This book provides an overview of a three-year research project 'MUSEE | Understanding Museum Architecture for Digital Experiences' (2022-2025), supported by the Hellenic Foundation for Research and Innovation (H.F.R.I.) and realized by the University of Patras.

The research project investigates digitally augmented experiences in museums from different points of view –the curator, the architect, the digital experience designer and the visitor– and links architecture to museology, and spatial analysis to digital experimentation.

It brings together an interdisciplinary research team with expertise in museology, architecture and interaction design, and is a collaboration between University of Patras –the Principal Investigator Kali Tzortzi– and University College London –the Co-Investigator Ava Fatah gen. Schieck– in partnership with the Ephorate of Antiquities of Ioannina/Archaeological Museum of Ioannina and the Ephorate of Antiquities of the City of Athens.

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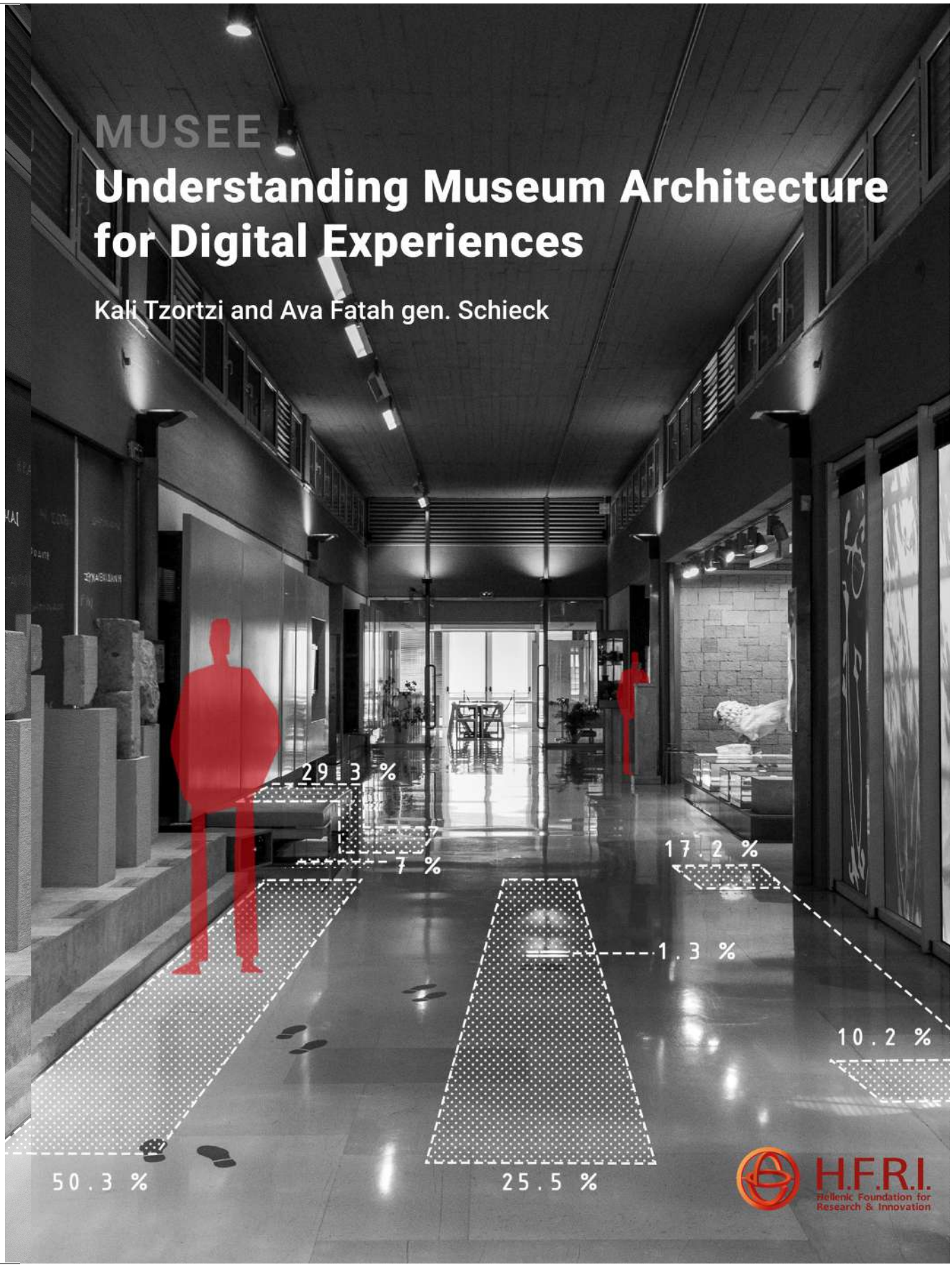
ISBN: 978-618-5452-30-8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MUSEE

Understanding Museum Architecture for Digital Experiences

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Kali Tzortzi and Ava Fatah gen. Schieck

In partnership with the Ephorate of Antiquities of Ioannina / Archaeological Museum of Ioannina and the Ephorate of Antiquities of the City of Athens

The research project MUSEE was supported by the Hellenic Foundation for Research and Innovation (H.F.R.I.) under the '2nd Call for H.F.R.I. Research Projects to support Faculty Members & Researchers' (Project Number: 2501)

Publications Papailiou

Printed, bound and published by
Publications Papailiou
Didotou 34, Athens
Tel. 210 3637643
Email: teo_papa@yahoo.gr

This publication has been made possible by the support of the Hellenic Foundation for Research and Innovation (H.F.R.I.).

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Preface

This book provides an overview of a three-year research project 'MUSEE | Understanding Museum Architecture for Digital Experiences' (2022-2025), supported by the Hellenic Foundation for Research and Innovation (H.F.R.I.) and realized by the Department of Architecture of the University of Patras.

The research project investigates digitally augmented experiences in museums from different points of view –the curator, the architect, the digital experience designer and the visitor– and brings together an interdisciplinary Research Team with expertise in museology, architecture and interaction design, along with stakeholders, such as museum professionals and policymakers, in a collaboration between the Department of Architecture, University of Patras (the Principal Investigator Kali Tzortzi), and the Bartlett School of Architecture, University College London (the Co-Investigator Ava Fatah gen. Schieck) and with partner institutions the Archaeological Museum of Ioannina and the Ephorate of Antiquities of the City of Athens.

The aim of this book is to sketch the main stages and dimensions of the research project, choosing key moments and aspects of interest for researchers and professionals in the three fields (museology, architecture and interaction design) that interact in the design of digital experiences (or what we will call *digital sensory environments*) in museums, so that it allows to build up an overall picture of this research in a field that is developing rapidly, though it is still largely underexplored from an architectural-spatial and museological-curatorial point of view, and to draw new insights from particular cases, including a set of empirically tested techniques as evaluation tools for the architecture of digital sensory environments in museums.

The documentation of the work, inevitably selective, is punctuated by references to the related academic papers of the Research Team as well as to the body of literature on which it draws. Richly illustrated, the book is guided by the belief that documenting, analyzing and communicating research processes, insights and results, can support both design and research, and contribute to knowledge development in this interdisciplinary field.

01
Introduction

Over the past decade museums have become increasingly important in health and well-being as well as economic development. In parallel there has been a growing awareness of architectural and spatial design in their functioning. This issue has become more complex as digital technologies offer new potentials to mediate between museum content and visitors, and in particular technologies which have the capacity to amplify senses and facilitate interactive, whole body, immersive and sensorial experience. These are already beginning to have effects on the spatial design of museums, and set challenges for curators, architects and exhibition designers.

A body of literature in different fields (in particular, interaction design and Human-Computer Interaction) reflect the attempt to better understand the design of digitally mediated experiences, their functioning and their effects on museum visits. However, to our knowledge, no systematic research, has been done in bringing together knowledge of digital interaction and museology by looking at both from a spatial point of view. Yet the problem of space is seen as a key parameter in the creation of the experience as well as its understanding.

The interaction between spatial design and digital technologies in creating the museum of the future is the focus of this research. To understand this interaction entails answering a series of critical questions.

Research Questions

Unlike the typical museum object, digitally mediated experiences, or sensory environments created through digital media which combine architecture, interaction design, projection, light and sound in a unified spatio-temporal experience, invite visitors to 'look, listen and feel', amplifying or altering their physical and sensory realities, and fostering an in-situ type of experiential

knowledge. This leads to the relatively underexplored questions: how to embed these new forms of knowledge in the museum context from a museological and a spatial point of view; How to conceptualize and analyse the architectural organization of exhibition spaces (physical) together with the organization of digital sensory environments and the interaction spaces they create (digital); And how the above impact on the *informational* and *social* dimensions of visitor experience.

Methodology

Two buildings were selected as the case study for this project: the Tower of the Winds (or Horologion of Andronikos), at the archaeological site of the Roman Agora, Athens; and the Archaeological Museum of Ioannina (AMI), where we focused first on the Gallery of the Roman Era, and then on the main circulation axis of the museum.

To explore the research questions and investigate the organization of physical and digital experience as an integral system, we exploited the analytical tools of architectural morphology, in particular Space Syntax, and combined them with human-centered methodologies applied in interaction design, coupling them to inquiries into visitor experience through questionnaires – an established research method in museology (Figure 1.1).

More specifically, the following research methods were combined:

a) *Development, design and implementation of novel media installations in museum/heritage settings*. The installations are site-specific, fuse digital and physical space, and communicate cultural meanings through interactive, immersive, sensorial and affective experiences.

b) *Analytical study of museum buildings*, using a range of techniques, recently developed as well as established. The in-depth first-hand study and analysis includes:
-representations of space, making a space syntax analytic model of the spatial layout of each building (e.g. isovists),
-spatial form analysis, measuring and analysing spatial relationships, using software-based technologies (such as VGA analysis).

c) *Detailed observation of spatial behaviour* of a sufficiently large number of visitors to ensure a reliable picture of visitor patterns for each of the three

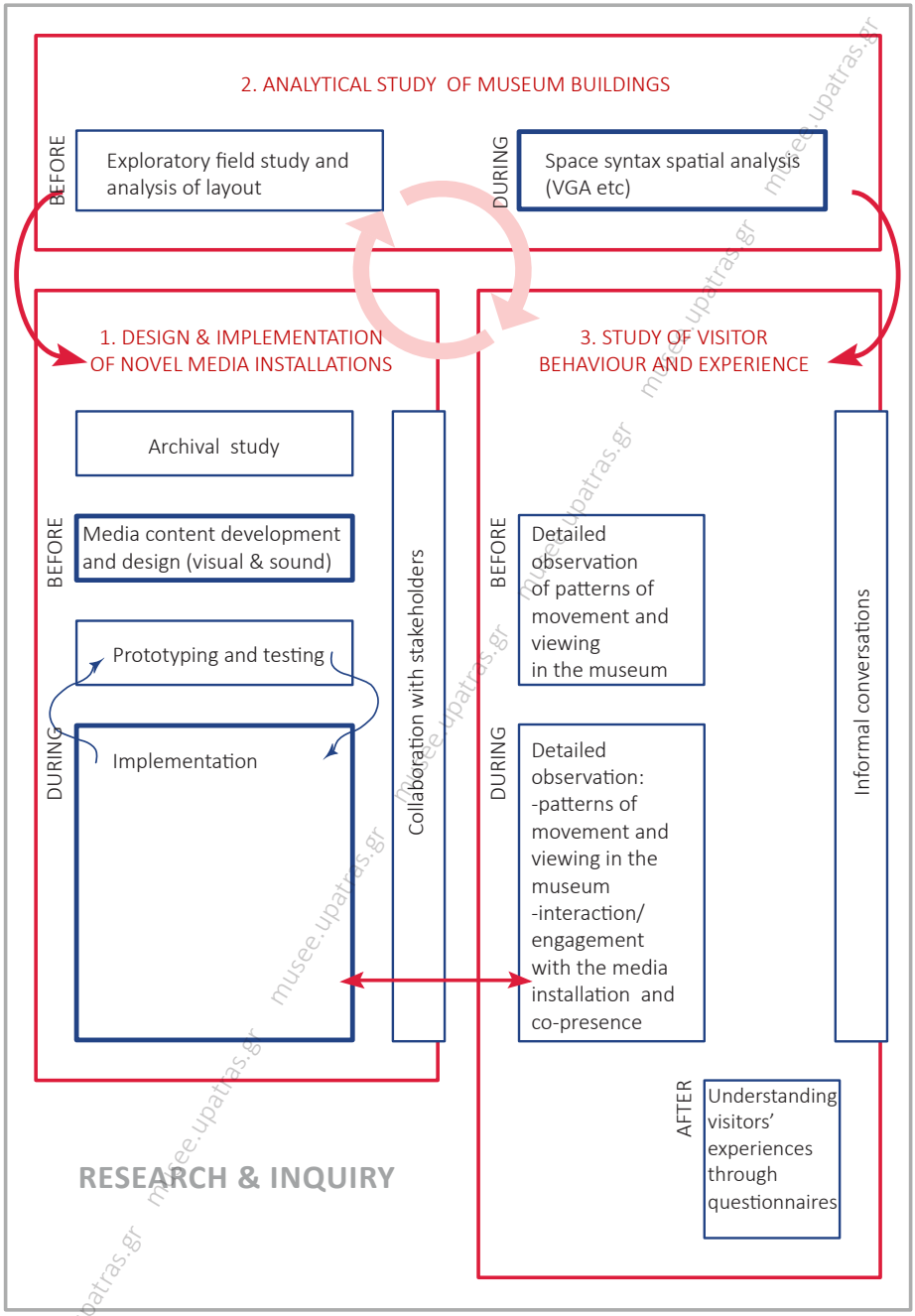


Figure 1.1
Methodological framework for the design, implementation and evaluation of digital sensory environments in museum settings.

case studies before and during the implementation of the digital installations (i.e. tracing visitors' paths, 'snapshots' of visitors in spaces), and

d) *Inquiries into visitors' experiences through questionnaires and interviews* (post-installation). By complementing observation of visitors' behaviour with questionnaires, both spatial design and visitor responses can be illuminated by different perspectives.

It should be noted that the spatial analysis and observation was conducted at two levels: the micro-level of the spaces in the vicinity of the digital interventions, and the macro-level of the museum layout as a whole.

Challenges

At a fundamental level, a key challenge for this project was to design and implement a series of experimental digital installations which have the capacity to amplify senses and facilitate immersive and sensorial experience, and at the same time contribute to meaning-making and visitors' active engagement. The site-specific media installations interact with their architectural-spatial context, create singular experiences for visitors that must be lived at that time and space, and open up new ways of mediating between visitor and content by breaking away from the screen, and proposing instead more physical ways of interacting with the digital content.

An additional challenge for this research was to understand the integration of digital experiences in the physical space of the museum and illuminate those characteristics that enable design intentions to reach their aim of an environment that fosters visitors' engagement and sociability. To this aim we have sought to draw together the systematic understanding of the architectural space (created through the building layout) and the sensory environment (created through the digital medium), and explore how these two interact to create the final museum experience, influencing the movement of visitors within them and their engagement with the digital content.

A third challenge derives from the above: to understand interactions beyond interaction design which tends to focus on the behaviour of the digital installation and visitors' reactions in a situated sense (e.g. the honey pot effect, the landing effect), without taking into account the overall space of the gallery in which it is placed, let alone the complex of spaces that the museum

consists. In contrast, with our integrated methodology, we explored the impact of digital interventions on visitors at the global level of the museum experience, so not only as a series of localised effects. The application of the consistent and rigorous configurational (syntactic) techniques for the analysis of space allowed the comparison of the effects of different contextual spatial designs, as well as different digital experiences, on the same formal basis.

Structure of the Book

Reflecting the sequence of the questions the research project addresses, the first three sections of the book look at the three central themes: digital interventions, spatial organization, and visitor experience. The fourth section synthetically reviews the main dimensions of museological-conceptual and spatial variability of the specially designed digital interventions. Drawing insights from the case studies, this last section of the book brings to light particular challenges and potentials offered by media installations in museums and heritage buildings, with particular emphasis on those that have spatial aspects, and proposes a framework of principles for their design and implementation, as well as the evaluation of their impact on key dimensions of museum experience.

02
Designing and Implementing Media Installations

The theoretical framework of this research project (MUSEE) is, on the one hand, the increased awareness in museum/heritage theory and practice of the significance of space in the creation of museum experience as well as its understanding (Falk and Dierking, 1992; Hillier and Tzortzi, 2006; Tzortzi 2015; Peponis, 2023) and on the other hand, the concept of 'embodied understanding' (Johnson, 2015; Levent and Pascual-Leone, 2014), which has led to the increased engagement of museums with embodied, sensory and emotive forms of knowledge.

While drawing on this body of literature, the project also positions itself in an interdisciplinary field where previous media installations explored projections on historic buildings and museum exhibits, adding layers of digital information over the physical environment (see for example Hornecker and Ciolfi, 2019; Tzortzi and Fatah gen. Schieck, 2023; Basballe and Halskov, 2010; Dalsgaard and Halskov, 2011; Nofal *et al.,* 2018). In effect the project seeks to contribute to the emerging field of Media Architecture ('the design of physical spaces at an architectural scale incorporating materials with dynamic properties' – Brynskov, Dalsgaard and Halskov, 2013), and sensory environments. Current ideas about Media Architecture and its effects on users predominantly derive from research on urban environments. Research within the area of urban screens has, for example, already made a broad contribution to understanding what happens in terms of interactions in front of the screens and the potential role of the urban space (Fatah gen. Schieck, 2009; Fatah gen. Schieck *et al.* 2008; 2013; Behrens *et al*., 2013; Fischer and Hornecker, 2012; Wouters, 2016).

The problem of space is an explicit theme in the field of Media Architecture. Authors like Brynskov, Dalsgaard and Halskov (2014) see *space* as one of five salient aspects of media architecture in public space, which, together with *aesthetics*, *interaction*, *meaning* and *participation*, plays a key role in the development, use and perception of public media architecture; Fischer and Hornecker (2012; see also Fischer *et al*., 2013; Vande Moere and Wouters, 2012; Gehring and Wiethoff, 2014; Afonso and Fatah gen. Shieck, 2019; Fredericks *et al.*, 2023), proposed the Urban HCI Space Type Model, which offers a conceptual framework as well as a terminology for the analysis of different settings for urban interventions.

However, as noted before, relatively little attention has been given to date, to the way digital storytelling, in particular through time-based and situated immersive projection, interweaves with the design of space in museums (see for example Hornecker and Ciolfi, 2019), and, more significantly, the opportunities it offers for communicating historic information of a complex past and 'teaching' visitors to 'read' narrative compression in an archeological object, have not yet been fully explored.

Empirical Case Studies – Description and Design Rationale

The aim of the work was to develop new knowledge from in-situ and in-depth first-hand studies of the specially designed and implemented digital sensory environments in two different museum/heritage settings – the Tower of the Winds (or Horologion of Andronikos), at the archaeological site of the Roman Agora, Athens, and the Archaeological Museum of Ioannina (AMI). The case studies, both considered as architectural and urban landmarks, were selected to provide variability in terms of spatial layout, and allowed us to move from a single-space building to a larger and more complex layout.

Over the course of three years (2022-2025), we have developed three media installations or interventions (a term used to emphasize their ephemeral character) in museum settings. The installations, one in the Tower of the Winds and two in the Archaeological Museum of Ioannina, have been developed in collaboration with external stakeholders from the public sector, namely the Ephorate of Antiquities of the City of Athens and the Ephorate of Antiquities of Ioannina. In all three interventions we started by carrying out a field study in order to establish an understanding of the specific opportunities and challenges related to the museum setting and the heritage site in which

Antiquity: astronomical and weather station

Byzantine Period (13th- 14th c.): a place of worship for Christians

Ottoman Occupation of Athens (17th c.): covered with depositions

18th c.: place for prayer for the Turkish dervishes

19th c.: the monument unearthed

Today: a point of reference for citizens and tourists

Figure 2.1
A visual timeline of the history of the Tower of the Winds.

the installation would be integrated. Each of the three cases allowed the exploration of a spatial theme in a different way: in the first case (Tower of the Winds), a total, physical and digital, immersive and sensory narrative environment; in the second (Roman gallery of the AMI) a dead-end gallery space, that is a destination space with a single entrance that invites occupation of space rather than through movement; and in the third case (the corridor space of the AMI), a through-movement space, and specifically the main axis, the dominant architectural theme in the museum. Each case contributed to developing the next stage of the research (see Figure 1.1), while adding up to the overall spatial hypothesis, that spatial structure is a powerful variable in museum experience.

CASE 1, Tower of the Winds

The first stage of the project focused on the Tower of the Winds (or Horologion of Andronikos), at the archaeological site of the Roman Agora, Athens (see also Tzortzi *et al*., 2023; Tzortzi, 2019; 2025). Built at the end of the second century BCE as an astronomical and weather station and a 'clock tower', the octagonal building has a long history with different uses, including being a sacred place for different religions – a place of worship for Christians and a place for prayer for Muslims. (For an account of the history of the heritage building, see Stuart and Revett, 1762; Kienast, 2008; 2014; Webb, 2017.) Today, it is regarded as the best preserved ancient building in Greece (Kienast, 2008, p. 7). Since 2016, it is open to the public, after years of restricted access. In parallel, it constitutes an urban landmark and a point of reference for contemporary citizens (Figure 2.1).

CASES 2 & 3, Archeological Museum of Ioannina

The second and the third stage of the project shifts attention to the Archaeological Museum of Ioannina (see also Tzortzi and Fatah, 2024) (Figures 2.2. and 2.3). Designed by the well-known Greek architect Aris Konstantinidis, the Archaeological Museum of Ioannina opened in 1970, while later changes were carried out in 2008 in the context of the refurbishment of the museum and the redisplay of the collection. The current display comprises archaeological findings from the wider geographical region of Epirus that span a long period, from prehistory to Roman times. They are arranged thematically in a broad chronological framework. (For a discussion on the museum, see Fillipidis, 1997; 2013; Kotjabopoulou and Vasileiou, 2009; Cofano, 2012; Soueref, 2013; Ryan, 2020.)

Key Design Ideas and Concepts

The design for the media interventions evolved over a long period, through experimentation, prototyping and testing in situ. The installations are site specific, and so the object (the building, the archaeological object) and the digital content can be understood in relation to one another.

At the same time, the media installations share in common preoccupations and intentions that are reflected in their features, and primary the intention:

a. To embed or superimpose layers of information onto the three dimensional physical environment/object so as not to cut the digital experience off from other experiences (i.e. the experience of other people, distant exhibits, and the physical space itself).

b. To use projection mapping (also called *Spatial Augmented Reality* – SAR) to enhance or emphasize physical aspects of the objects, augmenting the way they are experienced and perceived.
Additionally, highlighting the geometry of the object and bringing to light its structure was consistently the starting point of each projection.

c. To reveal something relevant that visitors might otherwise have missed and encourage them to look more closely, engaging actively with the object, making discoveries and gaining new understanding.

d. To render the intervention a source of meaningful experience, beyond its sensory characteristics, while offering viewers an experience of immediacy and physical presence.

e. To employ a subtle design and a restricted colour scheme consisting primarily of white, and resolve contrasting requirements – the tension between framing and open-endedness and between the need for scientific rigour and our creative imagination.

f. To create a rich acoustic experience (a specially composed music/soundscape installation) that fits and supports the different elements of the projections, and includes a variety of types of sound (e.g. natural sounds and sounds describing activities, combined with sounds of visitors' presence and social interaction), so as to emphasize sensory experience.

Figure 2.2
Key ideas behind the design of the media installation 'Sculpting in time' in the Roman gallery of the Archaeological Museum of Ioannina.

The Roman gallery
The media intervention is implemented in gallery (6), dedicated to the Roman Era in Epirus, located in the deepest part of the museum.

The relief representation
On the front of the marble sarcophagus, the relief scene of the offering of gifts to Achilles in exchange for Hector's body, as described in the Iliad, Book 24. In the middle, the dragging of Hector's body from Achilles' chariot. On the right, Priam, King of Troy, on bended knee, begging Achilles for the return of Hector's body, and kissing his hands. Behind the two Homeric heroes, stand Hermes and a female figure.

The gallery is open onto the central axis. The open spatial relationships between the galleries and the main axis create a sense of continuity and flow.

Encountering the object

The media intervention focuses on the Roman sarcophagus from Thesprotia (AMI no 6176; 2.2 x 1.5 m.), made of marble, and dating from the second century CE. The sarcophagus depicts scenes of the Trojan War narrated in Homer's Iliad on its three sides. With its strategic positon opposite the opening and its imposing scale, it becomes the central exhibit in the Roman gallery.

The sarcophagus lid features two partially preserved reclining figures (husband and wife) on a funeral bed, decorated with sea deities and nymphs.

In the lower zone lies a garland of leaves, framed by a pair of animals at the corners.

On the left side of the sarcophagus, a warrior (possibly Hector) is being armed for battle.

On the right side, Achilles depicted seated on the funeral bed of Patroclus.

The two scenes on the short sides can be seen as complementary to the key scene, both from an iconographic and a temporal point of view.

Figure 2.3
Key ideas behind the design of the media installation 'Chorography' in the main circulation axis of the Archaeological Museum of Ioannina.

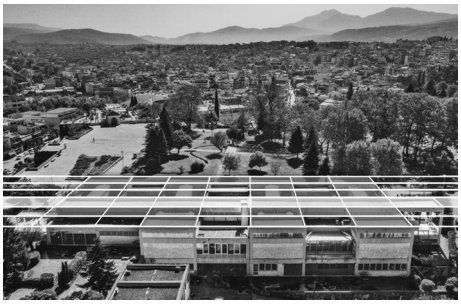
A global overview
The media installation is implemented in the main circulation axis of the museum, which extends the whole length of the building.

The placement of the building
The architect Aris Konstantinidis seeks to link indoor and outdoor space as a single 'organic entity' (Konstantinidis, 1992). The carefully considered placement of the building within the existing topography –it is located on a raised natural terrain on the edge of a park, and overlooking the lake– constitutes a distinctive feature of the museum.

The glass wall

Specifically, it is realized on the glass wall overlooking the central atrium, a 3 X 4 m. glass surface that mediates between the interior and the exterior,

and offers overlapping planes at different depths – the atrium, the covered semi-open space of the museum, the open space of the park.



Plan and section

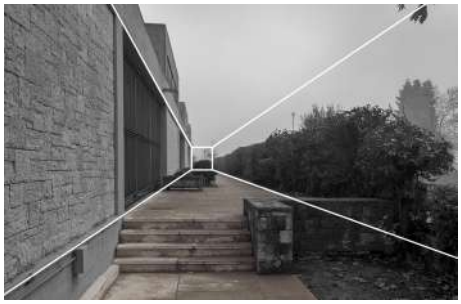
The plan and the section of the building are articulated on the basis of an organized system of lines. The powerful axiality becomes immediately felt: beyond the entrance, the viewer is placed at the beginning of a long axis terminating in the outside space. Its west end allows the view of the lake and its east end that of the city and the surrounding mountains.

