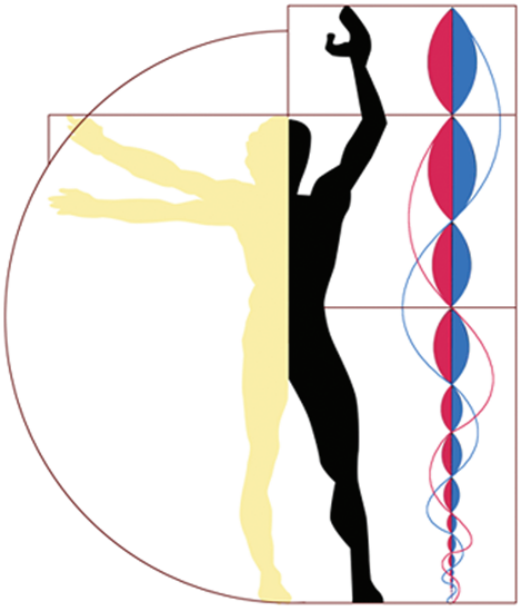
Fabbrica della Conoscenza

XIII Forum Internazionale di Studi

Le Vie dei Mercanti

Carmine Gambardella



HERITAGE and TECHNOLOGY

Mind Knowledge Experience

La Scuola di Pitagora editrice

Fabbrica della Conoscenza numero 56
Collana fondata e diretta da Carmine Gambardella

Fabbrica della Conoscenza
Collana fondata e diretta da Carmine Gambardella

Il volume è stato inserito nella collana Fabbrica della Conoscenza, fondata e diretta da Carmine Gambardella, in seguito a peer review anonimo da parte di due membri del Comitato Scientifico.

The volume has been included in the series Fabbrica della Conoscenza, founded and directed by Carmine Gambardella, after an anonymous peer-review by two members of the Scientific Committee.

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XIII Forum Internazionale di Studi

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ISBN: 978-88-6542-416-2

Progetto CAMPUS Pompei

Il Progetto "Ecoturismo urbano per la fruizione sostenibile dei Beni Culturali in Campania", in attuazione degli Obiettivi Operativi 2.1 e 2.2 del Programma Operativo FESR Campania 2007/2013 per la realizzazione e/o il potenziamento, nel territorio della regione, di forti concentrazioni di competenze scientifico tecnologiche, di alto potenziale innovativo, intende favorire la concentrazione di competenze scientifico-tecnologiche finalizzata a rafforzare la competitività dei sistemi locali e delle filiere produttive regionali non solo nei settori dei servizi associati al turismo e beni culturali ma anche in settori ad altissima tecnologia che possano rappresentare una svolta tecnologica e culturale all'approccio innovativo per lo Sviluppo sostenibile in aree ad altissima vocazione turistica.

Conference topics:

Heritage
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History
Culture
Collective Identity
Memory
Documentation
Management
Communication for Cultural Heritage
Architecture
Surveying
Representation
Modelling
Data Integration
Technology Platforms
Analysis
Diagnosis and Monitoring Techniques
Conservation
Restoration
Protection
Safety
Resilience
Transformation Projects
Technologies
Materials
Cultural landscapes
Territorial Surveying
Landscape Projects
Environmental Monitoring
Government of the Territory
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Le Vie dei Mercanti
XIII Forum Internazionale di Studi

Aversa | Capri
11 - 12 - 13 June 2015

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Peer review

Scholars has been invited to submit researches on theoretical and methodological aspects related to Heritage and Technology, 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

357 abstracts received from:

Albania, Argentina, Australia, Benin, Brazil, Bulgaria, Canada, Croatia, Egypt, France, Greece, Iraq, Israel, Italy, Japan, Latvia, Malta, Mexico, Norway, Poland, Portugal, P.R. China, Russia, Slovakia, Spain, Turkey, United Kingdom, USA.

More than 500 authors involved.

291 papers published.

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HERITAGE and TECHNOLOGY
MIND KNOWLEDGE EXPERIENCE

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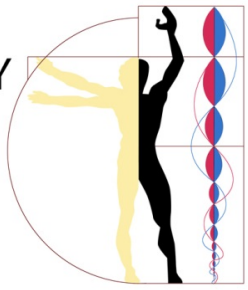

Self Explaining City

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Abstract

This paper presents a section of a wider research project [1], which deals with the enhancement of cultural heritage, also by means of Information and Communication Technologies. The focus is about the potential of architectural and urban design as a tool when pursuing this aim.
Since the layering of different elements and relationships has been producing a remarkable richness in the city, particularly in Italy, architectural design is meant as a lively part of this, slow though never ending, ongoing stratification. Architectural design adds a new layer to the pre-existing ones and, through the creation of urban spaces, aims to provide a larger awareness in the fruition of the city.
The case study, the area where the Eremitani Church lies in Padua, is heavily layered: around the Roman amphitheater the heritage of several centuries is found in the Scrovegni Chapel, the Eremitani Church, the city walls and the canals, which have been changing in terms of uses, meanings, spatial configurations and mutual relationships over the centuries.
The design of renewed spaces inherits its formal fundaments from the above-mentioned relationships, uses and meanings, the existing as well as the newly produced ones. The architectural project is conceived to produce a Self Explaining City, where educational and exhibition needs are merged, without transforming the city into a museum, and without subordinating architectural form and space to the smartness of technological exhibitionism.

