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THE JOURNEY OF HERITAGE, THE JOURNEY OF EXPERIENCE: A REFLECTION ON PHYSICAL/VIRTUAL MUSEUMS

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In the XIXth and XXth centuries, archaeological exploration of monumental sites uncovered large urban scenarios, architectural masterpieces, and valuable artworks. Early musealization often involved removing and relocating these findings to museums far from their original locations. This led to the creation of specialized spaces that made collections accessible to visitors and scholars. The British Museum in London, the Pergamon Museum in Berlin, and the Cloisters in Manhattan present architecture out of their original context, yet fully enjoyable without travelling to distant sites. This controversial approach left gaps in archaeological sites, while parts of buildings were treated as fascinating museal exhibition objects. Today, this legacy remains visible, but digital and advanced technologies offer new possibilities. Original sites can benefit from a "digital return," allowing the virtual reconstruction of moved items, and enhancing the perception of long-abandoned cities. In the present paper, a series of reflections in the parallel between the Pergamon Museum in Berlin and the original archaeological site in Bergama, Turkey, will be developed reflecting on how digital representation may help in reconstructing a separated and disseminated heritage, defining new interactive spaces for the contemporary visitors.

Keywords: Digital Survey, Digital Heritage, Displaced Heritage, Photogrammetry, Hellenistic Cities.

1 | Side page. View of the Pergamon Altar in the Pergamon Museum in Berlin (Repository: SALT Research).

Introduction

Visiting any archaeological site or museum often brings curiosity about the whole story and the deepest details of remains and items. Statues, fragments, and parts of architecture raise interest and develop knowledge about a site and a historical period. They can stay in place, sometimes repositioned by anastylosis, or even still standing after long centuries of events, or they can be displaced into museums, to find a safer location and be presented to the public in a controlled exhibition. Thus, in many situations, the original location in space and time does not seem clearly defined, the historical sequence of events fails to be communicated to a wide range of visitors, the sites require previous knowledge or guidance to help the interpretation, and the long series of items appear at risk of

losing their effectiveness in transmitting knowledge and understanding. This subject was previously widely explored by disciplines like "museum pedagogy"¹ and the relationship between the original locations and the exhibition of a particular element is important and most of the time is not merely a generic indication, but a strong grip between the observer and the provenience of what is observed. This is particularly true for certain findings, like large statues and decorative apparatus, where the reconstruction of the original positioning may re-habilitate a complex play of sights and views between the observer and the architecture space and between the artworks themselves. It is a fundamental aspect of the architecture too, defining complex issues about the proper strategies to be brought on in any reconstructive effort. The scenario is even more complex and

¹ Hooper Greenhill, *Museums and the Shaping of Knowledge*.

² Cfr. Bayrakdar et al., *Osmanlı Arşiv Belgeleri Işığında Bergama Zeus Sunağı'nın Berlin'e Götürülüşü Hakkında Bazı Düşünceler*, *Çağdaş Türkiye Tarihi Araştırmaları Dergisi*; Binan et al., *Bergama İzmir Kentsel Kültür Varlıkları Envanteri*; Dudley, *Displaced Things in Museums and Beyond, Loss, Liminality and Hopeful Encounters*.



“ *Look, the David by Michelangelo Buonarroti, standing in front of Palazzo Vecchio, in Piazza della Signoria. It is now a copy. But more real than the real one, while standing in the right place, where the real one was supposed to be.*

Adolfo Natalini

difficult when the site has a past story of spoliation from findings. Small objects, medium-sized artworks and secondary elements may not affect the perception of a place and can easily find a better context in the museum to be appropriately presented to the public, but when the displaced object is a large statue or sculpture that was originally integrated into the architecture or used as a focal point of attention to promote balance in the design of the space, the missing element comes to the fore in its full extent, causing a difficult replacement that is only fuelled by imagination. This happens with even stronger effect, when the moved parts are displaced to museums far from the original location, especially abroad, in other countries. In this case, the sense of deprivation meets a generic approval from public opinion and may create some consistent misunderstand-

ing between the reason and the sense of the context in which the displacement was done. The word “stolen” is often misused and sometimes the reconstructed elements may be interpreted as an illicit heritage, even if this definition should be used only for the element subject to the even older despicable practice of looting and reselling parts of the Patrimony. The practice removal large parts is nowadays no longer sustainable, but the past operations are still at the centre of a controversial debate with a variety of opposed tones².

