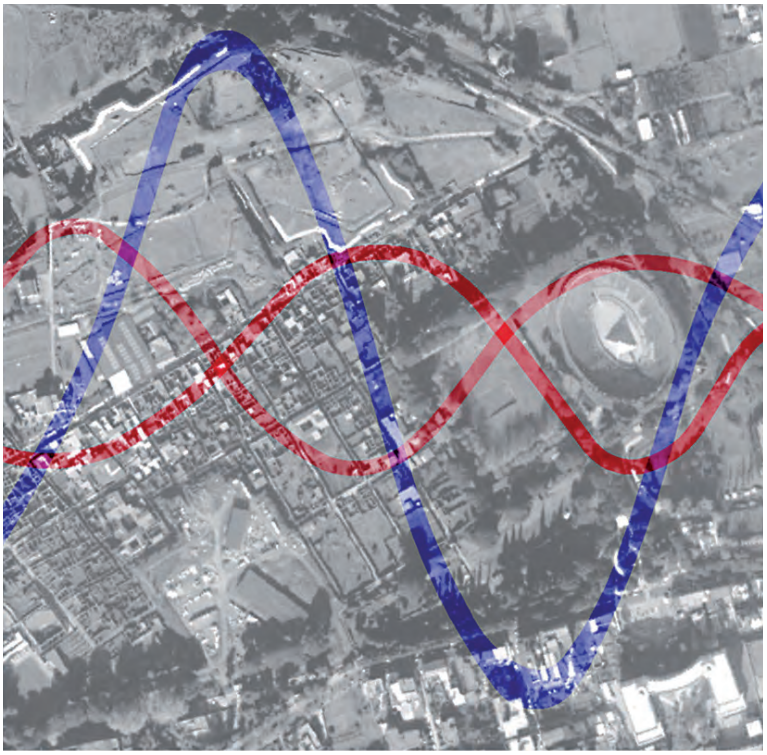
ARCHITECTURE HERITAGE and DESIGN

Carmine Gambardella

XVII INTERNATIONAL FORUM

Le Vie dei Mercanti



WORLD HERITAGE and LEGACY

WORLD HERITAGE and LEGACY

Culture | Creativity | Contamination

GANGEMI EDITORE SpA INTERNATIONAL

ARCHITECTURE HERITAGE and DESIGN | 4
Collana fondata e diretta da Carmine Gambardella

ARCHITECTURE HERITAGE and DESIGN | 4
Collana fondata e diretta da Carmine Gambardella

Carmine Gambardella

WORLD HERITAGE and LEGACY
Culture, Creativity, Contamination
Le Vie dei Mercanti
XVII International Forum

Editing: Alessandro Ciambrone

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

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

Gangemi Editore spa
Via Giulia 142, Roma
www.gangemieditore.it

Le nostre edizioni sono disponibili in Italia e all'estero anche in versione ebook.
Our publications, both as books and ebooks, are available in Italy and abroad.

ISBN 978-88-492-3752-8

Carmine Gambardella

WORLD HERITAGE and LEGACY
Culture, Creativity, Contamination

Le Vie dei Mercanti _ XVII International Forum

GANGEMI EDITORE®
SPA
INTERNATIONAL

Topics:

Heritage
Tangible and intangible dimensions
History
Culture
Collective Identity
Memory
Documentation
Management
Communication for Cultural Heritage
Architecture
Surveying
Representation
Modeling
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
Sustainable Development

WORLD HERITAGE and LEGACY
Culture, Creativity, Contamination

Le Vie dei Mercanti
XVII International Forum

Naples | Capri
6 - 7 - 8 June 2019

President of the Forum

Carmine Gambardella
President and CEO Benecon,
UNESCO Chair on Cultural Heritage,
Landscape and Territorial Governance

International Scientific Committee

Components:

Aygul Agir
Professor, Department of Architecture, Istanbul Technical University, Turkey

Ahmed Abu Al Haija
Professor and Head, Environmental Design,
Urban and Architectural Heritage,
Faculty of Engineering,Philadelphia University, Jordan

Ali Abu Ghanimeh
Vice president Al al-Bayt University Almafraq – Jordan

Pilar Garcia Almirall
Professor, UPC Ecole Tecnica Superior d'Arquitectura Barcelona, Spain

Harun Batirbaygil
Head, Department of Architecture, Okan University, Istanbul, Turkey

Artur Beu
Professor, University of Art, Tirana, Albania

Massimiliano Campi
Professor, University of Naples Federico II, Italy

Cevza Candan
Professor, İstanbul Technical University, Turkey

Federico Casalegno
Professor, Massachusetts Institute of Technology, USA

Alessandro Ciambrone
Benecon UNESCO Chair, UNESCO and Fulbright Former Fellow, Italy

Joaquín Díaz
Professor and Dean, Technische Hochschule Mittelhessen-University of Applied Sciences, Department of Architecture and Civil Engineering, Germany

Yurdanur Dulgeroglu
Professor and Head of the Department of Architecture, İstanbul Technical University, Turkey

Yonca Erkan
Chairholder UNESCO Chair, Kadir Has University, Turkey

Kutgun Eyupgiller
Professor, Department of Architecture, Istanbul Technical University, Turkey

Yankel Fijalkow
Professor, Ecole Nationale Supérieure d'Architecture Paris Val de Seine, France

Xavier Greffe
Professor and Director, Centre d'Economie de la Sorbonne Paris, France

Manuel Roberto Guido
Director Enhancement of Cultural Heritage, Planning and Budget Department, Italian Ministry of Heritage and Culture, Italy

Bernard Haumont
Professor, Ecole Nationale Supérieure d'Architecture Paris Val de Seine, France

Tatiana Kirova
Professor, Polytechnic of Turin, Italy

Alaattin Kanoglu
Professor, İstanbul Technical University, Turkey

Ilknur Kolay
Professor, Department of Architecture, Istanbul Technical University, Turkey

Mathias Kondolf
Professor, Landscape Architecture and Environmental Planning, University California Berkeley

David Listokin
Professor, Edward J. Bloustein School of Planning and Public Policy, Rutgers University, USA

Andrea Maliqari
Professor and Rector of the Polytechnic University of Tirana, Albania

Sabina Martusciello
Design and Communication Degree Course (President)
University of Campania 'Luigi Vanvitelli', Italy

Massimo Menenti
Department of Geoscience and Remote Sensing, Faculty of Civil Engineering
Delft University of Technology, The Netherlands

Rusudan Mirzikashvili
Ministry of Cultural Heritage, Georgia

Doe Morelli
Professor, University of Campania 'Luigi Vanvitelli', Italy

Louise Mozingo
Chair, Landscape Architecture and Environmental Planning, University California Berkeley, USA

Maria Dolores Munoz
Professor, UNESCO Chair, EULA Environmental Centre, University of Conception, Chile

Florian Nepravishta
Dean of the Faculty of Architecture and Urbanism, Polytechnic University of Tirana, Albania

Luis Palmero Iglesias
Politècnica de València UPV, Spain

Jorge Peña Díaz
Professor, Facultad de Arquitectura, Instituto Superior Politécnico José Antonio Echeverría, Cuba

Rosaria Parente
Ph.D. in “Architecture, Industrial Design and Heritage” at University of Studies of Campania “Luigi Vanvitelli”, Benecon UNESCO Chair, Italy

