	71-89
11	Industrial enterprises	70-98
12	Noise inside of residential settlements	70-85
13	Trams	75-90
14	Aviation	70-92

The degree of impact of different noise sources to inhabitants is depends on the number of factors: mutual dislocation of noise sources and living area, intensity and kind of moving transport flows etc. Generally, from the point of view of ecological impact, automobile transport is considered as the main noise source creating 60-80% of total acoustical pollution impacting to the town's population and giving up to 90% from all population complaints to negative noise influence. Transport noise level is increasing together with the cities growth. When the scale of city transport flows is bigger, acoustic discomfort zones are considerable increased. Transport number in towns is increasing with every month. Therefore the problem of transport

noise reduction in towns is so important.

Samara region is one of the leading industrial regions of Russia. The biggest towns of Samara region are Samara (the capital of region), Togliatti (automobile capital of Russia), Syzran and Zhigulyovsk.

As typical industrial towns Samara, Togliatti and Syzran have as a number of large industrial enterprises as considerable automobile transport park, making significant acoustic impact to abutting dwelling territory. Samara also has railway transport, trams and metro; Syzran - railway transport. The problem of noise impact in these towns is intensified by the fact that some industrial enterprises and highways are closely adjoining to cities dwelling areas. As result significant part of cities population is affected by increased noise level [1-3]. The peculiarity of Zhigulyovsk town is that it is situated near to the Zhigulyovsky reserve and Russian national park Samarskaya Luka. In a meantime Zhigulevsk has transport roads with intensive traffic and some industrial noise sources.

Thus, there are several main noise sources on the territory of Samara region. But the most important source of disturbing noise for the population of Samara region is automobile transport. Noise of moving automobile is induced by the noise from the engine and its systems, automobile aggregates, oscillating body, tires, noise of auxiliary equipment etc. Taking to account continuous growth of transport number of the region, the problem of transport noise impact to the inhabitants is coming more significant with every year.

Togliatti city of Russia has as a number of large industrial enterprises as considerable automobile transport park, making significant acoustic impact to abutting dwelling territory. The problem is intensified by the fact that some industrial enterprises and highways are closely adjoining to city's dwelling area. As result significant part of city's population is affected by increased noise level. It should be noted that such situation is typical not only for Togliatti, but also for many other tons of Russia and West Europe, especially for towns with ancient history.

Automobile transport is the main external noise source affecting to Togliatti city dwelling area. Specific city peculiarity is large automobile transport park, the most part of which consist of cars. This causes intensive transport flows at city's streets, which are generating significant noise impact. It should be noted that for Togliatti city comparatively homogeneous composition of transport flows is typical - railway city transport is absent, impact of aircraft noise is excluded.

But for other towns acoustical situation may differ. For example, in Hong Kong living areas are located near to airport and aviation noise here is very significant. In many towns impact of railway noise is also significant. The other main source of town's acoustical discomfort is industry.

It is also should remember about some other noise sources in towns like sport and cultural objects, food industry etc.

3. Experimental Investigations of Noise Levels in Different Towns of Samara Region of Russia

In years of 2001-2011 collaborators of R&D laboratory "Vibration, Acoustics, Ecology and Life Protection" of Togliatti State University have investigated external noise sources levels on the territory of Samara region. Measurements were carried out by using of "Octava 101 AM" sound level meter and other equipment.

As a measuring parameters equivalent sound levels L_A and maximal sound levels $L_{A\max}$ (dBA), octave and 1/3 octave spectra of sound pressure (dB) were used. 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). Method of noise measurement in noise "dangerous" points have been carried out according to Russian State Standard 23337-78*. Measured noise levels were evaluated according the requirements of Russian Sanitary Norms CH 2.2.4/2.1.8.562-96. Requirements of Russian Building Norms and Rules were also taken into consideration.

Results of measurements in every point have been presented as measurements registration forms, which including date, time and place of measurements carrying out, measuring points numbers and digital data of readings of noise levels in measured point, as well as in form of spectral presentation of sound pressure levels [1-3].

In Samara city noise levels were measured in some of the most important streets. The most significant exceeding values of sanitary norms requirements were obtained in Kuibyshev Street, Stara Zagora Street, Stavropolskaya Street and Moskovskoye Highway. An example of spectral presentation of sound pressure levels on the point of measurements Stara Zagora street, 255, Samara city is shown in figure 1.

In Zhigulevsk town the most significant noise levels were fixed near to the living houses situated near to railway station and highway Moscow-Chelyabisk. The scheme of points of noise measurement in Syzran city is shown in figure 2. The most significant noise levels in Syzran city were measured near to the Central Supermarket and railway station.

For Togliatti city comparatively homogeneous composition of transport flows is typical - rail city transport is absent, impact of aircraft noise is excluded. Transport and industrial enterprises are the main noise sources for Togliatti city. As object of study living territory of the Avtozavodsky, Central and Komsomolsky districts of Togliatti city was selected near to the streets with intensive transport movement and near to industrial zones. In total over 150 points have been investigated [1, 3].

As we may conclude from the results of measurements, the most significant excess of standard equivalent noise levels is 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-6, Central district, Mira street (near to bus stop "House of Nature"), the value of exceeding of normative requirements of equivalent noise level is 6 dBA; point C-5, Central district, Banykina street, the value of exceeding of normative requirements of equivalent noise level is 7 dBA; point C-7, Central district, Komsomolskaya street, the value of exceeding of normative requirements of equivalent noise level is 6 dBA, .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.

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. Here there are also some points of measurements with exceeding of normative requirements of equivalent noise level

Analysis of measurement results of external noise levels in living territory of Samara region shows, that there are noise dangerous zones of dwelling territory. The most serious problem of noise influence is for the dwelling territories of Samara region adjoining to transport highways. Values in a number of measured points are extremely close to maximally admitted normative requirements.

Thus, it is possible to speak about the existing of real problem of noise safety of Samara region provision. It is necessary to carry out further investigations of noise levels in all large cities of Samara region.

4. The Principles of Towns Planning in Russia Taking to Account Environmental Issues

In Russia every town must have 3 kinds of planning documentation: general plan of development (reconstruction); projects of planning and of building of total towns and of its separate parts; plan of land-economical gradation of town's territories.

General plans of development (reconstruction) of towns are having significant meaning for provision of the required state of environment in long-term prospect. General plans are developing for the period of 25-30 years. General plans of construction and reconstruction of Moscow, Saint-Petersburg, large regional centers are утверждает by Government of Russian Federation. Every 5 years general plans are précised according to variation of conditions of development of towns.

There are three main principles used during development of general plans of towns: zoning principle, ecological safety principle, rational territory organization principle.

Zoning principle means division of all the territory of town to four parts – industrial, living, culture-domestic and recreational. Requirements of ecological safety are admitting taking into consideration of norms of roads displacement, of living and administrative buildings, rest zones, fitting to the requirements of sanitary norms of maximal permissible concentrations and exhausts, for the displacement of sanitary-protective zones, waste disposal etc.

General plans of towns are the basis for development of projects of planning and building of town and of it separate parts. According to the requirements of Russian legislation planning and building of towns must foresee creation of the most favorable conditions for life, rest and health of population. The main task determining the order of complex improvement of towns is prevention and liquidation of harmful and dangerous influence of environmental factors to the living conditions of man.

Before to allow to make the construction of living houses or industrial objects it is necessary to receive positive conclusions of Russian State organizations of ecological and sanitary-epidemiological control and

oversight for organizations of all forms of propriety. It is one of the guaranties of provision of ecological safety of population.

Plans of land-economical gradation of cities are considering dislocation of communications for energy, water and heat supply, as well as waste management, rainwater escape etc. Plans are developing and realizing according to the sanitary norms and rules under control of sanitary-epidemiological organizations.

Some other kinds of town's planning are also significant. Among of them are complex plans of town's social-economical development; territorial complex schemes of town's environmental protection; different targeted scientific-technical programs.

Plans of social-economical development are intend for determination of the prospects of town for the nearest 5-10 years taking to account construction and reconstruction of enterprises, increasing of culture–domestic sphere, of residential building. Territorial complex schemes of environmental protection of towns are the main document which is forecasting for creation of plans of social-economical development of towns. The schemes are forming the informational-methodical and normative-technical basis of the plans. These schemes may be used for development of measures for prevention and liquidation of damage to environment from economic and social development of town, increasing of it territory.

5. Peculiarities of Acoustical Planning of Towns and of it Realization on the Example of Samara Region of Russia

During acoustical planning of towns it is necessary to take into consideration a number of architecture-planning solutions. Some of them are:
- rational acoustical solutions of plans of industrial areas and of general plans of objects;
- rational dislocation of technological equipment;
- rational displacement of working places in enterprises;
- creation of noise-protective zones etc.

The most noisy transport highway streets of towns may be considered as «transport corridors» with the main task of transportation of people and of loads. Transport highway streets are causing significant influence to the environment (not only noise but also air and soil chemical pollutions etc.) and should be isolated form the living areas. This requirement is necessary to take into consideration in architecture-planning decisions of building of living areas.

For provision of acoustical comfort it is reasonable to use first of all the solutions deciding not only noise-protective, but also architecture-planning questions. Earth mounds and artificial hills protecting the living area from transport noise should look as landscape elements and to have pictorial form.

During towns planning it is necessary to take into consideration correct zoning of territories surrounding the traffic interchanges which are traditionally the most noisy part of highways. In the zone near to transport highway it is not reasonable to dislocate living and social buildings of high этажности, because to protect it from negative noise impact it is necessary to erect noise barriers of high height.

Among of town planning solutions for noise reduction it should to point out the following measures:
• observing of the principle of zoning, giving the separation of noisy sources from urban territories;
• transferring of noisy enterprises beyond the bounds of living area;
• construction of special noise-protective living buildings.

Values of admissible gaps between single noise source and the object to be protected may vary in very wide range: from 8-10 up to 500-1000 meters. In zone of gaps auxiliary buildings and areas (garages, car parks, storehouses etc.) are dislocated. For many cases the gaps are should be considered as auxiliary measure.

Efficient town planning solution is using of noise-protective planting trees and shrubs. Approximate values of sound decay by using of several different kinds of planting trees and shrubs for single noise source are shown in table 2.

Results of measurements are shows that mean decay on the distance 10 meters of stripe of planting trees and shrubs is 1,5-2,0 dBA for trees and 2-4 dBA for rich trees and shrubs. But it is necessary to point out that for low frequences sound decay by using of planting trees and shrubs is insignificant.

High efficiency measures of transport noise reduction are development and using of alternative transport as well as more intensive using of public transport.

As alternative to automobile transport using of bicycle transport may be suggested. In this case during the planning of town's territory it is necessary to foresee special bicycle roads, places for bicycles parking etc.

In many towns noise protective barriers are using for noise reduction. But the installation of noise barriers in towns may significantly change external look of town, that is why before to make the decision to install noise barrier (even the acoustical effect is good) it is necessary to have the detailed consultations with architects.

Reduction of noise of living territories of urbanized complexes up to admitted hygiene requirements in present conditions is sophisticated scientific-research problem, which may be decided only by complex measures.

Table 2

Reduction of sound pressure level and sound level by planting trees and shrubs, dB/m

Kind of planting trees and shrubs	Frequency octave bands, Hz					Sound level, dBA
	250	500	1000	2000	4000	
Pine forest	0,1-0,11	0,1	0,1-0,15	0,16	0,14-0,2	0,15
Furtree forest	0,1-0,12	0,14-0,17	0,18	0,14-0,17	0,23-0,3	0,18
Dense deciduous forest	0,05	0,05-0,07	0,08-0,1	0,11-0,15	0,17-0,2	0,16
Green dense trees and shrubs	0,13-0,15	0,17-0,25	0,18-0,35	0,2-0,4	0,3-0,5	0,3

In whole all measures of noise reduction in the dwelling territories may be conditionally divided into several big groups:
1. Urban development and building-acoustic methods of noise control: rational acoustic planning of neighbourhood units, industrial enterprises and highways, erection of noise-protecting shields, noise-protecting planting trees and shrubs, increasing of sound-insulating qualities of buildings, development of noise-protecting screens constructions, foaming of the systems of settling groups on the basis of mass velocity passenger transport with definite functional zoning of the territory, removal of dwelling areas from intensive noise sources, using of compositional grouping of buildings etc.
2. Administrative-organizing measures of noise reduction: noise levels reduction due to decreasing of intensity and noise of transport flows; improvement of roads quality, using of road surface with lower noise; provision of rational velocity of movement; provision and even exclusion of automobile (especially lorry) transport traffic in central parts of town and in living area streets etc.
3. Legal acts, technical norms, prohibitions of noise generation in living zones etc.
4. Using of the technical means of acoustical radiation reduction.
Measures to reduce transport noise may be widely divided to two groups: reduction of transport noise levels in the source of its generation and on the ways of noise propagation.
Many scientists are supposing that the most efficient measure is transport noise reduction in the source of its generation. Design and exploitation of noiseless automobile constructions, especially in low frequency range, is one of the most efficient and economically reasonable ways of noise levels reduction in the living area. At city's level it is necessary to unite the efforts of scientists, designers of "AVTOVAZ" cars perspective constructions, specialists of transport department of administration. It is necessary to restrict responsibility for noisy automobiles using. While toxins of automobiles exhaust are strictly controlled by state automobile inspection, noise control of automobiles during exploitation is completely absent.

Some other measures of noise reduction should be used: rational organization of transport flows, prohibition of transport movement at some districts etc, as it pointed out above.

It is necessary to reduce intensity and noise of transport flows. It is required to exclude lorry transport traffic.

Secondly, it is recommended to use noise-damping road surfaces. Such surfaces have been developed presently by many foreign companies. For example, there is road surface "Viaphone", having reduced granulation and insignificant thickness of layer (2-3 sm). Other type - porous draining road surfaces. For example, "Gerland Routes" company suggests road surface Epsibel. "Colas" company is using in "Golsoft" mixtures recycled rubber from the automobile tires in two layers, providing noise reduction 8 dBA.

One of the modern approaches to town's noise planning and abatement is using of software for noise propagation calculation and for noise forecasting [4].

Let us consider some solutions for town's noise planning and reduction on the example of Togliatti town.

Evaluating transport noise influence to the living territory along to Banykina street of Togliatti town, it should be taken into consideration, that along this street blocks of city hospital and two schools are situated. For these objects hygiene requirements are especially strict. Further experimental investigations are required here.

Along with using of administrative-organizing measures of noise reduction and using of noise-damping road surfaces in this case it is efficient to use acoustic screens. For described area it is preferable to use acoustic screens-walls with sound absorption (as a rule, this kind of screens is using sound-absorption material and metal constructions). Noise reduction effect of suggested screens is provided by varying of it height, length, distance between noise source and shield.

For noise reduction in other parts of living territory in Banykina street of Togliatti town it is possible to use acoustic screens of combined type, combining acoustic screens-walls with fill or hollow. Efficiency of such shields may be significantly high without additional expenditures, connected with increasing of hollow depth or fill height.

In order to achieve noise attenuation in all frequency range, it is necessary to use hybrid type shields, combining muffling properties of acoustic panels with sound absorption material and active noise mufflers. Construction of hybrid acoustic screen have been developed. Construction includes active sound emitters and at least two independent controllers with using of multi-channel adaptive signal for low-frequency sound attenuation. Construction is patenting. It is possible use to use tunnels for noise reduction in this zone.

Peculiarities of external noise affection to the living zones of Komsomolskaya street of Togliatti town that a number of many-store buildings of this street (for example, between Lenina and Pobeda streets) are situated butt-ends to noisy transport highway, what contribute to transport noise penetration into internal parts of houses.

In total, effective noise reduction in living areas may be achieved by provision of complex administrative-organizing, urban development and building-acoustic measures: acoustic screening, noise-protecting planting trees and shrubs, increasing of noise insulation of buildings windows etc.

6. Conclusions

Negative impact of acoustical pollution now is one of the most serious problem as for populations health as for town's environment. At least half of inhabitants of towns are presently affected by increased noise levels. And the town's noise level is trend to be increased. Thus, it is necessary taking into account noise factor during environmental planning of towns.

Analysis shows that for the towns of Russia transport noise is the main source of acoustical pollution of the territory. It is pointed out that in many Russian towns the living areas are situated close to transport highways and to industrial enterprises. As result a lot of population is impacted by significantly increased noise levels.

Results of experimental noise investigations for the different towns of Samara Region of Russia are described. Estimation of measured noise levels on the territory of Samara region comparing with sanitary norms requirements have been done. Results of estimation are shows that there are exist some zones of urban territories with increased noise levels. Values in a number of measured points in day time in the territory of Samara region are exceeding the norms or extremely close to maximally admitted normative requirements. Thus, it is possible to speak about the existing of real problem of noise safety of Samara region provision.

Peculiarities of cities environmental planning taking to account noise impact are considered on the example of samara region and of Togliatti city of Russia. Approaches to environmental planning of Togliatti city to provide the required sanitary norms of noise impact are suggested, including architect solutions, sanitary-protective zones provision, different kinds of noise barriers installation, restriction measures of high traffic movement near to the hospitals, schools etc.

In total, effective noise reduction in living areas may be achieved by provision of complex administrative-organizing, urban development and building-acoustic measures.

Acknowledgement

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A net of small museums for policies of planning, safeguard and government of Mediterranean archeological landscape

Francesca FATTA, Domenico TOSTO, Andrea MANTI
Departement of Architettura e Analisi della Città Mediterranea, Faculty of Architettura, University Mediterranea, Reggio Calabria, Italy
E-mail: ffatta@unirc.it, domenico.tosto@unirc.it, andrea.manti@unirc.it

Abstract

We propose an integrated plan of small museums (*antiquaria*), strongly deep-rooted in the reference archaeological areas, in the northern Mediterranean region of Tunisia, where there are numerous sites of great value, sometimes not very well-known, that show basic analogies and common tourist-cultural interests. We have been able to point out, and not only in Tunisia, that still today the most important classical museum systems draw on the nineteenth-century idea of Vivant Denon, that is the great museum holding, in a succession of numerous expository halls, different collections coming from several parts of the region, in order to exalt the great variety and the treasures of the national territory.
Today this system appears very damaging for the more distant sites that are actually deprived of their memories to advantage of the capital, to be actually deprived of local testimonies, also of great dimension, as well as of great value.
The structures considered more suitable to support a diffused cultural tourism are, on the contrary, small museum architectures situated inside the archaeological areas that privilege a more direct and immediate approach with the reference context. To this aspect of "ecomuseum", we should add an important program of communication for the implementation of a virtual dimension of the museum itself, that can be supported both in the sphere of the *antiquarium*, in specific fields dedicated to the projections of the reconstruction examples, and for the communication of a "virtual museum" to visit on-line.
Today the aspect of the virtuality represents one of the most explicit forms through which a museum tries to promote itself and to renew the interest for the art works it preserves, in a more and more demanding and competitive tourist cultural context.

Parole chiave: Antiquaria, Virtual Museum, Virtuality Represents, Archeological Landscape.

1.   Una rete di piccoli musei per i siti archeologici mediterranei. Il caso della Tunisia
   (Francesca Fatta)

L"argomento generale del Forum ci ha indotto a considerare il valore del paesaggio archeologico mediterraneo come un bene da canalizzare in nuovi ambiti di progettazione, tutela e governo.
Vi è una moltitudine di siti storici sparsi in area mediterranea, e specie in nord Africa, di cui solo pochi sono realmente conosciuti e fruiti da un consistente pubblico. Questi luoghi, spesso testimoni da una importante storia urbana e ricchi di grandi presenze archeologiche, sono fuori dai circuiti di comunicazione più ricorrenti, appannaggio solo di pochi studiosi e privi delle più elementari attrezzature per accoglienza.
A questo proposito si è pensato ad un progetto integrato di piccoli musei (*antiquaria*) strettamente connessi alle aree archeologiche di riferimento, dislocati nella regione nord mediterranea della Tunisia, ove sono presenti numerosi siti di grande pregio, talvolta poco noti, che presentano analogie di fondazione e comuni interessi turistico-culturali.
Si è potuto rilevare, e non solo in Tunisia, che ancora oggi i più importanti sistemi museali di tipo classico riprendono l"idea ottocentesca di Vivant Denon, ovvero del grande museo capace di ospitare, in un

susseguirsi di numerose sale espositive, collezioni differenti provenienti da più parti della regione, per esaltare la grande varietà e la ricchezza del territorio nazionale.

Questo sistema appare oggi molto penalizzante per i siti più distanti che vengono, di fatto, spogliati delle loro memorie a vantaggio della capitale, per restare privi delle testimonianze locali, anche di grandi dimensioni, oltre che di grande pregio.

Le strutture che si ritengono più adatte a supportare un turismo culturale diffuso sono, al contrario, piccole architetture museali situate all'interno delle zone archeologiche che privilegiano un approccio più diretto e immediato con l'ambiente di riferimento.

Architetture di dimensioni contenute e ben inserite nel contesto paesaggistico, relazionate all'interno di una rete di altrettante strutture, e coordinate da azioni e sistemi di comunicazione integrati.

Uno dei casi studio che si è analizzato è il sito di Dougga (o Thugga) per il quale si è considerata una rete di comunicazione virtuale con i maggiori siti dell'antica Numidia, al confine con l'Algeria: Bulla Regia, Chemtou (l'antica Simitthus), Thuburbo Majus, Utica, oltre alla più nota Cartagine.

Figg. 1-2-3: Progetto per un parco archeologico a Dougga.

L"antica Thugga conserva numerosi resti di monumenti punici, numidi e romani, che ne fanno uno dei più importanti siti archeologici della Tunisia. Per l'eccezionale stato di conservazione di alcuni suoi monumenti, che rivelano la tipica struttura delle cittadine romane del Nordafrica, il sito è annoverato nella lista dei Patrimoni Mondiali dell'Umanità dell'UNESCO, ma questo non è stato sufficiente per creare infrastrutture e servizi d"accoglienza di cui il sito è totalmente privo.

Dal capitolium, al teatro, alle terme, alle domus, al mercato, Thugga può considerarsi un paradigma della colonia romana in Africa, per la sua organizzazione urbana e per le testimonianze ancora leggibili per molte sua parti.

Per poter apprezzare alcuni tra i mosaici più raffinati, come quello della casa di Ulisse, il visitatore però deve recarsi al Museo del Bardo a Tunisi, così come per molti altri reperti di grande interesse che sarebbero più comprensibili e apprezzabili se esposti nei pressi dello stesso sito di provenienza.

La stessa sensazione di privazione del bene archeologico da visitare in sito, si prova a Bulla Regia, Utica, Thuburbo Majus, Thysdrus e prerfino presso la stessa Cartagine che comunque ha un proprio museo.

Per questo si è pensato ad un progetto che preveda non soltanto un parco archeologico per la fruizione del sito, tagliato *ad hoc* per visite brevi, di media o di lunga permanenza, organizzato con aree di sosta, punti d"informazione, zone panoramiche e un *antiquarium* che possa informare, comunicare e intrattenere i visitatori e gli studiosi che si recano a Dougga.

A questo aspetto di "museo diffuso", dovrebbe aggiungersi un importante programma di comunicazione per l"implementazione di una dimensione virtuale del museo stesso, che può sostenersi sia nell"ambito dell"*antiquarium*, in specifici settori dedicati alle proiezioni dei saggi di ricostruzione, sia per la comunicazione di un "museo virtuale" visitabile sulla rete da chiunque sia interessato.

L"aspetto della virtualità risulta oggi una delle forme più esplicite con cui un museo cerca di promuoversi e rinnovare l"interesse per le opere d"arte poste al suo interno, in un contesto turistico culturale sempre più esigente e competitivo.

Fig. 4: Dougga: Il paesaggio ricostruito della antica Thugga e il paesaggio archeologico a confronto.

2. Le tecnologie a supporto di un turismo culturale nel Maghreb
(Domenico Tosto)

La proposta di realizzare una rete di strutture museali, connesse tra loro, nelle zone archeologiche presenti in Tunisia nasce dall"idea di creare un sistema a supporto di un turismo culturale che trova sempre maggiore diffusione nell"area del Maghreb. Architetture piccole e ben inserite nel contesto paesaggistico, relazionate all"interno di una rete di altrettante strutture, e coordinate da azioni e sistemi di comunicazione integrati.

Il sistema si basa sull"apprendimento collettivo tramite il quale ogni museo è in grado di fornire informazioni, creare nuove attività e servizi e di adattarsi nel tempo, rafforzando sempre di più la sua posizione di paradigma culturale. Infatti il museo oltre a proporre l"idea di luogo in cui si conserva e preserva l"oggetto, punto di riferimento della raccolta di tutte le informazioni che riguardano la crescita e sviluppo della società, oggi deve confrontarsi con l"evoluzione di quella società di cui lui stesso ne preserva la memoria.

Una evoluzione culturale che trova nell"avvento delle nuove tecnologie, un valore aggiunto e un nuovo linguaggio di comunicazione diretto e globale.

L'interazione tra i beni culturali e le nuove tecnologie potrà creare numerose opportunità a livello conservativo, comunicativo e di sviluppo economico per quello che riguarda il ricchissimo patrimonio storico artistico presente in Tunisia e in tutto il Maghreb.

Fig. 5: Museo Virtuale di Ercolano

Fig. 6: Museo Virtuale Architettura

Fig. 7: The Virtual Museum of Iraq

Fig. 8: MuseoVirtuale del Louvre

Il concetto di Virtual Heritage (VH) segna un cambiamento profondo, una vera e propria transizione tra paradigmi diversi; una trasformazione in cui le tecnologie della comunicazione e i processi di virtualizzazione dell"esperienza assumono un ruolo di primo piano.

Con il termine VH intendiamo l"ambito di applicazione per soluzioni tecnologiche e progetti di comunicazione del patrimonio culturale.

L'utilizzo delle tecnologie applicate al patrimonio architettonico e culturale crea un nuovo sistema di comunicazione che rende diverso, dinamico, il rapporto tra la conservazione e la fruizione del bene, che prima poteva essere considerato unico e unilaterale.

L'utilizzo delle ricostruzioni virtuali ha lo scopo di promuovere una nuova alfabetizzazione culturale che trova nelle tecnologie multimediali uno strumento di trasmissione e trasformazione dei dati in sapere digitale.

La realizzazione di strutture museali virtuali dà la possibilità a qualunque sito di diventare esso stesso strumento di promozione e comunicazione di se stesso e del territorio. La simulazione di un paesaggio che ormai non esiste più, proietta il visitatore in un ipotetico viaggio nel tempo che propone una nuova dimensione percettiva, esperienziale e cognitiva simile a quella che l'uomo ha nella realtà.

Inoltre l"utilizzo della realtà virtuale permette di fornire tutta quella parte di informazione che un museo non può offrire, al di là della presentazione degli oggetti che possiede che, il più delle volte diventa essenziale per la comprensione degli stessi, attraverso questa tecnologia l"utente si trova immerso all"interno di uno spazio che non esiste più ma dentro il quale può muoversi e cercare le informazioni richieste.

La Realtà Virtuale, superata l"iniziale obiezione per quello che può essere considerato come un ossimoro, è una tecnologia che applicata al patrimonio storico-culturale offre molteplici opportunità:

-catalogazione di oggetti tridimensionali,

-allestimento di musei e mostre virtuali,

-documentazione di interventi di restauro,

-ricostruzione di siti archeologici e di ambienti complessi di interesse storico-culturale.

Le scene tridimensionali ricostruite tramite l"utilizzo di software e grazie all"uso di immagini digitali ad alta risoluzione, oggetti tridimensionali ed effetti sonori,al giorno d"oggi possono raggiungere un elevato grado di realismo.

Elemento su cui si basa l'applicazione della Realtà Virtuale è il concetto di interattività, attraverso il quale viene consentito all'utente di muoversi in un ambiente ricostruito, cambiare visuale e compiere delle azioni come se questo fosse realmente presente nella scena.

Pertanto, in una stessa applicazione è possibile creare diversi "percorsi" predefiniti, ognuno dei quali con contenuti e informazioni multimediali diversi e appropriati al contesto di fruizione ed alle diverse possibili tipologie di utenti.

Le possibilità di strutturare ed organizzare le informazioni in modo appropriato, rende la Realtà Virtuale un potente e flessibile strumento di comunicazione e di diffusione del sapere digitale.

Fig. 9: Villa Livia: rapporto tra immagine reale e immagine virtuale (*Virtual reconstructionin the via Flaminia e Villa di Livia project*- di Eva Pietroni. II Scuola Italiana di ArcheologiaVirtuale - Monselice (Padova)).

La realtà virtuale (VR) è un medium in cui i sensi umani sono circondati da (o immersi in) stimoli, parzialmente o interamente generati o rappresentati da mezzi artificiali, e in cui tutte le immagini vengono visualizzate secondo il punto di vista di un singolo osservatore, anche se in movimento.

L'utilizzo della realtà virtuale permette di simulare e processare in tempo reale tutte le informazioni che sono contenute in un modello di riferimento, e successivamente interagire con esso.

Tutte le tecnologie interattive e multimediali applicate ai musei virtuali sono realizzate con l'obiettivo di creare spazi educativi e ricreativi, percorsi conoscitivi vivaci e completamente personali.

Le persone all'interno del Museo possono seguire un proprio *personale itinerario,* un *processo fruitivo dinamico,* che permette di scegliere *diverse modalità di fruizione, diversi livelli di approfondimento* e una grande varietà di stimoli propedeutici.

Alla domanda che pone Maurizio Forte "ma perché è così importante la ricostruzione virtuale di un insediamento archeologico?", si può rispondere che al di là dell'impatto fortemente divulgativo, la ricostruzione virtuale è una informazione complessa e proiettiva dell'interpretazione che va oltre alla mera riproduzione grafica. Si tratta di una simulazione che permette di esplorare tridimensionalmente il modello attraverso infinite prospettive e in modo non intrusivo.

Le ricostruzioni virtuali permettono di fronteggiare numerosi problemi che riguardano i siti archeologici: aree non omogenee, edifici ormai distrutti oppure ridotti a delle tracce sul terreno e, non di meno, la possibilità di affrontare in modo concreto l'assenza di fondi necessari per interventi di restauro o manutenzione.

Il vantaggio nella realizzazione di una rete di strutture museali in Tunisia consiste nell'implementare i dati storici, scientifici e teorici in modo continuativo tanto da creare un sistema di saperi e conoscenze in digitale.

Un sistema che potrebbe offrire un layout chiaro e condiviso in grado di consentire a culture e mondi diversi di comprendersi reciprocamente, in modo tale da rendere ogni esperienza replicabile in altre situazioni e contesti che presentino analoghe situazioni.

3. Il Reverse Modeling come strumento di conoscenza dell'Architettura Antica
   (Andrea Manti)

Il processo di *Reverse Modeling* di una architettura consiste nella *traduzione digitale* del manufatto reale in una sua riproduzione virtuale, attendibile secondo una certa tolleranza. La *pipeline* metodologica prevede l'integrazione tra diverse tecniche di rilevamento, l'utilizzo dei dati rilevati come base di partenza certa per la ricostruzione digitale del monumento e l'interrogazione del modello virtuale per l'analisi degli aspetti

morfologici, geometrici, distributivi della struttura. I vantaggi nell"uso del modello digitale come forma conoscitiva dell"architettura si evidenziano, in particolare, nella capacità di poter interrogare i modelli, simulando forme di analisi non sempre possibili attraverso l"applicazione di tecniche di rappresentazione tradizionale. La definizione del modello digitale si ottiene mediante un complesso iter che richiede competenze nell"uso degli strumenti, nel controllo metodologico del processo stesso e nella interpretazione dei risultati, poggiandosi su una conoscenza eterogenea che spazia dai trattati dell"architettura fino agli studi sulle più avanzate tecniche di rilievo e modellazione 3D.

Nel campo del rilievo architettonico è sempre più ricorrente l"utilizzo congiunto di metodologie di analisi tradizionali con quelle digitali di ultima generazione. Questa ibridazione metodologica offre la possibilità di ottenere dati metrici strumentalmente differenziati che rappresentano un evidente arricchimento nella conoscenza del manufatto, poiché ne consente una lettura multi-dimensionale e multi-livello. Bisogna porre attenzione nel collegare i metodi di conoscenza tradizionali con quelli digitali perchè un evidente svantaggio consiste nella possibilità di trovarsi in una situazione nella quale non si abbia una sufficiente conoscenza né dei primi né dei secondi. Tale condizione può portare alla possibilità di non sfruttare appieno le potenzialità di analisi oggi offerte dagli strumenti. Nell"ambito delle tecniche di rilievo digitale è essenziale quindi conoscere sia gli strumenti utilizzati sia la teoria che vi è alla base del funzionamento degli stessi, al fine di poter interpretare correttamente e valutare la qualità dei dati acquisiti. Questa pre-condizione risulta molto importante nell"utilizzo delle tecniche di rilievo 3D e delle tecniche di *Reverse Modeling* applicate nell"ambito architettonico. La nascita di questa materia è legata alle sperimentazioni avvenute fin dagli anni "90 in diversi settori scientifici. Nell"ultimo decennio alcuni dei processi contenuti nel campo del *Reverse Modeling* hanno vissuto una rapida evoluzione, legata principalmente agli sviluppi tecnologici in ambito strumentale ed in quello dei sistemi per la gestione delle informazioni digitali. In particolare l"applicazione delle tecniche di rilievo 3D da *laserscanner* e fotomodellazione digitale, hanno favorito l"estensione delle sperimentazioni anche ad altri settori come il Design e l'Architettura. In quest"ultimo campo sono diversi gli esempi che hanno segnato gli avanzamenti nei metodi di applicazione del rilievo 3D di manufatti reali a diverse scale, dal livello scultoreo a quello architettonico, dall"urbano fino al territoriale. Nella maggior parte di questi esempi risulta evidente come la sperimentazione di queste tecniche abbia avuto la principale finalità di ottimizzare il processo di acquisizione e modellazione delle forme, cercando di massimizzare le potenzialità degli strumenti e la qualità del risultato finale, minimizzando il tempo di elaborazione dei dati acquisiti. Gli esiti delle ricerche evidenziano la capacità di questa metodica di giungere a risultati eccellenti dal punto di vista della affidabilità nella ricostruzione digitale delle forme reali, fornendo modelli tridimensionali utili sia per la promozione del Bene Culturale, che per la sua analisi materica e dimensionale.

La fase di rilievo *in situ* si è concentrata sui resti dell'antico Teatro Romano di Dougga. L"esperienza, che è stata promossa dai docenti del Laboratorio di Sintesi Finale *Analisi dell'Architettura e della Città Mediterranea* della Facoltà di Architettura di Reggio Calabria nel Marzo del 2010, ha permesso di affrontare anche le tematiche relative alla modellazione tridimensionale e alle forme di rappresentazione digitale. Le analisi che sono state svolte hanno consentito di individuare dei moduli che regolano l"intero insieme. Il percorso seguito è stato quello di raccogliere tutte le informazioni utili per la generazione del modello tridimensionale dell"intero teatro, con particolare attenzione alla ricostruzione della forma originaria. In questa fase di analisi sono state integrate le informazioni provenienti dagli strumenti di rilievo con gli elaborati grafici tradizionali. La complessità del sistema architettonico ha richiesto un ulteriore passaggio: la scomposizione semantica del teatro nelle parti che lo compongono (gradonate, arcate, colonne, volte, ecc.), confrontando gli elementi individuati con i modelli dei trattatisti classici per verificarne la reciproca corrispondenza.

Il teatro è addossato alla collina che segna l"accesso principale alla città, tanto che è stato sfruttato il declivio naturale dell"altura per la costruzione dell"emiciclo e della cavea. Costruito intorno al 169 d.C. grazie al cittadino di Thugga, Publius Marcius Quadratus, l"intero organismo risulta a tutt"oggi ben conservato. L"architettura presenta le disposizioni classiche del teatro romano: gradini a semicerchio che formano la cavea per gli spettatori e una grande scena. La cavea è sopraelevata di 15 metri rispetto all"orchestra, addossata al pendio della roccia, per una evidente scelta di solidità dell"edificio e poteva contenere fino a 3.500 spettatori. Si compone di 19 gradonate disposte su più livelli e di gallerie di circolazione; il muro perimetrale presenta 5 porte. L"orchestra, posta sul boccascena, è relativamente piccola rispetto alla dimensione dell"intera struttura. Il teatro è dotato di alcune cisterne ricavate sotto il pavimento del portico, dato che la irregolarità e la pendenza del terreno aveva dato modo di sfruttare un discreto spazio sottostante. L"acqua serviva alle *aspersiones* per rinfrescare gli spettatori nei giorni caldi, come testimoniano le fonti letterarie. La *scaenae frons* presenta tre porte corrispondenti alle *valvae*, il *proscaenium* doveva essere coperto da un tetto in legno che migliorava l"acustica e per realizzarlo si è sfruttato il dislivello di quasi 20 metri tra la base della nicchia e la cima dell"edificio, suddivisa su vari terrazzamenti. Nel processo di realizzazione del modello virtuale la tecnologia informatica ha avuto un ruolo fondamentale, offrendo la

possibilità di controllare nello stesso tempo il complesso sistema architettonico e i suoi singoli componenti costitutivi. Partendo dai dati del rilievo sono state estratte sezioni e viste ortogonali dei prospetti, che sono divenute le basi di partenza per la generazione delle primitive grafiche utili per approssimare il dato rilevato. Successivamente è stato quindi generato un modello matematico che rappresenta le forme reali, dotate spesso di imperfezioni ed asimmetrie per il processo di usura o di fabbricazione. In tal senso, il primo passaggio necessario è stato quello della riorganizzazione di tutte le informazioni raccolte durante la fase di rilievo dei resti del teatro attraverso la creazione di un *database*, all"interno del quale si è proceduto ad una pulizia di tutto ciò che non era inerente alla realizzazione del modello. Lavorando per parti modulari è stato composto un vero e proprio abaco di elementi singoli, il cui assemblaggio ha portato alla ricomposizione tridimensionale del corpo di fabbrica che possiede tutte le caratteristiche metriche derivanti dal rilievo. Per quanto riguarda la *texturizzazione* del modello si è scelto di attribuire a tutte le superfici un materiale neutro con l"intento di dare un effetto *"maquette"* all"oggetto, al fine di agevolare la lettura delle varie parti che lo compongono. Il percorso di analisi non si è concluso con la realizzazione del modello virtuale, ma sono stati redatti anche dei disegni bidimensionali dell"intero modello (pianta, sezione, prospetto), ottenendo delle rappresentazioni utili all"analisi di alcuni dei principali componenti dell'architettura. Questo "ritorno" alla rappresentazione bidimensionale dal 3D avvalora un concetto sostanziale del *Reverse Modeling*, ovvero che il modello tridimensionale non sia il punto di arrivo dell"intero processo, quanto la rappresentazione iniziale di un complesso contenitore informativo che deve essere interrogato in funzione delle analisi che si vogliono effettuare.

Fig. 10: Teatro romano di Dougga: Paesaggio archeologico e paesaggio ricostruito.

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Exploration of the open spaces in Varna as a component of the cultural landscape

Prof.arch.Todor BOULEV, Assoc.Prof. Milena PETROVA Ph.d.Eng
Faculty of Architecture, Varna Free University "Chernorizets Hrabar", Varna, Bulgaria
E-mail: boulev@abv.bg, as@vfu.bg

1.City of Varna, Bulgaria

The city of Varna is the third largest in Bulgaria with population of approximately 500 000 people. Situated at the Black Sea coast, it is a major educational, industrial, sea port and resort centre. The various relief, the bay and the two lakes create an unique natural background (Fig.1).

The city is literally surrounded with the adjacent aquatic areas and forest-grown slopes and "plateaus". In respect to them, there have developed some historical and typical urban landscapes with many open green spaces, which create an attractive resort and tourism atmosphere.

For the preservation and renovation of this atmosphere, in particular, it is important that the qualities of the urban landscape should be recognized, safe-guarded and enriched.

Fig. 1: Satellite view

In 2010 – 2011, by assignment of the Municipality of Varna, a team of VFU "Chernorizets Hrabar" – lecturers and students with Head of Research, Prof. Arch. Todor Bulev, elaborated a special methodology to study and comprehensively evaluate the open spaces in the city of Varna as an essential supporting element of the cultural landscape – register of the open green areas of the city of Varna. The methodology defines a set of natural, urbanistic and cultural characteristics, which in their combination allow to make an overall evaluation of the characteristics of the open spaces (functional, ecological, aesthetical, etc.), by paying special attention on the biological components. The paper illustrates the methodology and the first stage of the studies on the territory of the city, namely, the street areas, and the smaller parks and gardens. The research was conducted on the basis of the available documentation, aerial photographs and terrain surveys. The materials from the study have been summarized in map-based materials according to the separate parts of the city and „passports" of the separate areas, which are presented on paper as well as in digital form.

Forthcoming is an analysis of the coastal cultural landscapes, the parks in the city and in the suburban areas.

Essentially, the register is a specialized information system for monitoring the condition of the open green areas of the Municipality of Varna, the various plant species therein, their exploitation, management and keeping. The register comprises the whole variety of green areas and all the territory of the Municipality, including the city parks and the territories envisaged for building suburban and countryside parks, as well as parks with special designation.

Employing the methodological approach, there are the principles set in the Register for: continuity and unity of the green system; for the comprehensive interdependence of the quality of the urban spaces, for their dynamics and development over time, and for the use of the register for efficient management of the green system in Varna as a whole. Therefore, the register contains not only system (base) data, but also a system of the necessary primary evaluations. Furthermore, it also allows (through the structuring and formalization of information) the performance of various analysis on separate problems and territorial units, facilitating the designing, programming, valuing, and management decision taking, related to the green system of the Municipality of Varna. The register will be used also in the elaboration of the integrated plan for regeneration and development of Varna.

The register of the open green areas serves to solve the following tasks:
❑ Comprehensive environmental assessment of the green areas;
❑ Evaluation of the potential of the spaces for creating the green system;
❑ Elaboration of an assignment for detailed structural plans;
❑ Elaboration of assessments of detailed structural plans;
❑ Elaboration of investment programmes for landscape gardening and shaping out the spaces, etc.

The first stage of the register elaboration provided also an idea of the great variety of nature and characteristics of the open spaces, the variety of the urban landscapes and their problems.

The elements studied at the first stage were the following: trees in good and bad health, and saplings, which have not been registered to date; registered trees, which have caught a disease; vanished or very sick trees; current condition of the registered trees; individual grass areas and grass areas on the streets and roads; bushes and groups of bushes; planting flowers, cachepots, flower pots; water taps, fountains, water areas, canals; low an high luminaries; waste bins and containers; single benches and groups of benches; kiosks, advertising panels and billboards; children and sports playgrounds; monuments; bus stops with and without a shelter. The changes in the street regulation have also been reflected.

2. Central Urban Zone (Fig. 2, Fig. 3, Fig.4)

Fig. 2: Central urban zone – satellite view

Fig. 3: Central urban zone – work sheet   Fig. 4: Legend

Just as well as in a number of other Bulgarian cities (Sofia, Plovdiv, Burgas) the central core area is characterized by high level of construction density, small parameters of the real estates with individual landscape gardening and clearly outlined street spaces. Streets are comparatively narrow in Varna, wide just between 8,0 and 10,0 m. Sidewalks are 1,5 – 2,0 m wide, yet, nevertheless, they have trees planted on them, creating an unique atmosphere of ,,arches" of greenery. A major problem is their maintenance and the timely shaping out of their crowns. A lot of the trees are now in a very advanced age and they have to be gradually replaced. The area has a clearly distinct specific character of an urban area.

3. Residential district ,,Asparuhovo"(Fig. 5, Fig. 6)

Fig. 5: Residential district ,,Asparuhovo" – Fragment satellite view

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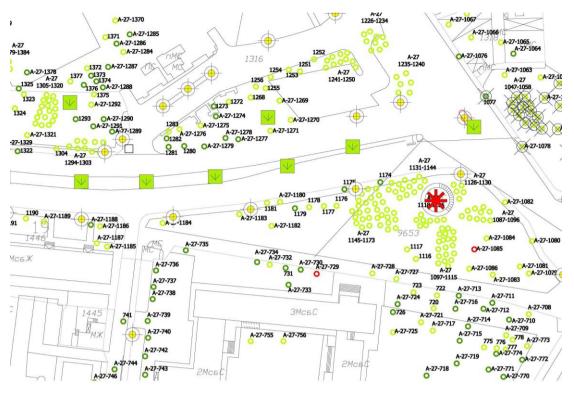
Fig. 6: Residential district ,,Asparuhovo" – work sheet

This district is an example of an urban zone, typical for the periphery of the big cities in Bulgaria. Originally, a village, cut off from the urban core – with large plots and lower level of construction, the residential district has been gradually urbanized; a public core area has been developed, as well as a park and a main street. Nevertheless, the urban landscape has preserved its spacious open areas, where street landscaping is dominating the view vis-à-vis the architectural shapes, and this specification renders it with a particular value.

4. Residential complex ,,Vladislavovo"(Fig.7, Fig.8)

Fig. 7: Residential complex ,,Vladislavovo" - Fragment satellite view
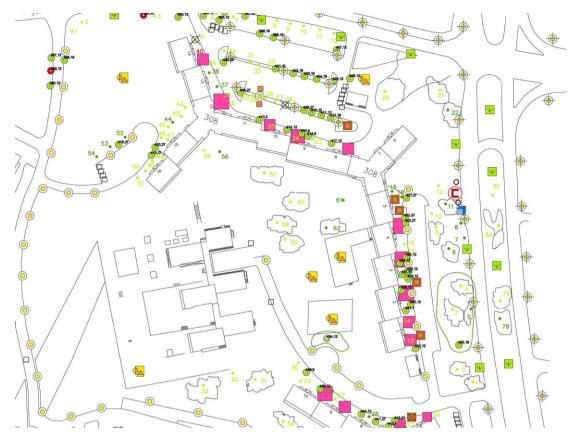
Fig. 8: Residential complex ,,Vladislavovo" – work sheet

The complex is a typical example of large-size housing construction, in specified urban territories, following the spirit of the Athens Charter, and oriented towards the large masses of city dwellers, while solving the housing problems, typical for the big cities.

The buildings are 8-10-storey high. They outline yards, which are sometimes quite big in size, where greenery is just yet to be imported and developed. Within those territories, important are not the streets, but the spaces between the apartment blocks, which create the characteristic urban landscape.

5. Garden square ,,The Red Square"(Fig. 9, Fig. 10)

Fig. 9: Garden square ,,The Red Square" - Fragment satellite view
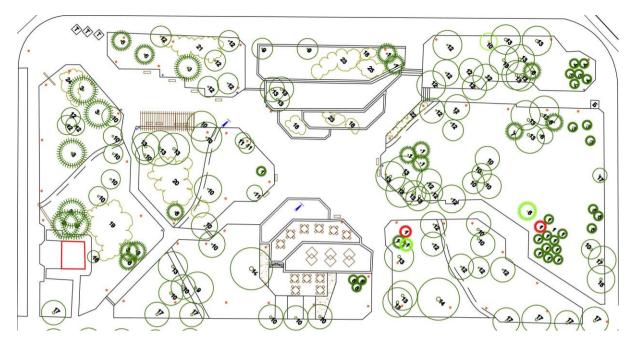
Fig. 10: Garden square ,,The Red Square" – work sheet

Quite typical for the urban environment, which developed from the end of the 19th until the end of the first half of the 20th century, is shaping out small, local community or public gardens and garden squares. Some of them, just as the one mentioned here, have undergone many transformations, yet, they have remained those indispensable ,,oases" in the ever more dense urban development. The plant combination and network of alleys are carefully studied and create a typical atmosphere.

The research done in the Register allows making and carrying out characterization of the urban landscapes (Fig.11), as well as directions for the green system development. Particular interest presents also the accompanying study of the visual communications (Fig.12), which are yet another characteristic feature of the urban landscape, creating the spatial-visual interaction between the separate parts of the city. These researches have become a part of the General Structural Plan of the city of Varna, which is already adopted as a basis for the city development.
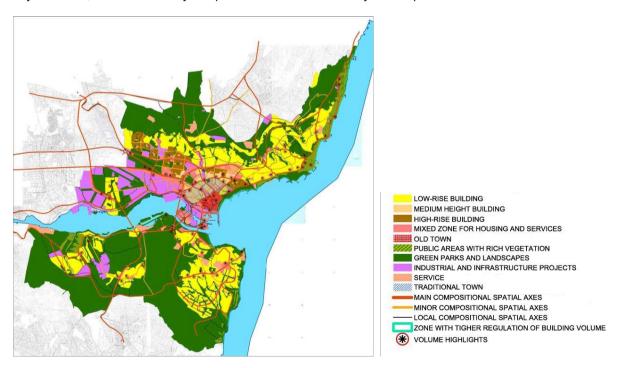
Fig. 11: Scheme urban landscapes of Varna (part of the Master plan of Varna, T.Boulev)
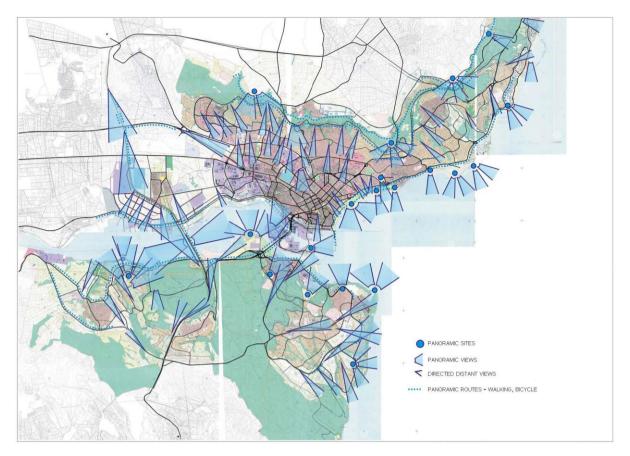
Fig. 12: Scheme of the visual communications and the complex interaction (part of the Master plan of Varna, T.Boulev)

Fig. 13,14: Panoramas of the city of Varna

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+ less
more
architecture
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Jordanian Villages and Landscape: More Sustainable Planning, Less Physical and Social Degradation

Ahmed ABU AL HAIJA [1], **Franca GIANNINI** [2]
[1] Faculty of Engineering – Philadelphia University, Jordan
[2] Faculty of Architecture, University of Genova
E-mail: alhaija2@gmail.com, francagiannini@libero.it

Abstract

In traditional Jordanian settlements, the rapid urban development and the abandonment of most of the rural areas, due essentially to the lack of national policy in controlling the process of planning, has caused serious variation of architectural character and urban landscape. Local territorial laws and building regulations have contributed both positively and negatively to this accelerating transformation.

This paper illustrates some aspects of Jordanian villages concerning their typology and architectural traditional elements. Particular attention is given to the urbanization impacts on the local communities, in light of the transformation of rural activity due to the reduction of agricultural areas, which has negatively affected the physical integrity of the productive lands, altering the characteristics of the ecosystem and the social system. This process is irreversibly threatening the rural character and natural landscape of valuable and rare areas, whereas 97% of Jordanian territory consists of desert areas.
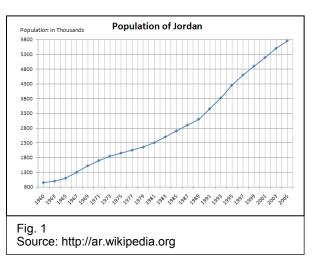
The objectives of this research are to highlight the importance of conserving the original habitat of these villages and to support the characteristics of their rural activities, introducing sustainable concept in Jordanian planning strategy. This research also advocates the need for the enactment of specific law for integrated planning -at different levels- and introduces specific guidelines for intervention methodology, concerning landscape and architecture, with scrupulous interest in European experiences (especially the Italian) in respect to the protection of tangible and intangible cultural human values, in terms of conservation of memory of places, traditional identities, in a process of sustainable development. Particular attention is given to the process of formation of the Landscape Territorial Plan with regard to the European Landscape Convention.

Keywords: Traditional Jordanian settlements, Rural transformation, Integrated Planning, Italian Landscape Experience

1. Introduction

Several historic populations have been established in Jordan since the Neolithic period (8000 B.C.). Traces signed by ancient objets like Dolmens, Gromlesh and different civilizations have been stteled in Jordan like Nabatanian, Persians, Greek, Romans, Byzantine, and Islamic (Abu Shmeis, 2008).

According to Ottoman tax registers, Jordan was well-populated until the 16th / 17th century, in which was produced a surplus of agricultural products. In the 18th and 19th century the Ottoman Empire declined and concentrated its armies at the western and northern borders to fight a series of wars. The villages of Jordan declined again and fell victim to internal strife and Bedouin raids.

Fig. 1
Source: http://ar.wikipedia.org

People left their houses and again turned to the way of life of semi-sedentary agriculturalists (Knauf, 1985). Semi-sedentary agriculturalists were confined to the mountain regions, while the nomads were located traditionally in the south and the east of Jordan.

As a consequence of the occupation of Palestine in 1948 and the war of 1967, more than one million refugees have mainly relocated to Amman, Zarqa and Irbid, causing rapid expansion of these cities, which has had effects on the rural communities from economical, cultural and social points of view (Potter, 2009). Many families left their agricultural lands and immigrated to the cities. As a result, numerous traditional houses were abandoned, deteriorated and demolished. The interrelation between the natural landscape and the traditional rural contexts altered profoundly in these years. The genuine nomad (Bedouin) lifestyle in relation with nature, habits and costumes has also changed. The source of their economy depends mainly on the state's aid and on some commercial activities created by the foreign tourists visiting the desert; their tents were replaced with cement blocks in order for them to be settled in the desert. As a result, the millennia-old natural habitat of nomads has been irreversibly altered in few years (Abu Al Haija, 2011).

This rapid urban development urged the Jordanian Government to institute territorial legislations in order to control and orientate this process, to conserve as much as possible green areas and historical centers. However, the planning system has only succeeded marginally in regards to the protection of natural resources and the historical fabric of the people. In fact, there is until now no applicable territorial plans work at the macro scale level to control the process of development, while local urban plans are generally created for   land use zoning rather than strategic plans. Effectively, weak attention to public facilities in relation with appropriate standards is witnessed; in addition, the absence of sustainability concepts in urban development, weak housing and industrial polices, weak historical center conservation and lack of environmental and hydrogeologic protection plans.

The Jordanian current situation is also extremely difficult because of clear contradictions between reality and governmental intervention, as seen in the following examples:

• Economically, The shortage of agricultural lands in Jordan (only 3.1% of the Jordanian territory) (Al Gazou, 2008). The urban plans ignore this situation by permitting new models of horizontally huge cities (Amman, Irbid, Zarka, Madaba, etc.) which causes loss of agricultural lands, waste of energy and excessive infrastructure cost.

• Socially, the Jordanian society has strong tribal and social relationships. The tendency of the urban plans decreases this sense of community and relationships; importing western subdivision models of residential patterns also in the historic areas as well.

• Physically, the major part of the traditional Jordanian architecture was appropriate to the local situation, regarding available materials, technique, climate, etc.. The demolition of these agglomerations, rebuilding them with cement blocks is considered inappropriate, assuming also a chaotic aspect in relation with the urban context and breaking off the old center's physical integrity. Consequently, the typical Arab's urban fabric has been changed completely, establishing large streets and houses with several windows oriented to the outside, the disappearance of the patio and semi public spaces , and so on. (Abu Al Haija, 2008).

The administrative authorities and urban regulatory bodies (Ministry of Tourism and Antiquities, Ministry of Municipalities, and the various urban Municipalities) of the Jordanian territory are trying to improve the economic infrastructure and urban development strategy (see Ministry of Tourism, 2005). However, historic centers continue to be neglected and a comprehensive strategy to protect the old centers has yet to be articulated and laws promulgated. At the same time, the rare rural areas located in the south and northwest of Jordan are diminishing rapidly, and also the natural landscape character is transforming continually.

2. Framework of Jordanian Laws and Territorial Planning

2.1 The Jordanian Laws in Force Regarding Historical Centers and Landscape

Five Jordanian laws pertain to urban planning with particular reference to the conservation of the historic buildings and natural landscape. These laws are:

a-	"Planning the Cities and Villages Law" No. 79 (1966) and its amendments;
b-	"Agricultural Law" No. 92 (1966);
c-	"Antiquity Law" No. 21 (1988);
d-	"Protection of Urban and Architectural Heritage Law" No. 5 (2005).
e-	"Environmental Law" No. 52 of (2006)

Law No. 79 (1966) concerns regional and urban regulation in general and some references are dedicated to the conservation of historical buildings and urban fabric. The only article concerning the

protection of the historic buildings and centers states: "The conservation of sites, caves, buildings have archaeological or historical interest…." These references are very general; they do not clarify how to classify historic or archaeological elements; also they do not elaborate the meaning of preservation. As a result, the laws in force are vague and open to various interpretations as to the legal definition of preservation.

Agricultural law No. 92 (1966) deals with general indication in one article the duties and responsibilities of the Ministry of Agriculture concerning the agricultural land management.

