POLITECNICO DI MILANO

Scuola di Architettura e Società

Corso di Laurea Magistrale in Pogettazione Architettonica e Storia

Adaptive Reuse of Corte Vecchia
Palazzo Ducale, Mantua

Relatore: Prof. Luigi Mario Spinelli

Tesi di Laurea di

Dina Elaraby 850076
Eyoel Guush 851957

Anno Academico 2016/2017

ACKNOWLEDGEMENTS

We would like to express our appreciation to our principal supervisor Prof. Luigi Mario Spinelli for his constant guidance and encouragement.

We would like also to thank Prof. Antonio Mazzeri and Prof. Francesco Fassi for their support and assistance within the framework of the workshop “Antico e Nuovo” in Casa Mantegna, May 2017.

Finally, We would like to thank our friends and colleagues in Politecnico Di Milano, Mantova Campus for continuous support and encouragement in our 2- year stay in Mantova.
Till we meet again.

ABSTRACT

The design proposal on which the thesis developed in is Corte Vecchia, the oldest nuclei of the Palazzo Ducale, which is of significant historical and architectural value. The challenge of designing in such a complex space with its history and transformations over time is to understand the relationship between the old structure of the Corte Vecchia and the new proposed function and how they relate to each other. Corte Vecchia, a complex of buildings of different time periods that were also transformed over time, its oldest structure, Magna Domus, predates the rise of the Gonzaga family. It was a home for GianFrancesco Gonzaga, Isabella D'este and Gugliemo Gonzaga, and accommodates significant works of architecture such as Santa Croce chapel, the first palatine church in the Gonzaga court.

The proposed exhibition space, challenged with the changing demographics, growing visitor expectations and developing technologies, explores the use of new technologies to enhance the visitor's experience. Additionally, creating additional media for comprehensive communication in museum and how it can shape the museum space and the narrative path of the museum, putting the visitor as a protagonist along with the objects. The design proposal aims to enhance the spatial experience of the building; exposing the architecture of this overlooked part of the Ducal Palace of Mantua and defining a new exhibition space that can work autonomously or complementing the function of the Palazzo Ducale museum.

The Palazzo Ducale, the city within the city, is a complex of rooms, apartments, courtyards, gardens and galleries that expanded and transformed over time. One of these is the Corte Vecchia, the oldest part of the palace, which predates the rise of the Gonzaga the family. It accommodates several works of historical and artistic value such as the Il Ciclo of Pisanello, the .Tapestries by Raphael and the extensive rococo decoration in Sala dei Fiumi

The setting of this design proposal (work /project) takes place in Corte Vecchia, The scope/ extents of the encompasses; Santa Croce chapel: a late gothic church and the first palatine church in the court of Gonzaga that was constructed in 1422 for GianFrancesco Gonzaga and his wife Paola Malatesta, the tunnel underneath the refectory, the Refectory, that which used to be an academy of art in the 1700's, and Sala dei Fiumi, an extensive rococo decorated room that looks over the Giardino Pensile. The space comprises different volumes from different periods of times and of different dimensions that were altered and transformed over time. The proposed design aims to unify these dispersed spaces through a contemporary function, an exhibition .space, and enhance the space through the introduced architectural elements

The Museum as a Space

This analysis is focused on studying the elements that shape the museum space; by museum space we don't mean just the physical characteristics of the space and the individual spaces of the museum, but the complex relations between spaces and how they are connected and how this shapes the way people move in the space. We will examine this through three main points; the sequential narrative in the museum, the object-user relationship and the visual fields in the space.

Museum Narrative Models

From the 1920's, comparing museums to narrative texts became an important museographic notion, this notion suggests that the cognitive process in the visitor path is like a timeline and that the human perception is linear and temporal like a literary text. The narrative and the spatial circulation are two main interconnected themes of a museum, how the space would shape the movement of the user and how the user perceives the object in the space. We can mainly classify the narrative models as linear, multilinear, free plan and hypertext. The affinity between museum and literary texts doesn't mean necessarily that all museums can be read as a text but it's a way to understand what design possibilities can come from it

- Linear Sequence

The linear sequence or plot is associated with the need to create an order of display, in the early examples of museum such as the Uffizi Museum in Florence; the long corridors were regarded as perfect setting for sequential display. A more recent example is the Guggenheim Museum in New York; the museum is organized as a single linear sequence, one continuous fluid story focused on the visitor’s experience and his cognitive process and not on the order of the artworks. Although the sequence of the museum is linear, the Guggenheim Museum is one of the early examples of the progression of museums from being encyclopedic to being a narrative.

- Multilinear Sequence

The most complex narrative systems are the ones that contain multiple interwoven stories, they could be a series of stories told one after another or inclusion of a story inside another or alternation where two stories that aren’t linked but told simultaneously. These multiple narrative structures allow a wider exploration of reality, by overlapping and offering multiple readings of the story. In museum design, a parallel path narration can be found in the new Mercedes Benz Museum in Stuttgart, where two parallel overlapping spirals are chasing each other, one exhibits the chronological collection of the car models, the other shows the evolution of the cult of the German can manufacturer. The museum offers a double route that may be visited sequentially or simultaneously with a central void. The duplication of the story offers multiple readings of the same object in different contexts. A more complex narrative structure example is Steven Holl’s design for the competition of MOMA Museum in NYC. The architect identified a set of routes categorized by art type and set in a chronological order (paintings, sculpture, photography, video, architecture, new media) creating a story that illustrates the diverse nature of the contemporary art. Then he outlined a system of transversal connections that crossed

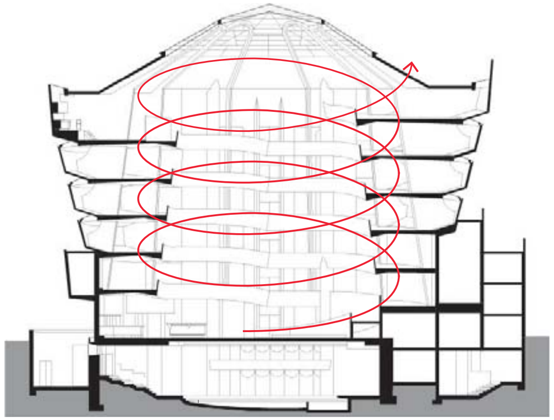


Fig 1.1 Guggenheim Museum linear Sequence, New York

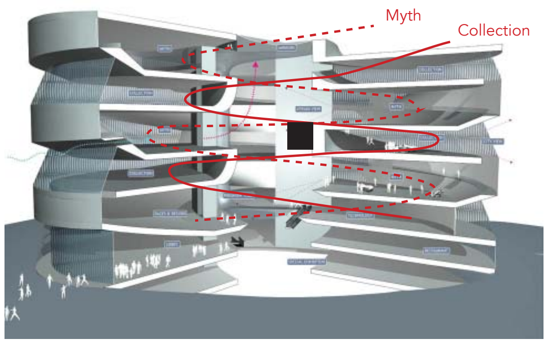


Fig 1.2 Mercedez Benz Museum Multilinear Sequence, Stuttgart

the vertical sub division of the museum. This gives the visitor the chance either to choose a specific reading of the evolution of an individual art or a reading across the various genres.

- Free-Plan Sequence

This sequence is a variation of the linear sequence where rooms or galleries can be accessed from a central space without the need to pass through another space. This type of spatial layout allows the visitors different possibilities of movement by breaking down of the linearity of the story-telling. Breaking up the linear plot hasn't however diminished the importance of the narrative structure in the construction of the text. On the contrary the structure acquired a new importance to give the story cohesion. Based on this idea, museums shouldn't be arranged to one single arrangement but should be based on a model with multiple outcomes, branched structures and networks to provide a comprehensive enriched understanding of our surroundings.

The entry for Centre Pompidou competition in 1971 by Richard Rogers and Renzo Piano yielded a deeply innovative museum, a transparent changeable machine with moveable floors and walls which allowed innumerable combinations. It wasn't a response to flexibility though but an experiment based on principles of contemporaneity. The museum had no rooms, no visiting route; the linear narrative was broken in favor of freedom and interpretation. The director of the museum wanted to create a city-like experience route through the works that didn't suggest a direction of movement, where the visitor is allowed to move freely even risking losing his way.

Fig 1.3 Pompidou

- Hypertext Model [1]

“Hypertext is non sequential writing, text that branches and allows choices to the reader, best read at an interactive screen. As popularly conceived, this is a series of text chunks connected by links which offer the reader different pathways” [2]

The fundamental aspects of hyper-textual structures may be considered as: modular and reticular (netlike) content organization; presence of various types of links that connect the text modules; absence of unique and mandatory reading direction. This kind of spatial circulation offers a number of alternatives for the visitor and don’t underline a dominant direction, Where readers can follow their own routes in expected or unexpected direction, go forward, stop or go back.

The theme of a museum organized following the hyper-textual model was studied by Zaha Hadid in the National Museum of XXI century of Arts in Rome (MAXXI), where the visiting routes cross each other, overlapping in various directions. The setting of spaces and exhibitions do not suggest a certain direction as the visitor can choose where to go spontaneously. Walking through the galleries can evoke feelings of confusion but also of playfulness and surprise; there are constantly new openings, angles, and spaces to explore when turning the corner. This complicated network is clear in the atrium where the various connections between the exhibition halls overlap.

Fig 1.4 Zaha hadid

---

[1] This term was used by Schiatteralla, A. (2014) Narrative Structures for Museum Design = Logiche Narra
tive Nella Progettazione Museale. Bari: ILIOS Editore, p. 146.

[2] Nelson. T.H. (1990). Literary machines. California: MINDFUL Press (CA). p. 2-3.

Object-User Relationship

This analysis is to explore the layout of the objects within the space, and the relationship between the object and the user. For a long time, visiting a museum remained a passive visit where the visitor 'looks' at the object as the objects were placed behind a showcase or hung on the wall. After the Second World War, Italian museums underwent a radical change of how the visitor should relate to the works of art. Among the protagonists of this period were Franco Albini, BBPR and Carlo Scarpa. Castelvecchio by Carlo Scarpa is one of the significant examples of how the exhibits are set to bring out the qualities of architectural space and enhance the experience of the visitor.

Case study: Castelvecchio Museum in Verona

Castelvecchio complex in Verona was modified with an intervention by the architect Carlo Scarpa; it was a complex of historic buildings from different periods, and it consists of the Reggia wing and the Napoleonic wing, connected through the twelfth century city wall that splits the complex in two. In the museum of Castelvecchio, major axes are the recurrent and found consistently on each floor; on the lower floor, the Napoleonic wing has a strong axis emphasized by the arched openings that passes through the sculpture galleries. Other two strong axes are in the paintings gallery; the north axis (parallel to the river) is at celling height and connected to the outside by the Cangrande node by the pavement and leads back to the entrance. The south axis has a similar paving to the gallery paving, punctuated by door like openings cut into the walls and act like an extension of the gallery space, these two axes present two patterns of movement, one is linear and continuous, the other is winding and interrupted. In the Reggia wing, on the first and the second floor, there is also an important axis that runs from the entrance to the dead end room. Each of these axes is anchored at one end by an element of the outside space; in the sculpture galleries by the *Porta del Morbio* (the gate under the bridge that was discovered by Scarpa during the excavation), in the Reggia wing by the *Torre del Mastio* (the tower that accommodates the vertical circulation) and in the paintings gallery by the *Cangrande della Scala* node.

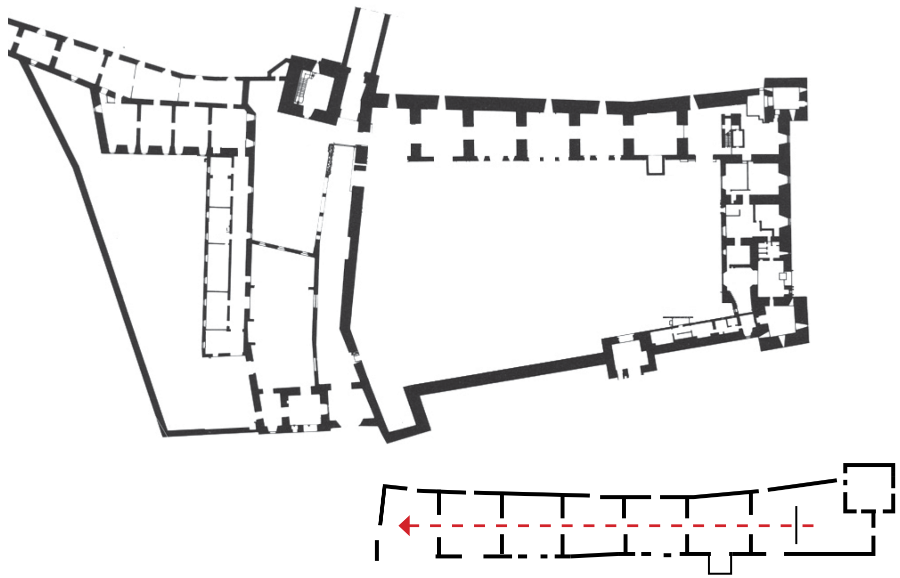


Fig 1.5 Castelvecchio Sculptures Gallery, Ground Floor, Verona

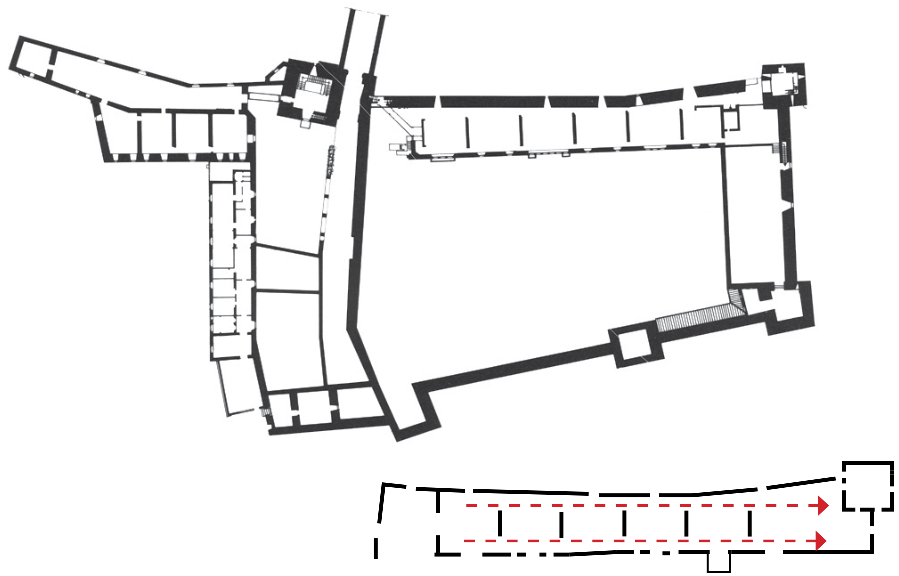


Fig 1.6 Castelvecchio Paintings Gallery, First Floor, Verona

In regards to the spatial layout of the objects, the objects in the museum Castelvecchio aren't placed axially but off center which is really evident in the Sculpture Gallery on the ground floor. The statues are placed on specially designed pedestals creating a void between the statue and the floor; they seem to be floating in the space, and positioned with specific orientations. A key principle of Castelvecchio is then it doesn't have a static point of view: the viewer comes up to the objects from behind, or moves around it or among it to face their front. A similar strategy was used in the Painting Gallery for example the Pisanello's *Madonna della Quaglia*, where the visitor is invited to enter the room guiding him to the back of the easel and then he has to turn to face it. Scarpa's experimenting with the different depositions of sculptures reaches its peak with the *Cangrande della Scala* equestrian statue. The vista of the statue keeps recurring to the visitor during his visiting route, from the entrance to the gallery and above the twelfth century wall, allowing the visitor to explore it from above and below even through the fourth dimension and its perception through time.