Michelangelo Russo
Professor, University of Naples Federico II, Italy

Paola Sartorio
Executive Director, The U.S.- Italy Fulbright Commission, Italy

Lucio Alberto Savoia
Ambassador, Secretary General Emeritus, Italian National Commission for UNESCO, Italy

Maria Anita Stefanelli
Department of foreign lenguagers, literature and Culture, Università degli studi RomaTRE, Italy

Elena Shlienkova
Professor of Architecture and Construction Institute of Samara State Technical University, Russia

Eusebio Leal Spengler
Professor, Historiador de la Ciudad de La Habana, Presidente de Honor del Comité Cubano del ICOMOS, Cuba

Isabel Tort
Professor, Universitat Politècnica de València UPV, Spain

Andrey V. Vasilyev
Head of Department, Samara State Technical University of Russian Federation

Yaliang Xiang
Professor, China Academy of Art, China

Yang XiuJing
Professor and Director, China Academy of Art, China

Natasa Zivaljevic-Luxor
Director, National Heritage Foundation, Belgrade, Serbia

Scientific and Organizing Local Committee

Alessandro Ciambrone
Coordinator of the scientific program and relationships with the International Scientific Committee

Rosaria Parente
Scientific Assistant of the International Committee President

Luciana Abate, Giuliana Chierchiello, Vincenzo Ferraro
Graphics and layout

Dario Martimucci
Web master

Peer review

Scholars has been invited to submit researches on theoretical and methodological aspects related to Smart Design, Planning and Technologies, and show realapplications 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 papershas been invited to submit full papers. These has beenagain peer-reviewed and selected for the oral session and publication, or only for the publication in the conference proceedings.

Conference report

300 abstracts and 650 authors from 39 countries:

Albania, Australia, Benin, Belgium, Bosnia and Herzegovina, Brasil, Bulgaria, California, Chile, China, Cipro, Cuba, Egypt, France, Germany, India, Italy, Japan, Jordan, Kosovo, Lalaysia, Malta, Massachusetts, Michigan, Montserrat, New Jersey, New York, New Zealand, Poland, Portugal, Russia, Serbia, Slovakia, Spain, Switzerland, Texas, Tunisia, Turkey, United Kingdom.

Preface

The XVII Forum "World Heritage and Heritage" addresses the issue of the handed down in the sense of transmission over time of generation, at the state of knowledge, the material and immaterial heritage that comes from the past. A generational commitment to operate, in the cyclical temporal process, in order to preserve and protect the cultural heritage; a duty of the present generations to deliver to the future generations the legacy of the past at least in the same conditions in which it is received.

A commitment that takes on an even more meaningful significance in a historical moment that is crossed by destructive and iconoclastic wars and by great migration phenomena involving abandonment of territories undermining the identities of places, traditions, material and immaterial culture, which characterize the Cultural Landscapes. A re-appropriation by humanity of the value of a biological continuity that is traceable in its genetic complexity as a custodian and bearer of the memory of the past and, at the same time, belonging to those who live in the future by living the present. Moreover, "to the state of knowledge" should not be interpreted as a limitation but as an exhortation not to live on the position income and above all to remind men that they were not "made to live like brutes but to follow virtues and knowledge".

Knowledge therefore contains an evolutionary value in the history of progress. Where knowledge is substituted by acts or policies conducted by brutal and unreasonable actions against Humanity and its Patrimony, a fracture on historical continuity is created, which produces a negative value due to the great expenditure of economic resources and loss of human values . Therefore, in the awareness that the value produced by the past generations, which have given us and above all entrusted as heritage to be transmitted to the future is not commensurable to the value of time to re-establish and restore continuity to the regenerative space of the common good, it is impossible to activate more and more moments of reflection and I would say to monitor the behavior of supranational cultural policies.

This in the spirit of inducing to avoid the disastrous temporal intervals that involve serious losses of the human heritage, which break the glue that binds the generations. Architecture, Cities, Infrastructures and Landscape not only represent the form of time but all the disciplines that have contributed to and contribute to their characterization. The form of time is the body of a cultural program of society and the modification project makes use of the knowledge at the date. Economics, mathematics, physics, in one the sciences are always traceable in the construction of man's works, from the simple artifact to monumental architectures, to cities, to large infrastructures. In fact, with

the previous sixteen editions of the International Forum "Le Vie dei Mercanti" an interdisciplinary community has been created of about 6000 scholars and researchers, coming from over 50 Countries of the World. These have presented realized projects, theoretical research, good practices, technological innovations, which are recognized in the principles and actions to be carried out so that the Planet with its species can always adapt itself to the needs of humanity in a sustainable reciprocal relationship for the salvation of the same Planet. And if Beauty will save the world, the principles and actions shared in these sixteen previous years will find with the seventeenth Forum a moment of evaluation of the state of art so that they can increasingly reach, interest and belong to as many people as possible such as Governments, Institutions, Universities, and Enterprises.

This is to create and disseminate a new Humanism that acts as a generational glue through a review of the inheritance concept, or of an ongoing heritage formed by resources intended as lot, which, declined as an income statement, create solidarity, peace, trust, work with art and quality of life.

For these reasons and for the history of the Forum, I am sure that the scientific community will establish a debate in Naples and Capri on 6th, 7th and 8th of June which will bring further richness to the discussion among researchers who have faced the protection and safeguard of heritage handed down to us and the researchers who through their works will be the bearers of the future legacy.

Carmine Gambardella

President and Founder of the Forum

Le Vie dei Mercanti
XVII INTERNATIONAL FORUM
WORLD HERITAGE and LEGACY
CULTURE | CREATIVITY | CONTAMINATION
Naples 6 - Capri 7|8 June 2019

SUSTAINABLE CONSERVATION: THE STATE OF ART AND THE NEED OF GUIDELINES ABOUT PROTECTION AND ENJOYMENT OF THE ARCHEOLOGICAL HERITAGE

Giuseppe DE GIOVANNI[1], Cesare SPOSITO[2]
(1) Department of Architecture (DARCH), Polytechnic School, University of Palermo, Palermo, Italy giuseppe.degiovanni@unipa.it
(2) cesare.sposito@unipa.it

Abstract
Within the scientific debate about the conservation, in general, of Cultural Heritage and, in particular, of Archaeological Heritage which are characterized by a dual tangible and intangible nature; and in consistence with Technological Culture for its features concerning the right development and enjoyment of the Heritage, the present essay offers a critical interpretation of the literature about a protection system with an architectural shelter for archaeological sites. On the basis of the critical elements detected in the activities that took place over the past sixty years, this essay underlines the absolute impossibility to postpone the definition of the guidelines which need to be always based on a case-by-case principle in order to bring workers towards an aware conservation, enhancement and enjoyment of the Archaeological Heritage. It is impossible to postpone the creation of operational models which allow us to set up a contemporary high-performance, reliable, sustainable but also reversible protection system (with morphological, typological, technical and constructive solutions suitable for the potential significance of the Heritage itself) in order to cope with significant and variable meanings that would or could be given by the future generations.