Keywords: cultural heritage, urban space, exhibition, CLT timber, form/matter

1. Merging city and art, through thick and thin (L.S.)

When submitting just one portion of the thoughts that have been leading a wide research project [1] dealing with the historical complex of the Eremitani in Padua, as well as its multi-layered urban context, and involving a large team of professors, researchers and firms, it is not possible to isolate some topics and cut away the links of a thick network, without giving up most of the complexity of a trans-disciplinary, methodologically ground-breaking, and technologically advanced, programme, where several issues, such as scientific knowledge, data processing, modelling of reality, scientific communication and dissemination, cultural heritage preservation, as well as the relationships between historical and artistic works and the people who enjoy them, have been complementary and mutually fostering. Yet, at least three key issues, arising from the horizon of this project, dealing with the knowledge, representation, and enjoyment, of the complex of the Eremitani, can provide a chance to cast a new light onto some recurring topics in the speculation about city, architecture and art. These topics are tightly mutually interlaced and only for the sake of simplicity they are split into three different points.

The first one deals with the relationship between the city and the work of art, where the city is meant both as a large complex artefact – a collective work of art – undergoing a continuous, sometimes quickly changing, flow, and as a varied, liquid and multicultural community, which interacts through the space-time, while an author- or workshop-created work of art is meant as an object bearing a peculiar, aesthetical and historical value, and undergoing an extremely slow flow, which wears out its matter and threatens its form and is often seen, for several reasons, as a phenomenon to be strenuously fought. The city and the work of art make

therefore an open system, whose elements, though simultaneous in space-time, are characterized by different, not uniform, and sometimes immeasurable, velocities. The difficulty to conceive and to manage such a complex system has often brought to adopt radical simplifications that have traced two possible main paths: the former lies in separating the system elements, subtracting, by means of different ways of isolation, or sometimes displacement, the work of art from the city flow; the latter is the attempt to slow down, in the direction of an asymptotic zeroing, the urban context velocity, with the aim to transform it into a crystal, with a duration that be uniform, if not coinciding, with the time of the work of art, i.e. virtually infinite. This attempt has often turned out into the hypothesis of transforming some whole urban districts into *en plein air* museums. In both cases, both the city and the work of art will pay their shares, since they are taken away from their own flow and deprived of their features, and finally choke, owing to the lack of mutual fostering. The dichotomy between transformation and preservation, which is unconceivable in other fields of thought, has harmfully marked the culture of city and architecture, inferring a wide detachment, if not an opposition, between the cultural approaches of design and of preservation, which have often ended up to delimitate their own exclusive, and possibly non overlapping, realms. These fields, which nowadays appear so naturally and unavoidably unrelated – among the scientific community, and especially in the legislative and bureaucratic management that rules the splitting of jurisdictions – were never so extraneous, although seriously discussed, up to the post Second World War period; just think about the reflections on art, architecture, and city, made by some fathers of Italian architectural culture, starting from the Italian unification, such as Camillo Boito [2], Gustavo Giovannoni [3] and afterwards Cesare Brandi [4, 5], yet a thorough list would be endless.

In view of a city flowing at differentiated speed, which is characterized by a complex space-time layering and by variable and unstable relationships, a dialectic re-composition of different points of view and scientific knowledge cannot rely solely on the identification of a greatest common factor – which cannot of course be found, except for states of ephemeral and feeble balance, owing to the immeasurability of non homogeneous magnitudes – nor on the aim to conquer again a unity where, as Viollet-le-Duc would say, *un état complet qui peut n'avoir jamais existé à un moment donné* could be established [6]. The loss of the unity and the growth of the multiplicity, the shift from homogeneity to variety, from a finite figure to the lack of any perimeter, from the whole to the fragment, from bijective and deterministic links to unstable, feeble, and probabilistic, formal structures, make an inescapable condition in our contemporary age.

As we consider the inalienability of the network of the possible relationships between the city and the work of art, as well as the need to find ways to intercept different trajectories and velocities, without being tempted to flatten the former's necessities to the latter's ones, the acknowledgment of the loss of the unity and the fragmentary nature of contemporary reality is the second main issue that arises from the research project on the complex of the Eremitani.