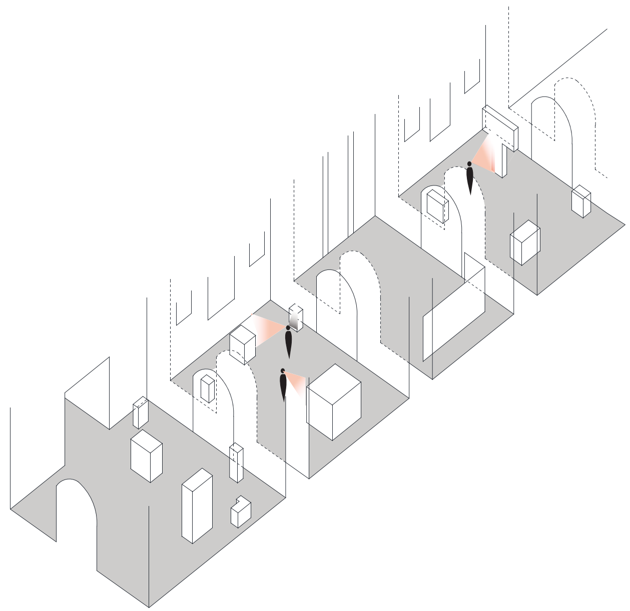


Fig 1.7 Castelvecchio Sculptures Gallery Layout

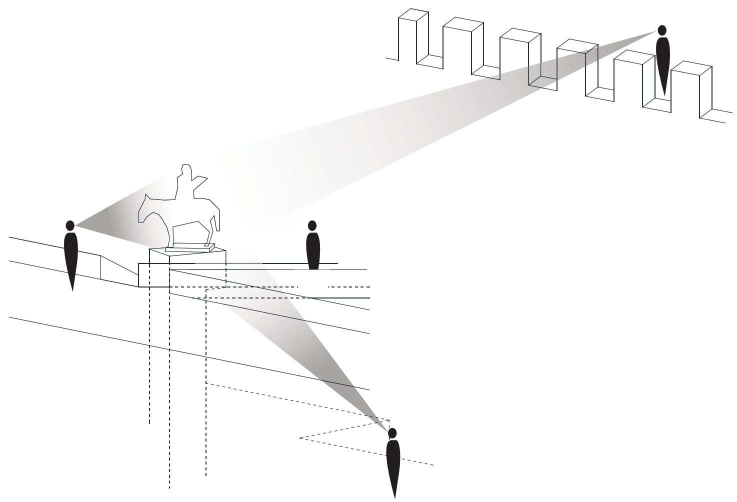


Fig 1.8 *Cangrande della Scala* Different Vistas

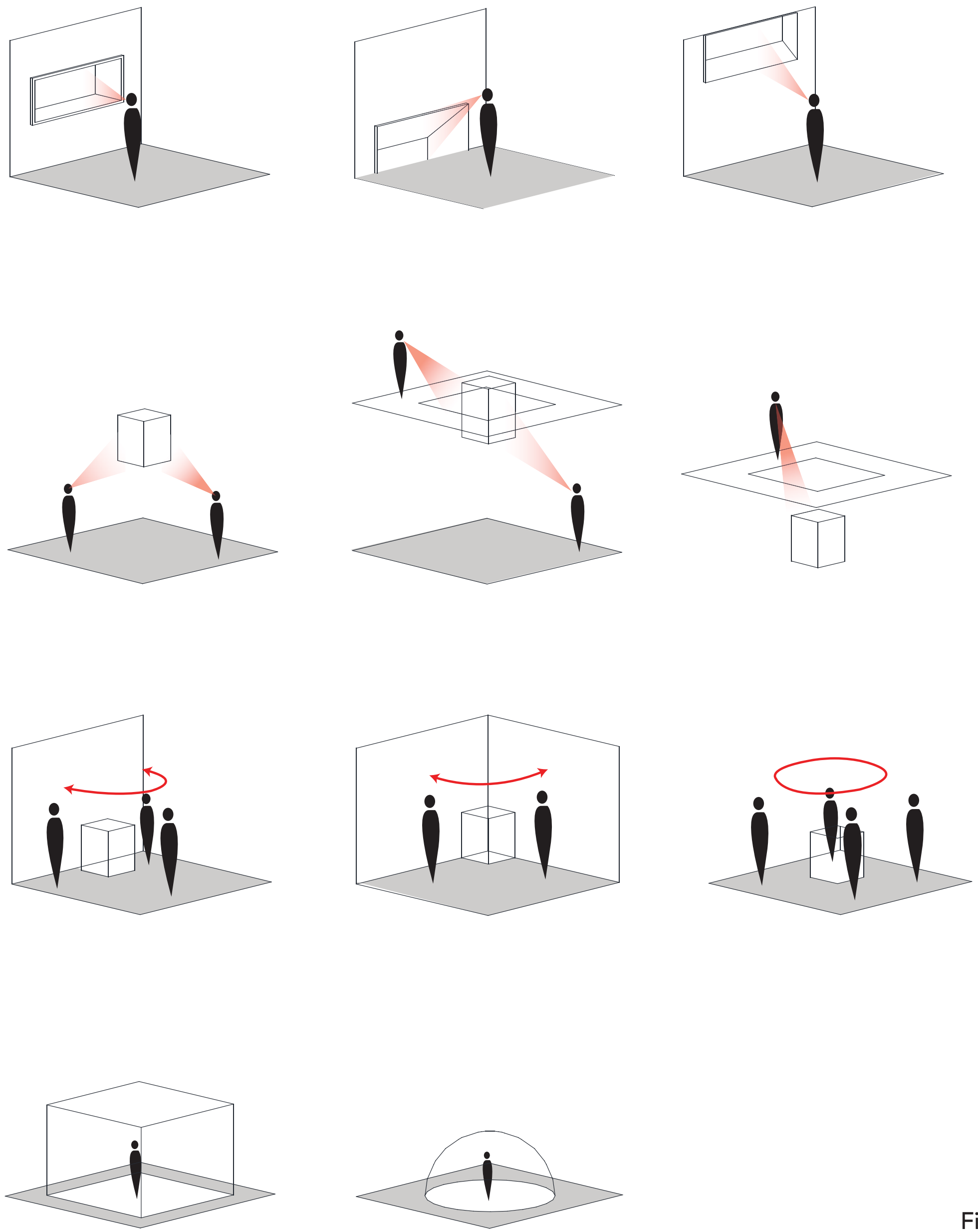


Fig 1.9 Different Scenarios of Object-User Relationship

Visual Fields

Isovist: an isovist is the set of all points visible from a given vantage point in space and with respect to an environment [3]

Isovists are constructed to study the perception of architectural space, to measure the limit of the visibility of a visitor and how it changes as he moves through a space. By using this tool, we can map the visual fields perceived from each point and understand the complexity of the routes in the space. Studying the visual fields makes us also understand the movement of the user through space, which spaces are more visible and therefore are more visited, and which are less visible and consequently less visited.

Case Study : Centre Georges Pompidou in Paris

The museum is a landmark in the history of architecture as the first museum-forum characterized by flexibility, democratic access and in close relationship with the city and its territory. In 1971, the winning architects, Renzo Piano and Richard Rogers realized the building in accordance with the international competition guidelines to build an authentic interdisciplinary laboratory, emphasizing the democratic and experimental spirit of the place. One of the rudimentary requirements of the competition was the facilitated access; to allow passerby to enter through every side and not only through one specific entrance. The original layout was designed as one plan layout, articulated by moveable panels which could be placed in clusters or dispersed in space; the uninterrupted spaces offered a random and not sequential approach. The museum went through a few transformations in the following years: Gae Aulenti was commissioned to remodel the fifth floor in 1985, where she tried to conserve the idea of moving freely and exploring the space. In 1997, the museum was renovated by Jean Francois Bodin in collaboration with Renzo Piano.

---

[3] Benedikt, M. L. (1979). To take hold of space: isovists and isovist fields. Environment and Planning B: Planning and Design, 6(1), p. 47.

The Centre Pompidou is organized around a long axis which referred to as the Grande Avenue, which gives access to the galleries on both sides. The galleries are organized in clusters of two or three units; each of these clusters has its own internal axis which is parallel to the main axis of the museum. On both sides of the cluster narrow galleries between the clusters acts as a transition spaces in terms of organization of the space.

The visual organization is dense and multidirectional which offers overlapping planes at different depth. Despite the complexity of its urban-like layout, isovists are structured along the main axis to offer glimpses through the narrow openings without exposing the adjacent galleries; isovists engineered within the galleries offer visual fields that expose new parts of the gallery. This sequence in isovists, hinting at places to come, invites the movement of the visitor to go further and explore among the galleries like an urban neighborhood which was one of the requirements of the competition in 1971.

Fig 1.10

“A museum is a non-profit, permanent institution in the service of society and its development, open to the public, which acquires, conserves, researches, communicates and exhibits the tangible and intangible heritage of humanity and its environment for the purposes of education, study and enjoyment.”

ICOM Statutes, the 22nd General Assembly in Vienna, Austria, August 24th, 2007

The 'New' Museum

Today, museums are challenged with ever-changing demographics, growing visitor expectations and developing technologies. However, Museums are rethinking their spaces, they are becoming narrative space that are concerned with the way a story is told, putting the visitor as a protagonist, along with objects, where he can build his own path and choose to interact passively or actively, this interaction and this two way communication between the visitor and the museum which are the core values of the reinvented museum [4].

Technology can aid in enhancing the visitor's experience and creating additional media for comprehensive communication in the museum. Embracing technology can even expand to there is the heritage digitalization, Thanks to Laser 3D scanning and photogrammetry, it is now possible to have a digital survey of high accuracy of a specified building, sculpture or painting. What is meant by 'New Technologies'? By 'New Technologies' we refer to multimedia systems, interactive 3D graphics systems in real time, systems for digitizing and cataloging cultural goods and large-scale networking technologies through sharing a common communication protocol (Internet). The new introduced technology is visually based and interactive, it also encourages perceptual-motor learning method, making it easier for the users to learn.

This new technology is appealing to the users for three main characteristics.

- They are visual; the center of communication is image based and not text. This is specifically relevant to the sector where the treated objects are mainly visual in nature such as paintings, monuments, archaeological sites and sculptures.

- They are interactive; they require the user to act, choose and answer. This creates multiple paths that contribute to the structure of communication. Interactivity acts on how learning and processing knowledge takes place. These processes can take place in two distinct modes, the first is symbolic-reconstructive; which a process that involves decoding and then rebuilding the transmitted concept. The second is perceptual-motor; a method that takes place through watching, touching and testing.

- They are connected; they are easily accessible and connected virtually to unlimited sources of information.

[4] Anderson, G. (2012). Reinventing the museum the evolving conversation on the paradigm shift. Lanham, Md: AltaMira.

Instruments of Traditional Communication

- Panels: it is the most traditional medium for transferring knowledge in the museum, however special design consideration should be taken into account such as the amount of text, the colors, the lighting, its position within the exhibition and relationship with the object concerned.

- Audio Guides: An audio guide is a handheld audio instrument that provides the museum visitor with information about the exhibits. The instrument though doesn't encourage interaction between the visitors, as they are isolated and cut off by the headphones. However, its comfort lies in being able to receive information at the same time as observing the work, what is harder possible in the presence of a written text that requires a continuous shifting between the exhibit and the written text.

- Paper Leaflet: Another traditional explanatory tool, its main advantage is that it is easy to hold, foldable and instantly accessible unlike the panels, it could include information about the path of the museum and the collection it holds.

- Audio-visual: they are tools that simultaneously implement images and sounds to communicate useful information or insights to the visitor. They should not be placed next to exhibits not to disturb the other visitors. Their limit lies in the fact that they play in a continuous cycle and not according the visitor's will, the visitors have to wait until the end to be fully appreciated.

- Guided visits: although it's a traditional communication tool, it's one of the most interactive ones as it features a man to man interaction and stimulates active participation between the visitor and the guide.

- PDA (Personal Digital Assistant): They are handhelds mobile devices with touch screens and wireless connectivity. Recent models are context-aware and could include multiple sensors and GPS. They could work as a museum map, leading the visitor along a predetermined path or a custom path. In museums, these devices could identify room or he works in the museum through RFID (radio frequency identification) or in some cases by QR codes.

Innovative Technology in Museums

Recent museum studies are concerned with the 'visitor experience' and how to enhance it. How the museum exhibition design can expand to meet the new needs of the users. The user no longer wants to passively interact with the exhibits, he wants to interact and be a part of the narrative. This question led to the emerging terms such as interaction design and user experience design in the circles of museum exhibition design. As mentioned before, Interaction is a phenomenon that involves people, exhibits and a context. Interaction Design aims to develop interactive products, which are technologies, environments, objects, applications, or devices that are easy, effective, enjoyable and adaptive to their contexts of use, its main purpose is to bring usability into the process of design. The Interaction Design is a multidisciplinary field, ranging from ergonomics, engineering, to psychology, software engineering, sociology, art, design. Experience design however, focuses on the overall experience between a user and a product. It is not just concerned with the interactive elements but also the way that certain elements appear, feel and how they deliver their output.

Virtual Reality

Immersiveness : an immersive system is one in which the user feels that he is inside a virtual world, due to the feeling of being naturally surrounded by it. Wherever they may look, the virtual world appears in front of them. This is achieved by the use of three main hardware systems that will be discussed later: head mounted displays, CAVEs and panoramic projection systems .

- Head mounted displays (HMDs): these systems based on tracking of the user's head orientation to send the image of the virtual world corresponding to the user. This device is responsible for monitoring the position and orientation of the user. In some cases, users are linked to the computer system by means of wires, normally using auxiliary devices to manage the way in which movement is simulated across the virtual world without physical displacement. Later versions manufactured feature wireless devices without the need for wires and thus liberating the movement of the user.

- Cubicles with wall projection (CAVEs): this is an example of an immersive, non-multi-user system with limited passage, most of the time a 3 x 3 m. room. These systems follow the user's movements, projecting on the cubicle walls stereographic images which are reconstructed in three dimensions thanks to the shutter glasses worn by the user. Thus, the person using CAVE is able to watch three-dimensional objects. Although this installation used by one user at once, it is usual to have several users viewing this installation simultaneously which encourage passive interaction, however the projected image corresponds to the viewpoint of the only user who is wearing the glasses.

- Panoramic projection screens: head mounted displays are essentially single user display systems that cut off the user from the outside world. Although this isolation can lead to very strong immersion, it significantly reduces the usability of these systems. While the CAVE is a multi-planar system of projection and can hold more than one user, correct and optimal viewing is only delivered to the single head tracked participant. Panoramic projection is another way to achieve the immersion by overflowing the visual environment of the user with images, the spaces are developed to become architectural, to simulate and visualize virtual environments. To get a seamless and a good resolution images, several overlapping projectors sending single or stereographic images to the screen are used. The projection field could be so vast that it may cover the vision field of a group of people, this kind of systems encourage interaction between the users however the users are in a fixed position. And there is no need for users' head tracking.

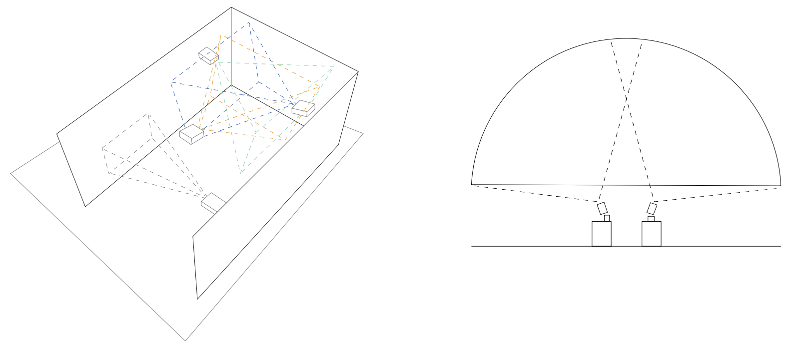


Fig 2.1 Panoramic Projection Screens

Multi Touch System and Natural User Interface NUI

This system is based on the direct interaction between the visitor and the machine. People naturally communicate through gestures, expressions, movements and this the core idea of the NUI (Natural User Interface). Interactive tools have evolved so that they are easier to use thanks to NUI, these systems understand people 'natural' actions and gestures, at the same time, reducing the time to learn and thus making learning intuitive by observation, as natural as possible.

In order to interpret human expressions, sensors are used and technologies that capture input from the environment, such as camcorders, microphones, RFIDs while the output could be in the form of two-dimensional display, such as LCD panels, plasma screens or video projections on surfaces such as walls (Sensitive Wall), floors (Sensitive Floor) or tables (Sensitive Table) or three-dimensional display systems such as holographs or virtual reality.

The NUI aims at eliminating mediators such as keyboards, mouse, etc., these mediators are replaced with either video projections or responsive surfaces. In the first case, we are dealing with a simulated multi-touch interface; the touch is detected through a system of cameras that are connected to optical sensors that detect the movement of the objects. In the second case, we are talking about a pure multi-touch interface: the touch is detected on a specific surface that is able to detect several points of contact independent from each other. Multi-touch tools are used and can be used simultaneously by a more than one user, this type of experience, in theory; it should encourage collaboration between visitors. The interactive table consists of a display connected to a computer that, thanks to the software, interprets and reprocesses the requests of multiple users touched at the same time the surface. The interactive wall and interactive floor react with sensors that cover their surface, sensitive to the pressure exerted by the users. The sensors activate the software that in turn drives a projector that starts with images, videos, and sounds. The difference is in the positioning: vertically or horizontally.

Another type of these interactive instruments is the holographic projections. There are two types of holographic projections; in the first typology, anthropomorphic forms are used governed in different application areas. In the second, the NUI image can be realized through three-dimensional systems represents the interface of an information system.