Alternating rhythms

The alternating rhythm of ceiling heights, of 3 m. and 5 m., is related to the alternating rhythm of open and closed spaces along the route.

Parallel axes and visual play

Parallel to the main circulation axis of the museum are three axes of movement:
a) the axis structured by the covered semi-open spaces, creating spatial and visual links between galleries,



Linear paths in the exterior

b) the exterior linear paved path, on the south side,
c) the path outside the building, at the north end of the park.

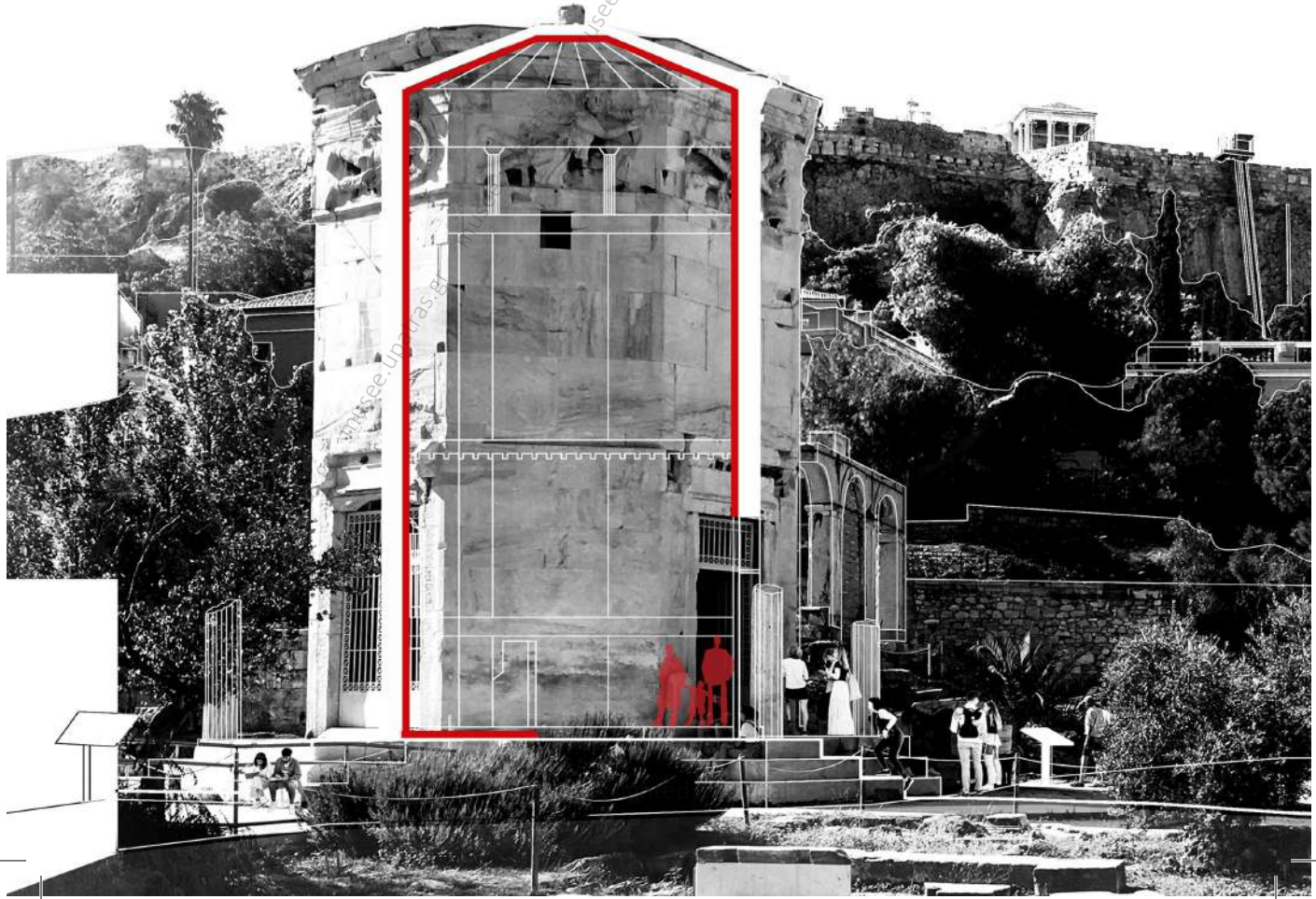
The Media Architecture Cases

CASE 1: Longue durée, Tower of the Winds
The intertwined layers of history as anchors for the media content design

a. A Framework of Concepts

The key design ideas discussed above are best illustrated by the media installation in the Tower of the Winds. The media architecture project is framed by the concepts of '*longue durée'*, *inclusivity*, and *accessibility*.

-Longue durée
Inspired by Fernand Braudel's concept of 'Longue durée' (a perspective on history that extends deep into the past) (Braudel, 1958; Thorsen and Obrist, 2011), the key concept for the digital content design is that of *long duration*, both in the sense that the monument has to do with thousands of years of history, and our time-based media installation reflects this; and in the sense of slowing down the time of 'reading' and prolonging visitors' time of stay in the monument, by attracting attention to meaningful details and heightening the sense of being physically present in it.



-Inclusivity

Related to this is the notion of *inclusivity*, in that the installation by taking a diachronic perspective brings to the fore important aspects of the city's past which tend to be less well represented, as for the example the life of ancient monuments and heritage sites after Antiquity (Papalexandrou, 2019) or the still rather marginal field of Ottoman history and archaeology in Greece (Kolovos and Vionis, 2019).

Inclusivity is also reflected in the use of audiovisual storytelling to support wider accessibility instead of using conventional text-based information, which is common in museums and heritage sites, where the aim is to address wider audiences with a range of age groups, background knowledge, including international tourists.

-Accessibility

A double meaning is also given to the fundamental concept of *accessibility*. As analyzed below, the project addresses both intellectual accessibility, by seeking to communicate meanings in an easy to follow and enjoyable way through animation,

as well as spatial accessibility, by analyzing the spatial layout of the building, and ensuring the audiovisual experience is designed to enable visibility and accessibility.

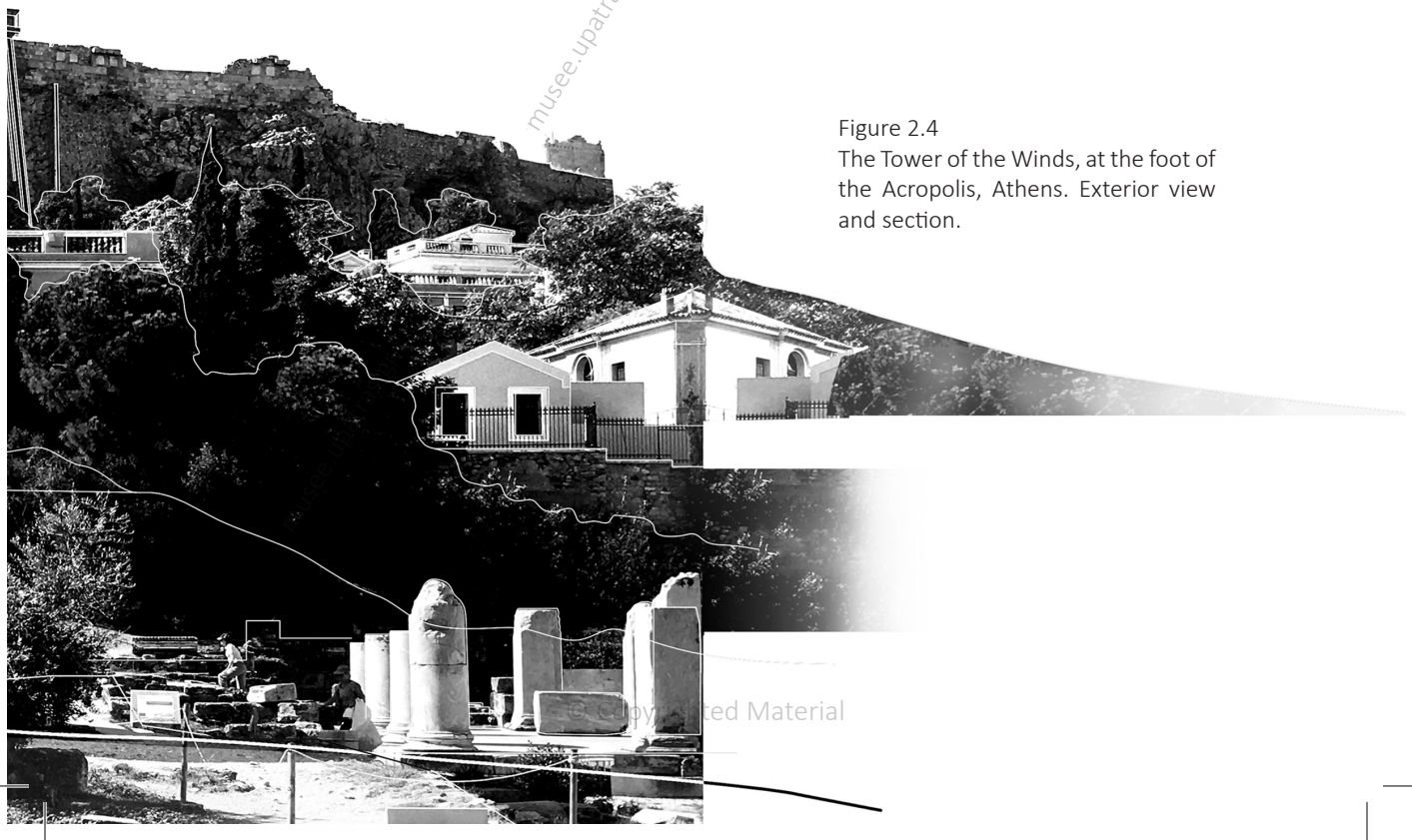
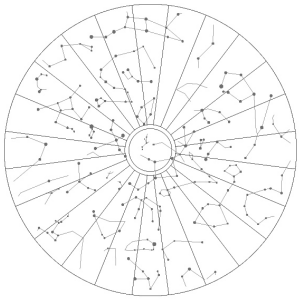


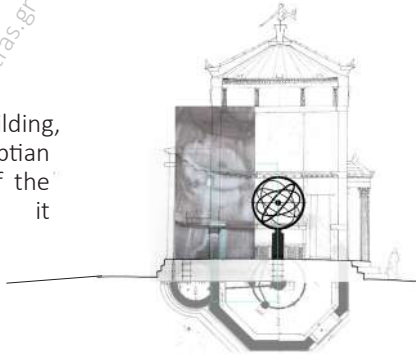
Figure 2.4
The Tower of the Winds, at the foot of the Acropolis, Athens. Exterior view and section.

Two thousand years ago, in the commercial centre of ancient Athens, the Tower of the Winds, designed by the Greek architect/ astronomer Andronikos, was a landmark in the city.

At the top of the roof, there was a bronze rotating weathervane, in the form of the god of the sea, Triton, which indicated the direction of the wind.



In the interior of the building, traces of pigment of Egyptian blue on the surface of the ceiling suggest that it depicted a starry sky.



The flow of time brings changes to the building's function. Fragments of wall paintings, which were discovered recently, indicate that the building was used as a church in the Byzantine period.

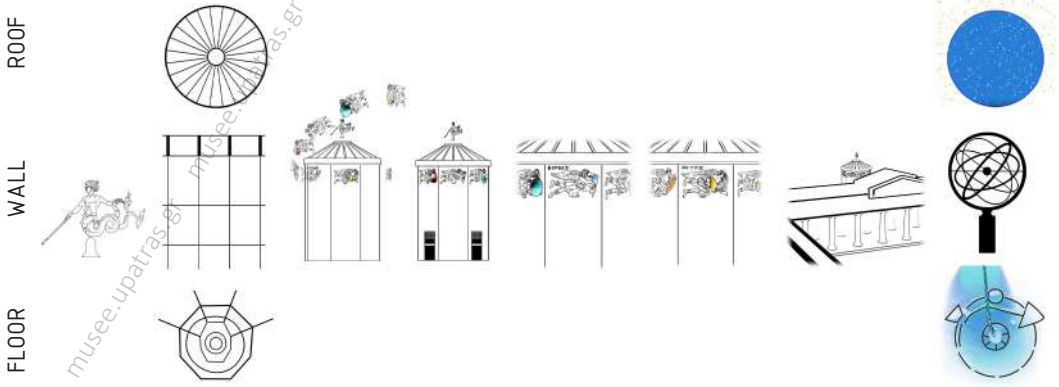
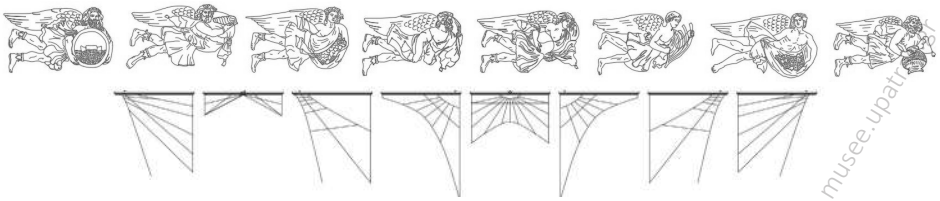
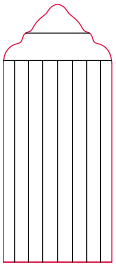


Figure 2.5
The intertwined layers of history of the Tower of the Winds, reflected in the material traces on the physical fabric of the building, as anchors for media content design.



It operated in combination with the representations of the wind gods on each of the eight sides of the building. The eight wind gods are depicted as winged male figures.

Cuttings in the floor and a conduit beneath it allow the hypothesis that a water-run mechanism once existed here. It functioned by means of water pressure coming from the small circular space, visible in the background. According to the most recent interpretation, this mechanism set in motion an armillary sphere, and the building served as a 'planetarium'.

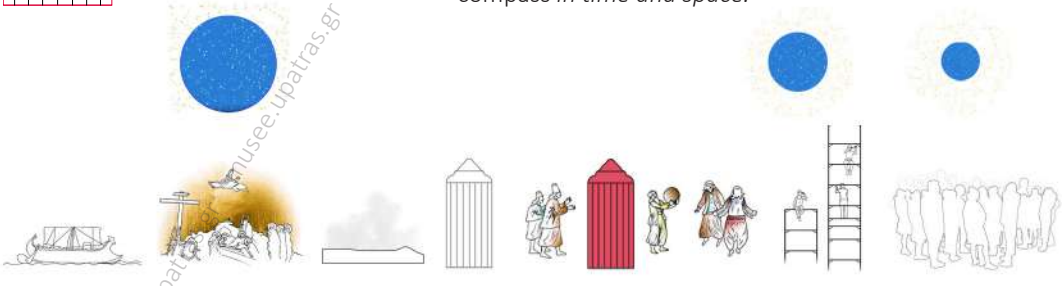


The building is then re-used as a *tekke*, a gathering place for dervish dancers, as documented by the remains of a 'mihrab' niche, a prayer-niche, carved in the wall.

Each side also had a sundial. The engraved lines for measuring time are still visible today below the relief figures of the winged winds. The sundials served the tradesmen and the other Athenians, which used the commercial centre of the city, in the area later occupied by the Roman Market.

The graffito on the wall representing a roman ship – an invocation perhaps to the god of winds for safe sailing– can be thought of as a nod left in time.

Regarded as the best-preserved ancient building in Greece, it continues to be a point of reference in the city for its citizens and visitors alike, a compass *in time and space.*



b. Motivation and Design Challenges from a Museological-Conceptual Point of View

-Access and understanding

The project was conceptualised so as to make the ancient monument more accessible intellectually to citizens and tourists alike. Though it is located in a central location in Athens, and in particular in the commercial centre, and is a familiar landmark for citizens, many might not have intentionally visited it or been aware of its functions over time (Figure 2.4).

The installation was designed with the aim of contributing to visitors' embodied understanding and appreciation of the building and to its layers of history by focusing on key points of its past and compressing events that took place over centuries into a single spatial and sensory experience.

The idea that the primary means for 'explaining' the monument is to let it reveal itself was the starting point of the design process. The use of traces (drawing with digits on these material traces, literally) more or less visible on the physical fabric of the building, and the careful alignment of the projection on the building and its meaningful details, is a distinguishing feature of the installation (Figure 2.5).

-Balance between the intellectual and experiential

Among the key museological challenges was also to communicate the richness, complexity and distinctive character of the monument in an engaging way by inviting visitors to 'look, listen and feel' (Witcomb, 2015). To this end, it was important to create a balance between the intellectual and experiential, and between the need for scientific rigour and our creative imagination (see design decisions below).

Process: Key Design Choices

a. Framing and Open-endedness

The key design choices were consistently guided by historical evidence and based on the study of sources (such as texts of travelers) and visual representations. At the same time, the work sought to shape a poetic performance and an open-ended message that set the monument in the everyday life of citizens and situated the visitor in the flow of historic time.

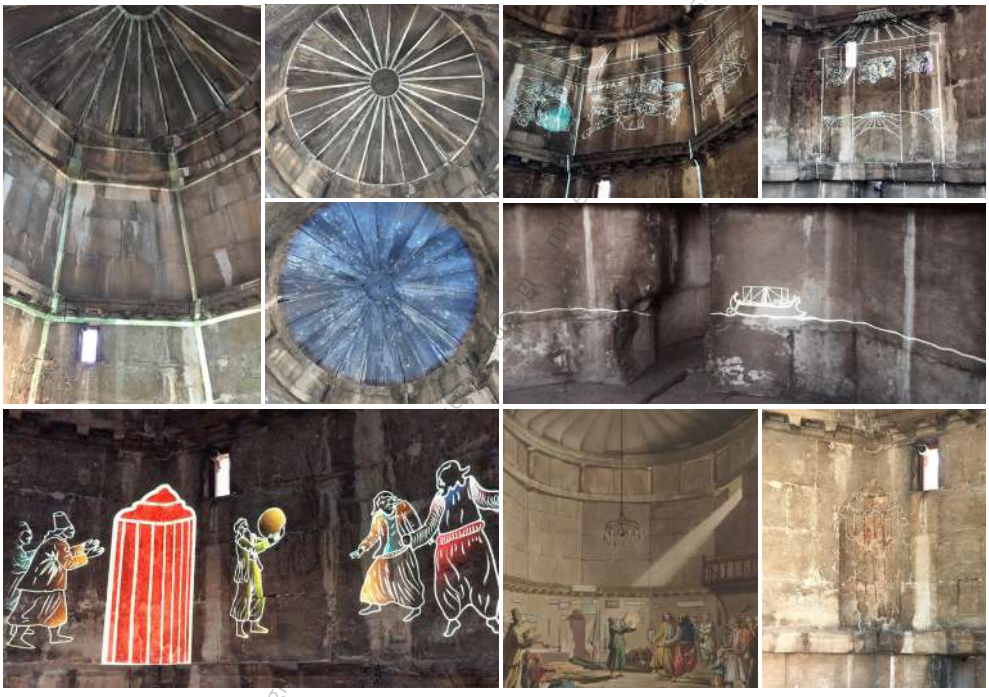


Figure 2.6
The use of traces more or less visible on the physical fabric of the building (roof, wall), and the careful alignment of the projection on the building and its meaningful details, are distinguishing features of the media installation (above). The physical remains of a 'mihrab', a prayer-niche carved in the wall which confirms the use of the building as a tekke, are emphasized by the digital projection, while the animation of a cultural dance makes a link between the building and its representation by the nineteenth-century archaeologist and painter Edward Dodwell (below).

For example, the physical remains of a 'mihrab', a prayer-niche carved in the wall which confirms the use of the building as a tekke, are emphasized by the digital projection, while the animation of a cultural dance makes a link between the building and its representation by the nineteenth-century archaeologist and painter Edward Dodwell (1819). Thus, the installation creates a visual illusion while it reveals, and combines the tangible heritage (the traces on the wall), and the intangible heritage of the activities that took place at this location (the dervish dance) (Figure 2.6).

b. A Visual Adventure and a Slow-paced Rhythm of Perception

The visual content was designed and superimposed on existing material traces on the roof and the walls, with the intent to invite visitors to look closer at the ancient monument and to reveal something relevant that they might otherwise have missed, either by accentuating what exists or by adding something to the space of the projections (Figure 2.6).

It should also be noted, however, that while it is designed to guide viewers in their reading of the interior of the building, at the same time experiencing the work becomes an act of visual exploration and discovery, encouraged by the sheer scale of the building and the localized nature of the projections.

c. A Rich Acoustic Experience

This is further enhanced by music. It was composed to fit and support the different elements of the installation, as for example to make visitors 'feel' the passage of time, and in particular the historical/cultural transition from the Byzantine to the Ottoman phase of the monument. There was a sudden change in musical style during the Ottoman period, an intentional change in tempo and music character to draw attention and emphasize the change of culture at that time.

The acoustic experience is enriched by narrative segments (with a female voice narrating about the ancient monument in its various stages). Audio and visual experiences point in the same direction to support and reinforce each other. More importantly perhaps, they progress in stages, mainly focusing on one element at a time, so that the viewer is led step by step from one point to the next. This unfolding of the experience establishes a slow rhythm of perception and constantly refocuses visitors' attention.

The soundscape included a variety of types of sound, ranging:
-from natural sounds (e.g. subtle wind and running water sounds)
-to sounds describing activities (e.g. carving in marble),
-combined with sounds of visitors' presence and social interaction (e.g. contemporary visitors talking and taking photos),
so as to emphasize the sensory experience and enhance the sense of place (Udsen and Halskov, 2022).

CASE 2: Sculpting in time, Archaeological Museum of Ioannina
Introducing time as the fourth dimension of the archaeological object

The media intervention entitled 'Sculpting in time' focuses on the relief on the front of the sarcophagus (AMI no 6176; dimensions 2.20 x 1.50 m.), depicting scenes of the Trojan War narrated in Homer's Iliad (Tzortzi *et al.*, 2023) (Figure 2.7). It uses media projection in a loop of animations and graphics on the archaeological object, combined with music and sound effects, so as to invite visitors to look closer and hear in a purposeful way.

The work fuses the archaeological object –the marble roman sarcophagus– and the media projection, seeking to create what Falk and Dierking describe as an 'educationally enjoyable experience'. Through the digital projection, the *synchronic* understanding of the relief representation (that is, its 'cinematographic' dimension where the different episodes co-occur at the same time) is temporally transformed into a *diachronic* understanding (presenting the development of the mythological episodes in time) (Figure 2.8). To these two 'objective' forms of time, of the relief representation and the digital narrative, is added a third one, *visitor lived time*.

The loop plays continuously for six minutes of projection duration, with a three-minute gap in between, so as to allow visitors to engage with the three-dimensional inspection of the archaeological object at the end of the projection or between the loops. The aim is not to add meaning in the archaeological sense but to enhance and prolong the viewing experience and to reveal something relevant in the scene that visitors might otherwise have missed, either by accentuating what already exists (as in the case of the relief figure of Priam, King of Troy, on bended knee, begging Achilles for the return of Hector's body, and kissing his hands), or by adding something to the object to extend the story of the scene carved in relief (as for example the fight between

Patroclus and Hector, presented as a 'snapshot' and based on the iconography of ancient Greek pottery).

-Key elements of the visual narrative
The visual narrative begins with the contour 'description' of the archaeological object, enhancing the fact that it is organized on three levels and two conceptual triangles – thematic units.

A series of episodes are presented as 'snapshots': the fight between Patroclus and Hector, the death of Patroclus, the anger and the grief of Achilles over the death of Patroclus – all catalysts for the events that follow (that is, the combat of Achilles and Hector, the death of Hector, the dragging of his body). As noted, the figures of the Homeric heroes are drawn based on the iconography of ancient Greek pottery.

With the enhancement of the figure of Priam, the projection focuses on the marble relief figures, adding elements of movement and immediacy – as for example the emphasis on gods as mediators, the group of sea deities and nymphs, Priam supplicating Achilles for the body of Hector, the expression of Achilles response to Priam's supplication by slightly turning his head.

Thus, through the digital narrative, the viewer's attention is turned from the world of humans (depicted on the sarcophagus lid) to the world of heroes (Achilles, Hector, Patroclus, Priam) and then the world of gods. Finally, the specially composed musical soundscape was intended to contribute to the visual narrative: a piano piece, which is accompanied by natural sounds (e.g. sea wave sounds) as well as sounds describing activities (e.g. sword fighting). The projection is proposed as an 'interpretative' experience through interconnected images and sounds, with no textual information.

CASE 3: (C)horography, Archaeological Museum of Ioannina
The building as an integral part of the experience of the museum

The media installation '(C)horography' is implemented along the central axis of the museum and in particular on the main glass wall, overlooking the central atrium. The work, which lasts three minutes, adds an intangible, digital layer on the material surface of the glass wall, and combines visual images (animated graphics), original music, a field of sounds, including nature soundscapes, and audio narration. Visual and aural meanings reinforce each other.

Figure 2.7
Synergy between scientific evidence and creative imagination: the content design of the media intervention 'Sculpting in time' is based on scenes of the Trojan War narrated in Homer's Iliad and the iconography of ancient Greek pottery.

