

Windows of memory: perspective panels to communicate archeological heritage

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Abstract

Even though virtual archaeology has assumed an educational role, in no way it can be compared with the excitement of the visit to an archaeological site.

Our project proposes an innovative exhibition *in situ* of some archeological goods located in Campania. In order to suggestively enrich the emotional impact, we provide a Plexiglas display, based on a visual and perspective effect that overlaps the ruins still visible and reconstructs, "in the eyes of the observer", the original shape of the building.

It is a re-composition, in a perspective view, of both real and virtual signs. The transparent panels on which some appropriate perspective drawings are printed from a 3D virtual model, collaborate actively in the unveiling of what have been lost in architecture, in a cognitive process of strong impact, comparable only to the more expensive "augmented reality", that, however, interposes an electronic device between the object and the observer. We allow the visitor to enjoy the architectonic space just by direct vision. The project is a flexible solution to be adapted to several archeological sites. It will provide the observer with an emotional experience, so to communicate, through a multisensory effect, the inner value of the visited sites.

Keywords: Perspective, archeological heritage, memory, augmented reality, virtual reality

1. The *windows of memory*: new perspectives for a Low Cost Augmented Reality in archaeological sites⁽¹⁾

The revised Code of Cultural Heritage and Landscape, of 2004, has included in the current legislation the innovative concept of "enhancement", in terms of promotion and dissemination, to an equal status level compared to the more traditional concept of safeguarding, which is no further to be conceived in terms of passive conservation, exclusively addressed to the physical preservation of the good, which nevertheless is the necessary condition of any action of revaluation. According to a fully correct perspective, the legislature sets the enhancement in close connection with the use of the cultural heritage, in order to transmit the knowledge, as a result of the "recognition of a value", which lays the basis for a subsequent transmission to the future generations. However, when we talk about communication, addressed to the wide public, is frequent the spectacularization of the information, with the aim of stimulating physical and emotional reactions, but not including a correct cognitive message: the task of a cultural institution, however, is to provide users, through appropriate and differentiated strategies and methodologies of communication, the codes to understand the monument. The temptation in which often falls the Virtual Reality is to create impossible perspective views, choosing the paths according to a spectacular contemporary sensibility, often disregarding the logic of the building and the physical and optical "rituals", which originally ruled the use of that particular architecture. But communicating the cultural heritage cannot mean, in the contemporary era, exclusively to provide correct information, but must necessarily invent new forms of data transmission, through which the visitor can assume an active role towards the exhibits, going over the simple contemplation of the beauty and the understanding of few basic data. It's fundamental today to give visitors the opportunity to consider, in a personal way, what stands in front of them, in order to develop their own

personal experience of learning. We therefore, emphasize the importance of using a cultural approach to the communication, which has to be based on the interpretive strategies in the construction of a meaning. Communication is therefore intended as a series of knowledge processes, through the continuous development of questions and answers. Our project proposes a knowledge, which is fulfilled from the identification of each possible relationship between the good and its context, no longer considered as an historical finding but as a living organism which needs to be transformed to survive over the centuries, to take on new meanings and to become a critical space, that could increase its educational potential and capacity. The only real experience of an architecture is the feeling of being inside; but when the building or the monument is reduced to a ruin, the loss of the greater volumes, lights, coatings and colors compromises decisively the possibility of appreciation of the good. In such cases, the interaction between the discontinuous real data with the 3D digital reconstruction, of what time has taken away, is perhaps the only way to make the observer understand the architectural values. In order to strongly enrich the emotional impact of the visitor, our project provides an exhibit installation in the archaeological areas of Paestum (SA), based on an original visual effect of perspectives that, overlapping the ruins still visible, reconstructs in the eyes of the observer, the original building shape. It is a composition of signs in a single perspective view, taken from the 3D model and transcribed on transparent display panels, located along some paths of the park. The Windows of the memory is a project that uses the most modern digital technologies in the fields of Virtual Archeology, with the aim to create immersive and interactive spaces, similar to those generated by the Augmented Reality, but without the need for any technological device between the data to transmit and the end user, in a communication process based on the wonder generated by the observer's perceptual phenomena, which is entrusted to an "epiphany of vision" to unveil the lost qualities of an archaeological good in an identification of a shape, whose main actor is the visitor, who becomes the active creator of the disclosure, rather than a passive recipient of information.