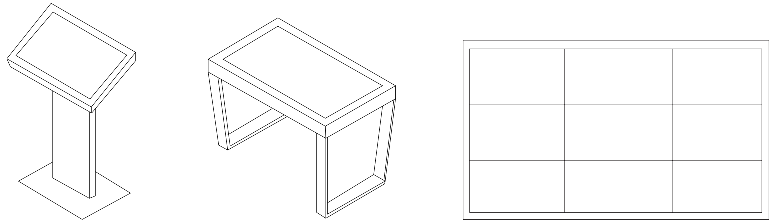


Fig 2.2 Multitouch Surfaces; Kiosks, Table or Walls

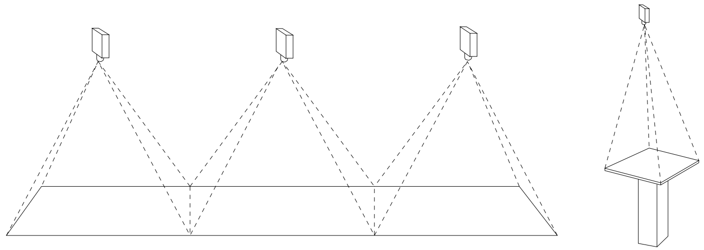


Fig 2.3 Interactive Surfaces; Intercative Floors, Interactive Tables

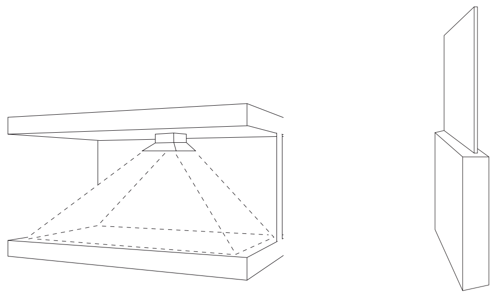


Fig 2.4 Holographic Instruments; 3D Systems, Holographic Stands

Sensitive Environments, *'Ambienti Sensibili'*

It's a term elaborated by Studio Azzurro, to describe a space that reacts if it is touched, stepped on, or acoustically stimulated. In this space, the central role of the spectator is emphasized, thanks to innovative interactive technology that is cleverly concealed.

These 'Sensitive environments' offer the opportunity for social interaction, the choices are the result of the visitors' actions, Encouraging people to approach as naturally as possible, to start dialoguing and to allow further immersion in these 'sensitive' environments. The Studio specifies two main characteristics of their installations that address the issues of 'Virtual' and 'interactivity', which are the creation of spaces of 'Collective Fruition' and the use of 'Natural Interfaces'. Sensitive environments are the result of Natural Interaction, blending the place where the interaction takes place together with the display and the visitor gestures. The body and its gestures are back to be the reals means for space exploration and a learning tool.

Case study 1
Palazzo Pepoli – Museo della Storia di Bologna, 2012

Palazzo Pepoli is the city history museum of the city of Bologna. The museum is housed in the medieval palace that dates back to the 13th century; the palace was transformed and altered through the years with overlapping floors, ceiling and paneling. The restoration of the palace was carried out by Mario Bellini Architects, The rehabilitation work first to consolidate the building structurally, subsequently, the recovery of each of the rooms of the palace and its decoration that was altered over the years. The most important task of the architect was to create the harmony between the historic building and the proposed function. The inner courtyard was covered to be used an entrance hall and a collective space between the different exhibitions. The other important design decision was the glass and iron tower in the middle of the courtyard, the tower is housing the stairs and the elevators for the vertical connection between the different floors.

The museum is designed on two floors, between forty rooms that tell the history of Bologna from the Etruscan time to the present day. The narratives are told in an innovative and dynamic scenic display techniques and interactive technology. The exhibition design was designed also by Mario Bellini architect, Italo Lupi and Studio Base 2, a multimedia design studio. The narration is chronological: it starts from the ground floor and then through the tower to the first floor. The narration develops using key episodes in the history of the city interrupted by specific thematic spaces; 'Forma Urbis' thematic room, that display a part of an original Roman street with a reconstruction of a portion of Bologna's old porch and old city sign boards; 'Citta d'acqua 3D', a visual reconstruction of Bologna as a city of waters, explaining the relationship between the city, economy and its local water system. The installation is created with laser beams inside a covered hall of mirrors that creates an immersive visitor experience; the 'city of Languages', devoted to the development of Bolognese dialect, its evolution and relationship with other Italian dialects and languages.

Fig 2.5 The New Vertical Core in Palazzo Pepoli

Fig 2.6 Bologna, Citta d'Acqua

Fig 2.7 Forma Urbis Thematic Room

One of these thematic rooms, a room that houses periodically updated daily news from local newspapers that are displayed and archived in a database that can be browsed by touchscreen. The last three rooms - 'Your Museum' - where citizens can display their own small collections associated with a special moment or memory; 'the people of Bologna speak' where it is possible to listen to talks by distinguished Bolognese figures from the contemporary world of politics, culture and sport, that recount experiences or particular points of view on the city, available through seven touch-screens with headphones.The last room acts as a visitor's book, a blog site where visitors can express a thought, comment, suggestion or a memory connected to a certain place in the city on a geo tagged map.
The entire narration combines objects such as images, engravings, books, sculptures, furniture and fabrics, clothing and embroidery, with multimedia elements. The collection, owned by the Bank Foundation CARISBO, it isn't specifically large; that's why the museum is more focused on story-telling rather than being collection oriented. The museum uses different communication tool exploiting theatrical languages and concepts of scenography, creating immersive spaces and historical reconstructions. The exhibition elements are detached from the wall, self-supported and comprise the necessary technical facilities including the electrical and lighting systems. The exhibition tools are custom designed by Mario Bellini and Italo Lupi and based on different variations of a three dimensional cage of a squared white frame that hosts the collections and supported by information panels, texts, drawings and other graphic tools.

The communication tools

- The three-dimensional cage. The three-dimensional cage has been constructed with coated steel square-section (25 x 25 mm) tubes. The works are showcased in structures which isolate the work and underline its position within the narrative of the museum and of the museum's itinerary. The square-section of the tubes houses the lighting system, a dimmer – in the cabinet's support – allows to control the quantities of warm and cool light emitted by the LED strips. This option means the right light mix can be found for all showcased works.

- The backlit panel. The backlit panel is made up of a Plexiglas sheet (approx. 200 cm x 270 cm (h), of a thickness of approx. 15 mm), supported by a steel frame, which also houses LED strips that light up the Plexiglas panel. The Plexiglas sheet his engraved with parallel horizontal strips. The light emitted from the LEDs strikes the engraved strips and transforms the sheet into a source of homogenous light. The Plexiglas sheet is overlapped with an opal polycarbonate panel with printed texts and images, and the panel, in turn, functions as an efficient diffuser of the emitted light. And thus the images and texts will be illuminated and staged as a powerful storytelling tool.

- The Teatrino. The Teatrino tool was used when there was need to compress a dense narration into a small space, becoming a sort of 'room inside a room', using different objects, pictures, newspapers, comics and presented together in one setting. This exhibition design is flexible, reversible and self-supporting with adjustable illumination for the various works it hosts.

The narrative of the building is based on visual communication, either by replicas, reconstructions, images or original objects. The main focus of the narrative is the visitor's experience although the story is told in a linear chronological narrative but the innovative exhibition design offers the visitors a unique interactive experience.

Fig 2.8 The Three-Dimensional Cage

Fig 2.9 The Back-lit Panel

Fig 2.10 The Teatrino

Case study 2
Sensitive City - Studio Azzurro
Shanghai World Expo 2010, Shanghai, China

Sensitive City is an interactive work presented by Italy in Shanghai Expo 2010 'Better City, Better Life'. The installation is a collection of images and the stories, collected in different Italian cities: Matera, Trieste, Siracusa, Lucca and others, to feature contemporary medium-sized cities those aren't touched by massive urbanization and consequently preserved its history, urban and architectural past. The city is shaped by the stories told by its inhabitants through their personal experiences and their memories. For this reason Studio Azzurro collected 100 people's testimony from each city with the aim to create a collection of audio visual portraits.

This exhibition employs the technology to create an immersive space that relocates the visitors elsewhere, by projecting life size figures on multiple vertical surfaces, only when the visitor grab him by the hand, the story bearer turns and starts telling his story. The places described by the story-bearer are also accompanied by images, drawings, paths, overlapping and expanded by the refractions of the projection glasses.

The user experience is highly emotional and absorbing, where visitors are surrounded by stories of cities and its inhabitants. The use of natural behaviors such as stopping a person by hand conveys a strong sense of connection and social presence, the low level of interactivity is balanced by the natural mechanics of interaction that makes the user forget they are using a technological system and enjoy a highly immersive experience. The layout of the exhibition allows multiple users to interact at the same time, recreating the conditions to socialize with other or eavesdrop as would happen in an urban environment. The installation is composed by a series of video projectors, holographic screens, high quality speakers and infrared triggering systems. It's a significant example of how technology can modify the relationship between people and space.

Fig 2.11 Senstive City Exhibition, Studio Azzurro

Fig 2.12 Senstive City Exhibition, Studio Azzurro

Case study 3
A Oriente. Città, uomini e Dei sulle Vie della Seta – Studio Azzurro 2011
Terme di Diocleziano, Rome, Italy

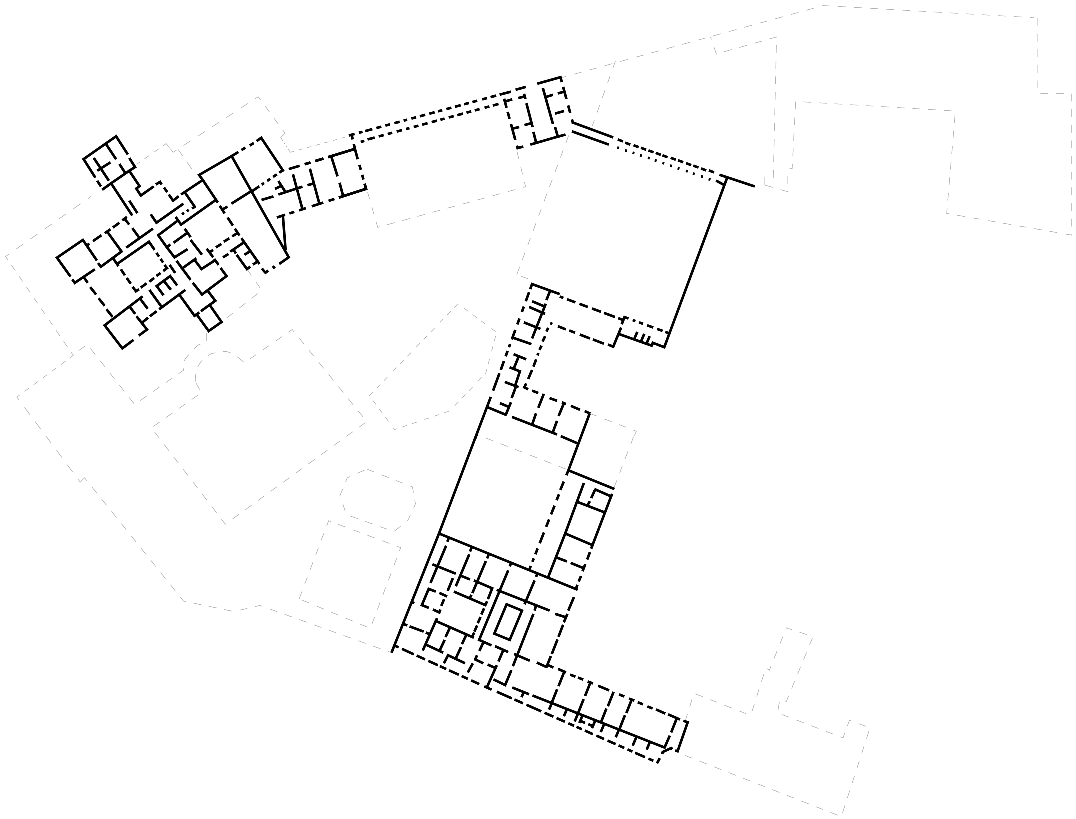
Another temporary exhibition by Studio Azzurro in the Diocletian baths in Rome: the exhibition narrates the intangible heritage of the Silk Route that passed through twelve cities - Palmyra, Tur ‹Abdin, Ctesiphon, Taq-e Bostan, Merv, Samarkand, Ghazni, the valleys of Swat, Kucha, Turfan, Dunhuang and Xi›an - from the second century BC to the 14th century AC, These cities housed different populations of different religions, cultures and traditions. The exhibition takes the visitor through an articulated multimedia path, learning how people lived together, understanding the complexity of this cultural system and listening to personal stories of people who lived along this road.
The exhibition is organized in eighteen multimedia stops connecting real objects on display with stories and characters of the past, using digital technologies and interactive booths. Each stop has to be activated by an interaction, some require just the presence of the visitor to be activated while others require an action to be performed just as flipping book pages or stepping on the floor. The exhibition mixes natural interaction such as flipping book pages with unconscious behaviors such as approaching a screen; there is no formal social interaction between the visitors but they can observe other visitor's experience.

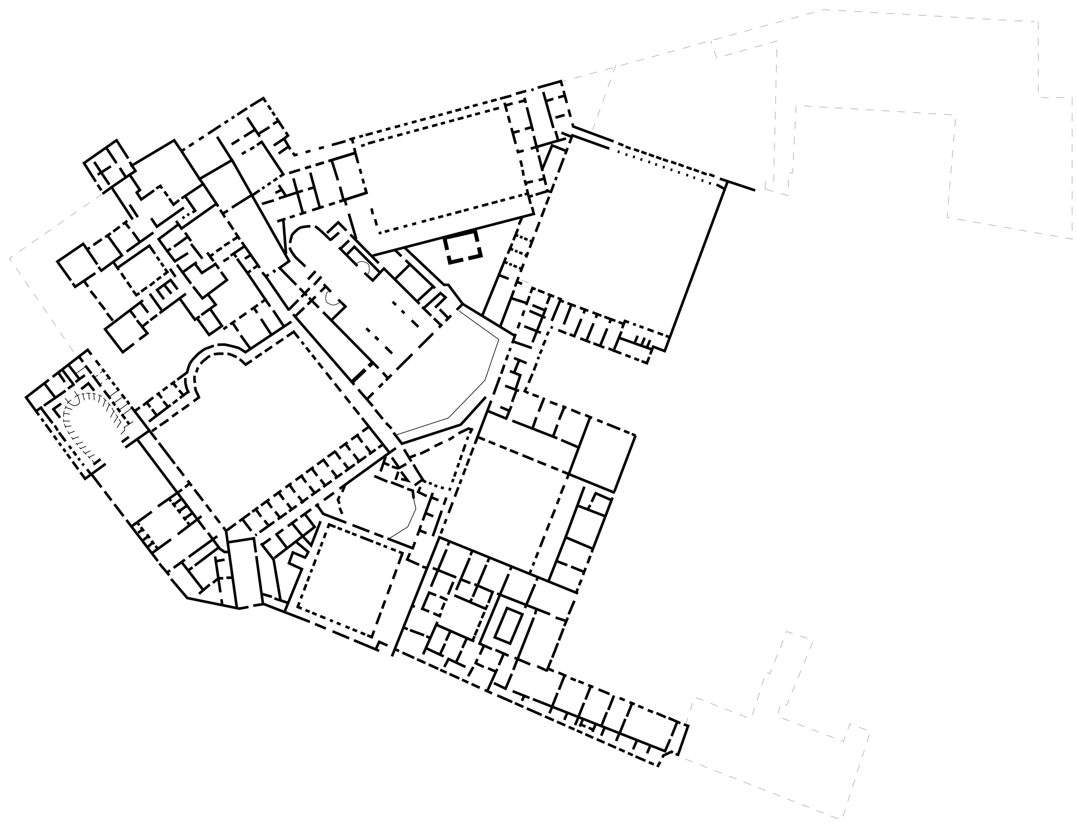
The installation is composed by a series of projectors, interactive HD video player, motion sensors, audio speakers, an interactive carpet, holographic plates and interactive books with RFID technology.