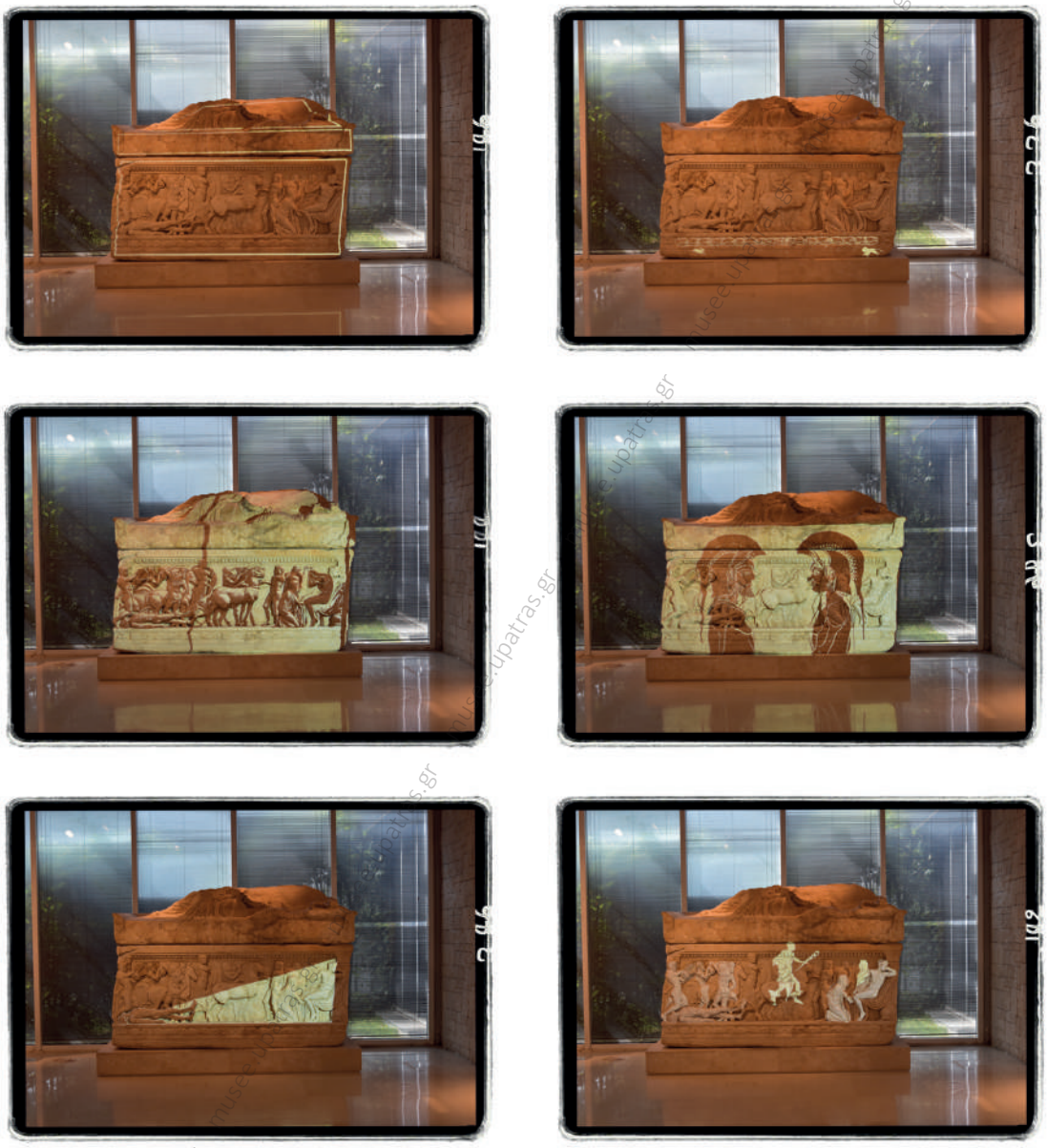


Figure 2.8
Visual storytelling: snapshots of the projection ‘Sculpting in time’ on the Roman sarcophagus.






The media intervention aims to turn attention to the building of the Archaeological Museum of Ioannina and to distinctive characteristics of the architecture of Aris Konstantinidis, and at the same time to express the idea that the design of space (*horos* in Greek) affects visitor experience – the way visitors explore the museum, perceive and read the objects, and become aware of the co-presence with other visitors.
John Peponis' book 'Chorographies' (1997) inspired the title of the digital intervention.

-Key elements of the visual narrative
The visual narrative is activated by visitor movement, and begins with the contour 'description' of the display area. The glass wall acts as a mediating surface, frames visitors' view towards the outside and at the same time becomes the focus of attention, a view itself. It becomes a structure that visitors look through and look at (Figures 2.9 and 2.10).

The animation reflects fundamental choices made by the architect of the museum, which unfold progressively during the time-based audiovisual narrative, taking as starting point the carefully considered placement of the building within the existing topography – it is located on a raised natural terrain on the edge of a park, overlooking the lake.

The rhythm of the visual narrative changes when attention is focused on the organized system of lines that create the syntax and the form of the building. The alternating rhythm of ceiling heights, of 3 m. and 5 m., is related to the alternating rhythm of open and closed spaces along the route. Different elements are drawn on the two dimensional plan (transparent walls and door openings, three atria, later changes to the interior space), with special emphasis on the main circulation axis which traverses the whole length of the building, and the three parallel axes of movement in the interior and exterior of the museum.

The appearance of the plan of the museum gives place to a section drawing, directing attention to the way the organization of space affects visitors' movement and viewing patterns. The transparent door openings create visual links through the atria and the sense of visual depth.

The final part of the visual narrative reverses the perspective, redirecting the viewer's attention from the atrium to the interior space of the museum: it

constitutes the point of convergence for archaeological objects and people, from different periods and regions of Epirus, and the intersection point of the trajectories of different visitors, rendering the viewing of objects and the transmission of knowledge a collective experience.

Having discussed the first, the media installations, attention is turned, in the two sections that follow, to the two key factors that must be related to them: the spatial structure the buildings and visitor behaviour and experience.

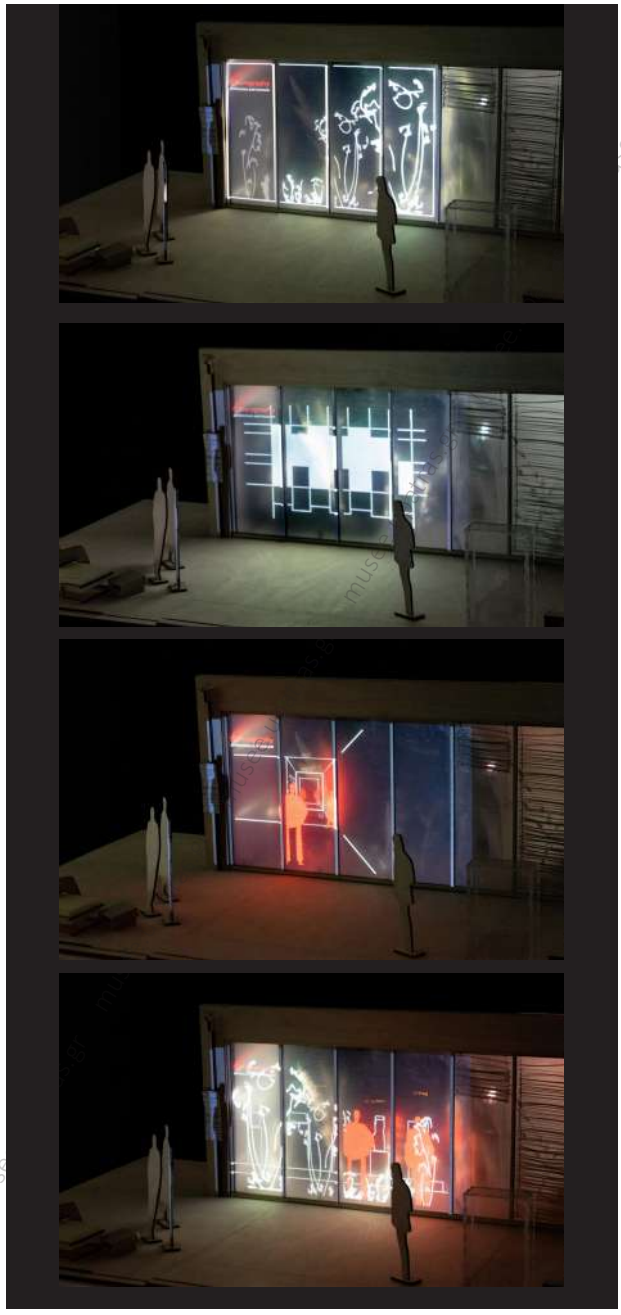


Figure 2.9
Visual storytelling: snapshots of the projection ‘Chorography’ on the physical model (scale 1:10) of the Archaeological Museum of Ioannina.

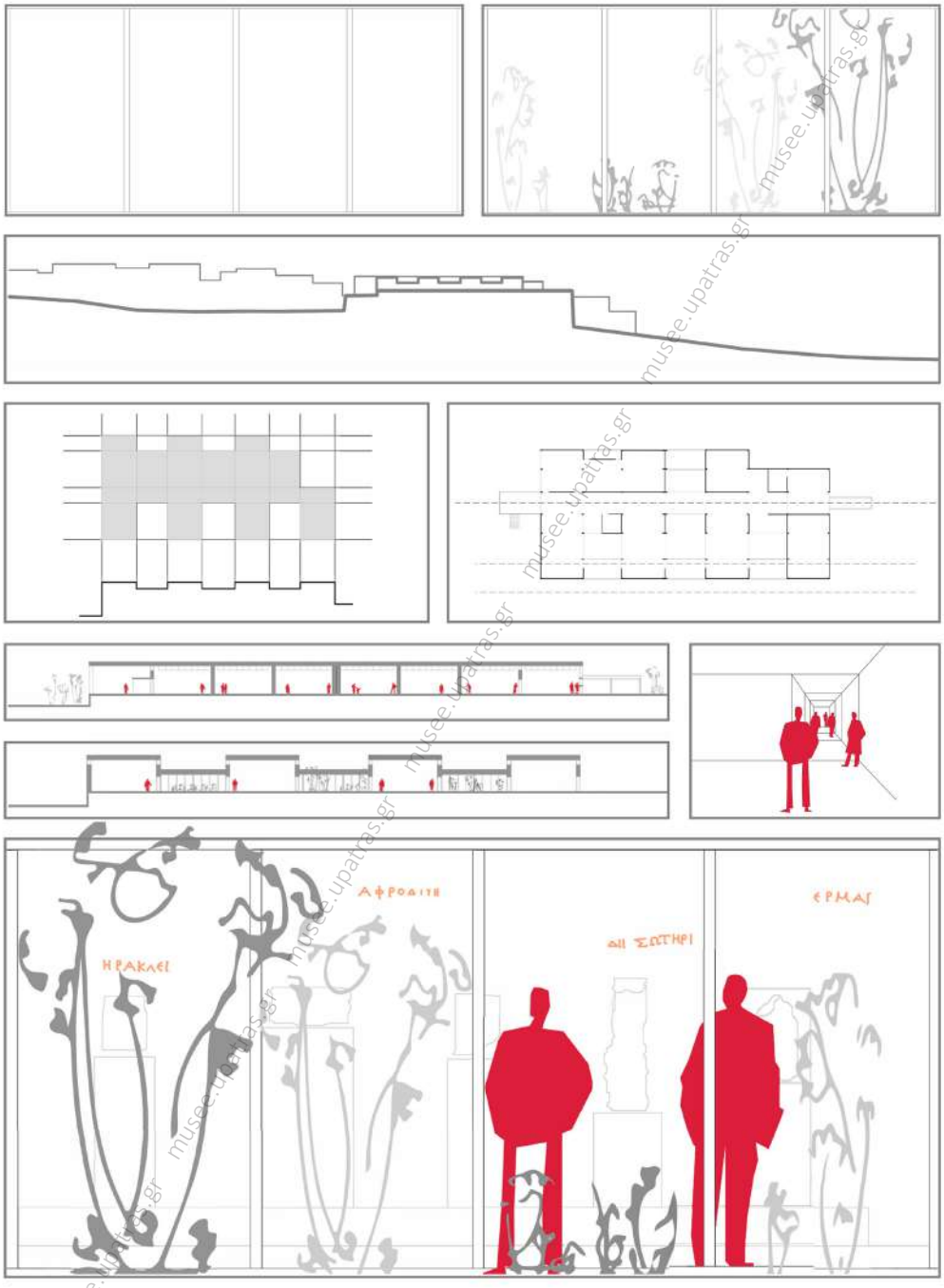


Figure 2.10
Scenes from the storyboard of 'Chorography', implemented in the main circulation axis of the Archaeological Museum of Ioannina.

03
Analyzing the Spatial Structure of the Buildings

As argued at the beginning of the book, the intention is to develop new knowledge from the in-depth study of three specially designed digital installations, and understanding of their effects on dimensions of visitors' behaviour and experience, using the proposed integrated and comparative methodology (see above). The first key step in the empirical case studies is the analytical study of the two buildings (Figures 3.1 and 3.2).

To describe and analyze the spatial layout of the two buildings the project uses key concepts and methods known as Space Syntax. Space syntax is a theory and methodology to describe buildings as systems of spatial relations, and a set of tools for evaluating their functioning and for representing and comparing aspects of the user's experience (Hillier, 1996). It is based on the fundamental proposition that 'space is first and foremost *configurational*. In other words, what happens in any individual space –a room, corridor, or public space– is fundamentally influenced by the relationships between that space and the network of spaces to which it is connected'.

More specifically, the research project uses the concept of 'depth' (the syntactic measure of distance, which is accordingly topological rather than metric) and the related property of 'integration' (a measure of spatial accessibility), the analysis of 'space types', and the techniques of 'isovists' (or visual polygons). These are combined with key museological ideas, such as the creation of the social dimension of the visit. Against this background, theoretical arguments, both architectural (syntactic) and museological, are tested against the observed aspects of space use, in particular visitors' patterns of movement, viewing and engagement

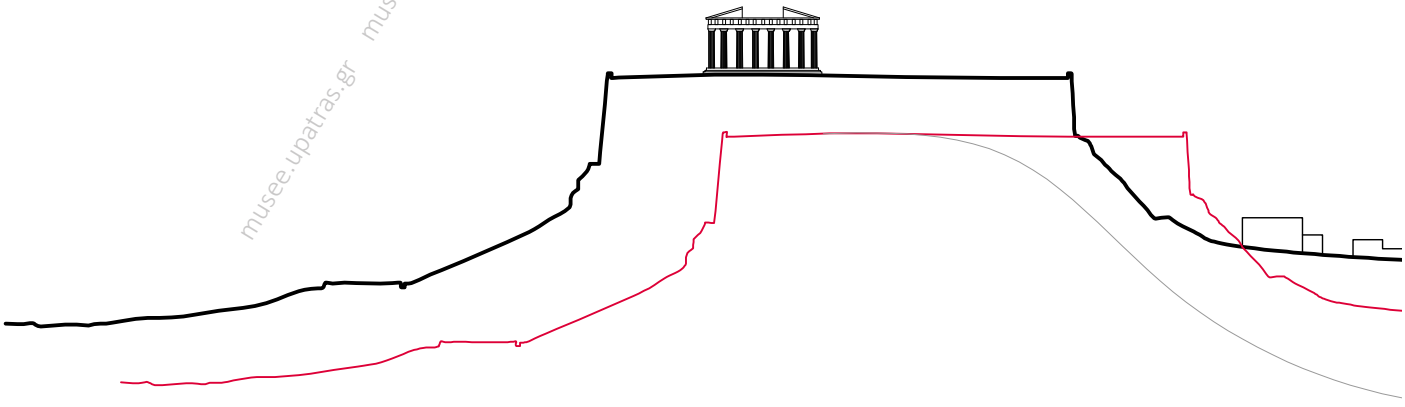
with digital content, as well as the emerging patterns of co-presence with other visitors (discussed in the next section of the book).

CASE 1, The Tower of the Winds

The Tower of the Winds, part of the archaeological site of the Roman Agora in Athens, is an octagonal building, made of marble, of 14 m. in height and 8 m. in diameter (Figure 3.3). The interior space of the monument is relatively dark, with two entry points and a few small openings.

It is characterized by a tension between accessibility (visitors, maximum 10-15 people, stand on a glass floor panel – in dark grey in Figure 3.3) and visibility. While spatially enclosed, it is visually a powerful space. At the same time, the juxtaposition of open visibility and visual insulation from the outside, the closedness of the space and its static rather than movement-oriented character, offer the preconditions that facilitate the assimilation and understanding of the intense local experience created by the media installation.

The audiovisual storytelling is distributed along the different planes – ceiling, floor and walls. This unfolding of the projection places visitors in a circular rather than frontal relationship with the work, so that they no longer focus their attention on one point but on the entire environment. The entire space is treated as a single situation into which viewers enter. The spatial affordances of the small-scale building, in combination with the specially designed soundscape, are used to create an immersive and all enveloping sensory experience.

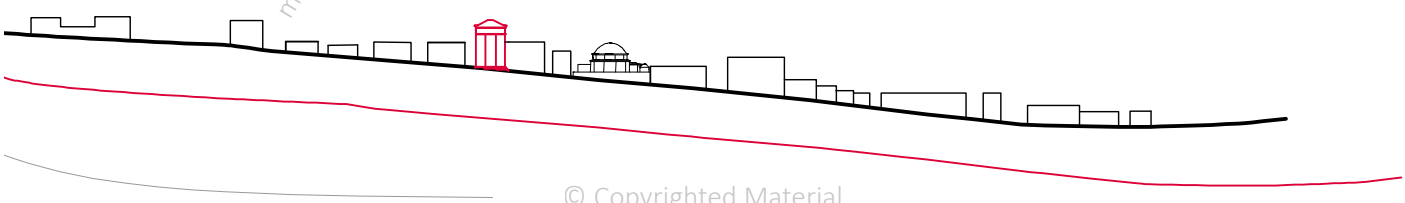


CASES 2 & 3, The Archaeological Museum of Ioannina

The Archaeological Museum of Ioannina, located on the edge of a park and overlooking the lake, is sensitive to the existing topography (Kenneth Frampton, as cited in Giamarelos, 2019, p. 86; see also Ryan, 2020). The extrovert relation with the natural surroundings, which constitutes a distinctive feature of the museum, is made immediately felt by the axis of the entrance (A in Figure 3.4): it traverses the whole length of the building and is anchored at both ends by an element of the outside space, rendering the distant view of the lake (at the east end) the recurrent motif as visitors move around in the museum (Figure 3.5). In a more obvious but no less striking way, the architect's intention to link inside and outside together in 'a pleasant functional unity' (Konstantinidis, 1992) is also reflected in the transparent walls and door openings that overlook the three interior courtyards, creating a dynamic relation between interior and exterior space, and illuminating the galleries in a way that constantly changes throughout the day.

The axis of the entrance (A) organizes the whole layout, articulated on the basis of a modular grid, and gives access to the galleries mainly on one side. Three major axes seem to duplicate the main circulation core of the museum: an interior axis (punctuated by the aligned door openings), which traverses galleries and courtyards and makes visual links between and through them (B); the exterior paved path running the length of the south side of the building (C); and the linear path crossing the park directly adjacent (D) (Figures 3.4 and 3.6).

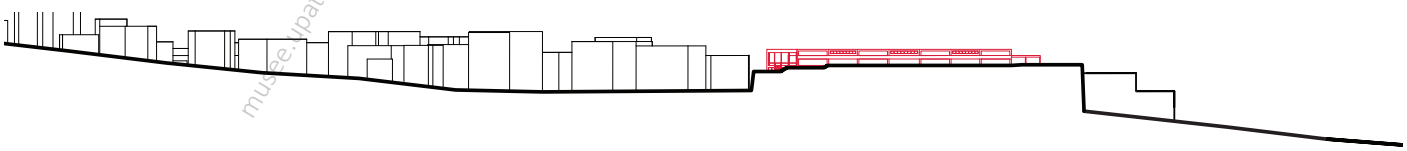
Figure 3.1
The topography of the Tower of the Winds: the relation between the city, the Acropolis hill and the monument (scale 1:2000).



The pattern of connections in the layout and so the possibilities of visitors' movement can be clarified by representing the plan as a *graph* in which the spatial elements (that is, rooms or spaces) are the nodes and the spatial links between them the lines. This can then be coupled to space syntax concepts, and in particular its concept of 'space types' (Hillier, 1996) which distinguishes spaces as four types, *a-, b-, c-,* or *d*-spaces, in terms of how they are connected to the layout of which they form part. The definition of each space type is presented in Figure 3.4. While some museum layouts make use of *a*- or occupation spaces (*b*-spaces are rare), most museum layouts are made up of *c*-, or sequence spaces and *d*-, or choice spaces. In contrast, a key feature of the layout of the Archaeological Museum of Ioannina is that it is made up of *a-spaces*, open to a *b-space* (the galleries and the axis) (Figure 3.4). The configuration of space creates a non-hierarchical structure, while at the same time giving a strong controlling effect to the main axis. As the galleries are open to the axis but have no relations of direct accessibility between them, the visitor is not walking though spaces but in and out of them. This spatial discontinuity of the layout sets the pace of the visit, inviting visitors to constantly delay the spatial progression towards the end of the main axis (see Filippidis, 1997, p. 101).

The media installations are designed for and implemented in two different types of space: 'Sculpting in time' in an *a-space* which is destination only and cannot be passed through (room 6 – Roman gallery), and 'Chorography' in a *b-space* that is destination but also passage to other spaces (the main part of the circulation axis of the museum) (see Figures 3.4 and 3.6).

The opposing spatial and topological properties of the two spaces where



the installations are located, are made visually clear by computer-based configurational analysis, carried out using the *DepthMap software* (an openly used visual and spatial network analysis software, see Turner, 2001). Analyzing the plan as a pattern formed by the visual fields that we see from each point, we can describe the complexity of visual steps from each point to all others and show clearly the pattern of differentiation between the parts or points that make up the layout. The colours –from red for the *most integrated* (or easily accessible) through to blue for the *least*– allows us to see at a glance the pattern of *integration* values in the layout. The configurational analysis makes visually clear the contrast between the central circulation space which constitutes the *integration core* of the building and the *deeper* Roman gallery (Figure 3.4). The distribution of the integration core along the main axis and the way it is linked to other parts of the museum, affects, as we will see, key dimensions of experience, for example the way visitors become co-present and aware of each other.

To represent space from the point of view of the individual visitor, we use the visual polygon or *isovist* (Benedict, 1979). The isovist defines the area that is visible around a point in the layout, and offers us a way to describe the patterns of visibility which are framed by the building and their change as the visitor moves. Changes in the area and shape of isovists, as well as the pattern of their overlap over paths of movement, allow us to analyse museum space as a visual field. A key aspect of the visual structure of the Archaeological Museum of Ioannina is the tension between stability and change, between the main axis which offers 'information stability' (Peponis, 1997; Peponis *et al.*, 1997) and the changing and complex visual experiences at the local level of the galleries (Figure 3.5).

Figure 3.2
The topography of the Archaeological Museum of Ioannina, located on the edge of a park and overlooking the lake (scale 1:2000).

The complete openness of the galleries to the axis, the systematic use of glass walls and display cases, and the recurrent visual links between spaces though the glass atria, which integrate the visual experience of the natural setting in the exhibition space (Figure 3.5), all contribute to creating overlapping planes at different depths and generating internally differentiated spaces. Thus, the organization of space combines coherence and intelligibility with an openness that allows for a measure of personal exploration and a degree of unpredictability.

With background the analytical description of the key characteristics of museum space, we can now move to the on-the spot study of visitor behaviour and experience.

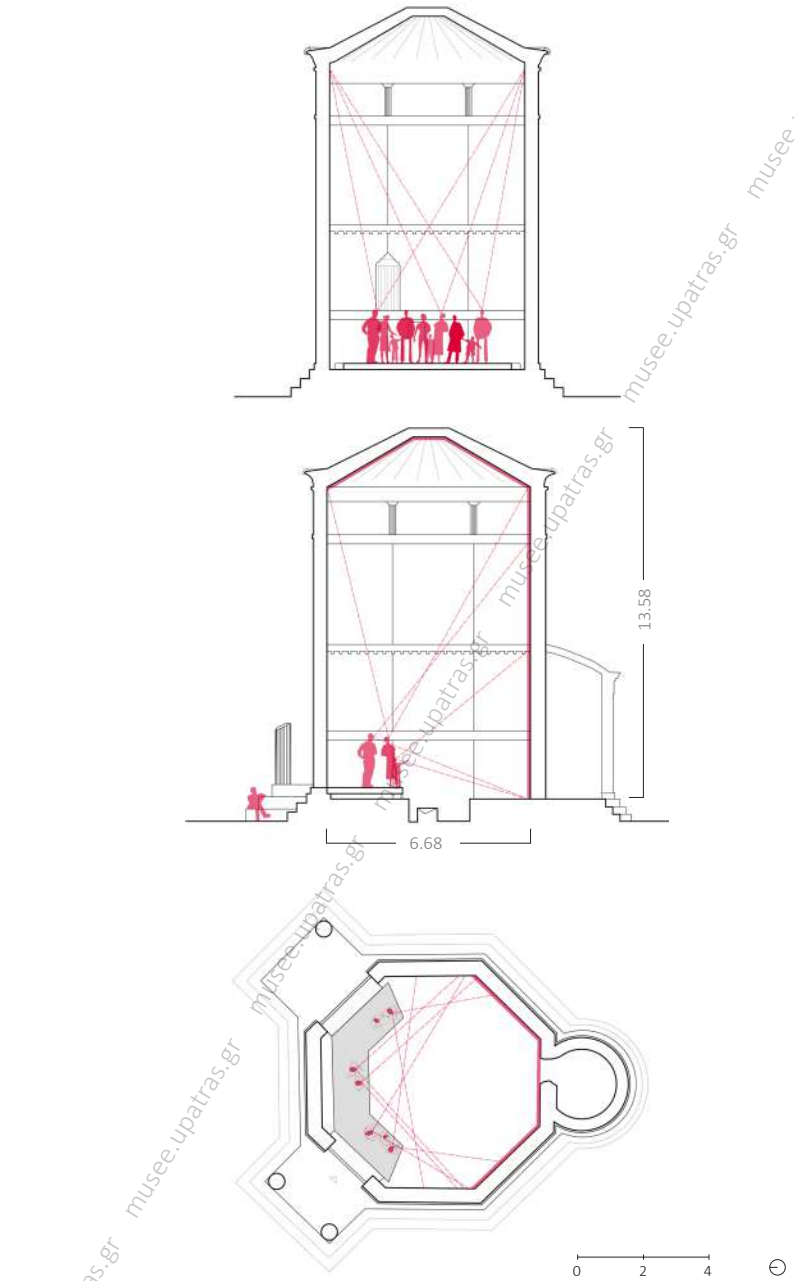


Figure 3.3
The Tower of the Winds: the entire space is treated as a single environment into which viewers enter. They can scan walls, floor and ceiling from a viewing platform (in dark grey). The spatial affordances of the building, in combination with the specially designed soundscape, are used to create an immersive and all enveloping sensory experience.