Keywords: conservation, enjoyment, quality, shelter, guidelines

1. Introduction
The joint approach of various experts and professionals and the disciplinary integration of archaeology, history, restoration, town planning, architecture and technology represent a prerequisite for knowledge and conservation projects [1, 2]. In particular, it may be said that the “conservation process” is different from the “construction process” insofar during its stages (technical-economic, definitive, executive feasibility). The final and executive plans illustrate a current reality which is destined to change over the years because of new actions or new discoveries concerning the Heritage as it often happens in a construction site for the Archaeological Heritage conservation. Therefore, the future reality will not be the one described in the initial project but the one which will be determined by updates and actions taken and requiring planned management and maintenance.
The “conservation process”, as well as the construction process, can be defined as «a series of activities, which vary over time, concerning the material and tangible aspects (the already processed matter) and the immaterial and intangible aspects (identity and values). Furthermore, they can identify criteria and organize projects and define crucial processes to preserve, protect, safeguard, enhance and handle the cultural artefact and its enjoyment especially in view of being handed down to future generations» [3]. The need to shelter the ancient artefacts such as archaeological sites, the architecture ruins, mosaics, floors, plasters and canvas etc., is an integral part of the conservation process. It is possible to list two strategies coming out from the archaeological investigation. The first one is about findings: after being excavated, observed, recorded and studied, they could be reburied in order to be preserved (this could be done just for minor sites). The findings could also be left exposed, restored, enhanced and offered to be studied by experts or to the public (this happens for

highly valuable and unique sites). Therefore, to preserve the ancient artefacts but also, and most importantly (unless you want to rebury the architecture ruins) “to shelter the ancient artefacts” becomes more important than conservation since it is the preparatory stage leading up to the restoration.
After the 1970s energy crisis, the public interest focused towards a more quantitative rather than qualitative conservation activities. For instance, according to the critical interpretation of performed sheltering interventions, we can notice a remarkable obsolescence within a relatively short period [4] and a non-methodical and non-systematic implementation of the UNI 8289/91 Standard (with its required performances and the absence of evaluation criteria in the many stages of its design) both on reliability and sustainability of protection systems and both on compatibility and sustainability of the added systems and on the anthropic risk due to the flow of visitors entrained by a non-suitable enjoyment. On the basis of the aforementioned critical aspects, this essay examines, by means of studies, research and implementations, the scientific debate concerning the Archaeological Heritage protection systems whose knowledge represents a fundamental condition to define binding operational methods and guidelines at the service of the various conservation workers.

2. Sheltering structure: State of the art between theoretical and practical research

Every historical period before the arrival of modern archaeology had to cope with the Heritage conservation and protection issue through processes based on its own cultural and specific historical dimension, often keeping memory of pre-existent buildings to preserve their symbolic, ethical, religion, political values. The ancient history gives us many examples, such as the Heraion Temple (600 B.C.) at Olympia, in which the restoration includes the replacement of the wooden columns integrating the new stone ones and the conservation of an original vertical element invested with «ritual values extraneous to its supporting and functional value or to its artistic quality» [5]. However, the architectural culture inspired by the 1800s, livened up by the selectivity of each finding and by the resistance to their integration with the following pre-existent buildings, has a propulsive role, first, on the “active” conservation, and then “integrated” of the Archaeological Heritage in situ.
From the one hand, the eradication of any linguistic contamination with the shapes of the past, actually promoted more from the Modernism movement than from the developed needs expressed by archaeology. On the other, the need of a “permanent protection of these artworks discoveries” finds its place within the many Restoration Charts (1932), the Venice Chart (1964), in Lausanne (1900) and also within governmental cultural bodies such as UNESCO in (Recommendation concerning the Safeguarding of Historic and Traditional Areas, 1967) and non-governmental bodies such as the ICC with The Code of Ethics for Art Conservation (1967), and the ICOMOS with the Charter for the Conservation of Historic Town and Urban Areas (1987), both working at an international and local level (the Council of Europe, and the Granada Convention in 1985). All these charts become the global landmark to discipline the monuments and the archaeological artefacts’ conservation and restoration actions - from the largest to the smallest archaeological artefacts - each of them with a great cultural value representing mankind civilization and their meaningful evolutions. Within their major features: the distinguishable restoration of the archaeological matter, the reversibility of interventions, avoid– where possible – relocations, and the prohibition to build especially on the existing masonry.
It was only in the second half of the 20th century that the “integrated conservation” of the Heritage concept was created. It was also applied within The European Year of the Architectural Heritage, promoted by the Council of Europe that has defined it within the Resolution concerning the adaptation of laws and regulations to the requirements of integrated conservation of the architectural heritage of the Amsterdam Charter (1976) as a set of measures which aims to ensure the perpetuity of this Heritage, to protect its conservation in an appropriate environmental context, built or natural, and also its location and its adjustment to the society’s need. Therefore, promoting the maintenance and restoration activities and its enhancement and use of the Heritage for public and social purposes.
These are just some of the actions aiming to the physical conservation of the architectonic heritage and its integration in the society. Successively, the Charter of European Cultural Heritage in 1991 has considered feasible through the management of every initiative able to facilitate the comprehension of the monument exposed without misrepresenting its meaning, specifying that, during architectonic excavation and explorations, it is imperative to immediately ensure that every site arrangement, every protection and conservation measure taken for architectonic works and every finding will be inserted into the town planning of the territory where they are located. In the field of the Cultural Heritage “the planned and precautionary conservation”, intended as a constant and anthropic activity aimed at assuring the perpetuity of material data, found at legislative level its first recognition in Italy in 2004 with the Cultural Heritage and Environmental Code. It was also confirmed by the Public Works with the Contracts Code.

In general, the archaeological heritage's vulnerability imposes to carry out restoration and periodical maintenance actions and also to organize seasonal protection systems and architectonic sheltering to ensure both the conservation, enhancement and enjoyment of ancient remains. The conservation in situ must be the main goal for each action on archaeological remains. This goal has been confirmed by the modern conservative culture and by the International Conservation Charters (such as the ICAHM Charter in 1990), with the support and the integration of suitable strategies concerning "active conservation" and "passive conservation" by adopting new methods about temporary reburying or employing architectural sheltering.
Until the end of last century, the archaeological sheltering was not addressed in the specialized literature. Because, on the one hand, the archaeologists thought that this issue was too far from their knowledge or even that it was unacceptable for the inevitable modification caused by the romantic and Ruskin-based image of a ruins archaeological site. On the other, architects underrated its importance by considering it as a temporary superstructure to service excavation activities. The need to cover and protect architectonic structures of an archaeological site – especially the findings made of the most ephemeral and delicate materials – has its origins, probably, in the Roman period when, to protect what was believed to be the exact place of birth of Romulus on the hill Cermalo, wooden and wicker covers were used. These covers were subject to special care and maintenance, almost like a place of worship [5].
Moreover, whereas between the 18th and the 19th century conservation was mostly used for the most prestigious decorations in enclosed spaces, the first half of the 20th century stands out for "conservation in situ" through a great number of horizontal sheltering, often made with reinforced concrete, with the illusion of greater durability and less expensive maintenance. The Ara Pacis case is emblematic. It was relocated during the aftermath of the Second World War in Rome by the Lungotevere inside a wider urban regeneration project. This urban project involved Piazza Augusto Imperatore which was transformed in a museum in situ by the architect Morpurgo through a majestic reinforced concrete sheltering and perimetral glass walls that had to disclose the monument and to protect the marble sculptures from the weather [7].
Between the 1950s and the 1970s the growing urbanization and the consequent greater degradation risk of the Archaeological Heritage sparked off a debate on this issue promoting a new consciousness towards conservation in situ and a new critical sense for the research of useful and distinguished solutions in order to combine the need to shelter with the need to excavate, or with the growing consensus of the enhancement and musealization in situ for the enjoyment of the Archaeological sites. In relation to these objectives the architect Franco Minissi from Viterbo can be defined as a pioneer - being also supported by the theories of Cesare Brandi (1956) - the most prolific of the 20th century on this subject. His essays as much as his projects show us his theories about a critical process divided in different stages thanks to a multidisciplinary knowledge support; starting from a study concerning archaeological and historical aspects, to the analysis of the conservation and restoration state and from the potential planning of protective sheltering to its presentation for the enjoyment.
The project to convert the area of the Villa del Casale into a museum still is considered as an outstanding case for the critical process through which he has linked the sheltering system and the archaeological site. The outcome is a sheltering system with brand new features compared to the ancient matter, which is able to solve, at the same time, the enjoyment and the conservation of ancient art in general and the mosaics, in particular. In relation to the physical and technical skills of that time, the sheltering of the Villa in Piazza Armerina, both from a conservative and scientific point of view and as a museum, with its landscape, architectural and decorative components, represents a sheltering that, at the time of its realization, was characterized by a modern idea perfectly in line with what the Institute for Conservation and Restoration (Istituto per la Conservazione e il Restauro: ICR) was pursuing in the rest of the world.
The Heritage protection between the "transparent cases" created by Franco Minissi is essential in that environmental and landscaping context especially for visibility and enjoyment. Unfortunately, during the years, due to a lack of maintenance procedures from the 1980s, it produced a rapid and often irreversible degradation and modification phenomena of the concrete material invalidating the expected results especially in some projects such as the Cinta muraria di Capo Soprano in Gela, the Villa Romana del Casale in Piazza Armerina and the Teatro ellenistico di Eraclea Minoa [8].
These three creations, linked to an architectonic culture with no awareness about the importance of the maintenance of planned solutions, could still be sheltering the Archaeological Heritage, as Maria Luisa Germanà pointed out, if at that time the Maintenance Plan and the Dossier for the Endeavour would have been mandatory, to force the architects to take into consideration the entire «lifecycle of what they are working on by defining the technical, organizational and financial details of every single action they need to carry on, in safe conditions for the workers, in order to keep the performances unchanged over time» [9]. The transparent case topic is to be brought back to the experimental - utopic - project proposed by the Swiss architects Schweiner (1977) for the Acropolis of Athens, a huge