Diving back to the XIXth and XXth centuries

In the course of the XIX and XX centuries, archaeological exploration of monumental sites in Asia Minor led to the discovery of large urban scenarios, ar-



2 | The area of the Altar in Bergama, Turkey, July 2024 and March 2021. Pictures by Pelin Arslan and Anton Skrobotov.

chitectural masterpieces and valuable works of art³. The discoveries made during this period represented a significant advance in the understanding of the past of this region. They provided concrete evidence of the existence of ancient civilisations, revealed the intricacies of their social structures, economic systems and religious beliefs, and shed light on the cultural exchanges and technological advances that shaped the history of the region. The monumental sites dating from this period, such as Ephesus, Troy, Priene and Sardis, have provided insights into urban planning, architecture and infrastructure, often revealing complex layers developed in ages. The excavations of these cities allowed archaeologists to reconstruct the daily lives of their inhabitants, from their homes and workplaces to their religious practices and social interactions. In addition, the discovery of architectural masterpieces such as the Temple of Artemis at Ephesus and the Mausoleum at Halicarnassus has revealed the extraordinary artistic and technical skills of ancient societies. The exploration of Asia Minor has also yielded the discovery of a substantial quantity of valuable artefacts, including sculptures, mosaics, pottery, and jewellery. These findings provide critical evidence regarding the artistic traditions, cultural exchanges, and economic activities of

these civilizations. The intricate details of sculptures, the richness of mosaics, and the artisanship of pottery and jewellery offer insights into the aesthetic sensibilities and cultural values of the past. In addition to their scientific significance, the discoveries made in Asia Minor have also had a profound cultural and historical impact. They have inspired generations of scholars, artists, writers, and have become an integral component of the region's Cultural Heritage. The ruins of the ancient cities and the treasures of the archaeological museums continue to attract visitors from around the world, offering a tangible connection to the past and eliciting a sense of wonder and awe. For the logic of the time, to bring to proper restoration and present to a wide public the important results of these archaeological campaigns, the practice of removing elements, components and entire architectural parts, was quite in use. A significant operation of economic support to gathering elements, often found in fragments and of remounting them in international museums was undertaken, producing the migration of large collections of architectures, statues and findings to specific museums.

³ Giuliano, *Le città dell'apocalisse. Monumenti e testimonianze della dominazione romana in Asia Minore*.

⁴ Cuno, *Who Owns Antiquity? Museums and the Battle Over our Ancient Heritage*.

⁵ Barnet, Wu (edited by), *The Cloisters: Medieval Art and Architecture*.

⁶ Gunsch, *See in the world: Displaying foreign art in Berlin, 1898-1926*.

⁷ Gossman, *Imperial Icon: The Pergamon Altar in Wilhelminian Germany*.

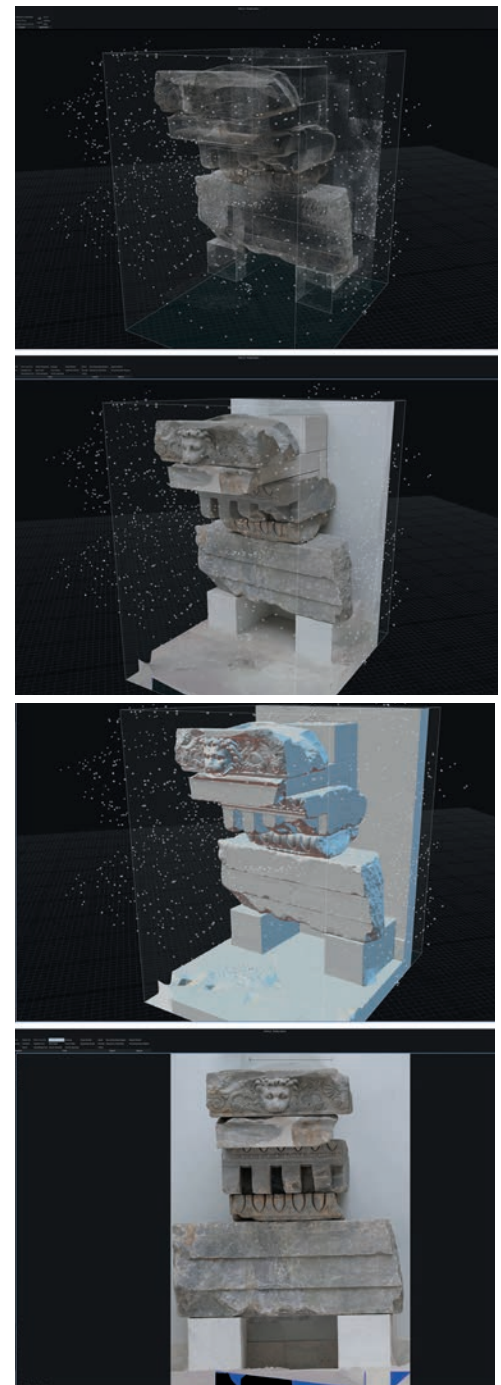
The complexity of itinerant heritage in the present time