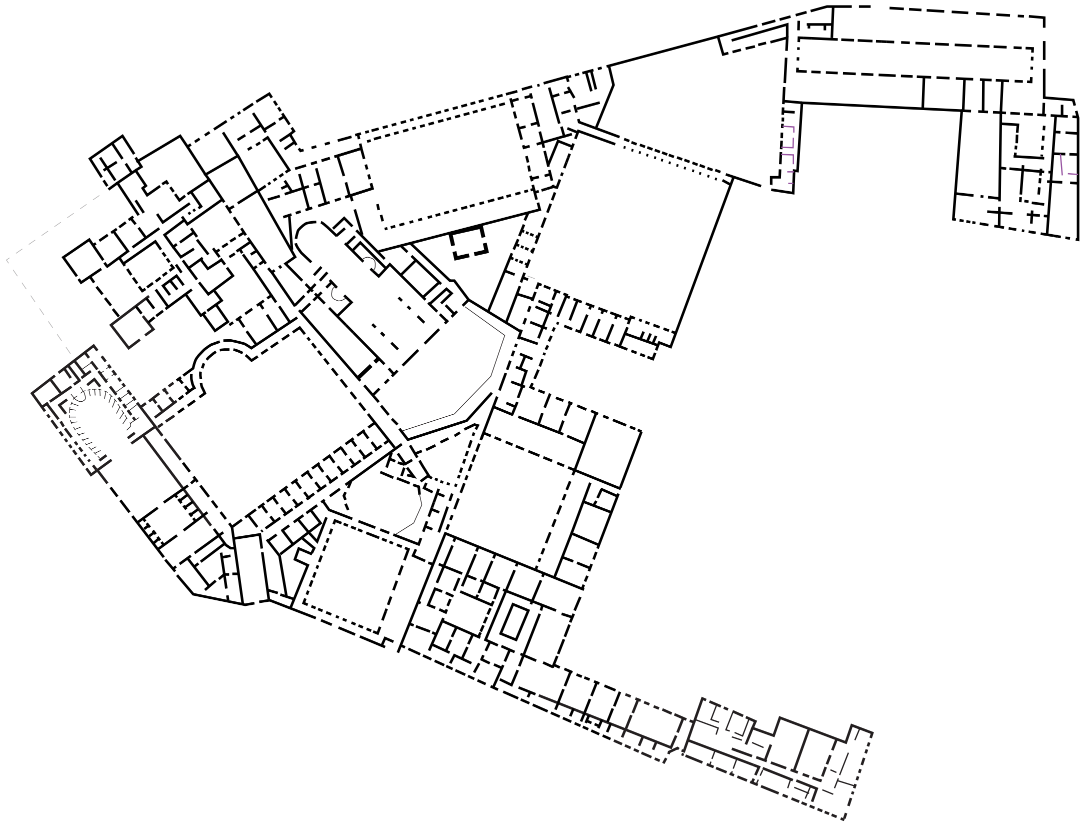
Fig 2.13 Video Projection in the Exhibition A Oriente, Studio Azzurro

Fig 2.14 Interactive Floor Installation in the Exhibition A Oriente, Studio Azzurro

CORTE VECCHIA AND PALAZZO DUCALE







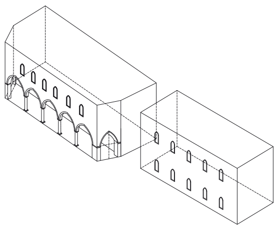
Corte Vecchia

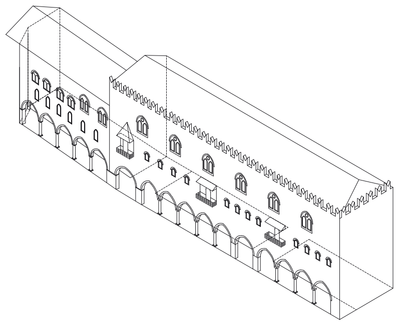
The oldest nucleus of the Palazzo Ducale, known as Corte Vecchia, predates the over throw of the Bonacolsi and the rise of the Gonzaga family in 1328. First of all , we have to understand the extents of the so called Corte Vecchia, the Corte vecchia encompasses the Magna Domus , Palazzo Del Capitano, The Palazzina that hosts Pisanello's cycle of frescoes and the Santa Croce apartments also known as Isabella D'Este apartments. Here we have a quick view of the historical development and transformations of the Corte Vecchia.

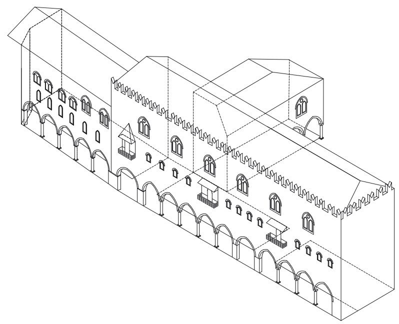
1300's

The facades with a clear medieval origins in the grand complex of the Palazzo Ducale are the Magna Domus , Palazzo del Capitano and the Palazzina that houses Il Ciclo di Pisanello. The first structure is the Magna Domus, which lies to the left of the current entrance and extends to the hanging garden. The Magna Domus was the result of union of two structures; a palace and an adjacent tower. The palace is believed to correspond to the first four bays of the porch while the tower corresponded to the fifth bay. The Magna Domus was inhabited by Guido Bonacolsi, captain of the people, and it is believed that under his direction the union of the tower and the palace, and the construction of the anterior porch took place, these works are believed to date back to 1308 [5] . The junction between the tower and the palace is still visible to this day. The edge of the building was chamfered which can be seen in the plan of the building, on the side that overlooks Piazza Sordello , which gave the shape of shape of semi-octagon. A part of the chamfered edge can be seen today on the side of the hanging garden.
The union of the Magna Domus was followed by another important union: the Magna Domus and the Palazzo del Capitano. The Palazzo del Capitano was of limited height and width, the current state as we perceive it today is believed that it took place during its union with the Magna Domus and the construction of the anterior porch in 1332 , four years after the overthrow of the Bonacolsi family, which subsequently allowed the construction of the gallery above the porch and the Salone dell'Armeria on the top floor. Palazzo del Capitano housed Luigi Gonzaga's sons; Filippino, Feltrino and Guido, later it became the official residence of the Captain of the people from the beginning of the 1400's.

The third medieval structure that exists in the old nuclei of the Corte Vecchia is the Palazzina that hosts Pisanello's fresco cycle and the Sala Dei Papi. The structure extends orthogonally to the Palazzo del Capitano and is believed that it was constructed between the second half of the 1300's and the end of the 1300's.







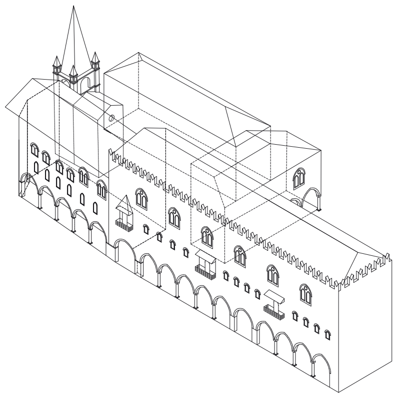
[5] LOccaso, S. (2002). Studi sul Palazzo Ducale di Mantova nel Trecento. *Atti e Memorie dell'Accademia Nazionale Virgiliana*, LXX, p. 142.

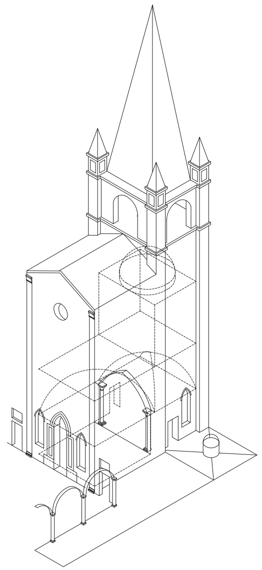
1400's

It was only in the 1400's under the reign of GianFrancesco Gonzaga that major works took place in the Corte Vecchia . First , starting with the demolition of the Bonacolsian Santa Croce, the concession for the demolition was granted in 1421. The church used to exist where the Giardino Pensile exist now. Successively, another Santa Croce was constructed inside the court in 1422 and so the adjacent apartments that are known as Santa Croce apartments that hosted Gianfrancesco Gonzaga's wife, Paola Malatesta , who was responsible for the maintenance of the church .

Santa Croce was built in the beginning of the 1400's, probably between 1421 and 1425 , under the supervision of the engineer Pace D'Arezzo , as a Palatine church inside the medieval complex of the Gonzaga's court. It started as a private church of GianFrancesco Gonzaga and his wife Paola Malatesta, supposing that she was living in the adjacent apartments that are known now as the apartments of Isabella D'Este. The chapel current façade is hardly comprehensible after the Austrian 1700's interventions. The church was narrow and high, framed with 2 pilasters and of a gabled roof. On the upper part of the façade, there are traces of an opening that probably allowed light into the superior oratory. The chapel was accessible on the two levels, there was an inferior church and a superior chapel of with the same dedication; the upper oratory had a height of almost the same as the inferior one. The inferior chapel consists of two rooms cross vaulted and separated with a late gothic which is richly decorated. The superior oratory was decorated with a stone rose window, through which the light filtrated the apse room. The lower oratory had its current extension; two rooms separated by a late gothic arch. The room that is bordering the courtyard is slightly bigger than the inner one and used to have the main entrance, flanked with two elongated lancet windows. The inner room used to house the altar and it received the light through an oculus that opened to Santa Croce road, the road was closed later to construct the current Giardino Pensile in the 1500's. The cortile of Santa Croce, where the church faces north east, was enclosed by 2 porches orthogonal to the façade , some sources suggest it was colonnaded on the 3 sides. From the outside of the complex, only the back of the church was visible and its slender late gothic bell and crowned with a pyramid shaped cone which can be seen in Bertazzolo map (date).

The typology of having a two leveled chapel refers to a specific typology famous in the Germanic area known as Doppelkapellen. Chapels of this typology are accessible on two different two levels communicating through a wide empty central opening (atrium). An example of this typology is the chapel of Aquisgrana in Aachen, Germany. In France, another typology of palatine chapels developed; 2 levels, both rectangular in shape but not communicating, where the first floor is open to public and the second level is reserved to religious ceremonies of the court members, the most notable example is Sainte Chappelle. In Italy the double church took various forms but it wasn't very common, which makes the Mantuan case a more significant one. It is possible that Santa Croce chapel was inspired by Sainte Chappelle of Paris during GianFrancesco Gonzaga's trip to Paris in 1389, accompanying Valentina Visconti and her husband Ludovico de Valois and thus used it as a model for his palatine church.



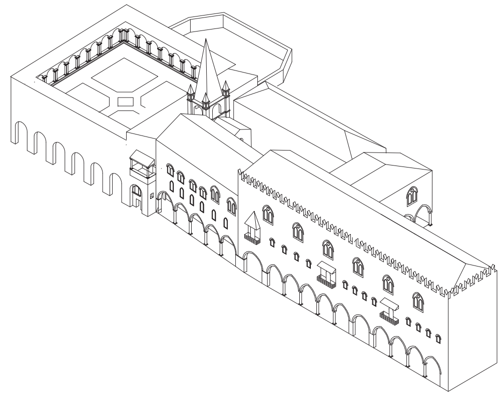


1500's

The Corte Vecchia, that was the center of the power for a century and a half of the Mantuan state, lost its political prestige with the end of the council of Mantua in 1459, when the Marquis Ludovico II moved to the Castello San Giorgio. Various transformations were carried by Federico I who took upon himself the construction of the Domus Nova and Federico II, his successor, who renovated the castle and expanded the new part with new monumental rooms that were modeled by Giulio Romano and Titian, which we know today by Corte Nuova. The Corte Nuova became the seat of the duchy of Mantua for 50 years.

The greatest merit is reserved to Isabella D'este who from 1515 began to construct the refined apartments of the Grotta in a new structure with ideal continuity with the Palazzina that hosts the cycle of Pisanello. Near her death in 1539, Isabella used to live in the apartments of the Grotta as well as the ground floor of the apartments of Santa Croce. The two apartments of the Grotta and the Santa Croce create the Corte d'Onore.

It was during the reign of the Duke Guglielmo Gonzaga, when major transformations in the Corte Vecchia took place; the duke built a new palatine church dedicated to Santa Barbara which was designed by Pompeo Pedemonte. Between the late 1570's and the beginning of the 1580's, works in the Giardino Pensile and the Sala Nuova (currently Sala dei Fiumi) took place along with the refurbishment of Santa Croce apartments, transforming it to the Appartamento Verde and finally the Cortile delle Otto Facce. another intervention executed by Guglielmo was the long staircase from the Cortile Santa Croce to the Refettorio level, which can been in Crevola plan drawings of the Corte Vecchia. Guglilemo abandoned the Castello San Giorgio and moved to the Corte Vecchia after its refurbishment.



1600’s

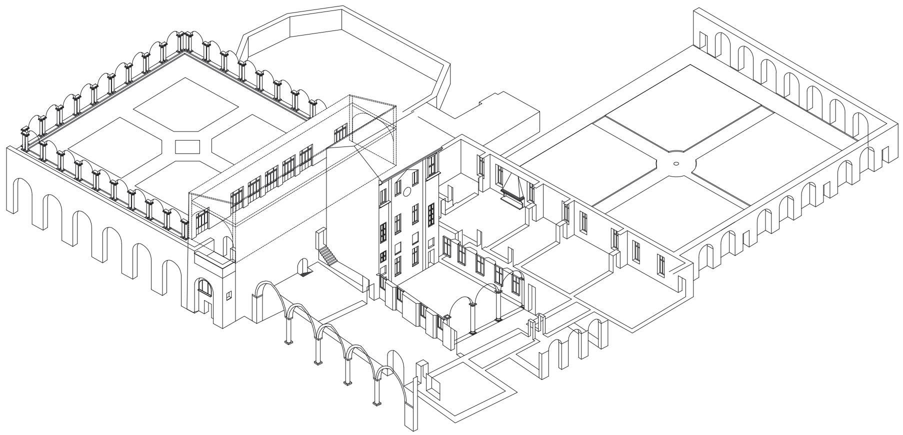
There are no significant changes in the Corte Vecchia in the 1600’s. Around 1607, Eleonora di Medici, wife of Vincenzo I, restored the upper chapel of Santa Croce with the intervention of Anton Maria Viani.

1700’s

After the death of Eleonora, the chapel was part of the apartments of Caterina di Medici, wife of Ferdinando Gonzaga, the oratory had to be redecorated in 1704 due to the sales in 1627-1628 and the sack in 1630-1631.

During the Austrian rule in 1708 , various interventions in the Corte Vecchia took place that changed its structure until nowadays; the loggia of the Sala Nuova was closed and the room was redecorated in extensive rococo decoration that gives its current name Sala dei Fiumi. The loggias of the Cortile Santa Croce were closed and the façade of the church was irreversibly altered. In 1780’s , all the apartments of the Corte Vecchia including the chapel of Santa Croce were heavily transformed and irreversibly modified; the pilasters in the façade of the chapel were chiseled away, Its internal decorations were removed , the ground floor became a pantry and the upper oratory disappeared and finally the bell tower was demolished. The levels changed completely, where there were the two-superimposed oratories, there are now three levels. The cross vaults were demolished and a new staircase knows as Scala dell’Impatrice was added.

The chapel of Santa Croce was a casualty of the neoclassicism of Paolo Pozzo which made it impossible now to appreciate the splendor of the first palatine church of the Gonzaga court.



BIBLIOGRAPHY

On Museums

- Achilli, F., Ballarin, M., Barranha, H., Ciolfi, L., Cuenca Julià, A., Dalla Mura, M., ... & Nikolic, M. (2012). Museum and Design Disciplines.

- Allen, J., & Lupo, E. (2012). *Representing Museum Technologies*. Milan: Politecnico di Milano.

- Allen, K. R. (2016). *Building Bridges between the Virtual and Real: A Study of Augmented and Virtual Realities in the Museum Space and the Collaborations That Produce Them*. Retrieved July 8, 2017, from www.escholarship.org/uc/item/67g7f83h.

- Anderson, G. (2012). *Reinventing the museum the evolving conversation on the paradigm shift*. Lanham, Md: AltaMira.

- ARUP. (2013). *Museums in Digital Age*. Retrieved July 08, 2017, from http://publications.arup.com/publications/m/museums_in_the_digital_age

- Batty, M. (2001). *Exploring isovist fields: space and shape in architectural and urban morphology* . Retrieved July 8, 2017, from https://www.researchgate.net/publication/23541237

- Benedikt, M. L. (1979). To take hold of space: isovists and isovist fields. *Environment and Planning B: Planning and Design*, 6(1), 47-65.

- Butti, A. (2013). Musei di narrazione: Studio Azzurro e il Riwaya Museum. Percorsi interattivi per preservare memoria, territorio e tradizioni locali.

- Buzzi, M. C., Buzzi, M., Leporini, B., & Marchesini, G. (2013). Improving user experience in the museum. *Proceedings of the IADIS—Interfaces and Human Computer Interaction,* pp. 327-331.

- Cameron, F., & Kenderdine, S. (2007). *Theorizing digital cultural heritage: A critical discourse*. USA: MIT.