Law No. 21 (1988) protects archaeological elements which are defined as "all constructions built before the year 1750". Buildings which were built after this period are not protected under this law. As a result, it is important to recognize that a vast number of buildings in Jordan are less than 250 years old. Therefore, they are not protected under the law. Yet, the conservation and preservation of many of these is imperative for historical, socio-cultural and architectural reasons.
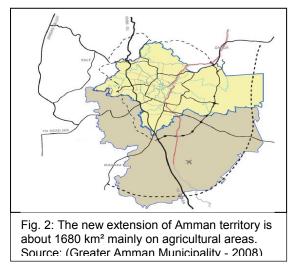
In Law No. 5 (2005) the Jordanian government recognizes officially for the first time the importance of the traditional (not only the archeological) buildings for the national identity and cultural heritage. Practically, no clear effective result protecting these categories of buildings is seen until now on specific maps because of several technical reasons, which could be reassumed as fallow (Abu Al Haija, 2011):

- The shortage of documentation regarding traditional buildings since there is no archiving system;
- Urban plans do not yet select and classify the traditional buildings according to their age of construction, historic and artistic value.

Law Number 52 of (2006) has established general indications in the conservation of natural resources and in respect of the environmental context in project elaboration and implementation. This law has also indicated the necessity to elaborate twelve technical norms concerning particularly the protection of nature, the environmental impact assessment, and the regulation of natural reserves and national parks.

2.2 Territorial Planning at Macro Scale Level as Practiced in Jordan

Although Law No. 79 makes reference to regional planning as a means to better control the territory, neither regional nor inter-regional plans have been adopted until now in Jordan. Only two territorial plans were elaborated in the last 5 years, but they are still not approved. The first one is the "Amman Metropolitan Growth Plan," which has been presented to control the rapid development of the Amman Area. It is structured at several scales simultaneously in order to guide the planning process for an anticipated population growth of Greater Amman to 6,500,000 persons in 2025. The Plan has been prepared under the guidance of the Greater Amman Municipality Council, the Central Government Ministries, and the Mayor's Roundtable.

Fig. 2: The new extension of Amman territory is about 1680 km² mainly on agricultural areas. Source: (Greater Amman Municipality - 2008)

The plan illustrates the location of existing areas accommodating residential and employment uses within the overall Metropolitan Area, as well as the preferred locations for the future expansion of settlement. It also details the projected future locations of new roads, public transit corridors, major natural heritage sites, and areas for more intensive mixed-use development. The plan has been developed according to different layers throughout its duration. Thus, the approval of this Plan also follows the ongoing development of these layers. The second territorial Plan, which is still not public but under revision, is Al Balka Comprehensive Plan.

The planning process in Jordan depends substantially on "Local Master Plans". In reality, the experience of the major part of the Local Master Plans--adopted until now by the relevant authorities-- demonstrated both methodological and technical problems. In these plans, the historic areas seem generally frozen. Practically, the development process is stronger in the old city centers than in the outlying areas. As a result, the development or the conservation in the old rural centers is generally less controlled than in the new urban areas. Other problems associated with these plans are the boundaries of the historical areas, which are not clear or not based upon a particular study or approach. Thus, the border of the historic areas is not precise or recognized officially by the Local Authority. This problem indicates that the historic areas are not regulated by specific norms and urban

regulations. The agricultural lands are under a huge process of transformation, but the physical plans in Jordan still don't consider the rural landscape as tangible and intangible heritage. Consequently, the local populations still   need more awareness activity regarding their rural heritage without compromising the cultural, historical and landscape values.

3. Jordanian Villages

Before the establishment of Jordan as an independent state in 1946, the Jordanian population was mainly composed of semi-nomads who settled in villages close to the fertile lands of the country, and nomadic Bedouins who had previously wandered in the desert of Arabia (see: Bin Mohammad, 1999; Shryock, 1997). The traditional Jordanian villages represented places of stability for the semi-nomadic population, where emotional attachment and a physical context became the signs of local national Jordanian identity. These villages were a typical result of natural habitat production, where the community in certain circumstances collectively creates its own common culture, symbolic values and characteristic living environment, producing specific forms, typology and a compact urban fabric suitable to their habits and lifestyles. This production of the habitat proper begins with the initiative of a familial bond, evolving without any pre-programmed projects to authentically reflect the collective and individual needs. People had the capacity to create their own shelter depending on social collaboration, rather than through the intervention of the State or by following particular norms and obligations encouraged by any local administrations. The spontaneous urban texture and architecture in these villages reveals the necessities of having minimum spaces to live, reducing the size of units, openings, and structural forms, and inventing typologies that reflect particularities of the vernacular architecture in Jordan (Abu Al Haija, 2011).

Fig. 3: The Village of Dana in south of Jordan , Photo was done by Abu Al Haija in 2011

The semi-nomadic population has lived many hundreds of years in small settlements cultivating the fertile lands of the surrounded areas, grazing sheep and producing milk and cheese. Particularly, after the year 1970, several groups gradually moved to new quarters located close to their traditional villages. The lack of substantial services and public transportation in the original villages favoured the displacement and, consequently, the abandonment of these villages, which thereby provoked gradual physical deterioration of the buildings and place alienation among the indigenous populace. "Alterations negatively contrast with the authenticity of the pre-existing architecture" (Sidónio Pardal). Figure n.4   shows some of the abandoned Jordanian villages located in the south, centre and north of the country.

Fig. 4: some abounded Jordanian villages. a: Dana Village, b: Namteh Village, c: Hosban Village
Photos was done by Abu Al Haija in 2010

Recently, the problem of the major part of the Jordanian villages concerns particularly their transformation from articulated rural areas compatibly organized respecting the environmental conditions and cultural needs, to a total state of urban and architectural confusion. Most of the agricultural activities are abandoned and replaced with governmental administrative jobs. The transition from rural society to urban society has had a profound impact on population attitude and on the landscape. The younger generation has abandoned the traditional activities, selling their agricultural, inherited lands. But these regions, such as Ajloun in the north west of Jordan, are still very poor economically in comparison with the new urbanized areas mainly localized in the surrounding areas of Amman. This reality has leaded to dysfunctional spaces and landscape deterioration, due also to the over subdivision lands, which can be divided in 4000 square meters, in order to satisfy the heredities.

Therefore, the Local Master Plans do not adhere to any criteria or methodology to conserve or protect historical centers or buildings. For example, there is no technical report explaining the methodology of intervention in the old center (Abu Al Haija, 2008). Figure 5 shows the transformation of the local architectural style in the last century
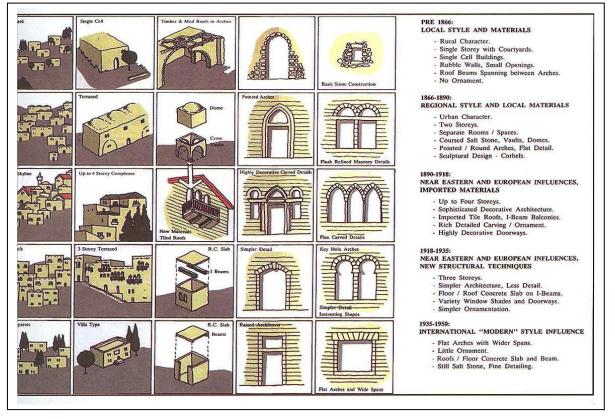
Fig. 5: historic development of traditional architecture in Jordan (Salt old center). Source: Khatib. R. 2008

4. The Italian Experience and the European Landscape Convention

4.1 The "Regional Landscape Spatial Plan" in the territorial governance process

The European Experience, in particular the Italian case , can constitute an important reference for the Jordanian State, which also has a valuable historical landscape and old settlements and cultural heritage.

The European Landscape Convention (2000) represents the most important legislative and cultural reference that the majority of European States is adjusting. It had influenced the territorial policies, integrated whit the landscape theme.

One innovative aspect of this Convention deals not only with the extraordinary landscapes, but even with ordinary areas and deteriorated places, in order to establish a quality of landscape in all components of the territory. For a comprehensive survey about the situation after the European Landscape Convention a specific study (Voghera, 2011) can be seen, that discusses the legislative innovations, policies, plans and methodologies for evaluation which were developed by various countries during the ten-year period following the approval of the Convention.

In Italy with the "Italian Cultural Heritage and Landscape Code" or "Urbani Code" (2004), that promotes the landscape planning and regional laws, there is a completion of a normative codification for landscape that, at least in its statement of principles, seems to be one of the most advanced in Europe.

Now the "Regional Landscape Spatial Plan" is really the fundamental support of the territorial governance process. (Giannini, 2011). In the new context, the important theme of agricultural landscape and rural settlements is addressed, and there is an important production of the studies on historical agrarian landscapes and on types of rural settlements related to agricultural activity.

Italy's rural landscape, the fruit of several thousand years of history, has always been recognized as one of the fundamental elements of the cultural identity of that country, and there is an important production of the studies on historical agrarian landscapes and on types of rural settlements related to agricultural activity.

Rural landscape constitutes a fundamental resource, resulting in an added value for productions with designation of origin and forming a key element for the development of tourism and for biodiversity tied to the quality of the cultivated areas and species introduced by man, thus representing an aspect characterizing the quality of life in rural areas.

In recent decades, the Italian landscape has been affected by progressive deterioration, which is jeopardizing its qualitative features (Mantino, 2008)

The "integration" is the actual theme in Italy, also in reference to rural areas: not by chance the UNISCAPE (European Network of Universities for the implementation of the European Landscape Convention) is now organizing in Florence a seminar called "Rural Landscapes: Towards A Better Integration Of Rural Development Policies, Urban And Landscape Planning". The aim of the seminar is to promote a debate on the current state of the research perspectives for rural and peri-urban landscapes. Particular reference will be given to the various contributions and knowledges that, with a trans-disciplinary point of view, confront this theme by challenging themselves to integrate spatial, urban and landscape planning with the guidelines of the agricultural and rural development policies.

The theme of landscape, whose importance is ratified in the Italian Constitution, requires an integrated multicultural approach, as recognized by the innovative contents – even on the cultural level of the European Landscape Convention, as well as by the evolution of the legislative framework and the various sectoral policies. One only needs to think of the landscape planning promoted by the "Urbani Code", and the role of landscape as strategic objective in the National Rural Development Plan, 2007/2013 (PSN Piano di Sviluppo Nazionale) and in agricultural policies, 2014-2020.

In the presentation of the Seminar it is stated: "The pursuit of these objectives with coherent and effective actions requires the support of experts specifically trained and the multi and trans-disciplinar [sic] collaboration of experts from various sectors, as well as between the worlds of research, education and public authorities and professionals. Any action able to modify the quality of landscape contributes in fact in an essential way to economic development and to the improvement of the quality of the environment and life of the population. The most recent agricultural policies have stressed clearly how important it is that landscape becomes a paradigm of reference in various actions of planning, designing and managing the rural areas, also in relation to the increasing awareness of the social and economic value that a synergistic union between agricultural production and territorial resources has, as well as the potential worthiness of the agricultural sector on the social and environmental level for urban spaces".

The Convention emerges as well from the definition of landscape (art.1) ("Landscape" means an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors ") considers the landscape as a problem of quality in all places of life of the populations and it concerns landscapes that might be considered outstanding as well as everyday or degraded landscapes. The Convention requires integrating landscape into its regional and town planning

policies and in its cultural, environmental, agricultural, social and economic policies, as well as in any other policies with possible - direct or indirect - impact on landscape.

The Convention states that "the landscape is a key element of individual and social well-being and that its protection, management and planning entail rights and responsibilities for everyone". It explicitly calls for a greater involvement of the local populations in government of its landscapes.

4.2 The Theme of "Landscape" In the New Regional Urban Planning. The Apulian case.

The theme of "landscape" (in its most complete conception and as a dynamic process) is therefore experiencing an important moment in Italy for the need induced by the new Regional urban planning laws to integrate environmental and landscape content in territorial and urban planning and to evaluate the plans (general and by sector) in terms of environmental sustainability, through the instrument of Strategic Evaluation (VAS). Precisely, the landscape content requires furthermore, more than any other thing, to make reference to a method of co-planning between diverse levels, since it is not possible to confine it in administrative perimeters.

We are thus dealing with "work that is under way…

In the very heterogeneous mosaic of the twenty Italian Regions, we have selected as a meaningful example the case of Puglia: a region that presents extremely varied and diversified "rural systems" that are characterized by the presence of a wide variety of naturalistic, landscape, architectonic, cultural, social and productive resources that, although with different levels of harmony and integration between them, they converge in qualifying themselves and rendering themselves unique.

Within the context of the different Italian Regions, which are very heterogeneous, but on their way towards revision, the Puglia region in particular is experimenting in a complete way the "new phase of Italian planning", building in an organic and innovative way a new system of regional planning, in concert with the Ministry of Cultural Heritage and attempting co-planning at a Provincial and Municipal level.

The new conception of planning in Puglia puts the improvement of life quality at the centre of the political initiative, as well as the valorization of the territorial heritage, with great attention given to landscape, meant as a rediscovery and testimony of identity, synthesized by the natural and cultural values of the territory. In this new vision, the territory becomes an instrument of promotion and socio-economic development that is durable and sustainable and is not simply a mere physical support that is able to be adapted to hosting any type of activity, ignoring aspects of quality and vulnerability. (And in particular this has happened to the rural territory).

The lack of an efficient framework of general settlements in a large scale has until now impeded the construction of cohesive and shared scenarios of protection and development of the territory. In the knowledge of this long delay, for the construction of the new planning system, the Regional Administration founded its line of action upon the realisation of a basis of shared and certified knowledge of the entire regional territory and on the involvement of all the local institutions, with the conviction that institutional and social cooperation is one of the essential premises for the efficiency and sustainability of the decisions made (Barbanente, 2008).

As the scientific Coordinator of the PPTR (Piano Paesistico Territoriale Regionale) of Puglia, Prof. Magnaghi of the University of Florence states "a plan is, more than anything, a cultural event, in that the transformations that it is able to induce are not measured only by its technical normative adhesion (in Puglia scarcely efficient, given the historical management and applicative planning deficit), but also by its capacity of transformation of the culture of the actors who are producing the territory and the landscape on a daily basis.

4.3 The Regional Landscape Territorial Plan: Articulation, Strategic Planning Connotation

The PPTR, as a technical instrument is articulated in three sections: the Atlas of Environmental, Landscape and Territorial Heritage, the Strategic Scenario and the Rules. The whole apparatus of the Plan is available on the site of the Puglia Region (http://paesaggio.regione.puglia.it).

The "Atlas" constitutes the cognitive framework of the PPTR, which organizes the body of information deriving from the various fact-finding operations that were launched in the past, enriched by original investigations carried out by the Technical Secretary of the PPTR (M.Valeria Mininni Coordinator). The sections of the Atlas at various scales are articulated in analytical levels, with structural synthesis and descriptions of the objects of the heritage.

This cognitive structure is orientated to the description of the regional peculiarities and the highlighting of the settlement rules that they have produced.

The historical investigation tends to rebuild, in the long term, the major phases of territorialization to investigate the formation of the characters of the rural landscapes, assigning to some of them a "traditional" character; to analyse the forms of the settlement throughout its evolution, especially in the variation of the relationship between a built space and an open space; to define the "territorial and

landscape figures", a unit of "minimum decomposition of the territorial individuality with a specific morphotypological structure".

The Plan directs great attention to contemporary dynamics, in order to record the nature of their effects upon the major invariant structures that connote the regional territory.

The desire to highlight the "long duration" of the dynamics that have structured over the course of time the formation of the peculiarities of the landscapes of Puglia is an attention to the past that is directed essentially at establishing roots within the territory for the choices of the "Landscape Scenario" contained in the second part of the PPTR, a prefiguration of the medium and long-term future of the territory of Puglia. The scenario has served as a strategic reference for "starting processes of public consultation, actions, projects and policies, directed towards the realization of the future that it describes."

The PPTR (Piano Paesistico Territoriale Regionale): The general objectives of the "Strategic Scenario":

Objective 1: Realize the hydrogeomorphological equilibrium of the hydrographic basins
Objective 2: Develop the environmental quality of the territory
Objective 3: Valorize the landscapes and the long-term territorial figures
Objective 4: Redevelop and valorize historical rural landscapes
Objective 5: Valorize the cultural-settlement identity heritage
Objective 6: Redevelop the landscapes that have been degraded and the contemporary urbanisation
Objective 7: Valorize the aesthetic-perceptive structure of the landscapes of Puglia
Objective 8: Valorize the slow fruition of the landscapes
Objective 10: Define territorial and landscape quality standards in the development of renewable energy
Objective 11: Define territorial and landscape quality standards for the settlement, redevelopment and reuse of the productive activities and infrastructure
Objective 12: Define construction quality standards, as well as urban and territorial ones in the urban and rural residential settlements.

4.4 The Norms. The "Building Regulation". The integrated projects.

The third part organizes the entirety of the Norms: there is a list of indications, directives and prescriptions that after the approval of the PPTR, will have an immediate effect on the utilization of the resources that constitute the landscape.

The PPTR has been among the first Regional instruments to test in the course of its drafting, active forms of participation in application of the European Landscape Convention. It started the production of "guidelines" and "integrated experimental projects" aimed at reaching the preset structures of the scenarios. Guidelines and projects have been aimed especially at planners and programmers, but in diverse ways they involve those who "produce" landscapes (builders, agricultural entrepreneurs, administrators, inhabitants united together in associations, etc.).

The guidelines, in part functioning within the integrated projects that attempt to create typologies, are drafted in the form of a datasheet-norm, with regulations aimed at particular management or construction aspects whenever the dimension concerns landscape aspects.

A protocol for the qualification of landscape and environmental development in a building regulation was signed with one of the Municipality (Giovinazzo), which proposed itself as a Regional regulation standard, with the introduction of qualitative rules on the building materials, the typologies, the colours, the insertion of the constructions in the urban and rural landscape, etc.
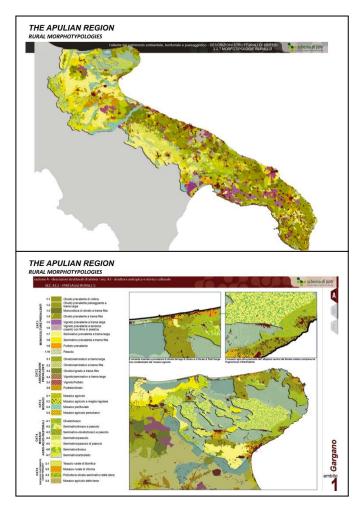
Another protocol regards the regulation for the National Park of Alta Murgia, agreed upon with the Park Authority, that oversees the morphotypological indications for the interventions of recovery and new construction, with the predisposition of an urban and building regulation for the construction and infrastructure activities both for recovery and for prevision of interventions of the single Municipalities in the Park area with specific prescriptions having a landscape character; and a priority Plan for recovery for agricultural, environmental tourism and residential purposes and for services for the agricultural villages that were abandoned by the Reform Body.

The Plan can be ready for other projects. For example, there are proposals for an innovative tourist guide based on the Atlas, that helps in the ecological and historical and structural understanding of the landscapes, and so forth.

4.5 The co-plan with the Rural Development Plan

The Plan, in the course of its drafting, oriented the active "policies" of the territory and regional landscape, opening a dialogue with the other instruments (the Infrastructure Plan, the Coastal Plan, the Plan for vast areas, the Territorial Plans of Provincial Coordination, the Rural Development Plan, etc.).The Landscape Plan chooses to co-plan whit the Rural Development Plan of the Region the main transformations toward a "multifunctional" direction of agriculture

- to promote rural economies, develop food and agricultural products distribution that is founded on the valorization of traditional products, to reduce the dependence upon foreign markets, and in particular, those of oil and wine production and at the same time, develop environmental quality and diversification of landscapes;

- to highlight and valorize the characteristics of historical rural landscapes, reinterpreting the complexity and variety of the rural landscapes of great historical importance as well as that of identity and to redefine their potential; to promote rural repopulation in the context of multifunctional agriculture; among other things, to promote and give incentive to agriculture that is less water-dependent.

Above all, the Plan expresses in its foundation attention to the involvement of the inhabitants in the cognitive and decisional processes regarding the regional landscape, that is evidenced also in the choice and in the calibration of the integrated projects: for example, those concerning the drafting of maps of communities among the diverse towns, Eco-museums and other projects in a participatory form, such as those that have been started for some time, of a multifunctional agricultural park in the Salento

Fig.6-6a: The whole mosaic of "rural morphotypes" recognizable into the Region and in the Area n.1: Gargano . Source: Regional Landscape Territorial Plan of Apulian Region.

The PPTR developed a site (where the progress of the Plan results are published) that includes the Landscape Observatory: an instrument that is calibrated on the principles of the European Landscape Convention in the attempt to investigate the perceptions of the inhabitants, as individuals or associations, in their living environment (www.paesaggiopuglia.it).

4.6 The regional "Guidelines for the restoration, maintenance and reuse of rural building and property"

Inserted within the "Strategic scenario", the "Guidelines for the restoration, maintenance and reuse of rural buildings and property" provides an abacus of criteria and design solutions for designers, contractors, government agencies, enterprises and all the operators concerned. It provides a set of technical and constructive knowledge, and good practices in the operations of building rehabilitation, restoration, renovation, for the complex and valuable rural regional heritage, with special attention on the "reuse" and destinations that are compatible with architectural features, structural, bio-climatic of the artefacts and their surrounding landscape. The classification of building typologies is connected to rural morphotypes described in the Atlas.

The "three key steps" to good design and transformations:

1 the knowledge of the regional rural heritage, of each building and its own rural morphotype

2 promotion for an adequate project to the morfotypological rural unit restoration and rehabilitation

3 adoption of general criteria for the re-use, re-function and administration of the morfotypological rural unit.

Fig.7: Schedule of "Network Systems" of the villages in the eleven "ambiti" of Regional landscape, from Abacus of "rural settlements morphotypes"
Source: Landscape Territorial Plan of Apulian Region.

Fig.7a : Detail Area n.1 Gargano, "Aggregates of rural manufactured, placed in the ridges and far away , for safety reasons, from the commercial or military historic routes, most after the wear uninhabited as a result of emigration, which today are often populated during the summer".

5. Specific recommendation and Guidelines for Intervention Methodology, Concerning Landscape and Architecture

To sum up we advocate the need for introducing sustainable concept in Jordanian planning strategy, and the enactment of specific law for integrated planning -at different levels- and introduce specific guidelines for intervention m ethodology, concerning landscape and architecture. In accordance with our model of reference, we have taken into special consideration the guidelines of Puglia Region for the protection and development of its territorial and landscapes resources.

We would like to get the Jordan Government to take up these:
- promote rural repopulation in the context of multifunctional agriculture; among other things, to promote and give incentive to agriculture that is less water-dependent.
- promote deep knowledge concerning the rural architectural as tangible and intangible heritage.
- urge the local governments to develop awareness activity regarding the rural cultural heritage.
- revitalize, actively and economically, the rural heritage without compromising the cultural, historical and landscape value.
- intensify the debate on rural architecture and develop an educational role with the new generations
- encourage the active participation of owners in the decisional process of planning
- recover the rural buildings and the activities according to their morphological context
- promote sustainable techniques, recovering and rehabilitating the traditional building construction of houses, rainwater harvesting, and so on.
- promote an adequate project for restoration and rehabilitation of the rural unit
- adopt a general criterion for the use, re-function and administration of the rural unit

Consequently, in this step the role of the Jordanian Regional Authority should:
- coordinate and control the implementation of the guidelines in terms of urban landscape and recovering the architectural rural heritage
- collect and archive surveys of the rural buildings with particular architectural interest
- favour experimental rehabilitation and recovering of green building techniques
- support the training activity of technicians in the field of recovering the traditional techniques of construction

- promote the publication of manuals in the recovering of rural buildings
- encourage studies, seminars and conferences on rural buildings and agrarian and natural landscapes.

Fig. 8: Relationship between built and open spaces system: access and control of the courts in the "camere urbane" in Matera, in the south of Italy. Source Panza, 2008.

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Sections 2 and 3 are elaborated by Ahmed Abu Al Haija
Section 4 is elaborated by Franca Giannini
Sections 1 and 5 are elaborated by Ahmed Abu Al Haija and Franca Giannini

Cultural landscapes: materiality and spirituality in the mountains of Abruzzo

Caterina PALESTINI
Dipartimento ARCH, Facoltà di Architettura, Università "G. d'Annunzio", Pescara, Italia
caterinapalestini@libero.it

Abstract
The representation of the landscape involves a deep knowledge of the places and of the cultural and natural features on which it is configured. The perceptions resulting are aesthetic material factors, tangible and concretely visible, but also intrinsic, educational backgrounds that uniquely represent the environmental contexts of which they belong to. Among the many research applications pursued in this direction, the contribution proposes screening of samples that mark the immense wealth protected by Abruzzo's mountains, where materiality and spirituality are blended in a symbiotic reality represented by the perched villages enclosed in the broad valleys , now almost uninhabited, and to reconsider the logic of sustainable development.
Supporting the proposal of the study for the knowledge and the upgrading of these cultural landscapes, the writings of Ignazio Silone describe them as they cannot be understood without knowing the Abruzzo's mountains that form the backbone of the physical structure "the body ", which is associated inextricably moral, "the saints and the poor people". The writer, on several tracks, provides the historical anthropology which reflect the physical and spiritual environment in which ,urban centers were built and several monasteries located between the mountains of Abruzzo, the current pictures and iconographic representations add informations that contribute to the knowledge and critical representation of the landscape in question.

Parole chiave: Landscapes, Heritage, Cultural, Knowledge, Representation.

1. Materiality and spirituality of the mountains. Knowledge and development of the Abruzzo heritage

Representation of landscape implicates a deep knowledge of the places, the naturalistic and cultural aspects on which it is shaped. Therefore, the perceptions which derive from it summarize material, tangible and concretely visible aesthetic factors, but also intrinsic, formative backgrounds which characterize the environmental contexts of belonging in a univocal way.

In particular, the analysis of the cultural landscapes tied in with the sacredness of the mountain induces one to search for meanings and experiences connected to this theme, in which spiritual paradigms, very different among themselves, united by an extreme mysticism sustained by austere and solitary lifestyles on the elevations.

An archetype common to many cultures perceives the mountain itself as an emblem of what is sacred and what is transcendent. In the collective imagination, the areas between mountainous elevations are considered particular places, the wide extensions which define them generate sensations of immensity and infinity; the height which draws them nearer to heaven, their harsh nature from which a hostile ecosystem derives which induces one to sacrifice, solitude and silence, have favoured the establishment of territories for meditation.

The mountain which the desert is in contrast with, are symbolically considered the most suitable places for meditation and spiritual ascesis as events concerning anchorites of various religions, Christianity, Hinduism, Buddhism testify, which, even though with different ideologies, share the habitat and analogous lifestyles.

The ascetic phenomenon from the east spreads in the Mediterranean area, involving various cultural idioms equalized by the demand for meditation in solitude, in impervious, isolated areas, as referred to in many narrations: Those of the Tibetan monks such as Milarepa, who lived between the eleventh and twelfth centuries, who remained in complete isolation in a cave near glaciers to purify himself before professing his karma; those of Christian fathers such as St Onofrio, who lived in solitude in the desert for many years.

Iconography shows images of stylites represented in settings defined by arid landscapes, seabeds with unexpected rocky caves from which they can be seen, represented in scenes of life which identify them. In this connection, the representations of the hermitages are interesting, which refer episodes of hermit saints, metaphorically united among one another in a single landscape context shown in a filmic way, in the interlinked series of a panoramic vision which synthesizes its spiritual essence in an ideal way.

The Renaissance hermitages, attributed to Blessed Angelico and Paolo Uccello, are specifically set in mountainous landscapes containing scenes of coenobitic life. The former, a tempera plate dated about 1420, unfolds in a long view a mountain chain crowded with simple architecture, retreats and caves, accessible by means of steep paths dug out the rock, which allegorically communicate a busy hermitic presence, scattered among high tops lapped by the sea.

Instead, Paolo Uccello's interpretation, which goes back to halfway through the fifteenth century, fixes onto canvas a limited portion of, still mountainous, landscape, in which he represents in a more detailed way analogous episodes referring to humble, industrious saints, who live between caves and steep, rocky spurs, in search of spiritual purity.

The two temperas seem to be inspired by a component model deduced by a Byzantine mosaic, formerly used by Buffalmacco in a fresco in the cemetery of Pisa, which reproduces the same theme of the stories of the "holy fathers" recalled as moral allegories.

The paintings supply a clear example of exegeses of cultural landscape. They show materiality and sacredness of the places contextually, specifically of some mountainous territories which, although they adopt the symbolic narrative formula of a Middle Ages type, find concrete parallels in real contexts that the contribution wants to highlight, by means of opportune comparisons and with different representative formulae.

Going back to the importance of the mountain, it can identify the place in which heaven and earth meet and across which the so-called *axis mundis* passes, shows the ascension symbolically, delineated physically by the altitude, which allows one to overcome the physical space of human limited nature by means of spirituality. In various countries, one or more mountain tops exist to which this sacred role is attributed, among which are: mount Olympus, from time immemorial the dwelling of the gods, Tabor, Adam's burial place, Fuji in Japan, Kailasch in Tibet. Alternatively, structures which recall mountains have been built: the Mesopotamian *ziggurats* of the paradigmatic monuments of Teotihuacàn in Mexico with flights of steps which lead towards heaven like the mythical Tower of Babel.

Also, the Tibetan monks identify some supposed "power places", some sites around which important energies and spiritual forces are concentrated, among which sacred mountains prevail, in which spiritual

Fig. 1: Beato Angelico, *Thebaid* 1418-20, Tempera on panel (73,5x208 cm), Uffizi Gallery, Florence.

Fig. 2: Paolo Uccello, *Thebaid* 1460, Tempera on canvas (83x118), Accademia Gallery, Florence.

entities are present and near which caves for meditation are found and hermitages [1] in which charismatic figures, adepts, proselytes, founders of monastic communities lived.

In this sense, one single similarity unites the Tibetan mountains to those of Abruzzo because of the high concentration of hermitages present in the region; this spiritual and landscape symbiosis directed the request for a concrete project [2] presented to UNESCO for the development of the Majella as European Tibet, not only because of its naturalistic importance, but because of the cultural grouping preserved in it.

In reality, the sacredness of the Abruzzo *Montagna Madre* has remote origins. Popular legends testify to Italic cults, migrations and spiritual journeys on the steep, rocky walls, to reach ancient shelters, the caves into which the anchorites retired, inspired by fascination for the Majella, considered, precisely, the "holy mountain".

The mystic importance of the places, mentioned also by Petrarca in "De Vita Solitaria" as among the most suitable for spiritual ascesis, finds confirmation in the presence of numerous charismatic figures who spend some time there in solitude and among these Pietro Angelieri from Morrone, the anchorite who abandoned his mandate straightaway after his election as pope to continue the rigid principles of monastic life.

The famous "refusal" reinforces the fame of Celestine V, the saint who renounced papal power for the essentiality of hermitic rigour, thus favouring the arrival of followers and the subsequent establishment of local movements which increased the already numerous coenobitic structures present in Abruzzo.

In the severe setting, characterized by mighty mountain chains which cross the region and in the difficult conditions of existence established by them, the spiritual profile of Abruzzo Christianity took shape, its particular ascetic vocation from which forms of autochthonous monasticism have arisen.

Factors efficiently described by Ignazio Silone [3] who, in his writings, sustains that one cannot understand Abruzzo without knowing its mountains which represent its bone structure, the physical structure, "the body", with which the moral structure is associated indissolubly, that "of the saints and the poor people".

Fig. 3: *Thebaid of Abruzzo*, hermitic scenes deduced from iconographic works of fiction gathered in the background of the Majella.

"… The destiny of men in the region, which has been called Abruzzo for about eight centuries, was decided mainly by the mountains …" In this way, Abruzzo was formed and consolidated "… safe from the immediate clash of historical events …"   The text continues, underlining how "the constant factor of the existence of the Abruzzo people" is established by a primitive element, the environmental one, of nature which constitutes the sum from which various connections derive and, among these, spiritual configuration.

The taking root of an extreme religiousness, in which Pietro da Morrone is "a borderline figure, an archetype", therefore intersects with the survival of "myths and pagan customs" and with the rigour imposed by the mountain that, in itself, requires the condition of "permanent defence from a hostile physical environment". The figure of the hermit in Abruzzo in many cases combines the meeting between what is sacred and what is profane, between the religious man and the shepherd who have approached each other, sharing among themselves the same shelters, the same places and caves at times evolved into walled structures which are able to house monks, followers of the rigid contemplative rule.

The harsh character of the environmental context and people, the unavoidable tie with places, the acute analysis of Silone, help one to understand the phenomenon from the anthropological-cultural point of view, making us frame the environmental setting and the role carried out by Pietro da Morrone, to be associated with the intrinsic sacredness of the Abruzzo mountains. From these introductory remarks, useful for defining the study of the places in question, research on the representations was started, on the images which were able to refer the appearance and the character of the landscapes imagined in hermitage form.

For the purpose of proposing a synthesis of the widest research on the representation, of the physical and cultural importance of the landscape, within the brevity permitted by the convention, the contribution shows the first step of the analysis carried out on the patrimony preserved in the Abruzzo contexts and suburbs.

Fig. 4: F. Paolo Michetti, *Gli storpi* 1900, tempera on canvas (380x970 cm.) Museo Michetti, Francavilla al Mare.

Fig. 5: F. Paolo Michetti, *La Figlia di Jorio* 1895, tempera on canvas (280x520 cm.) Province Palace, Pescara.

1.1 Iconographic representations

The interpretation of the sacredness of the mountains and rites connected with it was efficiently represented in various works by Francesco Paolo Michetti. By means of a series of studies, carried out with habitual visiting of the places of worship and with photographical experiments, the Abruzzo painter managed to capture the atmosphere generated by the religious scenes of a popular character. On the canvasses, the intensity and charisma of the purifying rites are so picturesquely interpreted that, according to sacred and profane beliefs, they were perpetrated by ancient traditions. The representations deriving from a careful analysis from real life, sum up the sacred character of the places and events, communicated visibly by means of the emphasis generated by the devotional practices and emotional tensions which sprung from them. As in the case of the *Storpi*, shown in one of the long, tiring missions which were carried out in single file, among the inaccessible mountain paths, to reach the places of worship and ask for a blessing; or in the *Voto* in which the faithful venerate the patron saint, crawling on the floor, in a dramatic situation of mystic consternation.

The efficient pictorial synthesis includes in itself the research that the artist carried out with other intellectuals in an artistic coterie, together with the anthropologist, Antonio De Nino, the poet Gabriele d'Annunzio, the composer Francesco Paolo Tosti and the sculptor Costantino Barbella, with which he shared the project of

an avant-gardist laboratory which was able to eliminate the barriers between the various arts, integrated among themselves with reciprocal influences. Often successful hybridizations, as in the *Figlia di Jorio*, the prize-winning painting at the first Biennial exhibition in Venice in 1895, to which the homonymous D'Annunzio tragedy (4) set in the fifth scenic part of the snow-capped Majella, in front of which there appear the figures who communicate the language of elementary passions, staged on the background of the inviolable Mountain, which appears majestic and unyielding.

The subject, influenced by an event which really happened among shepherds, impresses on the scene an unusual "trueness" expressed by the two authors with their respective communicative formulae, compared between them in the symbiotic cultural projection of the figures to be represented who, as sustained by Benedetto Croce, came true figuratively in the paintings "… Michetti's painting colours the D'Annunzio vision of the Abruzzo people".

Also, a series of of postcards designed by Basilio Cascella are inspired by the theme of sacredness, aroused by these cultural landscapes, that efficiently retract a *pilgrim's stopover*, groups of people who, worn out by the walk, rest at the slopes of the mountains, where they went to visit the virtuous hermits and obtain spiritual support, exorcisms and blessings from them.

In conclusion, the contribution, centred on the understanding of the naturalistic settings and cultural groupings contained in them, wants to underline how research carried out by means of various informative, literary, anthropologic and iconographic sources, allow one to add important details to the complex chain of critical knowledge of patrimony, material and immaterial, comparing them to different and wider enquiry sectors.

The Abruzzo territory supplies an exemplary test bed for the study of neglected places, now little known, but rich in architectonic, historic and environmental importance to communicate by means of the integration of more than one representative formula. Renewing the spiritual charisma of these mountains, compared to the Tibetan ones, constitutes an occasion for investing on patrimony, on many abandoned suburbs, to be reconsidered in the logic of sustainable development.

Fig. 6: Basilio Cascella, *Postcards of Abruzzo* 1910, Pilgrims' stopover.

Fig. 7: Basilio Cascella, Postcards of Abruzzo 1910, scenes of devotion and spirituality on the Mountains, *The exorcism*.

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[1] Among the most interesting Shetak, set near the top of a mountain, in the Yarlung valley, where two small communities of monks live; the caves of the Drak region, the Yongdzong hermitage where, according to tradition, the body of Buddha appears.

[2] The project was renewed by a group of Abruzzo scholars and politicians to obtain the development of the hermitic structures and the Majella environmental context. Cfr. *Il Tempo* Abruzzo, 13/10/2011.

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[4] *La Figlia di Jorio* is a pastoral tragedy in three acts, composed by G. d'Annunzio in 1903, performed at the Teatro Lirico in Milano in 1904.

less
more

architecture
design
landscape

Overlays in Amalfi Coast: *Less and More* of the elements in the landscape.

Luigi CORNIELLO
Facoltà di Architettura, Seconda Università degli Studi di Napoli
lcorniello@libero.it

Abstract
The search path suggests the study of the coast landscape of Amalfi, highlighting the values of the natural and man elements, creating a database, through which the knowledge, enables the management, protection and regeneration of the area. The mapping of the landscape is a key element discretization of knowledge and governance and is aimed at the enhancement. Through technology Corine-Land-Cover layers are of remote sensing of the cards stored in a GIS system becomes interactive and dynamic. In this respect the analysis of the tangible and intangible dimensions, interpolated in a process of recomposition anastylosis and allow the production of models LOD (Level of detail) in relation to the level of detail, discretizing the DLOD representations (Level Of Detail Discretizing) and proposing stages of mapping. The cognitive system on the environment of Amalfi takes shape through digital models organized hierarchically decomposed into sub-elements and through decompositions and aggregations aimed at multidisciplinary perspective. The overlap is the more and less understood of the landscape of Amalfi as addition and subtraction of numeric information in the GIS system.
Develops research oriented courses in history, architecture and environment, analyzing the skyline of the area, illustrating the landscape values through archival documents, the reading of images, the relative importance and performance.

Parole chiave: Amalfi Coast, Landscape, Knowledge

1. *Less and More*: the elements in the landscape
The search path mapping suggests the study of the coast landscape of Amalfi, highlighting the values of the natural and anthropogenic factors, constituting a database, through which the knowledge, enables the management, protection and regeneration of the area. The mapping of the landscape is an element of knowledge and discretization aimed at governance and valuation. The cognitive system environment Amalfi takes shape through digital models hierarchically organized and decomposable into sub-elements through decompositions and combinations aimed at multidisciplinary perspective. The overlap is the most and least understood of the landscape of Amalfi as addition and subtraction of numerical information. The research develops courses oriented between history, architecture and environment, analyzing the skyline of the area, illustrating its landscape through archival documents, the reading of images and its representation.

2. *Less e More*: the values of the landscape

The foundation of the coastal villages dating back to the decadence of the Roman Empire, as to the origin of names, the ancient Reginna Minor was called, from the river that flowed there, such a designation also designated the river of Maiori. In Sveva Age both lost the title of Reginna and were simply called Minuri and Maiuri. The Roman period is attested by the Minor remains of a large Villa of Augusto. The urban structure of the two villages, as they appear today, is typically medieval. The valleys, enclosed between two mountain slopes and open to the sea, take a vaguely triangular shape and end with a small beach with debris formed by rainwater and spring water. This geometry is revived natural setting-urban, which has its center of gravity on the boundary line between the town and the sea. In the reading area is of paramount importance to the knowledge of morphological structure in that both from a strictly natural integration of the intervention by man, is crucial for the use and did not consider an instinctive tendency intensive and extensive exploitation of the costs and resources, and can not prescindete from geomorphological features. The human intervention has from very early times in the construction of a vast system of terraced hills and mountains of the Valtellina of Pantelleria Island. He has contributed to the reclamation of wetlands and large rivers regimentation of the Etruscan and Roman. Then begins the policy of the construction of large, medium and small dams for water with different purposes from energy production to that of water supplies for agricultural irrigation. The natural environment has undergone profound changes over time natural and man-made. The multifarious nature of the Amalfi Coast is determined by the location, exposure, the elevation, the humidity and other elements that, over the centuries, have enabled the creation of different vegetation strips each of which gives rise to a specific ecosystem. The areas near the river have a type of vegetation favored by the abundance of water and the limited temperature: we find, beside the willows and alders, other species typical of mixed forest. A higher level of humidity than the shady ravines, the exposed areas to the south are dominated by evergreen oaks that once covered almost entirely in sunny areas of the Amalfi Coast. The oak forests were once forests, in the most dense, thatprevented the passage of sunlight and greatly limited the formation of so-called underworld. The landscape plant, on the side least exposed to the sun, is completely different; species belong mostly to the family of deciduous and during the fall season adorn the forest with intense colors.

Fig. 1: Immages of the landscape in the Amalfi Coast

3. *Less e More*: the coast defense is not utopian.

The coast towers, once used to guard the common Amalfi, were a warning system consists of robust construction firmly anchored to the rock and no ornamentation, apart from the battlements as the only design element terminal. Structures present on the Amalfi coast you can find two geometric forms: one circular and one square. The first can be traced to medieval times, which even before the Aragonese and Angioino. The validity of defense and visual connection remained unchanged for centuries, a phenomenon attributable to many circumstances and political-administrative and architecture: a cylindrical tower, of course, is easier to build, requiring no angular stones, and contains a surface equal upper perimeter of other geometric shape, does not require a specific orientation and reacts to ballistic impacts evenly. The towers when the system is square, mostly with raised truncated pyramid, possessed coverage plans similar to the deck of the vessels and therefore suitable to accommodate guns in battery. The interiors were used with multiple benefits of a military nature, sufficient to justify the adoption despite their higher cost. The escarpment is attributed to the need to object to the oblique ballistic impacts, to be ascribed to two reasons: the first static: changing the material of construction depending on the territory of which was to erect the tower, the second attributed to need to keep attackers away from the tower base and the relevant territory. The sighting took place in two ways: direct and indirect: in the first case the staff was having to give the alarm to the town, when sighted suspicious boat approaching the coast. The employees present in the towers had to consider the distance of enemy ships and the time required for their landing, in order to prepare the ground troops on the offensive and residents to take shelter in suitable places. The distance could be defined under the best atmospheric conditions, from the horizon to the beach, with D = 3850 (h) 1/2, where (h) is the height of the eye on the sea surface and (D) is the maximum distance visible. As a result of low coasts are resorted to structures with high vertical and average heights of the rocky headlands. Infact, note that the towers have a height Amalfitane not more than fifteen feet and allowed ten miles visibility, functional works of defense and the perception of the coastal landscape seen from the sea. Less obvious is the appearance of geometry and More coastal towers above the horizon. The many possible references to the Amalfi systems of towers, take a descriptive reference, the Tower of Fornillo in Positano, Praiano Tower, the Tower of Capo Conca in Conca dei Marini, the Tower of San Francesco in Amalfi, the Tower of Angelo in Maiori, offering their knowledge to a filing by map-based views of historical and current landscape shots. We analyze aspects of the configuration of matter in relation to landscape the site and supported by references to archival documents and aerial photogrammetric maps. The significance of the formal Amalfi systems tower take the reading parameters are interrelated, such as the geometry of buildings, location in the landscape and the specific communication function of the images, to perceive with reference to the natural beauty of places to protect it, the aesthetic forms and structures of the historic Amalfi system of towers.
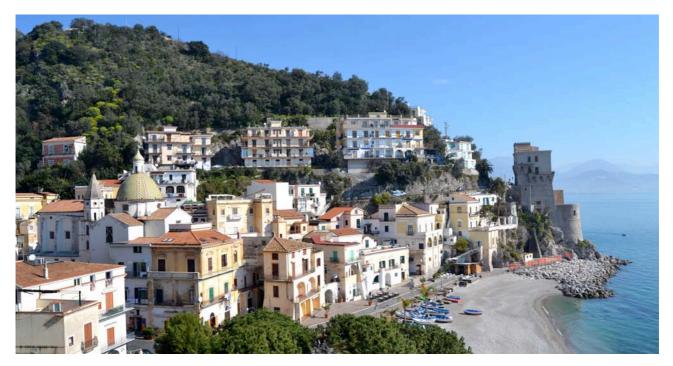
Fig. 2: The Cetara Tower in the landscape of Amalfi Coast.
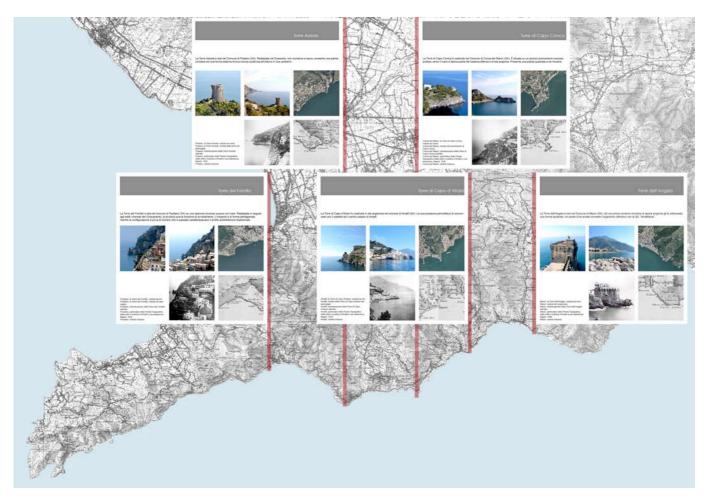
Fig. 3: The Towers of Amalfi Coast

4. *Less e More*: domes structures in the layers of representation

The coast can be like a real laboratory works in majolica pavements of the churches and cloisters, chapels and private villas. The views of small towns are dotted with bright domes and spiers of church steeples, covered with colored tiles arranged in designs frequently of meridians and parallels interpolating colors. You can see, the landscape values of the religious complex of Vietri sul Mare, Maiori, Atrani and Praiano through multiple relationships between form and color, environment and landscape, collecting notes on the architecture, the colourist on individual buildings assumed to emblem of ceramic decoration in his symphony of color and compositional effects that have defined this type of work "painted architecture" it is representative.

The glazed brick of dough, pressed dry, glazed in bright colors and slippery water are used as coating material for architectural works, creating multicolored robes reminiscent of the Byzantine and Islamic influences on the construction of the fishing villages, establishing a relationship with the topography of the place and putting themselves in the forms of the natural landscape. The vision of the natural environment in the viceregal era (Sixteenth Century - XVIII), included numerous domes and spiers covered with multicolored tiles, the curved line, with different colors ranging from yellow to green, brown to blue, arranged in patterns geometry. In a few hours of the day, the shimmer of multicolored coat, changing in relation to the path of the sun highlights the performance of buildings perched along the steep slopes of the places that stand out against the blue sea. The tiles, low cost products at the time, were particularly useful to take on the forms of monastic complex still facing our perception survey and historical documentation.

An example of a religious building with a dome is the church of San Giovanni Battista in Vietri sul Mare, which was founded in the late tenth century, destroyed by the Saracens and rebuilt in 1005. During the centuries it has undergone several changes and renovations in the styles Romanesque, Renaissance and Baroque. A Vietri, Giuseppe Salese, built on four pillars the dome, which at the beginning of this century it

was covered with majolica tiles produced by the brothers Tafani of Campania. Another church is Santa Maria a Mare that stands on a rock overlooking the town of Maiori. The transept is surmounted by a majestic hemispherical dome - completed in 1863 - whose soffit is crisscrossed by a grid of octagons punctuated by small diamonds. This has an internal diameter of 10.50 m and is constructed with a wall of constant thickness equal to 0.60 m, is devoid of drum and rests with plumes of four corner pillars. The dome has a hemispherical shape adhering to aesthetic reasons and structural reasons. The top surface is covered with yellow and green majolica tiles, with concentric lozenges harmonic patterns, and is crossed by ribs of dark ceramic, oriented in the direction of the meridians. The tiling is the work of artists of the second half of Vietri. At the top of the dome stands the cylindrical lantern with large windows, in turn surmounted by a dome covered with tiles, striped yellow and green. The dome of the apse, however, presents a linear decoration on the outer surface with alternating rows with three tiles of yellow and three green.

The architecture of the search path is added to the Collegiate Church of St. Maria Maddalena in Atrani that extends upward and toward the sea. It was built in 1274 on the ruins of an ancient fortress, by the people Atrani. At the center of the transept, a dome light spreads to the whole environment, and how those who hold the two side chapels, is covered with yellow and green tiles. Another interesting monument is the Church of San Gennaro in Praiano. Constructed in the Romanesque style - Renaissance, Latin cross, with round arches and domed oval on the cruise tiled majolica Vietri manufacturing. The coating of majolica tiles that glisten in the sun and the sober decorations inside were performed between 1771 and 1776. The colors of Less and More than the colors of the landscape.

Fig. 4: Domes in the landscape of Amalfi Coast

5. *Less e More*: a tool for mapping information.

A possible mapping in Amalfi Coast is an element of knowledge and discretization of the landscape which provides for protection and enhancement. In this respect the analysis of tangible and intangible dimensions, interpolated in a process of recomposition anastylosis and allow the production of models LOD (Level of detail) in relation to the level of detail, discretizing representations DLOD (Level of Detail Discretizing) and proposing stages of mapping.

The cognitive system can take the form of Amalfi through digital models and organized hierarchically decomposed into sub-elements through decompositions and aggregations in terms of typology and morphology. Interposing the amount of information with the scale of the representation is discerned a certain number of DLOD that constitute the different layers of the model LOD. This procedure allows a decomposition into individual elements and, through analysis, it is possible to lay down clear rules of composition related to the architectural language of signs in the landscape.

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A perspective from a contemporary point of view medieval

Nadia FABRIS
Dipartimento DAD, II Facoltà di Architettura, Politecnico di Torino, Italia
e-mails: Fabris@polito.it, nad.fab@libero.it

The research is part of a series of insights through various readings which depart from the booklets of travelers to the manuals of architecture, comparing historical representations of their environment by analyzing the city in his heart. In this context we wanted to investigate the visual projection of its transformations emphasizing a point of view, the medieval tower at the front door of Turin, then comparing with the current view taken by different cameras made , which allow us to read the urban fabric of a capital city, with a view to analyzing ancient, through the eye of an ancestor, which he sees going transformations. Read the urban fabric of a capital city, analyze it with an old perspective, through the eye of an ancestor. Means a city set in the past and a view over a century, dealing with time and space in processing, capture, if it exists, the identity of a place, such as Turin, starting with an overview, as if we were from the top of a tower and below us we see the city scroll quickly for one hundred years of the 18th century. A view at 360 degrees, from the Tower of Acaia, inserted into the current Palazzo Madama, in the heart of Turin, orientate the prospect looking streets, squares, work, holidays, Royal Palace, the places of devotion, stopping the time in some decisive years: the beginning of the century, after the siege of 1706; the years of great works taken by Vittorio Amedeo II and designed by Filippo Juvarra for equipping Torino capital ; at the end of the 18th century, when the ideas and the weapons of the French Revolution. Each capital lived these processes with sensibility and distinct rhythms, as it fits a pattern of net capital, Turin was the transition from a military Citadel, until civilian functions take precedence, political, cultural, which became particularly evident during the reign of Victor Amadeus II. This model was worked out definitively by the architect Filippo Juvarra from Messina between 1716 and 1719, responded to a more ambitious: Nineteen blocks, two squares, rectification of a street were the ribs that project would be realized in the third decade to become a model for future enlargements. For Torino capital, the facades of buildings, only partially violated the regularity and left leaked signs of wealth, as in the layout of streets and squares was celebrated the triumph of the principle of an orderly development, an essential beauty, that "nothing extremely beautiful, but all equal and nothing mediocre" that had registered Charles De Brosses passing from Turin, in 1740.

In Turin it was established the court nobility and the most recent service nobility and honor who had taken positions from the rank conferred by the Dukes while maintaining close links with the provinces, as in most European cities, including Turin throughout the eighteenth century and a moment of transformation.

The capital city is, therefore, a city in the harmonious baroque and rococo architecture and urban planning, churches, palaces and monuments. View, understand "this" Turin is not only to see the monumental complex: it is "seeing the form", walking along the streets, the wide straight avenues, many, many arcades, understand their perspectives and meanings. The great baroque palaces of the city become the Savoy, Palazzo Madama Palazzo Carignano, the palaces of the first capital of the Kingdom, a capital destined to remain so for a few years until moving to Florence.

Located in the heart of Turin, in what was to be the Roman fort, the Senate stands on that at the time of ancient Rome, was called Porta Decumana who had different life, being gradually incorporated into the castle that was erecting. At the beginning of the century this was the gateway to the city side of the Po, for its strategic position, was defended carefully: after the fall of the Roman Empire, the door was turned into a fortress, to act defense of the town, given the obvious importance of this way of communication, even if retained the original function of gate with the opening of the door in the ancient Roman wall Fibellona. Comparisons with the iconography and old photographs are immediate, where new requirements have subtracted the built, the *hall Madame Royale*, was demolished to facilitate the modern city, *the Mole*, which is imposed on the background of a city that wants to be European Union, the theoretical Guarino Guarini Baroque that leaves her diamonds with the chapel of the Holy Shroud and that of *S. Lorenzo*, who stand out as marvels of the time. And still the steeples of the monasteries represented by Friedrich Probst, still in the city built the gabled roofs of Turin valid in all ages, and tile roofs in Piedmont, preserved as a choice of

continuity leaves a warm color that blends with the brick buildings a view that brings out the color of the buildings of representation, with gold and copper tones.

This is part of ongoing research, including historical images and comparisons with today's reading, manuals and maps to lead to a conservative analysis is that perception of a historical setting, to give precedence to its essences stylistic points and enhance visual favoring a path and fruition that are not dictated by chance but by contemporary cultural angle.

The bibliography has provided key insights into the period and highlight the highlights of this part of analysis, while the cartographic and iconographic survey gives us the means of comparison.

Torino square tower castle

Archival collections

Il fondo dell'Archivio Conti, fabbriche e fortificazioni, articoli 178, 203, 207 (AST, Camerale, Conti, Fabbriche e fortificazioni, Cittadella di Torino, art. 178, m. 2, inoltre AST, Camerale,Conti, Fabbriche e fortificazioni, art. 203, m. 2, nn. 14, 15, 16 e AST, Camerale,Conti, Fabbriche e fortificazioni, art. 207, m. 1, n. 3.)

ASCTo: Archivio Storico del Comune di Torino, Affari generali Lavori Pubblici, anni 1866 - 1961
AF. ASCTo: Archivio Fotografico dell'Archivio Storico del Comune di Torino
Archivio LL.PP.: Archivio Edifici Municipali, anni 1950-1960
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: *Johann Friedrich Probst*, Turin 1727-1776, part of the original cm. 106x40 print on pure cotton paper .

Fig. 2: View Palazzo Reale, byl *Theatrum Sabaudiae*,

Fig. 3: View Palazzo Madama, ASCTo

Fig. 4: View Palazzo Reale, by foto 1890

Fig. 5: View Palazzo Madama, cartolina 1960

Fig. 6: photos of the author, from the tower Madama 2011

Fig. 7: photos of the author, from the tower church di S. Lorenzo

http://lineamenta.biblhertz.it : Sito di Lineamenta, collezione online di disegni architetturali del barocco romano sviluppato su una iniziativa di Prof. Dr. Elisabeth Kieven e sotto la supervisione di ricercatori della Biblioteca Hertziana del Max Planck Institute a Roma. Vi sono archiviate collezioni dell Accademia di San Luca

http://www.getty.edu : Sito del Paul Getty Museum di Los Angeles che possiede disegni di Filippo Juvarra

http://www.bnto.librari.beniculturali.it : Sito della Biblioteca Nazionale di Torino con in linea le collezioni digitalizzate del Corpus Juvarrianum

http://fr.structurae.de : Sito Structurae, galleria e database internazionale di opere architetturali nel mondo e genio civile nel mondo e on tutti i tempi

Fig. 8: : photos of the author, from the tower Madama 2011 image of the palaces of Castle Square

Fig. 9-10-11: photos of the author, from the tower Madama 2011 Mole Antonelliana, and via PO, the center card1960

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Reflections on drawing the landscape

Piero BARLOZZINI
Dipartimento di Scienze Animali, Vegetali e dell'Ambiente, Facoltà di Ingegneria, Università degli Studi del Molise, Campobasso, Italia
E-mail: piero.barlozzini@unimol.it

Abstract

In recent years the term "environment" has broadened its expressive content, until it reached the current meaning; a process of acquisition that has limited the historical conception of "natural environment", leaving the field, more and more, to the wide meaning of "everything that surrounds (us)".
Today, therefore, the environment is meant as "space/system". This interpretation gives the term a value that tends to concept of geographical scope, that is: an ensemble of localized and specific natural and socio-cultural conditions which, layered over time in a certain place/area, are the common heritage of the local community and the territorial basis of its identity.
By virtue of this value, for some professions the environment is a sort of "hypertext" in which not only the territorial base of a specific community finds its place, but also, and above all, the substrate af the local development processes. Growth which if not commensurate with the environmental features, not compared to local needs, or if carried put with tight stops and in a senseless way, changes the dynamics of socio-economic modernization, always based on the man/environment relationship.
Through the elements that stimulate the process of shaping and transforming the natural environment, the text provides an overview of the representative system in an attempt to identify the most appropriate means of expression to the current needs of land management.