In its first manifestations, the musealization of these findings brought to their removal and repositioning in museums far from the original locations. These operations brought the development of specific architectural spaces and collection wonders aimed at defining comfortable and easy-to-access contexts for visitors and scholars. The British Museum in London, the Pergamon Museum in Berlin, and the Cloisters in Manhattan have presented entire parts of architecture that are restored out from their original context but fully enjoyable without reaching far-away locations. This controversial museum behaviour left signs and missing parts in the original archaeological sites and even in the best of conditions, giving restoration and proper protection to inestimable monuments, it treated entire parts of buildings like exhibition objects. The learning drawing defined by these operations is still present and readable nowadays, with the option of being enhanced by digital and advanced technological solutions. On the other hand, the places of origin may now benefit from these same technologies for having a “digital return” and then virtually reconstructing a previous condition that may enhance the perception of the archaeological landscape of cities abandoned for a long time. The cases are numerous, an extended amount of fragments, statues and items appears nowadays in the collections of European and American museums, the archaeological missions coming from these countries brought back to their countries all the most significant discoveries to guarantee, in the scenario of that time, a proper restoration, protection, preservation and exhibition. In many cases, this approach was applied not only to small and medium-sized elements but to entire part of buildings. One of the most well-known cases is the migration of the whole Parthenon frieze, moved from Athens to the British Museum in London, with a quite articulated operation⁴ that is still a debated argument about its restitution and a subject of political discussion. In those times and up to the early XXth century many operations of this kind were

brought on, moving entire Romanesque churches from Spain and Italy to the MET Cloisters Museum in New York⁵; the Gate of Ishtar (575 BC) from Babylon, Iraq, to its visionary reconstruction in Berlin⁶; the Market Gate of Miletus (IInd century AD), and the Pergamon Altar (180–160 BC), both from the Aegean coast of Turkey to Berlin, Germany⁷. It is then important to underline that these last three buildings, all hosted at the Pergamon Museum in Berlin, had suffered ancient earthquakes and demolitions, so they were not unmounted from their original locations, but brought in pieces from their ruins and rebuilt and restored with accurate integrations in their new “casket”.

Connecting items in different locations, from Bergama in Turkey to the Pergamon Museum in Berlin

The case of the Pergamon Museum is one of the most fascinating and complex. The idea of creating a large architectural collection, reconstructed in large closed and protected spaces is almost unique. The fragments from the archaeological sites were restored and assembled, the missing part reconstructed, creating single fascinating elements, decontextualized, but fully accessible. The value of these reconstructions was not only practical or artistic but assumed a cultural and political value⁸, especially in the period of the “Empires”, something that was creating an element of dissonance, unbalancing the equilibrium between appropriation and preservation. This operation at that time, was probably looking like the best preservation choice giving excellent chances for these artworks to be recovered and exhibited to scholars and curious in a protected place. The events of World War Two put dramatically in doubt the concept of a “protected place” and even if these museums survived the utter destruction of Berlin, as well as the British Museum survived the Luftwaffe and V1 bombing in London⁹, they entered the contemporary age only after a period of foolish risk in the European cradle. Nowadays, the relationship between these extraordinary architectural masterpieces and their original sites seems still quite complex, but the conditions caused by the remov-



3 | Sequence of the 3D model generation by photogrammetry: from the alignment, with the point cloud generation, to the creation of a polygonal surface, to the texturing, to the extraction of high resolution orthoimages.

⁸ Willert, *The Archaeology of the Imperial Past: “Nostalgizing” in the German and Turkish Museums of the Interwar Period.*

⁹ Gardiner, *The Blitz: The British Under Attack.*



4 | Orthophotos of the partial reconstruction of the temple entablature, Priene, Sanctuary of Athena Polias, 4th–1st cent. BCE, Pergamon Museum, Berlin.

5 | The 3D digital model of the entablature in sketchfab.com with the QR code for direct access.