crystal case to protect a 40,000-square-metre area. On the one hand, it was thought to prevent the decay caused by air pollution and on the other to create a fence to restrain the urban sprawl. This project, without any structural and climatic control, had the merit of drawing the attention on the need to take appropriate measures to preserve the site.

But it's from the 1980s, when grew the interest for some findings of the material culture, ignored up until then, and with the employment of new stratigraphic excavation techniques, archaeological investigations and new restoration and conservation materials used for decorative and stone materials as well as with the maturation of new constructive techniques, that the Charters start to be understood and a new intervention philosophy aimed at the musealization in situ for the archaeological artefact starts spreading, even with the realization of architectonic sheltering. The sheltering proposed by Renzo Piano for Pompei (1988) is a perfect example of this renewed interest on the subject. It is a kind of prototype characterized by a flexible and ample structure based on regular and interchangeable modules which can be adapted to the need of excavation. It is also linked to the restoration of every access and service, to the realization of new instructional and informational assets for the archaeological complex, to the new street furniture proposal and finally to a centre to store and collect artefacts of new excavations.

In that decade, we have witnessed the birth of various conferences concerning archaeological sheltering. These conferences have always been followed by studies, theories and research; most of them tend to bring the complexity of the topic back to a few typological categories of intervention. Among these various conferences it is worth mentioning the Cyprus conference in 1983 [8] and the Ghent conference in 1985 [10]. These two conferences get the credit for having started a brand-new approach: the multidisciplinary approach; among their lecturers there were archaeologists, historians, professional mosaic restorers, architects and structural engineers.

During the conference on "Sheltering of the Vesuvius Hinterlands" held in Naples in 1984 different new problems emerged, such as the relationship between the sheltering system and the environmental context and the suitability of some architectural sheltering, already historicized, realized with philological restoration since the end of the previous century. In this scientific debate, Minissi proposed an initial classification of sheltering based on their efficiency and on their configuration by distinguishing four different models: 1) temporary sheltering; 2) the sheltering of a whole archaeological area, separated from the ancient remains; 3) the reconfiguration sheltering of spaces and volumes not supported by historical and archival sources; 4) the reconfiguration sheltering of original spaces and volumes on philological, reversible bases, using modern materials distinguished from the ancient ones [11].

Minissi's cultural heritage and his experience gained in the field led him to elaborate the "Musealization Theory for the Archaeological Areas", according to which the sheltering project must aim to fully enhance the archaeological area and its integration within the landscape; highlighting the figurative and architectural aspects with respect to the conservative ones. The architect favours the reconfigurative-philological typology with the use of modern materials, reversible and attentive to museological aspects. According to Minissi an "active" conservation can be considered as such if it introduces the so-called "musealization process". He thought that through the conservation in situ of movable and immovable goods it is possible to create a museum wherever there is a historical place or an artefact in which it is possible to recognize historical values, modernizing their meanings through a simple cultural use [12].

Another important research about protective sheltering is the one published by Prof. Hartwig Schmidt in 1988. His book, Schutzbauten, with the image on its cover of the new sheltering in Villa del Casale in recognition to Minissi for his theoretical and planning work, underlines three aspects of a protective structure: the "functionality", which includes protection from weather conditions, the correct air conditioning, security, stability, etc.; the "architectonic form", which must be adapted to the particular shape of the ruins and must give rise to an object clearly distinct from the findings; the "relationship with the context", which includes the compliance with the topography and with the environmental and historical context in which the heritage is located. The German researcher analysed more than 78 archaeological sheltering in the West and in the Near Middle East gathering together four different kinds of protection system: temporary sheltering, the ones not casing the Heritage (opened), the ones casing it (closed) and the crypts [13]. Closed sheltering types are divided into two subgroups depending on the form of the structure: the shed, independent from the archaeological context, and the philological sheltering which lies on old masonry suggesting the original forms and volumes.

Schmidt's studies, even if they were mainly focused on the architectural aspects and on the material used for the protective structures, underline as in some cases the wide transparent or glass surfaces may implicate a detrimental greenhouse effect for the ancient archaeological structures such as the formation of mosses and lichens on stone materials, plasters and mosaics by neglecting crucial issues regarding any intervention method. Two years later, with reference to Pompei and Ercolano's interventions, the archaeologist Giorgio Gullini categorized sheltering in three different types, including in the first type, the philological sheltering for what concerns their shapes and their materials. In the