Keywords: drawing, landscape, survey, GIS

1. Introduction

The concept linked to the term "environment" is a complex mental representation which in a general sense indicates the sum of the physical biotic and abiotic (from *bios*, life) components surrounding living beings in interactive relationship with them. Therefore, in modern language the environment is the space of the picture of life, the common home, fundamental patrimony in which men live. It is obvious that where Man, who is aware of himself as a presence and territorial agent, is missing the environment would not offer landscapes to the eye but only spontaneous nature.
In the wake of this, the environment can also be interpreted as a space/system; a physical space in four dimensions (the temporal factor is as relevant as the dimensional one) in which a complex system of events exists or, more precisely, as a space in which a succession of events occur, each of which reacts to the variation of only one of the parameters of the events themselves. Such an interpretation attributes the word in question with a value tending towards the concept typical of the geographical ambit, that is, a localised and specific sum of natural and socio-cultural conditions, which have become stratified in a certain place/territory during the course of time.

By virtue of this value the environment is the subject of interdisciplinary studies and for professional researchers constitutes a sort of "hypertext", in which not only the territorial base of a specific collective finds space, but also, and above all, the local substrata of developmental processes. However, this growth, if not in proportion with environmental peculiarities or local needs or if undertaken in rapid stages in an unmindful way, as in some Western societies, drastically changes the dynamics of socio-economic modernization, which has always been based on the relationship between Man and the environment. This change in behaviour is essentially due to the illogical thought characterising modern Man for whom the good, even less so the beautiful, are no longer his principal values, but the useful (which contrasts with both in that it subordinates them). Thus, nature is transformed into a laboratory in which Man experiments his intentions and kills it by using it as a raw material, leaving behind tangible signs of his works; signs which offend the territory, leaving deep wounds in the deepest layers of the earth which regulate the ecosystem. These signs reverberate in the uses and customs, in the history and economy of a place, disfiguring its historical identity [10].

However, it must be said, that recently I seem to be living a new season and the longed for change in the behavioural route taken by the human race thus far no longer appears so far off. In fact, in recent years, attention towards nature, initially the prerogative of a few sensitive individuals has grown in Man's conscience and is today permanently fixed, to varying degrees, within each of us. This sensibility if solicited by dramatic events may trigger reactions of indignation and surprising operative solidarity, which when combined can provide the necessary impetus to defeat the passive resistance of those who, holding important political positions or heading the institutions administrating public assets, still show little sympathy for the environmental question.

However, while awaiting a sign that this change transpires, I believe that in the immediate future something more can be done to facilitate its occurrence.

I refer, for example, to the possibility of increasing territorial surveillance by involving pupils from all types of schools and citizens of all ages who show sensitivity towards environmental issues. One initiative, which suitably sponsored by national and international institutions present within the territory, could be the developed through periodic courses, structured at various educational levels, organised by the departments of institutes in which such a theme is at the centre of research with a high scientific content. Clearly, such courses would be tailored to help the public to see, to see in order to understand, with the aim of establishing a positive relationship with the territory in which they live, thus educating them to respect the environment as a collective asset and universal value. Such an initiative would constitute the first formative nucleus of the longed-for environmental culture, that which we may define as the "direct" nucleus, to certainly be echoed by the equally as important "indirect" nucleus, spontaneously activated by participants in the educational projects on their return to their families.

In order to make a greater impression upon Man's conscience this system must be supported by another initiative, this time involving the institutions, which have some authority in this matter. I refer to the possibility of considering the field of research contextually from more than one point of view in order to highlight all of the stimuli which render it a dynamic, continuously evolving structure. In the first place, such an approach necessitates the identification of the disciplines comprising the entirety of knowledge and the subsequent creation of a system using their research results in such a way that the environmental resources relate and compare to each other in the heuristic-cognitive path. The idea comes from the observation that the environment is not always renewable and therefore is an asset to protect and safeguard by the appropriate management and use of its resources. Therefore, it does not constitute the private reality of individual owners, rather the physical support of collective and contemporary memory, an historical product containing references for the construction of a sense of belonging to places, which assumes a social importance that is also relative to economic dynamics. For this reason, every creative action that touches it should be guided by assiduous checks without being blocked by restrictive and protectionist laws, so that a sustainable development based on balanced and harmonious relationships between social needs, economic activities and the environment can be pursued.

In this interpretative and programmatic picture, the territory in its capacity as a space/container, is acknowledged with the role of coordinator of human activities, that is, guarantor for the safeguarding and recognisability of the natural values and identifiers of territorial communities, both in the landscapes of consolidated cities and in rural and natural landscapes, as stated by the European Landscape Convention, signed by 45 members of the Council of Europe.

All of this leads to the promotion of action to safeguard the figurative value and enjoyability of a territorial asset for which it is appropriate to identify the best implements for reading the characteristics of a place and the society residing there, as well as including its vocation for development and potential for transformation.

In the process of translation and comprehension of the richness of territorial diversity and complexity, the use of words is manifest, even if often evasive and interpretative, but what is even more obvious is the use of images, in particular graphic images in all possible forms. In fact, it must not be forgotten that drawing stands as a "useful" instrument for Man's activities from the origins of civilisation as it consents reasoning on the image as a surrogate to reality [12]. Therefore, in the absence of a more immediate, more spontaneous expressive procedure which may take its place, drawing will continue to assist Man in his daily activities. Thus, its original function survives today, acting as an external back up to the mind and support for the imagination, in which ideas can be clearly formulated and then return to being part of thought through the mechanism of perception [20]. In this way, drawing is revealed as something more than an external instrument, something other than a "tool", it becomes a part of the mind, a supplementary portion of the brain [8], and this occurs independently of how the graphic sign is achieved.

2. Some aspects of the expressive content of the term "landscape"

The word "paesaggio" (landscape) takes its meaning from the original root "paese" (village), intended as in the French paysage, made up of the substantive *pays* "country" and the suffix –*age*; the latter meant in the sense of "whole", "vision of a whole", "entirety" or "totality". Moreover, the term "paese" originates from the verb *pango*, "I plant a stake". Each "village" is therefore a marked place, an identification based on Man's action as a founder. The landscape is therefore an aspect of the ars *aedificandi*; to explain the concept further we may say that the landscape is a portion of anthropized territory perceived in one glance.

From this exposition, it can also be deduced that the word "landscape" is a neologism for the Italian language. Over the course of time, this new term has fascinated numerous cultural figures and all, or nearly all have contributed to the spread of the concept of landscape, often also offering a personal interpretation which, modelled on their own needs and principles, gradually became enriched with new semantic content. Today, these interpretations constitute the idea of landscape in the various cultural eras.

To look back over the evolution of the metal representation of this word in order to identify which is at present the most recognisable to those in the design/planning cosmos, is obviously an interesting undertaking not without its surprises, given the many nuances contained within the concept of this word. It would almost certainly go beyond the limits of this study and the available editorial space. Furthermore, the use of such an approach would not resolve the confusion generated by the twofold character, which distinguishes this term. I refer to the reality of landscape-image, an artistic or technical representation, and that of conscience-landscape or spatial-visual reality, a real inhabited landscape starting from a "here-me-now". In fact, as Franco Farinelli asserts, the word "landscape" is a «bat» word [9] (both bird and mouse, depending on how you consider it), which denotes the thing and at the same time the image of the thing, and in such a way that one cannot be distinguished from the other.

In the light of this, the reader should note that the idea of landscape in the guise of "symbolic image", produced by what the eye can take in as it sweeps the horizon, but which according to a well-calculated ambiguity of meaning confers the word with the idea of "environmental whole", therefore, will not be used throughout the rest of this paper. Thus, no longer landscape intended as an aesthetic appraisal of a section of anthropized territory, but landscape in which space has the dimensions of grand geographic scale, which, by virtue of its extensive nature, we can call the "geographic landscape" [3]. An original meaning which, immediately has the effect of overly dilating the confines of the observers gaze, until now linked to the visual capacity of the human race, and adopts the orthogonal method of representation using azimuthal projection, to the detriment of the perspective preferred in all earlier representation, a meaning which finds its logical and precise parallel in the essay by Vittorio Gregotti "Progetto di paesaggio" [13]. A landscape which has as a specific point of reference drawing directed more towards representation than portrayal; towards the production of graphics which, drawn up in relationship to the function "creativity + science = targeted product", takes on a mainly decisional, and therefore design character [7].

It goes without saying, that in this interpretation the landscape is the place where Man's history has taken place and left its traces, artefacts, hamlets, villages and towns. Here the landscape is conceived as «the theatre in which men live as actors» [23]. Although, not only. Here, the landscape also assumes the value of a territorial resource, an economic and social asset. Therefore, it must be appealing and for every type of intervention and territorial planning must be correctly formulated, with consonance of its parts and integration of the constituent elements of a place. There must also be respect for the site's vocation and its cultural aspects, in other words, only if the identity of a patrimony is reinforced, as the new Codice dei Beni Culturali e del Paesaggio suggests (D. Lgs. 22.01.04 n. 42), can this be achieved.

3. Representation of the geographic landscape

We look at the landscape in many ways. We let ourselves be penetrated by the impressions the vision produces in us, or we try to understand what the landscape can tell us about men and the society with which they identify themselves.

This consideration provokes the idea, also shared by Turri, that to look at a landscape «is like reading a book or watching a play» [23] therefore, as in both these cases, a landscape also requires codes for its reading which help us give meaning to what is seen. Let us see what they are.

Usually, when we talk of reading we refer to a group of signs, for example a written page, a book, a series of graphic elements etc., of which we know the meaning and thanks to which a piece of news, an event, a thought or feeling is transmitted. The reading of the landscape is no different in that for one of the fundamental semiological formulas: each object, even if pre-eminently created as a thing to be used, at the moment in which it is recognisable as such assumes the value of a sign. As Roland Barthes writes, «The function permeates itself with meaning [function-sign]; this semantization is fatal: from the moment that society exists each use is converted into a sign of this use» [2].

For greater clarity let us look at some examples, making use of Turri's observations.

The Man's home is certainly not constructed to be a sign, but to be lived in. However, once inserted into the territory it becomes a sign, it indicates a function. In fact, we know that houses are not built simply on a functional basis. There is an attempt to make them beautiful, to express, taste, social standing, aesthetic sense and the private or collective ownership of those residing there through their form. The same goes for a field used for a crop, for a wood, which can become a sign if inserted in a certain territorial order, among fields, houses etc., as it assumes a precise function within that order, but the same goes for a church bell-tower or a clock tower. It is thus that the landscape, formed by numerous recognisable signs, can be "read" and interpreted. An interpretation which does not, however, regard individual elements, such as the words in a speech, but rather the context, that is the ways in which the single elements assume functionality and meaning as parts of a whole, the how and why they are connected within space, so as to make of them a sort of first draft.

This leads to the consideration that the search for dialogue, for a relationship between Man and the environment, is not a prerogative of the modern world, but arrived with the appearance of our ancestors on the planet, or rather, based on what the archaeological evidence tells us, was born with the appearance of *homo sapiens* as *homo faber*, given that from antiquity man has continued this search, even if in a rudimentary and conceptually very different form from that of today. Of course, today we cannot state with any certainty what the specific reasons are behind this need. However, we can make suggestions, perhaps not far from the truth, if we reflect on Man's inborn desire to know, to understand things, and to somehow perpetuate elements from the everyday scene in which he lives his life, almost as if to conquer a personal form of survival.

The "graphic sign" and the expressive language appointed to document Man's undertakings were mentioned in the introduction to this paper. In the description of the relationship between Man and environment, "drawing" is supported by "survey", which becomes the main investigative tool for determining the elements necessary for its graphic representation. Today, both methods have seen great developments in technique and technologies, mainly due to the close involvement with the renewed problems of space/environment. In fact, there is a growing awareness that the management of the processes of area development and regeneration of exhausted productive sites requires a critical and precise description of the territorial complexities. A synthetic description which, in origin, when our species belonged to the «cold» social structure [15], was narrated through the use of expressive techniques that were free and literate, auto-referenced in order to be shared only with members of the clan. However, today, in the modern era, so by analogy in the «hot» social group, this description is represented by a code shared and transmitted without impediment.

A substantial change in the approach to his fellow men, constantly matured by Man during his evolution, began with the introduction of new elements to the original graphic alphabet, obviously each with its own attribute. At the same time Man experimented with alternative graphic mediums having tested every type of resistant material close to hand, from animal bone, to stone and tree bark, the first to be experimented, to baked clay, papyrus, parchment and then paper, to mention but a few. Then from the last two decades of the 20th century, pushed by the technological innovation that marked that period, the representative system based on graphic signs climbed another evolutional step: the analogical cord that had fed it from the beginning was cut and it transformed into the digital system.

Naturally, this change has not been without its problems. In fact, similarly to what occurred in other areas of human undertaking, the transition of graphic representation to the new technology was a road scattered with doubts and uncertainties. An almost immediate and significant consequence, was the decline of the

traditional graphic process (made of simple basic operations linked to specific execution times and tools, which, however different, still recalled the archaic in form and substance). Therefore, all those who in various ways were lovers of this language have had to undertake new training in literacy and familiarize themselves with the new tools (hardware, peripheral devices and software), which having lost the morphological and functional references to the old system of representation, appeared innovative and technological.

To have called the transition to digital technology an evolutional step is perhaps reductive. In effect, it is plausible to imagine the final step along the developmental route of the graphic system as the most innovative and having the greatest impact. In fact, in a hypothetical classification of evolutional steps it would not seem strange to many of us if this latest development was assigned a place, if not at the very top, at least very close to it. However, whatever its effective value in a developmental sense, we must ask ourselves whether or not, this has also brought innovation to the tools used for the representation of the geographical landscape, perhaps offering new ways of reading and understanding it, or, if in this sphere it is only the bringer of the latest change in tools and methodology with which graphic products are created.

Before answering this question let us get rid of any doubts that the question may raise in the reader. The query is not legitimized by the idea that the graphic mediums by which the geographic landscape has been represented to date are inadequate, that is, they do not manage to clearly transmit the message entrusted to them. Rather, it is legitimized by the desire to find alternative communicative systems, to place alongside traditional ones if desired, with characteristics that are more in tune with our present way of living and communicating, even capable of educating the less-well culturally prepared layers of society, or those less heedful of this subject, perhaps by bringing out their sense of belonging and of local identity which they are often missing. This sentiment originates from the bitter realisation that in our country considering the territory as a place to be plundered, ignoring the programmatic directives contained in documents, is a widespread phenomenon. Every day I am overcome with doubts about the actual existence of these directives, especially when faced with the absurd, uncontrolled building taking place throughout the peninsula, punctually highlighted by the force of nature when it periodically rebels.

In such a situation, there is no doubt that a valid promotional policy, such as that suggested at the beginning of this paper, would favour public sensitization towards such graphic products, and, therefore, towards their descriptive and prescriptive content, whose main aim, let us recall, is the safety of the public and assets, and at the same time that of maintaining an image of the geographical landscape that is more authentic and faithful to its history.

Having said this, let us answer the previous question. We asked ourselves whether or not digital technology has improved available tools for the representation of the geographical landscape.

Well, following such a long period of experimentation – about thirty years – the answer can only be positive.

In fact, apart from digital technology's simplification, rationalization and acceleration of numerous of the operations typical of the graphic language, it has been possible to create innovative tools for the investigation and divulgation of information, which also find efficient applications in the reading of the geographic landscape.

As we know as a "document of culture", the landscape is of interest not only for what is visible, but also for what is implicit, for its ethnic, social and economic content, as well as for the game of natural forces meeting within it. Due to its peculiarities, it requires a method of reading capable of looking at its vastness and complexity, from its exterior to its interior; a reading that could be projected into space, above its background, in order to understand its being and history in the most objective and measurable manner possible. In other words, the geographical landscape requires a reading that is able to identify the fundamental elements, which constitute and characterise it and at the same time allows the recognition of their interrelationships, so that the themes linked to the vocation of places can be organised in a legible and comprehensible narration. A synthetic narrative which the thematic cartography developed from the post-war period until today has always provided but to the detriment of a quantity of documents that is at times embarrassing, which for the comprehension of the descriptions and prescriptions requires a considerable intellectual capacity and technical-judicial knowledge beyond that of the average individual.

This leads us to consider the representation of the landscape in a modern key as a synthetic expression resulting from graphic procedures with various properties, geometric and analytic on the one hand, pictorial, intuitive, perceptive on the other, forming a language capable of expressing not only metric and object quantities, but rather qualitative and relational parameters to describe the morphological complexity of places. Means of representation that can provide a global vision, of both a scientific and subjective nature, also transferring the empathetic and emotive aspects, provoked in its perception.

In this sphere of representation, what is needed is a type of graphic with feasible connotations, although already possible with digital technology, on condition that all the potential of the hardware and software available these days is exploited to the full. Obviously, an affirmation that such a system already exists

automatically means referring to GIS technology, the acronym for Geographic Information System, created by Ian McHarg and Howard Fisher. This analysis system offers the possibility of acquiring and dynamically managing data regarding the geographical landscape independently of their format (doc, dwg, tif, jpg, sde, shp, oracle etc.).

Such technology applies the principles of geography (intended as the study and unification of various sciences able to lead to a general understanding of the nature of the anthropized landscape) to the organisation and use of information, utilizing space as a field of action for the resolution of practical problems. Furthermore, similarly to geography GIS has as its focal point the manipulation and analysis of data regarding elements of the real world within a spatial-temporal frame. Most data manipulation and analysis, for example, the transformation of coordinates, analysis of closeness and contiguity, spatial aggregation, overlaying of polygons etc., are common to both GIS systems and geography. Both ambits also share some concepts and principles, such as georeferencing (the process of localising elements within a model of the earth's surface), geocoding (the process by which a geographical reference is applied to a non-geographical datum) and topology (the branch of mathematics which defines the relationships between elements, which assume the role of guide in the implementation phase of GIS systems.

Systems of this type also offer other advantages. Thanks to digital technology, with a few clicks of the mouse the data organised in a GIS becomes immediately available on-line for Web users. Furthermore, if developed by different subjects in different areas, but with identical geographical bases of reference and shared standard procedures of data acquisition, these tools are potentially able to communicate, assuring the exchange and integration of information, actually providing the possibility of having a picture of knowledge relating to the physical environment that is always up to date (for example, in geology, of instability, infrastructures, land use etc.). In this way, GIS systems can also constitute a sort of model of the real landscape which can be manipulated and analysed with the aim of obtaining information useful for decision making with regard to actions relating to the actual world.

These capabilities distinguish GIS from other information systems and render it attractive to many for use in numerous subjects as a support to the explanation of events, prediction of results and strategy planning, giving life to new trends in research such as, for example, that geared towards "business mapping", that is the possibility of producing thematic cartography providing immediate answers to industrial and commercial businesses in their dealings with ever more unpredictable markets in the contemporary world.

4. Conclusion

To synthesize what has been described thus far it could be said: the geographical landscape is a casket in which the dormant values of the collective conscience are deposited. A precious possession which together with the culture landscape constitutes the patrimony of a territory, for which it is dutiful, as well as useful, to set up a mechanism of defence and enhancement; an educative course which, naturally, must begin with knowledge, therefore, with representation.

However, as a collection of dialectic ferments and stimuli, the geographic landscape is as difficult to comprehend in its entirety, as it is to represent. This difficulty of expression can be seen in the reading of the variegated series of its historical representations – where an extraordinary graphic refining is maintained with intellectual constancy and rigour – capable of leading us from a conceptual, philosophical and generically allegorical symbolism, to a use of signs principally recalling, in the collective imagination, the drawing of the objects and the reality ever closer to the perceived elements. The present, growing attempt to use GIS as an instrument for reading, which extracts qualitative and quantitative data from "drawn maps", from photographs and satellite images and alphanumerical databases, shows this innate tendency, which in its progress through history has always aimed to eliminate all possible subjective interference with the reality represented by interpretative elements.

To conclude, the geographic landscape as a collective asset and a universal value can only be enhanced if all subjects involved agree on the method by which to do so. It is not possible that some limit themselves to making requests that others must fulfil. Each of us should be given the opportunity to take part in the organisation of the landscape in which, and off which we live. Such a necessity is even more urgent today as resources are scant and Man increasingly menaces the survival of other living beings. The protection of the landscape, if understood in the right way, could represent an opportunity for all. For this end, respect is indispensible: respect between men and for the landscape, which is not just nature but a living body in continuous evolution, better still a history book written across the millennia and which continues to grow, a book which can be read and in which the farmer, planner or "simply" anyone who observes and loves the landscape, can continue to write.

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Can large systems be resilient? Inspiration from structural engineering

Claudia CENNAMO,[1] Bernardino CHIAIA[2]

[1] Department of Cultura del Progetto, Facoltà di Architettura, Seconda Università di Napoli, Aversa (CE), Italy E-mail: claudia.cennamo@unina2.it
[2] Department of Ingegneria Strutturale, Edile e Geotecnica, Politecnico di Torino, Torino, Italy E-mail: bernardino.chiaia@polito.it

Abstract

In a critical moment as the one the world economies are crossing, the "contraction" seems to be the only way of exit, the only solution not overwhelmed by system collapse.

As a result, for the single person as for the great factory, the "decrease" (growth STOP), the actual password, influences every action and every medium term approach.

The interest caused by the question can be transposed to interdisciplinary areas, and it is demonstrated, for example, that a lot of words assume different meanings according to the scientific context in which they are inserted. In other words, terms as resilience, robustness, fragility, are contemporarily present in the engineering, in the informatics, in the biology field, indicating different phenomena (although a common "philosophical" matrix can be recognized). In this expanded vision, an integral part of conversation can also concern the natural phenomena, that seem to confirm the contraction theory, in which processes like the self-limitation (e.g. the trees) and the size effect are involved. In the same manner, the antropological systems, like the great civilizations that collapse, seem to confirm the theory according to which the expansion must necessarily be self-limited. It is easy to think for example to the collapse of the Roman Empire in the precise moment of its maximum size, in the precise moment in which every default seemed improbable: it cannot proceed more than a predetermined threshold.

Therefore, *less is more* is really the survival rule? This paper investigates the question from a different point of view, "lending" some theories of structural engineering, based on these general considerations, of purely socio/economic character. The aim of the study is the verification of the "robustness" of the statements out of the proper scientific scope, and contemporary to evaluate the Mies' assertion in structural ambit.

Key words: nature's self-limitation, resilience, robustness, redundancy, compartimentation

1. Introduction

In engineering, the *resilience* is the capacity of a material to resist to sudden shocks without breaking; in informatic the same term indicates the capacity of a system to resist to usury in order to guarantee the availability of provided services; in psychology it is the men ability to deal with adversity, to overcome them, or to exit from them reinforced or positively transformed; in ecology and biology it indicates the capacity of an organism or an eco-system (included the human eco-system: the city) to restore the homeostasis, i.e. the equilibrium condition, after an external intervention that provoked an ecological deficit (i.e. the erosion of the resources consistency that the system is able to produce with respect to the load capacity) [1]. Recently the concept of resilience has been introduced in geriatrics also. In this field it is the unexpected ability to recover that some very ill elderly people seem to have, apparently under very compromised conditions, with respect to the usual care.

This quality is conceptually opposed to the elderly person *fragility*, that represents, on the contrary, a set of characteristics able to identify, in an early stage, the subject that risks to worsen his own life quality, but with appropriate interventions that possibility can be reduced [2].

In structural engineering, as it is known, the fragility represents the tendence in some materials to break suddenly without any deformations and yields previously occurred.

Again, the term *robustness* generally indicates the software or algorithm ability (obviously related to the programmer ability) to behave rationally in unexpected situations, not covered by specific indications. This type of situations includes errors and exceptions of various kind (uncorrected input data, failures of software or hardware external to the system and interacting with it, and so on). In this case the intuitive idea of robustness certainly implies considerations about the harmful effects that the system or the user suffer if the software reacts in a "no-reasonable" way in unexpected situations.

In analitical chemistry the robustness of an analysis method indicates its capacity to give good performances in a great variety of different situations. A study about the robustness of a given method should evidence all critical parameters, like pH, temperature, concentration, volatility, conductivity. The robustness of a measure is so that a tool index of how much little modifications in the analysis method (parameters variations), do not influence the tool reliability [1].

In structural engineering, the expression *robustness of a structure* describes the ability to avoid disproportionate problems (i.e. collapse) when the structure suffers serious local damage due for example to fires, explosions, collisions or consequence of human errors (Fig. 1).

The concept of robustness was formalized only recently, as aspiration to the realization of constructions able to involve all the resistance reserves, until collapse, through the activation of *alternate load path*.

In this way the aim is avoiding, inter alia, the generalized collapse danger, as a result of localized damage in the structure (progressive collapse), especially when exceptional events occur. [3, 4, 5]

2. Resilience of "small" vs. "large"

Less is more= small means robust. The Mies's sentence seems to link itself with the natural law called size effect (or scale effect), according to which the system performances are inversely proportional to the physical dimension of the system itself. In other words, it descends from the observation that the surface/volume ratio, for any object with constant form, decreases with the increase of the dimensions. Considering for example a cube with 1 cm sides, if the surface and the volume are calculated, it is easy to note that increasing the side lenght until 2, 3, or 4 cm or more, the surface increases according to the square (6, 24, 54, 96 cm², ecc.), while the volume increases according to the cube (1, 8, 27, 64 cm³, etc.) and therefore the surface/volume ratio decreases with the increase of dimensions (6:1; 3:1; 2:1; 1,5:1; etc.). A lot of the forms existing in nature could not exist if their proportions were greater. An ant 10 times larger could not stand on its own legs. The heat emitted by a creature depends on the surface of its own body, and so, if the animals were volumetrically larger, they in proportion would have a smaller surface, and therefore they could disperse little heat, in a way that the internal liquids would end in seething. The animals of great dimensions in fact lose heat more slowly than the little ones. [4, 6, 7]

2.1 Economical systems, companies, banks

In the economical field the concern is the way to improve the "resilience", that is the capacity to resist at the shocks of the financial system as a whole [8]. In this sense, a Masciandaro's article, printed in June 2011 on Il Sole 24 Ore, is cited. The paper describes the role- according to the Governor Draghi- that the Italian banks, both small and great ones, have had as a support to the productive system during the year. *Il rapporto tra banche e imprese, nel modello tradizionale di banca commerciale, ha mostrato – non solo in Italia – notevoli qualità di robustezza. Prima della crisi era noto che l'intermediazione bancaria tradizionale riduce i rischi ma non assicura alti guadagni, a differenza di altri servizi finanziari. A livello globale, sotto la spinta della finanza anglossassone, è divenuto dominante l'imperativo per cui l'unica cosa che conta è la redditività; tanto, la stabilità è automatica. Infatti, se l'intermediazione è redditizia significa che è efficiente, e poiché sul mercato rimangono solo i soggetti efficienti, quel mercato alla fine sarà anche stabile. Per cui s'è imposto un modello di regole in cui la capacità di ciascuna banca di assumersi rischi è molto aumentata; fino a degenerare. Il Governatore ha ricordato quali sono state le degenerazioni della finanza. Sono stati progressivamente abbattuti, negli Usa come in Europa, tutti i divieti alle scelte imprenditoriali dei banchieri. L'assunzione di rischio sarebbe stata comunque monitorata e controllata grazie ai coefficienti di capitale, alla disciplina del mercato, alla supervisione delle autorità pubbliche. Oggi si sa quello che è successo. Coefficienti di capitale e disciplina di mercato si sono dimostrati due pilastri insufficienti, se inseriti in uno sviluppo non regolato di forme sempre più diffuse e complesse di indebitamento privato, grazie al contributo, decisivo e incrociato, della contabilità creativa, dei mercati finanziari non regolati, in generale del sistema bancario ombra.*

Large banking systems involve large risks and great debts, that are translated in greater possibilities of failure. Small systems can involve reduced risks and can deal with critical situations. Any contractor knows to

experience (but essentially to intuition) that the resilience of a small company or a small bank is really larger with respect to the resilience of a large system.

2.2 Social systems, great civility, urban centres
In parallel, in architectural and urbanistic field, the small villages whose growth remains "within the walls" due to logistical reasons (spatial impossibility to expand), have kept alive the conurbation sense, continuing to use its own historical centre as the heart, "the city" of the agglomerate, and maintaining the relationship with it. On the other hand, the great metropolis that have not been able to integrate (or could not integrate) their own historical centre in an evolutive part of the strategic and productive core of the town, lost the relationship with it. The centre is often reduced as a mere tourist route, decadent and discredited by the chief soul of the "city", or transformed in a concentric development of suburbs increasingly marginalized (Fig. 2).

The town development accompanies the civility development and vice versa. It is demonstrated that the site influences the behaviour of the people living there. Sites and populations create together the social fabric.

The great civilizations, Egyptians, Persians, Greeks, Romans, even Barbarous nations, reached moments of maximum expansion and immediately after imploded. It seems like that an expanded organization, dual of the previous, was not equally robust and structured, and this was not equally credible.

The resilience, that on urban scale is translated in a core ability to preserve its own characteristics [9], is an auspicable concept for the modern metropolis. Their urban development needs an increasing amount of rules and/or indications for a guided expansion, or for stopping it, penalty the swiftly plunging in the irreversible metropolitan chaos, with all the known consequences from the sociological point of view.

2.3 Nature: bones, trees, snails
The above considerations seem to lead to the conclusion that the natural phenomenon of the growth self-limitation, product and re-product in the sociological and futuristic comprehension of the town, could suggest solutions for the resilience to the crisis.

An example can be the snail, as Latouche [10] points citing the Ivan Ilich's metaphora, self-limits the growth of its own shell considering the costs/benefit ratio that a new spire implies. The snail shell grows in fact in exponential manner, so that an increase of space would involve an excessive increase of weight, related to the benefit (<<…C'est qu'une seule spire encore plus large donnerait à la coquille une dimension seize fois plus grande. Au lieu de contribuer au bien-être de l'animal, elle le surchargerait. Dès lors, toute augmentation de sa productivité servirait seulement à pallier les difficultés créées par cet agrandissement de la coquille au-delà des limites fixées par sa finalité.>>). Or the tree, whose intrinsic dimensions are confined during the life in such a way that the old plant stops growing, but nevertheless reinforces its own position on earth increasing its trunk circumference (Fig. 3). W. Goethe: "Es ist dafür gesorgt dass die Baume nicht in den Himmel wachsen" (it is noted that the trees don't grow until the sky).

However, already Galileo, in his "Discorsi e dimostrazioni matematiche intorno a due nuove scienze (1683)", wonders about the effect of the proportional dilatation of the creatures' dimensions, and understanding that an animal so amplified could not stand under its own weight, concludes that the skeleton of large size animals holds a greater portion of its volume with respect to the case of smaller animals (Fig. 4). In other words, a small animal has more resistant bones, in proportion, than its giant dual (in sec. 2 the size effect = embrittlement of great structures, has already been mentioned) [11].

The scientific explication of this can be found in the definition of *fracture energy*, entity that, as it is known, depends on size, too.

Considering a fragile material sample under stress, in fact, the crack created in the moment of fracture depends on sample's size (if the sample is small, the defect should be small too). The diagram in Fig. 5 results to be just a material characteristic: it represents the stress propagation through the crack versus the the crack opening.

This softening law indicates an impairment of the interaction when the distance w between the crack surfaces (or free areas) increases. When the limit value w_k is attained, the interaction totally expires, and the crack becomes a total disconnection that divides the sample into two distinct parts. The area under the curve represents the energy dissipated on the fracture unitary surface. This cohesive law is a material characteristic that depends on the type of structure, on the material damage mechanism, and on the fracture energy G_f, defined by the following relation

$$G_f = \int_0^{w_K} \sigma(w)d(w) \tag{1}$$

The cohesive law results to be an intrinsic property of the material. The energy, dissipated on the crack surface, is $G_f A_0$ (with A_0 area of the sample cross section). Since the energy dissipation occurs only in the crack, and not in the volume of undamaged material, the globally dissipated energy in the volume $A_0 \ell_0$ (supposed in the absence of hardening) is still $G_f A_0$ [12].

This shows, according to what has been said in sec. 2 (the volume increases with cubic exponential law, while the surface increases with quadratic law), that doubling the sample volume, G_f doesn't double proportionally, but increases "only" of 1/3. Hence, the ant 10 times larger than the normal ones could not dissipate the energy due to its body load, and its legs, although (the legs, too!) 10 times larger than the normal ones, should collapse under that weight.

3. The "lesson" by structural engineering (strategies for a "great" life)

Nobody can always self-limiting in size, as the trees and the snails, but sometimes "great" structures must necessarily be created and sustained. In these cases, Nature provides indications that, combined with the structural engineering studies, suggest strategies to give robustness. In fact, the same robustness that the "system building" requires can be expanded, as a concept, to the "system society", understood as a complex set of banks, cities, nets.

Generally, a complex structure is the one that cannot be reduced to a simple scheme without loosing important aspects of the structural behaviour. The complexity of a system should be independent on the entity and the position of the external forces. Hence, a complex structure can be defined as the one made up by a large number of parts that interact in a non-simple way under an arbitrary loading scheme.

To describe the state system, the definition of *entropy* can be also used. The entropy, in a generical definition, represents the amount of information required to describe a system. In the classical thermodynamic definition [13], the entropy is defined as the natural force which carries a system from an improbable to a probable condition. In statistical mechanics, entropy is essentially a measure of the number of ways in which a system may be arranged. It is often taken to be a measure of disorder: the higher the entropy, the higher the disorder.

Entropy increases with the increase of variety and uncertainty in the system. Correspondingly, a highly complex system requires a larger amount of information to describe its state. An increase of the complexity of a system, through increased disorder, variety and uncertainty, would be represented by an increase of its entropy, which, as stated, quantifies the amount of information required to describe the state of the system.

Some Authors [13] recently provided a definition of *structural complexity index*. The SCI takes into account the definition of information entropy formulated by the same Authors, and can be computed by the following formula:

$$SCI = -\sum_{i=1}^{s} \frac{\psi_i}{\sum_{j=1}^{s} \psi_j} \log_2 \left(\frac{\psi_i}{\sum_{j=1}^{s} \psi_j} \right) \tag{2}$$

where s is the (finite) number of load paths, i.e. fundamental structures, and ψ_i the performance index of the *i*-th load path linked to the deformation work performed on the *i*-th fundamental structure (defined as the statically determinate structure subjected to the loads and extracted from a statically indeterminate scheme). Dually, the structural robustness is defined as the ability of a manufact into do not let propagate local occasional events (i.e. failures, lesions, explosions, terrorist attacks) up to the global scale of the manufact.

In this sense, an analogy with the concept of materials *tenacity* (namely the ability of do not propagate in a fragile manner a micro defect up to the macroscale) is done. The strategy to increase the structural robustness, therefore, can be reconducted at the same analogy with natural phenomena: **redundancy** of the elements in parallel, that is hyperstaticity, and **compartimentation**, just as some strategies of materials tenacity (especially the natural ones) are represented by the insert of reinforce fibers or crack arresters. So the human skull has crack arresters to partition the own shell and circumscribe the damages, the trunk of bamboo has a redundant texture in order to bend without breaking, and at the same time, to cope with unexpected events (i.e. a violent storm) (Fig. 6) [14].

So, in parallel with the *CSI* index previously defined, other Authors (belonging at the same work group) [3] recently proposed a *robustness measure*, starting from the **structure stiffness matrix norm**. In fact, decoupling the norm of stiffness matrix from the dimensional parameters (that make the measures "sensible" to the used metric scales, and impose to the structural designer an *a-priori* dimensional choice), the estimation of the matrix norm can be changed to the robustness evaluation. In a related manner, it can be related to the structural compartimentation, in order to develop a "rule" to design buildings able to survive to

the sudden and unexpected lack of one (or more) structural elements. In particular, some aspect of two different norms measures are evidenced, that is the robustness measures of Demmel [15] and Nafday [16], that appear of specific interest, although they were essentially developed for mathematical scope. In fact the first Author applies and perfects to the structural problems the results the other had previously computed from the essentially algorithmic point of view. Finally a third solution is proposed, able to evaluate the compartimentation degree, considered the first robustness parameter of the structure. The starting point is the diagonalization of the stiffness matrix.

The displacement norm, as robustness measure, can be analitically found starting from **q** and **P**, respectively generalized displacement and stress; in this case one has

$$\mathbf{q} = \mathbf{K}^{-1}\mathbf{P} \qquad \text{or, in index form} \qquad q_i = \sum_{j=1}^{n} K_{ij}^{-1} P_j \qquad (3)$$

Assuming as unit values only the solicitations P_j dual of the searched generalized displacement q_i, one has

$$P_j = \delta_{ij} \qquad (4)$$

thus, the same generalized displacement is

$$q_i = \sum_{j=1}^{n} K_{ij}^{-1} P_j = K_{ii}^{-1} \qquad (5)$$

from which a natural definition of the robustness measure (or **displacement norm**), follows:

$$\delta_q = \frac{1}{\sqrt{\mathbf{q} \cdot \mathbf{q}}} = \left(\sum_{i=1}^{n} q_i^2 \right)^{-\frac{1}{2}} \qquad (6)$$

eqn. (6) can be expressed by taking into account eq. (5) as follows, and then obtaining a formulation that depends only from the components of the stiffness matrix

$$\delta_q = \left(\sum_{i=1}^{n} \left(K^{-1} \right)_{ii}^{2} \right)^{-\frac{1}{2}} \qquad (7)$$

3.1 Difference of robustness and vulnerability in random and scale invariance networks

In the '50, the two Hungarian scientists Paul Erdős and Alfréd Rény observed that a large part of the human phenomena can be represented by graphs: customers and suppliers, nerve cells, houses and telephone lines, towns reaches by trains, people linked to others via friendship. All that is linked, can be schemed, mathematically, with nodes and lines. The application fields are very vast, because all Nature, including the Society, is made by complex links and interconnections. So Erdős and Rény elaborated a general model of network built according a **random** connection (Fig. 7 a) of nodes. Unlike what Einstein believed, they supposed that the Case was the more uniform and perhaps "democratic" way to establish nodes and links in a network.

Adding an amount of isolate nodes and some random links between they, in a first time some couples of scattered nodes were formed. Gradually, random links are added and increasingly more little isolated groups are established, but at some point a giant cluster suddenly is formed, in which every node has at least one

link with another. All nodes have a link with the others, becoming a set, that is something qualitatively different from the previous. This phenomenon is a radical transformation that occurs after the qualitative and gradual addition of links, and it is defined "phase transition" by the physicists, similarly to the transformation of the water in ice (that just occurs with the increase of entropy [13]).

The ability of reaction (resilience) to attacks and errors, and the adaptability to the random failures of a network depends from its structure too. The nets theory perhaps shows, from this point of view, its major pratical importance. In a lot of natural systems, a very high interconnection, together with a great capacity of self-tuning and robustness worthy of attention, can be observed. For example the eco-system, with the continual extinction of animal and vegetal species, shows an excellent fault tolerance. Instead, in a lot of human products, as the electric networks, the high interconnectivity lends itself to uncontrolled domino effects, like the black-out.

As a result the different sensibility at the events and the different robustness is not due to interconnectivity, but to the topology of these relationship. The **hub&spoke** system, that can be catalogued as scale invariance systems, is different from the random or not hierarchic system, because some observations about the cleavage. In a random network, if a node after the other is removed in a random manner, the net suddenly collapses in the moment in which it overcomes a given critical threshold. Barabási [17] summarizes the concept with these words: «La robustezza topologica ha quindi le sue radici nella struttura antidemocratica delle reti a invarianza di scala: i guasti privilegiano in modo sproporzionato i nodi più piccoli». The simple fact that there is a lot of small nodes and a few number of great nodes is a consequence. Therefore, if the nodes go out casually, it is more probable that this does not occur to the (numerical limitated) hubs. So the great hubs are not damaged, but the small spokes are. If the higher probability is that the random collapse of a limited number of hubs doesn't provokes disasters, it is also true that the stopping of few hundreds of chosen hubs is enough to flake virtually all the network, whether they are airports or informatic. The networks signed by the power law are then **fragile** respect to targeted attacks. Their vulnerability is manifested when an action conscious and pre-routed occurs (terrorism?). Clearly, a random network does not run these risks, but it is much less resistant towards the normal difficulties and simple abnormalities [18]. The specific dimension and distribution (hierarchic) of the hubs (Fig. 7 b) determines as a result the network topology, its stability and robustness, and its dynamic behaviour.

4. Conclusions (theory of the decrease?)

The network theory and the contribution of the structural engineering are really simple attempts to operate a "previsional" function, or anyway a "control" function on the Society and on its sociological development.

In 2007 the economist Taleb wrote an assay titled "The black swan" (then followed by "Robustness and Fragility" in 2010), in which he described as the improbable, or rather the imponderable, governs every aspects of the life, from the economical one on global scale, until the social one on individual scale. Starting from the swan metaphora, Taleb [19, 20] demolished the human certainties confirmed by the empirical experience: <<basta un solo evento inaspettato>>… as the sighting of a black swan, precisely… <<per demolire certezze e schemi consolidati da secoli… così siamo indifesi di fronte all'imprevisto, si tratti di vita quotidiana o di mercati finanziari>>.

Properly because of these new, coherent theories, that are far from the attempts of global network for a total control, the structural engineering today proposes the development of concepts as the system "resilience", that is a concept able to develop the adaptation ability to what will happen (and we aren't sure that today it can be defined) during the life of the structure/society. The development of the systems resilience, lent term by the material science, as well as the lesson of the structural engineering about the robustness recovery trough the redundance and compartimentation parameters, could represent a solution for the overcoming of critical social times, avoiding phases of contraction and decrease. In fact, if the Mies's assertion in the architectonical field can imply a cultural revolution, above all contextualized in his age, in structural engineering we think also that "more is more", and we aim to built ever higher skyscrapers, and ever longer bridges, although conscious that the challenge to the gravity results incompatible with the snail sapience.

Fig. 1: The wounded giant sunk (human error), while the small Boston, riddled with bullets, remains afloat (it is resilient).
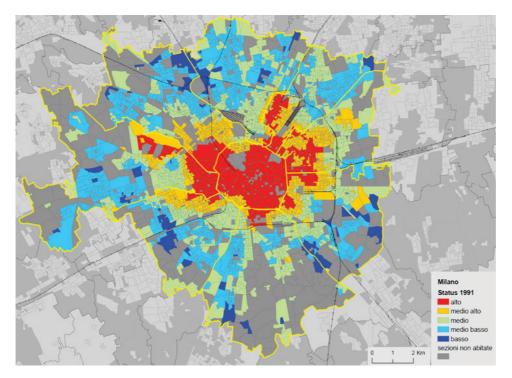
Fig. 2: Milan, population densities, 1° Conference-Exhibition "Milano, la Metropoli, le Periferie", 2009.

Fig. 3: Self-limitation of the growth, examples from the Nature.

Fig. 4: Human proportions.

Jonathan Swift (Irlanda, 1667-1745)
Scaling in Gulliver's Travels

Great fleas have lesser fleas
Upon their backs to bite 'em
And lesser fleas have lesser still
And so ad infinitum

Fig. 5: Stress in the material versus the distance between the faces after the opening.
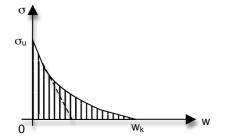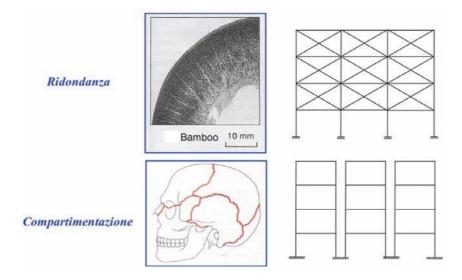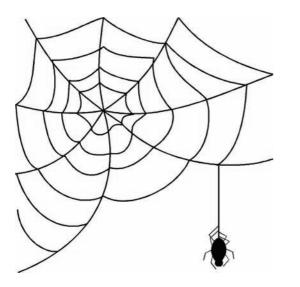
Fig. 6: Strategies for robustness: redundancy and compartimentation.
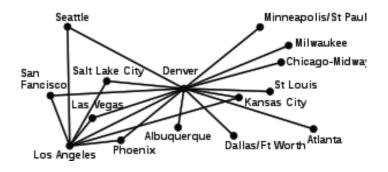
Fig. 7: a) hierarchical network; b) airports hub.

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CHAOTIC DEVELOPMENT AND URBAN MORPHOLOGY. THE SIGN OF THE ARCHITECTURAL ANARCHY.

Gerardo Maria CENNAMO[1]
[1] Facoltà di Ingegneria, Università Telematica Internazionale UNINETTUNO, Roma, Italia
g.cennamo@uninettunouniversity.net

Abstract
This contribution aims to deepen the complex relationships between urban form and architectural design, such as defined by the documentation of some peculiarities of the built environment in the city of Naples, whose process of building was stratified by continuous comparison not only with the topography and orography of the city, but also with the phenomena of transformation for endogenous and exogenous causes, both natural and artificial, determining, as explained in this study, spatial organizations of preeminent originality and complex conurbations both linguistic and structural, "daughters" of a society considered itself an expression of strong heterogeneity and adaptability. During the first half of the seventeenth century the city experienced a chaotic demographic explosion: in the 1606 it passed, in only fifty years, from a population of about 270,000 inhabitants to 450,000.
The nucleus of the city, consisting of nine urban districts and seven villages, expanded itself volumetrically but, at the same time, it was limited within the same geographical areas, through a dense layering of makeshift homes as lows, warehouses, small supports, houses carved into the tuff, wooden shacks clinging to the tuffaceous spurs that littered the streets and that were mostly popular houses.
These were often different evolutions of the same structures of shops and stalls used as beds during the night. The changes brought about by rapid urban growth, detectable in the different historical processes of development and transformation, have strongly characterized the morphological development of the city, which had to relate both with a prominent archaeological heritage and with the particular geo-morphological, hydro-geological and bio-climatic system.
The growth of settlements has been placed around the manifold configurations resulting by geophysical activity such as valleys, hills, gullies and their transformation into foothill locations such as stairs and ramps, by the erosion of systems that have transformed progressively in big hollows, ditches, by the transformation of tuff as a result of mining activities in caves, and finally by an opportunistic and "imaginative" Neapolitan people's ability to produce extremely heterogeneous aggregations, which is outside by any canonical cataloging.
The main purpose of this study is, therefore, the reading of a complex and messy process of evolution, mainly declined through the research on the role of evolutionary processes in project design and urban transformation. I will also take into account, trying to value its effective weight, the relationship between complex morpho-urban development, historically decisive, and the evolution of part of the complex social body of the city, historically inclined to modus and customs often connoted by strong individualism.

Key words: form, city, development, morphology, aggregation.

1. Premise

Early Roberto Pane in his "Naples unexpected" explained a few places in the city cataloging curious architectural and environmental solutions made in the eighteenth century, introducing a search that may take even several interpretations regarding the processes of urban growth and transformation that the city has had in the past centuries [1].

One of the most "unexpected" thing that you can borrow from the title, even now, what about some episodes of residence found in some historical cities and especially in Naples, i.e. a particular type of housing that, conditioned by the morphology of the places, was forcibly influenced by several economic factors, social and existential forms, returning "not designed" for certain parts of cities, because of their peculiar configuration might seem peripheral and marginalized and contribute fully to the definition of portions of historic urban centers, constituting integration of their overall fabric.

The specific reference is to the dwellings of "luck", born spontaneously in Naples, along the steep walls of tufa or excavated in underground, dark and ancient paths of water, in the caves, natural or derived from the extraction of tuff, made from six hundred/seven hundred century to cope with population growth and the resulting housing needs. (Fig. 1).

These solutions have defined, for subsequent volumetric addition, the characteristic of real "hidden" villages, that are, only from the standpoint of the social context, urban boundary. Subsequent additions have resulted, in some cases, a formal result, an architectural language and a technology configuration that highlight very bold environmental solutions, original and creative ideas. (Fig. 2)

Ignored by official historiography, these settlements are now a cultural heritage of the People's ability to invent an adaptive housing types such as to define a new relationship between anarchy housing and urban morphology.

The work lies in the particular field of study (the larger problem of retrieval and urban renewal) for the rehabilitation of these micro-environments constructed which, for their size scale and their peculiarities conformative, were heavily penalized by the development processes of the city.

Fig. 1: Cavone a Piazza Dante: superposition of buildings.

Fig. 2: Vico Lepre a Montesanto: buildings in stone (tufo).

Fig. 3: Luigi Guerricchio, I Sassi di Matera, da B.Zevi "Dialetti architettonici, Milano 1966".

Fig. 4: Manila, Benvenuti a Death city, da Repubblica.it.

Fig. 5: I Trogloditi di Mergellina.

The objective of this study tends, in fact, the mending of these organic pieces "poor" with the remaining areas of "rich" by solving a dichotomy between different "modus abitandi", ie between residential segregation and civilization.

In a lot of specialized vocabularies such properties are identified from time to time by such adjectives as "improper", "precarious", "luck", "forced", "rock" and others, but the common denominator that is always based on the trinomial poverty - marginalization - adaptation.

The history of these units is filled with examples of paradigmatic types, some of which have had the good fortune to have been investigated by the official culture of industry and others, such as those under consideration, which have been neglected due to physical and cultural isolation of city.

Just consider two extreme cases such as that of the "sassi di Matera" (Fig. 3) that is taken to the dignity of the UNESCO cultural heritage, and one that occurred in Manilla, where tombs, vaults, chapels and so have become housing for "underprivileged" (Death City-City of the Dead). (Fig. 4)

The theme of anarchy-residential construction is not new to Naples if you think that up to 1960/70 even in Mergellina some caves have been converted into homes, for which reason the inhabitants were called "the Troglodytes of Mergellina". (Fig. 5)

2. The tradition of building as "Techne"

The study of these particular architectural episodes as well as a methodological approach towards the construction of anarchy theme, seems to have been customary, intended as an activity unrelated to the more canonical disciplines of architectural interest.

Beyond an overall research on the phenomena of chaotic architecture that developed in residential theme in the city of Naples with its continuity, the primary interest of this work is to define an approach directed towards this "architecture of necessity", not necessarily attributable to already undertaken researches, but in order to recover our conscious reality that is often ignored or at least ignored by architectural and urban culture.

One of these concern approaches, surely, the "diversità" social, linguistic, productive and constructive architecture of hidden and overt Architecture of the city, revealing connotations and configurations closely related to processes of design, construction and building autonomous and differentiated.

The building unexpected architecture, not less than one designed, that follows "reasons" of laws and principles, have ancient origins: but while the second offers a more easily understood, because supported by an infinite analysis conducted under the most varied angles, in the first constructive engagement and building commitment is still to discover and understand.

At this point the chaotic architecture cannot express 'the prelude to consider some aspects that, while being interesting manifestation of creativity, can not contribute to the definition of a canonized productivity process', Anarchist designs and builds its own environment, subjecting only to its technical and cultural knowledge, escaping from any programmatic rule. [2]

The myth of the city as a dynamic center of cosmology and architectural symbolism, is scaled to the proper role of the contrappositore "out of town", where daily activities, spontaneous and creative weigh on culture and provide architectural elements and connotations associated with the processes of recognition the so-called "popular" culture. [3]

The city's architecture is reduced to the signs "understandable" and signs "incomprehensible" that splits and mergers in forms more related to the paper, indecipherable to the "other architecture" that the "system" this aloof, elitist that does not allow dialogue with the "strong" poor, and whose signs of recognition and prioritization are provided on how much wealth the "decorative liveries".

In this sense, the opposition between "popular" and "noble" between "spontaneous" and "bureaucratic" between "creatività" and "restoration" and between "everyday" and "programmed" with rampant evidence rises to a concrete symbol of the deep laceration - political culture. [4]

3. The cultural references

The subject under study has not, to date, a bibliography canonical, so it is quite complex research of literary references that it can endorse the scientific credibility.

Nevertheless it is precisely this lack originality and interest provides bibliographic research; "Order and complexity in the design of the landscape" is the title of an essay by Rudolf Arnheim German psychologist (1904-2007) in which it is admitted that the "disorder can be attractive and desirable. It provides a form of raw and anarchic freedom, and as such can offer some relief to the victims dell'irreggimentazione". Indeed, the modern option is for "loss of center", the rejection of any hierarchy, the ongoing interest in the accidental, the unpredictable, the abnormal, the deformed, the monstrous, the eccentric. [5]

Second Bruno Zevi, as reported in the volume of cheap paperbacks Newton, architectural dialects (against the history of Italian), "the principle of dissonance remains essential. The constant is mechanically repetitive, as occurs in the curtain walls of the city, or complaint a more differentiated additive system that emphasizes waste, imbalance, disharmony, conflict".

For Zevi, the difference between settlement forced and planned settlement lies in the fact that while in urban outdoor spaces, streets, squares, visual take on the highest priority, architecture forced unity "home" has a secondary value, bought his first posed the "sequence" of volumes, if they were molded together with a single gesture.

We are faced with languages "zero level" says Bruno Zevi still on the aforementioned "architectural Dialects", without grammar or syntax, parks adjectives, basic existential dictated by events, by nature and from work. Words of immediate significance, placed side by side, no verbs: a communication architecture exactly the opposite of that academy, devoid of semantic and composed of stock phrases. [6]

Buildings are mostly illegal, but in their continuous development horizontally or vertically in grooves or protrusions paretali tufa, can be defined as self-sufficient: that is handmade and homemade. [7]

4. Environment and place

The cities , already from their origin are characterized by different parameters predominant, including the essence of the "genius loci" and the morphology of the place.

The first is to identify the social identity of the civil power (government buildings), religious power (the temple, the church), military power (military buildings) and economic power (buildings for business), the second identifies the "forma urbis", the morphology urban developed through the natural and artificial processes of transformation and urban growth.

Clearly in such situations, there was a symbiosis between cultural, landscape andurban form that has influenced the cities and ways of life.

The official history has, sometimes, neglected the analysis of the morphologyof the places through the expansion projects, construction processes and the research of materials and natural resources that have local costruiton the form of the city.

This approach has resulted in a vision seemingly unitari of the built environment which, however, appears fragmented and cataloged in phases historical and sociological. Through the values considered, the meaning of "built environment" coincide with that of "urban place.

The environment, natural or artificial landscape, can be considered as "built by human, natural and artificial components." We can define the "place" as something more than an abstract location, as part of reality by environmental parameters recognizable by definite confines (houses, roads, buildings), then through "physical" limits that, in the case of this study , are represented by morphology and conurbation of the place. [8]

5. The case of Naples: the urban morphology

The causes that led to the construction of housing types unusual, fleeting referente to any architectural and structure, are to be found especially in some large city growth processes that have altered in some areas the bilance between natural and built environment, forcing many people less fortunate, to be resigned to a condition of living "extemporary" andimprovised.

In the particular case of Naples, the parameter most emergine and important tothis type of analysis, it is precisely the morphology of the place, which hasaffected the development and then the final form of the city.

Urban development has occurred within precise confines; the sea and the hills of Camaldoli, Vomero, Posillipo. The hill of Vomero is connected to the greek-roman archaeological settlement by ancient rivers and watercourses where they were subsequently constructed the neighborhoods of Petraio, of Cacciottoli, of Cavone, of Salvator Rosa, much like the hills of Capodimonte is connected downstream trough the streets of S. Teresa, Museo, Stella, Vergini. These two systems converge in two main directions of Pessina and Foria.

To the west the hill of Posillipo is connected downstream through the streets of San Antonio in Posillipo, Villanova, Fosso the Casale, Gaiola, Marechiaro, Riva Fiorita and Cordoglio crossing the homonyms settlements.

In these areas there is the existence of multiple barriera "physical", which were thereal limits for social inclusion and urban organization.

They are indeed, in the tradition and typology of the city places, that even now composing the historical center of the city, are still "far apart" maintaining a hybrid role of "village" in an urban perimeter that can no longer consider them such suburbs.

We can referin particolar to the settlements "broken" by the construction of the important street Corso Vittorio Emanuele, as Montesanto, S. Antonio ai Monti, Cacciottoli, S. Maria Apparente, Petraio or those "broken" by the construction of S. Teresa street, such as Vergini, Stella, Sanità, Materdei or even those "broken" by the construction of the Posillipo street as Villanova and S. Strato.

And still the Pedamentina S. Martino or Calata S. Francesco, interrupted by the streets Tasso and Aniello Falcone.

They are all settlements dating between '600 and '800, where it denotes aconstructive characteristic with brilliant and unexpected inventions and technological bold solutions.

6. The project area

We study a piece of the city, the area of Montesanto confined between a section of the Corso Vittorio Emanuele (upstream) and the streets Pessina and Toledo (downstream).

The whole area is bounded to the east by street Pessina (from the Archaeological Museum to Piazza Dante), to the north by street Salvator Rosa (from the Archaeological Museum to Piazza Mazzini), to the west by road Vittorio Emanuele (from Piazza Mazzini to staircase of Montesanto).