The fragmented state of Andrea Mantegna's frescoes (1448-1457) in the Ovetari Chapel – the focus of the

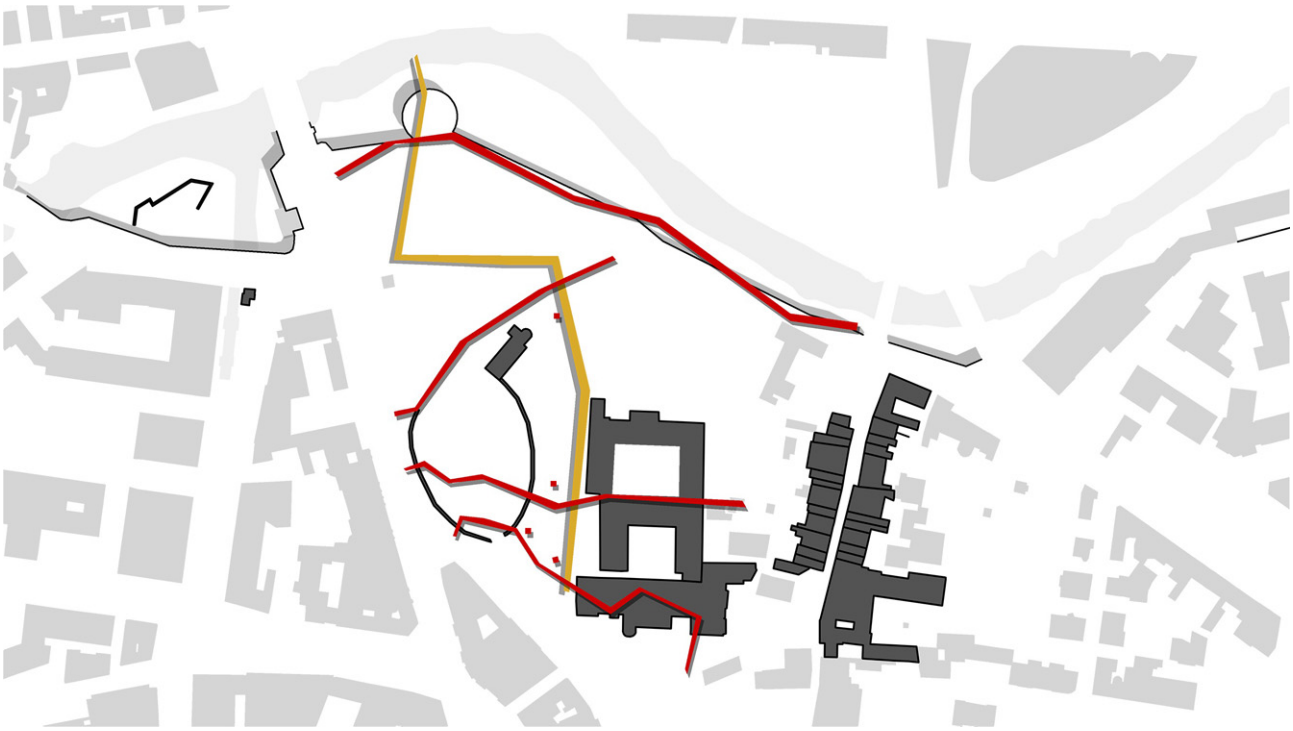

Fig. 1: Self Explaining City, concept. Architectural and urban design as a further layer across the multi-layered city.

research project – a consequence of the bombing on March 11th 1944, and the exhausting, as well as ineffective, attempts to re-compose the rescued fragments, are emblematic of the frustration of the ambition to reconquer not only the physical formal entirety, but even, definitely, that *potenziale unità originaria che ciascuno dei frammenti contiene proporzionalmente alla sopravvivenza formale ancora superstite in essi* [5]. This fragmentation dialogues with a heavily stratified urban context, a charming spatial and temporal continuum, which is marked by mutilations, differences, shifts, dissonances, and where the Roman arena's ruins live together with the traces of the medieval town, the Renaissance, and so on, up to the XX century architecture (Daniele Donghi, 1913-20; Giò Ponti, 1959-64; Franco Albini, 1966-79) and to the memorial for victims of the 9/11 attacks (Daniel Libeskind, 2005). Following the discourse that starts from the refusal to re-establish a hypothetical state of entirety, which have never existed [6], and then argues about the idea to re-compose the potential unity of the work of art [5], Mantegna's fragments appear as a warning not to idly linger on the view of a patchy pictorial surface and attempt to reconstruct its original outline, but to project an investigating gaze through it, along threads of thought, among material and immaterial lines, searching for imaginary spaces to walk through and explore, which, anchored to the material fresco fragments, be immersed in the space-time that continuously flows before and behind the painted wall. The fragments, the ruins, the interrupted architectures, the emerging traces, do invite to weave formal, spatial, and meaningful, relationships that intercept discontinuities, underline fractures, organize possible sequences of changeable stories. They invite us to vaporise point clouds, to trace virtual lines, to section the physical body of the city, so that the fragments can be observed, chosen, and collected, by the individual and collective narrative thought, so that each one can live, tell, recognize their own stories in a self explaining city, which exhibits its folds, its differences of potential energy, the curvatures and the cusps of space-time, without dictating a pre-established plot.