second type we find the reconfigured sheltering with different materials, while in the third type we find sheltering not linked to the ancient findings [14]. Both studies have an excellent documentary value although they may be lacking something. Schmidt's review has an uncritical feature, Gullini's, due to the specific Pompeian field, is excessively restricted to become a general reference.
How could we forget to talk about the research and trial carried out by the Getty Conservation Institute in the context of The Project on Mosaics Conservation (1988-91). It is important not only for the realization of the so-called prototype Hexashelter which is a temporary light, modular and adaptable for every context sheltering, but for its studies (one of the first on this topic) designed to verify the efficiency of the new sheltering (for the Fort Selden site in New Mexico) through an environmental monitoring and a data correlation beneath and outside the protection [15].
At the beginning of 1990s other influential experts inspected the archaeological sheltering providing some interesting essays for the classification of different types of interventions. Among them, Professor Dieter Mertens, architect and executive director of the German Archaeological Institute in Rome, who identified some new actions to arrange and preserve the site and the setting up for visitors with architectural examples exposition (partial anastylosis and models), total anastylosis actions and rebuilding actions [16], and John H. Stubbs, Senior Advisor of the World Monument Fund. He reformulated the sheltering classification through twelve different proposals which are characterized by a growing planning action starting from discovered sites that have never been excavated until their archaeological rebuilding [17]. Sandro Ranellucci, always during the 1990s, summarized in a systemic way the studies and the thought of Hartwig Schmidt and of his master Franco Minissi by promoting, where quality and knowledge of the findings made it possible, a "musealization in situ", avoiding inauspicious effects caused by an extirpation whose «negative consequence could not be solved neither by the most effective educational arrangement» [18] – through the realization of a sheltering that must necessarily be linked to the primary protective purpose and that allows visitors to evoke the image and the meaning of ancient art.
With the beginning of the new millennium, on the occasion of the Conference entitled Protective Shelters for Archaeological Sites in the Southwest USA, held in Tumacacori in Arizona in 2001, Martha Demas, project manager of the American Institute, takes stock of the state of the art examining a first review, then updated in 2012, sufficiently comprehensive of texts published in English, French, German, Italian, Spanish and Portuguese between 1959 and 1999, highlighting how the literature in question often omits to report the aspects of conception and analysis of the criteria that guided the project, on the functionality of the sheltering in their life cycle, on criteria and guidelines to the planning of the protective sheltering of the archaeological remains [19, 20]. Other study days and conferences about in situ protection offer moments of confrontation from which emerge the important progresses achieved by the culture of conservation on a programmatic level with the shared concept of "integrated conservation" but also the uncertainties in the archaeological field on subsequent activities to the phases of excavation and their correspondence to the orientations of the current culture, the indeterminacy of the disciplinary areas of competence, the need to «systematize the acquired knowledge related to the protection systems due to the substantial lack of general guidelines unambiguously accepted» [21].
In parallel, many studies and researches concerning protective structures for archaeological heritage are published. It is fundamental to recall the important contribution offered by the Central Institute of Restoration in collaboration with ENEA which develops research guidelines already launched by the ICR in the 1990s at the sites of the Domus dei Coiedii, in Castellone di Suasa, where an architectural sheltering was installed and a study for the environmental investigation of Arsalantepè in Turkey at the Casa dei Vetii in Pompeii was set up [22, 23]. The collaboration with the body for New Technologies, Energy and Environment allowed to launch a new research with the aim of developing, through the support of interdisciplinary work groups, a methodology aimed at designing protective sheltering in the archaeological field.
The study is essentially based on a first fact-finding phase, aimed at setting up a database, the Territorial Information System (TIS) of the Risk Map, which contains information on the state of conservation of 120 architectural/archaeological monuments, randomly analysed taking into account the different features of the sheltering (provisional, definitive, materials used) and the specificity of the sites (morphology of the area and geographical location), thematic maps of the main causes of risk for the architectural, historical and archaeological heritage, on the Static – Structural danger (related to phenomena such as earthquakes, landslides and floods, coastal dynamics, avalanches, volcanism), Environmental-Air (through indicators of erosion, blackening, physical stress), and Anthropic, direct (tourist pressure, vandalism, theft) and indirect (depopulation linked to the abandonment of a certain area, intensive housing growth), useful in identifying the relative intrinsic index of danger and vulnerability, which represents how much the Heritage is exposed to the action of degradation: if there is a bad state of conservation of the Heritage there will be a higher degree of vulnerability and dangerousness. This analysis phase allows us to evaluate the functionality for each sheltering, in

relation to its constructive efficiency, and the adequacy in relation to the conservation status of the protected archaeological remains.
Also in 2006, Jacque Teller and Sophie Lefert, researchers from the Belgian University of Liège, published the results of the APPEAR Project (Accessibility Projects, Sustainable Preservation and Enhancement of Urban Subsoil Archaeological Remains) funded by the Culture Commission of the European Union. A project that, through the multidisciplinary and transnationality of the consortium, and the involvement of different stakeholders, proposes a series of decision-making tools for the management of the urban archaeological subsoil, in order to reach a sustainable socio-cultural development [24]. With respect to the theme of protection systems, the interpretation of the experts about the architectural (protective) case is of particular interest, assimilated to an interface between the city and the archaeological findings and could be divided into three elements: the outer membrane, which dialogues with the urban context (or landscape); the inner membrane, which relates to the archaeological findings; the interface with visitors (which involves various functions including the enjoyment paths).
What appears to be of particular interest, apart from the stratigraphic decomposition, which obviously has technical and technological implications, is, on the one hand, the possibility of managing relations with the context and with the archaeological pre-existing elements according to different figurative solutions, intervening at the extrados and to the intrados of the coverage with materials or components that allow a greater integration with the context and a more adequate enhancement of the Heritage. On the other, it gives the possibility to equip the inner membrane with communicative apparatuses but also to hang on it enjoyment paths and thus limiting the support points on the ancient findings [25].
In 2007, Prof. John Ashurts, one of the greatest authorities of the English Heritage on the subject of the conservation of ruins, proposed a more simplified classification, limited to only three categories of intervention: the closures, the canopies and the ruins sheltered by other buildings. The latter, new and specific category, includes all those cases of urban archaeology characterized by anthropic stratifications, sometimes complex, but often also characterized by pieces of findings and limited spaces, without the typological and functional homogeneity that is often found in non-urban sites. On the subject of urban archaeology it is also worth noting the research of Alessandro Tricoli entitled The Hidden City: Experiences and Methods to Enhance the Archaeological Urban Heritage that, through an interesting critical repertoire of case studies derived from the European panorama, investigates the relationship between urban archaeology and contemporary city and between urban archaeology and architectural project, inferring from the best practices and the European Code of Good Practice on Archaeology and the Urban Project of the Council of Europe (2000) twenty points that an architect must pay attention to for a good project of the enhancement of the archaeological heritage in urban areas. Of particular interest is point 10, Material and immaterial accessibility. The latter, intended as accessibility «to cultural and identity meanings of archaeology to be achieved through information systems [...]» that «[...] must be communicative and, in the case of an actual musealization, must use the necessary techniques of contemporary museography» [26].
In 2012, Ranellucci published the results of a new research on this topic from which it is possible to deduce, through 98 examples of sheltering, mainly on recent or current excavation sites, three categories of interventions that are characterized by a different (disciplinary) approach. The “operational emergency”, with a provisional character linked to the need to realize a shelter in a short time due to the remains that emerged from the excavation, related to a technological and technical method with light sheltering, mainly tensile structures, with constructive, functional, economical and reversible speed. The “need to a musealization in loco”, which requires analytical spirit and essential judgements to «operate in a cultural transversality that has the dimensions of time and history with a strict connection with the essence of the place» [27]. The “musealization of the site as a predominant creative act”. It must be compositional and based on a dialectic contrast between the pre-existent structures and the new ones. Actually, Ranellucci also proposed a fourth classification, hardly acceptable, called the “the interpretation of the pre-existing archaeology in the restoration approach”, in which he relegates the protection projects for the “archaeological restoration” as the only discipline able to make an interpretative reading of the pre-existing elements and to formulate value judgements on the context.
In recent years, conference proceedings, monographs and magazines have given us a large number of scientific contributions about the sheltering for the Archaeological Heritage, with the aim of proposing operational models and/or intervention criteria concerning process, project or product issues. In this sense, there are research and experiments initiated by several experts that deserve to be mentioned: the proposal of a checklist as a guide in the decision-making process to assess the opportunity/need to protect the heritage through architectural sheltering, elaborated on the basis of the assumption that only by understanding the specific framework it is possible to assess whether a superstructure will be a benefit or a problem for the archaeological Heritage [28]; the new “climatic” approach to create sheltering structures for archaeological sites, with the use of computer tools for environmental simulation and modelling that can allow ex-ante evaluations in the implementation of