The planimetric configuration of the area can be considered as an urban barycentre, which is a pivot around which to develop the directions of the district Materdei to the north-west and that of the Quartieri Spagnoli to the south-east.

The whole area is crossed by oblique paths starting from the hill of the Vomero run off downstream. One of the most famous oblique paths is, of course, the Pedamentina of S. Martino (from the homonymous Museum to Corso Vittorio Emanuele) and its natural extension, the staircase of Montesanto. (fig. 6, 7)

LA DENOMINAZIONE DI PEDAMENTINA DERIVA
DAL TERMINE "PEDEMONTANUS" E SOTTENDE IL SIGNIFICATO
DI ASCESA VERSO UN POLO DI ATTRAZIONE COLLOCATO IN ALTO:
LA CERTOSA DI SAN MARTINO E IL FORTE DI S.ELMO.

CIÒ FA SUPPORRE CHE LA REALIZZAZIONE DI TALE
PERCORSO SI RICONNETTA DIRETTAMENTE ALLA COSTRUZIONE IN
EPOCA ANGIOINA DELLE SU CITATE EMERGENZE.

IL SUO ANDAMENTO È, QUINDI, SENZ'ALTRO INTEN-
ZIONALE A DIFFERENZA DI MOLTI ALTRI CHE HANNO ORIGI-
NE DAI SOLCHI DEI CORSI D'ACQUA A CARATTERE TORRENTIZIO.

planimetria

sezione A·A'

Fig. 6: La Pedamentina (footh path): San Martino.
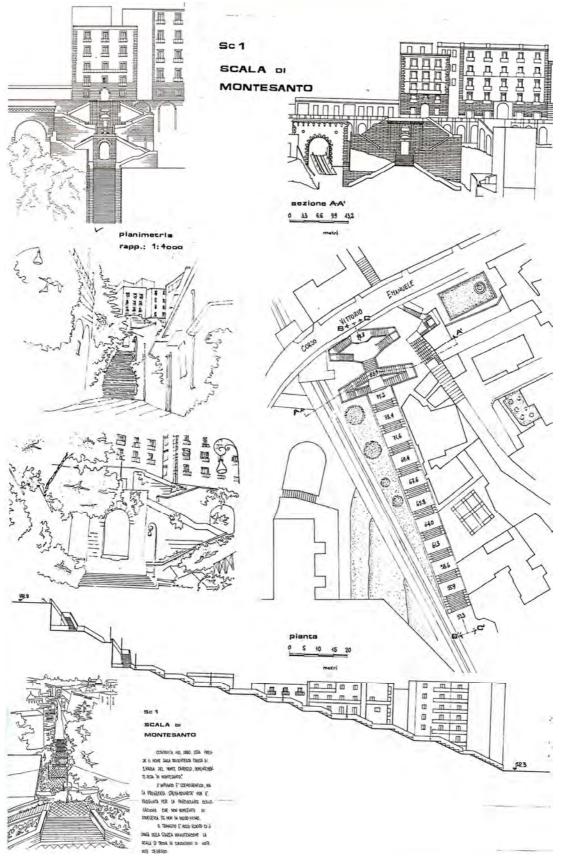
Fig. 7: The Staircase: Montesanto.

The settlement of Montesanto is classified by the official historiography, as "middle" area of the historical city, where there are more buildings of historic character together at a strongly compromised by the chaotic development of past centuries with a static level of degradation and to limit the environmental compromise.

The move away from the center of the city, over the years, a gradual but progressive deterioration of the housing stock, which in some cases, reaches the total degradation.

This condition is shown above along those guidelines in which the building was excavated in downstream into the tufaceous walls, as well as the settlements along the descents and ascents that have been "cut off" from their street Corso Vittorio Emanuele.

In fact, stopping the natural orographic "continuum" uniting these places, situated at the top, downstream towards the rest of city was determined to be an insurmountable barrier in terms of physical and social.

Therefore it is changed also the way to inhabit these residual places, and in them there has been a chaotic buildings, anarchic, unregulated and unsupervised; it specializes in a manner of building and inhabit in a "hidden" behind the buildings noble or in natural cavities. Emblematic of this situation the street Francesco Saverio Correra, called "Cavone" at Piazza Dante.

The "Cavone", in fact, that was a watershed, the ancient river bed Sebeto hill, where the water had carved a canyon tuff in promoting intensive extraction.

Sebeto disappeared, its river bed becomes a path, a street along which they settle many "fondaci", where the merchants deposited their merchandise, which displayed in Mercatello Piazza (Piazza Dante) at the time outside the walls of the city's defense.

On either side of Cavone rise the tall walls of tuff are the border, to the east of the settlements of Tarsia and Pontecorvo, to the west of the settlements and streets Tommasi and S.Giuseppe dei Nudi.

Along the sheer walls and on top of these can be found the buildings described, accessible only by stairs and walkways across the tuff. Housing in these areas, functions to meet a strong housing requirement and have found a particular type aggregative that defies the official consideration of architectural culture, because it is constantly changing and constantly changing urban design.

They are buildings that relate primarily to the concept of "common vicinity" that is, the "modus vivendi" for which the street, the staircase, the ramp is an integral part of homes.

These buildings are made from the assembly of functional systems typical of the traditional Neapolitan (verandas, terraces, patios, pergolas) that, with the Neapolitan yellow tuff, define an urban landscape a very special and worthy of attention and research. (Fig. 8, 9)

Fig. 8 – Juxtaposition between the natural and stone and artificial materials by buildings: S. Antonio ai Monti.

Fig. 9 – Juxtaposition between the natural and stone and artificial materials by buildings: Cavone a Piazza Dante.

7. The requalification program

The attempts to unify these places around the city, even with the advanced technology as the great staircase leading to the Corso Vittorio Emanuele, the funicular to Vomero, the stations of the subway and Cumana, were greater in the south, even marginalizing more concentrated in the northern area and areas around the terminals for connection (funiculars, staircars, station), the vast majority of economic activities and services such as hospitals, churches, banks, cinemas and theaters.

In recent decades of the area has been equipped with several services that have, in fact, tried to mend the rift between the two areas: the construction of the social park "Ventaglieri" (which took place in the years after the earthquake of 1980) and, more recently, the urban park on the former military hospital, and most recently the new station of the funicular railway and Cumana.

Since 1993 students of the Faculty of Architecture of the University of Naples Federico II, coordinated by the Department of Architectural Technology, have participated in a seminar on "The places of the contemporary city – Anarchy housingand urban morphology".

The seminar was studying three issues:

1. study of the urban development of the Cavone in Piazza Dante with a visit to S. Monica fondaco, to the fondaco "Fondachiello", to the homes built on the hillsides of tuff;

2. exhibition of the project proposals connected to toponymy and topography of Naples;

3. meeting and debate on the issues of the report.

During the same year the Institute of Technology of Faculty of Architecture Federico II drew up a research project with the CNR called "systems of the urban residential rehabilitation historical center and in particular the area of Montesanto".

The research, based on the study of the existing and the potential for redevelopment, was devoted to the problem of existing temporary housing area.

Unfortunately, all these cultural activities have had a practical application, so we mustmake a plan of reorganization of this built heritage aimed to a better integration of housing.

The retrofitting program, starting with strategies and methods of official culture of the sector includes research and survey of the most common types of housing, theanalysis of morphological characters, the organizational criteria of space, characterand functional performance, up to study all details of building components that characterize the architectural form.

Preliminarily will specify the role that morphological characters can play in the next work program retrofitting.

The research is the first part of the development of the whole work and maymaterialize in the cataloging of the "types", through a specific topographical andarchitectural survey, the study of materials and manufacturing processes, systemsand processes of transformation adopted in phases construction.

Completing this first phase, the program will address the identification of new stardards optimal models of functional organization, size and quality of interior space, corresponding to the different needs of users "in itinere".

The method of research, between practical and analytical model, first proposed aworking hypothesis, through a series of adjustments approximated by:

1. adaptation of the method of work to socio-economic reality in which it operates, respecting the values and human and social conditions;

2. control of the typological scheme through interaction with the relative humidity canmicroclimatic models, light and sound;

3. adaptation to the local building building systems, enhanced and updatedappropriately, complying with the principles of simplicity, ease of construction, ofcreative freedom;

Through the sequence of adaptations, it leads to a range of models, organized for each of the single type of homes, obtained by extrapolating the self as a "living cell" from the context of urban reality, context within which they should go to intervene in the strategies for implementing.
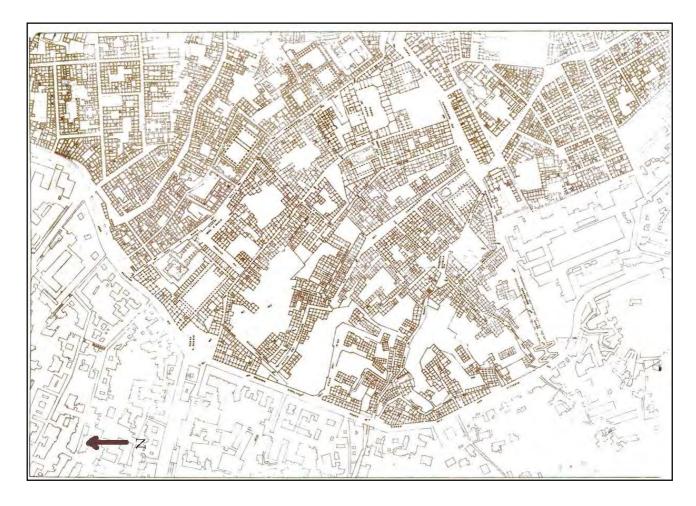
Fig. 10 – Survey of the types of buildings and site.

8. Conclusions

The attention to quality urban environment involves a thorough evaluation of the urban environment in terms of creativity.

This results in a process of reconfiguration of the urban fabric that results in terms ofreactualization and retrofitting extending the range of the project intervention also to the social.

The conclusion is that the balance in an urban environment like Naples is found in a situation characterized by morphological and environmental parametersantigeometrici spaces, informal, forming signs not rigidly preordained, not schematically concluded from points of view, in a sense that path leading tomulti directional, variable, changeable, vertical, inclined, semi-closed as well as thedynamic relationships between morphological suggeriscetra natural space and built space.

The regeneration program aims to integrate the few green areas, the organic integration of the roads to places where it exerts associational life, the capacity to create a utopia through the unification of the parties goes beyond the boundaries of urbanism of utopia to restore the city's past the marks of this.

It outlines a method for planning a redevelopment of the collective that couldprefigure, through architecture, an environment more congruent.

Reaching places, connecting different heights, means developing a project, organizing the resources available for a revision and reinterpretation of the environment from which emerges a new spatiality, not only in figurative terms, which serves to shorten distances, integrate gardens, surpassing compactness of the logic to connect parts of the city to in itinere actions, mechanisms and kinetics multiple circuits, enhancing the integration of culture, art and projects.

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less
more
architecture
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Protection, Management and Sustainable Development : the "Grand Site de France" Experience

Anne VOURC'H[1]
[1] Director, Grand Site de France Network, 9 rue Moncey, 75009 Paris, France
annevourch@grandsitedefrance.com

Abstract
"Grands Sites de France" network is a national association which brings together elected local authorities that are responsible for the long term and day-to-day action to conservation and presentation of cultural and natural sites, protected for their value in the landscape.
37 sites and 27 millions visitors, these two figures mean very strong pressures from tourism, and a major challenges: How to find and maintain the balance between the need to protect this heritage and its very attractive tourism potential ?
A national policy is currently carried out to manage sites with respect for the cultural or nature values of the site, the "spirit" (atmosphere) of the place and to seek solutions in cooperation with tourist operators through encouraging a quality experience for the visiting public and the participation of local residents.
Local authorities, in agreement with the State administration, are the main driving force to implement this strategy of sustainable development at heritage sites.
The State administration guarantees the legal protection of the Grands Sites, decides on their classification and issues authorizations for restoration or modifications within protected areas. But with the exception of a few major monuments which remain managed directly by the State, local agencies created and directed by elected local authorities are now responsible for the management of Grands Sites, in relation with participation of inhabitants.

Keywords: Heritage Site, Preservation, Integrated Management, Sustainable Development, Cultural Landscape

1. Introduction

"Grands Sites de France" network is a national association, which brings together elected local authorities responsible for both day-to-day action and long term evolution, conservation and presentation of cultural landscapes and other natural and cultural heritage sites, protected for their landscape value.
37 sites and 27 million visitors annually, these two figures mean very strong tourism pressures, and some major challenges for their managers: How to find and maintain a balance between the need to protect our heritage and its undeniable tourist potential? How to develop it in a sustainable manner? Via integrated management.
In France, a national policy is currently carried out in cooperation with local authorities to manage sites with respect for their cultural and/or natural values, the genius loci and local populations. The policy aims at creating local development in cooperation with local populations linked to the sites' values without damaging them. The responsibility for managing the Grands Sites in France has for many years been very centralized.

Fig. 1: Grand Site du Pont du Gard ©Réseau des Grands Sites de France, 2010

Nowadays, local authorities, in agreement with state administration, are the main driving force in implementing this strategy of sustainable management of heritage sites and their surroundings.

State administration guarantees legal protection of the Grands Sites, decides on their classification and issues authorisations for restoration or modifications within protected areas. But with the exception of a few major monuments, which remain managed directly by the State, local bodies created and directed by elected local authorities are now responsible for the management of the Grands Sites.

The Grand Sites are more than places of outstanding beauty and immense value, they are more than just the monument or protected area in their centre, they are territories where people live and work, they comprise fields, pastures, economic activities etc. and site managers integrate this reality into their management. Heritage Sites cannot be apprehended only as sites for tourists, but also as living spaces and the fact that populations are taking part in the Grands Sites' actions is essential for it brings better understanding and pride to the inhabitants, better preservation and a better base for sustainable development. We always need to think of a site in its environment.

This paper will present the global goal of this policy, and practical accounts of on-the-ground managers. It will focus on the key role of good governance for a long-term and a sustainable preservation of living-heritage sites.

2. The challenge: Finding and Maintaining a Balance

This article is based solely on the experience of the Grand Sites de France Network in the field of sustainable development of regions via an integrated management of heritage sites.

Answering the question of balance is not easy in France, a country that is the world's leading tourist destination (with 82 million international visitors annually), and which has strong domestic tourism (growing with the economic crisis we experienced during the past three years). The concentration of natural and cultural heritage sites is very strong in France. They form the basis of the tourism economy, accounting for 6.2% of GDP.

What are the problems the heritage sites face? The majority of these sites are protected by a powerful law, but sometimes with poorly integrated infrastructures, with insufficient regard for the environment and with no

managing bodies for many of them. It has been recognized for some time now that we must change the way these sites are managed. What other problems are the sites facing today and what measures are being undertaken to improve things? We face invasion of cars and coaches, undesirable levels of crowding disrupting site's atmosphere (genius loci), obtrusive shopping outlets which are becoming the same wherever you go, souvenir shops with products that are anything but locally produced, local residents depending solely on tourism or, on the contrary, residents who object to the influx of tourists and develop hostile attitudes, regular visitors who no longer want to come to sites that have become "tourist traps". In short, many heritage sites are victims of their own success – a success that is not sustainable

Fig. 2, 3: Illegal parking at the Grand Site des Roches de Solutré-Pouilly-Vergisson before parking installation ©Grand Site des Roches de Solutré-Pouilly-Vergisson, 2001 and A shop with standardized and low quality products at the Grand Site de la Baie du Mont Saint-Michel ©Réseau des Grands Sites de France, 2008

The national "Grand Site de France" policy has been implemented for 30 years. The Ministry of the Environment and Sustainable Development operates this policy and it concerns natural and cultural sites, protected for their landscape value by a long-standing and powerful law dating from 1930. This law relating to "the protection of natural monuments and sites with artistic, historic, scientific, legendary or picturesque character" allows protection of sites covering very large areas, often including important monuments which are themselves protected as historical monuments. The Grands Sites often include areas of recognized ecological importance as well. These are subject to national and/or European laws on the protection of biodiversity such as Natura 2000. They are very popular and well known in France, and in some cases worldwide. They form the bedrock of tourism in France and you will no doubt be familiar with many of them, such as the Mont Saint Michel and its Bay in Normandy or Mont Sainte-Victoire in Provence, made famous by the paintings of Paul Cézanne. The Grand Sites attract large numbers of visitors: the 37 sites in our network attract 27 million visitors annually, whether local, regional, national or international.

Some of them are also included on the UNESCO World Heritage List, like Mont St Michel and its Bay, the Roman aqueduct of Pont du Gard, the fortified City of Carcassonne, and so on. In every case, the values and key concepts of the World Heritage Convention inspire our actions, independently on the status of the sites.

Local authorities and public bodies managing the Grands Sites wanted to join in a network to share their experience and good practices, overcome their difficulties, move forward together and construct joint projects. Therefore, our association was created through a bottom-up initiative and not a "top-down" decision; managerial bodies join us on a voluntary basis. We have no authority over those local bodies,

members of the association, as our role is to facilitate their moving forward together, learning new skills, exchanging on good practices etc. We are recognized and supported in this by the state, especially by the Ministry of the environment. We work closely with other heritage networks, such as national parks, natural reserves, various associations of historic towns etc.

Le Réseau des Grands Sites de France
Janvier 2012
37 sites, près de 27 millions de visiteurs

GRAND SITE DE FRANCE

Aven d'Orgnac 1
Baie de Somme 2
Bibracte-Mont Beuvray 4
Les Deux Caps Blanc-Nez, Gris-Nez 14
Marais Poitevin 16
Pointe du Raz 23
Pont du Gard * 24
Puy de Dôme 25
Sainte-Victoire 21
Saint-Guilhem le Désert 29
et Gorges de l'Hérault **

Abbaye de Beauport 17
Alésia 33
Anse de Paulilles 37
Baie du Mont-Saint-Michel * 3
Camargue gardoise 5
Caps d'Erquy-Fréhel 6
Cirque de Navacelles *** 7
Cirque de Sixt Fer à Cheval 8
Cité de Carcassonne * 9
Domaine du Rayol, Le Jardin des Méditerranées 10
Dune du Pilat 11
Gorges de l'Ardèche 35
Gorges du Gardon 32
Gorges du Tarn et de la Jonte *** 12
Gorges du Verdon 13
Iles Sanguinaires - Pointe de la Parata 34
Marais et Place Forte de Brouage 15
Massif du Canigou 18
Massif dunaire de Gâvres-Quiberon 19
Mont Ventoux 20
Pointe des Châteaux 22
Puy Mary - Volcan du Cantal 26
Rocamadour ** 27
Roches de Solutré-Pouilly-Vergisson 28
Vallée de la Clarée et Vallée Étroite 30
Vallée de la Restonica 36
Vallée du Salagou 31

* site du patrimoine mondial UNESCO
** site du patrimoine mondial UNESCO au titre des chemins de Saint-Jacques de Compostelle
*** site du Patrimoine mondial UNESCO au titre des Causses et des Cévennes, paysage culturel de l'agropastoralisme méditerranéen

◉ Sites labellisés GRAND SITE DE FRANCE
● Sites engagés dans une démarche visant la labellisation

Le label GRAND SITE DE FRANCE est décerné par l' État, au gestionnaire du Grand Site, pour six ans. Il vient reconnaître que son action est conforme aux principes du développement durable.

Martinique   Guadeloupe   Réunion   Guyane

Fig. 4: The Grand Site de France Network and its members as in January 2012 © Réseau des Grands Sites de France, 2012

Studies carried out with our public show that nowadays, visitors do not appreciate being drowned in a crowd any more, preferring to be treated in a more personalized manner. Our visitors want human contact, they want to meet the residents and workers of the places they visit or stay at, they want to eat local food and buy local products (food, pottery, carved wood, local stories etc.

Fig. 5: Modern architecture which blends well into the surrounding landscape loaded with history – Museum at the Grand Site de Bibracte – Mont Beuvray ©Réseau des Grands Sites de France, 2011

In a Grand Site, they are looking for a new, interesting and enriching experience, something unfamiliar and in a way overpowering by its magnitude, beauty and identity, but also relaxing and shareable with friends and family, especially their children. Heritage sites are important places for inter-generational relationships and for value transmission from parents or grandparents to younger generations. Therefore, information about the site, its values and its inhabitants must be accessible and adapted to visitors with a wide range of cultural expectations and backgrounds, and programs for young visitors are to be developed. One expression comes up often in surveys carried out with the French public: "Don't over-develop these sites!" Culturally, public is attached to the notion of heritage as a common asset with a local anchorage which should not be turned into business.

3. Sustainable Management to protect sites and create local development

Local authorities, in agreement with State administration, have decided to react to the problems encountered by the Grands Sites they manage. They have all worked to change site management methods in order to adopt a strategy of sustainable development, to manage sites with respect for its cultural and/or natural values, the "spirit" (atmosphere) of the place, to work in respect of and in coordination with local populations and to promote local economic development. Many tourists want to have an intimate experience with the place they are visiting and they are more and more numerous to care about the impact their visit may have on the site – positive in terms of local economy and negative on the protected site itself.

The State administration supports local authorities and has recently created a label to distinguish the sites that have achieved a level of excellence in sustainable management (socially, economically and environmentally); a national label "Grand Site de France". This label is given for 6 years, and its renewal is possible only after an evaluation.

Fig. 6: "Grand Site de France" logo, ©Ministère de l'écologie, du développement durable, du transport et du logement

Fig. 7,8: Two of the ten Grands Sites which have obtained the Grand Site de France Label: Grand Site de Saint-Guilhem-le-Désert – Gorges de l'Hérault ©Olivier Arsandaux, Communauté de Communes Vallée de l'Hérault and Grand Site des Deux Caps Blanc-Nez Gris-Nez ©Réseau des Grands Sites de France, 2011

Grands Sites' experience shows that protection laws, however powerful they are (and the legal arsenal regarding these sites is very powerful in France), are essential but not enough to protect this emblematic heritage. It's not a case of "tourism versus protection" or "visitors versus locals". On the contrary, the healthy management of heritage tourism is central for the Grands Sites' protection. We cannot protect these sites if we are not acting according to principles of integrated sustainable development and we cannot offer a "real" experience to tourists if we cut them from local populations and vice-versa. The appreciation of the other comes with knowledge.

Local authorities have wide-ranging powers and have responsibility for policy coordination across their territory (town planning, economic development, environmental policy, local transport, etc.), which allows them to have a global vision and to act globally on both the site AND its environment, and not only on the protected zone. This broad vision allows the managing bodies to act towards local economic development via heritage sites.

It is important to state that tourism may play an important role in local economic development but it cannot be the unique way to take. It is the managing bodies that draw up the strategy of presentation and transmission, including congestion management, and the site management plan, while respecting rules of protection and in close cooperation with the culture and environment state bodies at the national or regional levels and local inhabitants and workers. Local authorities are also in charge of day-to-day running of the Grands Sites and the reception of visitors: Information, guidance, services, facilities, ticketing, designing maps and interpretation tools, programming cultural events, public relations and site promotion, carrying out necessary work, and so on.

4. Three examples of local development

The three examples are: Grand Site du Marais poitevin (Poitevin marsh in Western France), Grand Site du Puy Mary – Volcan du Cantal (biggest extinct volcano in Europe) and Grand Site Sainte-Victoire.

Grand Site du Marais poitevin is a cultural landscape of canals, fields, pastures and villages in Western France. It used to suffer from short-term tourism (1.5 days in average) concentrated in the heart of the area. The only attraction used to be visits of the canals in small boats. Agriculture was being abandoned since extensive agriculture – the only possible in the area, was not profitable any more. This meant that the landscape started to close itself and the visitor could not live the experience he came for, this feeling being emphasized by the over-concentration of tourists. The managing authority did an important work with local populations and local economic actors (mostly farmers and boatmen). The marsh landscape got back and is keeping its beauty via the renewal of traditional agricultural practices. The boatmen follow a quality chart, which guarantees a quality experience for the visitor. This work on quality and on diversification of tourism (400km of cycling paths were built for example) paid off. In 2011, the average length of stay was of 7 days – visitors stay longer, spend more money in the region and the tourism flow is dispatched in the entire site. Both the tourist's experience and local economy have improved. For its exemplary sustainable management, the site got the "Grand Site de France" label in 2010. That same year, the site got the "European Destination of Excellence" award for sustainable tourism development.

Fig. 9,10: Cows boarding a boat at the heart of the Grand Site du Marais poitevin ©Réseau des Grands Sites de France, 2008 and the cultural landscape of the Grand Site du Marais poitevin ©Réseau des Grands Sites de France, 2006

Grand Site du Puy Mary – Volcan du Cantal is part of the largest extinct volcano in Europe. It is a very big site (approx. 36000ha with 10000ha strictly protected). Its location in a very rural and remote area played an important part in the economic decline of the region in the second half of 20th Century. By the 1990s, population density dropped to 4 inhabitants per km2 and there were very few young people left in the villages around Puy Mary. For almost fifteen years now, Grand Site's du Puy Mary managing body has been working with local mayors and local populations to create a new project for the region. Nowadays, local actors and populations are strongly engaged in the project. Several new small scale tourism amenities opened around Puy Mary in the last few years – mostly restaurants and accommodations. By playing the card of authenticity and cosiness, use of local products and a "back to basics" approach, they managed to attract large numbers of visitors throughout the year. Visitors sensitive to authenticity are mostly sensitive to the environmental and landscape values of the site, which is a real plus. The managing body accompanies the local businesses in their implementation and boosts the project with interpretation centres that are for visitors and locals alike. Local economy got a new start.

Fig. 11,12: Making the children understand the Grand Site du Puy Mary – Volcan du Cantal and its integrated management via a game workshop ©Réseau des Grands Sites de France, 2010 and the landscape of the Grand Site du Puy Mary – Volcan du Cantal ©Réseau des Grands Sites de France, 2007

Grand Site Sainte-Victoire, a site located in the direct vicinity of Aix-en-Provence, is best known for the numerous paintings Paul Cézanne did of it. But it is also a site with rich biodiversity (Natura 2000) and an inhabited territory with a common goal – to preserve, manage and promote the site in a framework of sustainable development. Local populations take part in the project. The managing body recently commanded a study of the site's impact on local economy. Since there is no entrance fee, all benefits are indirect. The attraction of Sainte-Victoire brings tourists to the region (not only to the site itself). 60 million euros are spent annually be the visitors. They also generate 700 jobs and 9 million on local taxes. Sainte-Victoire's name also generates impacts in terms of brand value and in terms of real estate value. Even thought the impact of a heritage site on local economy is very difficult to measure, it is always positive, there can be no doubt.

Fig. 13,14: Hiking at the Grand Site Sainte-Victoire ©Philippe Maigne, Grand Site Sainte-Victoire, 2006 and Local products in the "Maison du Grand Site Sainte-Victoire" (interpretation centre and boutique) ©Réseau des Grands Sites de France, 2010

It should be underlined that a heritage site's public management structure is usually financed by the profit from related services and merchandise (for example parking, guides, souvenirs sales, etc.), as well as from public funds. Few are the sites with admission fees to the site. The site has a duty to function efficiently as a public service, but it is has no obligation to be profitable. Even though it is sometimes difficult to understand, heritage sites' impacts on local economy are important but indirect and will be attained only through management in a framework of sustainable development and if a site is well managed, all funds being invested in it contribute to the economic development of the area.

5. Conclusions

Based on our experience, management of heritage sites needs to be regulated by a local body representing public interest, in co-operation with state administration, local populations and scientists.

The challenge is to combine good public policies with private involvement with an important share of local involvement and investment, on the ground of shared values. Heritage site's managers and states shall always bear in mind that integrated management is the best optins for the sites and the surrounding regions and that preservation, management and tourism promotion should be in balance and that there is a need to work towards a harmony between visitors and 'locals'.

It is necessary to bear in mind that heritage sites are not attraction parks hence short term economic profitability should never be a site manager's first aim. Heritage sites are also to be taken and treated as a whole with territories/regions that surround them and tourism is not the only means for local development.

For more information, do not hesitate to visit our website www.grandsitedefrance.com.

6. A new project since 2010

Since 2010, the Grand Site de France Network has been opening to international perspective. The International Francophone Centre for exchange and training of heritage site managers was created in 2010 in the framework of a wider partnership: In 2010, the Monitoring Committee comprised the World Heritage Centre of UNESCO, the Association of French World Heritage Properties, 3 French Ministries (Foreign Affairs, Culture and Environment), the Regional Council of Burgundy, the University of Burgundy, the Ecole Arts et Métiers ParisTech of Cluny, the Centre des Monuments nationaux and the European Centre of Archaeology in Bibracte, France. In 2011 ICOMOS France joined this committee and Convention France-UNESCO did so in 2012.

It is intended for French-speaking site managers worldwide, whether they come from French-speaking countries or not, who wish to manage their sites in a sustainable manner, confront their views and share their practices with peers who face similar issues.

Three major themes are in the competences of the Centre: 1) international network and information resources platform, 2) place for training and 3) twinning creation. The first intensive training took place in December 2011 under the auspices of the French National Commission for UNESCO.

For more information: http://www.polepatrimoine.org.

Fig. 15,16: Intensive training session for francophone managers of heritage sites, - Group at the Cluny Abbey 2011 and During a visit to the Grand Site de Bibracte – Mont Beuvray ©Réseau des Grands Sites de France, 2011

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On the Soundscape of Folk Festivals as Intangible Cultural heritage

Luigi MAFFEI[1], Maria DI GABRIELE[1], Saverio CARILLO[1]
[1] ARV_Architettura Luigi Vanvitelli, Second University of Naples, Aversa, Italy

Abstract (Arial – 11 pt – grassetto – allineato a sinistra)
With the international convention for the *Safeguarding of the Intangible Cultural Heritage*, UNESCO recognizes "Intangible" as "cultural heritage". The main criteria for inscription of intangible on the UNESCO *Representative List* is their representativeness of human diversity and creativity. Moreover, the convention establishes the safeguard of intangible *in situ*. The soundscape of town folk festivals can also be considered as intangible cultural heritage, as it is unique or possesses qualities which make it specially recognizable by the people and makes these events tourist attractive. Currently, the Italian "Rete delle grandi macchine a spalla" is candidate for the inclusion in the List. So far, the nomination and selection of an intangible property in the UNESCO List do not require any acoustic criteria and the "sound" is not considered as an intrinsic value of cultural heritage that contributes to perceptual experience of the event. In order to characterize the sound environment of some town folk festivals marked by the music rhythm, video and binaural audio recordings were carried out. Rhythms and frequencies of sound events have been analyzed and correlated with other rhythmic elements as part of its overall perception. Binaural audio recordings taken during different folk festivals have been then compared to determine their sound characteristics and to establish the recognition by the community.

Parole chiave: soundscape, intangibile heritage, multisensory perception

1. Soundscape as Intangible Cultural heritage

The close correlation between tangible and intangible cultural heritage was already recognized in 2003 by the General Conference of UNESCO. The *Convention for the Safeguarding of Intangible Cultural Heritage* [1] infact consider these properties as part of the cultural heritage, just as for the tangible goods.

The above Convention extended the concept of cultural heritage, already established in 1972 by previous agreement about the *Protection of the World Cultural and Natural Heritage* [2], meaning by *intangible cultural heritage*: "practices, representations, expressions, knowledge, skills – as well as the instruments, objects, artefacts and cultural spaces associated therewith – that communities, groups and, in some cases, individuals recognize as part of their cultural heritage".

All these are forms of culture that communities have always practiced and that without a written codification have been transmitted orally from generation to generation.

The recognition of intangible as world heritage involves the recovery of all manifestations of culture defined by Alberto M. Cirese *volatile* [3]. Constantly re-proposed by the communities these give them a sense of identity and continuity and promote respect for human creativity and cultural diversity in an historical period in which the process of globalization on one side encourages cultural exchange and dialogue among the people, and on the other side cause the loss of historical memory and cultural identity.

Local communities play an important role in the protection, promotion and revitalization of folklore in all its manifestations.

In the last years an increase of nomination by States members of the *Committee for the Safeguarding of the Intangible Cultural Heritage* for inclusion of intangible properties in the *Representative List of the Intangible Cultural Heritage of Humanity* has been registered. This inclusion should be supported, among other, by a management plan programming all interventions to be implemented for the safeguarding of the heritage.

Italy, despite being one of the richest countries of folklore, rituals, traditions and folk festivals in the world, only in 2007 ratified the Convention [1] and in 2008 applied for the intangibles in the UNESCO Representative List.

So far only the Sardinian "Canto a tenore" and the Sicilian "Opera dei pupi" were included in the list, although were already declared *Masterpieces of Intangible Heritage* [4] before the entry into force of the Convention.

At the present time the "Rete delle grandi macchine da festa" [5] (Gigli di Nola, Macchina di Santa Rosa di Viterbo, Caldelieri di Sassari, Varia di Palmi), designed and coordinated by dr. Patrizia Nardi from University of Messina, is candidate for inclusion in the UNESCO Representative List of the Intangible.

They are folk festival of ancient tradition having in common the use of scenic and gigantic festival machines carried on men' shoulders according to a specific practice.

So far the management plans of tangible cultural properties (such as historic city centers) or intangible ones (such as popular festivals), do not take into account the protection and valorization of the soundscape as an intangible property of the site or of the event since unique, recognizable and attractive feature.

Furthermore, so far the nomination and selection of a site or of an event for the inclusion in the World Heritage List do not require any kind of sound criteria and no international official document drawn up by UNESCO or ICOMOS pays proper attention to the "sound" as an intrinsic value of cultural heritage that contributes to its perceptual experience.

Moreover UNESCO establishes the safeguard of intangible *in situ*. The concept of "cultural space" was already established in 2001 with the *Proclamation of Masterpieces of Oral and Intangible Heritage of Humanity* [4] as "an anthropological concept that refers to a place or a series of places at which a form of traditional or popular cultural expression occurs on a regular basis". These places, will continue to be alive thanks to the presence of community that hand down locally forms of folklore.

"A real environment, such as an urban street […] is sonically far more complex than a single wall […]. The composite of numerous surfaces, objects and geometries in a complicated environment creates an aural architecture" , namely "the unifying concept of the aural influence of space on the social, behavioral and musical activities of the inhabitant" [6].

The literature on the soundscape has also clearly shown that the judgment of the pleasantness of a sound depends not only on low noise levels, but it is influenced by other aspects of subjective perception. Its acceptability also depends on expectations and involvement of people in the event [7-8].

In the last decade many studies have been carried out on soundscape of tangible properties, such as historical city centers [7] or archeological areas [8]; the results are regularly reported in the literature [9].

Up to now no specific research has been conducted on the soundscape of folk festivals, although these involve a strong participation of the population. Moreover researches on the topic of "folk festivals" are in progress and approached in a multidisciplinary way.

In the present work a first part of a more complex research aimed at the characterization of the soundscape of some events of the folk tradition, marked by the rhythm of music and song, is presented. As case study the unique "ballata" of Gigli di Nola along the traditional path in the historical city centre was selected. Infact, a historical analysis has enabled the identification of some invariants of Gigli of Nola Festival, strongly marked by the key role played by the music, which disciplines the movements and performances of the machines along the whole path.

In summary, according to the authors, the soundscape of a place or of an event is recognized as an intangible property, if three important features coexist:
- Historical tradition
- Key role of the music
- Population involvement.

2. Case study: Gigli di Nola
2.1 Historical tradition
Every year, on the first sunday following Saint Paolino celebration, the Festa dei Gigli is celebrated in Nola. For the locals, this celebration has a deep religious meaning, as it is directly linked to Saint Paolino and to the Saint's devotion.

According to the tales [9] told by travelers who visited the Festival, we can observe how the obelisks have changed during the years, the birth of more and more new equipments and outfits and how the whole atmosphere has changed during the years along with them.

Although earlier stories provide important information on evolution of the shape and the frame from basic "cereos" [10] to more sophisticated "Mai, o Gigli" [11], from the tales dating to the nineteenth century though, we can get more details about the celebration itself. The highly educated Gabriele Quattromani, in 1838, told about "certe macchine che hanno la forma d'un campanile, e molti campanili sono minori di questi portatili che si chiamano gigli […]. Ciascuna di queste macchine ha su di sé i suonatori ed è illuminata di modo che la gente passa la sera tra la fiera e 'l vederle, e sentirne la musica [12] (trad: bell shaped obelisks, whereas the very local bells were even smaller than the obelisks themselves. On each obelisk there were even musicians and the light illuminating the obelisks allowed visitors to properly see them and to enjoy the music).

In 1853 the German Gregorovius got to Nola and was drawn from a whole crowd moving and swarming towards the city; "fu colpito da uno spettacolo mai visto prima di allora. Da una strada laterale a suon di musica venne fuori, oscillando, un singolare mostro […] un'altissima torre che, agitava di qua e di là sulle spalle di circa trenta portatori […] nel piano più basso sedevano ragazze incoronate di fiori, al centro un coro di musicanti con trombe, timpani, triangoli e cornette eseguivano una musica assordante [13] (trad.: He was highly impressed and mesmerized by a show he had never experienced before. From a lateral road he saw a creepy monster staggering out according to a rhythm , a huge tower which would swing hither and thither from about 30 men's shoulders. On the lowest story beautiful flower-crowned women were sitting, in the middle a choir of noisy and rowdy musicians play trumpets, drums, triangles and cornets).

The towers, coming to the cathedral from different sides, could be see over the local houses' roofs though and hear through the "musica rimbombante". (trad.: noisy rumbling music). "Appena un obelisco era giunto al duomo cominciava uno spettacolo singolarissimo: la gigantesca torre si metteva a ballare al ritmo della musica rimbombante. Davanti ai portatori camminava un uomo con un bastone e mentre egli indicava il tempo, quelle torri si muovevano secondo il ritmo, di qua e di là" (trad.: As soon as an obelisk was taken to the cathedral, a very strange show would take off: the huge tower would even start dancing according to the noisy rumbling music; the towers were swung hither and thither by several men, according to the indications by a man who stood at the very front, waving a stick).

All these descriptions can provide us elements which have not changed during the centuries: the Giglios' parade, the "paranza" (the outfit of men which got and brought the obelisk on their shoulders), the "maestro di festa" (which would be the celebration's master), the "capo paranza" (who would order the rhythm to both the musicians and the "paranza"), and of course, the music itself.

Music is definitely the crucial element of the fest: it not only entertains, but also brings all the movements about, as well as the original and fascinating obelisks' shows.

According to an iconographic and bibliographic analysis we can date back to the very origin and the evolution of this element, that is music and its whole arrangement. In 1700 and up to the first middle of 1900 the obelisks' shows were accompanied by fanfares, which were put on the obelisk itself, usually on the first story, as testimonied by a 1700 carving, reported on [9] (Fig. 1 a). The carving shows musicians holding breath-instruments (recorde, flute, horns) standing at the front of the obelisk, as well as other musicians holding percussion instruments (cymbal) on each side of the obelisk.

Other pictures from 1900 though, show the presence of the singers (usually two on each Giglio) on the Gigli, plus more new instruments. Moreover, on the obelisks new special device to amplify and increase the music can be made out. Other images from the fifties show the "capo paranza" giving orders to the musicians through microphones, which sometimes were even installed in front of the middle wooden bar, as well as loudspeakers fixed along the first part of the obelisks (the first portion of six, located immediately above the base). Their collocation and their bents upon different heights is not casual: they are in fact meant to guarantee the creation of a rumbling climate which is to cover the whole city and to convey the blaring music on the carriers who are galvanized, inspired and urged by it (Figg. 1 b – c – d).

At least up to the seventies both the breath and percussions instruments represented a form of respect of the tradition, notwithstanding the introduction of other items along the time, like saxophone, clarinet and accordion.

In the nineties even electric instruments, such as guitars and keyboards take place on obelisks, sometimes substituting the most traditional instruments (Figg. 1 e - f).

If on one hand these musical instruments and technology products can be elements of discontinuity with the tradition, on the other hand they did not make any fundamental change to the overall atmosphere of the festival, which continues to be characterized by loud music and cheering and joyful people.

Fig. 1: Pictures from different historical periods, showing the evolution of the music and its arrangiament: a) carving from 1700 (from [9]); b) 1950 (from [14]); c) 1960-1970 (from [15]); d) 1968 (from[15]); e) 1980 (from [15]); f) 2011.

2.2 The role of the music

Musicians and singers, at least from the mid sixteenth century are located on the Giglio. This feature of this festival is not found in other folk events in which giant obelisks are carried upon the men shoulders according to different rules and the music is placed in front of or under the obelisk. This disposition highlights even more the great harmony that between the "paranza", "capoparanza" and musicians have to be established. "Paranza" and musicians taking orders from the "capoparanza" send each other the rhythmic through the structure.

In regards to the music of Gigli, every year the "maestro di festa" chooses the best lyricist and music master to compose the musical repertoire that make distinctive his Giglio.

In last decades, in addition to new music repertoire, some commercial songs are arranged to give rhythm to the "girata" or "mezzo passo" and "marcia".

The most important song is written for the "aizata", an exhibition that is to raise the Giglio with a single movement performed synchronously by all carriers under the command of "capoparanza". Actually this movement is made several times during the festivals, or to restart after having stopped and "posato" the Giglio to allow the carriers to rest and/or to prepare them for some spectacular exhibition, or to enable the "capo paranza" to order some particular movement aimed at correcting the position of the Giglio when its stability is compromised.

Some traditional movements of the Giglio, in fact, require a special musical accompaniment that follows its own time and rhythm. In general the music played on the Gigli for accompanying their performances are in 2/4 and 6/8. Actually, sometimes music following other rhythms, such as 5/4 or 3/4, is also played but only when the Giglio is still.

The 2/4 rhythm is used for performing the traditional movements called "aizata" and "girata" but also for the "spallatta". These performances are carried out by Gigli on the place, without moving forward.

When performing the "aizata" and "girata", the Gigli follow a music in 2/4 rhythm, but it is played more quickly in the first case and more slowly in the second one. The "aizata", infact, for the above outlined reasons requires a strong beat, well marked and recognized by all the carriers which have to run synchronously the single movement.

The "girata" is a special exhibition in which the "paranza" shows its great ability, by rotating the Giglio of 360° on itself several times in an open areas or in other very characteristic and unique places of historic centre of Nola, sometimes very narrow, making the whole performance without touching the walls with bars.

The "spalletta" is a lateral movement of the Giglio performed to improve its position, for example to place it in the center of the road and make also easy the path to the carriers on the sides.

In fact, the song of the "aizata" is composed of about 4-5 parts (each part comprises verse and chorus) and all the carriers already know that traditionally after the second part the "capoparanza" commands the "aizata".

A music in 6/8 time is played to perform exibitions called "mezzo passo" and "marcetta". These performances are showed while the Giglio is moving forward.

In particular:
-   "mezzo passo", the Giglio moves forward while performing small rotations on the right and left sides. Together with the "girata" is one of the hardest performances.
-   "marcia/marcetta", the Giglio moves forward performing jumps.

Another traditional movement is the "posata": at first the capo paranza stops the music and every Giglio's movement and later he commands the band to perform "2 attenti" corresponding to a double sound of sax. After some second of suspance he orders the carriers "cuonce cuonce e 'jettele" and they all, with a single synchronous movement, put down the Giglio in a way that its weight is evenly discharged on the four cantons (Fig. 2).

Fig. 2: "Paranza" in action during the performances of a Giglio.

2.3 People involvement
Audio binaural and video recordings were carried out during the Festa del Giglio by an operator following the Giglio's parade along the whole path in the historic centre of Nola (Fig. 3 a).

Fig. 3: a) Planimetric excerpt of the Nola city center showing in red dashed line the path of the Gigli's "ballata"; b-c) people involvement in the Festival.

Binaural recordings were aimed to characterize the soundscape during the spectacular event and to identify sounds mainly heard by participants to the event. The audio binaural recordings, were taken with microphones placed on an headset put on the experimenter's head and connected to a two-channels sound analysis system. These audio recordings were taken in positions very close to the obelisks but also in other positions from which the obelisk could not be seen. The sound pressure levels measured in the proximity of the Giglio can reach values L_{Aeq} = 104,1 dB(A), while in more distant position L_{Aeq} = 79,9 dB(A), as shown in Fig. 4 a) and b) respectively.
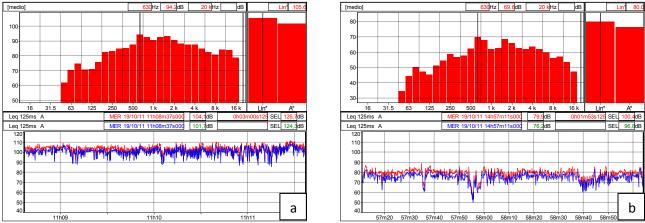
Fig. 4: a) Time history and 1/3 octave band spectrum of the binaural audio recordings carried out a) in a position very close to the Giglio; b) in a position in which the obelisk could not be seen.

Considering the presence of nine obelisks in parade along the same path, each one with its music and its crowd of rejoicing supporters, is almost impossible to find locations not influenced by the sounds of the festival. The main sound sources are not only the music located on the Giglio, but also the loud voices and shouts of the cheering people from the street and from balconies and windows of the buildings bordering the path (Fig. 3 b – c).. Furthermore, the spatial conformation of the Nola historic center, and in particular the area where the Gigli's "ballata" takes place, is largely made up of narrow streets and small open spaces creating a series of sound reflections. This leads to a strengthening of the sounds and also a condition that the sounds can be heard even without seeing the source. This justify also the high sound levels acquired in position far from the obelisk.

However, despite the high noise levels recorded during the festival, the involvement of the population is still so high as in the past. In fact, people are not annoyed by the deafening atmosphere perfectly as they are in tune with the music and the event.

3. Conclusions

Since 2003 UNESCO has established the safeguarding of intangible cultural heritage just as for the tangible one. They are the manifestations that constantly re-proposed by communities promote respect for human creativity and cultural diversity. UNESCO establishes also the safeguard of intangible *in situ*, introducing the concept of cultural space as place where continuously forms of intangible culture take place.

So far the soundscape of tangible and intangible heritage is not taken into account as intangible property contributing to their perceptual experience as so to protect and enhance.

Local communities play an important role in the protection, promotion and revitalization of the folklore and of its manifestations.

The soundscape of a place or of an event has to be recognized as an intangible property, if three important features coexist: i) Historical tradition; ii) Key role of the music; iii) Population involvement.

It was demonstrated that the Gigli di Nola Festival fulfills the above features.

An analysis of historical tradition has enabled infact the identification of some invariant elements of the traditional "ballata" of the Gigli di Nola. Audio and video recordings taken during the event permitted to characterize not only the soundscape but also identify the sound sources contributing to the overall atmosphere of the event.

Acquired data show that even if sound levels are very high in different positions, people are not annoyed and enjoy the festival.

Therefore, the authors believe that the Gigli di Nola Festival can be inserted in the *Representative List of the Intangible Cultural Heritage of Humanity.*

Further developments of the research will consist in i) interviews in situ in various subjects involved ("cullatori" namely men carrying the Giglio on their shoulder, citizens and tourists) in order to obtain information on the subjective perception of the event and ii) laboratory tests aimed to understand if the soundscape of a folkloristic event can contribute to its recognition by the community.

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Ahmet Vefik Alp
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TMMOB, AIA, IAA
Regional President of the International Academy of Architecture
Former Chief Advisor of the Prime Minister
Former Southern Europe Director of the American Institute of Architects

Assisting Team
Istanbul Technical University
Faculty of Naval Architecture and Ocean Engineering
Prof. Dr. Yucel Odabasi (team leader), Prof. Dr. Serdar Beji, Assoc. Prof. Dr. Kadir Sarioz, Assoc. Prof. Dr. Muhittin Soylemez, Assoc. Prof. Dr. Ahmet Ergin, Asst. Prof. Dr. Yalcin Ünsan, Asst. Prof. Dr. Ertekin Bayraktarkatal, Dr. Mustafa İnsel, Dr. Emin Korkut, Dr. Oguz Yılmaz,
Dr. Serhan Gokcay, Res. Asst. Ebru Narlı

The experimental tests have been performed at İstanbul Technical University, Faculty of Naval Architecture andOcean Eng., Ata Nutku Model Test Pool

1.

Istanbul, a great City enhanced by historical treasures and natural gifts, a settlement of 3.000.000 people few years ago has lately been drawn under the unplanned influx of 10.000.000 more settlers immigrating from rural areas. Today, %70 of the City's building stock, mostly in the form of squatter housing, is without buiding and/or occupancy permits. Problems such as air, noise, light pollution, security weaknesses, ethnic crashes, loss of historical, cultural and natural entities, and a congested traffic are commun in Istanbul.

The dense circulation today has become the nightmare of the people and the City's economics. Each day about 700 cars obtain new license plate and join the traffic. It takes around 3 hours to travel from one to the other side of the City. The congested circulation constitutes potential treath in case of a serious earthquake.

In order to cope with the traffic problem, in 1973 the Government built a suspension bridge over the Bosphorus, the Straits bordering Europe and Asia. Yet, soon after the Bridge and its highways have become congested. The 2nd Bridge, intended to establish a speedway for transit and peripheric traffic was erected further North in 1988 and has been connected at both ends to TEM (Trans European Motorway). It has become congested, too in a short time. On the other hand, the construction of the 2nd Bridge and TEM have accelerated the northwardsly rapid, yet unplanned, urban growth transforming 250.000.000 m2 of green areas into ugly, mostly illegal concrete structures.

Today, confused with the traffic problems, the Government proposes a 3rd Bridge over Bosphorus even further the North towards the Black Sea. Yet, since northern lands of the Bosphorus house the last green zones and water sources of the City, we believe building a third belt on the North will repeat the same cycle experienced with the 2nd Bridge and eventually turn the City towards the desertification trend, endangering the remaining 500.000.000 m2 forrest zones of the Metropole.
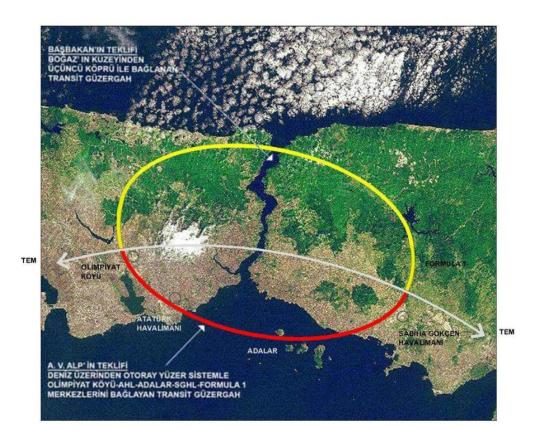
TRANSMAR has born from this point. Since the north of Bosphorus is not suitable for a new highway system due to natural entities, and since south of Bosphorus is also not suitable for a new bridge due to its dense urbanization and historical, cultural and natural treasures, the only reasonable solution was to go more south on the Sea of Marmara and built a bypass floating rail-road viaduct linking Europe to Asia across the water. TRANSMAR begins on the European side from the Olimpic Village, intersects the TEM, passes by the Ecological Village Project by Architect Dr. Ken Yeang, goes under the Ataturk International Airport, leaves the European shore as a 9 km viaduct on pilotis at 25 m above sea level ,continues as a6 km floating viaduct. The 2 km double span cable-stayed fixed bridge at 65 m altitude allows large sea traffic. It is followed by a 14 km segment as a floating viaduct. The system sits on land on the Kinali Island which serves as a service and emergency center. The system leaves Kinali again with a 14 km floating viaduct segment and approaches the Asian shore with a 6 km viaduct on pilotis. It enters the Asian cost near the urban project by Architect Zaha Hadid in Kartal, reaches the International Sabiha Gokcen Airport, reintersects with the TEM, and finally terminates at Istanbul Formula-1 Park.

It is expected that daily 100.000 vehicles will use TRANSMAR at a max speed of 100 km/h. The rail shuttle within the structure runs at 200 km/h and links the two Airports of the City in 15 mnts. The Project's cost is estimated about 4 Blln USD and the payback period 12 years.

Advantages of TRANSMAR compared with the Government-proposed 3.rd Suspension Bridge accross North Bosphorus

. It takes the transit, heavy weight and peripheric traffic out of the City
. It does not destroy the northern water sources and forrest zones of the City
. It does not harm Bosphorus' unpredecented historical and natural entity
. It helps and supplemets the intercity urban circulation network
. It does not allow for urban land speculation
. It does not permit illegal construction and squatter housing
. It does not need land privatisation
. It does not cause noise and air pollution fort he City
. It directly links the two major airports of the City in 15 minutes
. It may be erected fast and economically
. It helps the traffic of the Olympic Stadium and The Formula-1 Park
. It allows emergency evacuation fron Prince Islands in case of natural disaster
. It is not affected by seismic activity
. It enhances the underwater life of the Sea of Marmara

Similar long sea passages are numerous in the World. Floating systems, making use of the off-shore petroleum platform technology, appear to get momentum. They are not under seismic risk, they are much more economic than conventional systems in deep waters, they are fast to build and, finally, they make use of the sea instaed of the congested urban land.
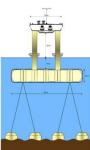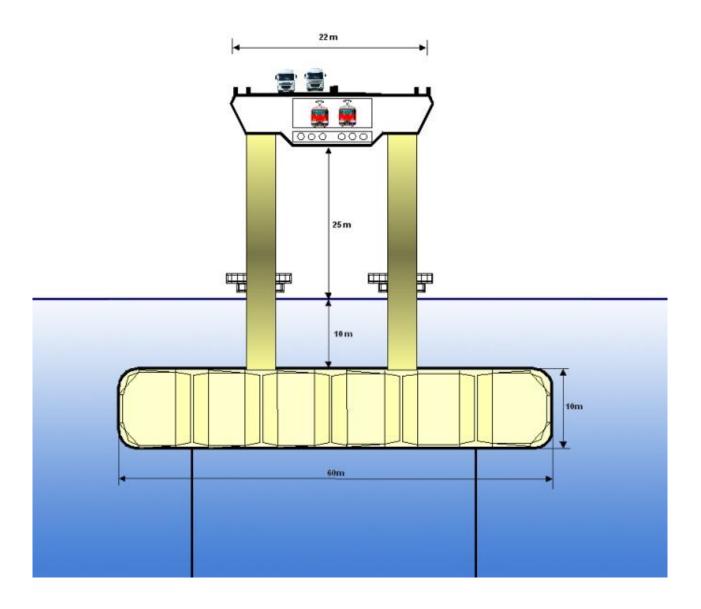
PROF. DR. AHMET VEFİK ALP
MİMAR / KENTBİLİMCİ

PENDİK - YEŞİLKÖY OTORAY YÜZER-VİYADÜK (TRANSMAR)

TRANSMAR

PENDİK - YEŞİLKÖY
OTORAY
YÜZER - VİYADÜK

PROF. DR. AHMET VEFİK ALP
MİMAR / KENTBİLİMCİ
2008

TRANSMAR
PENDİK - YEŞİLKÖY OTORAY YÜZER - VİYADÜK
PROF. DR. AHMET VEFİK ALP
MİMAR / KENTBİLİMCİ

İ.T.Ü. GEMİ İNŞAATI VE DENİZ BİLİMLERİ FAKÜLTESİ TEST HAVUZU

RECYCLING URBAN SPACES. AN ALTERNATIVE ACTION RESEARCH ON SUSTAINABILITY AND CREATIVITY IN IVRY-SUR SEINE

Silvana SEGAPELI,
GERPHAU Laboratoire Philosophie Architecture Urbain, Paris. Ecole Nationale Supérieure d'Architecture de Saint-Etienne, France
e-mail: silvana.segapeli@st-etienne.archi.fr

This study has the objectif to compare the mediterranean project of Officiamuseum in Pompeii with a french project located in Paris outskirts, Ivry-sur-Seine. Ivry-sur-Seine City Council has commissioned internationally renowned French artist Stefan Shankland to engage Ivry-sur-Seine communities through an artist's process and to foster a continuity of practices/projects in a large building site area (ZAC du Plateau).
TRANS305 is the name of the program created by Shankland to perform the changements of this area and it is also a platform of experimentation, action and research in the framework of urban transformations and cultural and political-social practices.
This collaborative initiative is based on an urban recycling operation in order to promote a new idea of relationship between culture, contemporary art, eco-production and territory. A pavilion is open to different activities (from artistic production to exhibition), acting as a temporary demountable urban structure, a shelter, a landmark and new urban medium. This last task appears essential in the transformation process to be undertaken in the Paris' banlieue.
To create still unfathomed links, activate unknown aggregations and find devices that may translate emotions and *desired* collectives into forms, in other words means structuring the territory with modifiable models, following the Italian architect and critic Andrea Branzi's principles of weak urbanization, identifying what Edward Lorenz (American mathematician and pioneer of chaos theory) would have called "attractors", towards which dynamic systems evolve in a determined temporal arc.