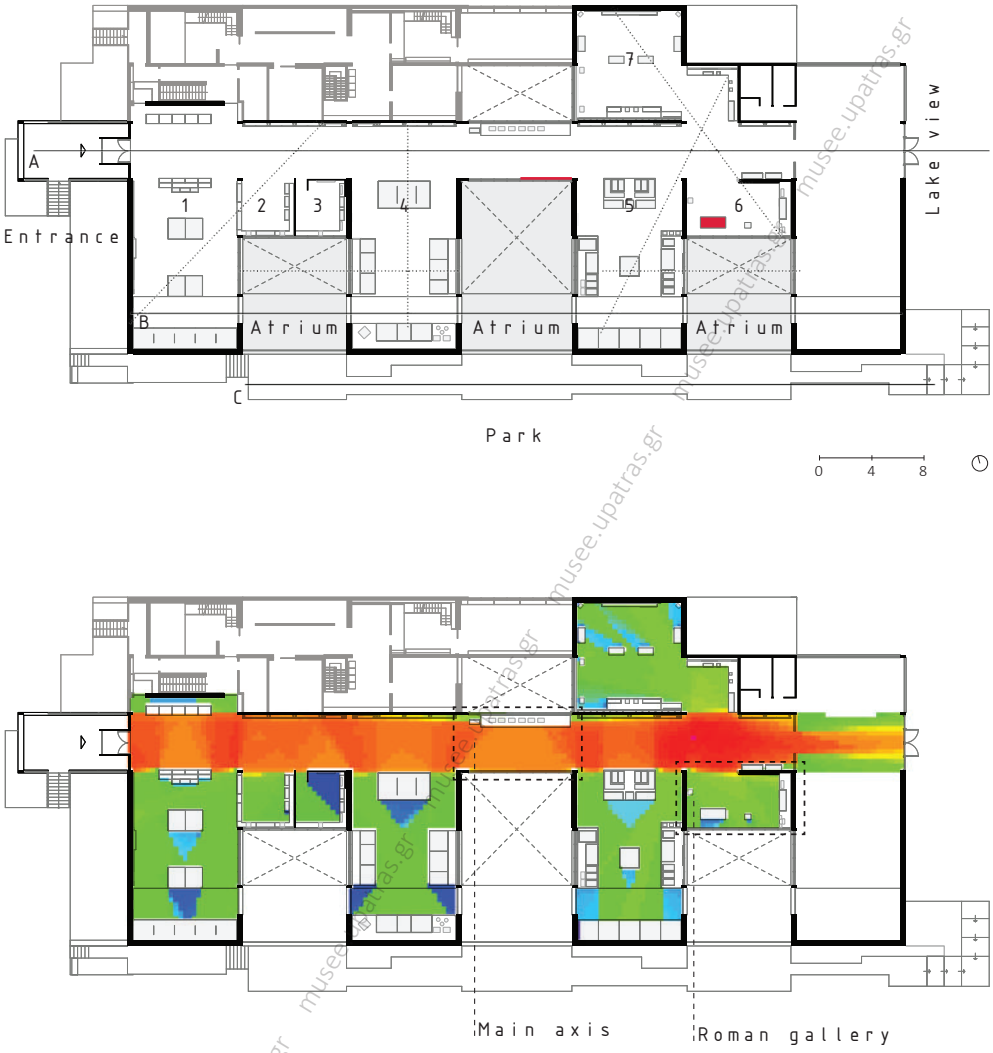
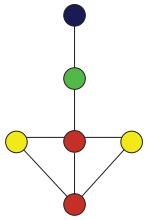
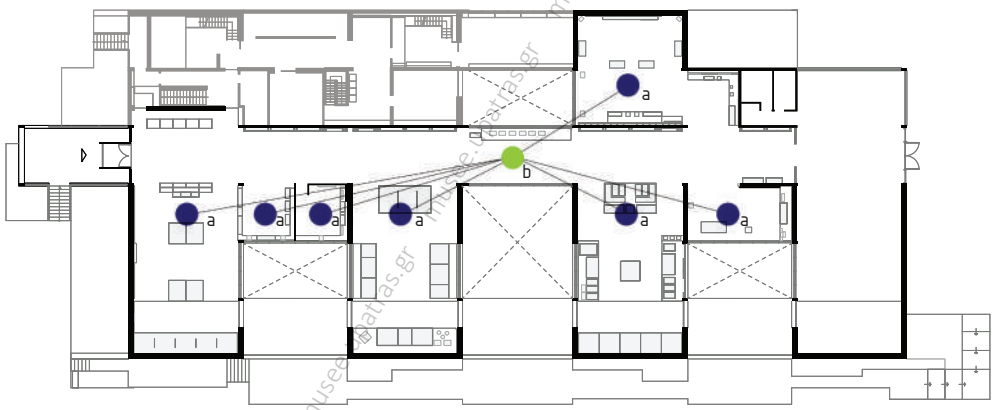
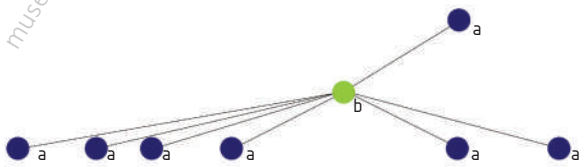


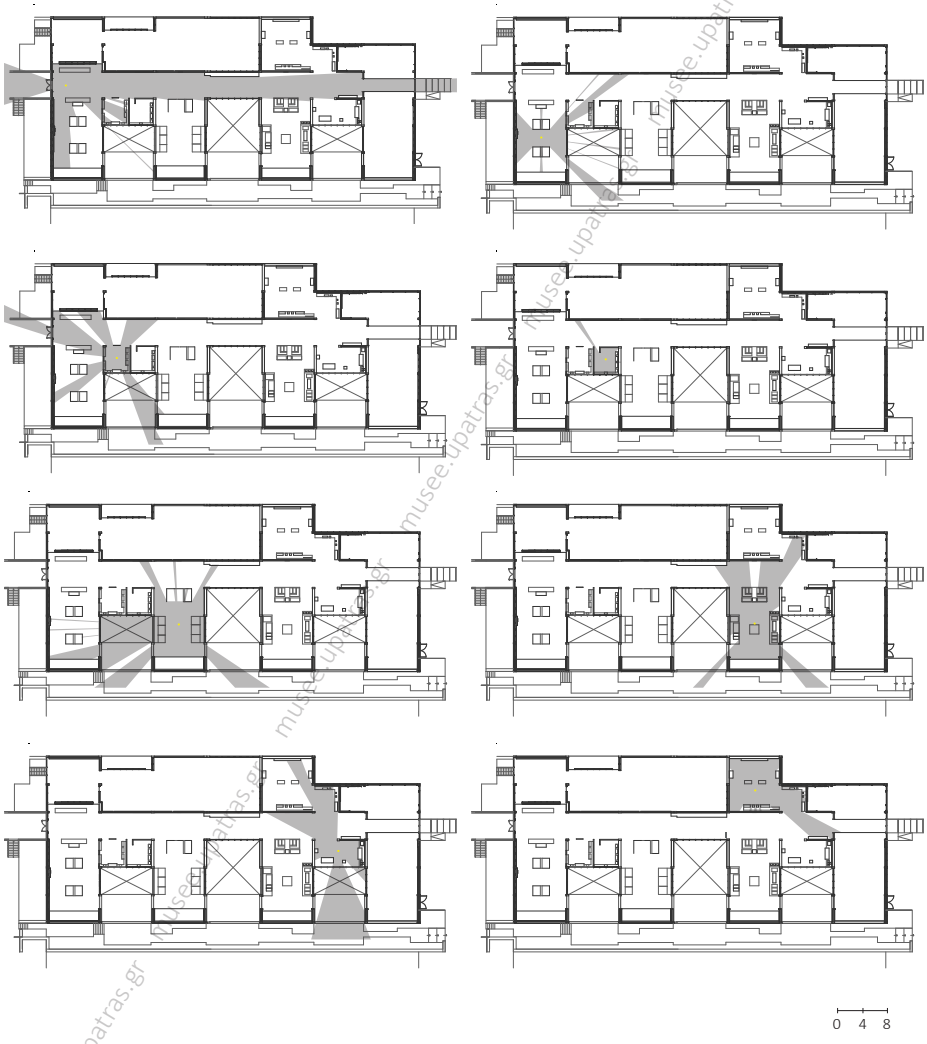
Figure 3.4
Above: The layout of the Archaeological Museum of Ioannina, with spaces numbered; long axes of movement, in the interior and exterior of the museum (B-C), seem to duplicate its main circulation core (A); additionally, visual links between and through spaces are represented by dotted lines, and the location of the digital interventions in red.
Below: The pattern of *visual integration* in the layout (from red for most integrated through to blue for least). The configurational analysis makes visually clear the contrast between the central circulation space which constitutes the *integration core* of the building and the *deeper* Roman gallery.
Opposite page: Definition of syntactic (*abcd*) space types according to their embedding in the layout; plan with superimposed connectivity graph; connectivity graph also showing space-types.



- **a-space:** destination space with one entrance.
- **b-space:** traversed space leading to an a-space or other b-space; not part of a circulation loop.
- **c-space:** part of a single circulation loop, thus offering more than one way back.
- **d-space:** part of at least two distinct circulation loops, thus offering multiple route choices.







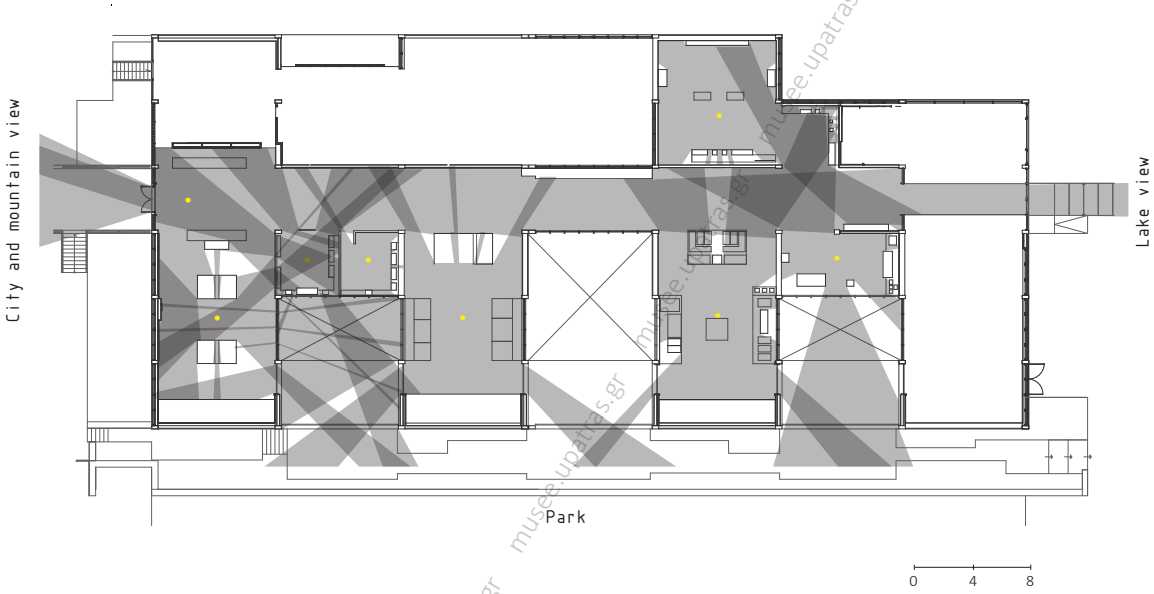
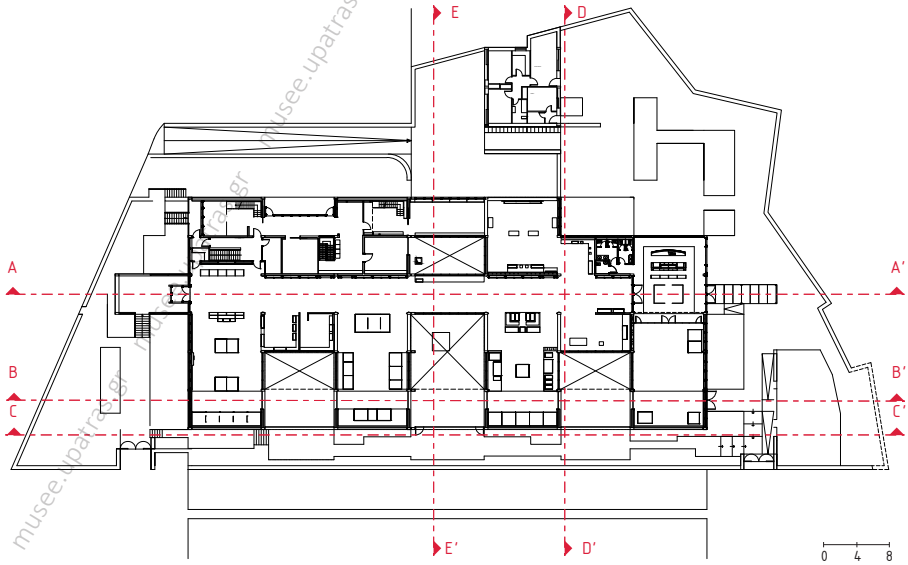


Figure 3.5
Opposite page: Archaeological Museum of Ioannina: isovists (or visual polygons) drawn from the entrance and the central points of the galleries (using the Isovist software – see McElhinney, 2024). Their juxtaposition shows the tension between stability at the global scale (offered by the main axis) and change at the local scale (heterogeneous visual fields from the galleries).
Above: In this figure the isovists are combined. Views of the natural landscape, either through transparent walls or door openings, act as a visual extension of the interior space and become key elements in the viewing experience.



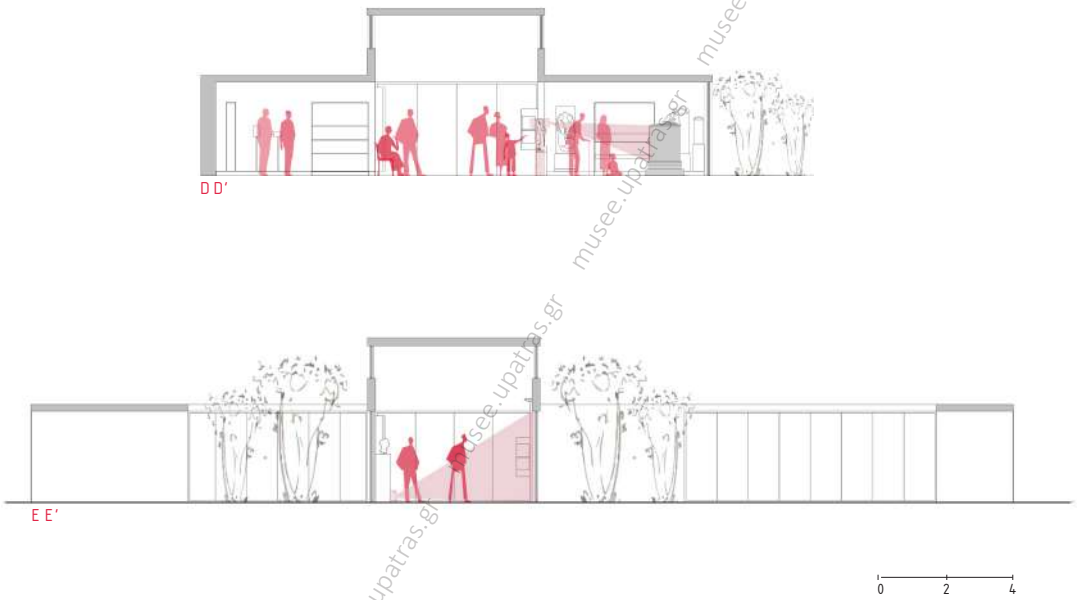


Figure 3.6
Opposite page: Archaeological Museum of Ioannina: layout and sections along the three axes that define the design of the building.
Above: Cross-sections of the Roman gallery with the 'Sculpting in time' media installation and the main axis with the 'Chorography' installation.

04
Understanding Visitor Spatial Behaviour and Experience

Seeking to understand aspects of behaviour and experience from the point of view of visitors, we combined detailed observation of patterns of visiting (pre- and during installation), and a research questionnaire (post-installation).

The observation of visitor behaviour entailed systematic representations of visitors' paths of exploration, their patterns of viewing and stopping points, and the emerging patterns of co-presence with other visitors, at the global level of the museum as a whole, as well as their patterns of behaviour and engagement at the local level of the digital sensory environment. It was carried out by two researchers, over the entire period of each installation, that is, between 23rd-25th September 2022 (European Heritage Days), in Case 1 ('Longue durée' in the Tower of the Winds), between June 2023-July 2024 in Case 2 ('Sculpting in Time' in the Roman gallery of the Archaeological Museum of Ioannina), and between August 2024-February 2025 in Case 3 ('Chorography' in the main circulation axis of the Archaeological Museum of Ioannina). The observation data collection and analysis allowed us, at the next stage of the research, to relate different kinds of spatial morphologies in the museum: the spatial structure of the building, the spatial arrangement of the media installations and the informational and social dimension of visitor experience.

Regarding the questionnaire research, the sample is made up of 653 questionnaires in total (n=200 in Case 1, n=355 in Case 2, and n=98 in Case 3) replied to by visitors, who were approached at random at the moment of exit, over the period of each installation. It consisted of closed ended questions (accompanied with the option of adding

comments), open questions, which are the focus here, and basic questions about the respondents' profile (age, gender, educational background, museum experience and prior visit and/or knowledge of the monument/museum).

The following sections give a brief account of the techniques for the observation of patterns of visiting and present research findings from the early stages of the analysis, which are of interest from the point of view of this book. Case 2, the media intervention in the Roman gallery, is used to illustrate key arguments most clearly, and is set in the context of previous empirical studies of museums (Figure 4.1).

Observation of Visitor Behaviour

CASES 2 & 3, Sculpting in time & Chorography

a. Spatial Behaviour of Visitors at the Macro-level of the Museum Layout as a Whole

-Morphology of visitors' movement

Visitor behaviour was analysed using established techniques. First, the traces of the paths of 57 visitors randomly selected, and spread across time periods, were recorded for their whole visit to the gallery spaces of the Archaeological Museum of Ioannina (that is, from the moment they entered the exhibition to the moment of exit) at three different stages: before the installations (31 visitors), during the implementation of the media projection 'Sculpting in time' in the Roman gallery (12 visitors), and during the implementation of 'Chorography' in the central part of the axis (14 visitors) (Figure 4.2) The precise location of visitors' stopping points (*sum of stops*) and the total time they spent in the exhibition (*time spent*) were also recorded (Figure 4.1). Arrows and other symbols were used to clarify in which directions visitors had been looking and where they had stopped for longer periods of time. The traces were used both to generate 'directional splits', showing the choices that were made at key points in the layout and to measure the *tracking score*, which is the percentage of visitors visiting each space (a variable proposed by Choi, 1999).

In general, visitors move in a systematic way and go to an average of

94% of the spaces. The spaces that tend to lie outside the search track of visitors are rooms 3 and 4 – two spaces shallow from the entrance and very different in scale, form, and character from the main galleries (Figure 4.3). Visitors then use the relation between the main axis and the galleries as a general guide for their routes and integrate the viewing of exhibits arranged along the axis at different points of their visit. In fact, the way they integrate the exploration of the axis in the viewing sequence is what essentially differentiates visitors' itineraries (Figure 4.1).

However, it is clear that in the case of the Archaeological Museum of Ioannina, space is a local determinant of movement, shaping exploration patterns within the spaces rather than a global determinant of movement flows – as we find in other museums, characterized by the strong relation between the degrees of accessibility of spaces and movement rates (Hillier *et al.*, 1996; see also Tzortzi, 2015).

Turning to the implementation period of the installations, in the Roman gallery (room 6) in particular, as visitors are not aware of the installation 'Sculpting in time' prior to the exploitation of the whole museum, we cannot expect effects on the pattern of circulation in the preceding galleries. But a key effect of this intervention is the strong bias towards the Roman gallery for visitors leaving gallery 5 and moving along the axis. The spatial and visual configuration, in combination with the projection, makes the vast majority of visitors observed turn to the right side of the axis as the next stage of their route (as opposed to half of visitors before the installation) (Figure 4.4).

-Morphology of viewing

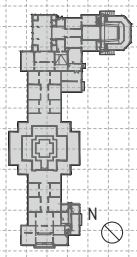
Turning to the viewing pattern, we find an overall more or less uniform pattern (Figure 4.3). In general, there is no diversity in the viewing order of galleries (with the exception of the opposite rooms 6 and 7, as noted above) nor differences in the viewing intensity of individuals in different parts of the museum, as indicated by visitors' stopping points.

We find *deeper* spaces having similar or sometimes higher number of stops than more shallow ones (as for instance in the case of the first and the last space in the route, that is, galleries 1 and 7). Before the installation, the highest rate of stops (in absolute terms) is found in

KM_KROLLER-MULLER

1933 m2

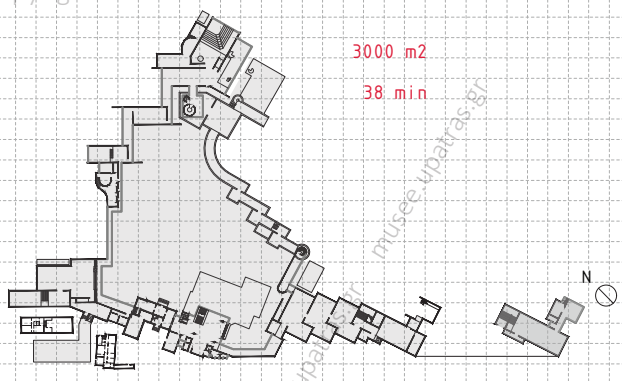
36 min



LOU_LOUISIANA

3000 m2

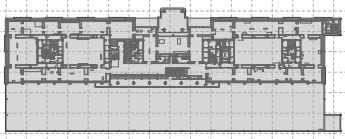
38 min



TM5_TATE MODERN 5

3586 m2

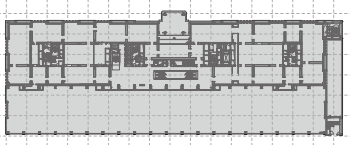
27 min



TM3_TATE MODERN 3

3416 m2

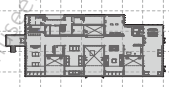
28 min



AMI_IOANNINA

853 m2

43 min



SW_SAINSBURY WING

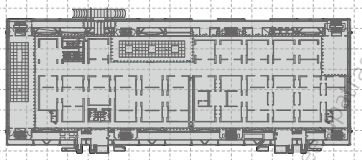
1633 m2

16 min

P05_POMPIDOU 5

4977 m2

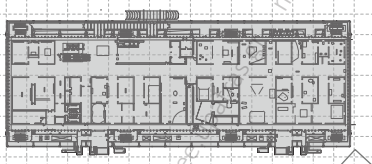
37 min



P04_POMPIDOU 4

5708 m2

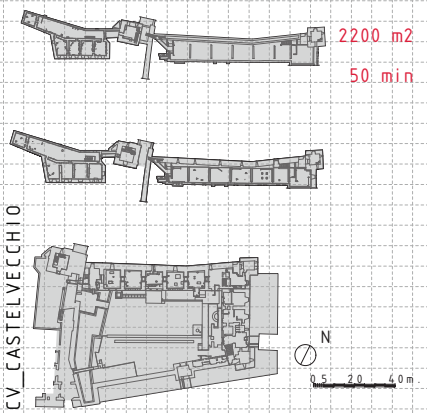
34 min



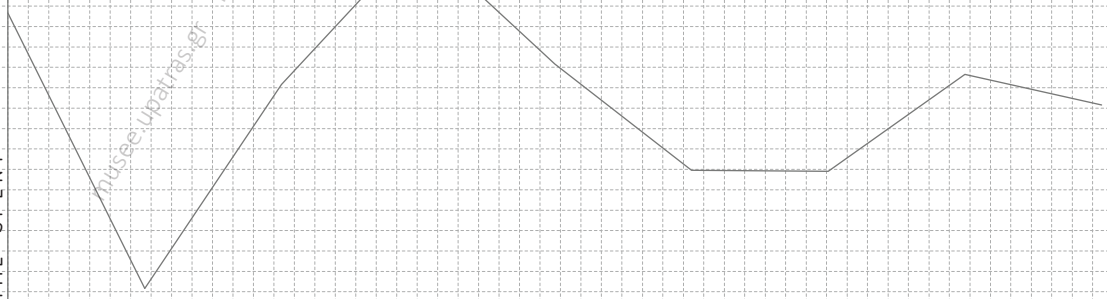
CV_CASTELVECCHIO

2200 m2

50 min



TIME SPENT



AMI SW KM CV LOU TM3 TM5 P05 P04

MUSEUMS BY AREA

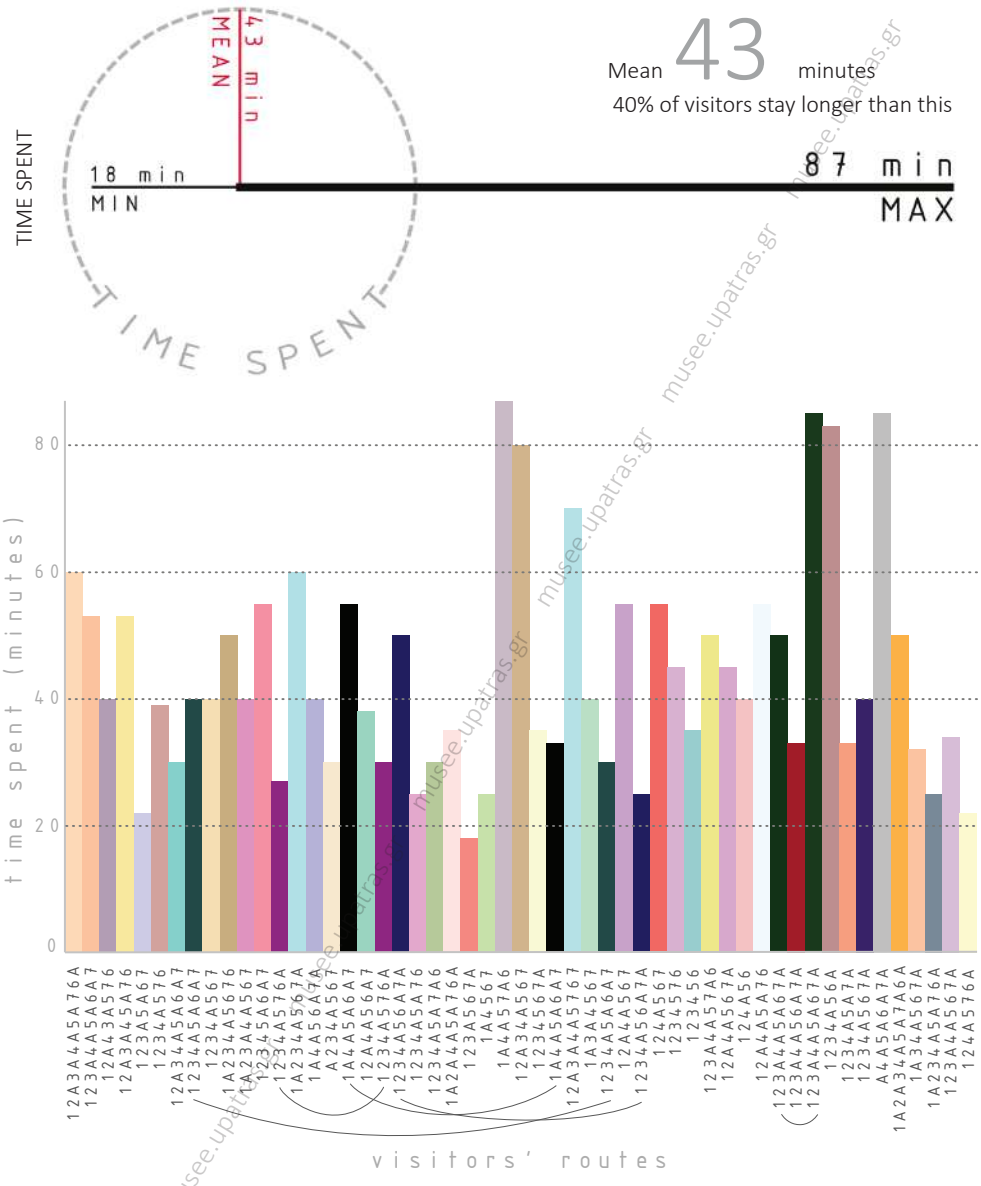


Figure 4.1
Opposite page: Comparing the Archaeological Museum of Ioannina with background cases in terms of the *ratio of time spent over area*.
Above: The average time spent is 43 minutes –though 40 per cent stay considerably longer that this (up to 87 minutes)– which perhaps gives a picture of the time required to explore the museum in its entirety.
Below: The heterogeneity of routes of visitors observed in the Archaeological Museum of Ioannina, coded as viewing sequences based on the location of their stopping points.