In this project, the space-time machine – conceived as a short-circuiting device, as a catalyst for semi-probabilistic reactions, as a mass capable to induce deformations or folds in space-time, interacting with the different material (ground, water, ruins, masses, volumes, surfaces, light) and immaterial (gazes, perceptions, ideas, thought, memories) layers that get in touch with it – is composed of hardware and software. It is form, space and mechanic or electronic device at the same time, and it is capable to generate forms, spaces and thoughts. It is capable to dissolve and to reveal itself only when interacting with something else. It dematerializes to appear again, it takes new different shapes and positions, expands, stretches, contracts, sinks beneath the soil, climbs a wall, excavates the ground, creeps along a groove, supports a ruin, peeps into a well, leaps over a void, bridges a gap, invites to sit, wraps a space, offers a shield, bears an inscription, hosts a room, exhibits an object, marks a pin point, stops before a tree, frames a

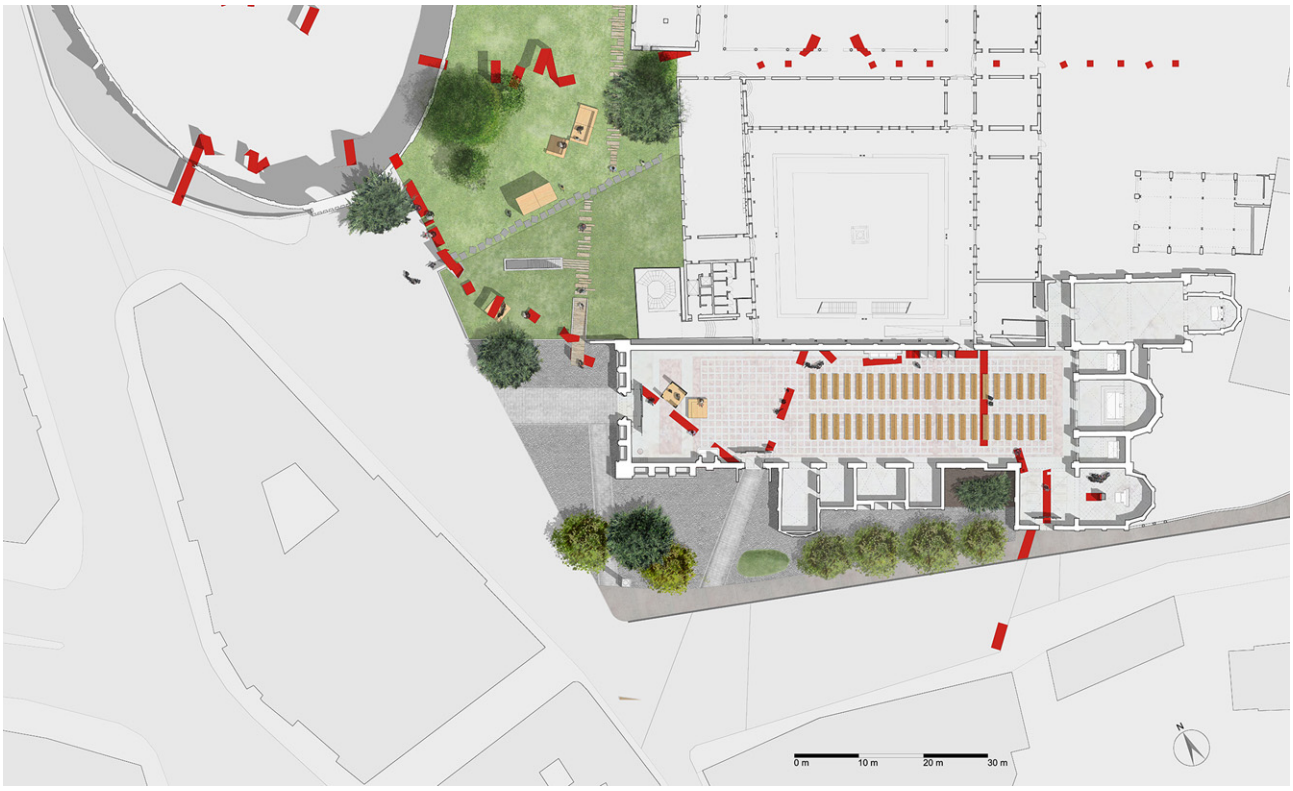

Fig. 2: Self Explaining City. The hypertext-paths across city, architecture, art.

view, directs a gaze, projects a vision, writes onto a wall, draws graffiti, recalls past images, opens a door, unveils a secret passage, lingers onto a fresco, underlines an absence, gives way to beauty. Along its discontinuous development, several rooms are deployed, as microcosms that allow delving into different dimensions and surfacing again to stare at the world from different points of view, onto different backgrounds, imaging alternative scenarios.