In this way, the designed semantic connection is activated by the observer, who becomes himself the creator of the meaning. The project, we propose, uses the latest generation digital technology to structure the contents of the cultural message, but creates a communication technique based on simple physical panels, usable by all people without any recourse to last generation tablets or Smartphone. This project aims to solve some theoretical and technical problems, highlighted by the large debate, of the last decades, in the variegated field of the Virtual Cultural Heritage, such as the criticized spectacularization of the archaeological data through unreliable reconstructions, not based on scientific methods.

«It is criticized the cases of arbitrary – or, at best, undocumented – reconstruction, which conveyed in the public the false impression that being 'snapshots' of the past, they had to be true. Virtual reconstruction in no way carried the uncertainty of interpretation and the possible existence of alternate solutions»[1]. In fact, the use of 3d models to reconstruct in detail the lost configuration of an archaeological ruin, generated some problems concerning the methods of representing the cultural heritage, primarily about the validity of the reconstructions hypothesis and then, it poses the question on how to make clear, in the digital model, the uncertainties and the possibility of choices that are the basis of any philological reconstruction. Excessive details, that make a 3D model appealing and realistic, give to the images the value of an absolute truth to what, for archaeologists, is only one of the alternatives hypothesis or, simply, the most likely.

To solve this problem we propose to evoke the architectural and technical drawing, with simple black lines even in presence of decorative details, in order to assign to the perspective image the value of 'representation of reality' and, thus, departing from the excessive hyperrealism of several photo-renderings, that instead ends up assuming the value of 'real data'. However this does not mean to reset all flourishing discipline of Virtual Archeology, because the drawing we propose is processed after a three-dimensional reconstruction of the building, which thus becomes a rich database available online for researchers, who want to investigate, by computer or laptop, the theoretical issues related to reconstructive hypotheses implemented. The computational load required by the free navigation in a complex 3D model is just sustainable by modern computers and, therefore, does not fit to the current mobile interactive terminals; on the contrary, is quite impossible to support the need for fixed terminals, possibly available in the archaeological site, that may even conflict with the emotional experience during the visit. Each *Window of memory*, thus, proposes to the visitor a single perspective view, appropriately taken from 3D model, that reproduces exactly the image generated by the physiological direct vision of the archaeological artifact, which an observer could experiment in a suitable position, along the exhibit path. This is a digital image, a perspective view from the 3D reconstruction of the architecture, but reworked according to a simpler

communication code, suitable to unveil the actual artifact and its relationship with the missing parts that we intend to integrate, in order to improve the emotional experience of the lost space [2].

In this way, our contribution to the digital communication aims to be properly integrated with the exhibition, looking for a balance between message, context and media. The declared overlapping between the direct vision of an archaeological fragment and its transparent digital reconstruction, highlights the fundamental role of the ruin and constructs a meaning in a cognitive process, which presupposes that each sign of the virtual rebuilt model has to be connected with the evidence of the witness's real and physical artifact.

We can also talk about 'low cost augmented reality' because, like this one, the project is characterized by the emotion of being immersed in a real space, increased by new signs that generate a deep interactivity and active involvement of the visitor. The affordability of such installation is also based on the non-perishable nature of the display physical panels, compared to the rather short life that characterizes all technological interfaces, whose inevitable fast progress would require, in few months, expensive upgrades of the software.

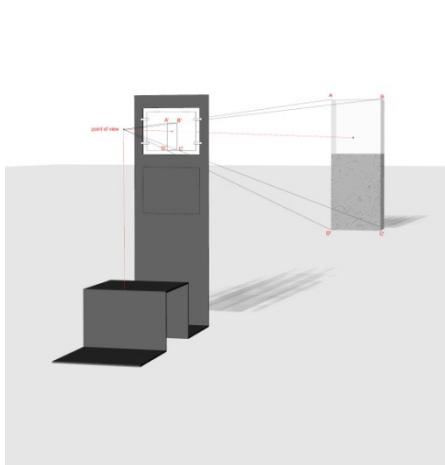


Fig. 1: Perspective scheme.