- CEFRIEL. (2008). L'evoluzione dei musei con l›Information and Communication Technology.

- Co, F. D., & Mazzariol, G. (1984). *Carlo Scarpa: the Complete Works.* Milano: Electa EditriceRizzoli.

- Erkaya, G. (2008). *From scriptural to spatial:"labelling" as a metaphor to understand museum space* (Doctoral dissertation, Middle East Technical University).

- Ferrari, M., & Di Vizio, E. (2011). Proposta per un museo. Il caso dei musei di Giuseppe Pellizza da Volpedo

- Hernández, L., Taibo, J., Seoane, A., López, R., & López, R. (2003). The empty museum. Multi-user interaction in an immersive and physically walkable VR space. In Cyberworlds, 2003. *Proceedings. 2003 International Conference* on (pp. 446-452). IEEE.

- Hookk. D. *Museum of the Future Insights and Reflections from 10 International Museums*. Mu.Sa, Retrieved July 08, 2017, from www.academia.edu/32830180/Museum_of_the_Future_Insights_and_reflections_from_10_international_museums.

- Huber, A. (1997). *Il Museo italiano: la trasformazione di spazi storici in spazi espositivi: attualita dellesperienza museografica degli anni 50: the conversion of historic spaces into exhibition spaces: the relevance of the museographical experience of the fifites = The Italian museum*. Milano: Lybra immagine.

- Krukar, J. (2014). Walk, Look, Remember: The influence of the gallery's spatial layout on human memory for an art exhibition. *Behavioral Sciences*, 4(3), 181-201.

- Merwood, J. (1997). *Ten Projects for the MOMA*. Lotus International (95). Milano:Electa

- Murphy, R. (1990). *Carlo Scarpa and the Castelvecchio*. London: Butterworths Architecture.

- Nelson. T.H. (1990). *Literary machines*. California: MINDFUL Press (CA).

- Peressut, L. B., Lanz, F., & Postiglione, G. (2013). *European museums in the 21st century setting the framework* (Vol. 2). Milan: Politecnico di Milano.

- Peressut, L. B., Lanz, F., & Postiglione, G. (2013). *European museums in the 21st century setting the framework* (Vol. 3). Milan: Politecnico di Milano.

- Peressut, L. B., Colombo, C. F., & Postiglione, G. (2014). *Museum multiplicities: Field actions and research by design*. Milan: Politecnico di Milano.

- Pescarin, S. (2014). Museums and virtual museums in Europe: reaching expectations. *Scires-it-scientific research and Information Technology*, 4(1), 131-140.

- Rosa, P. (2011). *Dai musei di collezione ai musei di narrazione.* DISEGNARECON, 4(8), 129-138.

- Roussou, M. (2000). Immersive interactive virtual reality and informal education. *Proceedings of User Interfaces for All: Interactive Learning Environments for Children* (pp. 1-9). Retrieved July 08, 2017, from http://www.academia.edu/download/30907503/10.1.1.25.8911.pdf

- Schiatteralla, A. (2014). *Narrative structures for museum design = Logiche narrative nella progettazione museale*. Bari: ILIOS editore.

- Simon, A., & Gobel, M. (2002). The i-Cone/spl trade/-a panoramic display system for virtual environments. *In Computer Graphics and Applications, 2002. Proceedings. 10th Pacific Conference on* (pp. 3-7). IEEE.

- Simonsson, M. *Displaying Spaces: Spatial Design, Experience, and Authenticity in Museums*. Retrieved July 08, 2017, from http://www.academia.edu/12494806/Displaying_Spaces_Spatial_Design_Experience_and_Authenticity_in_Museums.

- Stavroulaki, G., & Peponis, J. (2003). The spatial construction of seeing at Castelvecchio. *In Proceedings of the 4th International Space Syntax Symposium* (pp. 66-1). London: University College London.

- Turpeinen, O. (2005, May). Researching the Visual Qualities of Exhibition Design through Experimental and Cross-Disciplinary Methods. I*n Nordic Design Research Conference*, Copenhagen, Denmark

- Tzortzi, K. (2016). *Museum space: where architecture meets museology*. London: Routledge, Taylor & Francis Group.

- Valli, A. (2007). *Natural interaction*. White Paper

- Wang, J. (2015). Application and Design of New Media in Museum Exhibition and Display. *NCEECE 2015*. Amsterdam: Atlantis Press.

Sitography

- http://www.studioazzurro.com/
- http://www.genusbononiae.it/palazzi/palazzo-pepoli/
- http://www.bellini.it/
- https://www.architectural-review.com/
- http://www.archdaily.com/
- http://www.ennezerotre.it/

On History of Palazzo Ducale and Corte Vecchia

- Berzaghi, R. (1985). La Corte Vecchia del duca Guglielmo: tracce e memorie. *Quaderni Di Palazzo Te*, (3). Modena: Panini.

- Bonora Previdi, C. (2003). la rifunzionalizzazione di Corte Vecchia. *Il Palazzo Ducale di Mantova* (pp. 291-314). a cura di G. Algeri, Mantova: Sometti.

- Carpeggiani, P. (2002). Il progetto del Palazzo Ducale (1549–1587). *Gonzaga: La Celeste Galeria: Le Raccolte*. Milan: Skira.

- LOccaso, S. (2005). *Fonti Archivistiche per Le Arti a Mantova Tra Medioevo e Rinascimento (1382-1459)*. Mantova: G. Arcari.

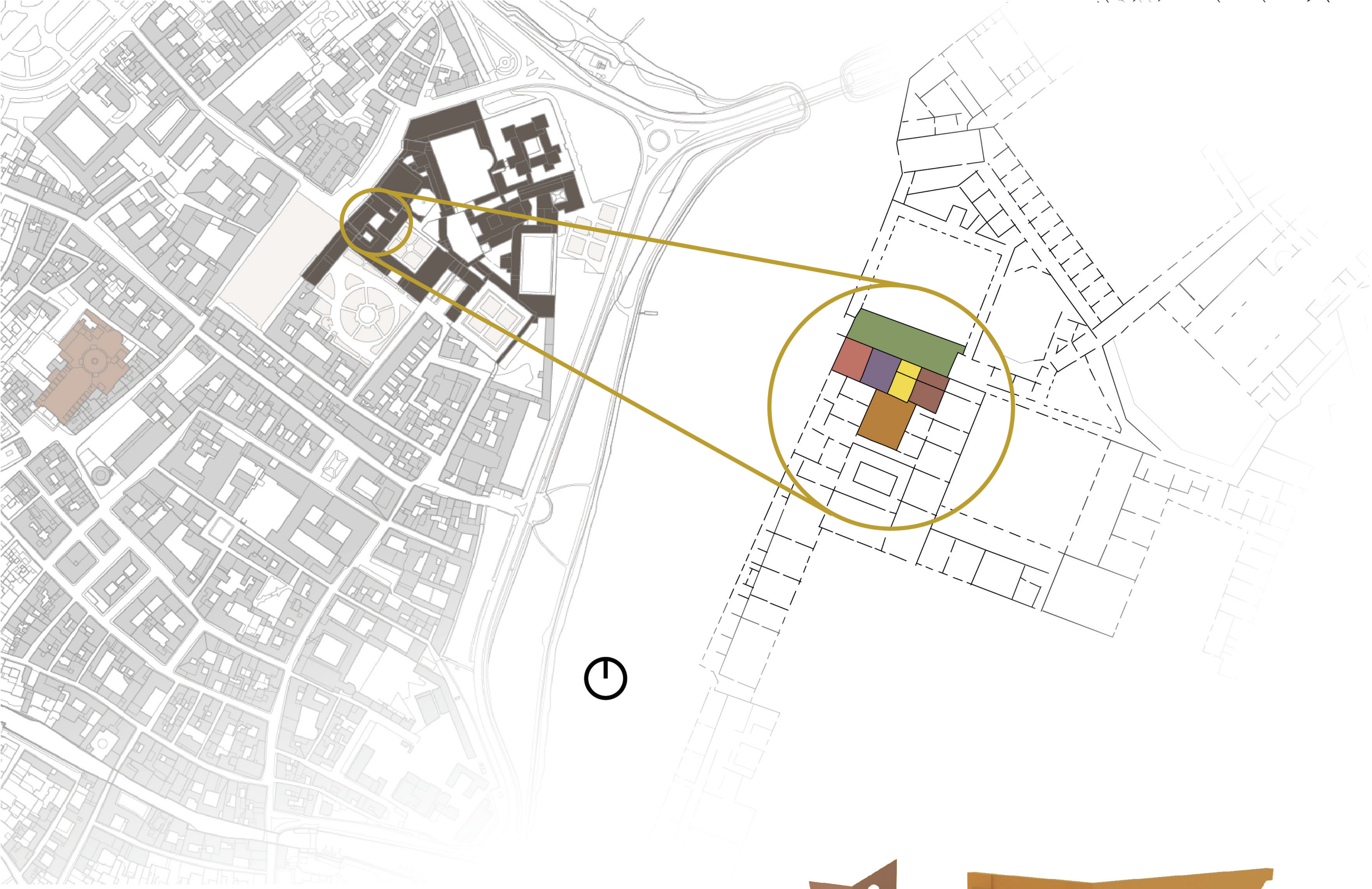
- LOccaso, S. (2005). Santa Croce in Corte. *Quattro Chiese Trasformate*. Mantova: Associazione Monumenti Domenicani

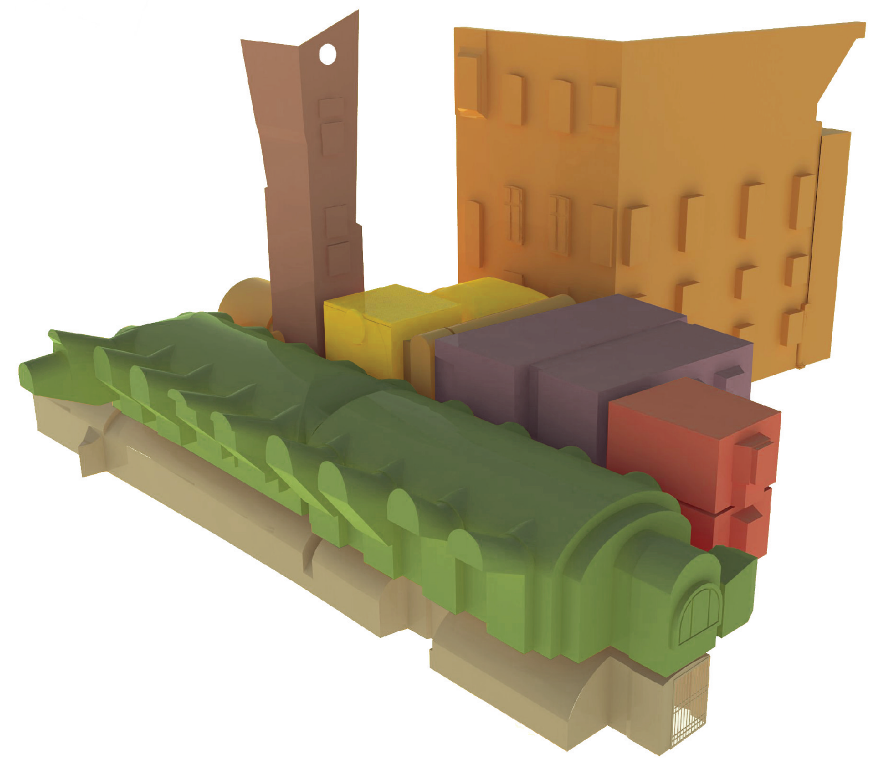
- LOccaso, S. (2005). Santa Croce in Corte e la devozione dei Gonzaga alla Vera Croce. *Rubens: Eleonora de Medici Gonzaga e loratorio sopra Santa Croce: pittura devota a corte*. Milano: Electa.

- LOccaso, S. (2002). Studi sul Palazzo Ducale di Mantova nel Trecento. *Atti e Memorie dell'Accademia Nazionale Virgiliana*, LXX, 135-167.

- LOccaso, S. (2009). *The Ducal palace Mantua*. Milano: Electa.

- Rodella, G . (2003). Le strutture architettoniche: Gli edifici medievali. *Il Palazzo Ducale di Mantova* (pp. 17-52). a cura di G. Algeri, Mantova: Sometti.





STORAGE CONNECTED TO MAGNA DOMUS

REFACTORY

ROOM OF THE MAGNA DOMUS

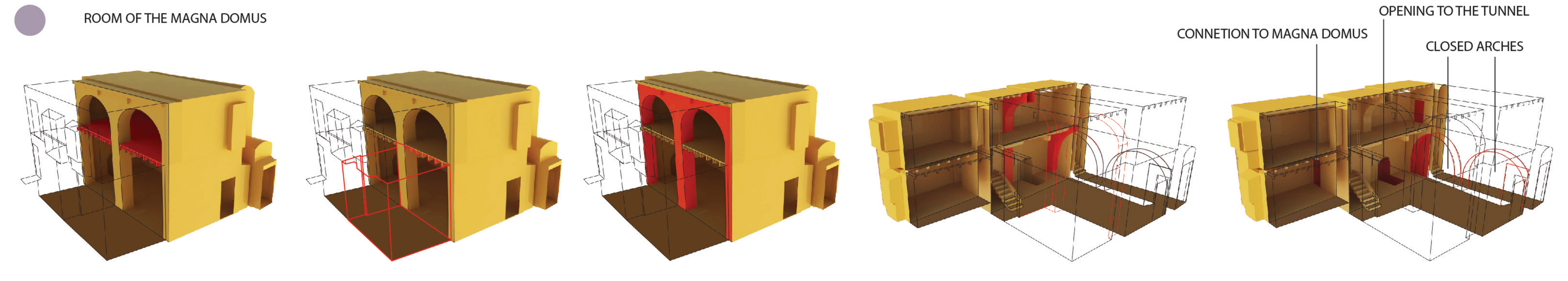
THE POZZO/ THE WELL/

SANTA CROCCE COTILE/ COURTYARD

THE TUNNEL

THE CHAPEL OF SANTA CROCCE

ROOM OF THE MAGNA DOMUS



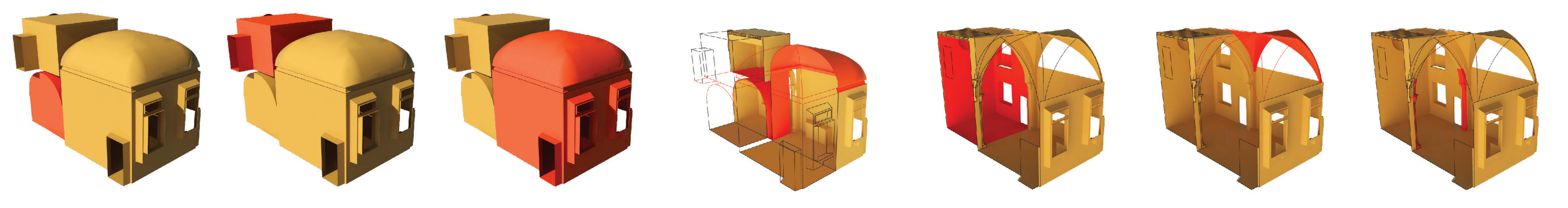
WOODEN SLAB WHICH WAS ADDED LATER TO CREATE A SECOND FLOOR LEVEL. FLOOR HEIGH OF THE LOWER LEVEL= 2m FLOOR HEIGH OF THE UPPER LEVEL= 9m

NOW USED AS A STORAGE ROOM, IT IS PART OF THE TOTAL MAGNA DOMUS AND COMPLETES THE CUBE LIKE SHAPE OF THIS DISTICT ROOM.

TWO ARCH STRUCTURES THAT EXTEND ALL THE WAY THROUGH THE TWO FLOORS OF THE MAGNA DOMUS. THEY MAKE A DISTICT ARCHITECTURAL STATEMENT. HEIGHT OF ARCH= 8m SPAN OF ARCH= 7m

VERY IMPORTANT OPENEINGS, DOORS AND ARCHES EHER CLOSED OR STILL ACCESSIBLE THAT WILL BE USEFULL IN THE DESIGN DECISION TO CONNECT THIS ROOM WITH OTHER PARTS OF THE CORTE VECCHIA.