¹⁰ Dreyfus, Schraudolph, *Pergamon: the Telephos Frieze from the Great Altar*, Vol. 1.

of particular originality the Gigantomachy, representing the battle between the gods and giants considered one of the initial events in the history of gods and earth¹⁰. The reliefs and their architectural frames were carefully removed and transported to Berlin by the German archaeologists, to be later reassembled in the specific room of the museum. At present, the situation in Berlin sees the Museum closed for restructuring since 2016, it opened partially for some years, but closed again completely in 2023, with the new opening foreseen at an uncertain date. In the future, when the museum will open again the visitors will find a setup for the Altar which will be equal to the original one at the time of the reconstruction, with the monument exhibited in its large room, with a certain amount of secondary fragments positioned around the main building, a very scenographic scene, flooded by homogeneous light, allowing a clear lecture of any details of the monument, with the visitors crowding the central large steps for visiting or resting. Although it is exhibited in very good conditions, its experience value is at risk of being decreased and instead, it has become something to be learned from narratives. At this point, the contextuality of the artwork should be discussed. While cultural heritage is a living piece within its spatial value, when it is moved to a museum, it cannot go beyond being a representative within the boundaries of the museum. Finally, it should be added that being visited by many visitors in a museum of international value brings fame and recognition. The situation in modern Bergama in Turkey is quite different, the area where once there was the altar and where, for a long time, was the ruins, is now a clean platform (fig.2). The complete removal of the Altar from the site had both physical and semantic consequences. There were gaps in the holistic composition of the ancient city, making it difficult for the visitor to immerse in the city and directly capture its full value, the empty platform, presents only some simple panels indicating the past condition and giving a reference to the Pergamon Museum, is not enough to capture the attention or give some empathy to the historical value of the place, in consequence it may be ignored.



In a certain way, the two setups create diametrically opposite conditions. The interaction required from the visitors is completely inverted in the two locations. In Bergama it is asked to imagine that once upon a time there was this large altar, it stood in its place in time until it fell into ruins, and then the ruins were moved away, so that the visitor may try to imagine that building on the remaining platform in between some trees and the open landscape. The request to the visitors in Berlin is to imagine that the monument, beautifully restored, was surrounded by an Ellenistic city, standing in an open landscape instead of a large, closed room. This condition can be enhanced with digital tools, it can be imagined an evolution of the interaction between place, monument, museum and visitors enriched by simulations and site-specific setup capable of reconnecting the place to the monument and the monument to the place. A process of this kind should start with proper digitalization, passing by various processes and defining two different digital tools aimed

at experiencing the monument on its integrity of place and art. At the moment of the writing, this is just a conceptualization, but this process in its first step has been already experimented on similar but smaller and less complex cases.

Heritage virtualisation, a case study from Priene to the Pergamon Museum

In July 2022 a Summer School organized by the Ozyegin University, Istanbul, brought on a variety of documentary and propositional interventions on the archaeological site of Priene, in the Aegean Turkish province of Aydin. The city of Priene was one of the main settlements in the area, but was often subject to great difficulties, being drastically damaged by the withdrawal of the water, which caused the end of its harbour and by frequent strong earthquakes which heavily destroyed the main buildings and numerous houses. It remained in use until the destruction by the invasion of the Seljuk Turks in the XIIIth century¹¹.



5 | Orthophotos of the partial reconstruction of an altar, Priene, Sanctuary of Athena Polias, ca. 200 BCE, Pergamon Museum, Berlin.

6 | The 3D digital model of the entablature in sketchfab.com with the QR code for direct access.

The city remained abandoned for centuries to be then discovered as an extremely interesting archaeological site, despite the unlucky story, most of the buildings kept enough consistency to allow reading the urban pattern and give a precious contribution to the interpretation of architecture from that time. All the main archaeological missions there were guided by English and German scholars, who supported the move of various findings and architectural parts to museums in their home countries. In Berlin, a collection of elements and architectural parts was hosted at the Altes Museum (statues and items) and in the Pergamon Museum. The research started in the context of the Summer school of 2022, allowed the gathering of a generous dataset, covering a large part of the urban area and defining materials for a rich variety of research, after an accurate development of materials aimed at better understanding the events that brought to the abandon of the city¹², the occasion to start a tentative in the virtual recomposition of the parts between Priene and the European museum was offered by the kind availability from the Altes and Pergamon Museum in Berlin in trusting a first series of surveys in their collections. In October 2022 and in May 2024, two single days of photogrammetric operations allowed taking the data from some significant items and starting a study about how to restore a link between places and elements using digital models. The Altes museum hosts mostly statues, with only one (the priestess Nikesa) with a clear relationship with the architectural space, all the architectural parts are instead preserved at the Pergamon museum, a first session on these elements will be the subject of the following part of this paper.