Fig. 2: The window overlaps the lost colors to the temple of Neptune.



Fig. 3: An ancient street in Paestum.



Fig. 4: The street in Virtual archeology.



Fig. 5: The window augments the reality.

2. A window in the Roman theater of Misenum

The theater of Misenum (Naples), datable to the second century AD, was built with an Hellenistic mould, digging the ridge of tuff and leaning the cavea; the structure, adapting to the Roman system, detaches from the tuff promontory of Capo Miseno thanks to architectural volumes to support, in the upper, portico and ambulatories. The theater, with a maximum diameter of 67 m, was originally constituted by three superimposed orders of arches; the upper floor needed to optimize the acoustics of the cavea. Today, however, only 19 of the 25 bays of the lower ambulatory and part of its vomitoria and corridors that led to the inner hemicycles as well as a tunnel 30m long and approximately 4.20m wide, dug directly in the rock of tuff coast, which now allows the direct access also from the sea, are visible and partially practicable. Built in conjunction with the construction of the theater, in the context of general urbanization wanted by the

emperor, to overcome the orographic obstacle of the cape for people coming from the north, the tunnel looks with almost parallel vertical walls, topped with an irregular barrel vault carved directly into the tuff hill setting a particular perceptual game of references between the inside and the outside. The site is the subject of the project P.O.R. Campania 2000-2006 of the Superintendence for Archaeological Heritage of the provinces of Naples and Caserta (expropriation, excavation, restoration and enhancement of the Roman Theatre with restoring of the access by sea), which has already led to the excavation of an access to the hemicycle of the theater and secured the structures from collapsing but which also has the overall objective of achieving an archaeological park that enhances the entire area by accepting the inseparable connection between the ancient and the modern city.

Despite this, however, the widespread illegal construction in the past years has led to the wild construction of private buildings on the area, that was supposed to be further excavated, so it makes impossible the interventions of recovery and definitively conceals a great part of an architecture that cannot be unearthed in any reasonable way. Therefore, this *status quo*, from which one cannot absolutely leave out of consideration, forces us to careful considerations about the most appropriate way of intervention to avoid that the errors of the past will lead to a definitive concealment due to a lack of interest caused by the insurmountable legislative-procedural problems that make impossible a "normal" process of restoration and enhancement. In contemporary practice on the protection and restoration, the importance of the concept of use of artistic and architectural heritage is unquestionable, since it is the essence of their existence.

Having, therefore, to think about the future of an archaeological site as that of the Theatre of Miseno we must reflect on appropriate actions to be implemented by targeting not only the communication or only its theoretical knowledge but, consistent with the reasons of protection, we have to ensure their direct use. So that the community is not a spectator stranger to reality but a dynamic actor able to establish a direct dialogue with the reality of the matter. We don't want to alienate the people away from the architecture as often happens because of practices oriented exclusively towards the use of digital technologies.

Therefore, we prefer to suppose an intervention able not only to communicate but also mainly to generate a "concrete" augmented reality, thanks to the installation of a Window of memory. Thanks to its tangible presence in real spaces, we will be able to tell the forms of architecture but, at the same time, to live the experience of the visit to the theater in its original form. We want to insert simple totemic objects within the hypogeal space of the hemicycle that, in respect of the monumental place and in the absolute reversibility of installation, could stimulate an improved visual-sensory experience of the place, in a game of mutual reference between illusory perception of non-existent spatiality and direct use of concrete matter. In the case of the Theater of Misenum, therefore, it is not possible to assume the full enjoyment of the complete architecture due to inability to perform the excavation over the entire area; so it is essential to focus exclusively on the part of the hemicycle currently practicable. We cannot, however, give up the communication to the visitor of the architectural complex so that he can at least perceive the original configuration of the site where he stay. It is important to emphasize that the current floor surface does not coincide with the original one, as it was at a lower level. The ambulatory, today dark and modest height, was a majestic place characterized by different proportions. But because we cannot bring back the floor to the real elevation, it becomes essential to think about the communication on this important aspect so that visitors can at least imagine the real characteristics of the Roman architectural apparatus.