THE CHAPEL OF SANTA CROCCE



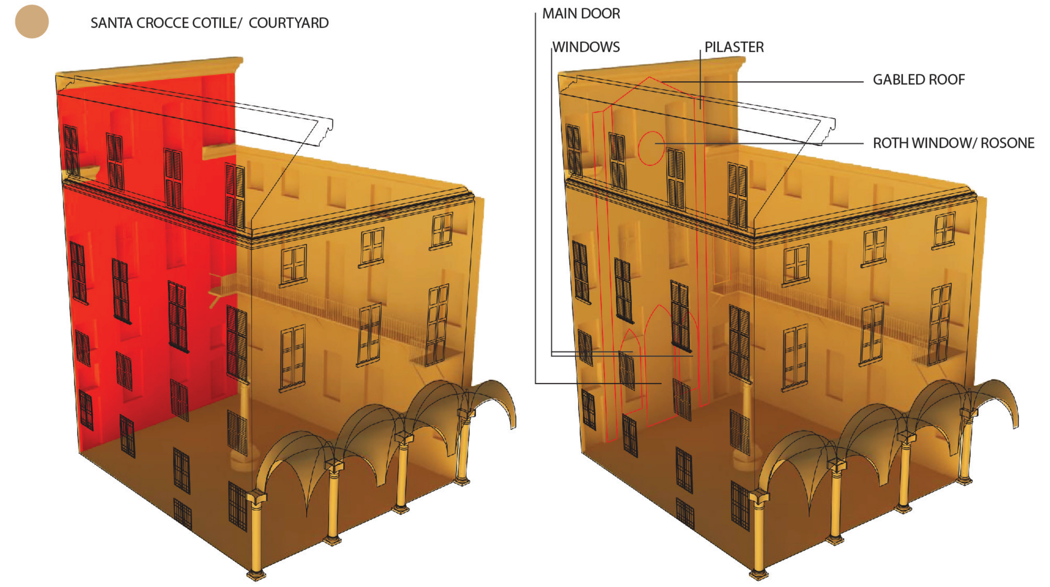
THE CURRENT STATE OF THE CHAPEL OF SANTA CROCE IS CHARACTERISED BY THE THREE VOLUMES HIGHEGHEDE ABOVE. ALL THREE OF THE HAVE DISTICT VOLUMETRIC SHAPE, MATERIAL USED FOR THE ROOF SLABS AND THE SIZES OF THE VOLUMES. THE REASON FOR THE CREATION OF THIS DITICTIONS ARE INTERVENTIONS MADE IN DIFFERENT PERIODS IN THE HISTORY OF THE CHAPEL.

STRUCTURES LATER ADDED INCLUDE MAINLY: 1. THE VAULT OF THE CHAPEL IS A PAVILION VAULT, MADE OF BRICKS AND FINISHED WITH STUCCO 2. THE BARREL VAULT ON THE MIDDLE OF THE ALTAR 3. THE WALL DEVIDING THE TWO SPACES OF THE CHAPEL.

THE REMOVAL OF THE PREVIOUSLY MENTIONED STRUCTURES CREATES THE ABOVE SHAPE TO BRING BACK THE FEEL OF THE OLD CHAPEL, ESPECIALLY IN THE ALTAR

TRACES SHOW THAT THERE WAS A CROSS VAULT IN THE CHAPELL WITH THE HEIGHT BEING A BIT HIGHER THAN THE EXISTING ONE. THE PART OF THE ARCH THAT HAS BEEN LEFT AFTER PART OF IT WAS CUT CAN BE EXTENDED TO APPROXIMATE THE ORIGINAL HEIGHT OF THE VAULT AND REVEALING THIS SHAPE AND THE PARTIALLY COVERED ARCH CAN FREE UP THE SPACE TO RECOVER THE VOLUME OF THE CHAPEL WITH IT'S ORIGINAL FEELING. THE COLUMNS AND ARCH ARE RED STONE...

SANTA CROCCE COTILE/ COURTYARD

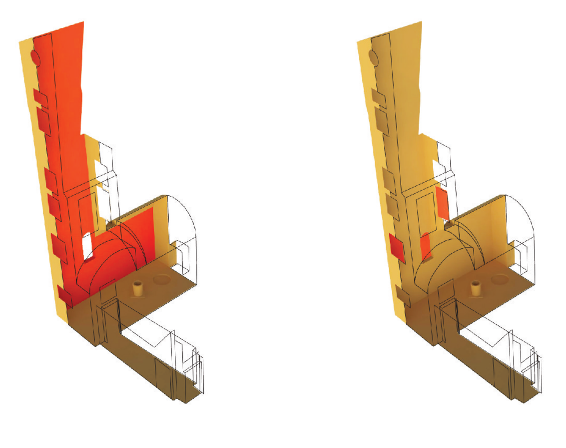


THE COURTYARD IS AN IMPORTANT SPACE FOR THE CORTE VECCHIA. IN ADDITION TO BEING AN ACCESS, IT HAS VERY IMPORTANT ARCHITECTURAL IMPLECATION. THE HIGHLIGHTED FACADE HAD DISTICT CHARACTERS BASED ON MATERIAL, TYPES OF OPENINGS, AND ITS PROPORTION IN RELATION TO THE SIZE OF THE COURTYARD.

THE RED OUTLINES SHOW THE TRACE OF ORIGINAL FACADE OF THE CHAPEL. THIS IS ASSUMED BASED ON MATERIAL AND OTHER HISTORICAL STUDIES THAT WERE CONDUCTED.

PHOTOGRAPHOMETRY AND LASER SCAN ALSO REVEILED FINELY THE PATTERN DIFFERENCE OF THE MATERIALS AND THE PLASTER TRACES THAT REVEL THE ABOVE OUTLINE.

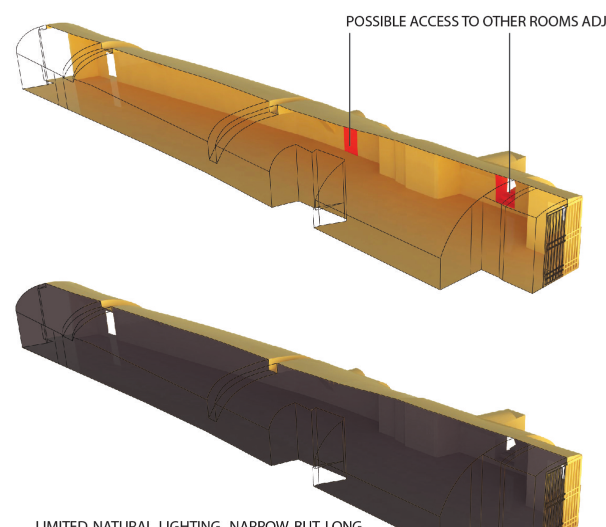
THE POZZO/ THE WELL/



THE WALL HIGHLIGHTED ABOVE CONTAINS SOME FRESCO PAINTINGS. ACTS AS A LIGHT CHIMNEY FOR THE REFACTORY AND THE WELL ITSELF

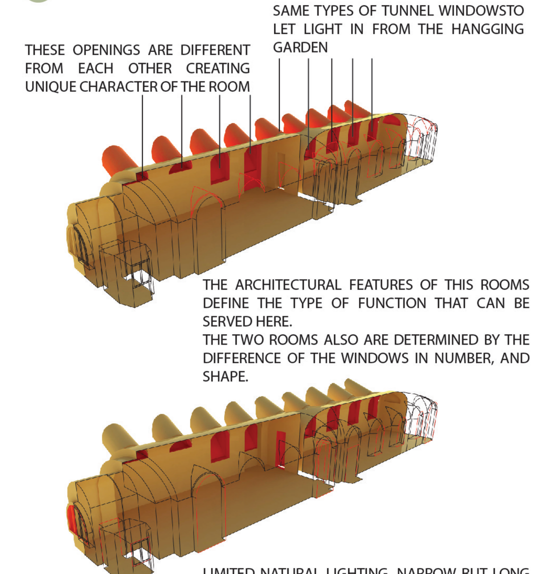
THE LIGHT FROM ABOVE GETS INSIDE THE ADJACENT SPACES THROUGH THE WINDOWS ARRANGED AROUND THE OPENDOWN.

THE TUNNEL



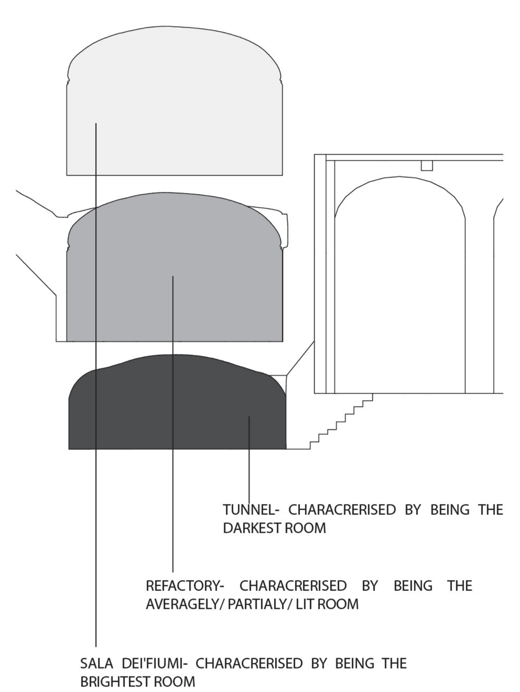
LIMITED NATURAL LIGHTING, NARROW BUT LONG SPACE WITH RELATIVELY LOW ROOM HEIGHT. NATURAL LIGHT COMES IN ONLY THROW THE TWO ENDS OF THE TUNNEL.

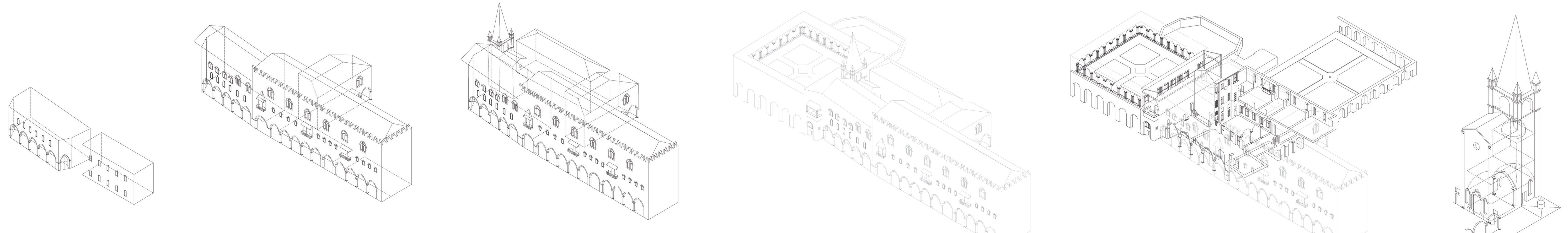
REFACTORY



LIMITED NATURAL LIGHTING, NARROW BUT LONG SPACE WITH RELATIVELY LOW ROOM HEIGHT. NATURAL LIGHT COMES IN ONLY THROW THE TWO ENDS OF THE TUNNEL.

CHARACTER ANALYSIS OF THE OVERLAPPING SPACES





1310'S
THE MAGNA DOMUS ITSELF WAS THE RESULT OF JOINING OF TWO STRUCTURES, A PALACE AND AN ADJACENT TOWER. THE PALACE WAS CORRESPONDING TO THE FIRST FOUR BAYS OF THE PORCH AND THE TOWER CORRESPONDED TO THE FIFTH BAY.THE UNION OF THE TOWER AND THE PALACE AND THE CONSTRUCTION OF THE ANTERIOR PORTICO DATES TO 1308, THE JUNCTION BETWEEN THE TOWER AND THE PALACE IS STILL VISIBLE TO THIS DAY.

1350'S
THE THIRD MEDIEVAL STRUCTURE THAT EXIST IN THE OLD NUCLEI OF THE CORTE VECCHIA IS THE PALAZZINA. THE STRUCTURE EXTENDS ORTHOGONALLY TO THE PALAZZO DEL CAPITANO AND IS BELIEVED THAT IT WAS CONSTRUCTED BETWEEN THE SECOND HALF OF THE 1300'S AND THE END OF THE 1300'S.

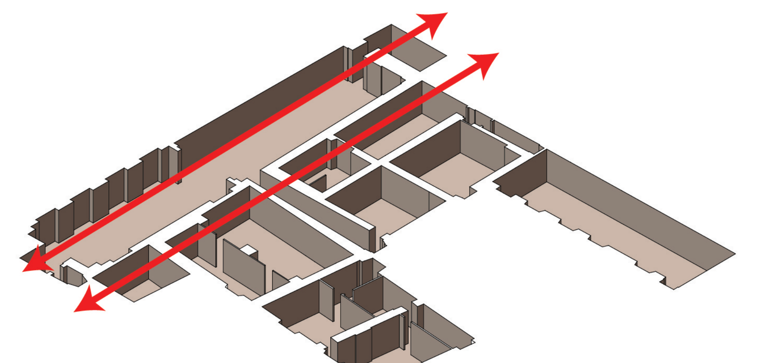
1420'S
GIAN FRANCESCO DEMOLISHED THE BONACOLSIAN SANTA CROCE CHURCH AND SUCCESSIVELY CONSTRUCTING THE SANTA CROCE INSIDE THE COURT. IT IS BELIEVED THAT THE CONSTRUCTION OF THE CHURCH TOOK PLACE IN 1422 AND ALSO THE ADJACENT APARTMENTS THAT ARE KNOWN AS SANTA CROCE APARTMENTS THAT HOSTED GIAN FRANCESCO GONZAGA'S WIFE, PAOLA MALATESTA, WHO WAS RESPONSIBLE FOR THE MAINTENANCE OF THE CHURCH.

1580'S
IT WAS DURING THE REIGN OF THE DUKE GUGLIELMO GONZAGA THAT THE CURRENT MORPHOLOGY OF THE CORTE VECCHIA TOOK PLACE. HE REFURBISHED THE APARTMENTS OF ISABELLA D'ESTE AND SUCCESSIVELY BUILT THE REFECTORY, ALSO KNOWN AS "SALA DEI FIUMI", THE HANGING GARDEN AND THE 8 FACED COURTYARD . THE SALA DEI FIUMI THOUGH USED TO HAVE AN OPEN LOGGIA TO THE HANGING GARDEN, THAT WAS CLOSED LATER IN THE 1700'S.

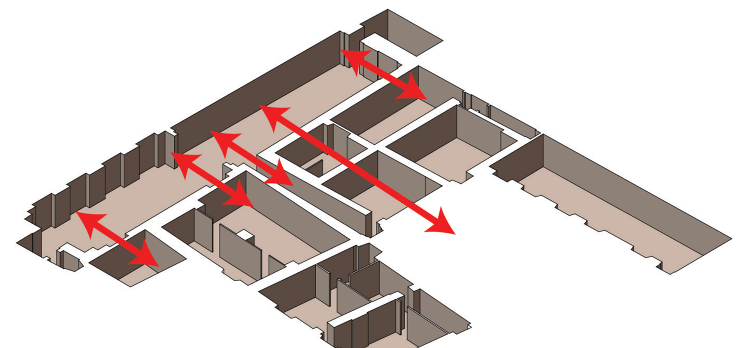
1700'S
DURING THE AUSTRIAN RULE, VARIOUS INTERVENTIONS ON THE CORTE VECCHIA TOOK PLACE, THE LOGGIA OF THE REFECTORY WAS CLOSED AND THE ROOM WAS REDECORATED IN EXTENSIVE ROCOCO DECORATION. THE LOGGIAS OF THE CORTILE SANTA CROCE WERE CLOSED AND THE FAÇADE OF THE CHURCH WAS IRREVERSIBLY ALTERED.

SANTA CROCE

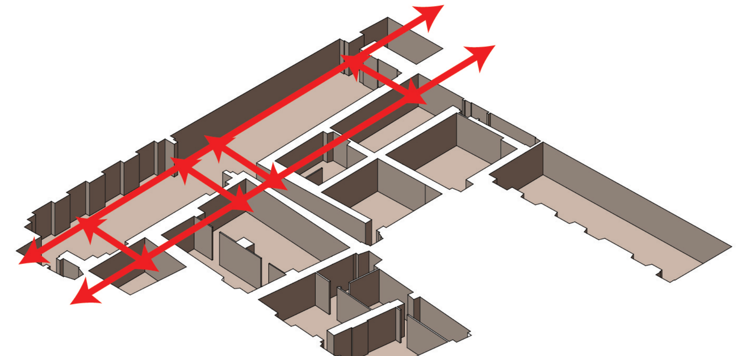
SANTA CROCE STARTED AS A PRIVATE CHURCH OF GIAN FRANCESCO AND HIS WIFE PAOLA MALATESTA, WHO TOOK CARE OF ITS MAINTENANCE, SUPPOSING THAT SHE WAS LIVING IN THE ADJACENT APARTMENTS THAT ARE KNOWN AS THE APARTMENTS OF ISABELLA D'ESTE. THE CHURCH IS BELIEVED TO BE BUILT AROUND 1422, ITS CURRENT FAÇADE IS HARDLY COMPREHENSIBLE AFTER THE AUSTRIAN 1700'S INTERVENTIONS. THE CHURCH WAS NARROW AND HIGH, FRAMED WITH 2 PILASTERS AND OF A GABLED ROOF. ON THE UPPER PART OF THE FAÇADE, THERE ARE TRACES OF AN OPENING THAT PROBABLY ALLOWED LIGHT INTO THE SUPERIOR ORATORY. THE CHURCH HAD ITS CURRENT PLANIMETRIC EXTENSION, TWO ROOMS SEPARATED BY A LATE GOTHIC ARCH. THE ROOM THAT IS BORDERING THE COURTYARD IS SLIGHTLY BIGGER THAN THE INNER ONE AND USED TO HAVE THE MAIN ENTRANCE, FLANKED WITH TWO ELONGATED LANCET WINDOWS. THE INNER ROOM USED TO HOUSE THE ALTAR AND IT RECEIVED THE LIGHT THROUGH AN OCULUS THAT OPENED TO ST CROCE ROAD WHERE IT HAD A LATE GOTHIC OPENING. THE ROAD WAS CLOSED LATER TO CONSTRUCT THE NOWADAYS HANGING GARDEN AND THE SALA DEI FIUMI IN THE 1500'S.