Keywords: Urban Interventions, Artistic Process, Recycling Systems, Transformations, Temporary

The TRANS305 project has come about following a series of important transformations along the frayed fabric of a major arterial road, the former "Route Nationale 305", connecting Ivry-sur-Seine, a municipality in the first ring of Parisian *banlieues*, to the capital. The city of Ivry is located right on the hinge between the south-east edge of Paris, a sector subjected to a series of interventions of profound urban transformation for at least twenty years or so, and a territory that falls within a boundary that has been the object of the highest attention at a national and international level. Indeed, this is one of the segments of the Grand Pari(s) program of renewal and rehabilitation of the urban belt and neighbouring zones.
The Atelier 305 project represents a specific phase of the TRANS305 program, an intervention procedure that envisages an interchange between artistic practices in an urban context and territorial policies.
It is a pilot operation of cooperation between art, architecture and urban planning, promoted by the municipality of Ivry and managed by an artist, Stefan Shankland.
Beginning from the 2006, the artist has been engaged in an artistic support process of an immense territory undergoing change, following the principles of the lead artist.
The zone in which his activities are being undertaken is called "ZAC du Plateau"; this represents one of the great lines of transformation of the Parisian periurban territory: a vast area of comprehensive planning that foresees a series of demolition and construction sites that will take place over an arc of more than ten years.

Atelier 305 is an ephemeral construction created within the construction site for an office building destined for the Ministry of Public Finance of Paris. The construction firm, together with the urban planning office of the municipality of Ivry, has agreed that part of the site should be allocated to an artist. However, the firm is furthermore committed to participating in the artistic operation by building the reinforced concrete platform on which a construction that can be dismantled will be installed, Atelier 305, envisaged as a observation point that is accessible to the public, with a view over the building site itself and the changing landscape. The platform is being erected in the area in which, following the project, a public space to be integrated with the offices is planned.

1. AN EPHEMERAL PROJECT FOR A CHANGING TERRITORY

The project is presented in principle as a transitory work operating as a kind of filter between the inaccessible space and time of the construction site and the space and time of the public and the road. Other interesting connotations have come about over time and still constitute the object of study.

Atelier 305 was constructed in June 2010 and from November 2011 the elements making up its structure were taken apart following the planned procedure, moved and re-used for different purposes in another area with a building site within the `ZAC du Plateau' perimeter.

The city that Shankland illustrates in this operation is the icon of a new frame of mind, already in ferment starting with the experiments carried out from the 1950s by Jean Prouvé and Richard Rogers, among others, on the first houses that can be disassembled or by Cedric Price and Yona Friedman on the city linked to movement and events. But today more than ever, through experiences of this kind, it is becoming increasingly apparent that what is needed, much more so than rules, in the contemporary city is the "idea-instrument" (Franco Purini, 2010).

A city made up of fragments to be reassembled, habitable cells to be stacked like boxes in a warehouse; a city with new scenarios and differentiated temporality that continually reinvents itself, changes and has the power to liberate itself from the inherited and reassuring image of a dense nucleus to be preserved and maintained as an immutable order. An elliptical concept of 'permanence' therefore emerges, no longer bound to forms of rootedness, but rather connected to mechanisms of reproducibility and of unperturbed cyclicity.

This experience has highlighted the possibility of a dual life of the building site, at both a city and territorial scale.

Nomadism, reversibility, ecology and recycling are the key concepts that place this intervention within the channel of weak urbanization, a line of thinking that has opened up the way to *temporary use* as the spazialization of the ephemeral. The concept of cyclical use and reuse of spaces implies a transitory quality that is conceptually opposed to the innate stable quality in the programmed use of managerial policies. *Temporary use* aims towards the dissolution of the criteria that support the culture of the master plan, using modest time spans and reduced spaces.

1.1 LIFE-CYCLES AND CYCLES OF USE. FROM THE TERRITORY TO THE OBJECT

The project of the TRANS305 atelier is undertaken by Stefan Shankland in collaboration with the architects RAUMLABORBERLIN in a kind of continuous flow of exchanges of experiences, of cross-referenced workshops between Ivry and Berlin, involving students of several schools.

If the loss and lack of references connoting the landscape of the periphery motivated reflection in the first phase of design and planning, urging the creation of a sculptural element in the landscape in the form of a visual attraction, in the successive stages the problem of making works of art to be inserted in a context leaves room for a more interesting question: in what way and with which instruments to enable a kind of meaning to emerge from the context? It is in this way that the project embraces a broader critical dimension.

Atelier 305 is modular architecture, conceived like *Lego*, according to a line of thought with an ecological basis that pursues sustainable creativity and cleaner production. All the elements to be composed come from a known cycle of use, from demolition yards or public works in the area or neighboring areas. All the elements have therefore been reused or recycled and may still be taken apart and used elsewhere. Containers, pallets, scaffolding and kits of building sites have been mounted during the course of training workshops for a public of apprentice students and trainee architects.

Atelier 305 may be considered an exchange platform at the crossroads of interests of contemporary creation and the territory in transformation.

As a workshop for young creative artists, an itinerant element linked to cultural events, scores of artists have made it a place for encounter, display and exchange. Students of all ages and different geographic, cultural and educational backgrounds have participated, covering different dynamics of appropriation of the territory and the urban space.

This tension between durable and ephemeral, proving to be an integral part of the new ways of city action,

has moreover contributed to raising the issue of the sense of display places, of appointed places, the spaces dedicated to culture and likewise the concept of the place of creation education, culture and exchange.

2. ARTISTIC PRACTICES IN THE PROCESS OF RENEWING THE URBAN PROJECT CONCEPT

The formal disorderliness, the altered temporality and the more rapid cycles of mutations constitute the grounds for research and terrain for a new aesthetics. It is for this reason that the critical and analytical instruments of art are coming closer together and at times intersect with those of architecture, giving rise to a genealogy of phenomena codified by Anthony Vidler (historian and critic of modern and contemporary architecture) as "intermediary art" (A. Vidler, 2009)

If on one hand, architects like Diller & Scofidio, Asymptote (Hani Raschid & Lise Anne Couture), dECOi Architects (Mark Goulthorpe), NOX (Lars Spuybroek), R&Sie (François Roche & Stéphanie Lavaux) and Andrea Branzi, are pursuing a path punctuated by frequent interactions with the world of art, on the other hand, artists like Tadashi Kawamata, Toba Khedoori, Vito Acconci and Thomas Saraceno, claim a sensitivity for the architectonic space and a procedure that attests more to the motifs of tectonics than those largely to single artistic disciplines.

If, as Vidler claims, the disciplinary crossover is undertaken in the two directions and by many with different approaches, it is important to note that the artists' interest in architectural planning and urban spaces takes on an ever greater importance in the context of urban practices, often acquiring a sociological connotation.

For more than a decade now, artistic actions have increasingly focused on peripheral ambients. This incursion of the real into art, without a hint of the transcendental, has led to an ontological change in the concept of the work of art and artistic intervention.

The issue of artistic practices in the urban context falls within a precise strategy, intent on finding alternative, though not substitutive, forms of action on the territory. Forms that are innovative with respect to a culture of the architectonic and urban project grounded in traditional systems of intervention, and finally released from the figure of the architect or the town planning demiurge.

Creative action shifts from the project to the process, from the object to the strategy. A shift that does not imply or mean challenging every material practice, nor a separation from phenomenal reality, but rather a strengthening of the process-like nature of planning: the work is not contextualized, it is the very work that constructs the site, that weaves relationships with the inhabitants by closing the gap separating those that live there from those doing the planning.

This activist *coté* of current artistic and interdisciplinary planning practices developed with the dawning of anti-urban movements, which challenged an era marked by the first urban project experimentations and the last undoings of a disastrous planning at various scales.

Pacifist groups of "urban warfare" and interdisciplinary collectives are today engaged, often through artistic practices, in processes of profound renewal of the concept of intervention or city project, focusing their actions starting from the archipelagos of the peri-urban, floating outside the dense territory of the city or between the more hidden folds of the urban area. They are the areas of greater flexibility, overflow zones one might say with a geographic metaphor, that ensure the possibility of constant evolution and continuous adaptation. Their cartography is patchy. In some ways it responds to the idea of a city that renews itself, that revives its centre chiefly by revitalizing the entire periphery and acting on its landscape. A broad production of interventions, mainly in the peripheral context, is bound to a refusal of rigid programming and constitutes a solid framework of a kind of militant anti-urbanism, an agile and flexible response to the need for a radical approach.
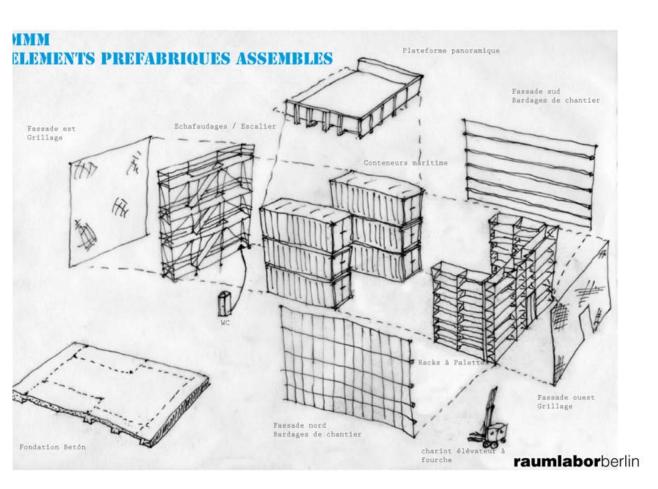
Fig. 1-7: ZAC du Plateau, Ivry-sur-Seine, building site

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FROM URBAN SPRAWL TO ECO-COMPACT CITY: THE URBAN RENAISSANCE

Luigi MOLLO, Rosa AGLIATA
Department of Civil Engineering, Second University of Naples, Aversa, Italy
architettura.tecnica@unina2.it

ABSTRACT

The alienating and uninhabitable suburbia of European and American cities is the manifest utter flop of modernistic architecture and urbanism, who lead to a mortification of principles and a huge waste of resources. This paper aims to show the more actual concept of urban design, based on the traditional urban design. The standards and principles of the new traditional urbanism, called "Urban Renaissance" in Europe and "New Urbanism" in USA, are designed to make areas more livable and people-oriented. These "eco-compact cities" are built and developed in balance with the natural environment and with an optimum ratio between social mingling and sustainable use of buildings, soil and other resources, assuring safety and accessibility to pedestrians, bicycles, cars and public transport. This model is based on the concept of organization in polycentric towns, where population density is such as to guarantee a good life standard, the presence of retail business activities, the creation of an efficient public transit system, the optimization of the use of natural resources, reducing pollution, and the reduction of government and social costs. At the same time, this logic can reinforce the sense of place, of community, of belonging, restoring civic pride.

Key words: eco-compact city, urban architecture, mixed-use

1. Architecture of the history

If it is true what philosopher Emanuele Severino wrote "to decide to escape out off the Western History is like willing to jump over our own shadow" [1] then, it is certain that this rather absurd experiment has been already done by both Modernist architects and their heirs, with all the consequences that are evident to everyone, and that, unfortunately, have not yet finished to produce countless practical, economical , and cultural damages. Therefore, we can agree with Renato Rizzi – the brilliant introducer to the works of Severini – that "contemporary architecture is the most efficient and concrete example of Western nihilism. Besides being its revealed metaphor and its accurate and desperate theatrical representation" [1].
From Licurgus to Stalin, from Plato to Leibniz, passing through all the idealists in more than 25 centuries of urban history, the city has always expressed the up-to-date petrifaction of a precise system of thinking, organic to the urban community, the coherent relationship between ideal and practical needs and its formal representation; at the beginning of the 3rd Millennium there is no doubt that "nihilism" destroyed any logic-demonstrative system. The typical unitary thinking, plenty of remands and consequences, has been completely shattered. The architectural space is everyday getting more hybrid. It often contradicts the fundamental needs of a civil society, while the architect's freedom of expression and conception turn into the abstraction of an endless variety of forms conditioned by the absence of an organic thinking. As a consequence, the adaptability of the system codified by the millennial experience turns into a kind of arbitrary and unlimited pluralism of forms that have anymore nothing to do with the concept of living within communities organized through a common culture. The design autonomy thus leads to a mortification of

principles, the establishment of a new arrogant pattern, a huge waste of resources, and finally to a big disappointment.

The contemporary architectural culture, states Rizzi again, identifies in the theory of ontology "the tyrannical form of both oppression and command, the condition of being forced to live under the weight of a vertical wisdom, which is hierarchical and, therefore, outdated in respect to the horizontal request formulated by the <mobility> of the formal sprawl" [1]. Thus, "the architecture passes from the evolution of forms to the revolution of the shapelessness", the "monotonous inequality" leads to the "loneliness in which the built works are relegated" [1].

In addition, this also destroys the principle according to the aesthetic quality has to be determined not by an individual judgment, by the unlimited invention of forms, but by the presence and relevance of permanent elements. Because they are part of history, incorporated into the local tradition and culture.

In fact, we are all aware of the richness of physical, technical, and operational resources that are at our disposal in the contemporary world - and many individuals would be capable of designing, calculating, and building vertiginous skyscrapers, gigantic concrete shells, innovative metal structures, in every context, for any given circumstance if only they accepted to break with a responsible self-discipline. Yet, we know too how a selfish, unrestricted and hazardous employment of those resources can severely damage the civil society instead of contributing to its development.

Here is the contradiction: while the democratic institutions, the economic systems, the working methods and tools are actually being coordinated and regulated on the basis of successful experiences, the urban space is being disintegrated day after day. Cities are losing their rooted functional and aesthetic features, architecture is evaporating in a unlimited collection of arbitrary and abstract forms produced by lonely inventions, and the human being - the citizen - is being mortified by the absence of any kind of respect towards his/her real practical, ideal, and cultural needs.

And this rather strange phenomenon does happen to please particular unlimited ambitions and specific economic interests, too often with the enthusiastic support of a generation of media always searching for shocking novelties. Sometimes, even with the encouraging attitude by the academic world, that misunderstands the right to research and experimentation (however not "at people's expenses") with the logic of professional education.

Finally, it is rather surprising to notice that those who oppose "globalization", support and push the destruction of any urban structure created to improve the human condition.[2]

2. The Urban Renaissance

"The Urban Renaissance is a term attested since the first Bologna Triennale in 1992 in order to emphasize a project culture based on the traditional principles of the urban spaces and the constructive techniques of the European city.

These years of experiences, observation, studies, books, concur us to assert that we are inside a new age of Urban Renaissance. Sure this "vision" appears clear to people working on it, more uncertain to the common citizens, or the readers of monotone reviews of architecture. Today the city is damaged and, at the same time, a different concept of planning and constructing is asserted. An Urban Renaissance which is introduced in opposition to the sprawl of "modern" periphery left to us in inheritance from the past century.

The images of the Rebirth pass from the extraordinary experience of the reconstruction of Bruxelles capital city of European Union, to the recent experiences of ri-urbanization of the periphery of Paris, of London and Berlin, touching every latitude of the Old Continent: from Saint Pietroburgo to the architectures of the Portugal on the Atlantic sides, to the new cities constructed in Turkey, from Stockholm and Oslo to the Mediterranean architecture of the new villages constructed in the islands of the Aegean. In continuity with the tradition of the occidental city, using local materials, valuing the peculiar aspects of every site, stretching the hand to the styles of the place.

The Urban Renaissance does not want to be a school, a movement or a tendency, but the occasion to regain the heredity of the culture of the European genius.

The aim is not that one to impose a new ideology, but to convince and to demonstrate through projects of evident quality, that an alternative to the functionalist culture exists, as it should be in a tolerant and democratic civilization.

All the modernist planning seemed to forbid, is now used in these pages: the reconstruction, the styles, the buildings aligned on the street-edges, the public realm, that never-ending-variety of complex urban-spaces born from the combination of simple parts typical of "healthy" traditional urban development.

Today the problem of good part of our peripheries and of many modernist buildings is not only on their existing, but rather than various architects and ideologists want to make to believe us that their construction was and is unavoidable, necessary also in the future.

In democracy also the architecture and the urban planning are a whole of choices, without no obligation. Anyone who refuse the existence of choices is undemocratic, totalitarian and, consequently, "not-modern", for how much futuristic and technological his building, his skyscraper, and his mall could seem.

Today a massive return towards solutions of good sense still exists, according to the philosophy of A Vision of Europe network, and with the American current of New Urbanism correspondent, in Europe, to the Council for European Urbanism" [3].

The standards and principles of Urban Renaissance are designed to make areas more livable, more vibrant, and more people-oriented, and to build community pride in the city and the work of its developers [4, 5]].

This is a Copernican revolution: the people, and not the cars, must to be the centre of the urban develop. The towns and the buildings are designed for the people and not as a monument to the "progress" or to the presumption of architect. In substance the principles of Urban Renaissance are resumed in applied of the principles of Traditional European Urbanism that governed the city grow in Europe during the last twenty five century.
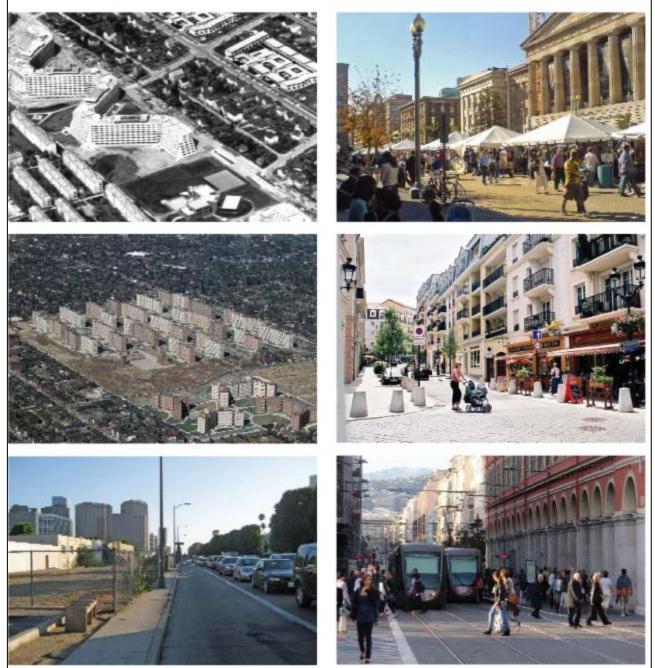
The consolidated urban environment already has its own natural predisposition to suggest and to accept as its own and in its own way the new elements so that every new event is introduced in its vital space, put and interwoven in its body. In this way every deformity, an abuse, an inconsistency introduced in a plan will become – and this is the worst damage – similar to a deformity, which remains and multiplies once it has been introduced in a living body. The enlargement of a town too is already potential in its organic structure and in its natural position. It is up to the architectonic designer to carry it out by means of suitable typologies by including and expanding the existing town so that every quarter meets its function on the whole and creates an order, a breath, a subordinate and harmonic autonomy in its units and links; so that neither the functions overlap without any coordination nor the new quarters rest on the old city centre by thickening, overcrowding and chocking it.

From this point of view, New Urbanism represents a concrete answer. In November 2003, in Stockholm, after a few years of work, during the annual general assembly of the Council for European Urbanism (CEU), researchers, engineers, architects, designers and entrepreneurs signed the Charter for European Urbanism.

The Charter proposes a new traditional way to design livable, sustainable and ecological towns, quarters and villages and a new way to give life back to suburbs. CEU started from the remark that metropolis, towns and countries are continuously menaced by phenomena of social exclusion and isolation, dispersion, waste of natural and cultural resources, mono-functional development, lack of competition and of whatever respect for local cultures; it defined as its priority objectives: the need to promote a urban designing supporting diversity of usages and social mingling; the promotion of an effective and sustainable use of buildings, soil and other resources, assuring safety and accessibility to pedestrians, bicycles, cars and public transport. Towns and quarters must be territorially defined during each step of their development. They must have streets and spaces defined (surrounded) by an architecture complying with local conditions – culture, tradition, climate and landscape – and must have a variety allowing the development of a society, of its activities and of its built shape.

CEU promotes the valorization of the distinctive and typical features characterizing towns, suburbs, villages and countryside in Europe; it encourages keeping and strengthening regional identities and citizens' aspirations; it supports the creation of new towns, quarters, suburbs incorporating, if suitable, these objectives; it stimulates requalification, formal renewal and transformation of outskirts and suburbs on the wane in poly-functional and active areas; it encourages the respect for natural environment and for human habitat; it promotes the protection of natural and building heritage. As towns, suburbs, villages and rural areas are a reflection of the social, political, economic and environmental context in which they have developed, physical requalification is not enough. Every intervention aiming at improving the physical quality of the environment must be considered as part of more complex policies aiming at improving the quality of the European population [6].

This reasoning leads to suppose a model of development based on a logic of sustainable globalization founded in the organization of polycentric towns, of towns organized in urban quarters, districts, suburbs and

BANLIEUE
SLAB - URBIA
SUB - URBIA
LOW DENSITY - LOW/HIGH RISE

LA VILLE EFFICIENTE
THE EFFICIENT CITY
LA CITTA' EFFICENTE
HIGH DENSITY - LOW RISE

villages, of towns where population density is such as to guarantee a good life standard and at the same time to support the presence of retail business activities. As Gabriele Tagliaventi wrote, "*the challenge of architecture is creating the physical conditions for the development of a world in which towns express local*

Via della Pietra
Bologna, Italia

Plan Masse / Masterplan:
Gabriele Tagliaventi
Architecture / Architecture / Architettura:
Tagliaventi & Associati
Infrastructures / Infracstructures / Infrastrutture:
Archingegno Studio

Structures / Structural Engineering / Calcolo strutturale:
Studio Mazzoni

Date / Date / Data:: 2004-2009
Presque acheve / Largely completed / Quasi completato

Site / Site Area / Sup. Terr.: 1,7 ha
Surface construit / Built surface / Superficie costruita:
12.000 m²
Residentiel / Residential / Residenziale: 10000 m²
Commerce, Bureaux / Retail, Office / Commercio, Uffici:
2000 m²

Habitants / Inhabitants / Abitanti: 300

realities, enriching the experience of an age of globalization through the plurality of visual and morphological experiences. This technically means studying urban shapes and local settlement typologies with no prejudice, but being open to the introduction of all those innovations consistent with the base framework and fit for improving it, according to the principles of traditional architecture." [1]

The study of urban typologies represents also a way to analyze the demands not directly expressed by citizens, but "*de facto*" written in the town's stones, which represent the history and the civic conscience of that community. It makes it possible to everybody to take part, even if indirectly, to planning. This way of acting can lead to the definition of projects which cannot be shared by citizens because they are based on its political, economic and social demands, in their turn, grafted on a definition of urban spaces realized on the basis of the typological evolution that the town has undergone in relation to its natural, economic and socio-anthropic environment [7].

Lasne
Walloon Brabant, Belgique

Plan Masse / Masterplan: Maurice Culot, Jean Pierre Majot
Architecture / Architecture / Architettura: Maurice Culot, Jean Pierre Majot

Date / Date / Data: 1995
Construit / Completed / Costruito
Site / Site Area / Sup. Terr.: 12 ha
Surface construit / Built surface / Superficie costruita: 55.000 m²

Habitants / Inhabitants / Abitanti: 1.000

In order to achieve this objective it is necessary to act at the different scales with a direct knowledge of the urban setting of reference in order to determine the unchanging typological elements – typological invariants – giving its character to the city and reinterpret them in building of new interventions (a quarter, a building or even a single building element). In this way the vital transformation of the city is obtained and at the same time the perpetuation of its peculiar, unique and unrepeatable historical connotations. The research for typological invariants has to be performed already in the step of planning devising, since already during this step it is necessary to define the typological features that the building intervention has to adopt at the different scales, from the urban scale to the building detail, in order to be bound with the building tradition of

the area. These objectives can be achieved by drawing up an instrument to manage the intervention, called urban code. This code is based on graphic tables which classify the typological invariants determining and regulating the development of that specific physical context at the different scales. The code works since on one side it is a useful and simple tool to carry out the necessary quality controls on the final product and, on the other, it guarantees the historical continuity of the built-up structure.

Synthetically, the Urban Renaissance promotes building of eco-compact cities. This are cities built and developed in balance with the natural environment; they are a cities with clear boundaries and with an optimum ratio between density and network of open public space defined by urban mixed-use blocks [8, 9].

They are cities made of a federation of organic urban neighborhoods and districts, but they can also be a metropolis (i.e. Paris). The optimum density that characterized the eco-compact city allows the existence of a rich system of small retail, while allowing the creation of an efficient public transit system. The eco-compact city allows its inhabitants to live within a pedestrian friendly environment, that encourages pedestrian movements, the use of public transportation, and disencourages the intensive use of automobiles. The main goal of this urban design concepts is to create a rich-interactive urban environment that optimize the use of natural resources and dramatically reduce the pollution of both the air and the natural landscape.

During the last years, the concepts and ideals of a new traditional way to build towns were spread.

In the figures included in the text, it is possible to see more examples of new towns or interventions of urban Renaissance designed or build in Europe. It is interesting to note that there is not a specific geographic or cultural area of diffusion but all European country are investing by this new wind of change [10, 11].

3. Structural and social benefit of the Urban Renaissance

In consequence of application of these ideals, the cities have a smart grow with the subsequent addition of eco-compact urban neighborhoods that provide the following benefits.

Mainly, they give people without access to a car, such as children, the elderly and the disabled, more safety and independence in their world. In second time, making mixed use neighborhoods, more dignified and rich of historical references, it preserves and promotes community character, increases urban lively and citizen access to culture and, at the same time, it reduces the need to escape to suburbs, therefore reduces the necessity for costly and useless sprawl and mall development. Really these new traditional ideals help restore of historic structures instead of leaving them in favor of parking or large suburban shopping center. Substantially they reduce government and social costs - especially because they reduce the costs for services (public transportation, garbage, welfare services, etc.) and for maintaining of infrastructures and, at the same time, they reinforce sense of place, sense of community, sense of belonging and restore civic pride [12, 13].

In this new urban space also edifices are built for permanence instead of structures designed, as too many contemporary structures are, for a short life. These permanent edifices promote flexibility and integrate income groups by mixing housing types and providing a public realm available to all incomes.

In these new traditional towns, streets are designed to slow traffic because travel choices are increased and the length and number of vehicle trips are reduced. In this way it promotes neighborhood and community self-sufficiency and, therefore, sustainability and reduces per-capita gasoline consumption and air pollution (C.E.U. - Oslo Declaration on Climate Change and Urban Design). Recently a European Union research showed that normally a car trip for 2 or 3 hours for day (from house to work and back again or similarly from house to mall), during the remained 21 hours it is parked on the streets or in the garages. So the urban system based on an irrational use of cars while in the traditional cities , as well as Paris or Rome or Annapolis, there is a balance between the needs of the car and the needs of the pedestrian integrated by public transportation system. The extraordinary key-factor of an eco-compact urban neighborhoods is also its high performance in term of walk ability. It is right the dispersion of small retail through the network of streets and urban blocks that allow citizens to easily shop on foot to the different type of contemporary shopping typologies: department stores, stores, small shops, etc., without using car. And the daily flow of citizens throughout streets and squares offer another dramatic advantage in term of security: the famous "people watching people" effect. The contemporary presences of cars and pedestrians on streets guarantees the presence of small retail. In the same time, the large presence of small retail on streets and squares allows an automatic and high performing type of surveillance for pedestrians. It is the main reason that led many American cities to adopt a special legislation to guarantee small retail on street; the small retail is therefore declared as "public utility", thus qualifying for a special tax exemptions [14, 15].

4. Conclusion

The Urban Renaissance is a term used in order to emphasize a project culture based on the traditional principles of the urban spaces and the constructive techniques of the European city. In fact it represents the most modern concept of urban architecture based on the traditional and historical western ideals of liberty, democracy and participation of the citizens to the development of the city.

At the same time, the development of traditional eco-compact cities allows a pedestrian oriented neighborhood with permanent edifices built with traditional typologies and mixed use; it reduces per-capita gasoline consumption and air pollution, encourages growing of retail in the urban space and, so, puts "eyes on the street" and promotes "citizen surveillance" of public places where citizens watch over their collective security, crime is reduced, as are public law enforcement costs. This is, briefly, the reason to consider the traditional way of making urban architecture as the best answer to build today true sustainable cities.

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THE CASE OF A EVANGELICAL ITINERARY ON TIBERIAS LAKE

Cesare CUNDARI,[1] **Gian Carlo CUNDARI** [2]
[1] Dipartimento di Storia, Disegno e Restauro dell'Architettura, Università di Roma "Sapienza", Italia,
[2] Dipartimento di Ingegneria Civile, Università di Roma *Tor Vergata*, Italia
e-mail: [(1)] cesare.cundari@uniroma1.it, giancarlocundari@libero.it [(2)]

Abstract

In the article we deal with a recent survey mission – in collaboration with the Magdala Project and promoted by the Custody of Holy Land – in the evangelical sites next to the Tiberias Lake in the Holy Land. The activity concerned the survey of the new archaeological site of the city of Magdala and the visit of other places of evangelical interest (Tabgha, Capernaum). The mission involved the integrated use of different survey techniques and suggested how a more systematic cultural approach to knowledge and documentation of the places – of strategic importance in history of mankind and civilization – could certainly promote a further social and economic development.

Keyworlds: survey, documentation, development, economy.

A mission for the survey of the ancient town of Magdala on Lake Tiberias, subject of a stratigraphic excavation project directed by P. Stefano De Luca, took place in recent months; the mission is part of a collaboration agreement signed by prof. Cesare Cundari (one of the authors of this communication) and by P. Stefano De Luca, scientific director of the *Magdala Project* which is held under the auspices of the *Studium Biblicum Franciscanum*, Faculty of Biblical Sciences and Archaeology in Jerusalem. The organizational part of the mission was provided by the ISI Engineering srl of Rome.

The study of the site, as well as for the evangelical events, is also important for understanding the historical stratifications that occurred, contextualized in relation to near Lake Tiberias and settlements that have sprung up along its perimeter (fig. 1: map of the Lake with highlighted Magdala, Tabgha, Capernaum). The ancient city of Magdala was a thriving commercial center also favored by its strategic location in the intersection of major roads of communication, just remember that it was crossed by the "sea route", a road leading up to Egypt along the valley of the Jordan.

The site has been undergoing major stratigraphic excavations between 2007 and 2011; research results have already been published, especially by P. Stefano De Luca himself [1].

The mission, which was attended by many scholars [2], had the purpose to carry out a systematic and widespread campaign of metric detection and photographic documentation in order to return (graphically and infographically) the physical reality of the ancient site and allow for their representation in the main steps of transformation. In carrying out the activities we used a complex of photographic equipment (calibrated or not), a laser scanner Leica C10 (specifically made available by Leica Geosystems), and a total station available in the area for a sample check of a very dense topographical network already made in previous months.

The activities of restitution and processing infographics related to the ancient city of Magdala will go on for the next few months.

The main purpose of this communication, however, is not so much to popularize the activities of the mission but, rather, to make known that, with his conduct, it was also possible to perform a careful survey of some

other biblical sites not far from Magdalene as Tabgha and Capernaum; it was also possible to start the survey activities of the main historic episodes in the two places and to lay the foundation for a systematic study and documentation which can be possibly extended to the main religious settlements that have sprung up along the banks of Lake Tiberias.
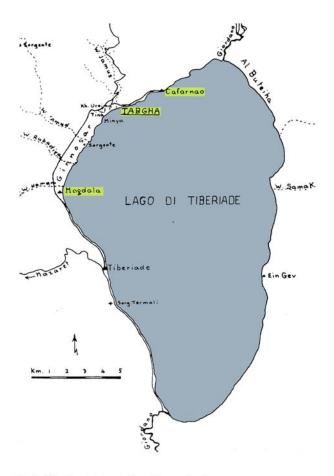
Fig.1: Tiberias Lake and the sites on its shores

Fig.2: The Church of the Primacy of Peter and the Lake's water level in the Seventies

Fig.3: The Church of the Primacy of Peter and the Lake's current water level

Fig.5: Survey activity in the ancient Beatitudes' church

Fig.4: Inner view of the Church of the Primacy of Peter

Fig. 6: Tiberias Lake seen from the ancient Beatitudes' church

It's hardly necessary to emphasize that the objective of the research is not only the documentation of the various buildings and sites; it should be clear to the reader the fact that the Lake Tiberias is located along the river Jordan, which flows in a valley that, as a whole, should be considered a rich palimpsest of evidence of ancient civilizations; from that - along with a careful reconsideration of the history of people who have inhabited - should suggest a careful critical analysis and enhancement that disregards the current political divisions to consider those aspects (of unifying type) that are strategic for economic and social regeneration, among which water supply is of primary importance.

In this regard, suffice it to say that a photo of 1970 (Fig. 2) certifies that, near the Church of the Primacy of Peter at Tabgha (which stands almost on the shores of Lake Tiberias), the water level of the Lake has lowered (fig. 3), during these years, of about 6 meters. It's also true that the whole area was not exempt, over the millennia by earthquakes.

The opportunity during the mission, to visit, among others, these biblical sites, showed that some of them are still the destination of pilgrimages and undoubtedly retain an aura of mystery and mysticism certainly linked to the sites; this is what you feel on the lake shore near the Church of the Primacy of Peter, or aiming the steps of the rock from which the story is that Jesus has appointed Peter's role in the foundation of his Church.

It's, then a + marking architecture (also built with simple and basic techniques) and an environment capable of transmitting even today, after two millennia, an undisputed historical significance (Fig. 4).

Others, indeed, deserve a better fate, as the place where traditionally you want the conversation of the Mount took place (or speech of the Beatitudes); on the road that goes from Tabgha to Capernaum, the Franciscans discovered in 1935 the remains of a religious building with a beautiful mosaic floor dating from the end of the fourth century and restored in the Byzantine era. Today, the building is quite recognizable in the plant (mutilated by the route of the road) on top of a hill, not far from the site where stands the church of the Primacy of Peter. Being there - even to make some basic measurements (Fig. 5) - made it possible to imagine, even in this case, the charm of ancient environmental conditions (Fig. 6); we regret to have to mark it with a - in the hope that the place can be recovered to the usability of pilgrims for its outstanding landscape value.

To be for long days in those places, however, allowed to experience the difficulties of a situation of latent and constant conflict that is matched, however, with the geo-political situation; we believe that a better understanding of the histories of nations may certainly contribute to mutual recognition and establishment of better living conditions. To this we can greatly contribute with our ability to engage an intelligent and prudent strategy of survey, documentation, dissemination. From this belief comes the desire to continue the action undertaken.

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[2] Alla missione hanno partecipato: P. Stefano De Luca (archeologo, responsabile scientifico del Magdala Project), Barlozzini Piero (professore, Università del Molise), Bautista Dominador (Università Sapienza di Roma), Cresciani Giovanna (dottoranda, Università Sapienza di Roma), Cesare Cundari (professore, responsabile scientifico dell'attività di rilievo e documentazione), Cundari Gian Carlo (dottorando, Università di Roma Tor Vergata), Cundari Maria Rosaria (dottoranda, Università di Fisciano), Curuni Michele (architetto), De Stefano Salvatore (grafico), Gabrielli Roberto (professore, CNR-ITABC), La Mantia Mariella (assegnista, Università Sapienza di Roma), Roberti Ferruccio (ing.), Lena Anna (archeologa), Paganelli Giuseppe (architetto, Università Sapienza di Roma), Russo Onofrio (ISI Engineering), Bagordo Giovanni Maria (dottore di ricerca, Università Sapienza di Roma), Peruzzi Laura (archeologa), Pollastri Francesco (archeologo).

* La selezione iconografica che illustra il testo è di Giovanna Cresciani.

SPECTRAL ANALYSIS OF WAVE CHARACTERISTICS ON THE BACK OF SUBMERGED BARRIERS IN THE MEDITERRANEAN

Giuseppe D'ANGELO[1] – Maria Cristina MIGLIONICO[1]

[1] Facoltà di Architettura, Seconda Università di Napoli, Italia
E-mail: giuseppe.dangelo@alice.it, mcristina.miglionico@unina2.it

Abstract
In the last decades of the just spent century, the worldwide scale degradation of the coastal environment has spread out in all its seriousness. One of the most important aspect of such a degradation is given by the recession of the shoreline and the erosion onset. The Mediterranean coasts are not affected by this emergency, according to recent Ministry of Environment report. Most of coastal heritage (45%) is currently threatened by erosion.
It is firstly necessary to have in mind that the shore line is the last most mutable sign of the natural landscape. The causes of its backward movements are affected by various aspects. Generally, this phenomenon is always due to the simultaneous presence of two factors: natural and anthropogenic.
The possible solution is the downstream action of the phenomenon, with the creation of defensive works facing the eroding coasts.
Such a paper puts in relation the geometric features of the structure (height and width of the ridge, slope of the vestments, permeability) and of the incident wave (height and period) to magnitudes. These quantities are also relevant for sediment transport in the protected area, and it is considered the parameters for the definition of magnitudes which represent the hydraulic response of the barrier. In particular this work deals with the influence of the building geometry and the wavy accidents characteristics:

- Primary spectral parameters;
- Low frequency waves;
- High frequency waves;

Key words: Environment, wave spectrum, submerged barriers.

1. Introduction

In the last decades of the twentieth century has exploded in all its seriousness, the degradation on a global scale, the coastal environment. One of the most striking aspects of this degradation is given by the recession of shoreline and since onset of erosion. The coasts of the Mediterranean have not been spared from this emergency, according to recent reports from the Ministry of Environment most of coastal heritage (45%) is currently threatened by erosion.
Always, to our coast is recognized as a valuable asset, whose natural beauty and economic performance should be preserved as much as possible over time. Nevertheless, since the late '50s, the Mediterranean coastal strip is used as an inexhaustible well, indestructible and its delicate balances are put in danger,

constantly, often irreversibly, by a large number of works and infrastructure. These two opposing trends have, over the years to the construction of various works of defense, which have had the role of interventions "buffer", under the pressure of urgency. Today, as a result, we have that our coasts are defense works of all kinds, created to meet the different needs, but too often constructed as a response of a careful design.

Bear in mind, first, that the shore line is, the signs of the natural landscape, one of the variables. The causes of its backward movement are varied and, in general, this phenomenon is always due to the simultaneous presence of two or more factors. Wanting to identify the main causes of the evolution of coastal profiles, you must make a distinction between the "natural" and those related to human activities.

Among the natural causes, the most important is certainly represented by the progressive rise in mean sea level (eustasy), which produces what is commonly called "erosion on a large scale." There is evidence that, from the Roman era, the average level of the Mediterranean has increased by about 2 m, with an average of about 1.2 mm per year. Among other possible natural causes may include also the effects of subsidence and bradisism (Phlegrean Fields).

The anthropogenic causes are, of course, more numerous and dangerous. They produce what is usually called erosion "long term" (or "structural"), largely due to the positive gradient of the solid flow rate longitudinally along the beach and is typically fatal. Among the most common human causes include:

- The construction of harbors and breakwaters;
- Destroying or tampering of the coastal dunes;
- The extraction of gas, oil or water from underground, and the consequent problems of artificial subsidence;
- The reduction of fluvial inert sediments, due to the extraction, sometimes wild, near the mouth (the case is emblematic of the Volturno, whose bed was plundered for years for the concrete production);
- The construction of dams;
- The arrangement of mountain basins.

On many of these factors is, as we understand, impossible or useless act. The only possible solution is therefore the action downstream of the phenomenon, with the creation of works of defense in the face of eroding coasts.

In the design of barriers offices are generally available only two equations. The first concerns the stability of the boulder with cabinet and is used for structural design; the second concerns the transmission coefficient and provides an estimate of the total incident wave energy transferred in the protected area.

In this paper we relate the geometric features of the structure (height and width of the ridge, slope of the vestments, permeability) and the incident wave (height and period) to magnitudes that are also relevant for sediment transport in the protected area, and we consider the parameters for the definition of magnitudes representative for the hydraulic response of the barrier, and, in particular discusses the influence of the geometry of the work and the characteristics of wavy accidents:

- The main spectral parameters
- Low Frequency Waves
- High frequency waves.

2.   The frequency spectrum

Observing the "real" sea surface we note that it has a pattern (in time and space) extremely irregular.

A "state of the sea" schematization by means of a monochrome wave train (or regular) characterized by a single value of the period T (or of the frequency f = 1/T) does not result always physically satisfactory.

It seems more realistic to assume that the real surface is constituted by a large variety of waves of different amplitude, frequency, phase and direction of propagation.

It follows that the actual wave is no longer periodic, neither in time nor in space, for this reason that it is defined irregular or random.

Analyzing a random signal, and using for example a window of the type box-car of length T, to determine the analyzed segments, it is possible to obtain different spectrum estimates, that, in general, do not coincide, either in the peak, or in form.

It is possible to shown that the resulting spectrum from a direct analysis of a random function is also a random function. In fact, if the expression of the Fourier series:

$$\eta(t) = a_0 + \sum_{n=1}^{\infty} a_n \cos n\omega t + \sum_{n=1}^{\infty} b_n \sin n\omega t$$

with:

$$\begin{pmatrix} a_n \\ b_n \end{pmatrix} = \frac{2}{T} \int_0^T \eta(t) \begin{Bmatrix} \cos n\omega t \\ \sin n\omega t \end{Bmatrix} dt$$

where η(t) is a normally distributed random process, even a_n and b_n are normally distributed random functions, and so the spectrum:

$$|F_n|^2 = \frac{1}{4}\left(a_n^2 + b_n^2\right)$$

To derive a statistical estimate of the spectrum, is needed what is called a smoothing operation.
The methods to carry out the smoothing of the spectrum tend to reduce the estimated spectrum bias, *B(f)*, defined as the difference between the estimated spectrum and the spectrum of the actual process:

$$B(f) = E\left[\tilde{S}(f)\right] - S(f)$$

the estimated variance of the spectrum:

$$var\left[\tilde{S}(f)\right] = \frac{S(f)^2}{T} \int_{-\infty}^{\infty} \omega_p^2(\tau) d\tau$$

Between the methods of smoothing, the most and widely used is the method of Welch. This method consists in:
1) split the set of length T, into K subintervals of length M = T / K
2) to estimate the spectra of individual subintervals $\tilde{S}^{(j)}(f)$, $j = 1,...,k$ .. (each subinterval has a frequency resolution of 1/K, or K/T, while the entire series would have a better resolution of 1/T)
3) calculate the average of the whole spectrum

$$\overline{S}(f) = \frac{1}{K}\sum_{j=1}^{K} \tilde{S}^{(j)}(f)$$

This method increases the bias (because it reduces the observation period), then reduces the frequency resolution, but reduces the variance.
It is possible to define the moment of zero order:

$$m_0 = \int_0^{\infty} S(\omega) d\omega$$

that represents the area under the spectrum curve. This time indicates the energy associated with the spectrum.

3.   Laboratory data analysis

The data relating to only measures of recorded wave height are processed first by adding data relating to the acquisition time and, after, using the methodology proposed by Yamashiro (Yamashiro at all, 1999).

Spectral density
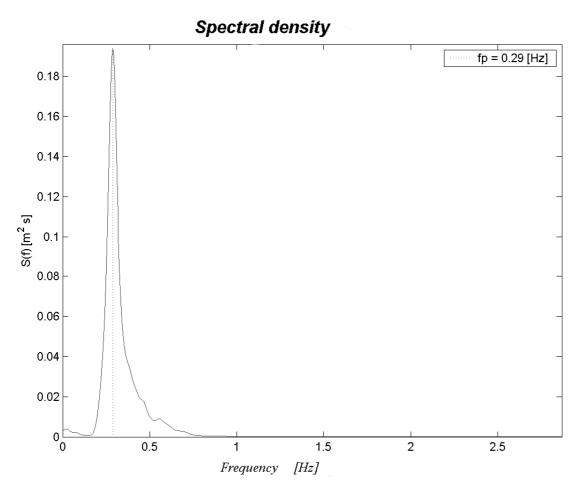
Fig.1 Wave off frequency spectrum.

The figure shows the trend of a typical wave off spectrum, it represents the concentrated energy around the peak frequency f_p.

Spectral density
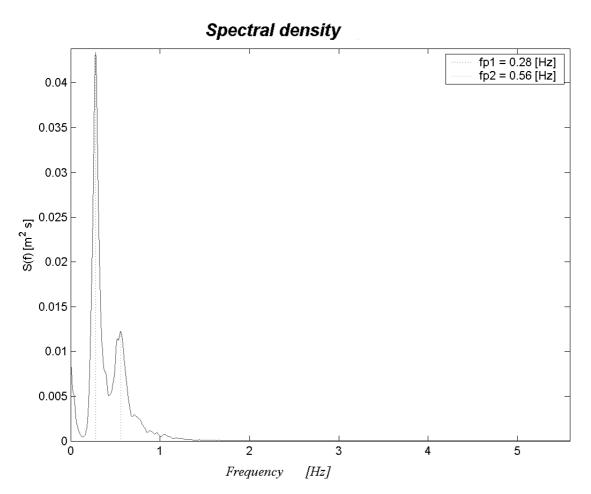
Fig.2: frequency spectrum of the wave after the barrier impact.

The figure shows the trend of a typical spectrum of the waves on the reverse side of the barrier.
Analyzing the power spectra, from wide to coast, it is noted that the energy decreases thanks to the intervention of the barrier. The spectrum has two peaks, one at a peak frequency f_p and the other at a frequency $f > f_p$. It has, the formation of two populations of waves: defined "low frequency" waves and "high frequency", with the peak frequency f_p, which remains unchanged.
Away from the barrier, the class formed by the high frequency waves of energy increases ("reforming").
It is possible to calculate:

➤ The zero order momentum, defined as:

$$m_0 = \int_0^\infty S(\omega)d\omega$$

➤ The meaning wave height, defined as:

$$Hm0 = 4 * SQRT(m_0)$$

with: $SQRT(m_0)$ the square root of m_0.

➤ "Transmission coefficient K_t" the ratio of the transmitted wave height and the one incident:

$$K_t = \frac{H_t}{H_i}$$

➤ where H_i and H_t represent the meant heights waves calculate with "sea states spectral" method, in absence and in presence of the hedge respectively.

1380

Once time determined the energy spectrum and their associated parameters, using the Yamashiro theory, it is possible to divide the energy spectrum in three parts:

- the included part $0 < f < 0.5 f_P$ (frequency impossible to find in the nature)

- the included part $0.5 f_P < f < 1.5 f_P$ ("low frequency area");

- the included part $1.5 f_P < f < 5 f_P$ ("high frequency area")

The figure 3 shows the spectrum in the 3 defined areas.
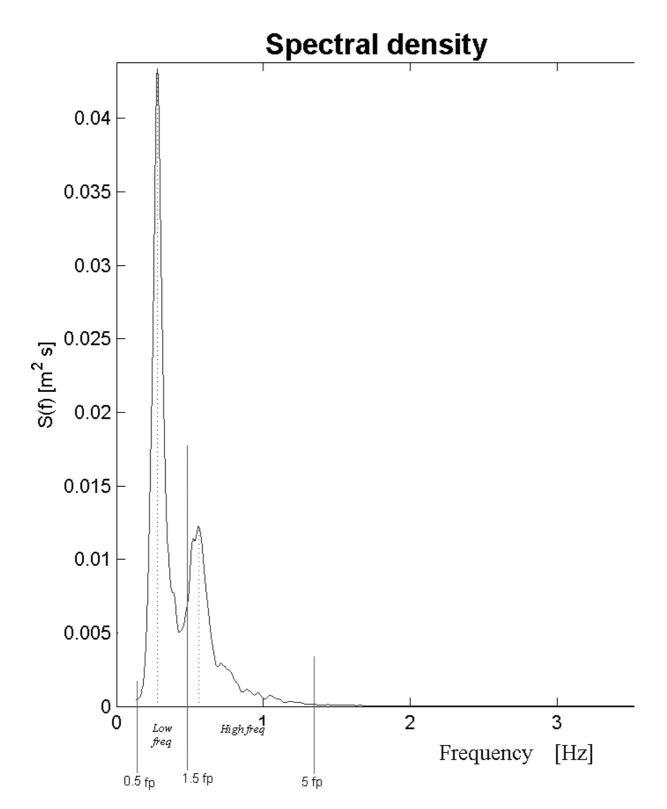
Fig.3: Divided energy spectrum following the Yamashiro theory.

After it is possible to calculate the values of m_0 for every area of low and high frequencies, by indicating with:

- m_0High the value of the zero order momentum refereed to the spectrum interval $1.5 f_P < f < 5 f_P$;
- m_0Low the value of the zero order momentum refereed to the spectrum interval $0.5 f_P < f < 1.5 f_P$;
- m_0Total the value of the zero order momentum refereed to the spectrum interval $f > 0.5 f_P$;

Afterwards, it is possible to calculate the wavy characteristics:

$$\frac{m_0 high}{m_0 tot}$$

e $\qquad\qquad$ K_t

on the basis of the geometrical characteristic of the hedge:

$$\frac{B}{gT^2} \qquad\qquad \frac{H_t}{gT^2} \qquad\qquad \frac{R_c}{B}$$

For "short" berms, with B=1, the ratio

$$\frac{m_0 high}{m_0 tot}$$

tends to decrease with the increase of the quantity $\dfrac{B}{gT_{P_t}^2}$. For *"long"* berms, with B=4 the ratio

$$\frac{m_0 High}{m_0 Tot}$$

remains constant while the ratio

$$\frac{B}{gT^2}$$

varies.
With the same quantity of

$$\frac{B}{gT^2}$$

the ratio

$$\frac{m_0 High}{m_0 Tot}$$

of the less submerged hedges, with R_c=-0.2, results greater than of the more submerged hedges, with R_c=-0.4.
It is important to observe that with the same value of R_c the ratio

$$\frac{m_0 High}{m_0 Tot}$$

decreases with the increase of the quantity

$$\frac{B}{gT_{P_t}^2},$$

this means that for structures with low

$$\frac{R_c}{B}$$

the ratio

$$\frac{m_0 High}{m_0 Tot}$$

results quasi constant, independent from the wave height off *Hm0.* Increasing the transmission coefficient (K_t) and at same time increasing the transmitted height wave, increases also the range of the ratio:

$$\frac{m_0 High}{m_0 Tot}.$$

It is possible to obtain best results (lowest transmission coefficient) for the structures with longer berms and less submerged. For the structures with short berms it is not possible to say about K_t in function

$$\frac{B}{gT_{P_t}^{2}}.$$

4. Conclusions

Spectral analysis shows that the energy spectrum is modified slightly first by interacting with the bottom, after it changes substantially with the passing of the structure.

The analysis show that the peak frequency remains unchanged to back off from the structure and the experimental data is rather a tendency, the transmitted peak frequency, doesn't exceed one incident in about 75% of cases the ratio

$$\frac{f_{i,p}}{f_{p,t}}$$

is less than the unity, and mostly for wide ridge structures. From the study carried out on the peaks frequencies shows that the variation of the frequency peak is less than 4% of that of large for most of the tests, which are normally carried out and, as regards the low frequencies, it is accepted that this percentage of energy spectrum transmitted, associated with long-wave enters significantly involved in the mechanisms of creation and modification of the forms of the bottom.

For high frequencies, however, has been analyzed the variation of the relationship between the time of zero order of the high frequencies and the total one, as a function of dimensionless parameters that refer to characteristics of the wave and the geometry of the structure, noting that increasing the transmission coefficient K_t, therefore, the increase of the transmitted wave, increases the range of variability of the

relationship $\dfrac{m_0 High}{m_0 Tot}$.

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Management models of sites of excellence in France for the rural landscape in the province of Caserta.

Alessandro CIAMBRONE[1]
[1] PhD student in co-direction: School of Architecture Luigi Vanvitelli, Second University of Naples, Aversa, Italy and *Ecole Nationale Supérieure d'Architecture Paris-Val de Seine*, Paris, France.
E-mail alessandro.ciambrone@unina2.it

Abstract.

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 has also focused on innovative agricultural processes through a conscious attitude of man towards this extraordinary natural heritage. Over the last decades, the dissipated use of space has damaged the image of the "beautiful landscape", that has been greatly appreciated in the past by foreign travellers. Not taking into consideration the shortcomings of local administrations willing to propose operational landscape management tools as well as the uncontrolled and unauthorized building interventions that have gone unnoticed by the institutions, the author believes that the most serious problem lies in the lost sense of identity and attachment of the local communities to the historical matrices of the place. In order to avoid repeating the same mistakes, the creation of a "local tourist system" for the province of Caserta has been proposed, with planning strategies aimed at enhancing the rural vocation of the territory as well as the involvement of local communities, as sustained by the European Landscape Convention and the Budapest Declaration on World Heritage. In this context, several management models of sites of excellence in France can stimulate strategies to be adopted in "*Terra di Lavoro*" (Land of Work): *Val de Loire patrimoine mondial*, *le Schéma de Cohérence Territoriale de Montpellier*, *les Grands Sites de France de Saint-Guilhem-le-Désert, Pont du Gard et Bibracte*.

Keywords: rural landscape, territorial management, cultural heritage, local community, public participation.

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 has also focused on innovative agricultural processes through a conscious attitude of man towards this extraordinary natural heritage. Over the last decades, it is passed, in a short period, 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 [1]. Not taking into consideration the shortcomings of local administrations willing to propose operational landscape management tools as well as the uncontrolled and unauthorized building interventions that have gone unnoticed by the institutions, the author believes that the most serious problem lies in the lost sense of identity and attachment of the local communities to the historical matrices of the place. This has effects on the social and economic aspects. The inhabitants of the area have turned away from politics and public institutions, delegated, in general apathy, to make planning choices. In this sense, looking to realities that have been signed by history in a similar manner to that of the province of Caserta, and which are considered models of territorial management for the real involvement of local communities as well as for proper landscape planning, can stimulate ideas and considerations on strategies to be adopted. The province of Caserta has been defined as an "immense Mediterranean garden " from the travellers of the XVIII century [2] and *Terra Laboris*, for its characterization linked to agricultural production and extraordinary fertility of the land as well as for its exceptional underground and superficial water apparatus. It is represented in its logo

by two cornucopias, symbols of abundance, filled with the fruits of the earth's labor. The allegory of fertility is found in the *Mater Matuta*, holding in her hand a pomegranate, earth product and symbol of fertility, the only exception of tufa statues *Matutae Matres*, women with one or more babies in their arms, exposed in the Museum Provinciale Campano and realized, from the sixth to the first century B.C., from Oscan populations. The rural vocation of the territory, characterized by urban centres of extraordinary historical and artistic interest, can be read in different historical stages and through different signs that have marked its landscape: the consular roads and subsequent *centuratio* in Roman times, the fortified architectures during the Middle Age and Renaissance, the convents and the agricultural colonies of the Benedictine monks, the Bourbon royal palaces, water infrastructure and major roads, implemented and expanded in following periods [3]. The Romans, besides the construction of the streets of communication with Rome, also organized agricultural land by taking the usual division into sectors of equal size squares, oriented according to cardinal directions denoting a quite evolved technique. These traces are still visible in numerous roads, including, Capua, Santa Maria Capua Vetere, Caserta and Casagiove [4]. Later, the presence of the Normans in the territory marks a period of economic and political stability, also guaranteed by an effective system of road monitoring, based on the construction of castles, fortified structures of defense and elements located at strategic points in the network. These are interwoven with rural dependencies and farms, managed by the Benedictine monastic communities, for the control of large areas subject to drainage and subsequent agricultural use. Subsequently, the Swabians introduce the productions and sales of local crops in national and international circuits, thanks to the regulation of monopolies, customs and the opening of fairs and markets [5]. From 1500, the Aragonese are substantially involved in the rehabilitation of vast areas of wetlands and construction of roads, especially for agricultural transport: they had the idea to make the Volturno river navigable in order to establish a connection between Capua and the sea. Since mid-1700, the best territories of the province are utilized for agricultural experimentations, which are considered a driver of economic development. These are promoted by the Bourbons, through a network of residences, the "real sites", spread over a large area [6]. The most important among these for the protection of the agricultural productions is the royal property of Carditello, destined above all, to the breeding of equine and bovine races [7]. The rural landscape in the eighteenth century, is strongly marked by extraordinary works of hydraulic engineering: 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 with the Royal Palace, the royal gardens and the industrial city of San Leucio characterized for its production of silk. The program of "rural urbanism" of the fascist period - focused on the reclamation and colonization of wetlands, especially along the Domitian coast - serves as a propaganda by the government, which exalts the virtues of rural life as a sign of a renewed morality to oppose to the industrial urbanism, seen, on the contrary, cause of population decline, disorder and social anarchy [8]. Today, the rural architectural heritage, which has significantly defined the landscape of these places, as already said, seems severely compromised and in a serious state of abandonment, both physical and functional. In recent decades, the uncontrollable urban and industrial expansion, the construction of several and massive highways and, in general, the unsustainable use of space have destroyed the image of "beautiful landscape", widely celebrated in past centuries by foreign travellers [9]. In addition, in line with the data diffused by the national drainage and irrigation association [10], the agricultural land was significantly reduced because of overbuilding in the area and changes in the conditions of work activities linked to traditional land use [11]. The province of Caserta should have tried to preserve these landscape features at least similar to some areas of southern France. These consist of a strong classical influence, a Middle-Ages connotation influenced by the Arab-Byzantine culture, and important episodes of architecture related to the Renaissance and Bourbon periods [12]. The rural landscape of *Terra di Lavoro*, if properly valorised, could encourage the economic development of the area, not linked solely to agricultural production, but also to cultural and gastronomic tourism in search for authentic experiences, outside of the international circuits of mass tourism. In this sense, "it is crucial to understand what are the identity matrices of places in order to advance hypotheses of design able to protect and manage the territory by creating a balance between the spaces of the past and present needs, offering innovative solutions to meet the different requirements in terms of sustainability" [13]. The international comparison can provide positive elements to implement strategies for heritage protection, even to export to other contexts [14]. Thus, the author believes that the strategies to be adopted for the management of natural and built heritage, must involve local communities so that the future sceneries of territorial modification could be compatible with their expectations, as advocated by the Landscape European Convention and the Budapest Declaration on World Heritage [15]. In this planning process, we support the idea that "the roots of the gene are fertile ground for producing innovation. This does not transform but modify, sharing that biological culture, natural and evolutionary, which will fulfil against any implementation of predetermined patterns, a sort of regenerative function, we would say "stem", as produced by the same complex identity of places" [16]. It is impossible to

recover the whole artistic, architectural and landscape heritage related to the rural history of the territory, in consideration, above all, of its exceptional qualitative and quantitative wealth and, also, for the limited economic resources devoted to protecting and enhancing the natural and cultural assets. Different forms of land management would be able, however, to avoid that the mistakes of the last decades are repeated. We think, for example, of establishing a "cultural district" or "local tourist system", as defined in the "Tourism National Reform" law (L.135/2001, article 5), connected to the World Heritage property of Caserta, for its international recognition, and characterized by the revaluation of the territorial rural vocation as an important stimulus of project for the socio-economic development of the area. Even the minor heritage, in this case associated with architectures and rural landscapes, in line with article 12 of the World Heritage Convention, included in a network, could assume and enclose in itself the Outstanding Universal Value, inseparable condition from the concept of World Heritage property. This could be promoted within a complex proposal of tangible and intangible values in which the province is extraordinarily rich. This project should involve the main stakeholders of the territory, as we can learn from the best practices on heritage management worldwide.