The blind and dark places do not help people to imagine that series of paths that lead to the upper levels or that accompanied to the large outside auditorium. Through the installation of a window of memory we want to highlight, with simple graphic signs, those forms that defined the spaces of the architecture so that the viewer can see beyond what exists, sensing his position with respect to the *status quo* and also imagining his position relative to the totality of the theater. In this way, the walls vanish in a conscious perceptual illusion and the floor, over the eyes, can return to the real elevation suggesting to the viewer the same dimensional relationships that belonged to the Theatre. The three-dimensional modeling is considered not only an instrument of abstract representation but also a means of dialogue and reading of space. The virtual reconstruction of the entire architectural apparatus, in its compositional complexity, has been associated with the environments currently viable to understand and communicate their relationships, in that dialogue between part and whole that tells a story now passed not more livable neither immediately understandable by the viewer.

Starting from the image that appears to the eye of the viewer, the projective operations, according to the rules of conic linear perspective, working in three-dimensional virtual environment, allow us to transcribe the

image that we want to be perceived on the transparent surface of the Window of the memory, which coincides with a fictitious vertical plane, already known as Alberti's veil. Therefore, in the direct use, all things properly recover themselves in the eye and in the mind of the observer. In order to practically implement a proper design it is, therefore, essential to work in three-dimensional virtual environment, starting with the full knowledge of the existing spatiality not only in its geometric abstraction but mainly in its present shape. For this purpose, first, in situ was conducted a survey through a laser scanner in order to obtain a cloud of points from which to draw all the necessary information for the virtual modeling of the ambulatory of Theatre: not only a theoretical knowledge of the status quo but a collection of data necessary to calibrate an object to a specific site. At the same time, it was essential to reconstruct, always in a virtual environment, the Theatre in its original configuration, starting from the available documentary sources, in order to superimpose the real forms with the original ones and understand the perceptual differences. Consequently, it was possible to proceed with the necessary geometric operations of central projection to determine the image to lay on reality. On the transparent surface of the glass, as with the simple stroke of the drawing, the contours of architectural forms are traced, as a perspective of the original configuration, so that, from the established point of view they can perfectly overlap the existing matter as if, within the window, everything was back to the second century AD. Abstraction and simulation of space to tell morphologies that go beyond the real view and people can discover new environments and new proportions currently hidden. Not just a totem, therefore, able only to exhibit images and textual descriptions but an object capable of interacting with the real space and above all capable of revealing shapes and proportions that no longer exist without departing from the site itself. Visitors can see, from the same position, the current state of the architecture, to live it in its three-dimensionality, but at the same time they will perceive, although in a fleeting and illusory way, what the time irrevocably deleted.

The concrete presence of an object, such as the Window of memory, located inside the path, ensures the use of the "augmented reality" and the use of the virtual reconstruction in a way more immediate than other practices of virtual archeology. It forces the visitor to stop attracting his attention and inviting him to watch something else that, if it was simply described on a display panel or on a web page, it would have been overlooked. The main aim is to give a new life to the existing matter trying to bring back into the darkness of the few viable bays inside the hemicycle the dynamism and energy of the ancient Roman pomp but mostly try to tell something that in any case cannot come back to light. Simple graphic signs that overlap, form a single point of view, on forms that actually exists without either cover them or deny them to narrate hidden aspects, extending the edges and relocating each element in the correct position. An overlapping of images that belong to different periods, the past and the present that are compared in an instant and stimulate the mind of the viewer, telling him the spatiality of lost places. A perceptive dialogue that can make the effects of time on architecture manifest, allowing the viewer to compare the real image and that transcribed one on the glass in order to see the differences and to fully understand the changes that the Roman ambulatory suffered.



Fig. 6: Original proportion of the ambulatory



Fig. 7: A window in the Roman theater of Misenum

3. The memory of S. Nicola abbey in Padula (SA) – Italy

The S. Nicola abbey in Padula was probably founded between the 5th and the 6th century A.D. and it is a direct evidence of the Byzantine preachers' presence in the area, to spread the St. Basil's Greek ritual [3]. The abbey was annexed to the Cava abbey in 1089 [4] and subsequently to the S. Lorenzo Charterhouse in Padula probably because of its healthy position on the top of a hill, to serve as hospital for the sick monks in 1538 [5]. It is not given to know much more about the life of the abbey or about its archive.