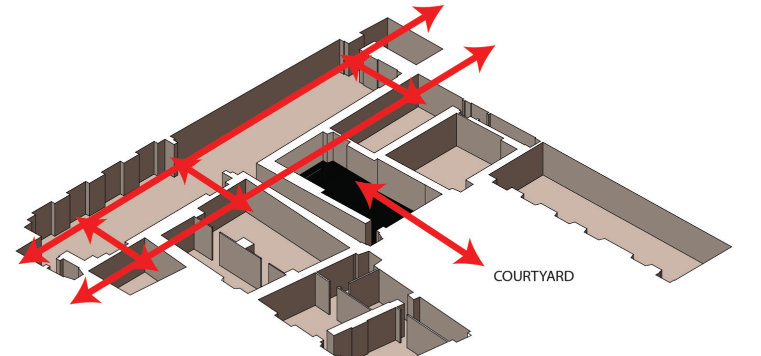
PARALLEL RELATIONSHIP BETWEEN ADJACENT SPACES



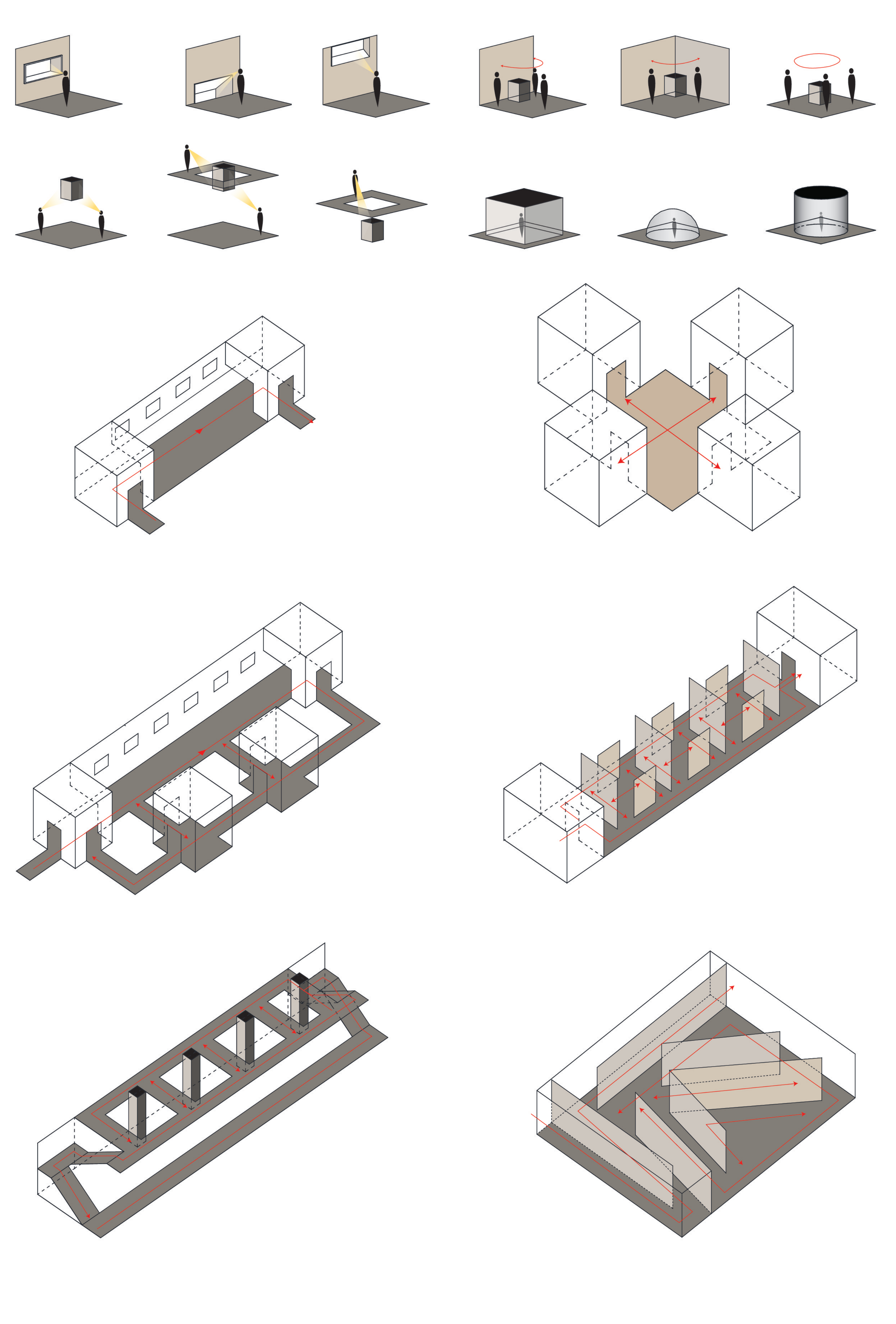
POSSIBLE CONNECTION BETWEEN TUNNEL AND ADJACENT SPACES