Photogrammetry

All the operations at the Pergamon Museum were carried out using a Fujifilm GFX50S with a digital medium format sensor at 50 MP and equipped with a Fujinon 32-64mm F4 zoom lens. The high quality of the lens, the size of the sensor and the overall professional features of the camera guaranteed excellent shooting conditions, with the possibility of taking images with the camera hand-held or just positioned on a monopod, to speed



up all the capture work. The ISO setting was regulated on a value of 400 or 800 with just a few spots taken at higher values to allow the shutter to operate at reasonable speeds without renouncing to a decent depth of field. For all the elements at the Pergamon Museum, a movable scaffolding was available, supporting and solving any possible issues for taking pictures from a high point of view. The following photogrammetric processing was then operated using EG Reality Capture software, according to well consolidated procedures, in the classic sequence of alignment, polygonal surface creation,

7 | Orthophotos of the partial reconstruction of the temple entablature, Priene, Temple of Asklepios, agora (market area), 150–100 BCE, Pergamon Museum, Berlin.

8 | The 3D digital model of the entablature in sketchfab.com with the QR code for direct access.



¹¹ Graf, Sideris, *Priene*.
¹² Giovannini et al., *Priene, a Monumental Disaster in the Aegean: Digital Approaches to the Doric Stoa's and the Theater's Lost Evidence*.



9 | Front view of a set of the entablature from the Sanctuary of Athena Polias, 4th–1st cent. BCE, in Priene, Miletos Archaeological Museum, Miletos, Turkey. Giorgio Verdiani and Alessandro Camiz.

surface optimization/simplification, texture creation and extraction of digital 3D model and ortho images in high resolution (fig. 3).

Element one

The first element is composed of a series of elements defined as the partial reconstruction of the temple entablature of the Athena Polias' Sanctuary (4th–1st cent. BCE). The photogrammetry shooting produced 1108 pictures, with a resulting mesh made of 282.3 million triangles, then simplified to three million triangles and textured with a resulting atlas of 20 images of 8x8 thousand pixels. The model was then used for producing high-resolution orthophotos (fig. 4) and uploaded to the sketchfab.com platform (fig. 5).

Element two

The second element is a composition of architectural parts with two sculptures combined to complete the partial reconstruction of an altar from the Sanctuary of Athena Polias (ca. 200 BCE). The photogrammetry shooting produced 924 pictures, with a resulting mesh made of 185.1 million triangles, then simplified to four million triangles and textured with a resulting atlas of six images of 16x16 thousand pixels. The model was then used for producing high-resolution orthophotos (fig. 6) and uploaded to the sketchfab.com platform (fig. 7).

Element three

The third element is similar to the first, again presenting of fragments assembled in a partial reconstruction of the entablature from the Temple of Asklepios, settled

in the Agora, market area (150–100 BCE). The photogrammetry shooting produced 425 pictures, with a resulting mesh made of 96.5 million triangles, then simplified to three million triangles and textured with a resulting atlas of three images of 16x16 thousand pixels. The model was then used for producing high-resolution orthophotos (fig. 8) and uploaded to the sketchfab.com platform (fig. 9).

A parallel at the Miletos's Museum

Priene and Miletos as well as a variety of significant archaeological sites like Didyma, Aphrodisia, and Tralles have a common, curious feature, they follow a logic of exhibition that presents "displaced" findings, so it is quite common to see a part or fragment coming from Priene exhibited in Miletos or statues from anywhere in that region exhibited in Ayden. Even if on a short distance, they replicate the process of displacement for items and parts. The issue is not that evident, but the separation between the elements and their context is similar. Is this the case of a portion of the roof moulding from the public collection in Miletos and coming from Priene, this element is from the same architectural setup as the first and third element surveyed in Berlin, which is an interesting occasion to apply digital solutions for developing a digital match between the two pieces. In the case of Miletos the photogrammetry was operated using a Nikon D800e Digital SLR, with a 36.3 Mp full-frame sensor, mounting a Nikkor 24mm F2.8 lens, with this configuration a shooting of 417 pictures was taken all around the item, which is pre-

sented on a low desk which allows some reasonable access to almost all the sides of the part. All the shots were taken with the camera handheld, to access all the sides practically and rapidly. The quite low light of the room made it preferable to set the ISO to "automatic" accepting some eventual extra noise but avoiding some possible motion blurred shots. In this way the whole piece was taken in the turn of half an hour, producing a complete 3D model scaled on the base of direct measurements taken in place. The resulting 3D digital model was made of 38 million triangles, then subsampled to three million triangles and exported with a texture atlas made of five images at 8x8 thousand pixels. The model was then used for producing high-resolution orthophotos (fig. 10) and uploaded to the sketchfab.com platform (fig. 11).