effective "passive" solutions useful for the conservation of ancient matter [29]; the identification of physical and environmental investigations, to be carried out with visual inspection or with digital instruments, necessary, on the one hand, to understand the causes of the degradation of an archaeological asset, and on the other, to provide data for the design of an archaeological sheltering, alongside the physical and environmental monitoring as a fundamental activity to ensure that the performance of the new protection will be maintained over time [30]; experimenting with new tools for the acquisition and cataloguing of data useful for the design of sheltering for archaeological assets, from the use of unmanned aerial vehicles (UAVs) to laser scanners, to the management of information on existing structures with a BIM software for the modelling of the existing structures but also as a valid support tool for the design of new coverage [31, 32].
And finally, the archaeological sheltering designed for a limited time. We point out the prototypes of the Molecular Shelter and the TemporAula. The Molecular Shelter was created by a group of architects from the Japanese Institute of Architecture under the scientific supervision of Kengo Kuma. It was firstly tested for the Landscape and Archaeological Park of the Valley of the Temples in Agrigento, and proposed a modular structure in pine wood designed to distance as much as possible the rain from the excavations and to minimize interferences on the ground level with the archaeological pre-existent structures, guaranteeing the freedom to position the vertical supports at different points of the grid, depending on the particular conditions of the site. It was made with an articulated system of four pillars (each made up of four slats), connected with planks by means of M6 type screws, and anchored to the ground with 20 x 20 cm prefabricated concrete blocks. The structure is characterized by its reduced weight (100 kg per module), its facility to be produced (even with local craftsmanship) and the possibility to be assembled in a reasonably short time (five days are enough), for its mobility, for its adaptability to the site, for its modularity, for its equipment and for the low-cost of the module [33].
On the textile sheltering, for which the phenomena of condensation and greenhouse effect are well known, we point out the multidisciplinary study carried out by the BEST Department of the Polytechnic of Milan, the Department of Physics of the University of Milan and the Superintendence of Cultural Heritage of the Provinces of Cagliari and Oristano that led to the design of two prototypes of horizontal closures: both the simulation stage in the laboratory and the stage of monitoring thermal-hygrometric performance in situ provided interesting and promising information on the performance of these membrane structures, designed as dynamic filters obtained from the combination of different technical fabrics [34]. A further development of the research was given by the TemporAula project. A textile case that implements thermo-hygrometric performances and also provides a discrete acoustic insulation using some ETFE sheets which are low-cost translucent insulating layers (for example expanded polyethylene, low-density polyethylene and expanded polyurethane) and two air cavities, while favouring diffusion and permeability to light [35].

3. Concluding remarks

The design of a sheltering for an archaeological site, in relation to the several contradictions that are inherent in its very function, is a conceptual operation, even before being technical, of considerable difficulty, since it is often characterized by the logic of work in progress for the partial or total exposure of the archaeological remains. However, due to the fact that the archaeological heritage has a dual material and immaterial nature, it is necessary to understand “what” to preserve and “why” in the perspective of a sustainable development, even before “how” to do it, allowing a clearer reading and an easier interpretation of the complex existing relationships between the archaeological pre-existence, the natural context and the added anthropic systems [3]. In most cases the protection and the musealization of an archaeological discovery is a motivated action of its potential to become a tourist attraction and a resource that can feed the local and the national economy [36]; it is based on «a number of incorrect premises» [37] which tend to overlook the key aspects of a successful site management, the most important of which is conservation.
Since the decision to protect the archaeological heritage is not necessarily based on a thorough assessment of their meaning, their conditions and their environmental relationships, it is not surprising that the final product does not reflect the initial conservation premise. On the contrary, it is evident that the design of some of these superstructures has moved away from that function, focusing on what Palumbo has identified as the architectural philosophy of «the form above the function» [38], projected towards an attractive museum installation that improves the visitor’s experience but inevitably risks being perceived as a visual intrusion into the landscape. The archaeological areas and cultural heritage in general, have been the subject of various experiments in recent years with the application of new materials, new techniques and innovative technologies in sheltering interventions, which progressively reconstructed, reconfigured and protected the remains allowing the musealization of remains and findings for their enjoyment.
Although the main objectives of a sheltering structure are clear and shared, the absence of documented data concerning the primary function of sheltering and casings explains the

counterproductive effect that this measure often had on the conservation of archaeological sites in terms of ancient material degradation and early obsolescence of superstructures [37]. In this sense, the literature provides a wide range of cases on the damage reported by the Archaeological Heritage due to a wrong choice of materials used for sheltering. The dangers associated with the use of transparent materials for the roof or the southern elevation are now well known especially in the Mediterranean areas, where an accurate choice should eliminate the negative effects of overheating and condensation [39].
In conclusion, what seems to be clear is that the experiments carried out so far have mainly aimed at satisfying the "enjoyment instance", often neglecting or underestimating; the "environmental instance" that the new sheltering have in relation to the surrounding landscape and the environment; the "archaeological request", referring to the relationship between the structural system and the ruderal system and the "financial sustainability", addressed to the resources used for the construction, maintenance and management of sheltering and ruins. The history of the last sixty years, with the several failures concerning the protection systems, teaches us that we can no longer procrastinate. Taking advantage of the previous experiences, with the contribution of the different disciplinary sectors is necessary to define new guidelines and operating models – a sort of code of practice – for the design of archaeological sheltering without renouncing to the case by case principle. It will be necessary to aim at a joint fulfilment of the aforementioned requests, identifying the necessary requisites for conservation, enhancement and use, adopting a systemic approach in terms of necessity/service, to assign to the heritage a new role and a new identity, consolidated or in formation, within the patterns (urban, extra-urban or landscape), and to configure a contemporary protection system (with morphological, typological and technical-constructive solutions suitable for restitution of the potential significance of the Heritage) that is performing, reliable, sustainable but also reversible, due to mutable meanings that future generations will or want to attribute to it.

Bibliographical References

[1] DELLA TORRE, S. Planned Conservation and Local Development Processes: the Key Role of Intellectual Capital. In VAN BALEN, K. and VANDESANDE, A. (eds). *Reflections on Preventive Conservervation, Maintenance and Monitoring of Momunents and Sites by PRECOM3OS UNESCO Chair*. Uitgeverij: Acco, 2013, p. 123-127.

[2] MASON, R. and AVRAMI, E. Heritage Values and Challenges of Conservation Planning. In TEUTÓNICO, J. M. and PALUMBO, G. (eds). *Management Planning for Archaeological Sites. An International Workshop Organized by the Getty Conservation Institute and Loyola Marymount University, 19-22 May 2000 Corinth, Greece*. Los Angeles: Getty Conservation Institute, 2000, p. 13-26.

[3] SPOSITO, C. and SCALISI, F. Processo conservativo e significatività: un approccio metodologico per la progettazione dei sistemi di protezione dei siti archeologici. In *Agathón, International Journal of Architecture, Art and Design*, 2018, vol. 4, p. 45-58.