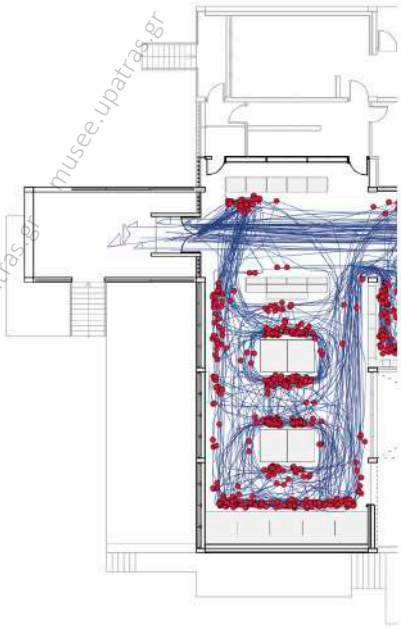
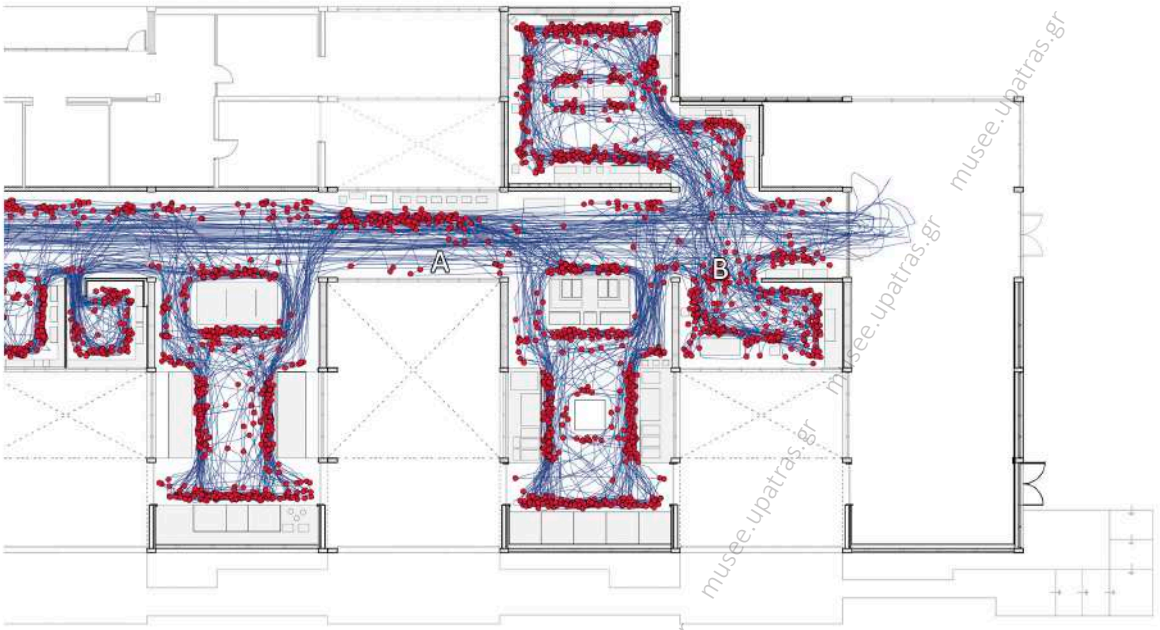


Figure 4.2
Archaeological Museum of Ioannina: the paths and stopping points of 57 visitors. (A) and (B) show additional concentration of stopping points due to the interventions in the central part of the main axis and the Roman gallery respectively.

Figure 4.3
Archaeological Museum of Ioannina: heatmap reflecting the average rate of stops (*sum of stops*) made in each gallery. In general, the overall pattern is consistent.



rooms 7 (featuring highlights of the collection), 5 and 4 (both displaying the highest number of objects), while the Roman gallery (room 6) gets a lower rate, which can be partly explained by its size and the number of objects on display (Figure 4.3). As might be expected, the investigation during the media interventions reveals a different picture (see below).

Finally, the average time of stay in the museum is 43 minutes, which is high in relation to the floor area (853m^2), compared with the values in other museums (Figure 4.1) (see Tzortzi, 2015). Moreover, 40% of visitors observed stay longer than the average (up to a maximum of 85 minutes).

If we were to define the key feature of the pattern of visitor behaviour in the Archaeological Museum of Ioannina, we would argue that it is focused viewing and active engagement, as reflected in the *ratio of time spent over total display area* and the explorative aspect of visitors' movement within the exhibition spaces. Both are further intensified by the media intervention, as we will see in the next section.

b. Spatial Behaviour of Visitors at the Micro-level of the Sensory Environments of the Media Interventions

During the implementation of the digital interventions, the all-day behavioural data at the local scale of the intervention (that is, the morphology of visitors' local paths and trajectories, the location where they stand to view the digital projection, the number of times each visitor views the projection, the nature of interactions between visitors and the social context of their experience – see Figures 4.4-4.9) were also gathered by direct observation. To complement the observation data, sketches and field notes were used to provide a more detailed picture of visitor activity.

-Reordering space

This intensive on-the-spot study of visitor behaviour has rendered explicit that the media installation as a lived experience has the potential to reorder interaction space and articulate sub-spaces. Adopting the Urban HCI Space Type Model (Fischer and Hornecker, 2012; see also Fisher *et al.*, 2013; Vande Moere and Wouters, 2012; Gehring and

Wiethoff, 2014; Afonso and Fatah gen. Shieck, 2019; Fredericks *et al.*, 2023), which offers a framework for the analysis of different settings for urban media interventions, we could distinguish six types of interrelated space that make up the digital sensory environment of the media intervention in the Roman gallery (Figure 4.4). It is clear that the *Display Space* of the media intervention extends beyond the Roman gallery itself and encompasses part of the main axis as well as the introductory space of the opposite side room (7).

-*Viewing zones*

We can refine the analysis and, based on the observation of the all-day behaviour pattern of visitors and the mapping of the precise location of their stopping points, identify two main *Viewing Zones* (1 and 2 in Figure 4.4, see also Figure 4.7), one along the axis and the other within the gallery, about 3.7-4 m and 2.5 m distance from the media intervention respectively. In most cases, visitors tend to move from *Zone-1* to *Zone-2* to view the projection for a second round. What essentially differentiates the two zones is the observed visitor behaviour. The analysis showed that the two viewing zones create two different kinds of spatial presence and co-presence. In *Viewing Zone-2* visitors tend to be more 'static' (in the sense that they tend not to move for a long time, sit on the floor, or make only short movements locally), while those in *Viewing Zone-1* tend to shift positions and viewpoints, either in relation to the regularly changing configuration of other visitors, or independently.

It seems that the spatial configuration of the museum acts on the pattern of common presence between visitors: *Viewing Zone-1*, by being part of the movement space of the museum, brings different groups of people together, allows for flexibility in the formation of viewers (for example, they can: position themselves along the whole length of the opening of the Roman gallery; form small groups toward the edges of the opening, thus framing it; or stand in rows and view the projection from different distances and angles of sight) and for diversity of activity (e.g. people watching the projection, reading the interpretative text on the media installation, taking pictures, or moving from/to a different direction), generating an *active* social co-presence. In contrast, *Viewing Zone-2*, located within the limits of the exhibition space (room 7), and most often occupied by people visiting together (couples, families, small

Display Space:
the area from which the media intervention is visible and which includes parts of the layout with fundamentally different spatial properties.

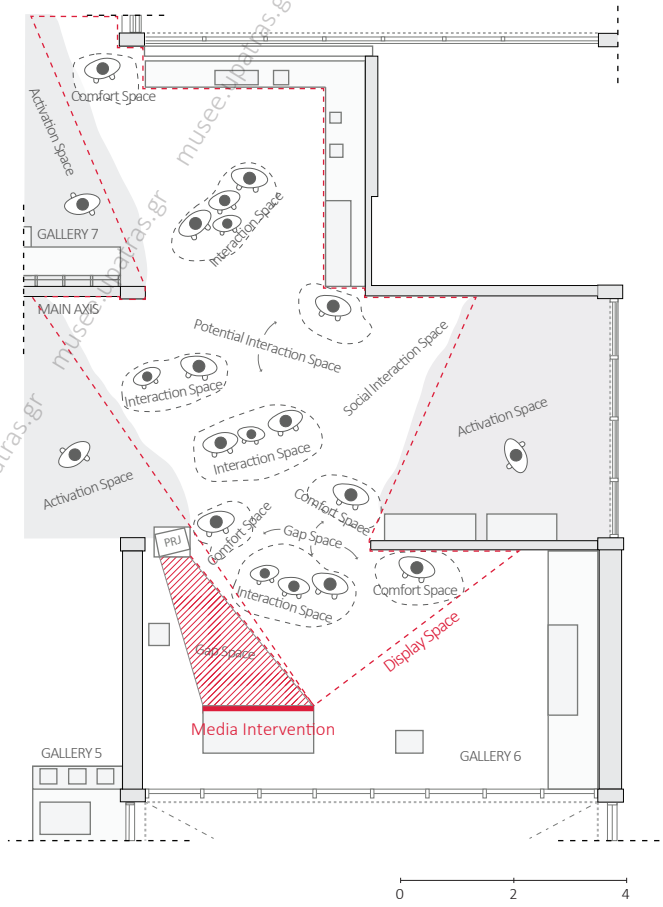
Interaction Space:
the space used at a specific moment in time; the *Potential Interaction Space* encompasses all the areas where a form of communication with the installation can occur.

Gap Spaces:
spaces that create distances and gaps between visitors or between visitors and the media intervention.

Social Interaction Space:
the area where people gather and can have shared experiences. It is mainly identified with the main axis where visitors' movements and encounters converge.

Comfort Spaces:
spaces near architectural elements that provide a sense of physical and psychological ease, giving people the feeling of being 'out of the way'. It is observed that people tended to gravitate towards the projector tripod, the walls, and the few available seats close to the periphery of the Display Space.

Activation Space:
the area from which the media intervention is partly visible, often triggering curiosity. Here visitors' physical rhythm seems to be temporarily suspended. Rather than immediately stepping into the gallery, visitors leaving room 5 tend to stand for a moment to make sense of an 'unusual' display and invite other members of their group to join them, before deciding to focus attention on the projection. This constitutes the main trajectory for visitors observed.



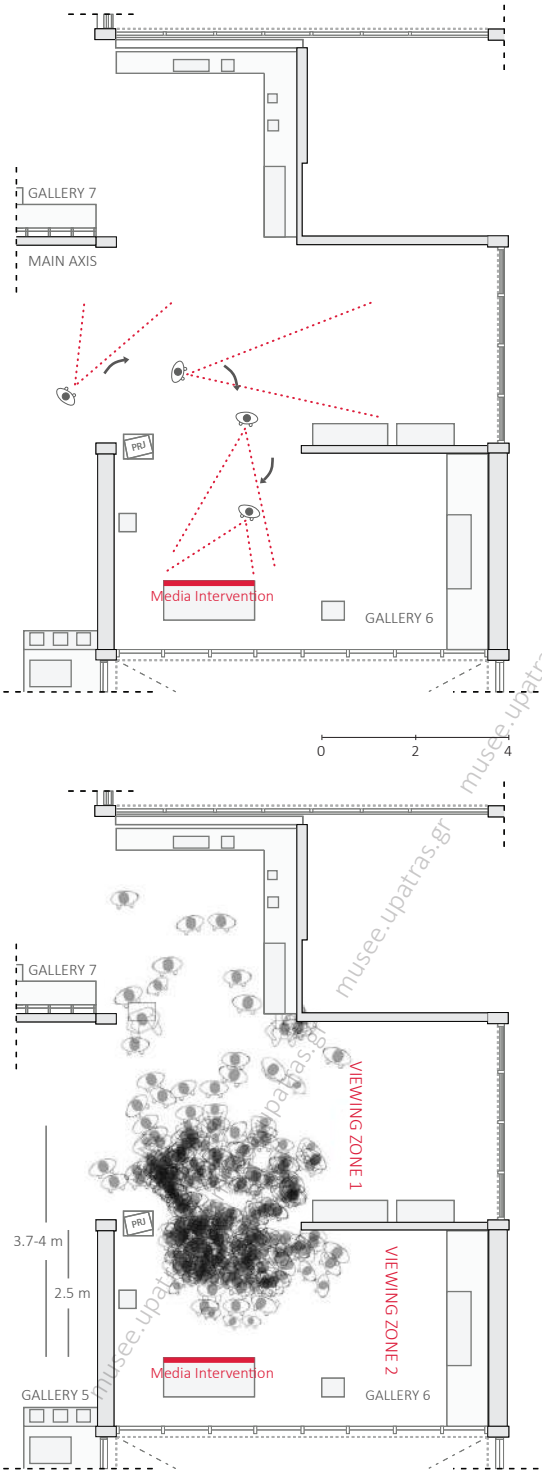


Figure 4.4
Opposite page: The media space: types of spaces (based on Fisher and Hornecker's Urban HCI Space Type Model).
Above: The overall trajectory of movement: the Roman sarcophagus is placed opposite the wide opening and against the background of the glass wall overlooking the interior courtyard. It is first perceived by visitors as they leave gallery 5 and move along the axis. When visitors find themselves at the east end of the axis, a multidirectional visual field invites them to choose one of the two side rooms (6 and 7). The long line of sight traversing the Roman gallery, in combination with the view of the sarcophagus which is large enough to be noticed from distance, and its digital augmentation, make visitors turn to the right side of the axis as the next stage of their route.
Below: The *Viewing zones* for the media intervention in the Roman gallery.

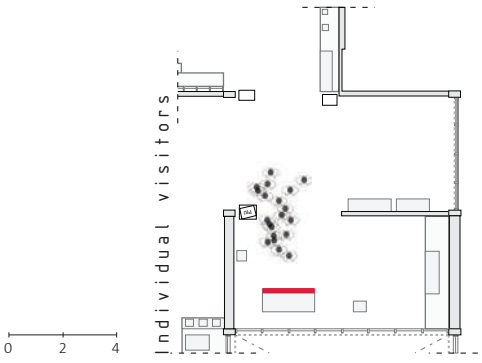
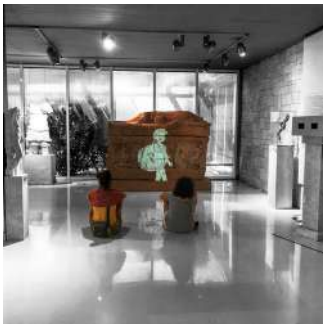


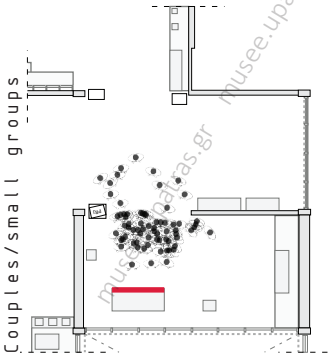
Figure 4.5
Different spatial behaviours displayed by different social groups.

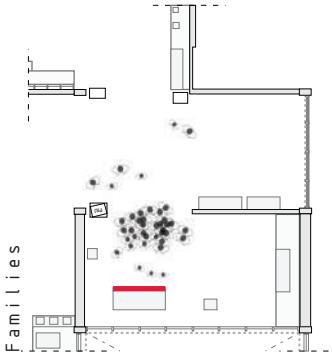


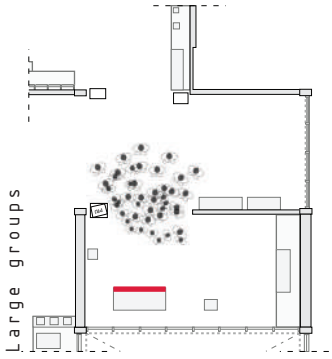












groups of friends), shapes a *contemplative* co-presence, interrupted only by the recurrent commentary between viewers. People tend to interact, talking, watching the projection together, showing things to each other and discussing them. Affective postures and attitudes (for example, holding hands, leaning against each other) between members of couples of different age groups, or between family members are often observed. The opposite is the case in *Viewing Zone-1*. Although it encourages encounter density, social norms reduce the opportunities for conversations between members of groups (Figures 4.5 and 4.7).

On the whole, the media intervention generates local intensification of movement and engagement, and balances the differences between the average rate of stops (*sum of stops*) made in the two opposite side galleries (6 and 7) identified before the installation (see above). The high rate of stops in the media space and the amount of time spent interacting with the intervention render the sarcophagus a very intensively viewed exhibit.

To these observations is also added visitors' tendency to engage with the three-dimensional inspection of the archaeological object at the end of the projection or in-between the end of one projection loop and the start of the next one (Figure 4.6). They shape jagged movement traces in front and on the sides of the sarcophagus, as they walk around and make short movements going forth and back and viewing again.

-Spatial presence and co-presence

No less importantly, the physical co-presence and visual contact between visitors interacting with the sarcophagus in the media space is lengthened and so intensified, as compared to the brief encounters along the axis before the intervention, reinforcing the pattern of common presence. It could be said that the media intervention, in combination with the open spatial relationships between galleries 6 and 7, and the ample cross-visibility between axis and galleries make social interaction visible and maximize people's awareness of each other generated by visibility across boundaries.

-Other types of behaviour

In spite of the differences between the three cases (for example, the

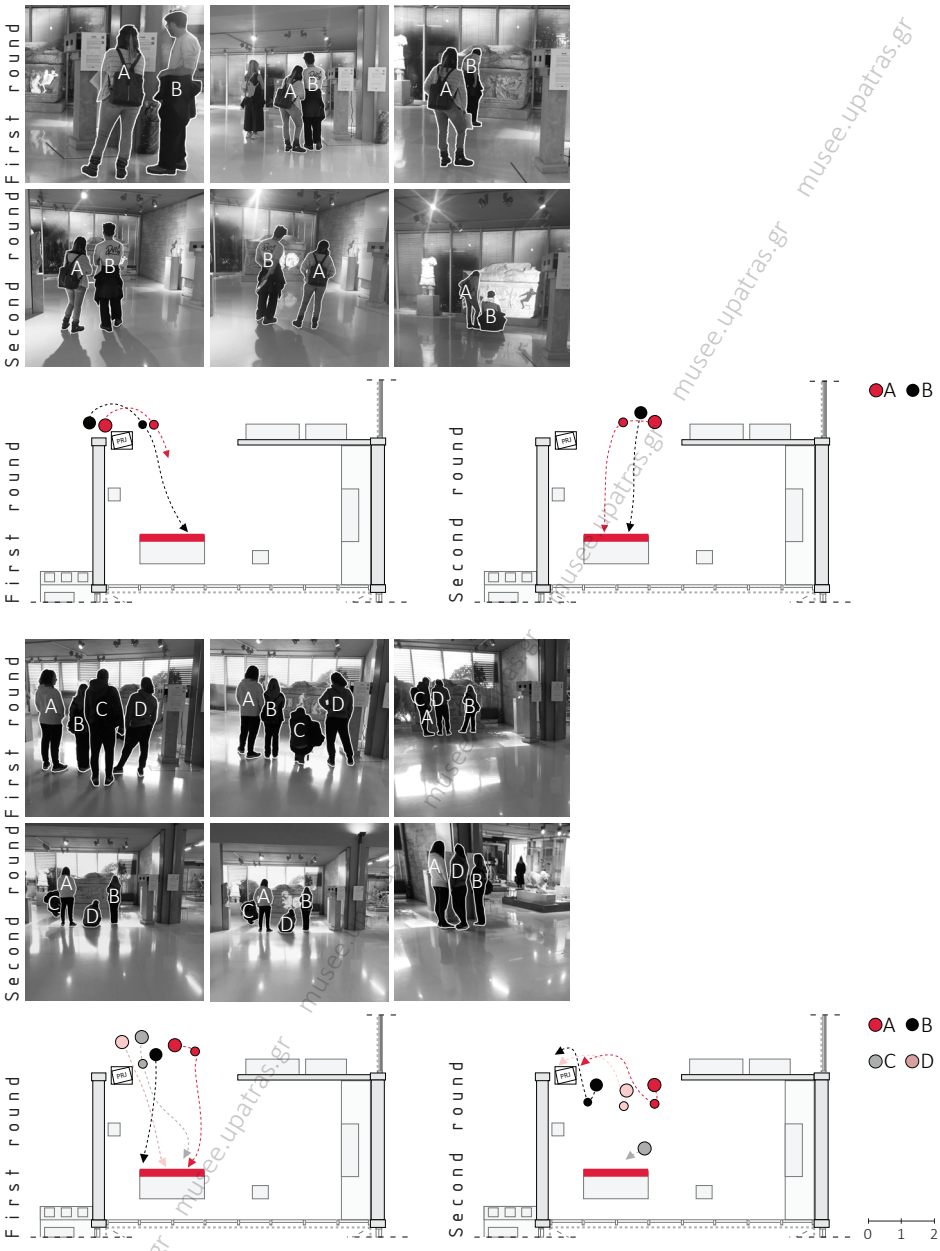
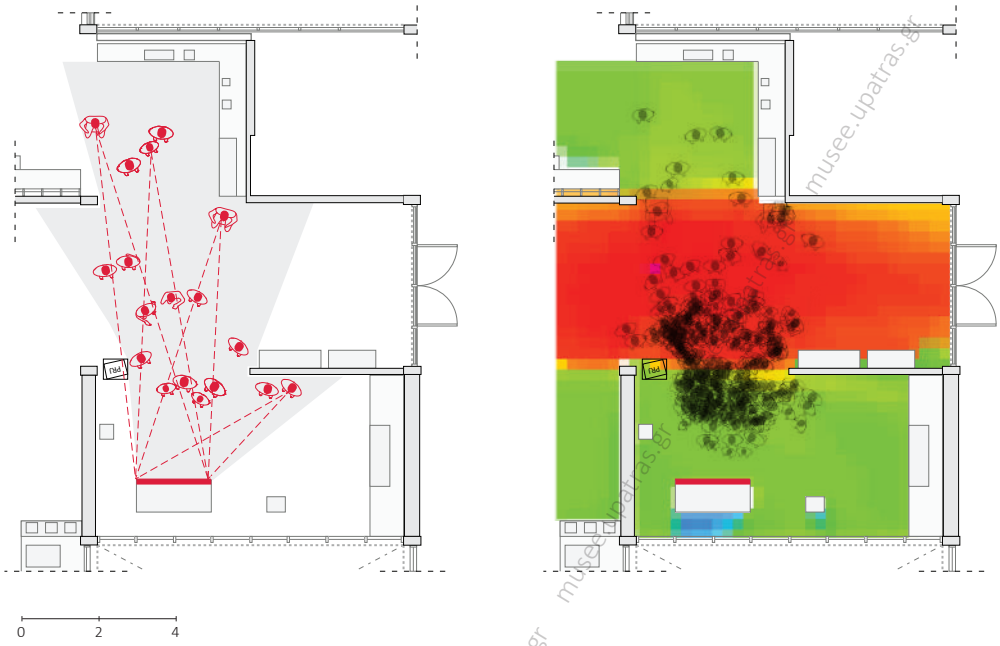
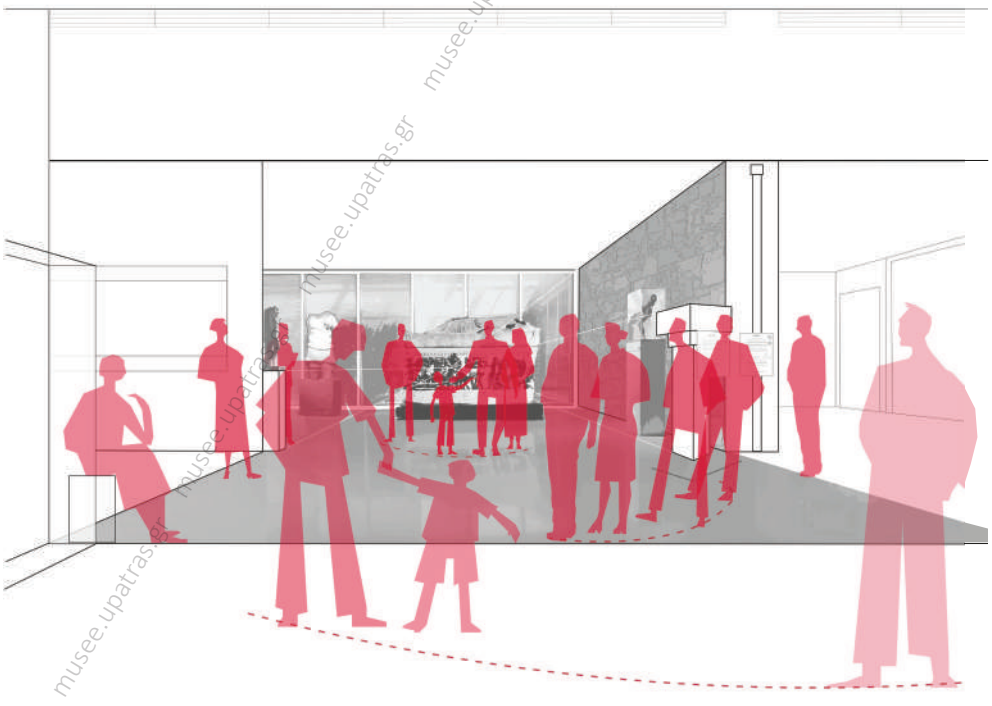


Figure 4.6
The media intervention in the Roman gallery generates local intensification of movement and engagement. Visitors tend to engage with the three-dimensional inspection of the sarcophagus at the end of the projection or in-between the end of one projection loop and the start of the next one.