Fig. 1: Roman theatre of Sessa Aurunca, province of Caserta (source: Alessandro Ciambrone)

In the UNESCO site of the Loire Valley, the involvement of local communities assumes great importance for the choice of territorial planning. The property, which extends along the river and includes 2 regions, 4 departments and 164 municipalities, is endowed with an innovative system of management. In 2002, the regional, departmental, municipal and local advisory agencies signed a "charter of engagement" with the aim of increasing the attractiveness of the area in terms of landscape, environment, tourism and cultural services. The State and local authorities, upon request of the World Heritage Committee, have established a system of site's management consisting of three bodies:
- the Territorial Conference, which is composed of representatives of institutional, national and international agencies. It draws up the guidelines;
- the Development Committee represents the main actors of civil and business society in the major domains of economy, tourism, environment, education, heritage, culture, education and research. The

Committee has advisory competences and the proposals are submitted by thematic working groups during the annual meetings; and

- Mission Val de Loire, which is the operational body. It has the task of transforming the guidelines and proposals, approved by the involved institutions, in concrete projects. The Mission is delegated by the State for the management of the label, linked to the identity values of the place that have allowed the property to be included in the World Heritage list [17]. The politics of land management developed through the synergic operate of these bodies, aim to protect specialized crops as well as preserve the natural environment, which strongly characterized the landscape of the Loire, considered "Garden of France". To enhance it, within the territorial planning instruments, agricultural protected areas have been established (ZAP - article L.122-2 du Code Rural). These aim to avoid the negative effects of contemporary agricultural sectors, which often stimulate the production of major crops at the expense of those typical. They regulate the relationship between urban sprawl and rural areas. The ZAP became operational, for example, in the metropolitan conurbation of Angers and in the municipality of Montlouis sur Loire. In general, along the river, scenic routes, related to local agricultural products, have been established, encouraging the development of cultural tourism. The landscapes of the Loire Valley, characterized by vineyards – the main crop of this territory - were included in the international circuit, the Vitour network, which connects through a wine tour, seven European vineyards included in the World Heritage list [18]. The idea of preserving and enhancing the rural landscape structures le *Schéma de Cohérence Territoriale* (SCoT) of Montpellier, related to the agglomeration of the city which includes 31 municipalities and 410 thousand inhabitants. The urban plan of the inter-municipal cooperation became operational for the first time in France in 1999, thanks to the law Chevènement. In the same period, the law Voynet, *d'orientation pour l'aménagement et le développement durable du territoire* (LOADDT), established the legal institution of "agglomeration contract" to articulate local development projects in cooperation with State and regions. Finally, the law Gayssot-Besson (2000), *Solidarieté et renouvellement urbain* (SRU), improved, over the scale of town planning, a tool of orientation and design – the SCoT - which promotes the social and special integration in homogeneous territories belonging to contiguous municipalities.

Fig. 2: Saumur, Loire Valley (source: Alessandro Ciambrone)

The *Schéma* of Montpellier – forecasting 100,000 new inhabitants and 40/45.000 new residences in the next 15 years - plans the urban expansion outside the agricultural space, which becomes an impassable limit to be protected and a productive resource to be valorized. The area designated for new residences of project, occupies the middle of the space with respect to that used for the same number of housing units built in the years immediately preceding the approval of the SCoT. Therefore, the logic that agricultural land and natural sites are perceived as a variable to be adapted to the needs of urban expansion is reversed, in favor of a vision that, in contrast, envisages such areas as expression of the identity of the places and vector of economic development. The urban development is planned along a directional axis - the "sea route" - which projects the city on the coast, with large planned spaces dedicated to nature and agriculture [19]. In this logic, the concept of dense city is preferred. This is opposed to urban sprawl, spread over a wide area and result of a speculative land planning linked to little attention at the sustainable use of the soil.

Fig. 3: coastal area of the agglomeration of Montpellier (source: REICHEN, Bernard et ROBERT, Philippe & Associés. Schéma de Cohérence Territoriale (SCoT) de Montpellier. Agglomération de Montpellier).

The SCoT foresees three levels of housing intensity for the realization of the new residences. The number of planned constructions is greater in the urban centre and decreases in the periphery and in the vicinity of agricultural areas. This approach, in line with article 52 of law 2 February 1995, aims at the protection and enhancement of the French natural environment. Additionally, design solutions are proposed to facilitate short distance travel of limited environmental impact. For new construction, the SCoT envisages the reduction of the number of parking spaces near working areas and the construction of garages in residential centres, starting from the analysis that these measures encourage alternative travel with public transport, or through pedestrian and bicycle paths [20]. A similar attention to the enhancement of rural landscape, understood as the engine for sustainable development of the territory, is projected in the management plan *du Grand Site de France de Saint-Guilhem-le-Désert et Gorges de l'Hérault*, which includes 5 out of the 28 municipalities *de la Vallée de l'Hérault*. The label *du Grand Site de France*, is a prestigious recognition, attributed by the State, for a management that combines preservation of the landscape and "spirit of the places" as well as quality of the reception and participation of local communities in the preservation of cultural and natural assets. The five villages (Saint-Guihelm-le-Désert, Saint-Jean-de-Fos, Montpeyroux, Aniane Puéchabon), which host a population of about 5,000 inhabitants, receive from 650 to 700,000 visitors per year, with peaks of 12/13 thousand visitors a day during high season among the localities of Pont du Diable, Grotte de Clamouse and the village of Saint-Guihelm-le-Désert [21].

Fig. 3: Saint-Guihelm-le-Désert (source: Alessandro Ciambrone)

Thematic itineraries have been realized to avoid human pressure due to excessive tourist loads. These depart from the *maison du Pont du Diable*, reception centre and gateway to the territory as well as point of exposition and sale of local agricultural products. From here, it is possible to reach, among the local cultivations, the nearby potters village of Saint-Jean-de-Fos, where there is *la maison de la poterie*, interpretative space of a famous local handicrafts. In addition, through a riverside nature trail, it is possible to reach the village of Saint-Guilhem-le-Désert [22]. The landscape du *Grand Site* is characterized by designed and cultivated terraces bounded by local dry stone walls. The protection of agricultural and pastoral areas is

the goal of the "local program of concerted management", drafted in 2004, which is joined by the association of landowners "*Les Terrasses de Gallon*", constituted for the law 1901. The farmers have dealt with the recovery of the two-thirds of the olive cultivation of the territory from 2005 to 2007, and production and sales of olive oil since 2006. The community of municipalities in the Vallée de l'Hérault, has extended the management policies related to the rural identity of the territory to all the 28 municipalities constituting, among other things, a photographic observatory on landscape. The local photographers and association *Les Panoramistes* have captured 60 points of view, which are taken each year through pictures in order to inventory and constantly update the transformation of places [23]. In the framework of the policies of management for cultural and landscape heritage, the *Etablissement Public de Coopération Culturelle* (EPPC) is an innovative institute of governance adopted by the UNESCO site and *Grand Site de France du Pont du Gard*. In this organizational structure, the general manager is responsible for coordinating all the institutional representatives at different spatial scales, who are components of the board of directors. Additionally, the director has the executive power, under delegation, to implement the strategic actions approved by the board. This facilitates and makes shorter the long and complex bureaucratic processes which often prevent the management of properties under the control of national and international constraints and guidelines, for their own particular state of "excellence". A scientific council oversees all research activities, also related to the virtual exhibition on the Roman world, the largest in France, set up in the interpretation centre, gateway of the site [24]. The modern structure, of minimal environmental impact, is not far by the Roman aqueduct and is designed to not be perceived, in its own perspective axis, from the valley where the aqueduct is located.

Fig. 4: Pont du Gard (source: Alessandro Ciambrone)

The strategic choices for the enhancement of the site are oriented to the protection of its identity and landscape, including agricultural spaces, with the recovery of a natural area of 15 hectares adjacent to the Pont du Gard and the construction of a pedestrian promenade through it. *Mémoire de garrigue*, this is the name of the thematic path, guides visitors to the rediscovery of the Mediterranean landscape characterized by stone walls, local crops and medicinal plants as well as activities related to farming and forestry. Besides

unquestionable aesthetic enhancement of the landscape and the important cognitive function of the place, the project has contributed to the definition of a "cultural district", which, in a few years, has allowed a significant increase in economic revenues linked to cultural tourism for the site and the whole region. The number of visitors has increased by 100,000 units in three years, from 1.3 million in 2008 to 1.4 million in 2011. In the same period, the business figures have increased by 87% and the auto economic maintenance of the EPCC, compared to the allocation of public funds, increased from 50 to 73%. Pont du Gard moves an economy on a large area involving 1500 people engaged in cultural activities and tourists' reception, and produces an economic revenue of 140 million per year in the Languedoc-Roussillon region [25]. The archaeological site of Bibracte, located on Mont-Bouvray in the regional natural park of Morvan in Burgundy, is managed through the legal institution of *Etablissement Public de Coopération Culturelle*. Bibracte, considered the most important Gallic city at the time of Caesar, is a large proto-historic fortified agglomerate bounded by 12 km of walls that enclose an area of 200 hectares within the protected forest of Mont-Bouvray. The site has received the labels of National Historic Landmark (1985) and *Grand Site de France* (2008) for its landscape and historical prerogatives as well as for the concrete actions to protect and enhance it. Particular attention was dedicated to the preservation of the landscape characterized by its centuries-old forest and agro-pastoral activities typical of the area. A landscape management plan, with a projection-time of one hundred years, orients the scenarios of future archaeological excavations within the area as a function of the biological rhythms of the natural environment [26].

Fig. 5: Museum of Bibracte (source: Centre archéologique européen, Bibracte)

The fortune and development of Bibracte are linked to the political choices of president François Mitterand who proclaimed it, in 1985, the *oppidum*, site of national importance, and, in 1989, included it in the ambitious program of the "great works of the State." The investment of 215 million francs had two objectives: to make the archaeological site a model for research on *oppida*; and to highlight its importance for the French and European history [27]. In the following years, there will be a research centre, a museum and two residences that host for free researchers and students of the partner universities, which have signed international agreements of cooperation with the EPCC. Even the tourist management policies are related to

the protection of the landscape, through the organization of numerous guided tours, especially with local schools. Moreover, a promotion campaign of the property has been launched, aimed at regional and international visitors interested in authentic and natural experiences, related to the suggestive conservation of the natural environment. Best practices in France can promote possible forms of management for the establishment of a local tourist system in *Terra di Lavoro* (province of Caserta), which on the traces of architecture and forgotten landscape may find the "meaning" to design strategies for its future development [28]. The management of the considered French properties is oriented to define plans that exceed the individual involvement of local government, and involve institutional representatives at different territorial scales, including international institutions of reference. In the case studies mentioned above, organisms able to make the projects operative have been highlighted. For example, in the Loire Valley, the Mission is the operational body that deals with the implementation of joint projects approved by institutional representatives (*Conférence Territorial*) as well as representatives of society and local entrepreneurships (*Comité pour le Développement*). Also, in the EPCC of Pont du Gard and Bibracte, the general manager is delegated to the implementation of projects approved by the board of directors, with all that this implies in terms of shortening and accelerating the long bureaucratic procedures, which, in contrast, often slow down the planning processes in Campania. Additionally, the planning process is oriented to the rediscovery of the historical identity of places that, in the French case studies, refers to landscapes strongly characterized by their rural and natural prerogatives. This is the case of the large-scale landscape design of the Loire Valley, which focuses on the affirmation of the values that have allowed the property to be included in the World Heritage list. The SCoT of Montpellier takes ownership of natural and agricultural areas that become the limit to the urban expansion, which is projected through a green axis, toward the sea. At Bibracte, Pont du Gard and Saint-Guilhem-le-Désert, the strategies for the protection and enhancement of the rural landscape become a stimulus of attraction for tourists in search of authenticity. In all the French properties appear clear and essential the involvement of the local collectivities in the processes of territorial modification and re-appropriation of its identity values. Finally, the best practices analysed suggest that if it is not feasible to recover all the historical, architectural and landscape heritage, as in the case of the province of Caserta, for who is involved in management of assets become a concrete option to re-create the memory through a virtual itinerary. For example, it is worth considering the creation of an interpretative centre which allows to read the layers of historical stratifications and the identity of the places [29], in a cognitive process of re-appropriation of values shared by local communities [30].

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Knowledge and representation for landscape re-design: the area of Lago Piatto in Castel Volturno

Nicola PISACANE[1]
[1] Dipartimento di Cultura del Progetto, Facoltà di Architettura Luigi Vanvitelli, Seconda Università degli Studi di Napoli, Italia
nicola.pisacane@unina2.it

Abstract

This paper presents a project related to the study for the sustainable development of a site in the region of Campania (Italy): the city of Castel Volturno, in particular the area of Lago Piatto. The research is about the census of all the building and street of this area characterized by the presence of an unauthorized district in an area near the sea coast and the river Volturno with a high hydraulic risk. The activity has involved the census of about 4000 buildings. For each buildings were surveyed both quantitative and qualitative data in order to be able to evaluate not only the quality of the place but also to provide for an intervention of protection in a site with an high environmental and natural valence, but highly degraded by human action.
The data acquired by existing documentation and detected by the working group were incorporated into a GIS platform, and then associating to chart a given database with the information acquired.
The use of GIS technologies for creating a Geographical Information System of the whole area has made it possible to combine all the physical and intangible components with a view to safeguarding and enhancing the site for landscape re-design.

Key words: Landscape, Geographical Information Sysyem, Survey, Census, Castel Volturno

1. Landscape drawing, landscape design

Investigate a territory, measure its multidimensional components in order to seek out traces of its evolution, analyze its constituent elements are fundamental moments of the landscape knowledge. The landscape, in fact, "is a document, a mixture of words, ideas, images, in which the system was forced to disband because of its elastic stiffness to adhere to the complexity of the problem" [1]

The survey of a landscape allow to analyze and to evaluate its quality, the aspects that damage its image, the changes that have taken place over time and which have changed positively or transformed negatively the environmental, perceptual, historical, geographical aspects and all other components that create a place " whose character is the result of the action and interaction of natural and/or human factors". [2]

To represent the complexity of the landscape, which goes far beyond the mere summation of the various components that compose it, it is essential to understand and analyze the relationships between the articulate and dynamic components trying to identify, through knowledge, the topological relationships of the changes that have affected the landscape that we are analyzing.

The dynamic study of the landscape provides a criterion of interpretation and analysis of n-dimensions that constitute it, to describe it in summary, based on the most significant changes, the peculiarities and the problems, the talents and the compromise, the fragility and the landscape vocations. The multidimensional analysis and the identification of changes and transformations of the past can guide the destiny of the

territory through the description of evolutionary trends to program the various actions of control, protection, management and re-design. The dynamics of landscape changes analysis and the direction of modifications based on a study that predict the future of the landscape, puts the researcher in front of highly complex phenomena that are supported by the tools offered by technological innovation driven by specific knowledge. Very different is the reading of the landscape - natural and/or built - carried out analytically and investigated by the specialists of the matter, in relation to their skills.

Environmental studies, in particular disciplines which refer to the earth sciences and biological sciences, allow to obtain a deep and comprehensive knowledge of both abiotic environmental factors, ie the character of the land and natural support that determines the good conditions to the development of life, both biotic environmental factors, ie the complex system of relationships that establishes a living community with the space in which it is born and raised and, therefore, the mechanisms that govern the life of our planet.

The different skills deepen, in various ways, knowledge of human activities and events in its evolution: the numerous and complex problems and phenomena, natural and cultural, related to the organization of the territory, the management of natural resources and cultural heritage; the birth and development of settlements, scattered buildings, the roads, the crops, the social organization and the technical knowledge of various community groups and local modes of utilization of available resources in various places, in addition to studying the ecological systems, anthropogenic and non anthropogenic modification and used for the sustainable management of landscapes

2. Degraded landscape

Among the major innovations introduced by the European Landscape Convention, is certainly worthy of note that the extension of landscape idea also to places that do not have exceptional values but for which quality can be traced in a hidden quality although strongly affected by anthropic actions who have completely transformed its aspects. In fact, Article 2, indicating the scope of the Convention, states: "This Convention applies to the entire territory of the Parties and covers natural, rural, urban and peri-urban areas. It includes land, inland water and marine areas. It concerns landscapes that might be considered outstanding as well as everyday or degraded landscapes".

An innovation of considerable conceptual and operational value that represents a significant excess of the previous vision of landscape, land and environment. It has therefore developed a new and complex landscape discussion on the issue: reflection that led to recognize a physical entity in the landscape.

The result of the interaction between culture, human activities and development of natural reality, undergoes spontaneous events and human actions, infused by cultures and traces of the historic building and by premises of future mutations, is an important document which recognized the landscape -with numerous cultural, economic, ecological values- an important role in promoting European identity and the relationship between man and his living environment.

In fact, trying to classify landscapes according to their aesthetic value, according to Annalisa Calcagno Maniglio, it is possible to identify four classes related to their value: the landscapes of exceptional value that must be preserved and should not be changed, the landscape of high general value that can undergo the transformations that we can not find anywhere else (for example, the expansion of a mountain village for the needs of residents or the construction of a road) with particular care to minimize the loss in value; the landscapes of common values that may undergo too large, provided that such changes do not diminish the value and, if possible, increase; degraded landscapes in which the transformations are necessary to achieve an acceptable quality.

Landscape and environment thus become two points of view of a single problem that is identified with the perception and the existence of relations between man and the context of transformation related to three spatial dimensions of living: the domestic space and the close relationship, the city and the space of social relations and the territorial activities.

The landscape then becomes a place where characters are identifiable thanks to parameters that can be found in perceptual sensitivity and mentality of the community. It is therefore a place concrete, jumble of signs and meanings, and presence of tension that builds up over time-course of relentless change and intangible assets.

Fig. 1: Castel Volturno, Lago Piatto, Degraded landscape

The landscape is geographically, historically and anthropologically specific, knowable and governable. It is a relationship between form and motion everlasting life, nature and outcome of the layers of memory and all the projections into the future.

Cultural Landscape represents the symbolic expression of cultural heritage in a modern way. As wealth spread on land, cultural heritage signifies the set of tangible and intangible heritage as a resource for common identities of a territory and of people who inhabit it.

The cultural heritage that make up this collective entities include material, concepts and representations, specific aspects of community life and land, as a synthesis through which people reproduces the concepts that are used for their identification and representation.

The word 'culture' is therefore a sense of a cultural traces that need 'protection' of a particular region or spatial domain, regarded as a cultural town. It is clear, however, that the problem now is extended to larger areas, especially if we think of a small planet like ours, a mere artifice, which is important, not only protect but also to improve and redevelop brownfield sites, abandoned and degraded areas in order to transform urban public space, most vital assets.

The need of coming back to give to places lost quality through interventions that have compromised the characteristics to eliminate what has been the result of actions not aware, within the meaning of Koolhas, junk-space. The junk-space is the residue mankind leaves on the planet. The product is constructed of modernization is not modern architecture but Junkspace.

The Junkspace is what remains after modernization has run its course or, more precisely, what coagulates while modernization is in progress. Modernization had a rational program: to share the benefits of science, universally. As its individual parts are the result of brilliant inventions, lucidly planned by human intelligence, their total marks very clearly the end of the Enlightenment. The Junkspace is the sum total of our current achievements, we have built more than all previous generations put together, but for some reason we can not be measured on the same scale. [3]

Fig. 2: Castel Volturno, Lago Piatto, Environmental and natural presences

3. Analysis and survey tools

Using G.I.S. as a tool for the government actions of the territory gives a multiple meanings in which terms as information system, land and government have different meanings. Territory Management considers territory in its global and unit aspects, such as complex apparatus composed of heterogeneous elements that coexist in a certain space (the building stock, population, workforce, economic activities, services, soil, etc.) but all these elements are interconnected by cross-influences, consisting of trade in goods, services, money, image , people. Identifying territory as a real system immediately places those who want to govern it two sets of problems:

- The description of the system using a model for many parts of the informal, which sets individuals, relationships and behaviors;
- The ordering of the constructed model by means of precise and rigorous formal tools, such as mathematical equations that express the dynamics, or computer systems.

G.I.S. use who manage multidimensional data enables the creation of a dynamic platform fully implemented and queried to support the activities of re-design the landscape from its own resources.

Besides representing a strategic variable, the preservation, conservation and enhancement of specific sites constitutes a tool for long-term (i.e. widespread and diversified) and sustainable development. Indeed, an economic process based on local resources ensures a higher multiplicative effect on income; in their turn, wealth and well-being create the conditions for further growth and preservation

The information will be inserted in a geo-referenced database using GIS technology. The database was designed to be a dynamic system for supporting integrated and interactive knowledge

4. Case-study

Lago Piatto area, located in the town of Castel Volturno, just in the north of the river that runs through the city is strongly characterized by the presence of low-value construction settlement. The high landscape value of the site shall be given over by the strong links with the mainland of Litorale Domitio [4] by the closeness of historical, architectural and natural presences: the San Castrese Village, the Lago di Patria and Variconi Oasis. Emergencies in stark contrast with the area in question which emerges in a landscape devoid of a particular design and developed without a plan and through the construction of buildings mainly abusive, made with shoddy construction techniques and materials, and especially without the quality that characterized the site before the settlement of the Lago Piatto district. The constructions, made largely without requisite authority, and the almost total lack of any basic services and infrastructure that would ensure quality housing, transform this area of the town of Castel Volturno in a place characterized by physical and moral degradation of the people who live or frequent the place.

The survey conducted in this area is intended to be an inventory of resources and about the consistency and the situation of the housing and transportation infrastructure.

Employing the opportunities offered by technological innovation, the phase of the census involved the filing of physical characters and intangible assets of approximately 4000 properties. The filing and local survey was followed by the construction of a data-base to support the graphical data of Geographic Information System. In particular, for each building has been classified not only quantitative and metric data (height, number of floors, extension of the built and of that discovery, etc.) but also the consistency reladte to the quality of the building (use for each plan, maintenance status, presence of appliances, etc.). Then was done, through a comparison chart, a check on the legality of the construction, comparing with the cadastral map and aerial orthophotos to verify any regularity.

It is therefore a genetic document of the area [5] of lago Piatto area that give us significant data on the value of the area and about the strong anthropic and not sustainable action realized in few years in an area of high environmental value. The value of the site still shows even if hidden by intensive construction activity and the abuse that undermines every piece of land in areas of high environmental and hydrogeological risk: the line of sea coast, the bend of Volturno river and the areas close to lake. Man action is realized in contrast to any prescription and any environmental constraints and urban security.

Knowledge action becomes finding the essential foundation for hypothesis to re-design the area and for the recovery of the landscape and its resources. The census has indeed found that just over 50% of buildings in the Lago Piatto area are shown on the cadastral map and some of the settlements insist on areas not

divided into lots. Another important finding concerns the almost total absence of commercial facilities and transportation services in support of a high-density housing development. The few commercial appearances are in fact placed at the ground floors of the residences on the main road, parallel to the coastline, crossing the entire area. Residential presence are above all isolated houses of two floors, surrounded with an open area used as a garden. The state of preservation and maintenance is largely poor, due also to constructions made of low quality materials and technologies and to widespread state of neglect and decay.
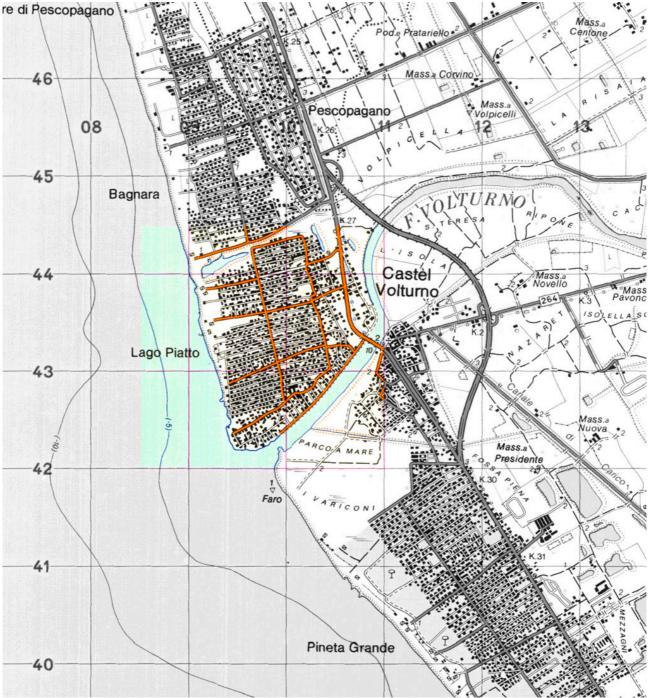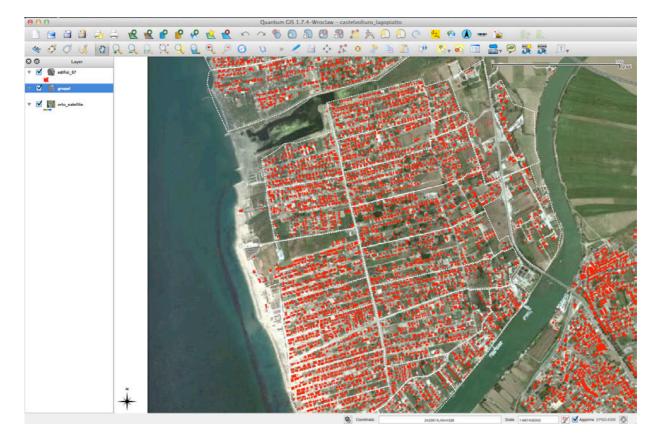
Fig. 3: Castel Volturno, Lago Piatto, IGM map - table n.429 (detail)

Fig. 4-5: Castel Volturno, Lago Piatto, Geographic Information System

Fig. 6: Castel Volturno, Lago Piatto, Geographic Information System data-base

Fig. 7: Castel Volturno, Lago Piatto, Map comparision (aero photogrammetry and cadastral map)

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THE PROCESS OF THE PROJECT BY MARCELLO PIACENTINI OBJECT TO THE CITY: CLARITY AND EXPRESSION FOR WISE AND BALANCED USE OF PROPORTIONS.

Fabio Converti

Dip. di Cultura del Progetto, Facoltà di architettura *"Luigi Vanvitelli",* Seconda Università di Napoli, Aversa (CE), Italia,
fabio.converti@unina2.it

Abstract

The harmony of the invisible architecture of Piacentini, indicates, in the facades of his main works, details of plastic resulting thickness of the walls with altered geometry and modulated surface.The articulation of the various projects is always controlled by the rules of proportion between full and empty, indicating a relationship with the modules and submultiples with evidence in detail of construction and the continual comparison with the carrier.
These works lead to an overall effect that tends to bring out the details and the signs of Appeals as a element of modular measurement.
This assembly determines, in effect, decorative elements derived from the modular size of materials, which are expressed with mathematical rigor, leading to a shift from general to specific to the geometric logic of the organic project.
The Piacentini has expressed his own work on architectures for social shaping public spaces and / or relational spaces, consisting of a multiplicity of urban elements with a strong relationship between the shape of the history and structure of the city.
For Piacentini was of primary importance in urban redesign projects, to defend the town center, enhancing the city's identity, preserving as much as possible the diversity of activities of the place.
The research aims to identify and enhance, through specific aspects, achievements and entries in relation spaces, in the architecture of Piacentini, clarifying, models, values and functions that he intended to express in his long and varied production of works architecture.
This search leads to highlight a fundamental element, which the study design and analysis of extremely complex processes, including the approach, method and procedure for the success of these works with unique characteristics, with a harmonious relationship between mathematics and geometry.

Keywords: Representation, Project, Piacentini and City

1. Introduction

The dominant values, which characterise a given culture, tend to permeate the specific rules of each category and situation that are part of the system, and in which they are applied.
In the construction of the objects which make up the qualities of urban space, the concept of crisis in the contemporary cultural values can be attributed to the multiplicity, ambiguity and indeterminacy of the values that govern the operational choices, forms, reports, the symbolic meanings transmitted, which then impinge on the behavior of the inhabitants of the city. The signals arriving to the individual, in general, don't communicate a coherent whole, so they don't combine themself into a system. The result is often an ambivalent, incoherent, disordered, reality that is the result of the application of a wide range of possible standards following combinations and variations without coordination, within processes of transformation and continuous spread.

E-42 - EUR

Il complesso dell'E-42 fu pianificato per celebrare i vent'anni della marcia su Roma in occasione di una importante fiera internazionale

Presentato nel 1938 sotto la direzione di Marcello Piacentini, il modello è ispirato all'urbanistica classica romana con elementi del Razionalismo Italiano

La struttura prevede un impianto viario ad assi ortogonali ed edifici architettonici maestosi ed imponenti, massicci e squadrati, per lo più costruiti con marmo bianco e travertino a ricordare i templi e gli edifici della Roma imperiale.

Fig. 1 Rome, Piacentini Eur Plan

If its possible to assert that organization of city spaces is inseparable from the whole of its social manifestations, are the relational processes, which are developed in it, which can be revised to incrise and emprove the quality of urban environment, and its beauty, only by creating systems of reading territory that express and show the complex phenomena of ancient and contemporary environment.

If a new quality of reality is produced, as a result of an encounter which makes hybrid transforming which is actually placed in it, in any case it's usefull underlining that any definition of identity is a process that concerns the interaction between object and subject. If the first process reaches a stable condition, the manner in which the latter perceives that identity, even of beauty, therefore, it instantly shows temporary, changeable, as in any construction process, the result must prepare to questioning and to be able transformed into something different.

Consequently the architecture, whose legitimacy is now a prevalent reason for being in the aesthetic dimension, rediscovers the value of the emotion, the involvement of the senses, the reflection surface, the reverberation in his relationship spaces, and new forms of urbanization is increasingly built on the principle of union between ancient and contemporary meeting as short and engaging, surprising and emotional, a maker of stories, experiences and emotions.

2. Research field

Architecture, like all other aspects of human culture is a product of the general model adopted, generated by the basic symbols, which of course identifies also the relationship which the individual has both with the "function" and the "shape" , understood as the basic components of the environment. So the architecture itself becomes a model which, once organized, tend to strengthen the symbols that are generated indirectly, by creating additional symbols. Those places that do not notice the symbolism is not emotionally charged and are therefore foreign to us.

The investigation of these forms of representations consist, therefore, a question from several points of view on the morphologies of the country as a reinforcement of new ways of use of urban space: the signs of geomorphology are transformed from internal to external to the new city extended. May represent the primary elements of new urban structures based on a system of plural different architectures, united by a strong body of places: structures at the same time old and new, who kindly join the "object" of architecture and the city.

Fig.2 Rome, Via della Conciliazione Project, Piacentini's and Spaccarelli's project.

So, the act of representing the city by Piacentini, evidently, was not only a technical and graphical matter, but it was characterised by the willingness to symbolize, treating it as an artifact, a work of art, a masterpiece that has its own identity, and a own spiritual plastic. In fact, subject and object are no longer separable elements to analyze in isolation. Instead they are the two poles of an indissoluble relationship. In this perspective, the process that leads to the formation of systems which observe, it's also the same process that forms the observed reality. The two processes are distinct, they are only two ways of looking at a single principle in evolution. A system becomes able to recognize certain signs because these signs exist, but the fact that the system can react to them is the condition of existence for those signs. In fact, into Piacentini's architecture we witness the "coming into being" of new forms each time it's made a match between observer / observed. In the course of evolution (in the phylogeny of the species) are seeing a continuous growth in the number of forms recognized and reproduced. The shape determines its recognition, and its recognition determines the shape.

Into Piacentini's work prevail some elements such as the use of architectural forms and materials with precise symbolic meanings, the use of a particular material would never happen by choice or by calculation, but only by intuition, such as the desire the enhancement with coating materials such as marble and stone, the return to the basic elements of classicism, which then brings up to date with his sensitivity and new interpretation, the attention paid in the views and perspectives, the use of small scale and then get to large scale. He also rejects the monotony, which considers typical of American cities and those of the nineteenth century speculative. Still, it enhances the values of the change and harmony. This is the result of aesthetic sensibility, is reducible to numerical relations, and obtainable only with a design of three-dimensional symmetric and varied.

Piacentini criticized the two-dimensionality, he has even exceeded the three-dimential interpretation of architecture, giving an high value on the fourth dimension, time, considered as a means to manage a plan.

Fig.3 Bergamo, Piacentini's Project exhibition area

3. Objectives

Such as human language, in which a large part of the communication is free from the formal rules of the verbal code, so also in the urban language elements of communication are many, varied and multidimensional (or polysemantic).

The exploration of various ways of representation of an urban landscape can start with a representation of its "boundaries" that have been proposed and / or designed in studies and acts of planning. These areas, which cut in a different way the territory, often doesn't overlap between them, because of their derivation from nonequivalent scales and reading criteria for the interpretation of spatial variables, or often purely physical morphological. Otherwise the spatial contexts, within which individuals and local operators carrying out their main functions to which they belong or believe they can give "name", appears also different. Knowledge of the spatial structure and urban pre-modern forms is the starting point for further knowledge acquisition.

In order to better understand Piacentini's production is worth deepening the role of design in the twenty-first century.

The combined use of different materials, the diversity of information they contain allow a broader, detailed and careful survey of Piacentini's projects . The cross-reading offers images and reveals conditions and items not otherwise visible or not fully understood.

Piacentini reserves to his works a careful study that involves proportions, unlike the studies of metrology, a precise search of the affinity (dimensional and design) between the individual parts of one or more objects.

Therefore the study of Piacentini's graphic documents, together with the analysis of the text, have highlighted the crucial role of representation in dealing with architecture, specifying each time the design aspects of purely geometric, graphic or forecasts of the buildings constructed.

The interest in the images of Piacentini's projects comes from the fact that today these have assumed a key role in changing the culture and reality, but also by the fact that never before has the relationship between image and reality has a sticky and this complexity to make it the center of architectural thought and planning.

Fig. 4 Rome, Piacentini's Palace of Civilization and Labour at Eur

4. Design process

Piacentini's architectures are defined by a set of signs is of both numbers: the firmitas is abstracted in the number, the venustas remains line.

Subsequently, with the knowledge of the formal potentiality inherent in the new building systems, it was given life to rationalism, where the formal expression is obtained only by playing with the basic technical elements and their physico-mechanical: it is the "no style", the"necessary architecture ", the new real "Order" after the Doric. In some cases Piacentini, using the supporting structures of buildings, gave functions not only to building envelope but connoting loud and clear the building.

For Piacentini, already in his time, were considered important the connections of the various components that contribute in the construction process: in fact in its plans the amount of different materials and components used were different with a high number of connections.

In architecture of today the ornament understood in the traditional sense no longer find a place, here, as L. Kahn said, the richness and expressiveness of a formal architecture also lies in the clarity of the connections between the parties and the readability of their autonomy as well as in the Piacentini's architecture.

Fig. 5 Brescia, Piacentini's Urban General Plan

This does not mean that the technique performed can only legitimate architecture, the technique, as the function, is necessary but not sufficient to create architecture! The process of the project must have information, order, recognizable and also critical for creating a history of the project.

The design procedure goes and defines itself through the plane of the drawings, while responding to the same nature of the drawing to be a code - then as guarantor of information competence and its transmissibility - to making himself structure within the design process, so its narrative nature, places him as plot, network, web of meanings, layers of cultural contextualization of a concept, an expression of choice direct.

Just through the drawing act, the most interesting architects have built processes which establish relationships between the parties, between the intentions of the project. Relationships that have helped to establish working conditions, to discover constraints and ask and answer several specific questions.

The formation of each of them is the place of exchange and also the center of a ritual of approximation, in which the drawing brings with it the general rules and personal intentions that are the plot. The training becomes beyond the place of provenance of individual discoveries and knowledge, the experience of "how" the experience of "doing". The exercise on the critical reading, to re-write continues where it requires the choice, "Complexity and Contradiction", individual and generational, social and cultural being incorporated in the drawing make it unique, personal and collective.

Design drawings are, therefore, a further element on the study of Piacentini's work though reading the signs by which theoretical and design intentions.

Within a single element of the composition can be read all the characteristics (composition choices, linguistic, formal, identity) that are found expressed in a larger scale. Consider for example the windows, rectangular geometry, the building of the Palace of Justice in Milan: in it are well aware of all the assumptions and motivations that drive the architect to design and bring their buildings to simple geometric shapes. This means that the design of a building structure is something extremely logical and consequential damages, so the "whole" is found to vibrate in a small scale, even within a single element of detail.
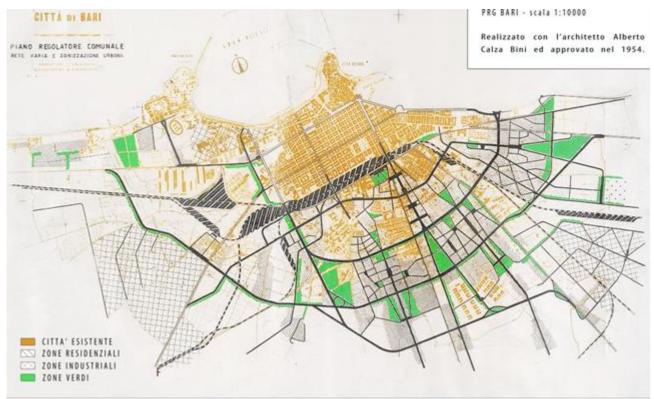
Fig. 6 Bari, Piacentini's and Calza Bini's Urban General Plan

Such sets out a frameworkof relationships extremely delicate and complex within which it must fit design process, where architect knowledge and awareness must find its expression and freedom, while responding to very specific rules and laws.

The delicate harmony and balance full of tension which Piacentini came reveal strategies skillfully conducted to containing forms and signs to resolve the relationship between free and great light transparent parts, between immobility and movement.

The first element in common is the constructive need that determines the perfect adhesion between the shape of a building and its contents, which in this case is the function, making it unnecessary to any decorative tinsel applied to the structure.

Next to the plastic sense of Piacentini's work, expressed by the elaborate compositions of pure volumes, the new aesthetic arises with simple surfaces, not weighed down with decorative motifs, bare walls, such as industrial buildings, distinguished only by calibrated relationships between solids and voids and linear profiles, which are enhanced by the use of materials such as concrete and marble.

5. Conclusions

Piacentini's works reveal concepts and ideas realizations, with architectural shapes and chromatic values that reveal, in their entirety, the psychological state of an entire society. This psychological state also comes into play in communication, making it one of the most showy elements of urban language. So, if drawing is language and memory, into Piacentini's work it's remarkable his study and his observation, that identify a constant work method that, in this case, was able to create a shape in Rome architecture, through its drawing and design.

Finally, the multidimensionality of the relationship with the place is not limited, of course, to physical aspects of the geography of the area. It presents its structural features, the so-called ancient/new relationship: into such interrelation between different economic roles and forms and modes of production within the territory of man-made.
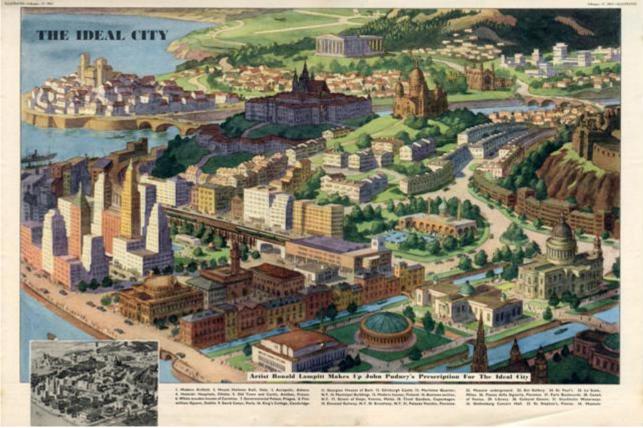
Fig. 7 Ideal City 1951

According to Piacentini the ancient center hasn't to become a paralyzed element that fails to establish itself as a matrix of development of the urban core, but with his studies on "unified aesthetic concept" brings to decompose and recompose the whole structure of the city to create a sense of the whole. Finally into Piacentini's work it can be immediately notice his attempt to create a new design method that is the union of two cultural planning processes, one sensitive to the historical memories and the other extended towards new achievements.

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The Gisbusiness as a tool to manage change and innovation

Gabriella Abate
Dipartimento di Cultura del Progetto, Facoltà di Architettura Luigi Vanvitelli SUN, Aversa, Italy
Email: gabriella.abate@unina2.it.

The Gisbusiness as a tool to manage change and innovation
Competitive scenarios are changing swiftly and oblige firms to abandon definitively defensive strategies to become effectively leading to global markets. The challenge is not more in improve outcomes compared to its past, as in the know and be able to compare with the best competition. The recovery of competitiveness should be placed at the center of attention in the country, in the awareness that being competitive is a community value and brings benefit to all. Recovery of competitiveness which should concern businesses, in their role as a vector of development, but also of the entire countrywide system, with far-reaching reforms that can support such development. We need a leap equal to the magnitude of the changes that we are experiencing. This quantum leap, paradoxically, must be harmonious, pervasive and synergy between the world of research, business, educational system, labour market, infrastructure, services and policies for businesses and the market. It is therefore essential to highlight the importance of spatial data and geography in almost all industry analysis to manage change and innovation. In fact Through the Customer Management (CRM) Relazionship hooked to geographic information systems (GIS), you can "do" Gisbusiness and represent the data stored on a map, highlighting on the same business opportunities in the territory. Project management takes on a strategic importance in the management of change and innovation, through the design of new products/services but also internal asset market positioning, the entry into new business, in the synthesis of the design challenge.

Parole chiave: Gisbusiness - Knowledge Factory – Market – CRM - GIS

1. The Gisbusiness as a tool to manage change and innovation
The competitive sceneries are changing in rapid times and they force the enterprises to definitely abandon defensive strategies to become indeed protagonists on the global markets. The challenge doesn't consist of improving the results in comparison to the anymore really past, how much in to know him and to be able to be compared with the best competition. The recovery of competitiveness must be sets to the center of the attention of the Country in the awareness that to be competitive is a value of the collectivity and door benefit to everybody. Recovery of competitiveness that must concern the enterprises, in their role of vector of the development, but also of the whole system-country, with reforms of great course able to support such development. We need a leap equal to the magnitude of the changes that we are experiencing. This quantum leap, paradoxically, must be harmonious, pervasive and synergy between the world of research, business, educational system, labour market, infrastructure, services and policies for businesses and the market (taxes, privatization, research, finance, etc.). It is denominator common of it the ability to plan together the common growth. The is not enough anymore already difficult assignment to govern the complexity. They serve competences, wish and tools to manage the modification, to choose with decision the innovation - in his ampler meaning - what competitive weapon. The international competition is intense and aggressive more and more, on open and global markets more and more. The Italian production system is

compressed between countries that are leading innovation and Countries benefiting from lower system costs. Given that we do not undermine but rather to improve our standard of convenience, the choice is obliged: to stand up in the value chain, through more investment in research, innovation, knowledge and appreciation of this heritage " Knowledge Factory " (Gambardella 2010) that it characterizes our history in the sector of the culture of enterprise. Knowledge Factory as value as wealth that it produces wealth as ability to promote the modification and to manage the future projects. It is not a case that the principal competitive assets of which we prepare and that they cannot be purchased on the market I am really the ability to produce and to develop projects. It appears as the best guarantee to face with success the competitive dynamics, to anticipate the markets, to gather the evolution of the consumptions to exploit the technological opportunities in the products. Insofar, the human resources are considered what the true capitals of the firms, but of other song the market of the job results that more rigid. This has always forced the Italian enterprises to aim at the innovation of trial rather than on that of product, producing more and more and more in way efficient mature products, lifting so in comparison to our competitors the levels of technical immobilization and the thresholds of gone out of current productions, consequently reducing the profitability of the invested capital, that is struck at the end on the same occupational perspectives. From a side it always assumes great importance the economy of the knowledge that is at the base of the recent technological revolutions of the information and the communication, with, for instance all the potentialities of the net Internet still to express him in terms of widening of the markets and approach between producers and consumers; from the other side our quota of products high tech on the total one of the manufacturing assistant value is among the lowest of Europe and our exports of product to high technology and intensity of knowledge I am of big long inferior to those of the Countries mostly industrialized. It appears therefore inevitable that in a Country that has the most elevated rate of entrepreneurship but the lowest number of great enterprises, it goes deeply reconsidered where in a market the integration and the intensity of the competitive challenge they are redefining the markets: in other terms, must be questioned the competitive lever of the small but flexible one goes. The small one and it mediates enterprise it possesses as a rule a deep competence of the product and his productive trial, and it is notable also the direct knowledge of the potential buyers, rather than of the dynamics of the question and the competition. The innovation of the fittings and the machineries not by chance, prevails on that of the product and of the way to present on the market. Insofar the strengthening of positions of leadership of based niche on the quality, the attainment / maintenance of a status of excellent supplier, the integration of a system of firms, shape a great necessity to face the change through the for activity, the planning, the operazionalizzazione of the opportunities could be said, in the context of bright results gotten in the current management and in its flexibility. In fact the new sceneries that open introduce risks, but also enormous opportunities. It is up to therefore to the system of education and the search the strategic assignment to form the decisive resources. those human. and to develop that tools that better can sustain this binding challenge "on the new one" (Gambardella 2010). The project management assumes then a strategic importance in the management of the modification and the innovation, through the planning of the new products/services but also of the inside assets, of the positioning on the market, of the entrance in new business, in synthesis the planning of the challenge. It is therefore fundamental to underline the importance of the territorial datum and the geography in almost all the analyses of sector to be able to manage the modification and the innovation. In fact Through the Customer Relazionship Management (CRM) hooked to the Geographical (GIS) Informative Systems it is possible "to do" gisbusiness and to represent the data memorized on a map underlining on the same one the opportunities of present business in the territory. It is already said previously that to study a datum in geographical key they are necessary his geographical coordinates, hooking a managerial business to a geographical informative system. The greatest part of the information that they are gotten by a managerial they are attributes that give a strategic importance to the territory. We use, to this intention, the necessary tools for the visualization of some analyses typical of a firm:

• The georeferencing of the model sold for zones would allow to develop a precise strategy of sale thanks to the gotten visualization. Can we wonder the reason for which in that zone that model is sold rather than another? Which morphological, social, economic and demographic characteristics do they characterize that territory? The whole the products could be optimized for single point in operation sale of the relative location and to improve the distributive net of the single points sale; to plan advertising countries and in operation promotional actions of the location of the proper target; to esteem the potential expressed by one determined geographical area for a specific market sector, to define and to analyze the basin of use of a store, in base to the construction of areas represented with different colorations;

• The georeferencing of the billing of the clients (annual, quarterly or monthly according to the demands), getting the immediate perception of as the sales is going on the analyzed territory;

• The georeferencing of the billing of the agents (annual, quarterly or monthly according to the demands); you/they can be defined objective of sale, for agent or for area, to individualize the possibilities of commercial penetration of the net sale and to develop new strategies;

• The georeferencing of payment and discount; visualizing the zones in which the payments are regularly made and those where instead present are more unsolved an important indicator it is gotten for developing careful analyses of the market of reference;

• The analysis SWOT (or Strenghts and Weaknesses, Opportunities and Theats) delineates the critical points of strength and weakness inside the firm compared with the external environment and studies the threats and the opportunities of the market of reference. Purpose of this analysis is to allow to anticipate important developments that could have repercussions on the enterprise. For this type of analysis, the visualization on a map of the usual clients and those potential constitutes a tool of more punctual analysis of that that to everything today it has available a firm. To represent the sales for typology and characteristics of model can clarify us on the why in you determine areas some models they sell him and not others considering of it, for example, the color, the particular ones, the customizing and so street. To visualize the location of the stores and to have a precise knowledge of it, guarantees the immediateness of the information on the nearer points of assistance for the final client;

• Market segmentation, which can be geographical (country, region, province, city, neighborhoods, etc.), demographic (age, gender, family size, income, occupation, education, religion, race, nationality), psychographic (for social class, lifestyle, personality) and behavioural (for ease of use, the benefits sought, situations, the intensity of use, brand loyalty, awareness, attitudes towards the product)makes sense, the multiple benefits derived from these data on a map. Can be circumscribed areas of analysis to study in detail the market their product and to assess any penetration strategies. To view customers on a map you must hook up the data that are in the CDB with geographical database data; consider the following fields from the CDB: business name, the street, the city, and a unique code (e.g. that ISTAT that uniquely identifies a town, a municipality, a province and a region). From geographical databases will take the coordinates of the municipalities and/or provinces and/or regions, which define the location, geographical boundaries through points or polygons, connected cities, and to ensure that the data is represented, the coupling between the code and the GIS management. If we wanted to do an analysis to model customers bought, you could connect the different tables, whose field of Union is the unique code (linked always to the CDB by the ISTAT code GIS or similar); the data that we represent the model and its features, price and quantity purchased, the city where the customer resides, and finally, the date of purchase will be displayed, in a simple and immediate. It is useful to georeferenced suppliers (both regular and potential ones) because through this analysis can be identified part of logistical costs, such as travel to collect the goods, by reducing the same with the grouping of suppliers to zone (vehicle routing). To analyze another important part logistic costs is an important representation of deliveries (Origin - destination array) through the merger of the following fields: name of the carrier, the city, the cost of transport, the product quantity transported, the consignee of the goods, the city and the date of delivery. The most suitable tool for this kind of analysis is definitely the GIS. You get increased speed and security of the same: the data displayed surely makes it easy, with the possibility of changing views with additional questions on different data depending on the results you want to achieve. Surely it has a higher quality of services offered; Whereas such as corporate meetings with agents, architects and business executives, the analysis data can be explained with a territorial view or be sent to the format map. The choice of variables is large; you can select several fields and columns in the database, it is possible to select different records and on the choice of geographic detail assumes importance in relation to the outcome you want to achieve. Visualization of analysis that you get through them, showing the GIS tools used and the possible detail analysis. Reported applications are only indicative and may be extended in size and in number. GIS is a tool that supports the common marketing decisions, including primarily those settlement lots, segmentation and targeting. An important element of the ability to understand the use of GIS is tied to the way in which technology can also be used to carry out traditional activities; a particularly important case for analysis of marketing mix in each of the four components of the product (which also relate spatially attributes of products with groups of customers/consumers); price (and it is known that through the study of local markets the geography influences the price); place (in which decisions on the modalities of settlement lots and distribution are among the first to benefit from a systematic and efficient use of geographic data); promotion (whose efficacy can be analyzed not only globally but also distinct in different regions highlighting, as often happens, the results varied reasons for geographical areas of customers). In all these cases, the GIS allow quick integration of different data sources, without this technology, it would be very difficult. Therefore it is clear that the benefits obtained or assessed through the use of GIS technology duly integrated with CRM systems and with a multidimensional analysis (Genomics) you can do gisbusiness

is to highlight the potential of an undertaking is to manage appropriately the possibility of territorial development.
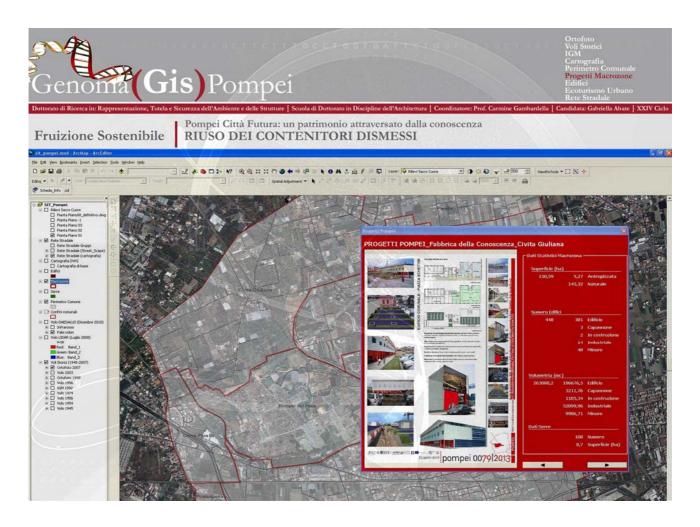
Fig. 1: Abate G., *Manage the change in Pompeii with Gisbusiness: Reuse of Disused Industrial Buildings,* 2012.

Fig. 2: Abate G., *Manage the change in Pompeii with Gisbusiness: The city of Greenhouses Art,* 2012.
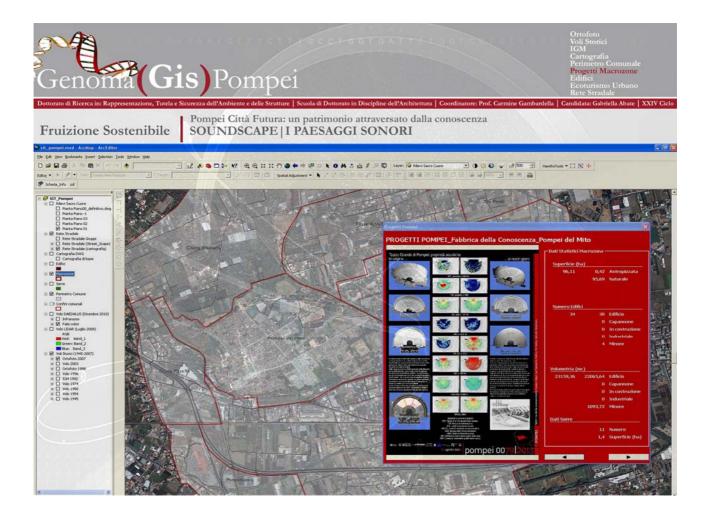
Fig. 3: Abate G., *Manage the change in Pompeii with Gisbusiness: Soundscape,* 2012.

Fig. 4: Abate G., Manage the change in Pompeii with Gisbusiness: The Museum Business, 2012.

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Cultural Landscape and Culture of Landscape

Gaia GIORDANO
Dipartimento di Cultura del Progetto, Facoltà di Architettura *Luigi Vanvitelli*, Seconda Università degli Studi di Napoli, Napoli, Italia
E-mail gaia.giordano@unina2.it

Abstract

All Landscape deserve the title of *Cultural Landscapes*. Nevertheless, this *Cultural* epithet is preferably applied to landscapes that express a particular harmonic relationship between the society and the environment, in the spirit of what we call, today, sustainable development and that are representative of a certain culture or civilization. The Cultural Landscape, indeed, is defined as a complex entity formed by the synthesis of physical, environmental, historical, social, economic and political issues that characterize the identity of a place. These are cultural aspects that contribute, in the course of history, to change the material and immaterial dimension of the territory, of signs and sediments to which they connect the immaterial forms of perception, are signs and sediments in which they connect the immaterial appearances of perception. The Cultural Landscape represents the symbolic expression of cultural heritage in a modern way. As heritage diffused on territory, the cultural heritage take the overall meaning of the material and immaterial goods that are the source of heritage and identity to a common area and to the people who inhabit it. The cultural heritage that make up this collective entities include material, concepts and representations, specific aspects of community life and the land, as a synthesis through which individuals reproduce the concepts that are used for their identification and representation. The adjective "cultural" would be perceived as the presence of cultural traces that need 'protection' of a particular region or spatial domain, regarded as a common good cultural. However it's clear that today the problem extends to much broader area, especially if we think of a small planet reduce to a mere artifice, like ours, which is important, not only protect but also improve and redevelop brown field sites, abandoned and degraded to transforming them into urban public space, a most vital assets, mostly endangered.