Each time *machine à habiter*, *machine à regarder*, *machine à émouvoir*, *machine à penser*, architecture takes different shapes, where form and matter dialogue, according to a rich array of variations. The research project about the Eremitani was based onto a thick twine of physical, virtual, augmented, and immersive, reality, by means of technologically advanced tools allowing the management of material and immaterial data and the making of visions that are capable to go through different segments of reality to draw highly interactive scenarios of knowledge, awareness and design, projected into the past, the present, and the future.

In this frame, onto the relationship between form and matter a third reflective issue is founded, since the formal thought that leads the project is developed through different stages of this relationship: immaterial forms, material forms, and matter that is not controlled by any alien form, interact and support each other, according to a complex relationship structure, which can no longer be described by means of a unique paradigm. In view of such a complex interaction between material reality and virtual forms and spaces, which are managed through Information and Communication Technology or projected onto the physical space by means of devices producing images or holograms, the different realities acquire manifold level of interdependence or autonomy, whose description requires an enlargement of the possibilities that can be found along a path starting from canonical paradigms – first of all the Alberti's one, which considers a formal thought that is dominated by the *lineamenta*, where a drawing subordinated, and not immediately necessary, matter is inscribed [7] – and getting to less conventional ones – e.g. the reflections by Peter Eisenman about the formal potential of a matter that is not framed by the drawing, which lead to counterpose diagrammatic notations to conventional drawing, when describing space [8] – hybridizing different paradigms and accepting their weaknesses for the observation of an urban space that is structured by layers [9]. In the field

Fig. 3: The Eremitani's façade seen from the garden. Merging public space design and cultural heritage preservation.

~~of these probabilistic interactions between form and matter, each layer, each artefact, each touchable or virtual image, can intentionally or accidentally play the role of, and be valuable as, a support for other forms, each fragment is a potential speaker in many different dialogues.~~
~~Yet only those artefacts that, even when the functional relationship according to which they act as support for something else is ceased, keep their own formal value and can generate a space, capable to enlighten a thought on form, are actually architecture and are immune to obsolescence that, on the contrary, is going to struck the supports, the machines, the devices that, the highest might their technological value be, do not possess formal qualities. These are bound to become debris. Architecture, when matter is worn out, shall become ruins, i.e. still architecture [10].~~

2. Cultural heritage as urban space (R.S.)

The use of cultural heritage and its so-called enhancement involve the exhibition and the explaining of cultural objects to the public. While the massive flux of visitors in the cultural sites proves that the needs of physical accessibility are satisfied, it is not the same for the comprehension of the works of art. This situation is due to the gap existing between the code and the context of visitors and of works of art. Since the work of art is a sign finalized to communicate, it is necessary to bridge this gap to allow the communication [11]. For these purpose several communication techniques and technologies exist. In the wide discipline of Public Archaeology, for example, there are some activities finalized to generate a sense of belonging toward archaeological ruins, which are based on the recovery of cultural recognizable layers existing between the public and the exhibited objects. Some tools, like Information and Communications Technologies (I.C.T.), are potentially unlimited about communicative possibilities, although they can be inadequate if their communicative contents are not well designed or are not designed by an expert in this field [11]. Furthermore they do not always provide the cheapest solution for the same communicative result. Another important wat to use and communicate cultural heritage is the design of the spaces in which artworks are exhibited. In fact, in order to contribute to bridge the gap between the visitor and the artwork, the spaces must be enough wide to allow telling a story about the exhibited objects or to show the context in which the objects were generated. The issues about the use of cultural heritage, which are often dealt with according to a small scale design – the design of a museum or of its showrooms – concern also the urban scale. The layering of a great deal of elements occurred in the long run has produced a stratified city where the elements of several

Fig. 4: The space-time machine stops and stares at the fresco remains on the northern wall of the Eremitani church.

layers have interweaved relationships of shape, use and meaning, when they have not been obliterated by other natural or artificial layers and it often happens that several layers are excavated, unveiling new findings, which need to recover their relationships with the context. The frequency of similar cases and the width of the affected areas brings to think about the possibility of creating a sort of open scattered museum, where the city becomes the exhibited object and, when it is possible, the mobile findings can be preserved *in situ*.
The here presented architectural project, which is a part of a wider research project of University of Padova [1], shows the application of these concerns onto the case study of the Eremitani area in Padua with a focus on the Eremitani Church, where Andrea Mantegna's frescoes are kept in the Ovetari Chapel. The Eremitani Church, the Roman arena with its archaeological site, the Scrovegni Chapel, where Giotto's frescoes are kept, the walls of the city, and the canals, are a remarkable example of layering as a result of several events that affected and profoundly transformed the area [12] [13].
The Church, dedicated to the Saints Philip and James, was built by the Eremitani monks of St. Augustin, during the second half of XIII century. The building has only one very long nave and at the beginning it had a rectangular plan. In the long run many chapels were built along the south side of the church and, in 1306, a monk, Giovanni of the Eremitani, built the curved wooden roof and likely the stone cladding of the façade. The Ovetari Chapel, instead, was built in the middle of XIV century. Other buildings, which lay along the north-west side of the church, were a section of the religious complex that linked the church to the Roman arena. This, instead, was used as a garden of the Dalesmanini Palace, which was destroyed between XVIII and XIX centuries, and of the Scrovegni Chapel. Two cloisters lie beside the north side of the church and are currently the abode of the Musei Civici. After the bombing in March 1944 the church and the cloisters were interested by several works of demolition led by the *Genio Militare* and other ones of re-building in which Franco Albini's atelier was also involved [14]. All these changes have produced the present condition of the intervention area: a metallic fence separates the cloisters from the church and from the Eremitani square; a garden, where some archaeological findings and contemporary sculptures lie, separates the Roman arena from the cloisters. For the absence of the Dalesmanini Palace and for the presence of the archaeological site, the arena appears detached from the urban context.
As a preliminary action to the architectural project, the area was described as a combination of those layers that are considered fundamental or mostly significant: water, walls, green spaces, the historical buildings that