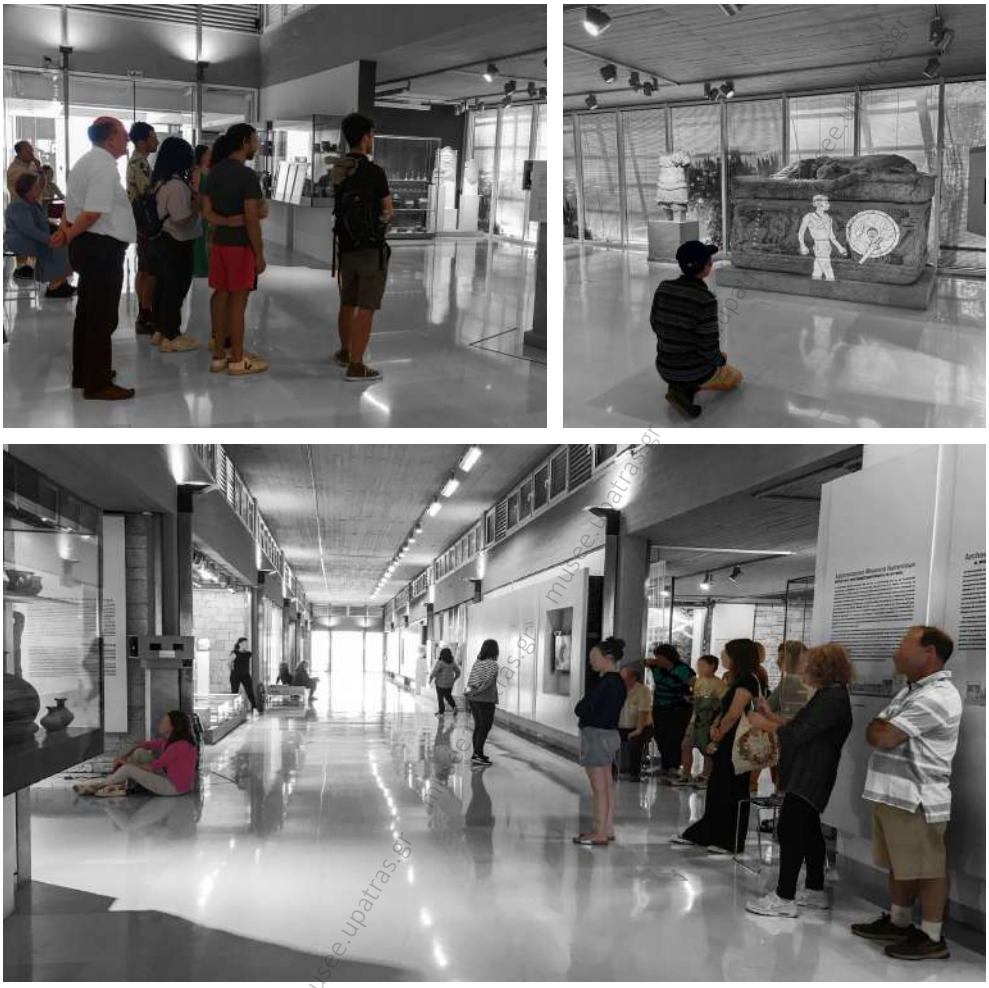


Figure 4.7
Opposite page, left: The interaction space of the media intervention in the Roman gallery, in comparison to the more conventional display space of the archaeological object, is strongly *synchronized* (since a larger amount of space is invested in it) and highly *descriptive* (in that a larger number of spaces are related to it, either directly or indirectly).
Opposite page, right: The relation between the pattern of *integration* and visitors' stopping points in the interaction space of the media intervention.
Opposite page, below: The physical co-presence and visual contact between visitors interacting with the sarcophagus in the media space is lengthened and so intensified, reinforcing the pattern of common presence.
Above: The configuration of the interaction space of the media intervention reconciles the two imperatives of a shared, and so social, experience, and a comparatively more private contemplation and experience.

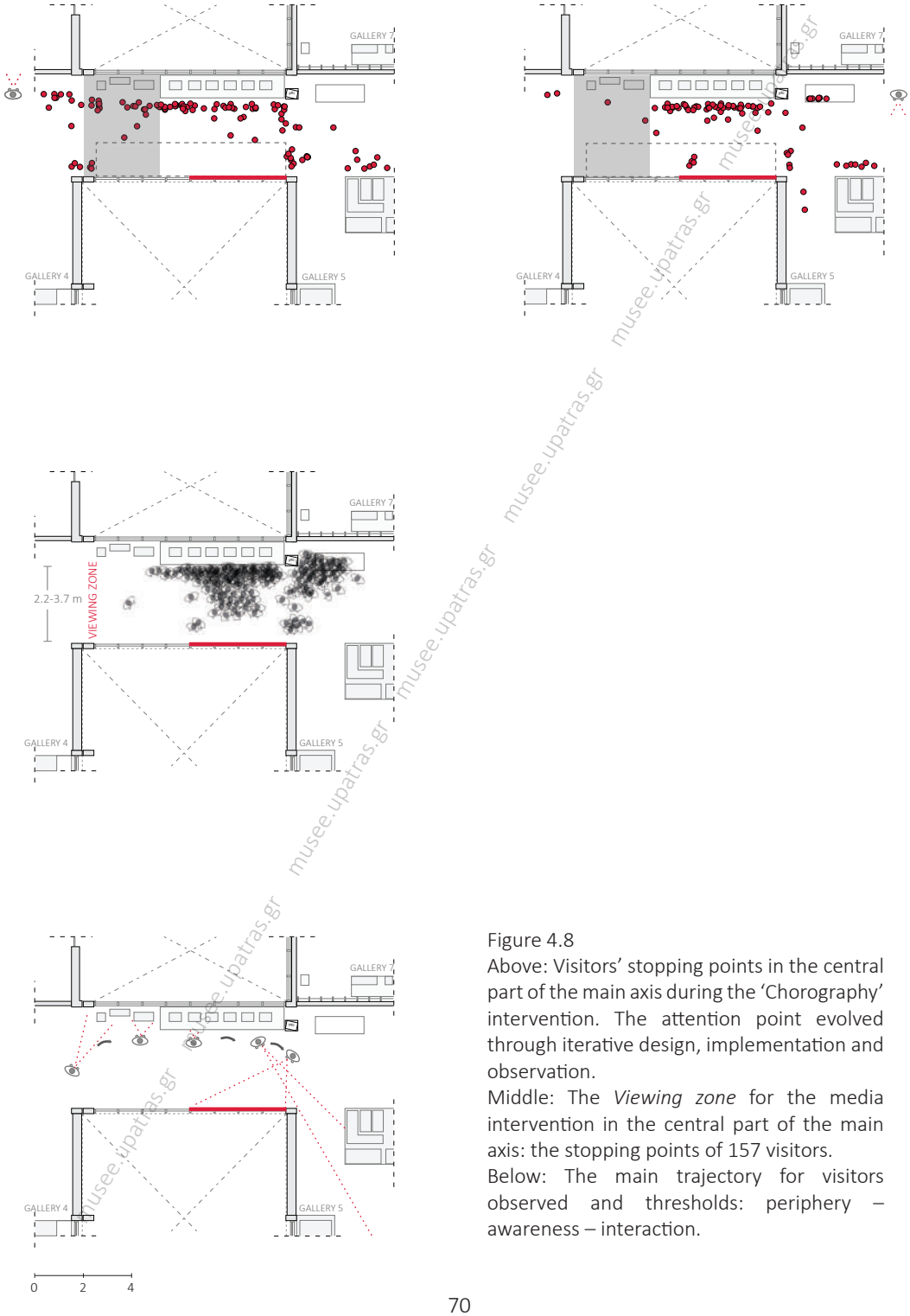


Figure 4.8
Above: Visitors' stopping points in the central part of the main axis during the 'Chorography' intervention. The attention point evolved through iterative design, implementation and observation.
Middle: The *Viewing zone* for the media intervention in the central part of the main axis: the stopping points of 157 visitors.
Below: The main trajectory for visitors observed and thresholds: periphery – awareness – interaction.

Above: Visual interaction: during the study period, visitors displayed different behaviour towards the media installation ('Chorography') in the main axis. This included: pass-by or glance at the projection wall, change in head or head and body orientation, slow down or stop and watch (brief or long interaction). Overall, our observations indicated that the majority of visitors (60.3%) stopped for a long(er) period of time. The least likely behaviour was glance (4.3%).

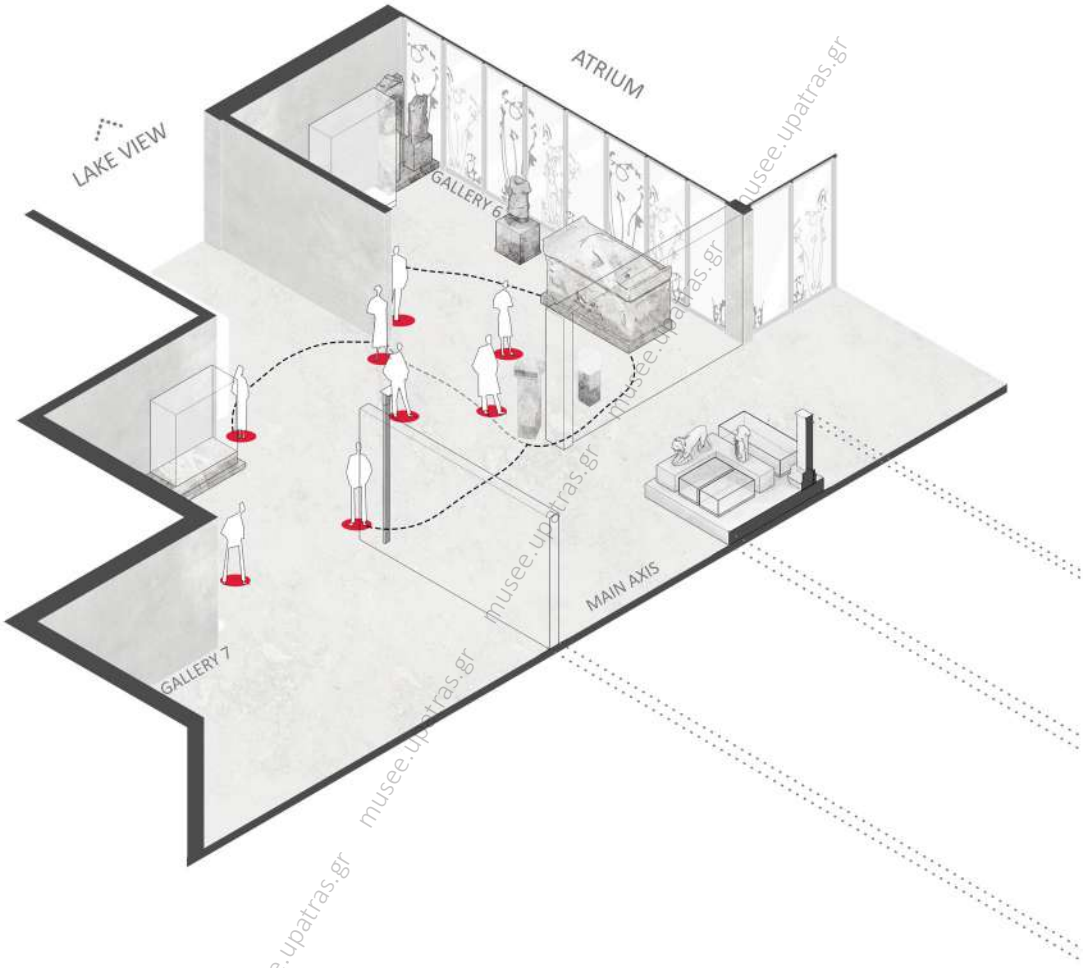
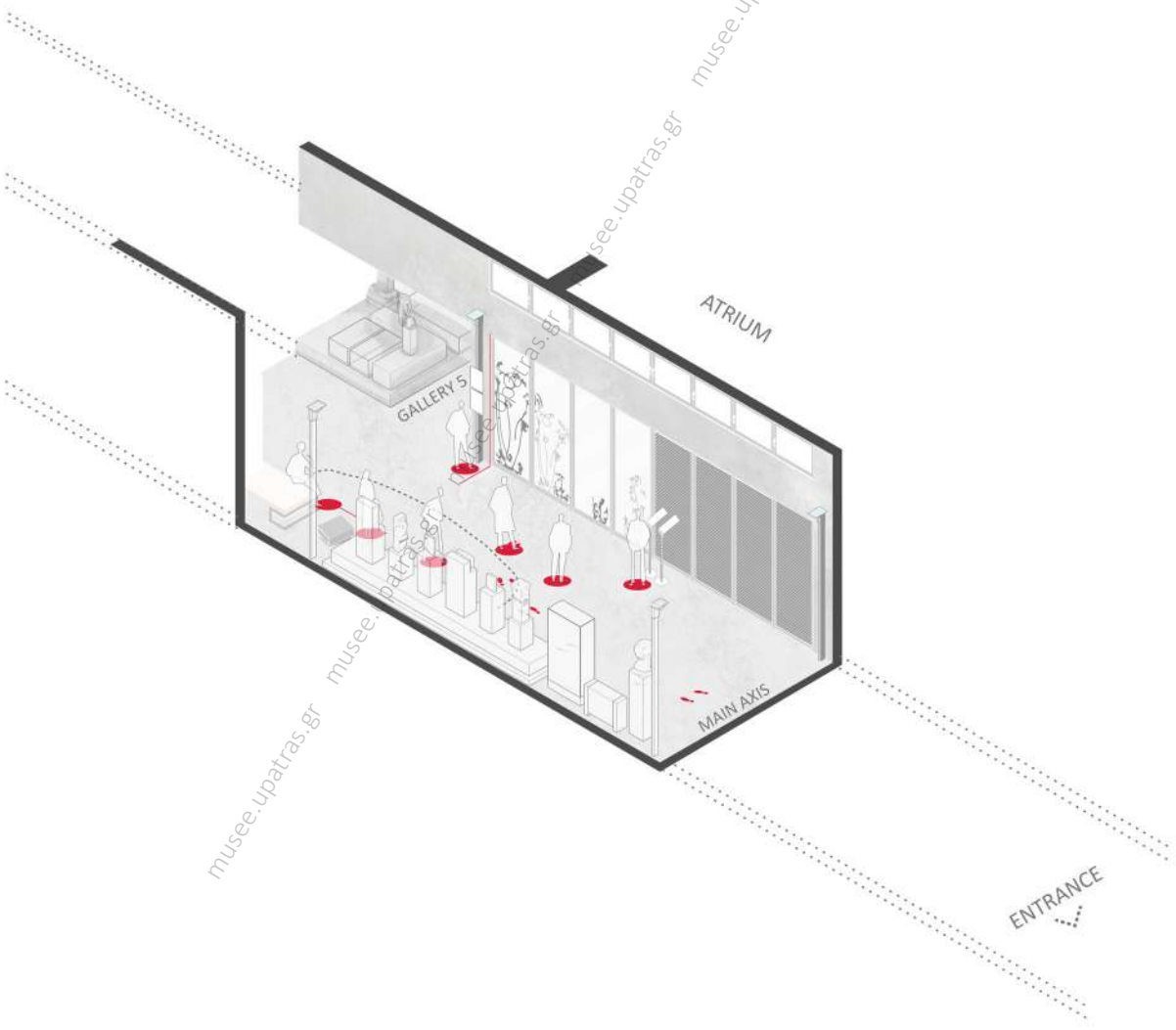


Figure 4.9
Axonometric representation (1:150) showing the link between the two parts of the Archaeological Museum of Ioannina (Roman gallery, left and main axis, right) in which the two media interventions were implemented.



media installation in the main axis is characterized by a heterogeneity of movement and interaction patterns, which range from pass-by, glance, short to long interactions (stopping and viewing) – see Figures 4.8 and 4.9), a common behaviour in all three cases is making sense (*human-to-object interaction*), gesturing/pointing, and explaining to others *(forms of person-to person interaction mediated by the projection)*. Other types of behaviour include dancing and clapping hands, mediated through the change in sound rhythms and the use of music, and bodily interacting with the projection *(human-to-medium interaction)* (Figure 4.10).

c. Relating Three Spatial Morphologies

The spatial and observation data analysis begins to illuminate the relation between the spatial structure of the building and the sensory environment and interaction space created by the media intervention, and its effects on dimensions of visitors' behaviour and experience. Using the two syntactic concepts of *synchrony* –which refers to the scale of a space– and *description* –which refers to the configurational embedding of the space in its context (John Peponis – see Hillier, 1996, p. 232; Tzortzi, 2015, p. 166), we could argue that the *Display Space* of the media intervention in the Roman gallery, in comparison to the more conventional display space of the archaeological object, is strongly *synchronized* (since a larger amount of space is invested in it) and highly *descriptive* (in that a larger number of spaces are related to it, either directly or indirectly) (Figures 4.7 and 4.9).

The analysis also suggests that it is a strength in the layout as a whole and in the digital sensory environment in particular, that different spaces (axis, Roman gallery) have different spatial and visual characteristics, and create a variability of visitor patterns and kinds of co-presence. It could be argued that the media intervention engages two polarities through the way it uses space to construct interaction and create engagement:
-between the most richly *connected* and highly *integrated* space in the layout where the diverging paths converge (in red in Figure 4.7), and one of the *deepest* dead-end spaces which focuses perception remote from movement;
-between the most visually open space that extends the whole length of the layout and a more enclosed and visually protected room that

eliminates external information and isolates the embodied experience; -and between the space that sustains an intensified awareness of the other people and renders viewing a shared, and so social, experience, and a space that encourages a comparatively more private contemplation and experience.
In other words, the media intervention in the Roman gallery points to the significance of a configuration of space which offers many opportunities, as for example, a space that reconciles the two imperatives of 'society and solitude' (Figure 4.7).

Inquiries into Visitor Experience through Questionnaires

Turning to the questionnaire research, its starting point was the theoretical question how visitors respond to novel and carefully designed media installations where new interpretation possibilities and spatial, visual and aesthetic means, are used to convey ideas and meanings and lead visitors into particular or new ways of looking at things.

Visitors' responses show clearly, consistently and in different ways a very positive response to what they experience as intelligently conceived and well-designed installations, and appreciate both the intellectual content and the effectiveness of the media format.

Their positive appeal is strengthened by visitors' comments to the open questions which are penetrating and show derivation from critical thought. Visitors' response to the 'Longue durée' questionnaire is a case in point.

CASE 1, Longue durée, Tower of the Winds

a. Visitors' First Impressions and Thoughts

In many senses the replies to the first open-ended question, about 'visitors' first impression or thought', clearly reflect their positive approach to the media project and their thoughtful comments. More specifically, visitors' first impressions seem to affect their feelings and their curiosity, increasing their engagement and contributing to the enjoyment of the sensation of understanding:

Figure 4.10
Tower of the Winds: the media installation attracted diverse people both locals and tourists/ various age groups. A common behaviour was making sense *(human-to-object interaction)*, gesturing/pointing, and explaining to others *(forms of person-to person interaction mediated by the projection)*. Other types of behaviour included dancing, mediated through the change in sound rhythms and the use of music *(human-to-medium interaction)*.

- I was curious to discover the history of the place. it was very beautiful and poetic. It was like a "conte de fées".
- It was like an exciting film or book that I want to see/read directly.
- I understand the use of the building. That was a nice feeling.
- Curious, emotionally involved. I found answers to the curiosity. The explanation was interesting.

The media project can even change their initial critical views to a positive approach:
- I'm sometimes a bit skeptical of historical/archeological visualisation, but this time it was very well done and took me in immediately.
- I was interested to see what sort of modern project could be achieved in an ancient monument (perhaps skeptically). I was pleasantly surprised.

b. Cognitive and Affective Engagement

When asked to compare their first impressions and thoughts to those at the end of the visit, visitors' 'thinking aloud' about their experience gives insights into the interweaving of the intellectual and affective cognitive dimensions of the experience, the combination of the aesthetic and the intellectual point of view:
-Une expérience à la fois instructive et poétique :)
-Magical. Immersive. Informative and beautiful.
-Deeply impressed/very informative/seen things I wouldn't have recognized. And kind of emotional experience.
-Very beautiful. Excited to learn about the tower.

Visitors' comments are striking for their language of immersion, and the discursive expression of intense subjective feelings and emotions:
-Very moving. Felt more appreciation than before.
-Overwhelming happiness.
-Relaxation, peace. I was feeling like I was in a space ship.
-I felt like I was transformed back in time. It was very surreal to be standing there.

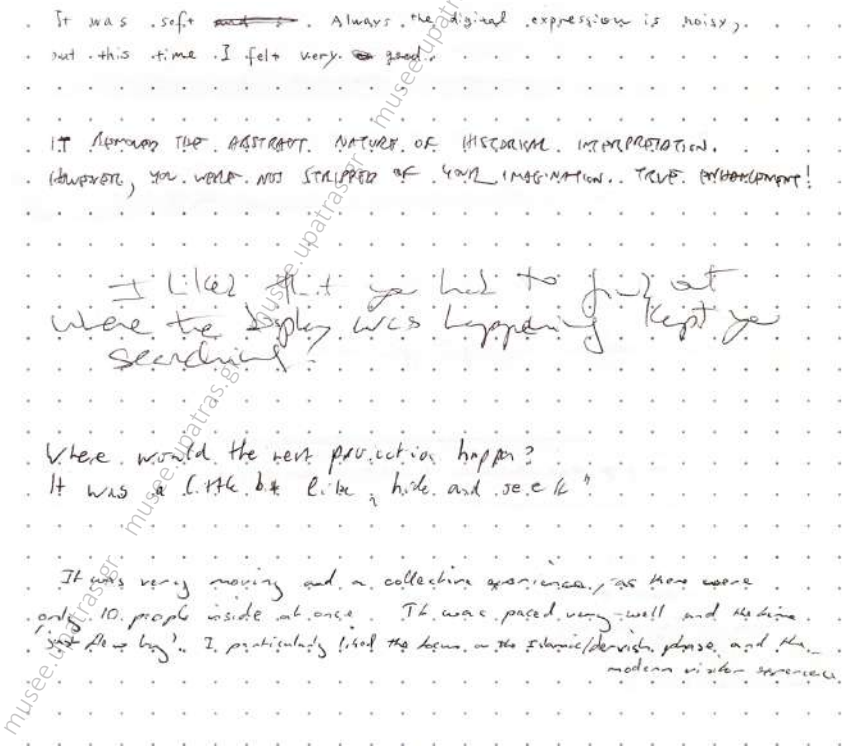
c. Visitors' Intelligent Discussion of the Media Project

The media project generates not only a positive response but also provokes an intelligent discussion of how it is designed and how it is working for visitors.

In their comments, visitors compare the audiovisual medium to textual information, and reflect on the way it augments space and enriches perception:

-Showed details of building. A sign or just reading wouldn't be the same.
-I liked how the digital experience used the structure as a background and used projected images to teach about the purpose. It was much better than a sign.
-How it did transform a building with nothing inside in a complete different story.
-It brings value to this place. In my opinion we can develop our perception.

More importantly perhaps, visitors perceive and enjoy the key features of the media project that can be thought of as creating its distinctive spatial, intellectual and social character – for example, the static nature of the experience, the collective dimension, the discreet use of colours, the unexpectedness of parts seen, and the sense of a heightened awareness of the interior space of the monument:



Concluding Remarks

Taken together, visitors' responses to the questionnaires in the three cases illuminate how a diverse audience (both locals and tourists, of various age groups and with different educational background) perceives the interplay between physical and digital space, and uses this to construct embodied and affective meanings (Figures 4.11-4.14). They demonstrate the ability of the media projects to enrich perception and understanding, as well as their significance as a spatial experience, personal and at the same time highly collective.

We could then say that media architecture, by presenting 'the past as a field of experience' (Salber Phillips, 2004) can be seen as a mode of mediation with the past and introduce visitors to new ways of seeing and experiencing a heritage site and a museum space – a public place.