[4] NOVAKOVIĆ, P., HORŇÁK, M., GUERMANDI, M. P., STÄUBLE, H., DEPAEPE, P. and DEMOULE, J. P. (eds). *Recent Developments in Preventive Archaeology in Europe: Proceedings of the 22nd EAA Meeting in Vilnius*. Ljubljana: Ljubljana University Press, 2016.

[5] VILLANI, S. *Le protezioni delle aree archeologiche. Architettura per l'archeologia*. Tesi di Dottorato di Ricerca in "Storia e conservazione dell'oggetto d'arte e d'architettura", ciclo XXIV. Roma: Università degli Studi di Roma Tre, 2012.

[6] GUZZO, P. G. Coperture per Aree e Strutture archeologiche. In *Arkos*, 2000, vol. 1, p. 2.

[7] MORETTI, G. *L'Ara Pacis Augustae*. Roma, 1938.

[8] STANLEY-PRICE, N. P. (ed.). *La conservazione sullo scavo archeologico. Con particolare riferimento all'area mediterranea. Atti del Convegno di Cipro del 1983* (Translated by NARDI, L., 1986). Roma: ICCROM e Centro di Conservazione Archeologica, 1984. [Online] Available at: https://www.iccrom.org/sites/default/files/2018-01/iccrom_08_scavo_it.pdf [Accessed 12 June 2017].

[8] VIVIO, B. *Franco Minissi. Musei e restauri. La trasparenza come valore*. Roma: Gangemi Editore, 2010.

[9] GERMANÀ, M. L. Archaeological construction and its relationship with place: the theme of shelters. Costruito archeologico e rapporto con il luogo: il tema delle coperture. In RUGGIERI TRICOLI, M. C. and GERMANÀ M. L. (eds). *Urban Archaeology Enhancement | Valorizzare l'archeologia urbana*. Pisa: ETS, 2013, pp. 183-207.

[10] AA.VV. *Preventive measures during excavation and site protection*. Proceedings of Conference in Ghent, 6-8 November 1985. Roma: ICCROM, 1986. [Online] Available at: https://www.iccrom.org/sites/default/files/2018-02/1986_preventive_measures_ghent_56277_light.pdf [Accessed 4 June 2017].

[11] AA.VV. Coperture a protezione di zone archeologiche. In *Restauro – Quaderni di Restauro dei Monumenti e di Urbanistica dei Centri Antichi*, XVI, n. 81, settembre-ottobre, 1985.

[12] MINISSI, F. Perché e come proteggere i siti archeologici. Relazione al Convegno Internazionale COPAM, 1-4 luglio 1986, Napoli. In *Restauro*, n. XVI (90), 1987, p. 78-85.

[13] SCHMIDT, H. *Schutzbauten*. Stuttgart: Theiss, 1988.

[14] GULLINI, G. Il restauro a Pompei. In FRANCHI DALL'ORTO, L. (ed.). *Restaurare Pompei*. Milano: Soprintendenza archeologica di Pompei, 1990, p. 25-58.

[15] AGNEW, N., MAEKAWA, S., COFFMAN, R. and MEYER, J. Evaluation of the Performance of a Lightweight Modular Site Shelter. Quantitative Meteorological Data and Protective Indices for the Hexashelter. In *Conservation and Management of Archaeological Sites*, vol. 1, issue 3, 1996, p. 139-150.

[16] MERTENS, D. Planning and executing anastylosis of stone buildings. In STANLEY-PRICE, N. (ed.). *Conservation on archaeological excavations: with particular reference to the Mediterranean area*. Roma: ICCROM, 1995, p. 113-134.

[17] STUBBS, J. H. Protection and presentation of excavated structures. In STANLEY-PRICE, N. (ed.). *Op. cit.* 1995, p. 73-90.

[18] RANELLUCCI, S. *Coperture archeologiche. Allestimenti protettivi sui siti archeologici*. Roma: DEI, 2009.

[19] DEMAS, M. Annotaded bibliografy on protective shelters for archaeological sites. In *Conservation and Management of Archaeological Sites*, vol. 5, issue 1-2, 2002, p. 91-105.

[20] DEMAS, M. Protective Shelters for archaeological sites. In ROBY, T. and DEMAS, M. (eds). *Mosaic in situ. An overview of the literature on conservation of mosaic in situ*. Los Angeles: J. Paul Getty Trust, 2013, pp. 1-75. [Online] Available at: https://www.getty.edu/conservation/publications_resources/pdf_publications/pdf/lit_review.pdf [Accessed 6 February 2019].

[21] VILLANI, S. *Le protezioni delle aree archeologiche. Architettura per l'archeologia*. Tesi di Dottorato di Ricerca in "Storia e conservazione dell'oggetto d'arte e d'architettura", ciclo XXIV. Roma: Università degli Studi di Roma Tre, 2012.

[22] LAURENTI M. C. (ed.). *Le Coperture delle Aree archeologiche. Museo aperto*. Roma: Gangemi, 2006.

[23] CACACE, C., CAPPONI, G., LAURENTI, M. C. and PIETRINI, N. La protezione delle aree archeologiche. La Domus dei Coiedii a Castelleone di Suasa. In BISCONTI, G. and DRIUSSI, G. (eds). *Dal sito archeologico all'archeologia del costruito, Atti del Convegno di Studi Scienza e Beni Culturali XII, Bressanone 3-6 Luglio 1996*. Padova: Arcadia Ricerche Editore, 1996, p. 412-420.

[24] AA.VV. *The APPEAR Method. A practical guide for the management of enhancement projects on urban archaeological sites, European Commission Research.* Report n. 30/4, February 2006. [Online] Available at: https://orbi.uliege.be/bitstream/2268/28975/1/guide_en.pdf [Accessed 8 June 2018].

[25] TELLER, J. and LEFERT, S. *L'intégration architecturale et urbaine des vestiges archéologiques*, Actes du Colloque International APPEAR. 2004 [Online] Available at: https://orbi.uliege.be/bitstream/2268/28974/1/Teller-10.pdf [Accessed 6 May 2018].

[26] TRICOLI, A. *La Città Nascosta. Esperienze e metodi per la valorizzazione del patrimonio archeologico urbano.* Monografie di Agathón. Palermo: Offset Studio, 2011.

[27] RANELLUCCI, S. *Conservazione e musealizzazione dei siti archeologici*. Roma: Gangemi, 2012.

[28] THOMPSON, J. and ABED, A. B. Deciding Shelters: values and the management context. In ASLAN, Z., COURT, S., PESARESI, P. and THOMPSON, J. (eds). *Protective Shelters for*

Archaeological Sites, Proceedings of a Symposium, Herculaneum, Italy, 23-27 September 2013. London: British School at Rome, 2018, p. 13-39.

[29] ASLAN, Z., COURT, S., PESARESI P. and THOMPSON J. Introduction: sheltering the Mediterranean's archaeological heritage. In ASLAN, Z., COURT, S., PESARESI, P. and THOMPSON, J. (eds). *Protective Shelters for Archaeological Sites, Proceedings of a Symposium, Herculaneum, Italy, 23-27 September 2013*. London: British School at Rome, 2018, p. 1-10.

[30] CURTEIS, T. The use of environmental survey and monitoring in the design and avaluation of archaeological shelters. In ASLAN, Z., COURT, S., PESARESI, P. and THOMPSON, J. (eds). *Protective Shelters for Archaeological Sites, Proceedings of a Symposium, Herculaneum, Italy, 23-27 September 2013*. London: British School at Rome, 2018, p. 40-50.