Keywords: Cultural Landscape - Representation - Identity

1. Natural Matrix and Generating Action

All Landscape deserve the title of *Cultural Landscapes*. Nevertheless, this *Cultural* epithet is preferably applied to landscapes that express a particular harmonic relationship between the society and the environment, in the spirit of what we call, today, sustainable development and that are representative of a certain culture or civilization. The Cultural Landscape, indeed, is defined as a complex entity formed by the synthesis of physical, environmental, historical, social, economic and political issues that characterize the identity of a place. These are cultural aspects that contribute, in the course of history, to change the material and immaterial dimension of the territory, of signs and sediments to which they connect the immaterial forms of perception, are signs and sediments in which they connect the immaterial appearances of perception. (Gambardella, 2010). The Cultural Landscapes represent a multidisciplinary conceptual framework that attaches to the landscape dimension, already characterized culturally, an even more pronounced characterization towards the interpretive and representative action that culture has on the land, they are the

result of relationship that companies have established with the environment over the centuries in order to meet their survival needs and social. Therefore, they are products of history and culture. The concept of Cultural Landscape allows you to reposition the human activities and the area within a framework full of meaning and cultural identity, the most appropriate category to indicate territorial space is the 'place', understood in its anthropological sense of the scope of *identitary*, *relationally* and *historical*: (Augè, 1993): *identitary* because for each birth, natural and symbolic, is realized in a place that acquires an additional value given by the sense of belonging that contains the original dimension, *relational* because the sites are configured in relation to the actions and relationships that they house, *historical* because they settle in places the traces of social forms, settlement and production of the populations in the course of time. The place is so different from space, giving the dimension or function of geophysical additional meaning, expression of specific cultural values. In places, indeed, "we identify ourselves, we have our social ties, our dead, our memories, our vital interests, as to be the starting point of our knowledge of the world, a reflection of our action, the measure of our lives the territory " (Turri, 1998). The Cultural Landscape represents the symbolic expression of cultural heritage in a modern way. As heritage diffused on territory, the cultural heritage take the overall meaning of the material and immaterial goods that are the source of heritage and identity to a common area and to the people who inhabit it. The cultural heritage that make up this collective entities include material, concepts and representations, specific aspects of community life and the land, as a synthesis through which individuals reproduce the concepts that are used for their identification and representation. The adjective "cultural" would be perceived as the presence of cultural traces that need 'protection' of a particular region or spatial domain, regarded as a common good cultural. However it's clear that today the problem extends to much broader area, especially if we think of a small planet reduce to a mere artifice, like ours, which is important, not only protect but also improve and redevelop brown field sites, abandoned and degraded to transforming them into urban public space, a most vital assets, mostly endangered. The geographer Otto Schluter is credited with having used formally for the first time, the term as a Cultural Landscape academic term at the beginning of the twentieth century. In 1908, Schluter argued that the definition of geography as Landschaftskunde, would have given the science of landscape, from the logical point of view, a subject of study is not shared with any other discipline. He defined two types of landscape: the Urlandschaft original landscape, or landscape that existed before major human-induced changes, and Kulturlandschaft, cultural landscape created by human culture. The main duty of geography was to trace the changes in these two types of landscape. It was, however, probably Carl O. Sauer, human geography, the most influential scholar who promoted and developed the idea of Cultural Landscapes. Sauer was determined to emphasize the action of the culture as a force capable of shaping the visible features of the earth's surface in limited areas. As part of its definition, the physical environment remains a central meaning, as the means by which and through which human cultures act. His definition of cultural landscape is as follows: "The cultural landscape is fashioned from a natural landscape by a cultural group. Culture is the agent, the natural elements are the means, the cultural landscape is the result". Since the first formal use of the term by Schluter and the real promotion of the idea by Sauer, the concept of Cultural Landscape has been variously used, applied, debated, developed and refined in academia , until, in 1992, the UNESCO World Heritage Committee decided to organize a meeting of specialists to advise and assist the rewriting of the Operational Guidelines of the Committee to include the Cultural Landscapes in the World Heritage List is not characterized from one form neither purely natural nor purely cultural. The adoption and use of the concept of Cultural Landscape by the UNESCO World Heritage Committee has seen many specialists in the world and many nations to identify, evaluate, include in the list of assets, manage and actually make known and visible to the world the Cultural Landscapes, with very practical ramifications and challenges. The theme of Cultural Landscapes, debated for a long time in Anglo-Saxon countries and in Europe, it also raises the attention of Italian society, equipped with various facets and complex, it offers a point of balance between the need of an environment on a human and memory and the desire of a landscape area. The term itself, however, would seem to indicate a difference between cultural landscapes and other landscapes, forcing a confrontation between different points of view: on one side protected by the ideology of the Cultural Landscape Conservation, careful to the established values of the community, on the other hand those landscapes fast processing, places in which the city is lost and blends into something else, the object of attention from the disciplines of geography and territory. In the current cultural and scientific debate, then, the landscape is becoming more and more importance and significance. A deep cultural innovation has in fact characterized by a completely new interpretation than in the past, considering it good to be protected as an expression of social-ecological transformations occurred on the territory by the community. Any culture not only interacts with the landscape as if it produces with its practices and relationships are often intangible, but also because he perceives it, is reflected on it and gives it meaning and particular and changing values, also the psychological one Consequently, a cultural landscape, in a given historical moment, shows always

different stages of development of a society. Identify and represent the culture of a community in the heritage of symbols made in the course of history gives way to explore her deepest identity and draw together the visions of its humanization and its network of values. The landscape and its cultural representation are a central theme for the recognition of the intrinsic and absolute value of the culture of a place, culture rooted in a territory which has its own geographical dimension, a physical space. This main theory leads to represent the culture as a story of symbols attributed to places and living spaces by the community. Places, symbols and living conditions are, therefore, the conceptual terrain within which proceeds the cultural representation of the landscape. We are now faced with the need to equip ourselves with new eyes, new instruments are sensitive to these intangible assets needed to find and understand the cultural dimension of the landscape, to highlight the weft and warp of the relationships between places and people in a given geographical area. It can ultimately say that the action of culture is the force capable of shaping the visible parts of the earth's surface in limited areas, to define the landscape changing physical and natural environment through human actions and coined the cultural landscape, shaped by a natural landscape by a cultural group. Culture is the agent, the means of the elements, the cultural landscape is the result.

Fig. 1: **Austria**. Hallstatt-Dachstein Salzkammergut Cultural Landscape. Declared Cultural Landscape in 1997.

Fig. 2: **Australia**. Uluru-Kata Tjuta National Park. Declared Cultural Landscape in 1994.

Fig. 3: **Austria**. Wachau Cultural Landscape. Declared Cultural Landscape in 2000.

Fig. 4: **Argentina**. Quebrada de Humahuaca. Declared Cultural Landscape in 2003.
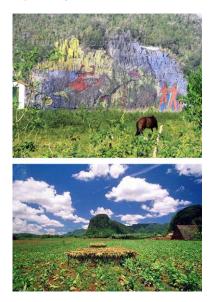
Fig. 5: **Cuba**. Viñales Valley. Declared Cultural Landscape in 1999.

Fig. 6: **Austria/Hungary**. Fertö/ Neusiedlersee Cultural Landscape. Declared Cultural Landscape in 2001.

Fig. 7: **Germany/Poland**. Muskauer Park/Park Muzakowski. Declared Cultural Landscape in 2004.

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Speculations on the Future City

Dr. Fatih RIFKI, Professor
Montana State University, U. S. A.
E-mail rifki@montana.edu

Introduction – Questions and Axioms

Today, the 'information age' is an increasingly urban age, because, since 2008, more than half of the world's population can be called "urbanite". In this second decade of the 21st Century, urban population in the world as a whole has reached 7 billion and still continues to grow at a fast rate. The 'digital society' on the other hand is a society, which is mostly domiciled in cities and metropolitan regions.

Given this state of matters, a prudent question one may be prompted to ask is what the current nexus is (and in the future would be) of the rapid acceleration of the use and the phenomenal advancements in the capabilities of digital technologies, particularly information processing and communications on the one hand, and the intensifying urbanization of the planet on the other. That is one may ask what the impact of these technologies is on the contemporary spatial, social, economic, geographical, political, and cultural processes urbanites are engaged in mostly in urban areas of the globe. Or more succinctly posed: is there -a cause-and-effect relationship between digital technologies and urban life? If there is, which is the cause and which is the effect? Are (or aren't) the ever-ubiquitous digital technologies and urbanization constitutive elements of broader processes of modernization, internationalization, globalization, industrialization, restructuring, and cultural change? These constitute the main questions this paper attempts to answer.

Cities continue to be, as they have always been, where financial and human capital is concentrated as more and more of the regionally or nationally focused, if not internationally oriented firms and institutions, flock. At the global scale, these cities attract people with higher disposable incomes who initiate, demand, and nurture cosmopolitan and multicultural social environments. Further, cities are increasingly becoming mediated by flows of electronic information and symbols, as evidenced by the progressive digitization of money, services, media, information, education, and logistics. In light of these, at the very basic level and a priori to the above questions, isn't it prudent to explore the ways digital technologies help facilitate, nurture, and intensify the urbanization processes at the global scale? Conversely, how do the demands of the contemporary urban life, work, and play; initiate, sustain, and nurture innovations in digital technologies? These two questions reflect the title of the paper.

Three main axioms can be cited on the nexus of digital technologies and urbanism:

First, digital technologies encourage urbanized entities, mainly service and manufacturing as well as cultural centers, to mostly locate in cities and facilitate them to extend their markets, powers, and control to over ever more distant regional, national, international, and even global hinterlands. Cities after all have the infrastructure to facilitate this influence and consequently affect urbanity. Urban infrastructure in turn helps bind, integrate, and add economic dynamism to the vast, extended, and multi-centered urban settlements, corridors and regions of our age.

Second, in an intensely complex, multivalent, and currently volatile global economy, and the growing speed, complexity, and riskiness of innovation in all sectors, cities seem to attract a parallel concentration of creative assets and nurture an 'innovative milieu' to sustain the ongoing competitiveness. Creators and innovators of the digital technologies still need to be in the proximity of one another, i.e., 'in the thick of the innovation process', even though their products can the often be instantaneously sent online to distant markets and users as well as to local urbanites.

Finally, demand for digital technologies -mobile and land-based telephones, satellite and cable TVs, computer networks, electronic commerce, Internet services, is overwhelmingly driven by the growth of metropolitan markets. Global cities, which rely on digital technologies, drive most aspects of innovation and investment necessary for developing and sustaining digital technologies. After all, urban social and economic processes that take place in cities require speed and mobility and in turn result in complexity and dynamism.

Previous Scholarship on the Nexus of Digital Technologies and Urbanism

From the mid 20th century up until the early 1990s, the complex links between cities and the digital information processing and communication technologies had generated a curiously meager body of scholarship in urban studies, mainly because of the relative invisibility of these technologies compared to physical communications systems. Information and communications studies, on the other hand had traditionally tended to neglect the dominant role of modern cities, again until the last decade of the 20th century. There were few, but significant exceptions to these in literature and film, particularly in late 19th and early 20th centuries and most of these had a science fiction slant.

Since the mid-1990s however, notable theoretical, empirical, and policy research on the links between the ever developing digital technologies and the changing nature of cities and urban life has rapidly emerged in urban studies, anthropology, geography, planning, art, sociology, architecture, cultural studies, and transport studies, as well as in information, communication and media studies. So much so that a "sub-discipline" seems to be emerging as scholars are positing the reciprocal impact of Internet, mobile phones, Geographical Information Systems (GIS), and Virtual Reality (VR) on urbanism. Currently, urban scholars are particularly interested in the mutual influence of the forms, processes, experiences, and ideas of urban life and the digital technologies in a wide variety of contexts across the world. Nevertheless, debates about both the implications of digital technologies for cities and urban life, and the effects of the cities and urban life on digital technologies, have yet to move to center stage on urban research agenda.

Against the widespread assumption from the 1960s to late 1990s that electronic communications would necessarily work to *undermine* if not outright *threaten* the very existence of cities, notable empirical evidence suggests that the two realms are actually supporting each other. So much so that nowadays coming across counter claims such as the ones that posit that the current and potential use and application of digital technologies within and between cities constitutes a critical, strategic, and positive nexus that underpins the development of human societies, settlements, and, indeed, civilizations is no longer an isolated occurrence in the relevant literature but is more commonplace than the contrarian view.

However, it was only a few decades ago, mostly during the second half of the 20th century, that "dis-urbanists" dominated the urban discourse taking place and this was occurring mostly in the western world. Many commentators, business writers, futurists, novelists, utopians, media theorists, architects, planners, and social scientists portrayed digital technologies as being effectively at war with any urban-based activity, which generated the need, or desire, for geographical concentration of people and economic and social processes in cities and urban regions. Their critical justification was that conventional, i.e., face-to-face human interactions would be gradually replaced by growing flows and capabilities of electronic communications. This, it was alleged, might even lead to the gradual 'dematerialization' of advanced societies resulting in a post-urban fantasy. For example:

In 1964, media theorist, the late Marshall McLuhan, known for his aphorisms such as "if it works, it is obsolete" and "turn on, tune in, drop out" (by way of Timothy Leary who wrote a book that had this as its title), suggested that the coming of the 'global village' would inevitably mean that 'the city as a form of major dimensions must inevitably dissolve like the fading shot in a movie'.

Urban theorist and professor emeritus at the University of California, Berkeley, the late Melvin Webber argued, around the same time, that in the near future, 'for the first time in history, it might be possible to

locate on a mountain top and to maintain intimate, real-time, and realistic contact with business and other societies. All persons tapped into the global communications network would have ties approximating those used in a given metropolitan region'. Reflecting on the complexity of urban development in an age of rapidly growing communications and mobility, he challenged the conceptual foundations of urban studies, postulating that urban planners and transportation analysts should focus less on the notion of place and more on the linkages and connections, both physical and informational, that bound together what he called "non-place realms." Seeing the city as, in effect, a giant switchboard, he anticipated the 'networked society'. In the light of new forms of communication and the prevalence of the automobile, he argued that concentrated, denser urban forms were not necessarily more desirable than more dispersed settlements.

French philosopher, cultural theorist, and urbanist Paul Virilio, best known for his writings about [technology](#) and credited for the often-referenced quote "The speed of light does not merely transform the world; it becomes the world; globalization is the speed of light" also speculated about the urban future shaped by digital technology. In 1993 he observed that the diffusion of digital technologies into cities would mean that 'the city of the past would slowly become a paradoxical agglomeration in which relations of immediate proximity give way to interrelationships over distance'.

And at around the same time, i.e., in 1995, Nicholas Negroponte, then the Director of MIT's Media Lab, asserted that 'digital living' would include less and less dependence upon being in a specific place at a specific time, and the *transmission of place* itself would start to become possible. Soon, he believed, homes would be equipped with 'electronic windows' allowing him, from Boston, to 'see the Alps, hear the cowbells, and smell the (digital) manure in summer'. Thus, while being in Boston, he would, in a way, be 'very much in Switzerland'.

Martin Pawley, an influential British architecture critic, pronounced in 1997 that, 'in urban terms, once time has become instantaneous, space becomes unnecessary. In a space-less city, the whole population might require no more than the 30-atom diameter light beam of an optical computer system'. He foresaw a society with ever-greater technical means of communication becoming paradoxically more insular and dysfunctional.

Finally, British writer Charles Leadbeater pronounced that 'at the moment (in 2000) it is as if we occupied two worlds at once, especially in our congested cities: the physical world of clogged roads, which is inefficient, slow moving, and rigid; and the immaterial world of computers and communications, in which we can work at the touch of a button. The ease of use and responsiveness of the new, immaterial economy will make us increasingly frustrated with our experience of the cumbersome old economy of physical machines and roads'.

Building on these and many other suggestions broadcast by writers that new technologies would overcome the need for spatial proximity, many more authors implied that the spread of digital exchanges at the speed-of-light pace, and the explosion of digital domains, would necessarily imply some catastrophic collapse for cities.

The implications of these predictions seemed depressing for those who cherished and valued vibrant cities in all their physical juxtaposition, conflict, unpredictability, and their social and cultural diversity. If such scenarios were to be believed, human reliance on urban places, urban infrastructures, transport flows, and even the corporeal presence of human bodies could, and would, ultimately be transcended. After 8,000 years, urban life, with all its messy and material ambivalence, its clashing territorialities, and its associated congestion, poverty, conflict, violence, pollution, and social problems, was on the way out. Crudely put, the pure, clean, and limitless realm of (post postmodern) 'cyberspace' would rescue us all urbanites from the dirty, polluted, contested, finite, (modern) city. To believe such authors was to believe that a new post-urban age was being ushered in, which would finally allow the rural utopias of the twentieth-century architects like Frank Lloyd Wright to be realized.

Four "Romantic Visions" of Post-urban Fantasy

Place - Breakdown of Materiality - Cyberspace
The romantic vision of the demise of cities, in favor of place-less (non) urbanism stressed the technological basis of a post-urban societal revolution. Rather than seeing the digital technologies as means to be seized upon, shaped, and readily adopted within the fine-grained practices of everyday urban life, such technologies

that enabled cyber-spatiality, were cast as a 'dazzling light,' 'holy grail,' and 'shining' above everyday concerns of urbanism.

Replacing physical movement in and around the city would be the limitless domains of dematerialized cyberspace -the digital domain that results from the convergence of computers with digital telecommunications and new media technologies. First coined by science fiction writer William Gibson, the term cyberspace has been defined as 'a parallel universe' or 'a new kind of space, invisible to our direct senses, a space which might become more important than physical space itself'.

The period these romantic visions became the most common was the last two decades of the 20th century when the "information age" reached its pinnacle with the rapid growth of the Internet and world-wide-web, as computing power was doubling every two years and microchips were starting to saturate every domain of life. It seemed very possible that soon every equipment, instrument, appliance -even human bodies, would be fitted with digital technologies and turned into globally connected digital appliances or terminals linked by broadband telecommunications services over fiber optics and global satellite links.

The "master narrative" or the 'teleology of cyberspace' suggested that digital technologies would transform 'information from something separate and contained within computers to a space we can inhabit'. The world of cyberspace, invariably, was pictured in this romantic discourse as 'a world that exists in the future ... a hope, an expectation, for future fulfillment'.

Architecture scholars who espoused this romantic vision, like Michael Benedikt, a professor at University of Texas-Austin yearned for a future when 'materiality' was 'cast away' because humans could 'inhabit' a virtual world of pure information, while software engineer David Gelerntner predicted that 'reality' such as cities, would be replaced gradually and piece by piece by its 'software imitation' i.e., the 'virtual reality'.

Because the software produced reality was immaterial, infinitely extendable, and an absolute substitution for all forms of physical mobility and corporeal presence, 'cyberspace' was thus seen as a force for decontaminating the natural and urban landscapes, redeeming them, saving them from the chain dragging bulldozers of the paper industry, from the diesel smoke of courier and post-office trucks, from jet fuel flames and clogged airports, from billboards, trashy, and pretentious architecture, hour long freeway commutes, ticket lines, choked subways - from all the inefficiencies, chemical and informational pollution, and corruptions associated with moving information attached to things, across, over, and under the vast and bumpy surface of the earth rather than letting it fly free in the soft hail of electrons that was cyberspace, declared - yet again- Michael Benedikt.

By late 1990s, the explosion of wireless infrastructure promised and began to deliver the unhitched computing and communications from fixed locations, as cyberspace advocates predicted. In its wake, a non-spatial world beckoned where digital streams of information, data, images, and video - manipulated and processed through an infinitely complex global skein of computer networks, pervaded every domain of contemporary society.

Process - Dawn of the more Egalitarian, Capitalistic, and Ecologically Sensitive Societies - Cybernetics

The second romantic vision of the post-urban discourse involved utopian assumptions that the shifts away from place- and city-based lives made possible by digital technologies could meld communities and mediate democratic processes in ways that would completely replace the political, social, and anthropological roles individuals and communities have played and continue to play in urban places. It was often uncritically assumed that such a development would automatically lead to shifts towards more democratic, egalitarian, decentralized, and ecologically sensitive societies. As a matter of fact, the digital "revolution" would yield a cultural revolution because information could be transmitted and transmuted in fundamentally limitless ways, enabling the successes already being witnessed in digitally processed economic transactions. A global neoliberal marketplace where individuals engaged seamlessly as consumers with the entire planet based on globally stretched digital technologies was no longer a utopia.

Beyond the tangible, digital technologies would offer the priceless intangibles of friendship, community, and understanding leading to a new democracy dominated neither by vested interests of political parties nor of

the crime syndicates or oligarchs. It could narrow the gap that separate capital from labor and it could deepen the bonds between people and planet.

Advocates declared that with reduced (or altogether eliminated) need for face-to-face encounters and interactions; tools to (re)-install some form of idealized Athenian or Jeffersonian democracy were now available in the national and global digital infrastructures. With the capabilities of the digital technologies that would support bi-directional and decentralized communications, communities, and democratic links could be forged irrespective of geography, resuscitating democracy itself.

People - End of the Actual Being and the Complete Substitution of Corporeal Presence - Cyborg:
The third romantic vision of the post-urban discourse was the most bizarre of all: the progressive blending of digital technologies with human bodies! Society would effectively be dematerialized, as urban activities would effectively migrate into the ever-extending domains of virtual interaction. Thus, cities would become increasingly and conspicuously "old-fashioned" and unfit as political, social, and cultural expression of the time. As a matter of fact, it was claimed, cities would gradually be complemented, and eventually be replaced, by a fast-expanding universe of virtual realities, virtual communities, and digital economies, as well as unlimited and electronically constructed and maintained domains accessible from anywhere and at any time.

In a direct challenge to the human experience of "actual" place, "virtual" domains would increasingly evolve to be experienced immersively through Virtual Reality (VR) technologies. These "places" and the digital media would fuse with the human bodies and nervous systems of their cyborg (cyberneticorganism) hosts ever more seamlessly. Such 'terminal citizens' could, in a sense, 'leave' their physical bodies ('meatspace'), and their local geographies, 'behind' the arrays of technology they used to create, to inhabit the new simulated, replaceable, and infinitely extensible, virtual worlds. Richard Coyne, who is a Professor of Architectural Computing at the University of Edinburg, put it this way: "in a virtual world you can have instant access to any coordinates in data space. You can be here, there, or any/everywhere, unlike the limited spatially constrained world we usually experience". Expressions such as this summarized the critical seam of the discourse prevalent in this romantic vision, often called Technoromanticism. More and more in this context, the concept of a person or of human beings appears to depend on the attenuated possibilities of cyberspace.

For better -and certainly not worse, the crude and in most cases, bleak fantasies of a complete substitution of corporeal (i.e. bodily) presence and movement within and between urban places to habitation of a virtual domain are now less ubiquitous than during their heyday from1960s to1990s. Nevertheless, 'at the turn of the twenty-first century', anthropologist Caren Kaplan, currently Professor of Gender and Women's Studies at University of California at Davis, has argued that it is still 'the rhetoric of cyberspace and information technologies that we hear and read, and the discourse is heavily reliant 'on a hyperbole of unlimited power through disembodied mobility'. Whether we encounter theorizations of new cityscapes published by university presses or are exposed to advertisements in magazines, references to boundless space, unfettered mobility, and speedy transfers abound.

Time - Collapse of Geographical and Temporal Constraints - Cybertime
The last romantic vision emerging out of the post-urban revolution that is relevant here, involved the assumption that digital technologies would entail a generalized collapse of temporal constraints –mostly manifested by distance- on urbanites' interactions, which urban life is about. After all, people always chose to establish themselves in cities to overcome the "separation in time and space", i.e., distance, with other people whom they engage with in urban processes (service, trade, cultural partake, etc). The city had evolved for 8,000 years of urban history by concentrating human life in geographical territory. Through minimizing space constraints, cities had allowed the time constraints on physical human interaction to be reduced. Even in major metropolitan regions physical, face-to-face contact could be achieved within a reasonable time. The prediction was to continue witnessing the exponential growth of the communication technology in capability, scale, and sophistication to such an extent that they would directly displace, and substitute for the city. It followed that, in the future, the key relationships in the 'digital age' or the 'information society' would not link a person or a group and his/her or their home, their neighborhood, their city, or their nation, by rather, the urban relationships would continuously telescope between the individual and the integrated and planet-wide, digital civilization as a whole. Thus, parallel to the death of cities, the death of distance, by way of cyber space, was presented as both logical and obvious. Inevitably, the digital

technologies would be detrimental to the future of urbanism. Since the digital technologies of communication would facilitate 'real time' interactions to occur: time -as a significant inhibitor of human interaction- would thus be no longer relevant in urban life. The underlying logic of this romantic vision was founded on the equating of distance with time.

Critique of the Post-urban Fantasy

In the dialectic discourses that have been taking place in the last half of the 20th century, as posited by the romantic visions delineated here, the digital technologies and urbanism would diverge into polar opposites. However, these visions of the post-urban fantasy were far from being a single or even a unified discourse. They varied significantly in their assumptions, bases, arguments, and even in conclusions, save for the common belief in the death of cities –as we had come to know and experience them. A complex range of philosophical and theoretical antecedents served as bases on which each were put forth. Many had futurism, cyberpunk science fiction, media, and critical theory as their source, though architecture, planning, and urban studies were significant fields of study from which many of the discourses drew their genesis. A significant number of discourses, particularly the ones coming from science fiction, had bleak, cynical, and a pessimistic view and critique of the direction global political, economic, and technological change predicted to take place.

Nevertheless, all the depictions of the future, predicated on the speculated advances in digital technologies, had one commonality: they were based on a general, and thus uncritical, use of the metaphor that cities would simply be 'impacted' by new technologies, particularly those that pertained to communication, and this impact would be in the same way planets are impacted by asteroids. In all the above accounts, digital technologies were portrayed as arriving from 'out there', as a transformative 'force' or 'shock' hitting the fabric of urban society.

To regard new technologies as 'largely unproblematic and even autonomous in shaping the life and form of urbanity reflected the long-standing tendencies within the contemporary culture, and this may be held as the foundation for -and fountain out of which sprang the four "Romantic Visions" of post-urban fantasy outlined previously. In all, digital technologies were generally portrayed as some disembodied, external 'wave' of change which, quite literally, transformed cities and urban life single-handedly. Alvin Toffler, the author of Future Shock, even used the metaphor 'Third Wave' to capture the latest digitally based societal revolution, following on from the First (agricultural) and Second (industrial) revolutions.

This view reflects the classic, deterministic view of the role of new communications and transport innovations in which 'changes in technology lead inexorably to changes in urban form' and urban life, and not the other way round. In this view, the fledgling networked infrastructures like the Internet become little more than 'progenitor[s] of new urban geometries'. Such rhetoric assumes a simple, linear, cause-and-effect chain where the technology itself is as the direct and single causal agent of urban change. Commonly, this intellectual perspective is quickly translated into the broader use of technological and infrastructural depictions of historical urban 'ages': from the 'hydraulic civilizations' of the first urban centers in Mesopotamia, through to the 'steam', 'electric', 'auto', the 'nuclear', and 'information age' metropolises of the past three centuries.

Thus, the critical problem with the romantic fantasies is that they tend to portray technologies as having overwhelming power in ushering in simple and discrete societal shifts, which seem to amount to some naturalistic process of urban and societal evolution. In the process, the parallels and congruencies between historical periods tend to be underplayed or completely disregarded. Further, in the fantastic scenarios of place, processes, people, and time, each romantic vision also implies that all cities would somehow be 'impacted' by digital technologies in similar ways, irrespective of their starkly contrasting geographical positions, sociologies, economies, cultures, political structures, and histories, because technology it is assumed to operate in the same way in the general and at speculative levels. The tendencies of newer technologies to overlay, and subtly combine with, rather than replace, earlier ones are often ignored. And the forms and processes of city life tend to be simply read off as the deterministic result of the intrinsic nature of the new generation of technology.

Such 'technological determinism' - the reading off of the universal effects of technologies from their intrinsic properties- is nevertheless attractive. It helps to create powerful scenarios, clear stories, and tangible predictions however simplistic they all are. It makes good copy for the media and creates glamorous notions

of a new electronic 'frontier' awaiting colonization by those hardy pioneers that are up to the task. Such rhetoric seems to tally well with the early periods of the diffusion of a new set of technologies and practices. This is because, at this stage, people literally see the social world, and the urban landscape around them, gradually filling up over time with new equipment, new artifacts, new practices, and new ways of organizing human experiences -as if coming from nowhere. Above all, technological determinism and the metaphors of their impact accord well with the dominant experience in the Wild West in the U.S. several centuries ago.

What is unfortunate however is that the pervasive reliance on 'technological determinism' leading to end of city visions actually obscures the complex relationships between new communications and information technologies and cities and urban life that have emerged as these have diffused to be embedded in real everyday lives and practices.

Many urban scholars find the digital technology-related shifts in everyday urban life occurring now to be more intriguing than could possibly have been predicted solely by the generalized scenarios pumped out between the 1960s and 1990s. The architecture critic and Yale University professor Keller Easterling for example, argues that 'the explosion of changes to the world's markets, cities, and means of shipping and communication [are] far more strange and unpredictable than any of the swaggering futurology scenarios'. Thus, there is a desperate need, as many sociologists suggest, to move beyond the deterministic discourses about the 'impacts' of 'cyberspace' on society to look in rich empirical detail at the complex ways in which digital technologies are being used in real ways, in real urban regions, and in the real world. This is imperative.

Far from being a complete and revolutionary break with the past, most advances in digital technologies retain many intrinsic qualities of and maintain intimate connections with old media, old technologies, old practices, and mostly electromechanical old infrastructures and spaces e.g., telephone systems, broadcasting systems, electricity systems, highway systems, streets, airline systems, logistics systems. The so-called 'information age', then, is best considered not as a revolution but as a complex and subtle amalgam of new technologies and media fused onto, and 'remediating' the old ones. They are allowing for the subtle 'remediation' of TV, newspapers, magazines, radio, telephones, publishing, books, art, video, photography, face-to-face communication, and the social and anthropological experiences, and construction of place. This is happening as established practices subtly combine with, rather than disappear all together, in socially constructed technological patterns. There are a great many more continuities and synergies than many romantic visionaries of the post-urban fantasies would have us believe. We are not experiencing some wholesale and discrete break with the urban past ushered in by the 'impacts' of new technology. Rather, we are experiencing a complex and infinitely diverse range of transformations where new and old practices and media technologies become mutually linked and fused in an ongoing blizzard of change. 'Cyberspace' is very much a part of our contemporary world and it is constituted through a series of remediations. As a digital network, cyberspace remediates the electric communications networks of the past 150 years, the telegraph and the telephone; as virtual reality. It remediates the visual space of painting, film, and television; and as social space while it also remediates such historical places as cities and parks as well as 'non places' such as theme parks and shopping malls. Like other contemporary tele-mediated spaces, cyberspace refashions and extends earlier media, which are in and of themselves embedded in material and social environments.

The first problem is obvious: deterministic end of city accounts are simply, empirically wrong.

End of city discourses studiously ignore the fact that fast pace urbanization and growing digital technology use are actually going hand in hand.

The beginning of the 21st Century marked the milestone of the world population being more urbanite than not.

End of city perspectives also ignore the rapid rise in all forms of physical mobility at all geographical scales. These have actually grown in *parallel* with the application of digital technologies; they have not been replaced them.

The growing gridlock of city streets; the staggering rise of global automobile ownership; the exponential growth of airline travel; intensifying levels of consumer and business tourism; growing energy consumption; and a general acceleration of flows of goods, commodities and raw materials at all scales across the world.

Cities of all types across the world continue to be not only the powerhouses for all aspects innovation, research, application of digital technologies, but their demand and installation.

However, current processes of economic, political, social change mostly facilitated by digital technologies, are radically affecting cities. There could be no denying that cities are becoming more diffuse just as the condition of all spaces within societies becomes more generally urban.

The second problem with digital technology-based end of city visions is that they ignore the very material realities that make the supposedly 'virtual' realms of cyberspace' possible. 'Cyberspaces' do not exist on their own; the many supposedly 'virtual' domains and worlds are brought into existence, and constantly facilitated by massive and globally extended sets of material systems and infrastructures.

Because the material bases for cyberspace are usually invisible they tend only to be noticed when they collapse or fail through wars, terrorist attack, natural disasters, or technical failure. Thus, in contrast to the vast and land-hungry infrastructural edifices that sustain transport, electricity and water flows, the myth that cyberspace is an ethereal, unearthly and even immaterial realm continues to retain power.

The third problem with the utopian and anti-urban predictions of end of city visionaries is that they massively over-generalize. They imply that all experiences are the same anywhere and that digital technologies relate to all cities in the same way at all times.

Tough the digital technologies are helping to facilitate significant reconfigurations in the geography, mobility patterns and social economic and cultural dynamics of cities, and in the ways in which urban life is represented, lived and managed, these changes are subtle. They are often counterintuitive and they tend to involve many other processes of change.

The fourth problem with deterministic end of city predictions is that they tend to dramatically overestimate the capabilities of digital technologies to mediate human relationships. At the same time, they dramatically underestimate the complexity, richness, and the continuing anthropological and cultural power generated by co-present human bodies in places, which are predominantly urban.

The penultimate problem with end of the city scenarios is that they -at least in their utopian incarnations- tend to promote simplistic, biased and glossy ideologies of the so-called 'information age'. Many of these have been relentlessly used to improve the public relations profiles of governments and digital media and telecommunications firms.

The final problem with end of city visions is that, in their depoliticized depictions of cities being 'impacted' by waves of autonomous, future technology, which seem to arrive from elsewhere, they imply that there is little or no space for policy innovation in cities, urban regions, or nations and supranational blocs.

It is the irrefutable reality that the twenty-first century will be a century marked by *both* the deepening urbanization of all parts of our planet *and* a growing reliance on fast-advancing information and communications technologies.

Four Romantic Visions on the Future City

Place - Breakdown of Materiality - Cyberspace

Process - Dawn of the more Egalitarian, Capitalistic,
and Ecologically Sensitive Societies - Cybernetics

People - End of the Actual Being and the Complete
Substitution of Corporeal Presence - Cyborg

Time - Collapse of the Geographical and Temporal
Constraints - Cybertime

"Carolino" Aqueduct landscape

Gilda EMANUELE

Dipartimento di Cultura del Progetto, Facoltà di Architettura, Seconda Università degli Studi di Napoli, Aversa, Italia, gilda.emanuele@gmail.com

Abstract

The insertion in 1997 in the UNESCO Heritage Sites has urged a great attention on this magnificent work. This action has solicited a greater attention on this magnificent work that from the Taburno it comes up to Carditello.

In 1750 the architect Vanvitelli, that was getting great comparison near the pontifical and noble clients in Rome, was entrusted from the sovereign Charles of Borbone so that realize a stately palace to Caserta, the new political capital of the kingdom and to contextually see to resolve the old problem of the water provisioning. The jobs of the stately hydraulic work, began in 1753, after the presentation of the project to the sovereigns and it lasted until 1770, with a total expense of around 700.000 ducats. The denominated "Carolino" aqueduct , in honor of the sovereign, it is long around 40 km and it crosses the territories between the provinces of Benevento and Caserta, it depart from the sources of the Fizzo up to the falls of the Palace. The water pipe was entirely buried, except external lines on the bridges, and the path was signalled by 67 turret, square building with pyramidal coverage, together with the other works of service, collectors, gathering tanks, mills, ramifications for the water restocking, signal the presence of it and they constitute the element "meaning" of what we could define "the *Carolino* landscape."

keyword: "Carolino" landscape

The modification of a landscape

Prigogine writes "the science is a dialogue with the nature, but the knowledge passes through the time. It implies a becoming, a difference between present and past. It implies an universe under construction and a life that he evolves. These concepts can be conceived in a very vast horizon and extended the term, but if we want to analyze the meaning of anthropization. In more real sense, it needs to consider the various ecosystems on our planet formed from: water, earth, atmosphere.
The anthropization begins with the appearance of the man on the earth. The first great civilizations, nevertheless, despite some imposing works as the Pyramids or the control of Nile course in Egypt, the capital terraced with great hanging gardens in Babylon and the beautiful states been in Greece they didn't provoke great environmental changes. An example of balanced environmental insertion were nobles Romans villas that exploited the characteristics of the places. Also in the Middle Ages and in the humanism

the architectural and rural environment was of great harmony. Only in the last centuries the demografic increase was creating a great impact on the rural environment.

The built environment must represent the fusion of the natural element with the human intervention. And' that "new system in harmony" that magically Wright was able to build and every planning of the built environment must aims to it.

On the basis of what results to be the management and the modification of the environment in modern sense, the "Carolino" aqueduct was realized.

This infrastructure in 1997 was inserted in the UNESCO Heritage Sites. This action has solicited a greater attention on this magnificent work that from the Taburno it comes up to Carditello.

In 1750 the architect Vanvitelli, that was getting great comparison near the pontifical and noble clients in Rome, was entrusted from the sovereign Charles of Borbone so that realize a stately palace to Caserta, the new political capital of the kingdom and to contextually see to resolve the old problem of the water provisioning. [1]

After the aqueduct, built in the first years of Six hundred by the Acquaviva of Aragon, reacting and strengthening by the introduction of some sources, denominate Small Waters, you displace on the surrounding Mountains in the plain of Caserta, he made the course of the water still resulted insufficient and decide to realize a new structure [2], an aqueduct that, according to the Charles of Borbone ambitions, it was able to furnish water to the building, to the gardens, to the new city that was forming, to feed the turbine of St. Leucio twisters of, to the mills, drinking trough, to Carditello estate and to increase the preexisting Carmignano aqueduct that supplied the city of Naples. The aqueduct would be become the symbol of Charles sovereignty to emulate ancient Romans works devoted to the great Cesar. [3]

The searches of sources was long and hard. The sources should have rise in a site higher than Royal Palace, so that the water arrive with necessary pressure. A rich zone of sources was found at stratum of Taburno, 254 mt above sea level, on Airola's property, belonging to the prince Riccia, that subsequently gave him/it to the king.

Different solutions were introduced for the realization of the path to the Palace, that don't seemed him easy both for nature land that for the same length, 26 miles, about 38 km.

The jobs of the stately hydraulic work, began in 1753, after the presentation of the project to the sovereigns and it lasted until 1770, with a total expense of around 700.000 ducats. The denominated "Carolino" aqueduct , in honor of the sovereign, it is long around 40 km and it crosses the territories between the provinces of Benevento and Caserta, it depart from the sources of the Fizzo up to the falls of the Palace. The water pipe was entirely buried, except external lines on the bridges, and the path was signalled by 67 turret, square building with pyramidal coverage, together with the other works of service, collectors, gathering tanks, mills, ramifications for the water restocking, signal the presence of it and they constitute the element "meaning" of what we could define "the *Carolino* landscape."

The paths of the "Carolino" aqueduct :
- The aqueduct has origin from the sources of the Fizzo and continues downstream toward Faenza river (current Isclero) where it was built a bridge with three arcs layers, 7 meters high and 190 meters long. (1. Source. Bridge on the Isclero).
- After the bridge on the Isclero the path widens toward S. Martino and Cervinara to lace other sources and then it returns within earth in a tunnel about, 2 Km long, in the hill called Prato. After the crossing of Mount Ciesco Mountain it comes on another deep valley crossed by Faenza river and it crossed with a bridge. The "Carolino" continues for the territory of Sant' Agata de' Goti trough Mount Castrone, of the Acquavivola, of the Sagrastia, of the Cacosa, of Stella Maggiora, of Fico Fano, of Traugano (Mountains belonging to the chain of the Taburno). (2, bridge on the Isclero. Sant'Agata de' Goti)
- The path continues still crossing the Mountains of FicoFano and of Traugnano and then Durazzano. valley Where there is a bridge with 5 arcs, 60 meters long and 19 high. It continues until Cascione torrent and then it meets Mount. Longano The road of the Longano end with the splendid scenery of the Bridges of the Valley. (3.a S. Agata de' Goti. Mount Longano)

The most famous line that countersigns the hard-working project of the aqueduct is certainly the imposing building denominated "Bridge of the Valley" of Maddaloni.

The project developed to overcome what seemed an insuperable obstacle in the time: the vast valley that separates the Mount Longano from the Garzano. Once that it was easily understood that water could not go down from the slope of a Mountain and to go up again the other without water lost the necessary pressure to reach Caserta, it was decided to build a bridge to overcome the obstacle. The work was very hard in the time, as revealed by the many letters that the architect wrote to his brother Urbano

The Bridge, 2000 palms (529 meters) long, 220 high (95,3 meters), was built on three levels of arcs, progressively 19, 27 and 43. An inside passage allowed to cross in all the verses the three orders of arcades,

strengthened by buttresses.

The grandeur of the work, especially in the aerial line, it didn't miss to strike the foreign travellers of the epoch that crossed Naples kingdom; it constituted an exceptional show, in the middle of a solitary valley, All of a sudden rise the magnificent bridge to three orders of tall arcs, that majestically cross the valley on one side to the other. (3. b The Bridges of the Valley - 3.c a war memorial).

Once trough Maddaloni valley, the aqueduct crosses the Mount Garzano.and it continues along the slopes of Tifatini Mountains. The walk continues in depth of 6 Km and than two collectors, allows the clearing of the water in smaller plumbings. (4 Mount Garzano. Mount Briano)

Minor water system is constituted from three small aqueducts: The Old Duct, the Sant' Elmo and the Giove-Fontanelle. (5. Minor water system) [4]

The "Carolino" aqueduct can be seen as a monument that once it has lost its functional value (utilitas) has continued to live and to be appreciated for its landscape and monumental value (venustas).

This is the the case in which "the architecture is what it makes beautiful ruins", as asserted August Perret.

The known aphorism of Perret introduces us to brief considerations and critical reflections.

This work is assimilable somehow to the Greek temples, that are everything today admired in how much, despite their native aspect it is perceivable only, it remains in them the beauty (venustas) and their architectural and constructive quality.

In the downfall of a true architecture we recognize the expressive character, the constructive system, the idea that has produced him/it the osmotic relationship that he is istaurato with the landscape.

In the bare structure, deprived of ornaments, architectural identity appears today still us unchanged, rather strengthened in the expressive eloquence of the naked construction.

This is the motive for which the visits of Louis Kahn on the different European sites of ancient ruins represented for him the key of time in its formation. Its architectures are in fact daughters of a resistance to the banalizzazionis of the modern one and the "flagwaving" technological ends to if same. They are creatures that are born from the almost devoted respect for the man and the nature.

The architecture should not be a mass in scene of a show that once ended it not only loses its functional value but also its identity and its ability of it stuffed to move, quoting her Corbusier we can say that "The architecture is a fact of art, a phenomenon that arouses emotion, out of the problems of construction, beyond them. The Construction is for tener on: the architecture is for moving."

Too often the contemporary architecture is an architecture-installation in which it seems to prevail the attitude to put in scene, to communicate an image, that becomes only with the time old, but not ancient, once that you/he/she has reached the condition of ruin, it loses every value of his and it doesn't even purchase that of "beautiful downfall."

Unfortunately this is a condition common to so many works of contemporary architecture, that don't converse with the surrounding environment.

The greatness of a work as that of the "Carolino" and particularly of the Bridge of the Valley of Maddaloni, it is in the being entered symbiosis with the landscape and to have emphasized him/it with his/her assistant value. it is a monument that he/she lives in osmotic relationship with the landscape, alive in symbiosis, it interprets him/it and it melts him with it.

The manufactured article in this case is a car, it is an anthropological system that valorizes the natural environment; the architecture and the environment constitute a non referable unity to the sum of the parts, but to the totality, that has in itself the assistant value that is gotten with the union and it loses him in the separation of the elements; and it is together that form the monument as Roberto Pane intends him/it. In fact, as he/she quotes the art. 1 of the 1964 Venice Paper, "You notion of historical monument includes as so much the isolated architectural creation the urban environment or landscape that constitutes the testimony of a particular civilization, of a meaningful evolution or of a historical event" and it is for this motive that the safeguard of the manufactured article implicates that of its environment.

In 1972 the UNESCO Convention on the Protection of the World Heritage defines "monument", or better, "Heritage" both the architectural manufactured article is the site, or rather "every complex both work of the man that of the nature, that has historical value, aesthetical, archaeological, scientific, ethnological, anthropological or remarkable physical characteristics, biological and geological, that justifies a protection and an exploitation" The fundamental action that precedes the exploitation of the cultural and natural Heritage is the knowledge of the architectural manufactured article and the landscape in which is inserted.

In this point it makes space for the drawing becomes a means of representing the complexity. The architecture, the land and the environment can't be represented simply by returning three dimensional, but at this canonical method, plus a multidimensional approach, it follows, so that all the elements constituting the landscape should be investigated at different scales representation and, above all, in both forms, extensive

and intensive, that is, entering into the body of the object and know its constituent elements. The objects are then discretized by the knowledge that is traversed in order to be re-established and capitalized.

The evolution of research lies in the limit, in this dynamic place that allows extensive information from entering the body of the objects, and enriching the information, determines the evolution of the representation as a project. Understanding through drawing marks a fuzzy boundary between relief and the project as the relationship between the object detector determines not only knowledge, but also foreshadows the fate.

The desire to recover the historical memory, the deep roots of the place, the traces of the past reveal that the vocation of the place (genius loci), must accompany any systemic approach aimed at understanding the changes, so that the knowledge of the past suggests a continuity with the present and a future in which tradition and development have been merged in the process of economic and social modernization.

For the protection of the landscape and the environment must take two levels of actions:
protecting and regenerating the construction of quality works.

For the protection necessary to engage in an activity intended to measure and capitalize the infinite reasons of nature and recognize the environmental context of the gene.
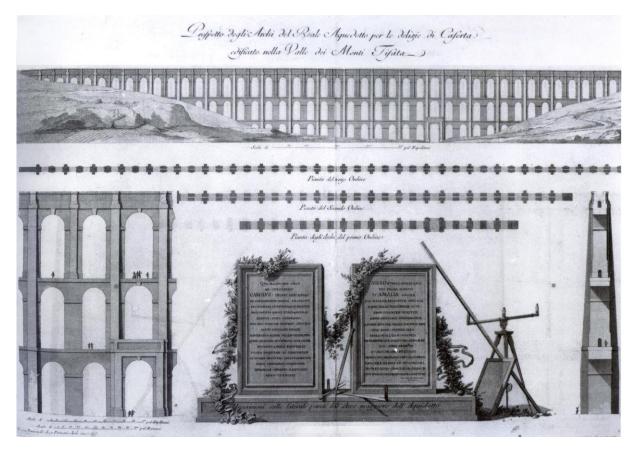
By measuring and drawing changes pass to the next track and intangible assets, favoring quality works through a process of modification of the territory, and not of transformation that involves action taken to overcome the limits imposed by knowledge.

Transformations, a tangible sign of the unstoppable anthropization soil, often beyond repair may have altered the landscape: from cultural and social (think of succumbing to the peasant culture than the urban one), the ecological landscapes. Less well known, at least in the Italian tradition, but the action is "positive" in the process of territorial change in order to improve or increase the same landscape quality of certain urban areas or territorial waters.
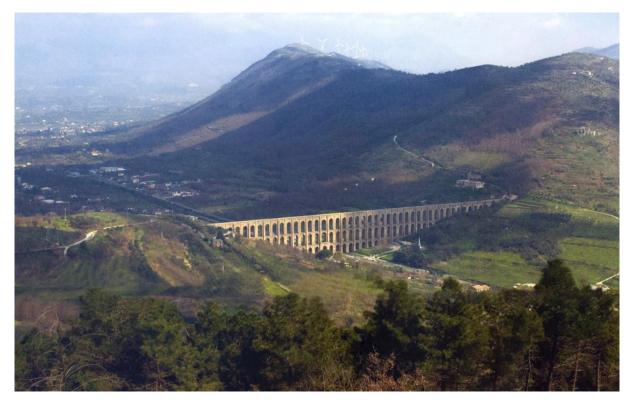
The man works characterize the period, representing the memory to date on an evolutionary process that each sign contains a bio-design.

To be able to get a more complete protection activities must regenerating the natural environment and built to live and develop into the progressive change of the human experience so that the landscape appears as a result of today than yesterday and the becoming, through the project, will be of chief importance to abstract and extract the archetype, defined as geometric matrix of the foundation, the transporter rule knowledge, discretizing in all parts together in agreement.
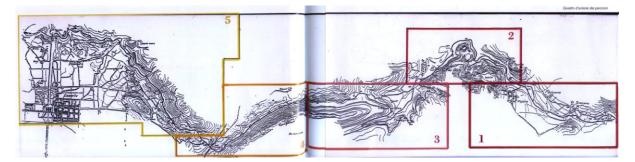
Through the representation metabolizes the past and lays the foundation for change that respects and recoveries, the relationship between archetype and nature, comparable to the value of a stem cell regenerator (borrowed from biology) that is produced by the same complex identity of places. [5]
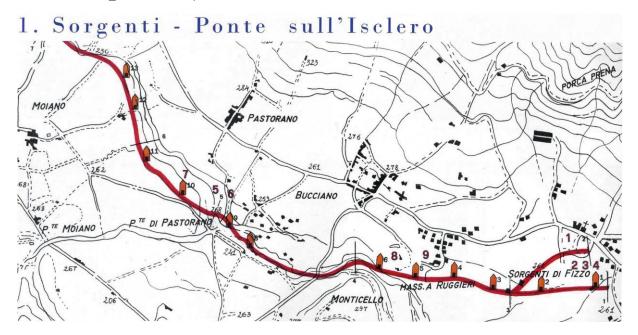
Elevation "Ponte della Valle"
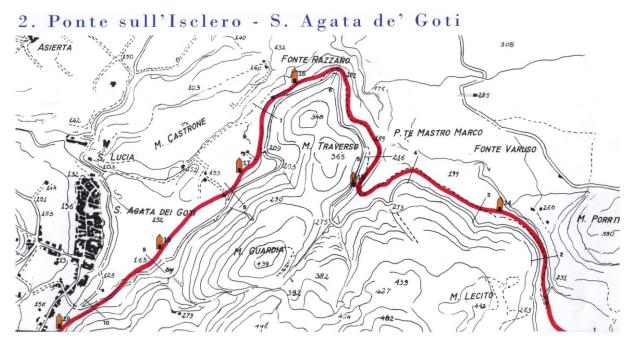
 "Ponte della Valle" landscape _ Maddaloni.
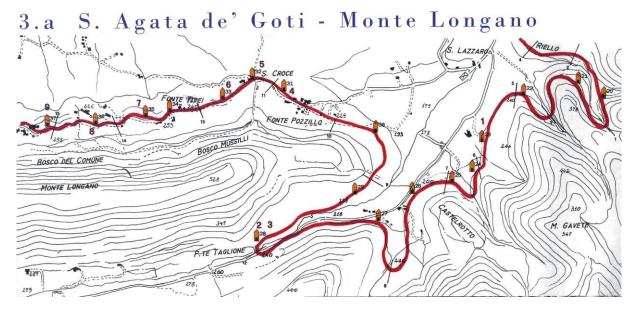
The five courses _ "Carolino" Acqueduct

Course 1 _ Sources – Bridge on the Isclero

Course 2 _ Bridge on the Isclero – Sant'Agata de' Goti
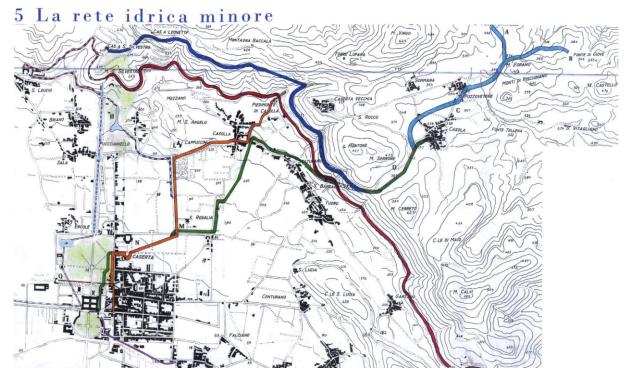
Course 3 _ Sant'Agata dei Goti – Mount Longano

Course 3b _ A war memorial

4 Monte Garzano - Monte Briano

Course 4 _ Mount Garzano – Mount Briano

5 La rete idrica minore

Course 5 _ Minor water system

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Contribut of technological innovation to reinforce the multidimensional knowledge of environment and direct its development

Lina ABATEGIOVANNI
Department of Culture Project, Faculty of Architecture L. Vanvitelli, Second University of
Naples, Aversa, Italy
lina.abategiovanni@gmail.com

Abstract
The main theme of this research is about the awareness and recognition of the territory, with particular attention to the possibility of an integrated approach of different techniques and technologies, as tools to establish forms of sharing territorial data between different disciplines, which may tend to its development. Requisite for the enhancement is with no doubt its knowledge, which passes through measuring action and management of resources that belong to it.
The aim of this essay is highlighting of a method of investigation and analysis that provides a good introduction to the multidisciplinary study of the territory and its multidimensional reading, made possible by a skillful integration of innovative techniques.

Keywords: territory, heritage, multidimensional knowledge, development, technological innovation

1. Introduction
The territory appears to us with higher obviousness as expression and outcome of the complexity of nature and culture, of human actions on landscape in their setting and in their existing impact. To understand the general organization of places, but above all, to prefigure the protection and regeneration, it needs an innovative approach to the study of area based on the integration of skills and knowledge articulation. The contribution of the current technologies that allow us to integrate and to network the knowledge products make us able to show the thought of man, the project in its complexity, as it had never been possible until now, by moving the point of view above, below, on each side but also in the territory. The territory, therefore, constitutes a fundamental reference point of our identity and quality of life, then, a more active consideration of it involves action at several levels. To speak, or rather, to write about the territory in relation to new technologies means addressing the issues of values, identity, perception, the expectations of individuals and the interdisciplinary approach.

1.1 The importance of use of joint disciplinary skills and new technologies
The technological solutions made available by today's contemporary Geomatics disciplines, provides an opportunity of great interest for the detection of the territory and its cultural heritage, both for the relief time and the issues concerning the representation of objects architectural, artistic, archeological things.

The field of c ultural h eritage has attracted in r ecent years a growing i nterest by t he s cientific community often refers to the s cience of detection. UNESCO and other a gencies and authorities of t he f ield now ar ise more and m ore attention t o t he di gital meter of ar chaeological s ites, historic c enters, complex building of historical a nd architectural importance, archaeological r emains; then it is spreading the i dea t hat knowledge of an asset may not involve only its artistic history, but it must also include the characteristics of position, shape and geometry.

New technologies offer the possibility to detect an item in a very short time and with high degree of detail and precision. The qu ality of modern i nstruments, the possibility o f integration an d flexibility they a llow, are combined with the expressive power provided by modern techniques of representation.

The disciplines of surveying, over the centuries, in this regard have refined measurement techniques tailored to the situations and the potential offered by technology, by more simple and effective methods, means of direct relief to t hose der ived from primary descriptive geometry and, finally, today w ith the great potential offered by electronic and information technology and, therefore, the tools offered by modern Geomatics.

In this reading, and in a multidisciplinary perspective, it is easy to understand the meaning and significance of modern development and renewal that are attributable not only to technological advances but also to a new and modern way of dealing with it.

Today's t echnology ar e g uided b y a s urvey m ethod bas ed o n m ultidimensional k nowledge t hat a llow t o "capitalize" the territory, its resources and to enter in the body, bringing back the value of identity.

It is amazing see how using the tools of modern technology, it's possible to represent a UNESCO site, study its components and measure them in a complex management.

The m easure, t herefore, i s t he bas is of k nowledge and e very r epresentation of ph ysical an d i ntangible values of r eality and d ocumentary t races of m an in his b iological e volution as a f unction of en vironmental context in which they live. Measuring and capitalizing the endless reasons of nature mean to recognize the genetic heritage, the identity of places.

The k nowledge of t he c ulture, s upported b y t echnology, c an allow you t o r esume a c omprehensive and challenging debate, especially if the researching areas are supported by developing sceneries, the recovery of new opportunities that this land and cultural treasure can offer to contemporary society. Consequently, it achieves a new survey, whose task is to describe the complexity of the critical factors that affect the urban reality, the natural environment and the entire antropic space in which it occurs top plan out conservation and adaptation to the needs of survival and human welfare.

For a full exploitation of the t erritory, taking i nto account i ts immense her itage, the s et of ne w t echnologies is now an unavoidable tool for t he ac quisition and us e of geo-referenced i nformation to the g overnment and the innovative management of land and environment.

It is t herefore nec essary to k now the bas ic c oncepts underlying c omputer t echnology for t he processing of data and territorial and environmental information, as well as learn about the technological resources now available to us e its specific ch aracteristics in r elation to t he d ifferent territorial pr oblems. The i ntegration of t he t echniques allows t o obt ain a f air am ount of controllable dat a, in s pite of their heterogeneity, and different processing, to s upport t he different purposes programmed i n the conservation project.

The new techniques an d digital t echnologies of fer, i n f act, t he pos sibility of o btaining n ew pr oducts ne w products not only by the relief's activities but also in the representation and in the view, with the purpose of having a metric accurate description of the whole territory.