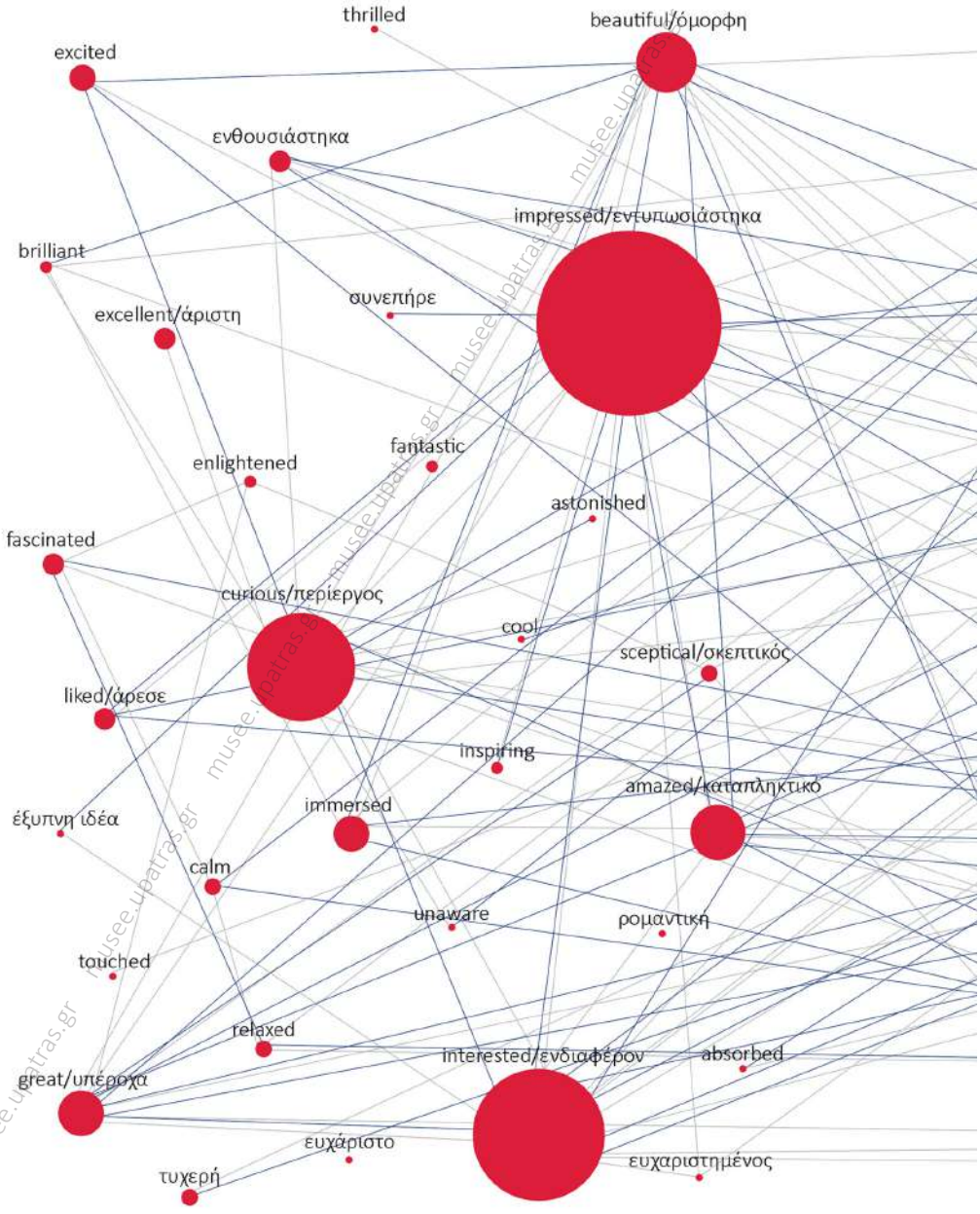
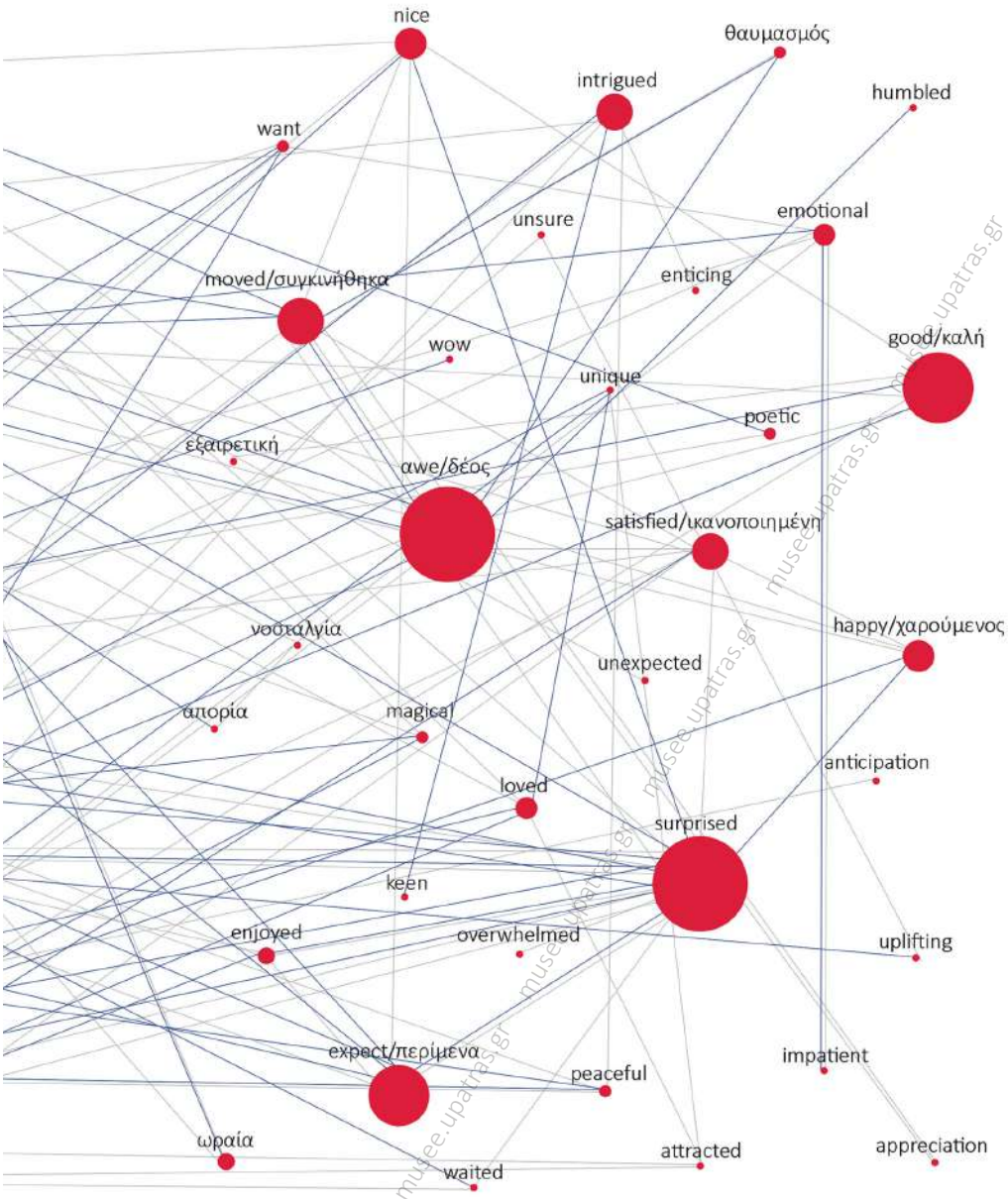


Figure 4.11
'Longue durée' media installation in the Tower of the Winds: initial mapping of the words expressing emotions used by visitors in response to the two first open-ended questions about their impressions or thoughts at the beginning of their engagement with the installation and at the end.



1 3 5 7

The size of the circles represents the frequency of the words, and the connections between them the links between words used by the same visitor in the context of the two questions. Sample: 200 questionnaires.

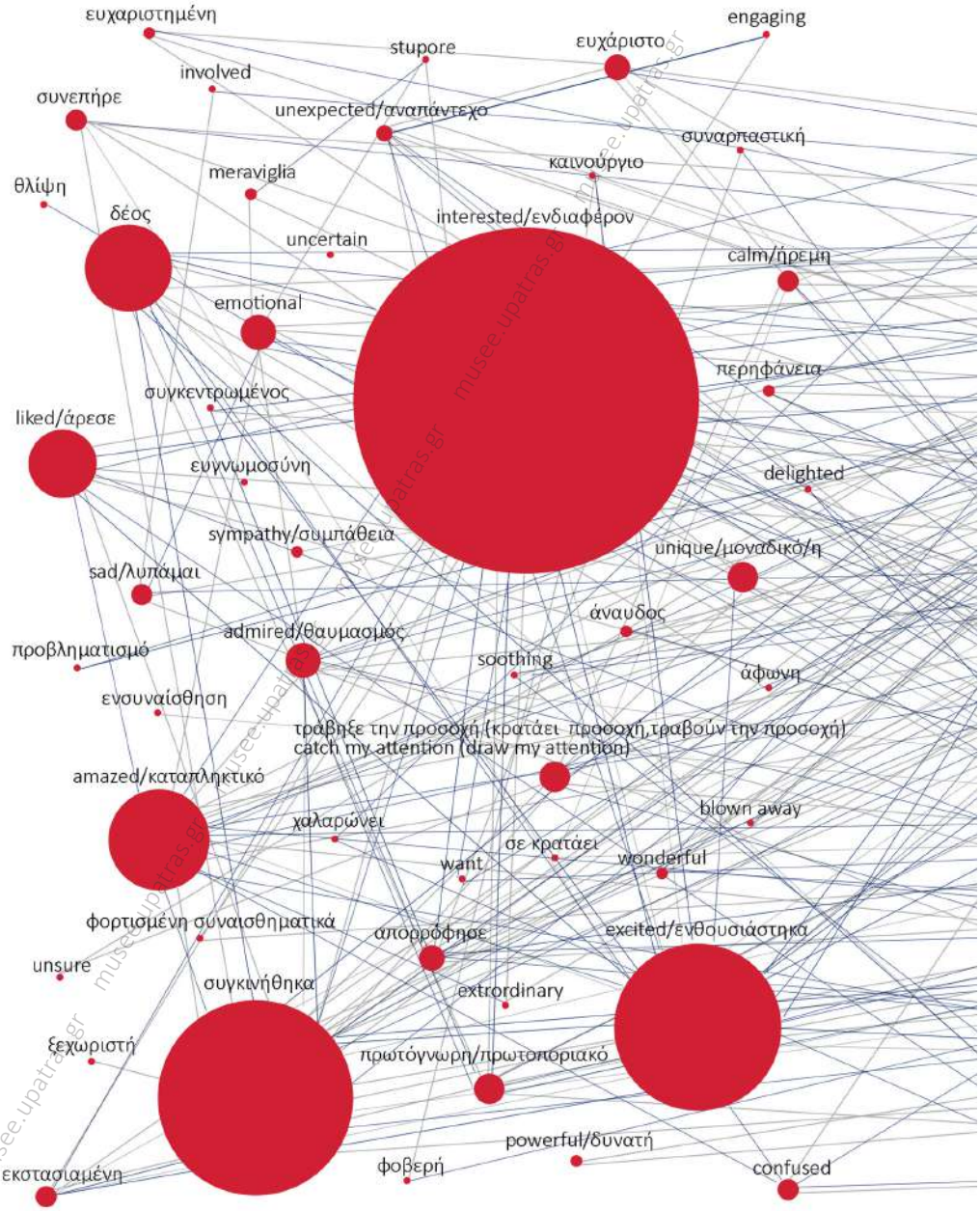
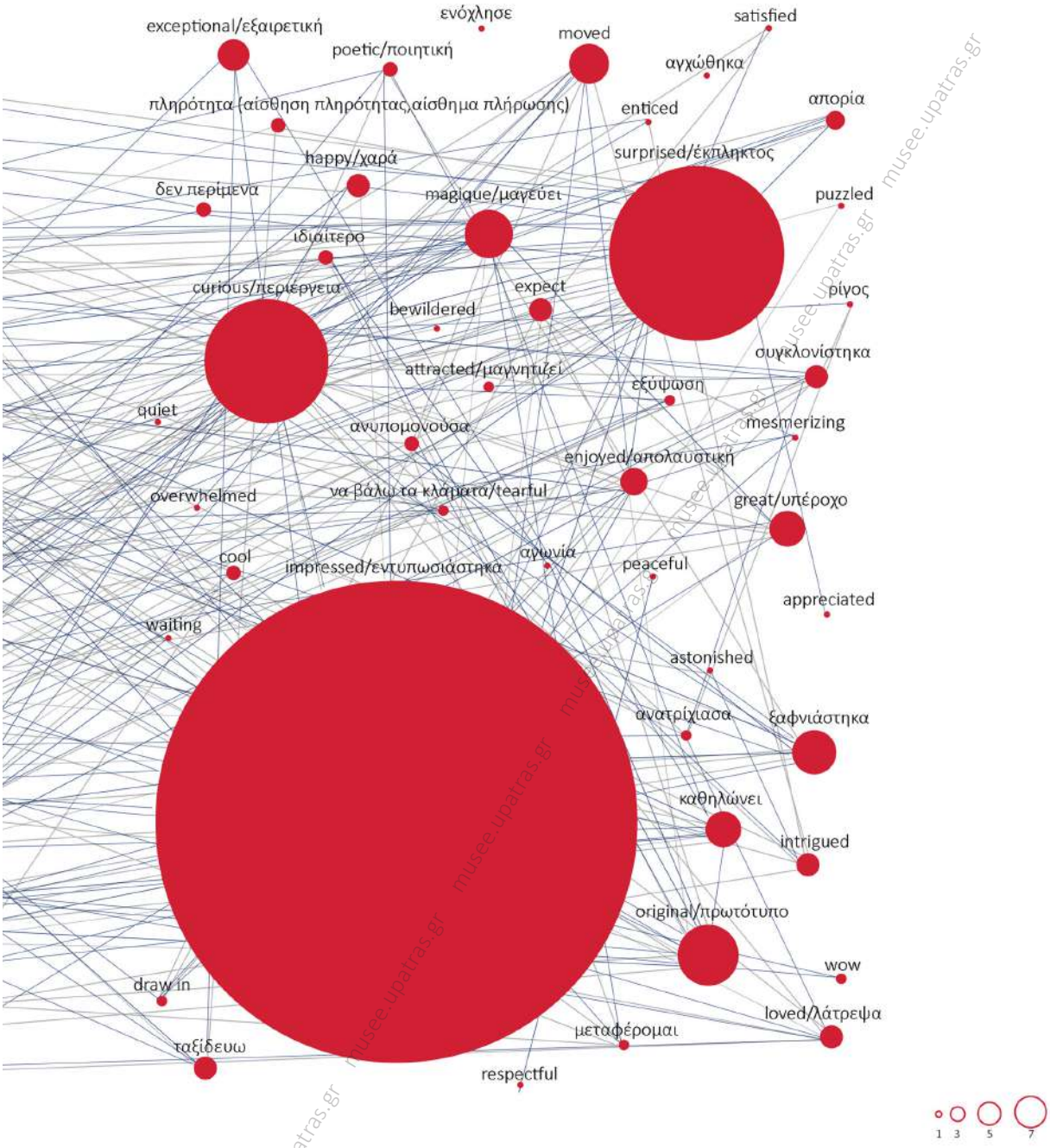


Figure 4.12
Archaeological Museum of Ioannina, 'Sculpting in time' media installation: initial mapping of the words expressing emotions used by visitors in response to the two first open-ended questions about their impressions or thoughts at the beginning of their engagement with the installation and at the end.



The size of the circles represents the frequency of the words, and the connections between them the links between words used by the same visitor in the context of the two questions. Sample: 355 questionnaires.

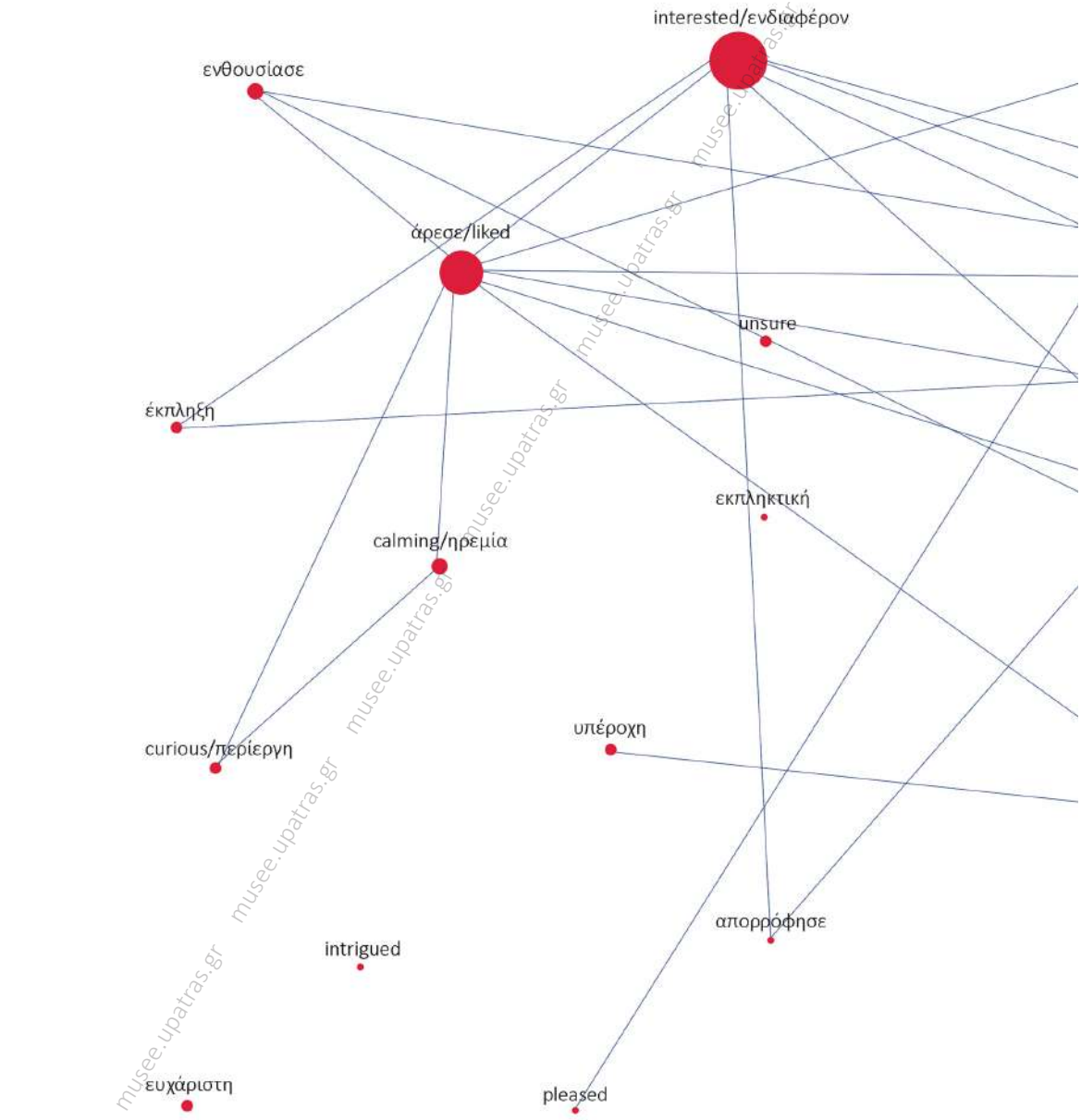
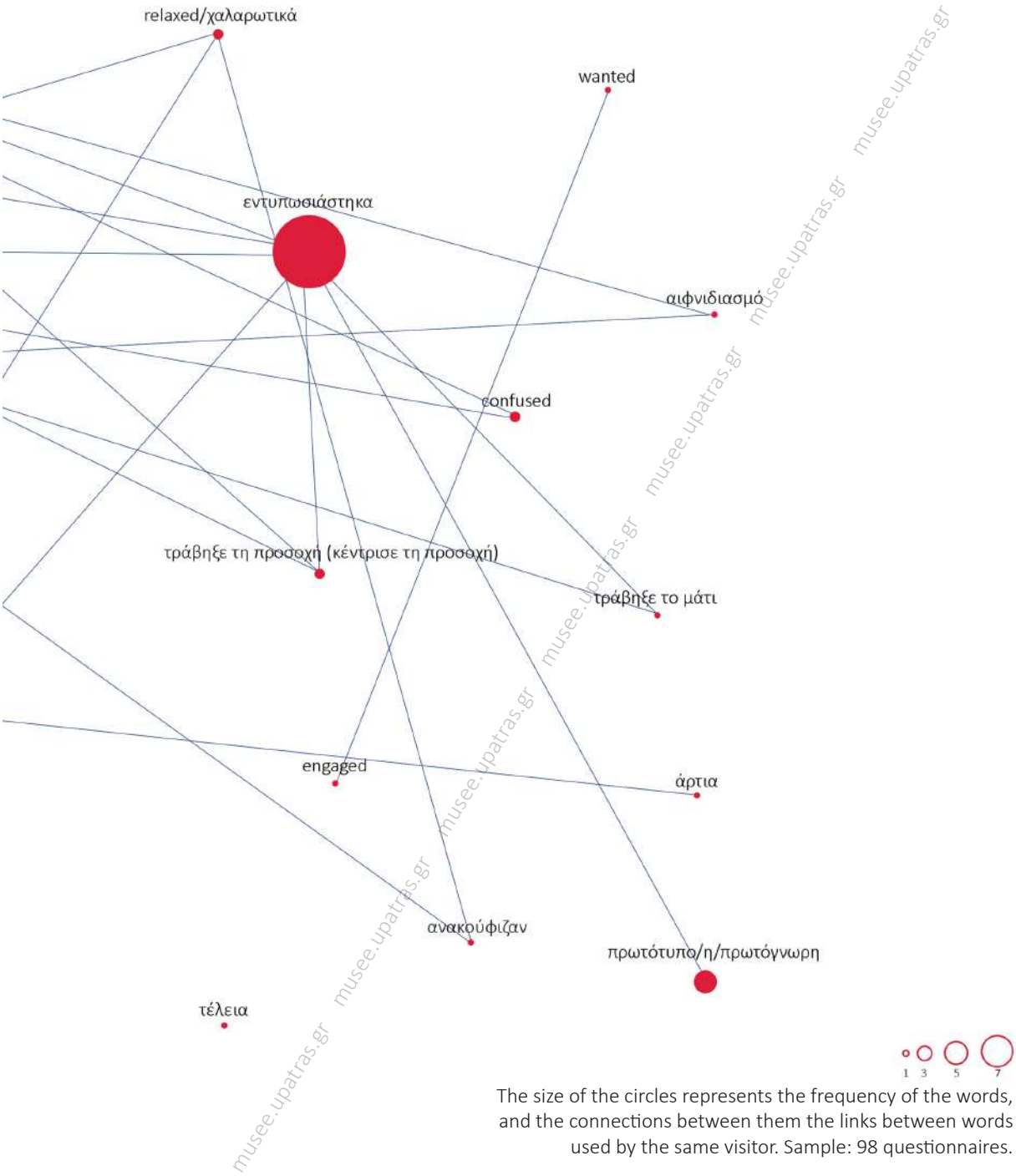


Figure 4.13
Archaeological Museum of Ioannina, 'Chorography' media installation: initial mapping of the words expressing emotions used by visitors in response to the first open-ended question about their impressions or thoughts at the beginning of their engagement with the installation.



The size of the circles represents the frequency of the words, and the connections between them the links between words used by the same visitor. Sample: 98 questionnaires.

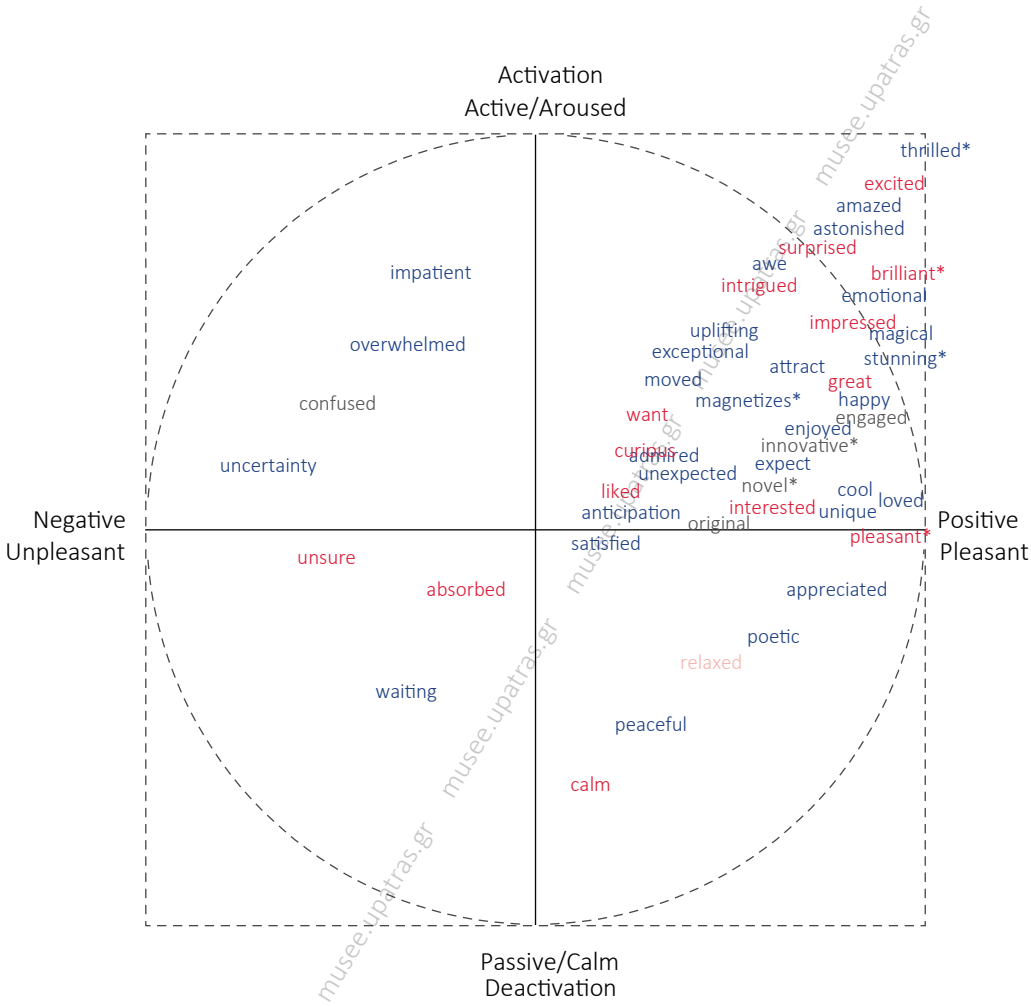
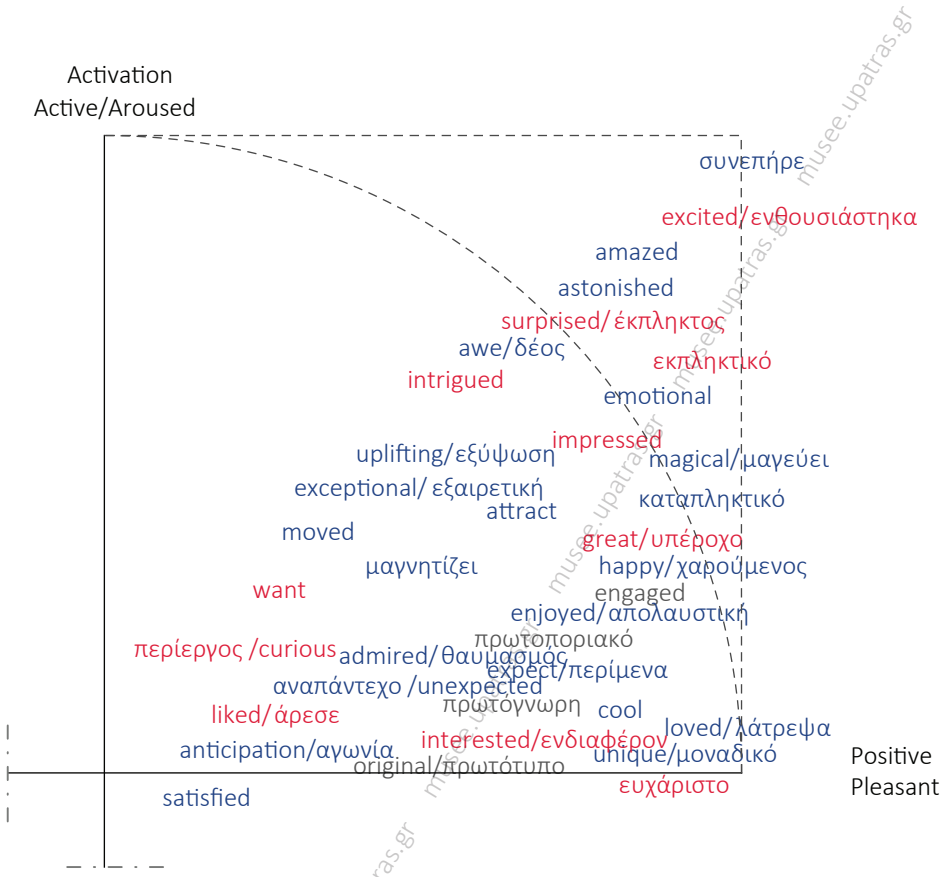


Figure 4.14
Above: An initial mapping of words reflecting visitors' responses to the three media installations, plotted on two axes. The words are common to all three cases or in pairs (see Key). The diagram is adapted from the two-dimensional circumplex model of affect (after Russell, 1980) to the context of the experience in the museum. The horizontal axis represents whether the emotion is positive or negative, while the vertical axis represents the intensity of the emotion.
The words were drawn from questionnaires (first open-ended questions) completed after engaging with the installation, where visitors described their first impressions, initial feelings during the projection, and what they noticed. It can be observed that the majority of the words fall within the upper-left quadrant, associated with positive and high-intensity emotions.
Opposite page: Enlargement of the upper right part of the diagram, including all words in Greek and in English.