The S. Nicola abbey is placed on a hill, not far from the urban center and it is the oldest building in proximity of Cosilinum, the early settlement from which Padula was founded. Padula is also well known for its stone, and two quarries are on the north and on the south side of the town. The southern one is right below the abbey, and what is left of the building is overhanging on a cliff.

Most of its structure was badly damaged by a earthquake in 1857 [6] but the building layout was still visible on the ground when Sacco measured it: his drawings are the most accurate statement of S.Nicola's appearance before the following collapse of the structures. Sacco describes the building as rectangular in plan, with its parts closing around a rectangular patio fenced by a wall. The access to the patio was granted by a fine stone portal, centered in the wall. The church and the bell tower were on the right side of the patio, while service rooms were on the other two sides. Sacco mentions the access door, the bell tower and the fountain on the left in the patio as museum pieces.

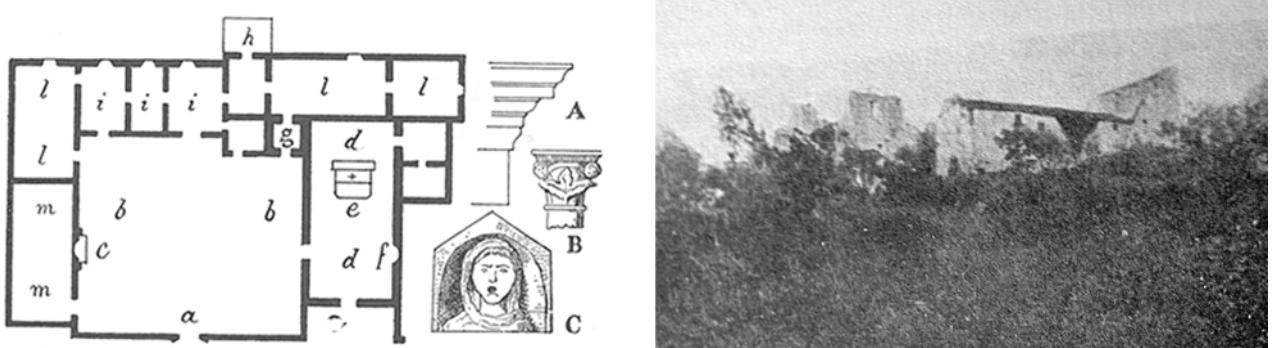


Fig. 8: Left: S. Nicola abbey plan. Right: photograph depicting S. Nicola abbey. Images from SACCO, Antonio. La Certosa di Padula disegnata, descritta e narrata su documenti inediti dal prof. sacerd. Antonio Sacco. Boccia Editore, Salerno, 1982.

At present time most of the structures are missing or are badly damaged and most of the building doesn't exist anymore. The quarry has worn out and eroded a great piece of the part of the hill where S.Nicola stood, but the walls still standing up are even now helpful to imagine the original dimension and size of the building, and can still provide a good reference point to place the outer wall that was once fencing the patio. The only documents that can help us to imagine the original appearance are the drawings and measurements by Sacco and some photographs that can be found in archives. After a research it was possible to get more informations about the elevation of the structures and about the roof pitches. To place the building in its original position it was necessary to refer to a GIS maps that contained the abbey's contour. Comparing the GIS map [7] with the drawings by Sacco and with the ones recovered from the interviews, it was possible to recreate and size a tridimensional model of the abbey.

The privileged point of view for the projection is in the old part of Padula, right in front of the valley separating the hills where Padula is and where S. Nicola abbey is. Placing the privileged point of view in this particular place allows to create an ideal and visual correlation between the town center, the abbey and the hill on its background, which is the one where Cosilinum (the ancient town) was, creating a historical connection through sight.

The project exposed in this paper can be easily extended to other parts of the abbey. The site where the ruins are is easily accessible, but it is impossible at the moment to see them clearly because they are covered with a thick vegetation coat. After further and more accurate measurements of what is left, and after clearing the ruins from the vegetation coat it will be surely possible to place analogue installations to allow the visitors to experience what the abbey would have appeared like when it was still a whole.