Which interaction space for which users? The pedagogic value of a Museum should always be at the forefront of any contemporary collection setup. Even the richest and most varied exhibitions of artworks and findings should have some fundamental element defining each object: the location of provenience, the date, and the main materials. These three points, well described and defined, should always fix in time, space and consistency their reference subjects. This should be a mandatory condition for each exhibited element, to support at least with a minimal set of indications the visitors, especially those who come to the museum searching for learning and understanding. Vice versa, the places of provenience should be marked and present minimal documentation and a link about the fact that a specific part is moved somewhere else. This may appear as a monumental work, but starting from some main and extremely significant cases, it may gradually be extended to a larger number of situations, a coherent and digitally functional system of simulation and links may extend efficiently the quality of the visits and expand the digital layer to these otherwise "deprived" archaeological contexts.

For example, the one-day campaign at the Pergamon Museum produced three valuable digital models that may be accessed with the simple insertion of a QR code in any location. It may be put in rela-



10 | The 3D digital model of the entablature in sketchfab.com with the QR code for direct access.

tionship with other parts and fragments. They offer a better visualisation of the artefacts. Being a digital copy allows possible digital replicas and adds an option for recreating that part even after the most baleful event that may happen to the original.

Conclusions

The subject of the migrant cultural heritage is extremely complex, from one side the basic logic of the "return to the original place" may sound logical and appropriate, thus the articulated story behind each illicit or licit artwork is often so interesting to create a story in itself, a story that can't be reverted. At the same time, it is probably worth defining how different the conditions are between the other categories of elements that may be identified in these "migrations". One of the points that are raised against the "return" is that these elements are not supposed to go back to their original location, but to a museum, so they are in a public museum yet. They can be observed there and studied there by any scholar, there is no need to dispose of a new journey for these elements, they have their role in the Patrimony of Humanity, and in this way, they are yet in their right place after about two centuries since their excavation and restoration. This reasoning even if more articulated than the "back to the origin" strategy has its strength and rightfulness. Thus, when dealing with these delicate arguments, it is possible to distinguish the elements migrated somewhere from their origin with a

more reflective point of view, developed on their impact on the completeness of a place. Single items, jewellery, treasures, small statues and artefacts are in their definition of being "objects" elements that may be moved, changed from hand to hand, and find a reasonable location in more than one place. Instead, large statues, part of architecture and, most of all, entire buildings, are often, if not always, in a strict relationship with their original context. A statue may be the centre or one of the guiding elements in the design of a space, its position may be in a relationship of gestures and sculpted staring actions, which may be a fundamental element in the perception and comprehension of its architecture. In the same way, a building is in relationship with its context, with the environment, the landscape, and other buildings. In these cases the removal of these parts, even when they are fragmented in pieces on the ground, is creating an emptiness that needs some kind of repair to fix the issue caused to the original place. There are three possible steps to do this, in order of just hypothetical complexity from higher to lower (while each case may reveal specific conditions): first, the coming back of the removed elements, which is not practical and often neither possible nor in most of the time not possible in the original place, but just in some other museum.

Second, the reconstruction of a real-size copy using new materials, which may recreate a complete impression of the original setup, but may create some weird effects and raise criticisms, thus it represents a design subject where probably

a lot of experiences are yet to be done. Third, the virtual reconstruction of the original setup, based on panels, physical maquettes, or digital modelling, to be used in site-specific and/or remote solutions, capable of extending the sharing of content, interpretation and enriching the opportunities of knowledge in place or during any kind of research. This variety of options has all three a common need: the correct documentation and digitalization of places, of the involved items, of their similar references, creating a proper digital context allowing proper choices, interaction and even mixing between the findings, the places and their contemporary users. The construction of a robust "learning and sharing machine" based on these contexts, capable of restabilising relationships between migrated parts in their present location and all their original location is a changeling subject for the next evolution of digital heritage in its interaction space with any level of users.

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