In order that this complex procedure show its full effect it needs the shortest possible time switch from the "cognitive dimension" to the "time o fuse" of information. It is therefore essential aspect of the *geo-referenced* data: that is the operation to assign to each element of the territory, its real spatial coordinates compared to a known reference system, in such a way that the scale of representation is uniform and allows to consider the territory equivalent to a map (Figure 1).
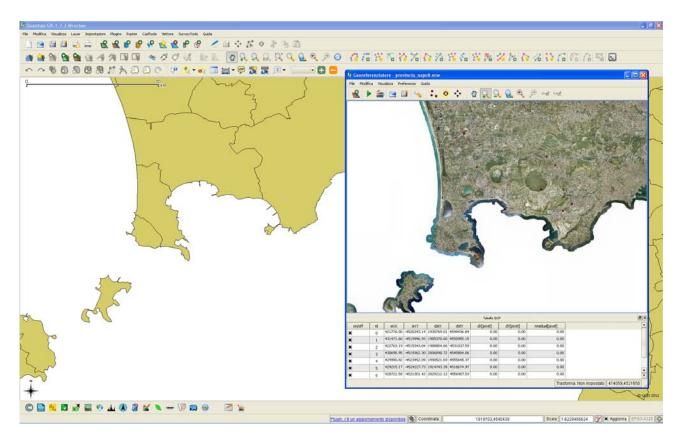
Fig. 1: Georeferenced territorial method thanks to ArcGIS software.

The necessity t o prepare in a s hort t ime, restorative models that al low to c ombine the r igor of t he investigation of m etric k nowledge with the n eed to e ffectively s erve as a t ool f or understanding t he values and to c ommunicate the m eanings of t he s ite, ne w relevant t echnologies are e ligible to ha ndle large quantities of spatial information, but require an integration and joint use by the operator.

Among others, the *laser scanning* technology is playing an increasingly important role in the relief, tanks to the advantages it offers especially in terms of speed of acquisition, the amount of measured data, however, the ability to immediately provide the user a 3D representation.

The surfaces prepared starting from the clouds of points acquired by laser scanners, they describes not only the s ize a nd ar rangement of ar chitectural el ements i n t he t erritory bu t c an gi ve back t he material consistency, making it readable masonry equipment, materials degradation and injury and give the ability to segment t he dat a into l ogical l evels, d ividing t he architectural s tructures, as w ell as t he e lements t hat characterize the territory, into simple elements, then apply them different procedures for surface modeling.

The spread of laser scanning techniques is relatively new and certainly is one of the technologies that will find a larger expansion in the near future. As known, a scanning laser system provides as a direct result of the measurement session a set of three-dimensional coordinates, usually in a reference system linked with the instrument, referred to a very high number of points that are hit by the laser beam; the cloud of points thus describes the surface of the scanned object. Jointly to the measurement of the distance, these tools are generally able t o a lso m easure t he r eflectance of ea ch poi nt-object t o t he f requency of t he beam and, in some cases, to acquire the RGB image recorded with the laser (Figure 2, 3).
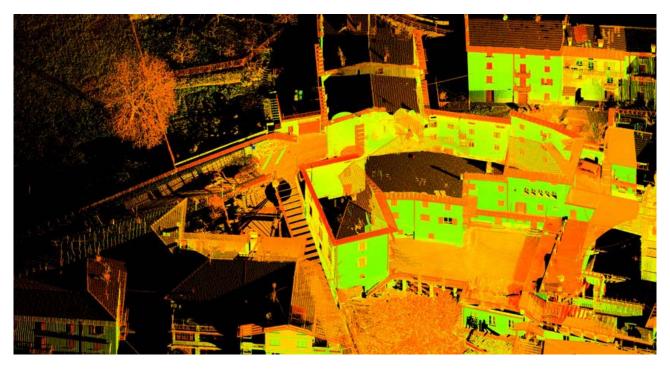
Fig. 2: Scan performed by terrestrial laser scanner and displayed in the form of points of cloud.
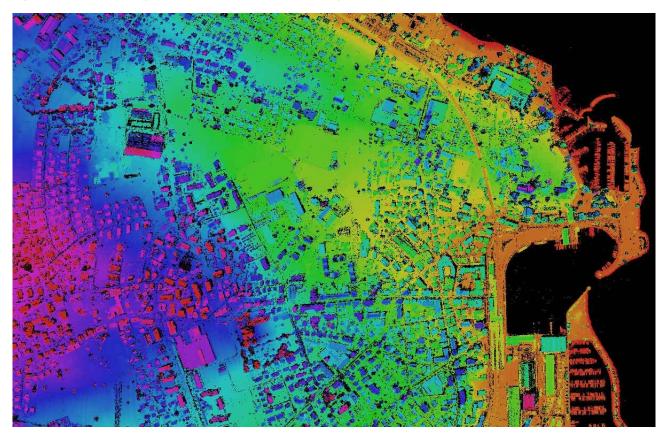
Fig. 3: Scan performed by airborne laser scanner and displayed in the form of points of cloud.

In recent years, laser scanning techniques have been widely used in various fields of metric survey, from the architectural and cultural heritage to the land one. The ability to collect and process high amounts of data very quickly has deeply changed the philosophy of metric survey, which was based on practice and on a relatively small number of extremely accurate measurements, requiring long time and remarkable skill. Today, however, you run the risk when you rely on packaged software in a superficial way, that this change in attitude may reflect a loss of control by the operator on the individual data and the various stages of processing. This means that you can get high quality results without being aware of the strategic importance of the different techniques and the integration of many existing high-tech tools with different disciplinary skills.

The integration of the laser scanner with *digital photogrammetry* offers a valuable tool to respond the specific requests for relief, in this way, it's possible to operate according to different modes and scales.

The techniques and experiments that have exploded in recent years in all phases of the photogrammetric process are numerous and difficult to categorize and list.

The photogrammetry without a doubt has a key role in the generation of maps for historic urban centers, archaeological areas and building more or less extensive. The role of photogrammetry as a modern and rigorous technique in the cultural property field is undisputed, its characteristics of being a technique that requires no contact with the object, of rapid acquisition, with a considerable flexibility of use and excellent metric accuracy in determining the geometry and shape of objects of all kinds, have made it spread more and more, now much enlarged by the possibilities offered by digital (Figure 4).

Today we wonder whether photogrammetry is still makes sense compared to laser scanning: the answer is definitely positive. The two techniques are not in competition but complement each other or rather should integrate with their different characteristics.

Fig. 4: Method of photogrammetric survey on digital orthophotos.

New technologies, combined with the use of geographic information systems (GIS), are integrated together in order to achieve fast and rigorous multi-scale relief, from the territory, through its heritage and up to each individual element.

The future of the science of detection, then, lies in an approach that would merge data from different techniques, made possible primarily by the sharing of a single reference system that allows the reading and understanding of every subject of interest not only in itself, but in the context in which it is.

It needs, in other words, involve different types of knowledge to contribute and present overlapping *layers* that compose the state of the art compared to a "cumulative knowledge".

The dynamic request includes the need to merge the different levels of knowledge in a database (regional, provincial and local) which must constantly update and monitor in real time "discoveries" and events, natural and/or anthropogenic, that added to the previous ones.

The multidimensional knowledge, then, must be understood as the primary basis for planning and cross-articulated between functions and uses of our time and memory resources of the past, between the status of fact, the transformations and developments in progress, supported by contribution of technological innovation, more and more integrated into our daily reality.

1.2 Observations and expected results

Correlate the cultural heritage with technology and innovation is an important strategic action that could produce positive results in many fields, generally, in the economic development one.

New technologies can break down, analyze, evaluate and manage the land, they also can bring people to cultural heritage, revitalize cultural contents and transfer them to the public in the form of new ideas and encouraging creativity and involvement reviving the past and, at the same time, plan the future.

It needs to promote the use of technologies that are used to rebuild the characteristics of the property, to constantly monitor their status and plan a more effective maintenance.

Furthermore, in developing programs and funding, priority must be given to those interventions that better integrate the assets with different technologies, rewarding those projects that have groundbreaking elements, paying close attention to the expected results. The technology must, therefore, represent a stimulus and a help making culture affordable for everyone.

It arises the need for a new way to address the representation and protection of property that the area has provided, the awareness of its cultural assets with the aim to bring added value given by its knowledge.

It appears the compulsory study of an innovative methodology capable of defining territory, on several levels and on different levels of knowledge, traces of past and present needs through a multidimensional approach that takes account of a variety of sizes and material, immaterial, perceptive, intrinsic values allowing the transition from the simple addition of different knowledge, of its multidisciplinarity, to full knowledge in which any information is amplified by a added value by knowledge itself.

With the help of new technologies and the creation of a knowledge network based on the integration of knowledge and analysis of multidimensional, the objective is to aim at the forefront of territory protection and enhancement of its heritage, exploiting all potential.

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LANDesign:
from "*Orto di San Lorenzo ad septimun*" to "smart gardens"

Andrea BUONDONNO, Sabina MARTUSCIELLO, Maria Dolores MORELLI
Facoltà di Architettura "Luigi Vanvitelli, Seconda Università degli Studi di Napoli, Aversa, Italia
sabina.martusciello@unina2.it ; mariadolores.morelli@unina2.it; andrea.buondonno@unina2.it

Abstract

"The Project "cultivate in the Faculty" means the necessity of deferrable "Growing culture": the garden as an opportunity to regain the own land or giving it back its best value landscape / environmental, economic / social / educational training, perceptual / sensory or the value deeply ethical and aesthetic that belongs. The monumental complex of San Lorenzo in Aversa ad Septimun - Faculty of Architecture SUN - surrounds with its walls about 7000 square feet outside the carelessness of the time and different priorities in the restoration of the plexus has eroded and compromised. Like most urban spaces, the area outside Abbey has hosted open dumps in the spaces taken from the collective benefit, and wasted by neglect abandonment. In 20 weeks we have realized our dream: the dream of translate into action our genetic local ethics; the dream to regenerate the connective tissue nature / culture, the dream of participating in a collective project and work with teachers, students, farm laborers than another ortho 'Intra Moenia' working quietly for several generations; the dream of planting Our vegetable cultivars and biotypes tracking local dream recover the ancient well without wasting a single drop of water, the dream slowly replacing all "now" global universe that is needed and in time of local ground, the dream of offering our first harvest at the table brotherhood of the Shrine of Saint Lucia a Mare, the dream of understand that outside the virtual experimentation of tastes, odors, perfumes there is a real perception of places that "listen" with our senses, a dream not to waste space community and use the products in the Garden of the Faculty buvette km 0 away.
The dream of allowing nature to one long long Travel to the culture. Specialist skills were involved in the process of regeneration - not just formal-of the "vacuum" of the Abbey: morphological / Dolores Morelli, soil / Andrea Buondonno, agronomic / Gaetano Pasquale and Alberto Cappelletti, Mathematics / Cristina Miglionico, eco-alimentare/Eugenia Aloj, culinary/ Salvatore Genovese, quality control and food / Luca Rastrelli. And together we "sown" the "Laboratory Gardens of San Lorenzo" to explore and draw with students of Architecture and Design "the secret law of nature "of which Goethe speaks, extracted from the leaves, by vegetables, fruits geometric matrices, the golden section, the Fibonacci series, fractal geometry, traces of an archetypal project that goes from nature to artifice: bags that evoke the form drag of "pummaroce", banana peel as shoe covers for ortho, libraries inspired the structure of the leaf according to the process of representation suggested by Munari articulated shelves on the Fibonacci series and a bicycle ecological drawn on the snail to "speed up" sustainable mobility [0 <miles < 0.0298258] by the short food chain [km 0] average speed of the snail [0.0298258 miles]. A slow, gradual, starting from the involvement of students, not only of our faculty, students of schools high school and elementary school children involved in virtuous cycle of recovery of common ground"[1].

Key words: land, design, children, garden, school, love

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The roots of the "Orto di San Lorenzo *ad Septimum*": a polycyclic soil telling a thousand year history

Eleonora GRILLI, Pierclaudio ODIERNA, Andrea BUONDONNO
Dipartimento di Scienze Ambientali, Facoltà di Scienze del Farmaco per la Salute e l'Ambiente, Seconda Università degli Studi di Napoli, Caserta, Italia
grillieleonora@hotmail.it, pierclaudio.odierna@gmail.com, andrea.buondonno@unina2.it

Abstract
Soil is the common earthen parchment upon which humanity's cultural signatures are imprinted. Reading the complexity of a soil profile from the pedogenetic point of view is equivalent to read the peculiar history of a site. The aim of the present work is the pedo-semantic analysis and the reconstruction of pedo-historical identity of the soil of "Orto di San Lorenzo *ad Septimum*", at the Faculty of Architecture of Second University of Naples, Aversa (Italy). On the basis of field observations and laboratory measurement, it is evident that the soil: i) is characterized by an extremely complex horizonation, including a whole of 17 horizons with several buried layers, and, ii) its formation is the outcome of three main genetic Cycles driven by natural and/or anthropic events/impacts. The 1st, older and deeper Cycle (14.9 to 3.9 ky b.p.) formed by Volturno and Clanio rivers flooding, starts after Neapolitan Yellow Tuff formation, and closes with "Avellino Pumices" eruption; the 2nd middle Cycle (3.9 ky b.p. to 1807 a.D.) includes Roman finds and the authentic "Abbot's Garden", detected by organic carbon and phosphorus peaks; the recent 3rd Cycle (1807-today) consists of past and recent anthropogenic layers. The pedo-semantic analysis reveals the very complex and fascinating history of "Orto di San Lorenzo *ad Septimum*", confirming the impressive relevance of soil in the human life, and also highlighting the intriguing traits and the proficiency of the multidisciplinary cooperation among Architecture and Soil Science.

Key words: Orto di San Lorenzo; pedotechnique; pedoarcheology; buried soils; HTMs.

1. Introduction
The different pedological and bio-chemico-physical nature of soils has determined and determines different settlements and developments of human civilizations and societies, resulting in a biunique correspondence between soils and landscapes. From this standpoint soil is also accredited as depositary of historical, cultural and artistic heritages of mankind. As known, the early Latin derivation of *Homo* (Latin for man) was *hemo*, meaning the earthly one; akin to the Latin word for earth or soil, namely, *humas*, and the Latin, word for humans, namely, *humanus*. The history of humankind, and our ancestral Homo species, is the history of our relationship to the Earth and its environment. Archeological evidence in many parts of the world reveals our penchant to alter the environment, be it to our boon or bane. Soil is a major component of the natural resource trinity (soil–sun–climate) from which humankind's sustenance is rooted. And soil is the common earthen parchment upon which humanity's cultural signatures are imprinted [1]. In other words, reading the complexity of a soil profile from the pedogenetic point of view is equivalent to read the peculiar history of a site. The aim of the present work is the pedo-semantic analysis and the reconstruction of pedo-historical identity of the soil of "Orto di San Lorenzo *ad Septimum*".

2. Materials and Methods
The investigated soil profile is located in the garden of the Benedictine Monumental Complex of San Lorenzo *ad Septimum* in Aversa (Caserta, Italy) (Fig.1), an area which represents, since Roman age, an important human settlement place. Recently, as of 1992, it is the seat of the Faculty of Architecture of Second University of Naples (Tab.1). In 2010 the garden of this Abbey has been subjected to pedotechnical intervention aimed to its environmental and functional restoration (Fig.2).

2.1. Site description
The geo-lithologic substrate consists of pyroclastic products of recent volcanic activity of Campi Flegrei (Phlegraean Fields) District with irregular intercalations of fluvial deposits such as limnic materials [2]. From a pedological point of view the investigated site is situated in the "Phlegraean Piedmont Plain" Subsystem that encompasses very urbanized areas with well drained volcanic soils classified as Pachi-Vitric Andosols, MolliVitric-Andosols [3].

2.2. Soil sampling, analysis and classification

The soil profile was sampled, described and classified using standard soil survey methodologies [4, 5, 6]. Soil samples were air-dried and 2 mm sieved for laboratory analyses according to the Italian procedures [7] and international standards [5]. Total Organic Carbon (TOC), Total Extractable Carbon (TEC), Humic and Fulvic Acids (HA+FA) and Total Phosphorous (P) were took into account as reliable clues for the identification of the so-called "buried soil", *i.e.* ancient soils covered by more recent soils, superimposed by various natural and/or anthropic events/impacts, and past human activities [8, 9]. From the taxonomic point of view, horizons along the soil profile are denominated according to the latest Keys to Soil Taxonomy [6]. In particular: (i) the "caret" symbol (^) indicates just mineral or organic layers formed by Human Transported Materials (HTMs), *i.e.* natural (soil filling materials) and/or artificial materials (limestone gravel, amendments) moved horizontally onto a pedon from a source area outside of that pedon by directed human activity usually with the aid of machinery; (ii) the letters "A", "B" or "C" designates, respectively, mineral surface, sub-surface, or deep, poorly pedogenized horizons; (iii) the subscript "u" denotes presence of artifacts created or modified by humans such as materials derived from excavation activities; (iv) the subscript "p" warns a pedoturbation, *i.e.* a mixing within a soil or sediment profile by various natural/anthropic processes, such as animal burrowing, tree throw, freeze-thaw cycles, manual/mechanical movements or transports; (v) the subscript "k" indicates an accumulation of visible pedogenic calcium carbonate; (vi) the subscript "b" denote the presence of identifiable buried horizons.

3. Results

The synoptic comparison of field observations of soil horizons, laboratory measurements, and the distribution of TOC TEC HA+FA (Fig.3) and total P (Fig.4) along the investigated soil profile, clearly reveals that it developed under three main pedogenetic cycles -at least-, and suggests a preliminary reconstruction of its pedo-historical identity (Fig.5). The polycyclic and polygenetic genesis shows a complex and anisotropic horizonation, characterized by many lithologic discontinuities, *i.e.* significant changes in particle size distribution and/or mineralogy of parent materials (identified by Arabic number prefixes).

The first deep Cycle, from -185cm to -130cm, made up of poorly pedogenized sediments, is subdivided in two subcycles: (i) the I.1 Subcycle, from $7C2$ to $7C$ horizon, was formed after the "recent cycle" of Campi Flegrei volcanoes, which produced the Neapolitan Yellow Tuff (14.9 ± 0.40 ky b.p.) [10]; it includes limnic materials, likely associated to the common floods of Volturno and Clanio rivers in ancient times, when the whole area was a marshland named *Maremma Liternina*; (II) the I.2 Subcycle, $6C_k$ horizon, formed by volcanic materials of the "Avellino Pumices" eruption of Vesuvius, 3.9 ky b.p. [11].

The overlying horizon sequence, *i.e.* $5B'_b$, $5C_u/B_{kb}3$, $5C_u/B_{kb}2$, $5C_u/B_{kb}1$, $5B_b2$, $5B_{bk}1$ and $5A$, from -130 cm to -40 cm, identifies the second Cycle. The evolution of its deeper horizons may be contemporary to the *Via Campana* building, dated at about 400 a.D., as supported by the presence of earthenware fragments of Roman times, lime mortar and artificial concrete. This Cycle ends with the 5A horizon, which likely represents the original soil surface of the "Abbot's Garden", which performed its functions from 1777 to 1807, when Napoleon laws dispossessed the "San Lorenzo *ad Septimum*" Abbey of its assets. Indeed, this assumption is strengthened by the remarkable peaks of TOC, TEC, HA+FA and total P (Fig. 3, 4) in $5A_b$, clearly evidencing that such horizon was at the surface of the "Abbot's Garden" soil.

The recent third Cycle, from -40 cm to field level, represents the modern *man-made* horizons of "Orto di San Lorenzo *ad Septimum*" made up by HTMs, horizonated as $^A A_{upk}1$, $^A A_{upk}2$, $^A A_{upk}3$, $2^C C_u/A$.

In this third Cycle the whole lithologic discontinuities is associated to very abrupt colour changes (Fig.5).

This Cycle is subdivided in: (i) III.1 Subcycle, from 1807 to 1992, formed by $4^C CB_{ub}/A_b$ $3^A A$ horizons, and (ii) III.2 Subcycle from 1992 to present, which represents the final result of pedotechnical interventions.

4. Conclusions

As guessed, the pedosemantic analysis of the investigated polycyclic soil profile revealed the very complex and fascinating history of "Orto di San Lorenzo *ad Septimum*", from the age of the dramatic last Phlegraean Fields activity, to the contemporary pedotechnological era, through Roman, Mediaeval and Modern times. Such outcomes not only confirm the impressive relevance of soil in all the aspects of human life, but also highlight the intriguing traits and the proficiency of the multidisciplinary cooperation among Architecture and Soil Science.
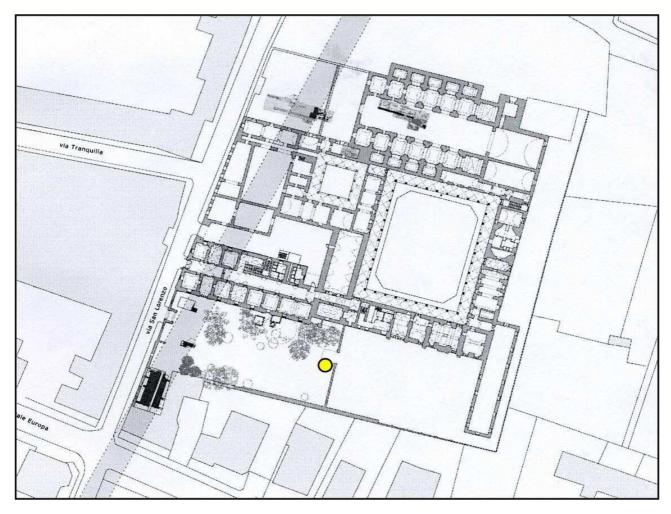
Fig. 1: Plan of "San Lorenzo *ad Septimum* " Abbey, with location of *Via Campana* lay-out (grey dotted line) and sampling site (yellow-filled circle) [12].

Date	Main events
4th century B.C. (Roman times)	*Via Campana* building
10th century A.D. (Longobardic times)	Benedictine *Cella* under the authority of San Lorenzo Abbey of Capua.
11th century A.D. (Norman times)	Independent Benedictine Abbey
12th century A.D.	Maximum expansion and social-cultural influence
1777	Renovations and creation of the "Abbot's Garden"
1807 (Napoleon times)	Abbey abolition
1812	Girls boarding school "Casa Carolina"
1812-1970	Seat of various Institutes and institutions
1992	Seat of the Faculty of Architecture

Tab. 1: San Lorenzo *ad Septimum*: historic milestones.

Fig. 2: Garden of "San Lorenzo *ad Septimum*" Abbey before (a) and after (b) the pedotechnical interventions (2010).
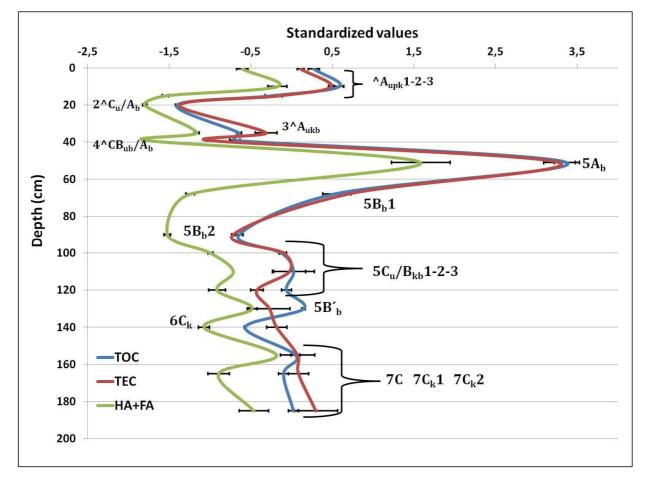
Fig.3: Distribution of Total (TOC) and Extractable Organic Carbon (TEC), Humic and Fulvic Acids (HA+FA) along the "Orto di San Lorenzo *ad Septimum*" soil.
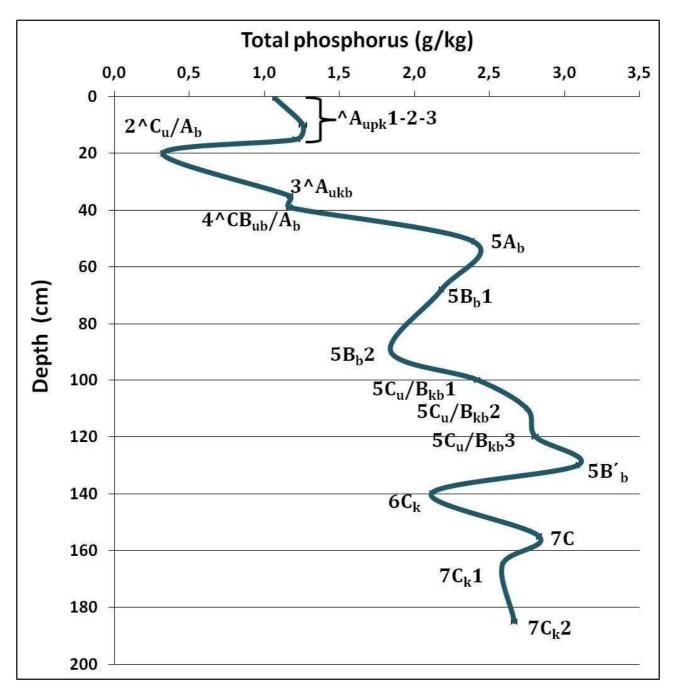
Fig.4: Distribution of Total Phosphorus along the "Orto di San Lorenzo *ad Septimum*" soil.
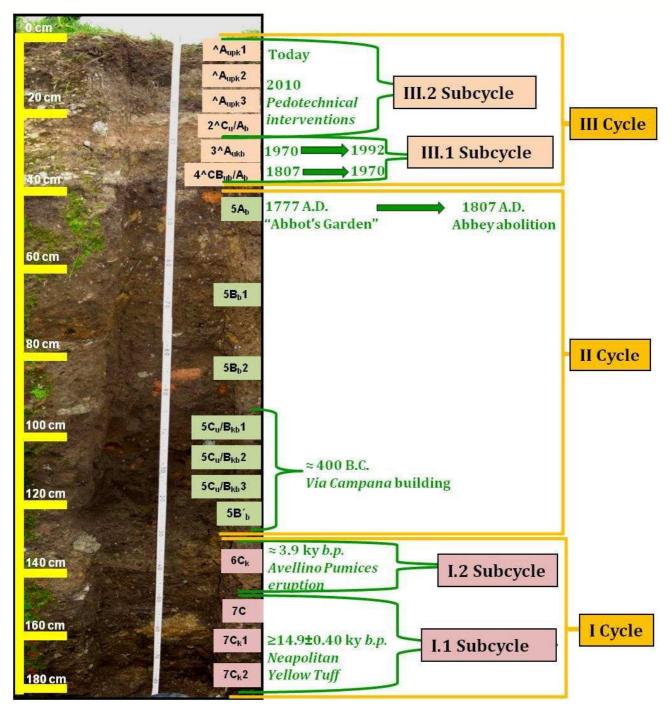
Fig.5: The "Orto di San Lorenzo *ad Septimum*" soil.

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The trunk and the branches of the "Orto di San Lorenzo *ad Septimum*"

Sabina MARTUSCIELLO, Maria Dolores MORELLI
con Eugenia ALOJ, Andrea BUONDONNO, Maria Cristina MIGLIONICO, Ornella FORMATI,
Giovanna BRANCACCIO, Cristina MAGLIULO, Giuseppe D'ANGELO, Filomena GOLINO,
Nicoletta DI VINCENZO, Maria Grazia DI CASTRO, Anna ZOLLO, Anna GRAVINA, Alfonsina PALMIERO,
Federica AMAZIO, Daniela ESPOSITO, Valeria PERROTTA, Fabrizio SOLLA, Nicola DEL VILLANO
e Ciro MENALE.
Facoltà di Architettura "Luigi Vanvitelli, Seconda Università degli Studi di Napoli, Aversa, Italia
sabina.martusciello@unina2.it ; mariadolores.morelli@unina2.it

1. The trunk of the "Orto di San Lorenzo ad Septimum"

Last year, the trees planted in the orchard of the Abbey of San Lorenzo were very small, almost unrecognizable. As these vertical wires are thickened, have begun to branch out and below spring leaves, flowers and fruits. The trunk, as Munari said, is the thick branch , because "every leaf on top of branches, has a tube that goes back to the trunk and keep in touch with the earth. With this tube sucks its nourishment: the trunk is the set of all these tubes, this is bigger than the other branches [1]. "The trunk is composed of several parts, the outer bark, protection of the plant that allows gas exchange needed for its life, the sapwood consists of living cells that make up the circulatory system, the book contains the vessels that carry nourishment synthesized; the exchange, the thin layer of tissue responsible for the production of the new wood; the heartwood, the inner part of the trunk, the most valuable formed and stable, the bone marrow, the central part of the trunk, generally not very differentiable from the heartwood that contains it; unmistakable, and concentric circles convertible in the horizontal section, link structures constantly in vertical section.
The trunk represents the height phase of the Landesign project "seeding in-formation into Faculty" and all the children from the schools of different levels are the tubes, mentioned by Munari, who visiting and doing creative sensory experience of knowledge in San Lorenzo's Garden in the Faculty of Architecture of the Second University of Naples contributes to give the project his lifeblood.
The university is the place to teach "universal knowledge", where "to concentrate on bringing intelligence", "educate the know" to form men who can "feel at home in any environment ... End the university will not is the creation of new genes, or political leaders immortal authors - although many of them arise within its walls - but you can form mature personalities, endowed with freedom, equity, moderation, peace and wisdom, "wrote John Henry Newman promoter and first president of the Catholic University of Dublin (1801-1890) in his book *The Idea of a University*. Newman called this kind of training 'liberal education', whose purpose is to train gentlemen. Newman aspired to an university education where each discipline was given taking into account the contributions of others and the general context where all belong; that education has in itself the ultimate reason of his "useful" education, which is required for each good moral life, but insufficient by itself to cause it.
The relevance of Newman's thought comes from the fact that his is not a model of university, but a model of education for person, able to the bottom with its personal implications of determining an attitude "of its own" in front of the world, to others, his conscience: for this, his "Idea of the University" is still a suggesting reflection.
The project starts with the idea of pursuing these conditions by opening the architectural spaces of the Abbey of San Lorenzo ad Septimum in Aversa in the Faculty of Architecture of the S.U.N. to children, youth, vulnerable groups, elderly and disabled, structured educational exploratory workshops open to schools of all levels and all those who want to participate in this shared project which acts to spread the love, care, respect, the value of their land, thereby making the design as a moment of collective around a table at work where children interact with students and teachers.
The 16 laboratories, grow a chemistry set; I investigate the earth; watch the sky; recognize the architecture; the clay model; supporting bio-energy; "green-gym"; experiment with bio-energy; dance and song tradition; vibrating with the sounds; drawing tastes; exploring flavors; eating well; seeding the city; collect, play, differentiated and recycling design, are designed and organized by a team composed with faculty members, experienced in teaching baby, research doctors, graduates, farmers, interns, college students engaged in the role of tutors, are aimed at school children and adults, divided into age groups (3-5y.o.; 6-11y.o.; 12-14 y.o.; 15-20 y.o.; 20-100 y.o.), group synergy of disciplines (science, technology, computer science, physics, Italian, history, art history, art and drawing, image education, physical education, anatomy, theory and composition, education and sound music, dance history, technology and farming techniques, art, civics, art and representation techniques, technology and computer science) and modulated sensory perceptions.

The format of the 16 laboratories involves three phases: *historically_* 'Benedictine Abbey of San Lorenzo; *naturally_* sharing the redevelopment of degrade with the project by seeding and planting trees in the Orchard of the Garden; *creatively_* the early phase introduced by tales, games and debate, leads to the elaboration of drawings, models, mosaics made from natural or recycled products on the themes of nature, and his extraordinary potential. At last children and teachers are called to give an assessment of the three stages of presentation, in-training and design of the laboratory report.

The project "seeding in-formation into Faculty," supports the student creativity, sport through lessons on the recovery of folk dances, concerts and evening parties in order to involve young people with the vision of musical performances at local, national and international musicians blending the traditional Italian cuisine with music, speeches responding to a renewed material culture, the needs of the body and person, its mobility, the criteria of sustainability and globalization with the help of technology and telematic. So are planned workshop activities and sport, attentive to the disability in respect of ease of management and regulations, accessibility, security, usability, comfort and environmental well-being, choice of materials and equipment "risk free".

The phase out of the project Landesign "seeding in-formation into Faculty" proposes to establish a network of virtuous school buildings who want to decline the project to restore degraded areas and to establish their own educational and exploratory workshops with the aim to achieve and maintain daily green spaces turned into orchards or gardens horticultural farming.

[Maria Dolores Morelli]

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LUIGI VANVITELLI
nihil est sine de_signo
Seconda Università degli Studi di Napoli

Diocesi di Aversa Pastorale Universitaria

l'Orto di
sanlorenzo
naturalmente

in-formazione
Coltivare in facoltà
coltiviamo cultura nell'Orto di San Lorenzo della Facoltà di Architettura
con laboratori didattico-esplorativi per le scuole di ogni ordine e grado

per osservare il sapore del verde e non vedere il nero dei rifiuti
per ascoltare il profumo delle foglie e non sentire il rumore dei clacson
per gustare il racconto della lattuga e non mangiare un codice a barre
per respirare il colore della natura e non odorare l'ignoranza dell'incuria
per toccare il suono della terra e non cliccare il mouse di un pc

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AZIENDA SPECIALE
Camera di Commercio Caserta

Agrisviluppo
AZIENDA SPECIALE
Camera di Commercio Caserta

laboratori didattico-esplorativi

cresco piccolo chimico
indago la terra
osservo il cielo
riconosco l'architettura
modello la terra_cotta
sostengo bio_energie
orto gym
sperimento piccole energie
danzo e canto la tradizione
vibro con i suoni
disegno i sapori
esploro sapori
mi nutro bene
semino la città
raccolgo, gioco, differenzio
riciclo design

"Cultivare in-informazione in facoltà", coltiviamo cultura nell'Orto di San Lorenzo della Facoltà di Architettura con laboratori didattico-esplorativi per le scuole di ogni ordine e grado.

○ **cresco piccolo chimico** [scienze+tecnologia+informatica+fisica]
insieme comprendiamo la trasformazione degli elementi naturali (acqua-terra-fuoco-aria)
per scoprire i piccoli tesori della terra

○ **indago la terra** [scienze+tecnologia+storia+informatica]
insieme esploriamo le tracce che raccontano la storia della nostra terra per ri-comporre
le diverse età dell'orto

○ **osservo il cielo** [scienze+tecnologia+matematica+informatica]
insieme riconosciamo e misuriamo le pioggie, i venti, le nuvole e il sole che partecipano
alla costruzione e alla vita dell'orto

○ **riconosco l'architettura** [storia dell'arte+tecnologia+arte ed immagine+italiano]
insieme esploriamo le tracce che raccontano la storia del luogo per ri-comporre le
diverse età degli edifici

○ **modello la terra-cotta** [arte ed immagine+design della ceramica+scienze+tecnologia]
insieme agli studenti della Facoltà di Architettura e Disegno Industriale, progettiamo e
realizziamo oggetti in argilla per sviluppare le capacità manuali

○ **orto gym** [scienze motorie/sportive+educazione suono+musica+scienze]
insieme sviluppiamo la conoscenza del nostro corpo, la coordinazione, la respirazione con
attività motorie, pilates e yoga

○ **sperimento piccole energie** [arte ed immagine+italiano+teoria/composizione]
insieme giochiamo con i bambini per condividere storie sull'educazione ambientale e la
sostenibilità

○ **danzo e canto la tradizione** [educazione suono/musica+storia della danza+italiano+storia]
insieme balliamo col tamburo, tipico dell'Ager Campanus, sulle note di canti e musiche
dal vivo per recuperare i ritmi contadini

○ **vibro con i suoni** [educazione suono/musica+italiano+storia+tecnologia]
insieme partecipiamo ad una lezione-concerto di musica tradizionale locale, per
approfondire l'origine e il valore dei canti e degli strumenti musicali meridionali

cosa possiamo

"Cultivare in-informazione in facoltà", coltiviamo cultura nell'Orto di San Lorenzo della Facoltà di Architettura con laboratori didattico-esplorativi per le scuole di ogni ordine e grado.

○ **sostengo bio_energie** [scienze+tecnologia+informatica]
insieme sostituiamo le parole risparmio e buon uso delle energie naturali alle parole consumo e spreco

○ **disegno i sapori** [arte ed immagine+scienze+tecnologie/tecniche agrarie]
insieme agli ortaggi e le verdure dell'orto coloriamo le storie del signor broccolo, dello zio zucchino, della nonna melenzana e del cugino asparago

○ **esploro i sapori** [tecnologie/tecniche agrarie+scienze+storia]
insieme ri-conosciamo i prodotti dell'orto per cucinarli secondo la tradizione locale, le ricette storiche e "cucirli" alle innovazioni di food design

○ **mi nutro bene** [scienze+tecnologie e tecniche agrarie+storia]
insieme recuperiamo i modelli corretti di alimentazione per ri-stabilire il nostro legame con il territorio e i suoi prodotti

○ **semino la città** [arte ed immagine+storia+arte/tecnica di rappresentazione+teoria/composizione+scienze]
insieme conosciamo e ci ri-appropriamo del territorio campano attraverso il recupero di spazi degradati da trasformare in orti urbani o giardini di agricoltura

○ **raccolgo, gioco, differenzio** [tecnologie/informatica+arte ed immagine+storia+scienze]
insieme proponiamo progetti di smaltimento, trasformazione e riutilizzo dei rifiuti finalizzati all'acquisizione di comportamenti eco-compatibili

○ **riciclo design** [tecnologia/informatica+arti/tecniche di rappresentazione+teoria/composizione]
insieme agli studenti di Disegno Industriale e di Architettura recuperiamo tutto ciò che non viene utilizzato per "combinazioni nuove che siano utili"

fare insieme

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in-formazione
Coltivare in facoltà

orto_gym 070620

discipline coinvolte
educazione fisica + scienze + anatomia

età
3|5
6|10
11|14
15|19
20|100

obiettivi
Insieme sviluppiamo la conoscenza del nostro corpo, la coordinazione, la respirazione con attività motorie singolarmente o in squadra, pilates e yoga.

modalità [3 ore]
Il Laboratorio, della durata di due ore, è strutturato attraverso esercizi pratici-motori, supportati da un video delle attività. Riflettiamo insieme sulla conoscenza, sul funzionamento e sulla potenzialità del nostro corpo. Il Laboratorio si svolge nell'Orto di San Lorenzo per "ri-ascoltare" gli odori e i colori della natura.
[3-6 anni]: attraverso il gioco sviluppiamo la coordinazione e la mobilità.
[6-10 anni]: attraverso giochi strutturati consolidiamo ed ampliamo le attività motorie di base, sviluppando la coordinazione e la respirazione.
[11-14 anni]: attraverso attività motorie sviluppiamo la coordinazione specifica, oculo-motoria, oculo-podalica, della forza, della resistenza con obiettivi a breve e lungo termine.
[15-100 anni]: attraverso attività statiche recuperiamo e potenziamo schemi motori di base, miglioriamo la mobilità articolare e la coordinazione, sviluppiamo la forza e la resistenza garantendo risultati funzionali di benessere.

contatti
Orto di San Lorenzo | Facoltà di Architettura "Luigi Vanvitelli" SUN
Abbazia di San Lorenzo ad Septimum | 81031 Aversa [CE]
tel. 081 8142166 | fax 081 8148626 | ortodisanlorenzo@gmail.com

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in-formazione

Coltivare in facoltà

semino la città 140314

discipline coinvolte
arte ed immagine + storia + arte/tecniche di rappresentazione + teoria/composizione + scienze

età
3|5
6|10
11|14
15|19
20|100

obiettivi
Insieme conosciamo e ci riappropriamo del territorio campano attraverso il recupero di spazi degradati da trasformare in orti urbani e giardini d'agricoltura.

modalità [3 ore e 1/2]
Nel Laboratorio della durata di tre ore e mezzo aiutiamo il bambino/ragazzo a comprendere gli spazi, la città in cui vive, ripensandone alcune parti al fine di conferirgli la qualità di "piccolo cittadino." Nella prima parte apprendiamo informazioni sul degrado urbano e i fattori inquinanti, approfondendo temi legati all'ambiente, al coltivare e al mangiare sano; nella seconda realizziamo elementi di segnaletica per un orto urbano e piantiamo alcuni semi in un piccolo orto/vasetto da portare via.

l'Orto di SanLorenzo naturalmente

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contatti
Orto di San Lorenzo | Facoltà di Architettura "Luigi Vanvitelli" SUN
Abbazia di San Lorenzo ad Septimum | 81031 Aversa [CE]
tel. 081 8142166 | fax 081 8148626 | ortodisanlorenzo@gmail.com

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in-formazione

Coltivare in facoltà
raccolgo, gioco, differenzio

150314

discipline coinvolte
tecnologia/informatica + arte ed immagine + storia + scienze

età
3|5
6|10
11|14
15|19
20|100

obiettivi
Insieme proponiamo progetti di smaltimento, trasformazione e riutilizzo dei rifiuti finalizzati all'acquisizione di comportamenti eco-compatibili.

modalità [2 ore e 1/2]
Le parole della poesia di Gianni Rodari Un poco di prato_"Signori architetti che fate progetti di case e palazzi di torri e terrazzi... Un poco di prato l'avete lasciato? Su, siate gentili: fate anche i cortili. Pensateci un poco ai campi da gioco... Lasciateci appena lo spazio, che poi a far l'altalena pensiamo da noi: sarà cura nostra farci anche la giostra" introducono alle attività del Laboratorio, della durata di due ore e mezzo, avvicinandoci con gli alunni alle problematiche dei rifiuti, al loro smaltimento, alla trasformazione e al riutilizzo. Con attività ludico-progettuali adottiamo l'Orto di San Lorenzo e produciamo "energia" per mantenerlo in vita; lo spazio diventa un luogo magico progettando e realizzando un percorso flessibile, dinamico, pronto ad essere modificato assecondando e riproducendo il ciclo della natura, utilizzando materiale di riuso.

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l'Orto di San Lorenzo
natural|mente

contatti
Orto di San Lorenzo | Facoltà di Architettura "Luigi Vanvitelli" SUN
Abbazia di San Lorenzo ad Septimum | 81031 Aversa [CE]
tel. 081 8142166 | fax 081 8148626 | ortodisanlorenzo@gmail.com

"Cultivare in-informazione in facoltà", coltiviamo cultura nell'Orto di San Lorenzo della Facoltà di Architettura con laboratori didattico-esplorativi per le scuole di ogni ordine e grado.

in-formazione

Coltivare in facoltà
danzo e canto la tradizione   090320

discipline coinvolte
educazione suono/musica + storia della danza + italiano + storia

obiettivi
Insieme balliamo con il tamburo, tipico dell'Ager Campanus sulle note di canti e musiche dal vivo per recuperare i ritmi contadini.

modalità [3 ore]
Nel Laboratorio, della durata di tre ore, trasmettiamo il valore della cultura locale attraverso le danze e il canto popolare, facendo riconoscere le tradizioni del territorio, rinnovando il legame esistente tra i canti, le danze e il ciclo contadino, come parte integrante del modo di vivere la "terra". Oltre ad fornire le tecniche di base della "tammurriata" (danza sul tamburo) conosciamo gli strumenti musicali tradizionali.

età
3|5
6|10
11|14
15|19
20|100

l'Orto di Sanlorenzo naturalmente

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in-formazione
coltivare in facoltà
disegno i sapori 110310

discipline coinvolte
arte ed immagine + scienze + tecnologie/tecniche agrarie

età
3|5
6|10
11|14
15|19
20|100

obiettivi
Insieme agli ortaggi e le verdure coloriamo le storie del signor broccolo, dello zio zucchino, della nonna melenzana e del cugino asparago.

modalità [3 ore]
Il Laboratorio della durata di tre ore è organizzato in due fasi. Nella prima fase, insieme ai bambini "ascoltiamo" dai contadini e dagli studenti la storia dell'Orto e dell'Abbazia di San Lorenzo - sede della Facoltà di Architettura e di Disegno Industriale, la storia della natura e dell'architettura. Nella seconda fase, con ortaggi e frutta prepariamo le "storie cuci-nate".

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tel. 081 8142166 | fax 081 8148626 | ortodisanlorenzo@gmail.com

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in-formazione

Cultivare in facoltà

mi nutro bene 130620

discipline coinvolte
scienze + educazione civica

età
3|5
6|10
11|14
15|19
20|100

obiettivi
Insieme recuperiamo i modelli corretti di alimentazione per ri-stabilire il nuovo legame con il territorio e i suoi prodotti.

modalità [3 ore]
Il Laboratorio della durata di tre ore intende promuovere una riflessione critica sul tema dell'educazione alimentare posta alla base di un rinnovato stile di vita. Intendiamo favorire l'acquisizione di corrette abitudini alimentari, stimolare l'interesse nei confronti delle produzioni e della cultura alimentare locale, valorizzare la conoscenza dei processi produttivi, dei prodotti e delle diverse culture per promuovere l'inserimento di persone extracomunitarie senza dimenticare la loro identità.
Attraverso il Laboratorio riflettiamo insieme con lezioni ed esperienze sulla relazione terra - alimentazione - ambiente, con rappresentazioni teatrali sui valori dell'Orto e dei cibi locali e con la partecipazione a cruci-questionari sulle abitudini alimentari dei partecipanti.

l'Orto di Sanlorenzo natura/mente

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Abbazia di San Lorenzo ad Septimum | 81031 Aversa [CE]
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in-formazione

Coltivare in facoltà

sperimento piccole energie   080314

discipline coinvolte
arte ed immagine + italiano + teoria/composizione

età
3|5
6|10
11|14
15|19
20|100

obiettivi
Insieme giochiamo con i bambini per condividere storie sull'educazione ambientale e la sostenibilità.

modalità [3 ore]
Il laboratorio della durata di tre ore è incentrato sul tema della progettazione collettiva introdotta attraverso la narrazione, il gioco, la discussione e le attività laboratoriali.
Saranno parametri guida nella fase di progettazione le seguenti fasi:
Le mani dell'albero: Evanescente quanto trasparente, un telo si anima di colore quando le impronte delle nostre mani si uniscono a comporre un grande albero.
L'orto siamo noi: Immagini e parole che scorrono sullo schermo ci raccontano la storia di un progetto, i suoi protagonisti e le loro motivazioni.
Naturalmente: Guidati da un esperto viviamo l'esperienza della natura ed impariamo a discriminare frutti ed ortaggi coltivati in facoltà.
Creativamente: La magia dell'illusione ci introduce alle "bizzarrie" di Arcimboldo: giochiamo a creare volti con le sagome di vegetali.

l'Orto di Sanlorenzo naturalmente

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Abbazia di San Lorenzo ad Septimum | 81031 Aversa [CE]
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in-formazione

coltivare in facoltà

riciclo design 161301

discipline coinvolte
tecnologia/informatica + arti/tecniche di rappresentazione +
teoria/composizione

obiettivi
Insieme agli studenti di Disegno Industriale e di Architettura recuperiamo tutto ciò che non viene utilizzato per "combinazioni nuove che siano utili".

modalità [3 ore e 1/2]
Il Laboratorio della durata di tre ore e mezzo è organizzato in due fasi. L'obiettivo è di ridefinire il concetto di rifiuto, sostenendo che gli oggetti e le cose che non servono più possono essere trasformati e utilizzati in maniera diversa.
Guidati da specialisti e dagli studenti di Disegno Industriale e di Architettura progettiamo da cose recuperate nuovi prodotti (dal disegno al prototipo) e assistiamo alla proiezione di filmati e immagini sul tema del recupero e del riuso.

età
3|5
6|10
11|14
15|19
20|100

l'Orto di SanLorenzo naturalmente

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2. The branches of the "Orto di San Lorenzo ad Septimum"

Hugo Cabret, the last great movie by Martin Scorzese, it's an extraordinary metropolitan tale.
The town is represented as a gear whole and each castor means something inside and between the others.
If the machine go stuck the only way to unblock the instability of the "urban system" break, it's the love: that driving force that heals every neurosis and disease in man and in the city. Children are given the task to act for common good, to control the flow of time, to switch passivity and resignation in excitement and concrete actions to regain possession of the past accelerating ethical and poetic conversion. In some large contraption jammed cities rotate large attractors / detractors and a series of smaller widespread wheels: the schools, places where children spend most of their time, are usually gray, sad and resigned places, which will certainly affect the scope and immensely perceptive and emotional in every single child, which becomes adults in amorphous areas, with the risk of an addiction to bad, forgetting that, to quote Fuerbach "we are what we eat" (with eyes, ears, nose, touch, taste).
The applied research leaded with students of Urban and Environmental Survey of the fifth year of Architecture and architectural design Laboratory of the first year aims to rethink the city focusing on the redesign of outdoor areas, particularly schools as priority anchors for re-composition of the urban mosaic. Downstream of several memoranda of understanding between the Faculty and schools, with students, pupils, the children clean up the voids municipal solid waste, we adopt the school, we design and build "smart gardens": priority areas for reasons of external brevity (proximity to the Faculty, the residence of students, particularly disadvantaged places and needy immediate concrete actions).
"Landesign: from Gardens of San Lorenzo to the "smart-gardens " is a process of co-design and co-production: degraded areas of the city become resources, raw materials for redesigning spaces and minds, the square and people are plus ethical and aesthetic value, declining the good practice implemented in the Garden of San Lorenzo, home of our Faculty of Architecture.
L.A.N.Design [Local Area Network Design] is therefore to reflect, share, draw, tell, spread the wealth of resources in people and things.
Local, in the sense of a project that has its roots in the place of reference in which the land, with which and from which to extract traces, signs, fragments, for the design of places that become events;
Area, soil resources the common good, limited non-renewable, physics surface that we see, touch, hear, taste, we perceive;
Network, as a network of meetings, incentives for real people who share a path of making it part of their land according to a fractal metaphor.
We begin to change the color of the landscape, with students of design, thinking the interior. We enlive along the corridors, classrooms, gyms, cafeterias, a participatory process that acts to change - developing it - the concept of design, not classifiable with the product life cycle "project, production, sale and consumption" (De Fusco, 1990).
In this renewed ethical dimension of the urban areas involved in emotion found in which the beauty becomes inducer of comfort, but also social. The Vitruvian triad (form, function, technical / feasibility) and the three dimensions that fall in physical assets (economy, ecology and emotion) are the basis of a positive process for you to take root in the Garden city, town and give himself to be a good practice to decline in the empty school buildings, aware that the space (the city, the school) is about us.
We want that "observed the flavor of the green, and not see the black waste; listen to the scent of the leaves, and not hear the noise of car horns; enjoy the story of the lettuce and not eat a bar code; breathe the color of nature and not smell the ignorance, neglect; tap the sound of the earth and do not click on a pc mouse"[1].
[Sabina Martusciello]

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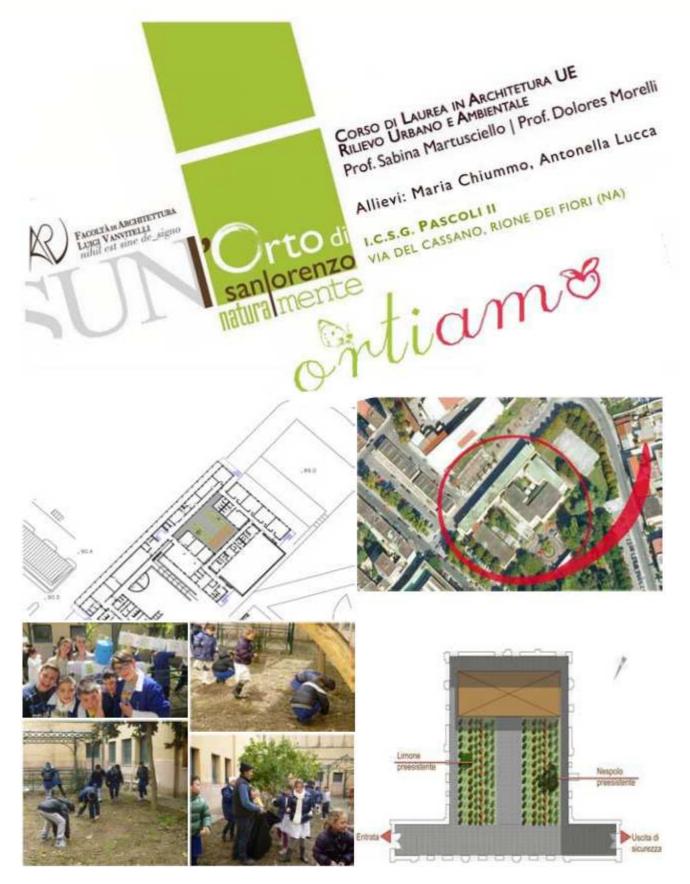
[1] Based on the "Bill of the Association of San Lorenzo Garden" 2011

CORSO DI LAUREA IN ARCHITETURA UE
RILIEVO URBANO E AMBIENTALE
Prof. Sabina Martusciello | Prof. Dolores Morelli

Allievi: Atelio Amato, Carmen Massaro,
Alessandra Mozzillo

I° CIRCOLO DIDATTICO, CARDITO (NA)

CalendORTO

Stato di fatto

Progetto

Incontro
con i bambini

Risultati raggiunti dal Protocollo d'intesa Facoltà di Architettura - I Circolo Didattico, Cardito (NA) - gennaio 2012

1478

Risultati raggiunti dal Protocollo d'intesa Facoltà di Architettura - Scuola Elementare, via E. Fermi - Aversa (CE) - gennaio 2012

Risultati raggiunti dal Protocollo d'intesa Facoltà di Architettura - I.C.S.G Pascoli II, via del Cassano Rione dei Fiori (NA) - inaugurazione 27.04.2012

Risultati raggiunti dal Protocollo d'intesa Facoltà di Architettura - IV Circolo Didattico "G. Marconi", Frattamaggiore (NA) gennaio 2012
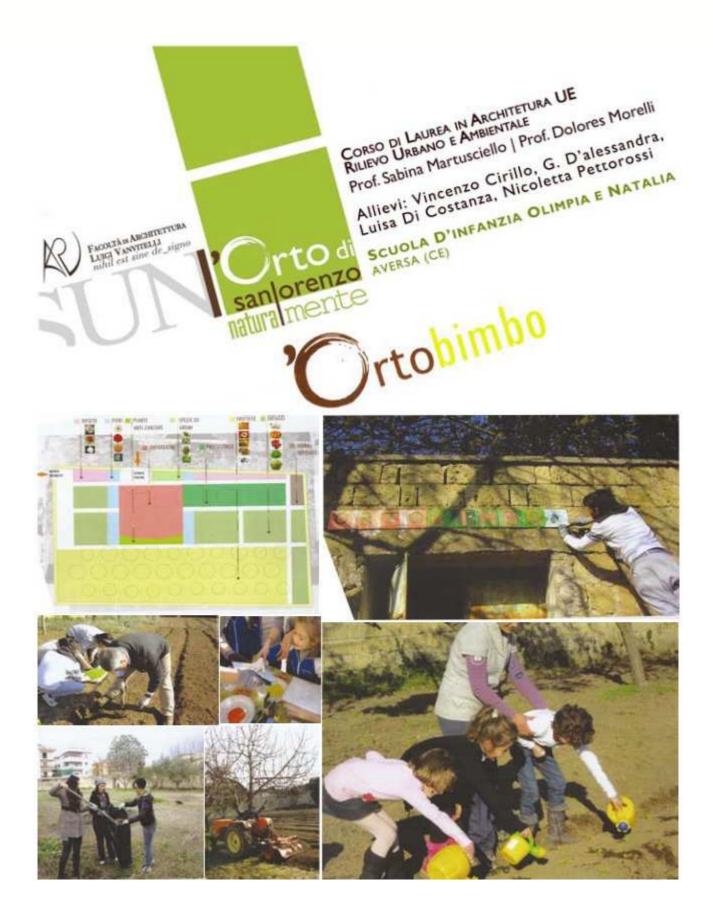
Risultati raggiunti dal Protocollo d'intesa Facoltà di Architettura - I.T.C. Alfonso Gallo, Aversa (CE) - gennaio 2012

Risultati raggiunti dal Protocollo d'intesa Facoltà di Architettura - Scuola Media Giovanni XXIII, San'Antimo (NA) - gennaio 2012

CORSO DI LAUREA IN ARCHITETURA UE
RILIEVO URBANO E AMBIENTALE
Prof. Sabina Martusciello | Prof. Dolores Morelli

Allievi: Nadia Conte, Rosaria Parente

SCUOLA MEDIA STATALE "G. MAZZINI"
SAN NICOLA LA STRADA (CE)

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Ortobaleno

area verde
palestra
percorso pedonale
pensilina
parcheggio
percorso carrabile
scuola
ingresso carrabile
ingresso pedoni

Risultati raggiunti dal Protocollo d'intesa Facoltà di Architettura - Scuola Media Statale "G. Mazzini", San Nicola la Strada (CE) - gennaio 2012

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RILIEVO URBANO E AMBIENTALE
Prof. Sabina Martusciello | Prof. Dolores Morelli

Allievi: Vincenzo Cirillo, G. D'alessandra,
Luisa Di Costanza, Nicoletta Pettorossi

SCUOLA D'INFANZIA OLIMPIA E NATALIA
AVERSA (CE)

SUN l'Orto di sanlorenzo naturalmente
l'Ortobimbo

Risultati raggiunti dal Protocollo d'intesa Facoltà di Architettura - Scuola dell'Infanzia "Olimpia e Natalia", Aversa (CE) - gennaio 2012

Risultati raggiunti dal Protocollo d'intesa Facoltà di Architettura - Scuola Media Statale "G. Impastato", Giugliano in Campania (NA) - gennaio 2012

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