Fig. 9: Left: the installation from the point of view, where the observer will be able to see the original shape of the abbey. Right: the panel that holds the screen and an informative text is easy to install on the existing rail.

4. The windows of the invisible

The vesuvian territory is rich in wonderful architectonic proofs dated of Roman and Italic Era, crystallized after the eruption of 79 A.D. In this way they've joint to our era. Ruins of the ancient society, characterized not only by public and religious buildings but also and above all, private houses, which reflect the owner's social status, appear today as a scenographic set given by the vesuvian stones colors, above which are represented some frescos and mosaic floors which are very rich in elegance and symbolism.

In spite of all the reconstruction made, what is now visible lets the visitor of the archeological areas to perceive the original sight of a colorful scenario, based on scenographies where figurative places lived in symbiosis with the home and natural one. In this way, the ruins obtained during the excavations, some of the archeological, botanic and other hypothesis let us to set up the scenery before the eruption of 79 A.D, thanks to both the *Grand Tour* visitors' drawings and to architectonic, sculpture and painted restoration scales and to the sowing of vegetable species.

By integrating the bibliographic research with some reliefs based on geometry and perspective, it's been possible to highlight some important points of view belonging to the inner places of *domus* and *villae*, allowing to verify how the architectonic elements are put together showing all the environments, as people goes in the houses. At the same time it has been possible to understand and rebuild also the integration way of the figurative system with the architectonic one, defining some illusory spaces spaces which appear to be bigger than the real planimetric configuration. The perceiving of those spaces is based on some of exact points of view from which is possible to recreate as always a complete and a coherent image of a provided space.

Referring to the vesuvian archeological areas, known as a tangible proof of the heritage, where the most important thing to do is to propose some of invasive interventions (less intensive as they can be), the windows of memory are described as totems to locate in the exact point where it's possible to see "what is not possible to see anymore".

The ancient prospective imagine represented on the Plexiglas panel and which is juxtaposed on the actual one is filled not only by the cancelled architectonic elements but also thanks to the representation of the real paintings which, where absent, are not represented in their original colors. As regards the supporting structure is metallic, and it is possible to locate it easily both inside and outside of the houses. Particularly, outside of the *domus*, now permanently closed to the public, the windows of memory allow to rebuild the whole prospective view which was also visible for a spectator from the I century AD. It consist in a perfect integration of figurative, architectonic and vegetable levels which characterized both the illusionary and colorful vision of a bigger space beyond the *domus* level.

Maybe, inside, they're located in such a way to overlap the dark and naked walls of *viridaria*, *triclinia* and *cubicula*, dark and naked, because of the lack of the painting allowing people to see bigger spaces over them. In this way, the totem plays not only as a memory window of a past which is no more possible to see

and of the imaginary 'what is not possible to see no more' because the panel represents a reality which is not possible to produce once again both because some finds are now considered as ruins, and because of the morphology. For this reason, these kind of totem will be called 'the windows of the invisible'.

Both in the *domus* of the *Insula Occidentalis* in *Pompeii* and the summer *diaetae* in Arianna's Villa in Stabia, the windows of the invisible can show a sea sight once again, in which the coast was much closer to the archaeological areas than now. Those windows propose also the imaginary, propose a sort of illusion painted on a space against the closing where was possible to draw a symmetric configuration which is also bigger and axial.

The examples propose the application of the window to Sallustio's *domus* in *Pompeii*, currently closed for visitors and for which it is possible to conjecture an external installation.

In this way it is showed the prospective vision that it's also given by the juxtaposition of architectonic and figurative levels. So what is not possible to see no more is given by the lack of the paintings in First Style, whose different colors are characterized by the orthostatic (*atrium*) and to the lack of garden paintings on the wall of *viridarium*.

This illusory scenography is thought as a pictorial space more extended than the architectonic one that, with the representation of a wood beyond a painted colonnade, defines a symbolic opening in direction of the real wood that really existed.



Figg. 10-11-12: A window in Sallustio's *domus* in *Pompeii*.



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