Fig. 5: The space-time machine through physical, virtual, immersive, and augmented, reality in the Ovetari Chapel.

shaped the urban space (Roman arena, Scrovegni Chapel, Eremitani complex, Medieval houses in *via Porciglia*). On this basis the project consists of a series of paths arranged as if they were the structure of a text in which the user can freely choose to proceed along the main thread of the narrative or to analyse a theme of interest for them. The main text of this "experiential tale", the north-south path, lies on the area between the religious complex and the arena, shows a section of the history of the place since it develops across the most representative elements of the different layers. A series of paths, which are roughly orthogonal to the main path, link together some other elements, highlighting the previously individuated relationships concerning shapes, materials, uses, and meanings, which can be existing, have existed in the past or be introduced by the project. These secondary paths work as hypertexts, which allows the visitor to explore some themes of interest. From north to south, the first hypertext takes place along the city walls paths, the second one links the archaeological site near the Roman arena to the Scrovegni Chapel (in the past they were parts of the same complex of buildings), the third one links the archaeological findings lying in the cloister to the wall of the Roman arena. Finally the fourth hypertext links the church to the Roman arena and to the Eremitani square. The hypertexts are composed by a set of fragments roughly aligned along a direction and are able to create urban spaces, while they allow the possibility to accommodate the exhibition needs. The design of renewed spaces inherits its formal fundamentals from the site rather than from exhibitive technologies, which remain only one of the possible uses of architectural artefacts. So the duration of the architectural project exceeds the exhibition technologies one and the project is set free from the so-called smart design which, on the contrary, hides the ghost of obsolescence and of debris [10]. The fragments of hypertexts become portals that frame sections of urban landscape, benches, or just units to measure the surrounding space. The new designed layer permeates the area like an interference [15] looking like the work of Armand Grüntuch and Almut Ernst at the German pavilion for the "Biennale" of architecture in 2006 or some artworks of Krijn de Koning, where some elements of the composition give new views of the architecture. In particular the path passing through the Eremitani Church, which is the focus of the present work, is shaped like a bending-warping stripe that pursues the above-mentioned aims. It becomes a mark on the floor outside Ovetari Chapel, and then it becomes the track of the former *tramezzo* in front of the presbytery, an opening of whose still survives in the north wall of the church. The stripe continues its path in the nave declaring his contemporary through its shape and its red surface and becomes a confessional, then a frame for the fresco traces (which are nowadays unnoticed) on the north wall, and it finally becomes a section of the entrance structure. Outside the church, the stripe becomes a portal framing the entrance of the church, on whose surface drawings and captions can be applied. Then it replaces the existing metal fences, becoming the entrance of *Musei Civici*, a bench, a tool to measure the height of the Roman arena and finally it leads into the arena gardens.
This design concept has got the potential to be replicated and reshaped indeterminately to absorb new sections of the city into the tale-paths. This type of design aiming to the self-expression of the city, without transforming the city into a museum, can be applied to other similar cases where the model of the park – physically limited and which is often the result of the failure of the territory protection policy [16] – is replaced by the model of Self Explaining City: the city which explains itself highlighting the relationships between its sections. This can be a design strategy that replaces the passive method of the restriction (of building, of uses, and so on) with the dynamic method of the use and of the transformation of the spaces considering an osmotic and never ending relationship between nowadays and the past.

3. Linking past and present: timber technology applied to cultural heritage (A.B.)

A feature of historical monumental architecture in the Veneto region is the resort to two materials: brick and timber. Out of the Venetian lagoons two construction approaches have spread overland; as centuries rolled on, they have produced extremely light buildings, in which the two materials have blended together, resulting in almost see-through brickwork and quite nimble roofing. Thanks to this exchange, static and construction related norms got transformed into formal choices, determining rich and widely different spatial solutions. In the Veneto region the evolution of timber roofing has followed the evolution of styles, though constantly maintaining a first-rate, strictly linked to shipbuilding tradition technical quality. Such connection appears evident in the sort of roofing fitly named "keel shaped"; developing in late XIII century, it was used until late XV century, obvious proof of the relation between naval and civilian architecture. This particular type of roofing, used to cover wide-sized buildings such as churches and public palaces, can be found in an area more or less geographically overlapping the area over which the political and cultural sway of the Venetian Republic was dominant, namely Venice itself, Padua, Vicenza and Verona, and as far as Aquileia.
The origin of keel shaped roofing, its formal implications, and construction techniques, have already been surveyed. A first analogy, born out of the suggestive association home-ship [17] [18] has traced the origin of such roofing in the shifting of the construction expertise acquired within the Arsenal of Venice to the construction of the town itself thanks to ship carpenters who could also find work in the town`s building yards. Later studies have thrown light both on the existence of "professional" limits between ship carpenters and house carpenters [19] and on the deep differences between timber building on dry land and ship