Common words:

Longue durée - Sculpting in time - Chorography
Sculpting in time - Chorography
Longue durée - Sculpting in time
Longue durée - Chorography

05
Comparative Analysis and Lessons Learned

Taking into account the different components of the analysis as well as the ideas they generated, the aim of this last section is to offer, first a brief comparative overview of the three case studies from museological-conceptual, media installation and spatial points of view (Table 5.1 and 5.2 respectively and Figures 5.1-5.3), with a view to proposing, in the second part, a framework that addresses potentials and challenges for evidence-based design, implementation and evaluation of digital sensory environments in museums.

A Framework of Principles for the Design and Implementation of Media Installations in Museums and Heritage Buildings and for the Evaluation of their Effects on Visitors' Spatial Behaviour and Experience

In this practice-based research we first sought to explore the potential of a heritage building (the Tower of the Winds and the Archaeological Museum of Ioannina) and an archeological exhibit itself (the Roman sarcophagus) to act, through the integration of media installations which incorporate animated visual storytelling and sound, as a presentational object to: tell their own story and encourage a more inclusive way of tracing and experiencing a complex past, communicate universal themes and questions about human nature, and make the invisible explicit (see Section 1).

There is also a larger relevance of this research offering key insights and implications for the development and implementation of digital experiences, specifically through (projection-based) media installations in the field of museums. Though based on a limited number of cases,

this research, by suggesting a better understanding of:

a) the potentials and the particular challenges and considerations in integrating technology supported experiences in museum settings and proposing ways of handling them,
b) the key role of space, in combination with media technology, in creating the final museum experience, and
c) the effect of design choices on visitors' experience,

can creatively inform future designs from the perspective of museum curators, media/experience designers and architects. This includes:

From a curatorial and media content design point of view

1. New ways of thinking about visitor experience: Introducing media interventions in museums requires a new way of thinking about the design and use of the digital intervention, since it becomes part of a larger and a more complex system spatially (i.e. physically), conceptually (curatorially) and socially, and affects the visitor's physical rhythm.

2. Technology as a tool for augmentation rather than distraction: Although digital technologies may risk becoming distractions, insights from the study indicate that the complex stories, already embodied in heritage buildings and archaeological objects, provide a scaffold for the audiovisual narratives, leading to effective and meaningful augmentation.

3. New media offer new forms of engagement and interaction: The design of the media content should suit the specific medium, as well as be custom-designed for the specific environment, and in particular exploit its dynamic dimension and its potential to introduce *time* as the fourth dimension of a museum object.

4. Alternative narratives of existing museum objects and new ways of seeing: The evidence from the study also suggests that the integration of physical and digital space and the strong connection between the object (heritage building, archaeological object) and the digital content design can keep the emphasis on the object itself and powerfully affect the way visitors perceive it visually and intellectually, see it and understand it. It can render an invisible

object the highlight of the museum and dramatically extend the focus and attention span of viewers helping them 'to learn how to see', and heighten their feelings of presence and spatial awareness.

5. Contributing to the affective impact of objects and spaces on visitors: In addition to contributing to conceptual, intellectual and verbal understanding, digitally augmented experiences can complement this with additional modes, creating responses which are embodied, sensory and affective, thereby engaging diverse audiences.

6. Balance between the intellectual and experiential, between framing and open endedness: In terms of conceptual media content design, as suggested by our practice-based investigation, creating a balance between framing and open-endedness is critical to communicating meanings while allowing viewers to exploit their own imaginative and intellectual resources for experiencing the media intervention.

From a spatial point of view

7. Constructing meaning through space: Visitors can be strongly aware of the interplay between media content and the museum's physical and spatial environment, and use this to construct meanings. Space can become an integral part of interpretative processes.

8. Space and social context: The research highlights that a deeper and systematic understanding of the architectural space (created through the building layout) and the sensory environment (created through the digital medium) is essential. Different spatial and visual configurations shape different local behaviours, including different patterns of social co-presence between visitors.

9. Integrating space and technology: As the research begins to show, there seem to be rich possibilities and opposing strategies in relating space and technology – as for example, one in which the spatial potential (e.g. to create distancing, containment and enclosure or visual links) is used to support the impact of the media installation, and another in which the media installation as a lived experience can act as an enabler to *reorder* space and create a sense of continuity

through spaces, and weaken the boundaries between spaces.

10. Exploiting different spatial possibilities: As suggested by spatial and observation data, a configuration of space which offers many opportunities –for example, a space that reconciles the two imperatives of 'society and solitude', and so allows for a shared, and so social, experience, and a comparatively more private contemplation– can assume a positive function and contribute to the creation of an environment that fosters visitors' engagement and sociability.

11. Carefully considering affordances: The media installation could unintentionally dominate visitors' experience. Careful consideration of the conceptual, spatial and media affordances is key to avoiding possible issues such as crowding, social media-driven behavior or negative impacts on nearby objects due to changes in space use and visitor dwell time.

From a practical point of view

12. Control over the physical location of the intervention: From a technological point of view, successful implementation of a media installation requires a large degree of control over the physical location in which the technology is employed. This is particularly challenging in the case of historic buildings and archaeological displays, which inevitably set requirements and impose their own restrictions on the implementation of the installations.
    Beyond the initial implementation period, the financial implications for the maintenance and the operation of the installation for a longer time period should also be considered.

13. Environmental and technical considerations: Working with real-world conditions can be challenging. Light intensity and projection resolution can influence how viewers engage with the installation. Light intensity could also affect the museum object and its material properties and sensitivity to light, when applied for a long period of time. Other factors such as image quality, size, shape, resolution, or the intensity or direction of natural daylight—varying throughout the day—can also play a role. While sound intrusion

may be acceptable for temporary installations, it must be carefully assessed for long-term use.

14. **Navigating stakeholder dynamics through iterative investigation and implementation:** Success relies on coordinating diverse interests through dialogue and collaboration, coupled with a design approach that evolves in stages, which is critical in the implementation of media projects in museum contexts, in that it allows the growth of trust and self-awareness of the parties involved (e.g. museum curators and designers), and enables finding a common language.

A Final Reflection

It may be argued in conclusion that, although it is acknowledged that there is no single method of inquiry that could ever fully capture complex interlinked phenomena of body, meaning and mind, the proposed methodology, with its iterative implementation and reflection, allows us to link architecture to museology, and spatial analysis to digital experimentation. As the interaction between these fields becomes increasingly important, insights from the development and implementation of MUSEE (2022-2025) can inform further research. By bringing a rigorous perspective to the interdisciplinary field, and by opening up new perspectives in the practice-oriented and evidence-based design of digital sensory environments in museum settings, the project can contribute to positively impacting contemporary social and economic goals of wider access to culture and sustainability, so benefiting both institutions and people.

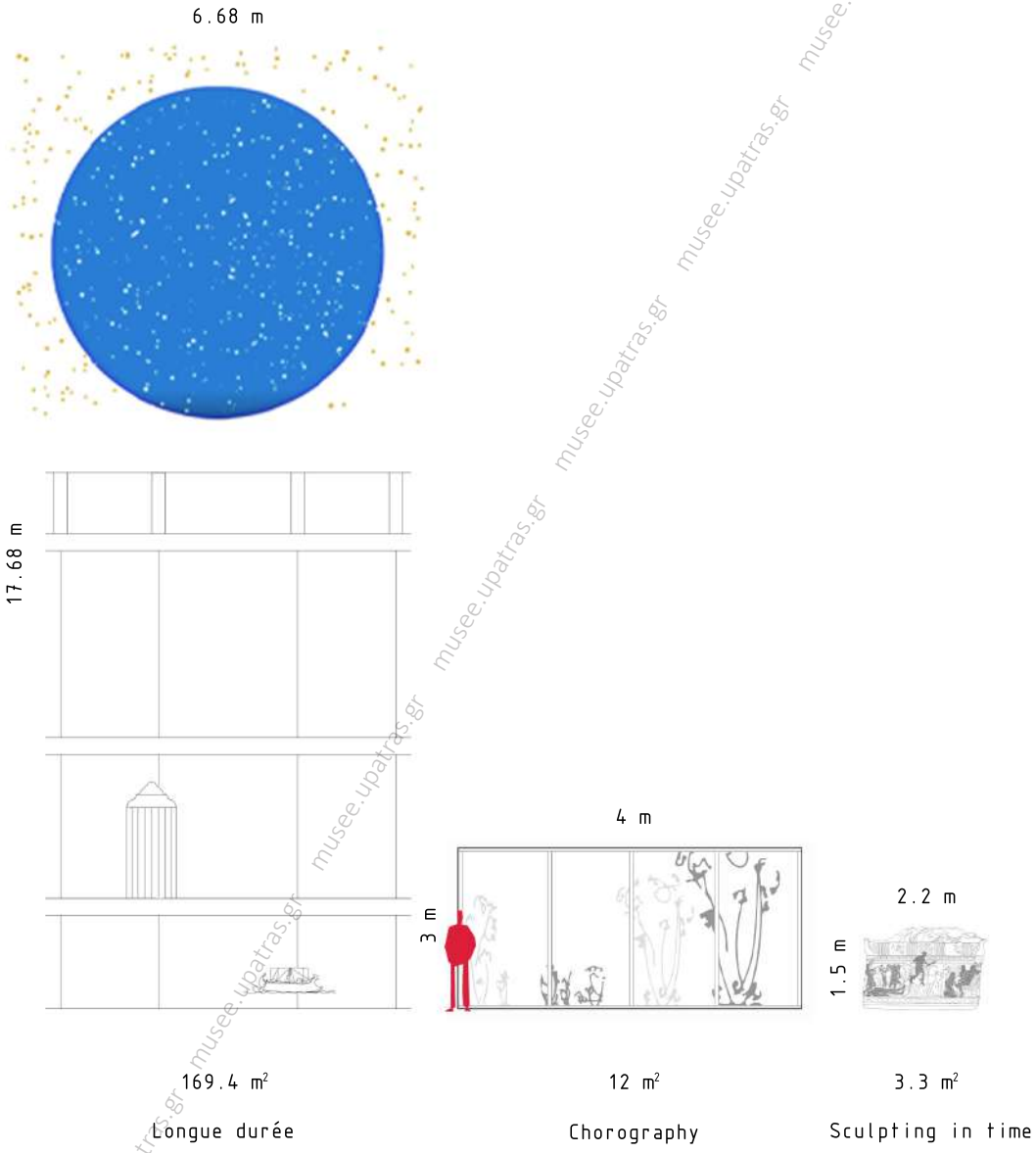


Figure 5.1
Visual comparison of the interventions: size (l, w) m. of each of the three media displays.

	Longue durée	*Sculpting in time*	*Chorography*
Object of media project	ancient monument	archaeological object	museum building
Duration	European Heritage Days – 3 days / September 2022	13 months / June 2023-July 2024	7 months / August 2024-February 2025
Media content (visual and audio)	animation graphics - narrative sections soundscape	animation graphics visual effects - music sound effects	animation graphics - narrative music sound effects
Size (l, w) m. of media display	6.68 x 17.68	4 x 3	2.2 x 1.5
Conceptual relation to museum narrative	informative, immersive experience, communicating historical information, integrated in the building	experiential, integrated in the museum	informative, integrated in the museum
Purpose of audio content	informative	atmospheric	informative
Attributes of interactivity	dynamic, communicative -	dynamic, communicative -	dynamic, communicative, interactive: triggered by visitor movement
Mediated experience	immersive	affective / emotional	informative / symbolic

Table 5.1
Overview of the interventions from a media content design and implementation point of view.

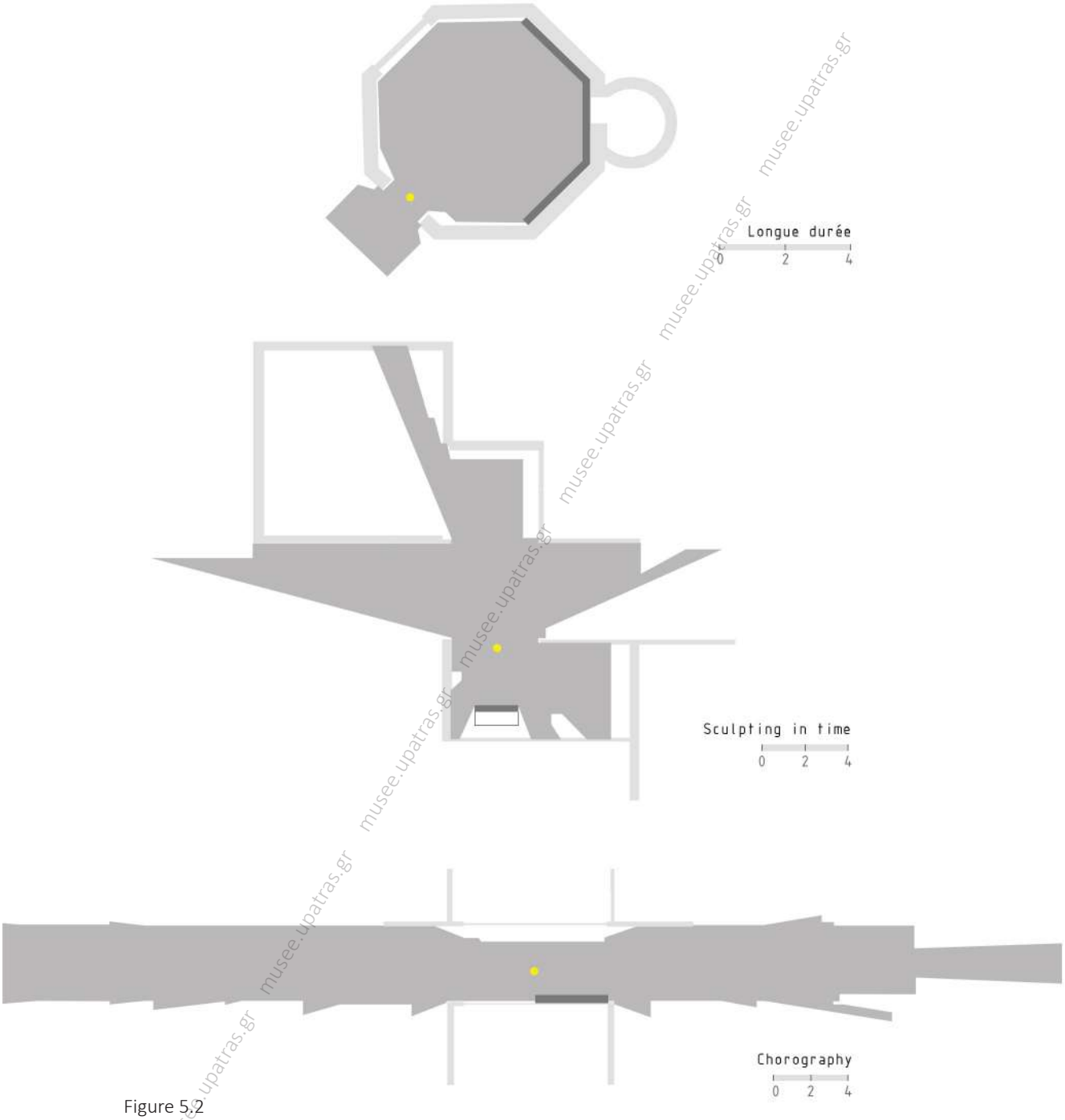
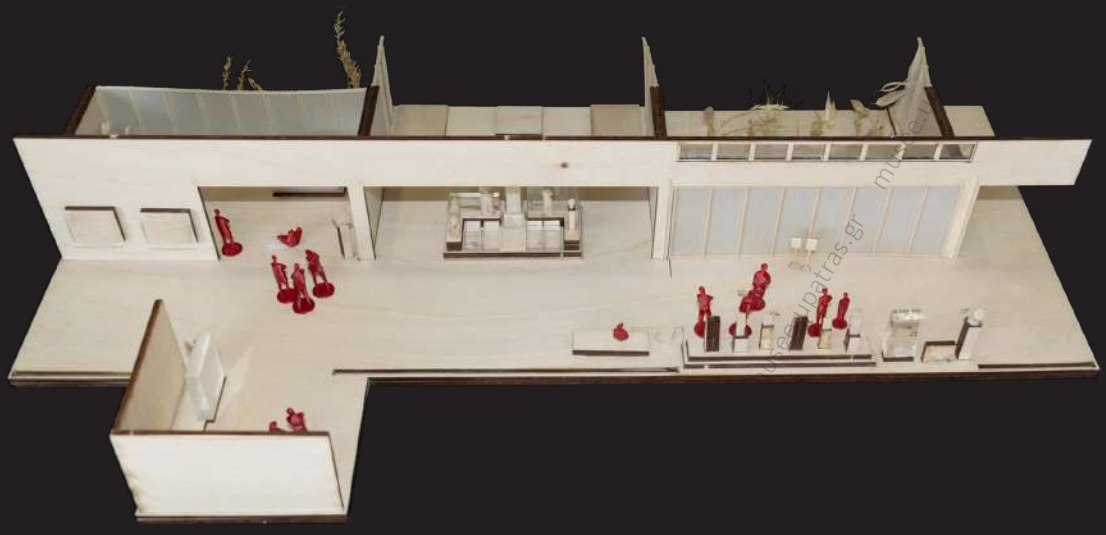


Figure 5.2
Visual comparison of the media interventions: the diametrically different isovists drawn from key points of their interaction spaces.

	Longue durée	*Sculpting in time*	*Chorography*
Location/spatial setting	interior space of an ancient monument	in a gallery in a permanent museum exhibition	corridor space in a permanent museum exhibition
Space type	single-space building	*a-space* (destination space with a single entrance)	*b-space* (traversed space leading to an a-space or other b-space)
Spatial shape of installation space	octagonal	convex	axial / transient
Degree of visual integration	highly integrated single space	relatively segregated but next to the most integrated space	part of the integration core of the museum
Visual structure of the spatial setting	controlled omni-directional visibility	localized view of space but also visibility across boundaries (both to the outside and to other spaces)	open and distant visibility
Axial vista	opposite the entrance axis	at the end of a short local axis, not on the main axis of movement	on the main axis of movement
Orientation in relation to visitor path	different visual planes	frontal view	lateral view
Patterns of social co-presence	collective spectatorship	shared encounters and co-presence	dynamic brief co-presence

Table 5.2
Overview of the interventions from a spatial point of view.

Figure 5.3
Testing and experimentation. Scale models (1:50) of the Archaeological Museum of Ioannina.



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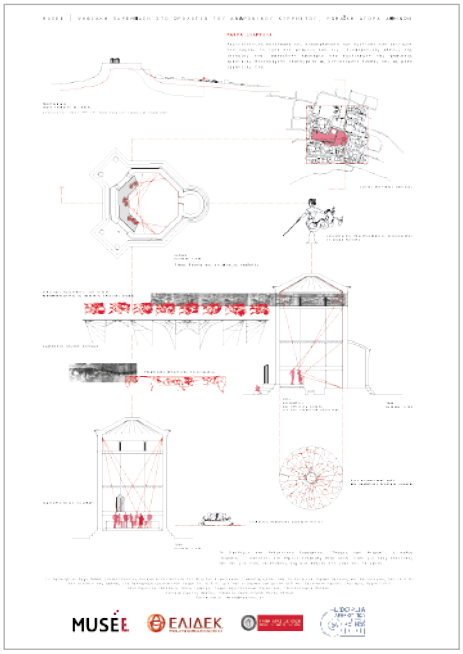

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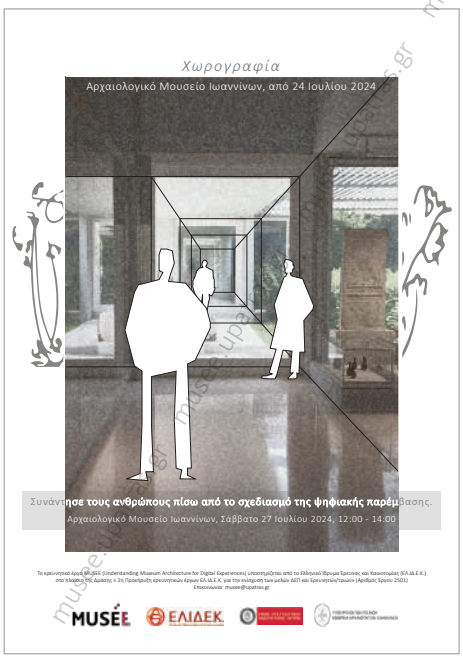

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Thanks to: the Antiquities guards of the Ephorate of Antiquities of the City of Athens and the museum guards and technicians of the Archaeological Museum of Ioannina

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Special thanks to Eftihia Maria Kontogeorgopoulou for defining the visual character and quality of the publication

DESIGNED COVER IMAGE:
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Unless otherwise specified all photos by the research team.
pp. 15, 22-23, 27: Horologion of Andronikos of Kyrrhos – Ephorate of Antiquities of Athens City © Hellenic Ministry of Culture/Hellenic Organization of Cultural Resources Development (H.O.C.RE.D.) (L. 4858/2021)
Figure 2.3 (second row, left and middle): *A brief guide of the Archeological Museum of Ioannina,* 2024, pp. 160 and 164
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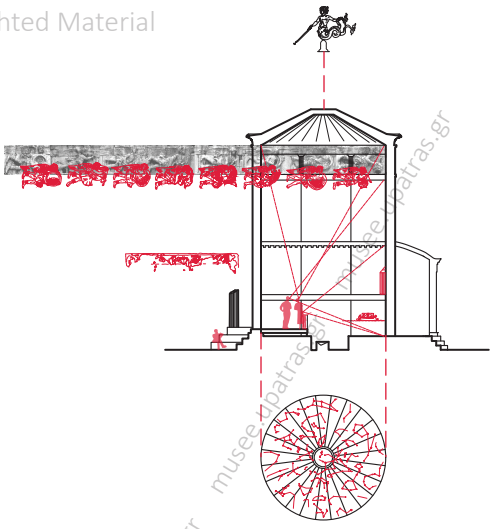

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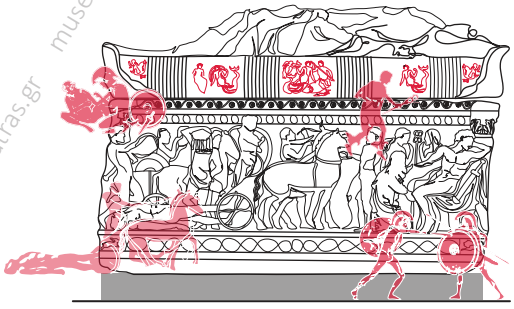

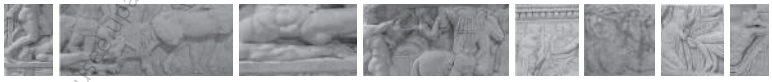

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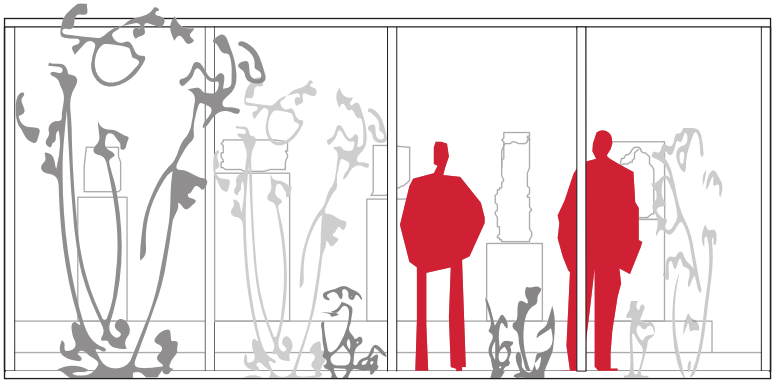

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Ωρολόγιο Ανδρονίκου Κυρρήστου, 2022

Το ερευνητικό έργο «MUSEE | Understanding Museum Architecture for Digital Experiences» υποστηρίχτηκε από το Ελληνικό Ίδρυμα Έρευνας και Καινοτομίας (ΕΛ.ΙΔ.Ε.Κ.) στο πλαίσιο της Δράσης «2η Προκήρυξη Ερευνητικών Έργων ΕΛ.ΙΔ.Ε.Κ. για την ενίσχυση Μελών ΔΕΠ και Ερευνητών/τριών», 2022-2025 (Αριθμός έργου: 2501)|musee@upatras.gr

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Αρχαιολογικό Μουσείο Ιωαννίνων, 2023-2024

Το ερευνητικό έργο «MUSEE | Understanding Museum Architecture for Digital Experiences» υποστηρίχτηκε από το Ελληνικό Ίδρυμα Έρευνας και Καινοτομίας (ΕΛ.ΙΔ.Ε.Κ.) στο πλαίσιο της Δράσης «2η Προκήρυξη Ερευνητικών Έργων ΕΛ.ΙΔ.Ε.Κ. για την ενίσχυση Μελών ΔΕΠ και Ερευνητών/τριών», 2022-2025 (Αριθμός έργου: 2501)|musee@upatras.gr

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MUSEE
Understanding Museum Architecture
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RESEARCH PROJECT INFORMATION

TITLE:	Understanding Museum Architecture for Digital Experiences
ACRONYM:	MUSEE
PROJECT NUMBER:	2501
FUNDING BODY:	Hellenic Foundation for Research and Innovation (H.F.R.I.)
CALL:	2nd Call for H.F.R.I. Research Projects to support Faculty Members and Researchers
PRINCIPAL INVESTIGATOR:	Kali Tzortzi, Department of Architecture, University of Patras
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PARTNER INSTITUTIONS:	Ephorate of Antiquities of Ioannina/ Archaeological Museum of Ioannina and Ephorate of Antiquities of the City of Athens
DURATION:	2022-2025
PROJECT WEBSITE:	musee.upatras.gr