[31] FIGUEIREDO, M., BERNARDES, J. P., RODRIGUES, J. I. J. and GONÇALVES, C. A Framework Supported by Modeling and Virtual/Augmented Reality for the Preservation and Dynamization of Archeological-Historical Sites. In RODRIGUES, J. M. F., RAMOS, C. M. Q., CARDOSO, P. J. S. and HENRIQUES, C. (eds). *Handbook of Research on Technological Developments for Cultural Heritage and eTourism Applications*. Hershey PA: IGI Global, 2018, p. 215-227.

[32] SCIANNA, A., GRISTINA, S. and PALIAGA, S. Experimental BIM Applications in Archaeology: A Work-Flow. In IOANNIDES, M., MAGNENAT-THALMANN, N., FINK, E., ŽARNIĆ, R., YEN, A. and QUAK, E. (eds). *Digital Heritage. Progress in Cultural Heritage: Documentation, Preservation, and Protection – Proceedings of the 5th International Conference, EuroMed 2014, Limassol, November 3-8, 2014*. Lecture Notes in Computer Science, vol. 8740. Cham: Springer, 2014, p. 490-498.

[33] MASERA, G., IMPERADORI, M., VANOSSI, A. LIOTTA, S. J. and ITO, Y. Modular, Adaptable Shelters for Environmentally Sensitive Archaeological Sites. In *International Colloquium on Bio-based and Bio-inspired Environmentally Compatible Structure at Tokyo*, 2015. [Online] Available at: https://www.researchgate.net/publication/280841273_Modular_Adaptable_Shelters_for_Environmentally_Sensitive_Archaeological_Sites/citations [Accessed 8 September 2018].

[34] ROMOLI, E., ZANELLI, A. and ROSINA, E. Il monitoraggio delle aree archeologiche per l'ottimizzazione del progetto delle coperture. In *Atti del XXIX Convegno Internazionale Scienza e Beni Culturali, Conservazione e valorizzazione dei siti archeologici, 9-12 luglio 2013, Bressanone*. Venezia: Arcadia Editore, 2013, p. 629-640.

[35] MAZZOLA, C., ZANELLI, A. and STIMPFLE, B. Project development of an ultra-lightweight bending-active temporary structure. In BÖGLE, A. and GROHMANN M. (eds). *Proceedings of the IASS Annual Symposium 2017, Interfaces: architecture.engineering.science, 25-28th September 2017, Hamburg.* Hamburg: IASS and HafenCity University, 2017, pp. 1-10. [Online] Available at: https://www.researchgate.net/publication/321128328_Project_development_of_an_ultra-lightweight_bending-active_temporary_structure [Accessed 18 December 2018].

[36] CASTELLANOS-VERDUGO, M., OVIEDO-GARCÍA, M. A. and MARTÍN-RUIZ, D. Tourist Assessment of Archaeological Sites: The Case of The Archaeological Complex of Itálica (Seville, Spain). In *Visitor Studies*, vol. 14, issue 1, 2011, p. 100-112.

[37] AGNEW, M. Methodology Conservation Criteria and Performance Evaluation for Archaeological Site Shelters. In *Conservation and Management of Archaeological Sites*, vol. 5, issue 1-2, 2002, pp. 7-18. [Online] Available at: https://www.tandfonline.com/doi/abs/10.1179/cma.2002.5.1-2.7 [Accessed 6 September 2018].

[38] PALUMBO, G. Sheltering an archaeological structure in Petra. A case-study of criteria, concepts, and implementation. In *Conservation and Management of Archaeological Sites*, vol. 5, issue 1-2, 2002, pp. 35-44. [Online] Available at: https://www.tandfonline.com/doi/abs/10.1179/cma.2002.5.1-2.35 [Accessed 4 September 2018].

[39] YAKA ÇETIN, F. and İPEKOĞLU, B. Impact of transparency in the design of protective structures for conservation of archaeological remains. In *Journal of Cultural Heritage*, vol. 14, issue 3, 2013, p. e21-e24.

Fig. 1: From the right. Museum of the Roman Archaeological Site of Coire, Switzerland (P. Zumthor, 1985-86) and Villa Romana di San Biagio in Terme Vigliatore, Messina, Italy (F. Ravidà, 2005).

Fig. 2: Domus Romana San Pancrazio in Taormina, Messina, Italy: the Shelter and Catwalk for night fruition (A. Sposito and C. Sposito, 2006).

Table of content

Table of content

Table of content

Table of content

Table of content

Table of content

Table of content

Table of content

Table of content

Table of content

CARMINE GAMBARDELLA

UNESCO Chair on Landscape, Cultural Heritage, and Territorial Governance; President and CEO of Benecon SCaRL Research Centre on Cultural Heritage, Ecology and Economy (Consortium of five Universities: University of Campania “Luigi Vanvitelli”, Pegaso University, University Federico II of Naples, University of Salerno, University of Sannio). Rector at the European Polytechnical University, EPU. Professor of Drawing at the Pegaso University and at the University of Campania. President of the International Forum ‘Le Vie dei Mercanti’ since its first edition in 2003. Honorary President of the Italian Committee of the National Fulbright Sector on Cultural Heritage, Sustainable Development, Urban Planning, Architecture and Management of UNESCO World Heritage Sites. Editor and Founder of the series “Surveying is/or Project”, “Knowledge Factory” and “Architecture, Heritage and Design”. Component of the Scientific Committee of International Class A Magazine ‘Abitare la Terra’/‘Dwelling on Earth‘. He covered various roles including the Pro Rector of Institutions, Academic Senator, Director of the Department of Architecture and Industrial Design Luigi Vanvitelli, Dean of the Faculty of Architecture Luigi Vanvitelli, Director of the Department of Culture of the Project, Director of Doctoral School in the Discipline of Architecture, Coordinator of the PhD in Protection, Safety and Representation of the Environment and Structures and Territorial Governance, Coordinator of the PhD Program in Surveying and Representation of Architecture and the Environment, President of the Course Degree in Industrial Design. He is author of numerous scientific papers on surveying and representation of the built and natural heritage.

benecon
knowledge network

United Nations
Educational, Scientific and
Cultural Organization

UNESCO Chair on Landscape,
Cultural Heritage and Territorial Governance
BENECON Research Centre of Competence of
the Campania Region for Cultural Heritage,
Ecology and Economy, Naples, Italy

Università
degli Studi
della Campania
Luigi Vanvitelli

PEGASO
Università Telematica

Università
degli Studi
del Sannio

PATRONED BY

UNIVERSITÀ DEGLI STUDI DELLA CAMPANIA
LUIGI VANVITELLI

SCUOLA POLITECNICA E DELLE SCIENZE DI BASE

DIPARTIMENTO DI ARCHITETTURA
E DISEGNO INDUSTRIALE

Organisation
des Nations Unies
pour l'éducation,
science et la culture

UNESCO Chair
Forum University
and Heritage

UNIVERSITAT
POLITÈCNICA
DE VALÈNCIA

Organizzazione
delle Nazioni Unite
per l'Educazione,
la Scienza e la Cultura

Commissione Nazionale
Italiana per l'UNESCO

MiBAC
MINISTERO
PER I BENI E
LE ATTIVITÀ
CULTURALI

GANGEMI EDITORE®
SPA
INTERNATIONAL

FULBRIGHT
THE US - ITALY FULBRIGHT COMMISSION
Linking Minds Accross Cultures