construction, [20] [21]: these findings make a simplified shifting of Arsenal construction expertise to civilian building yards quite impossible. Recent comparative studies have furthermore underlined the basic difference between the static behaviour of a ship`s timber hull and the one of a roof of the same material [22] [23].

The resort to timber in architecture in the Veneto area is born out of the need to make buildings lighter: brickwork had to be thin so as not to weigh overmuch on a soil that frequently tended to give way. Horizontal timber beams were essential in order to make vertical walls stable, since they would have been too thin to withstand the sagging of foundations; at the same time, timber roofing covered the top of the building. Resorting to a timber structure even allowed some flexibility of construction: several sections could be substituted, without jeopardizing the structure as a whole.

The variety of timber roofing witnesses how underlying the different choices there was a determination beyond mere technical aspects: resorting to keel-shaped roofing (i.e. to a non-structural false ceiling) was meant to lead the eye towards the apse, three-dimensionally enhancing the function of multi-lobate arches. This easily led to Renaissance roofing, where trussing is completely hidden by panelled, picture-embellished ceilings. In both cases the structural pattern did not undergo substantial changes.

There are, however, several points of contact between Venetian naval and civilian architecture, with reference to timber construction. Such points of contact witness an exchange of building expertise, with reference not so much to construction techniques, as to know-how, to skills applied to planning and making complex timber structures, rather than types of construction.

Therefore, even if formally and structurally different, the roofs of the Chiesa degli Eremitani e of the Palazzo della Ragione in Padua, of the Chiesa di Santo Stefano in Venice or of San Fermo in Verona can be compared, with reference to their formal quality and construction inventiveness, to the hulls of Mediterranean galleys in the XIV century or of early XVI century galleons. In the same way, the complex trussing in the Doge's Palace (which was renewed in the XVI century) seems to herald the structures of the vessels the Serenissima started building in early XVII century.

If we intend to interpret the resort to timber from a contemporary viewpoint, it is possible to assess its main features, translating them into an innovative technological system that may underlie projects boosting our cultural heritage.

The project of MODULO has been developed within the framework of the research project aiming to enhance the potential of the Eremitani complex in Padua [1].

On the basis of the project input, the objective has been to realize a flexible set up, capable of increasing or of dwindling according to exhibition needs, subject to the changes of time; a unit interacting with the town

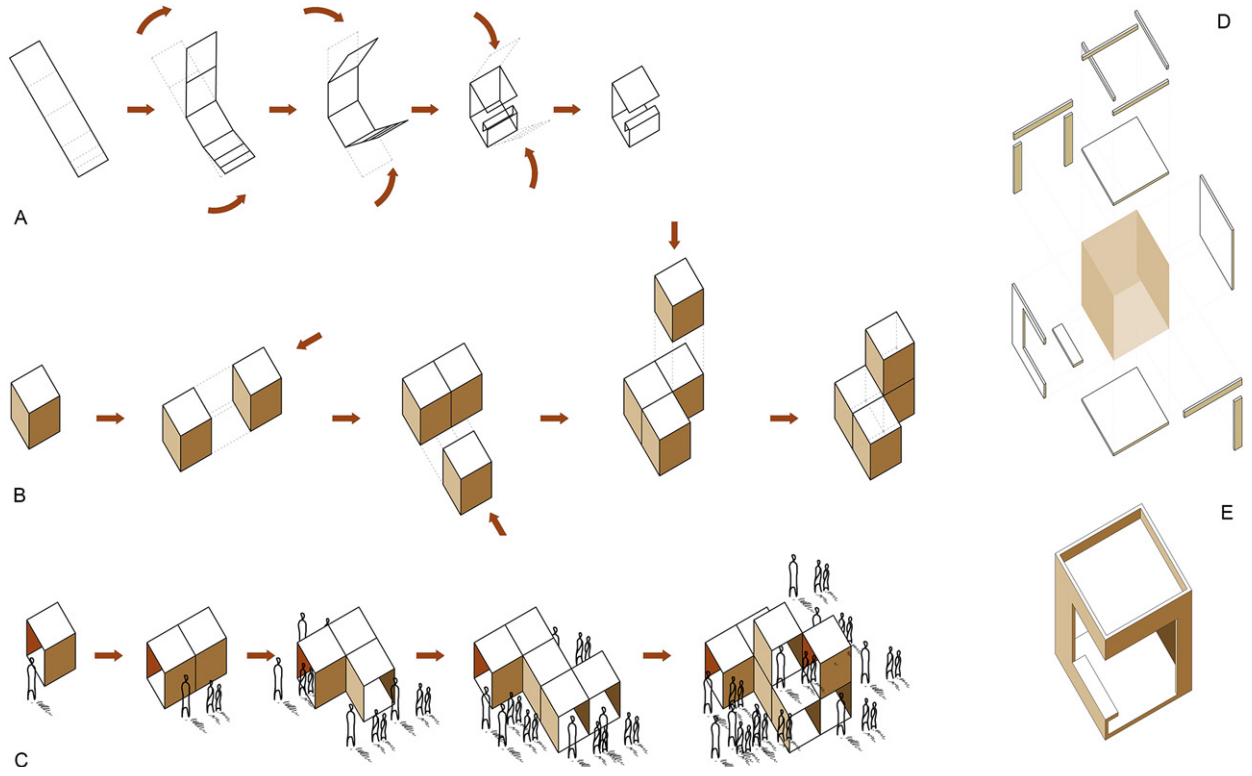

Fig. 6: Building scattered microcosms by means of the timber MODULO.

landscape, suitable for being used beyond its functional role of exhibition. The MODULO system has therefore been planned as the starting point for enjoying our cultural heritage, not only as an element designed for housing exhibitions but also as a building, thanks to which the town landscape may be used and enjoyed.

CLT (Cross Laminated Timber) has been used in this MODULO; it is an industry produced material, based on wood. This choice is strictly connected to its features and potential, above all if we must take into account how little invasive it is, when for example our intervention might disturb a context that could prove to be multi-layered from a historical point of view.

The resort to timber (in our case CLT) is not widespread yet, even if there are examples of temporary set-ups in which elements can be easily assembled and removed, or modules placed differently, which allows the set up to be both flexible and changeable to its former pattern, even in the case in which timber panes are used alongside with other materials. On the subject, the experiences of Endless Stair (2013) are telling: they have surveyed the environmental potential of CLT resorting to hard timber. Another example is the Paracity (2014) set up, in which the 240x240x240 cm MODULO has been raised on top of a floor consisting of 4 structured 600 mm wide and 100 mm thick wooden boards, together with padding structures made up of aluminium frames, to which alveolar polycarbonate panes have been anchored.

CLT is the basic material of the MODULO: an industry produced material, it consists of boards straight out of the saw mill mainly obtained from the outer layers of trunks of Norway spruce, pine, larch and silver fir. Such boards are of scanty value, however they can safely be relied on as offering the best endurance and rigidity. The boards and panes are normally between 80 mm and 240 mm wide, between 10 mm and 35 mm thick. The ratio between width and thickness must be defined according to the equivalence W:T>4:1. The typical structure of a pane consists in layers of boards or single-layer panes one on top of another alternately oriented at 90°. It is also possible to orient the layers of the boards at a 45° angle. The almost rigid connection of single-layer panes is obtained by means of evenly gluing their surfaces thanks to properly applying the glue. Furthermore, the pressure the glue requires must be maintained constant throughout the cycle of pressing. The sizes and shapes of the elements of the panes are determined by the requirements of production, transport and assembly. Since the panes cannot be left at the mercy of bad weather (class of exposure 1 and 2), they are coated with suberite on the outside: such material can be sprayed on surfaces and acts like cork: surfaces are even and without joints, though at the same time resilient (Suberfloor system). Thanks to it, surfaces are capable of withstanding wear and tear and become slip-proof; it is even possible to add pigments to the mix in order to obtain surfaces of various colours.

The resort to CLT panes has allowed some important targets of the project to be reached, thanks to the modular nature of the material and of the elements. First of all, the elements have been made versatile thanks to the freedom the resort to CLT panes has allowed: once the 295 cm size has been chosen (which is the standard height of the panes) an abacus of Modules has been drawn up, capable of meeting the various requirements: showing exhibits, letting people walk through or sit. In this way each module may be employed independently, since their size, the features of the material and construction enable modules to be structurally efficient.

The standard height of CLT panels (295 cm) has also suggested the building of modular 295x295x295 cm elements: with such sizes it is in fact possible to have elements that may be joined so as to obtain even two-storied buildings by simply positioning the cubes one on top of the other. With a view to the latter hypothesis, a staircase module has been built, its size being 295x295x590 cm with landings either on the left or on the right.

The possibility of joining exhibition modules together, in order either to create a structured walking alley or a temporary building, makes the MODULO capable of suiting various requirements by adapting its set up. In the Eremitani case study, we have devised to resort to various modules tracing a walking path showing exhibits both inside and outside the church, capable of stringing together the main themes in a sequence through time and space. The modules have both been employed as structures supporting multi-media set ups, seat-provided areas, and information stalls in the open air.

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