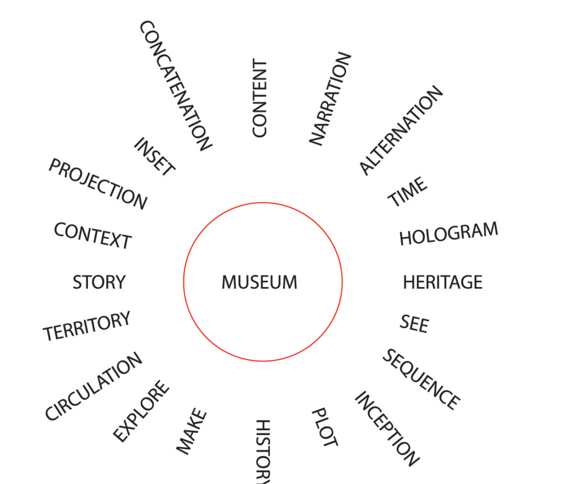


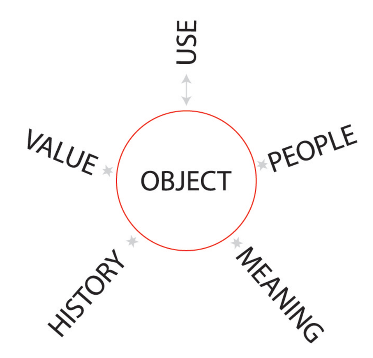
POSSIBLE COMBINATION OF CONEECTIONS BETWEEN TUNNEL AND ADJACENT SPACES

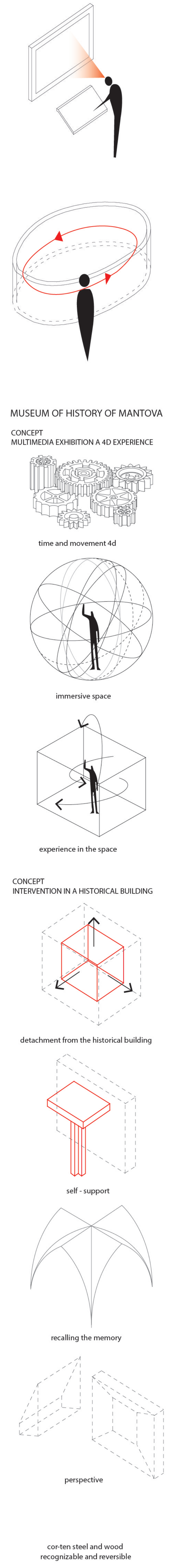


POSSIBLE CONECTION WITHIN THE VOLUMES AND WITH THE OUTSIDE









MUSEUM OF HISTORY OF MANTOVA

CONCEPT
MULTIMEDIA EXHIBITION & 4D EXPERIENCE

time and movement 4d

immersive space

experience in the space

CONCEPT
INTERVENTION IN A HISTORICAL BUILDING

detachment from the historical building

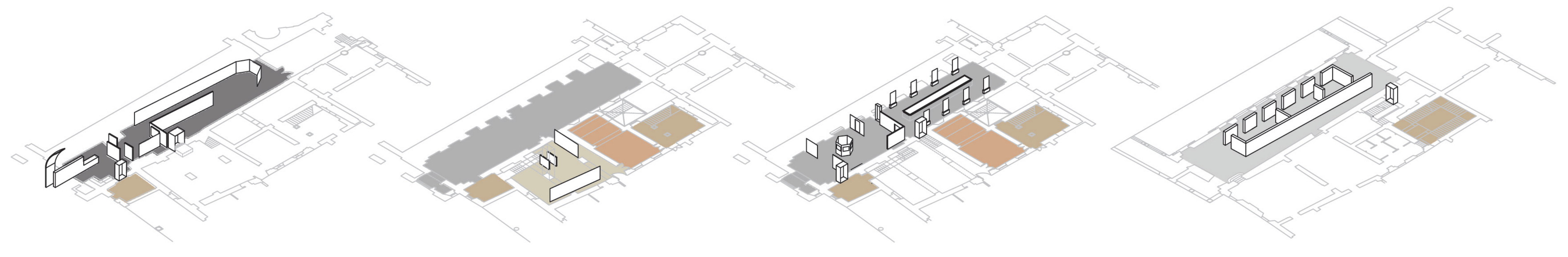
self - support

recalling the memory

perspective

cor-ten steel and wood
recognizable and reversible

STUDY OF THE CONNECTIONS AND FUNCTIONS



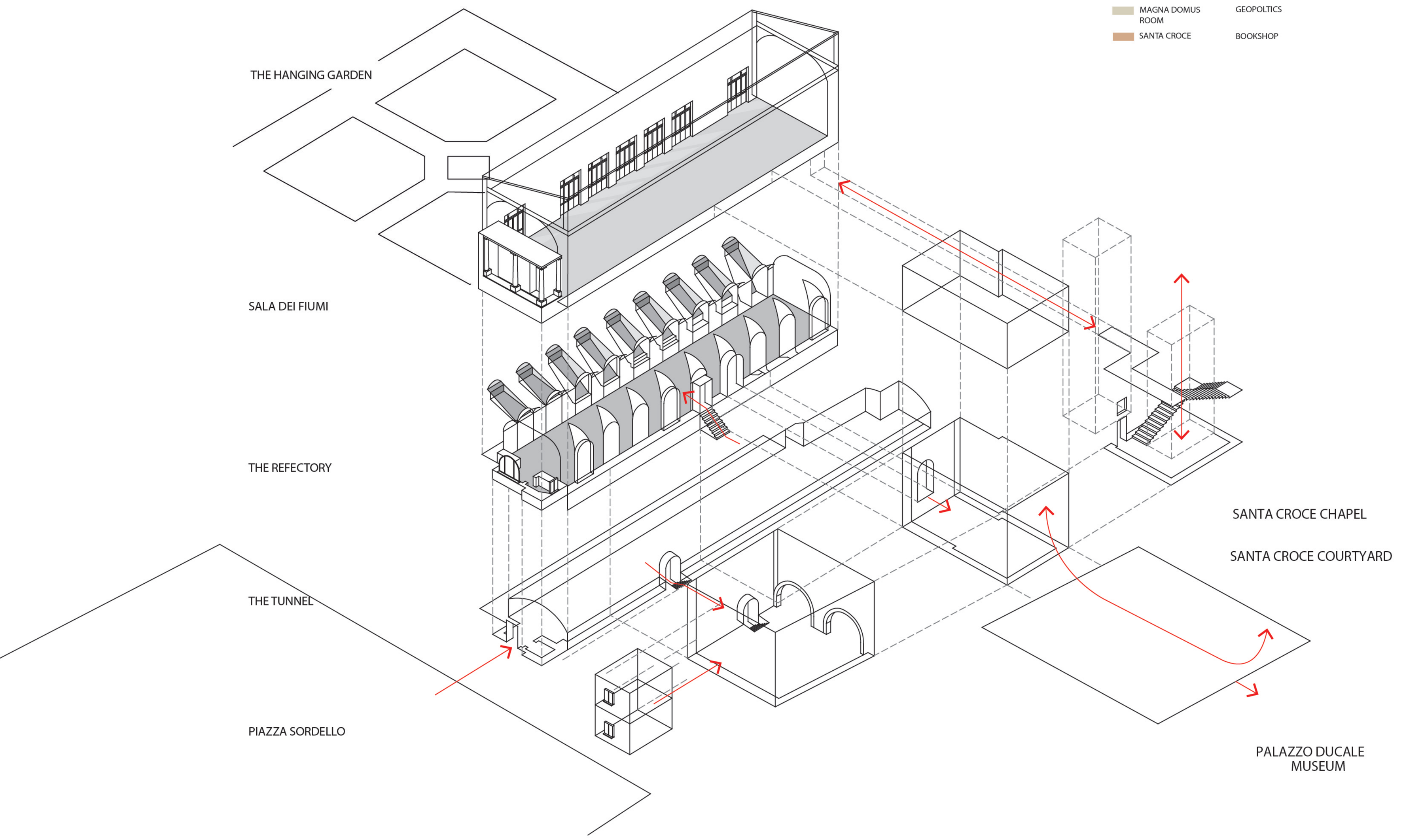
GROUND FLOOR

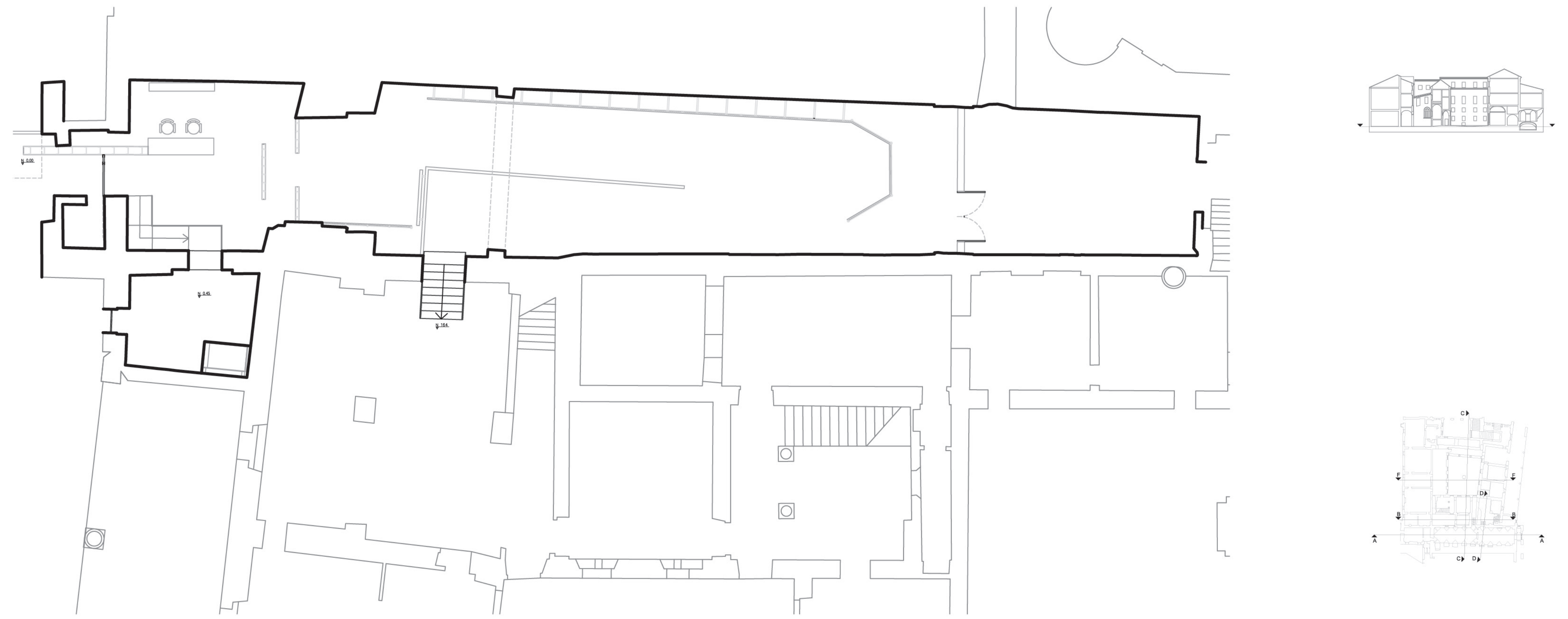
FIRST FLOOR

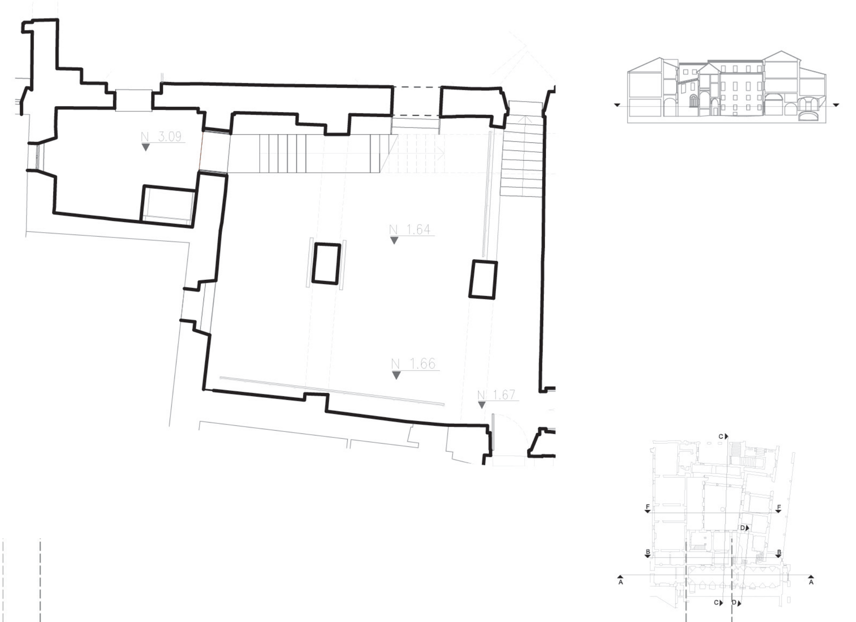
SECOND FLOOR

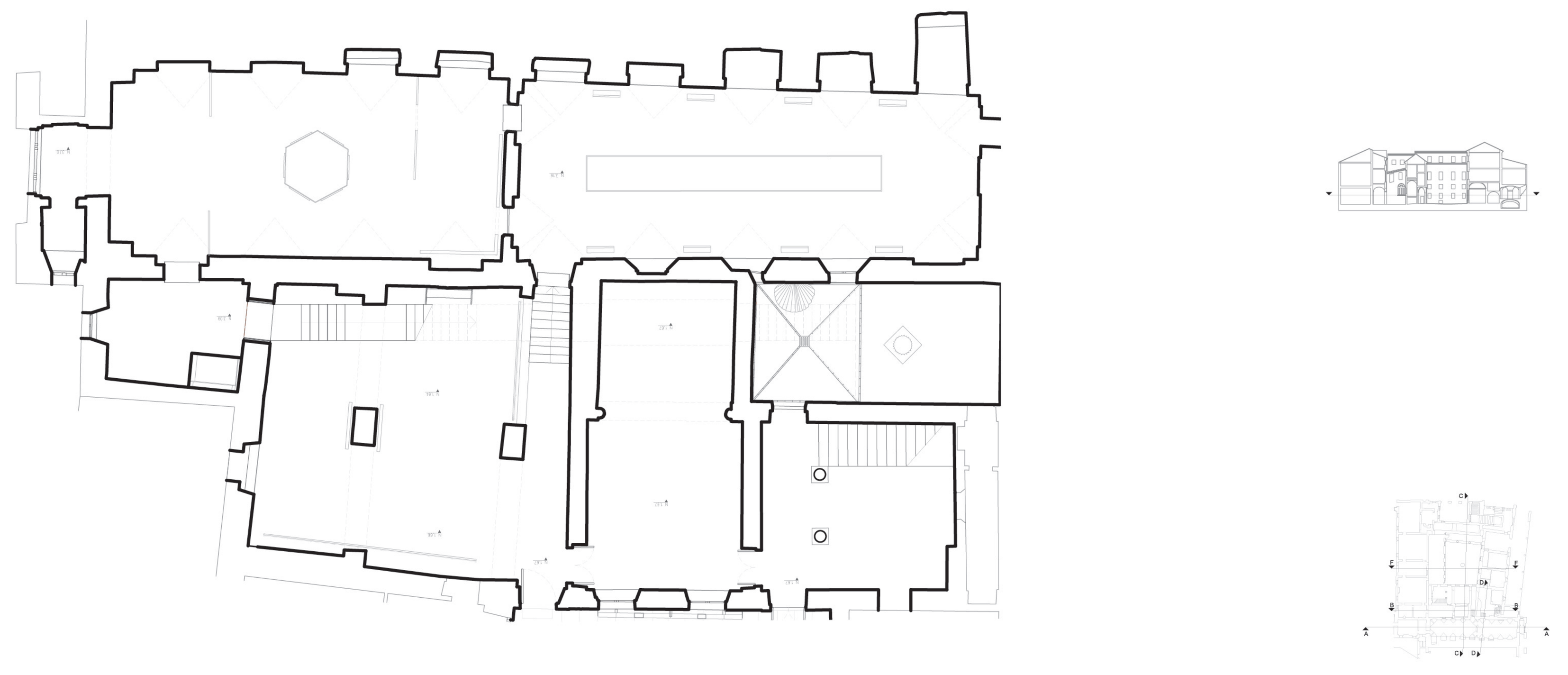
THIRD FLOOR

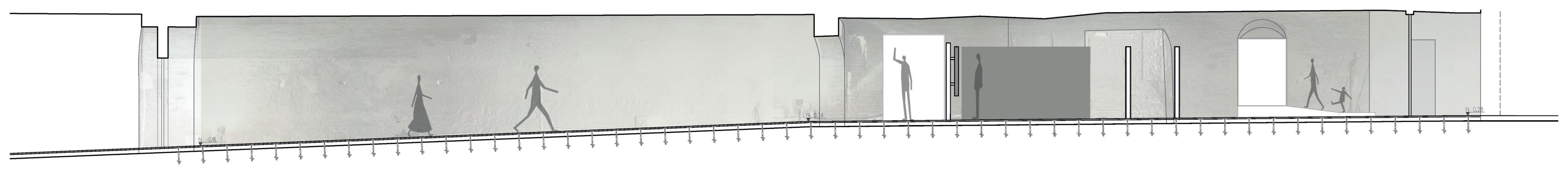
EXHIBITION ROOM	NARRATIVE STRUCTURE
SALA DEI FIUME	COURT LIFE, TEMPORARY EXHIBITION
REFECTORY	PATRONAGE ARCHIVAL DOCUMENTS
TUNNEL	MYTHOLOGY MANTUA AND TERRITORY
MAGNA DOMUS ROOM	GEOPOLTICS
SANTA CROCE	BOOKSHOP

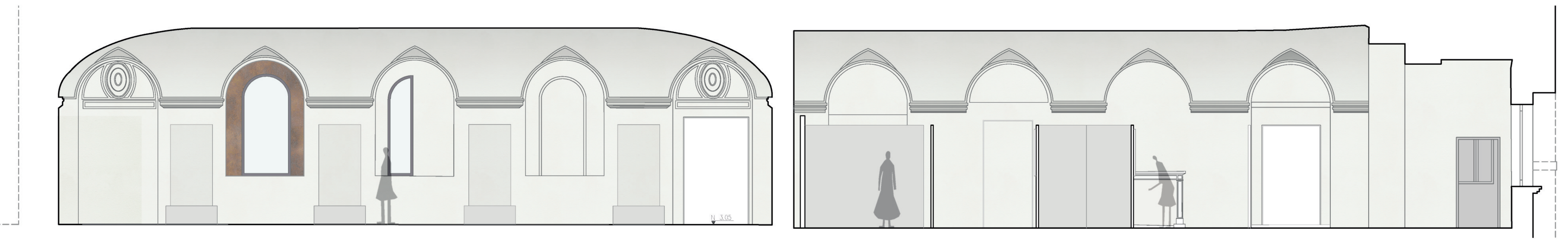


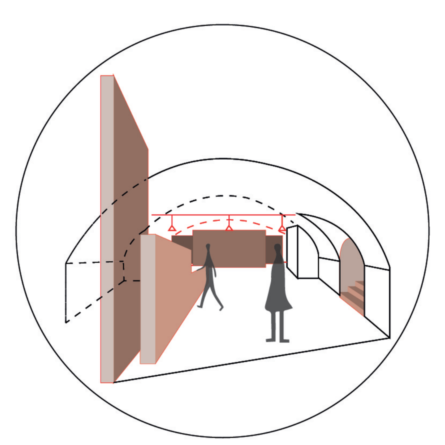




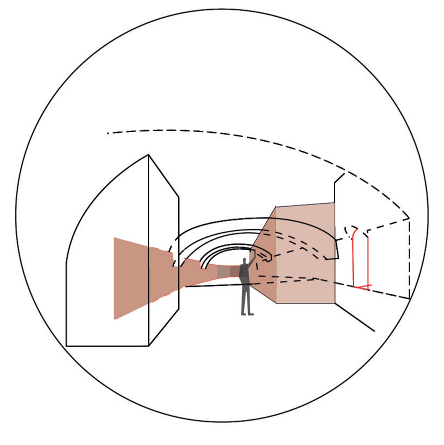




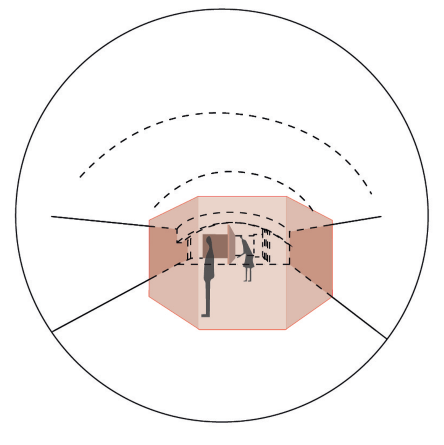




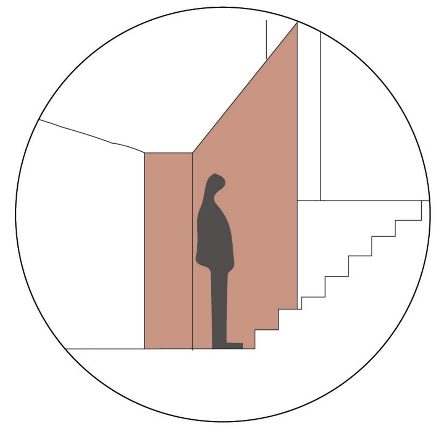
1.ENTRANCE TUNNEL



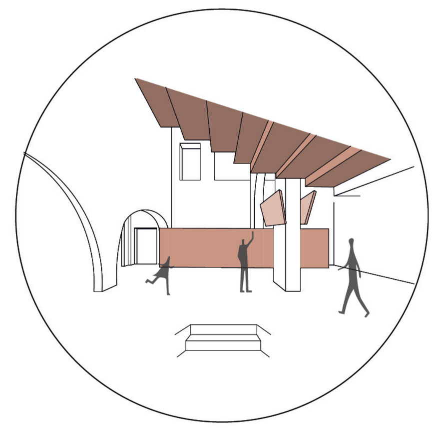
2. EXHIBITION TUNNEL



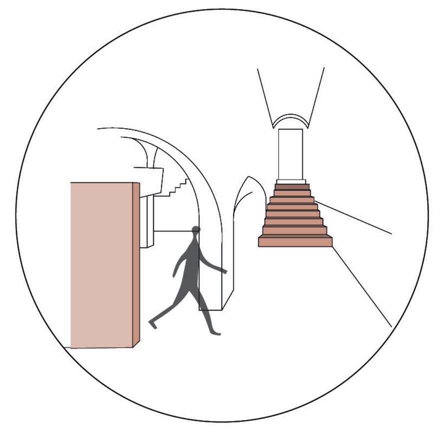
3. EXHIBITION TUNNEL



4. TO MAGNA DOMUS

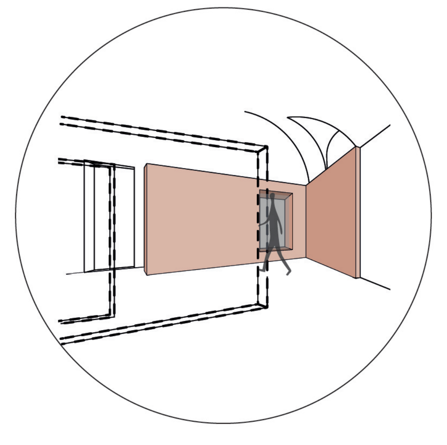


4. MAGNA DOMUS ROOM

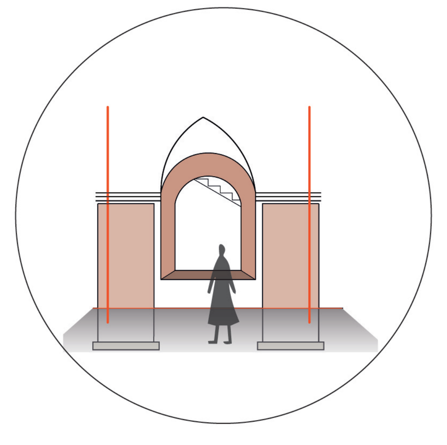


5. STAIRCASE TO THE REFECTORY

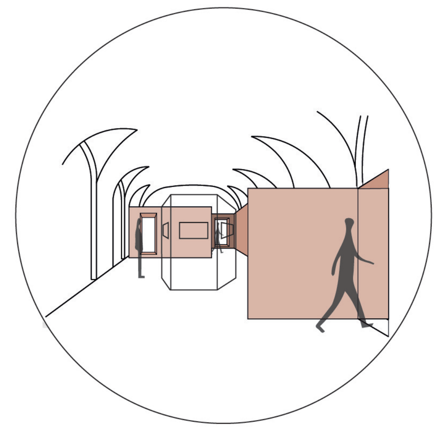
6.EXHIBITION REFECTORY



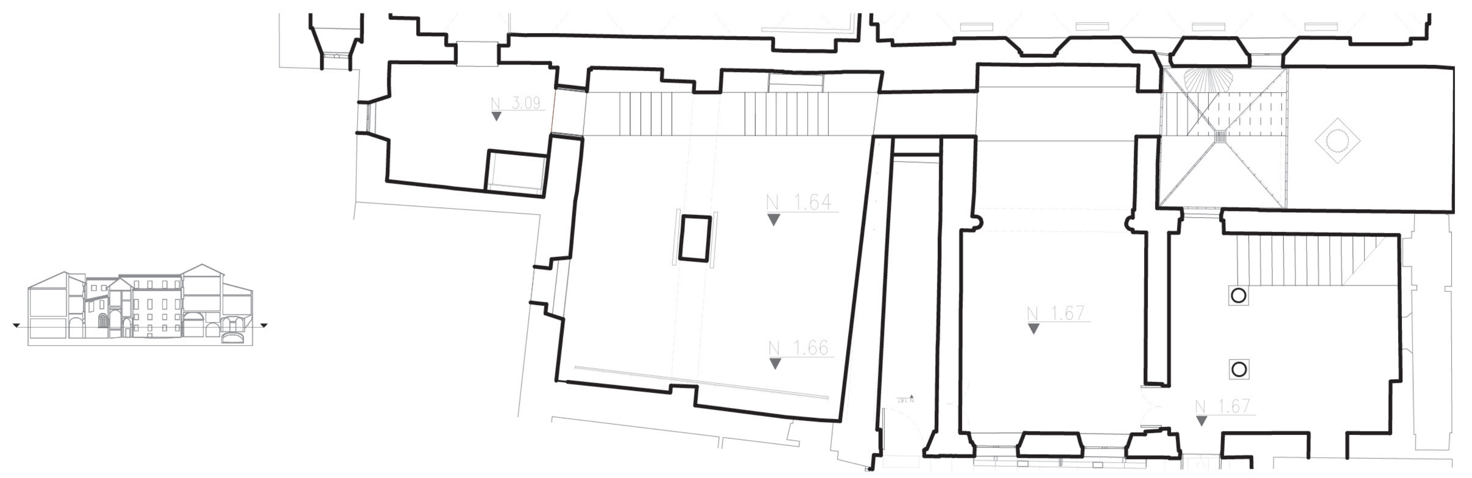
7.EXHIBITION REFECTORY

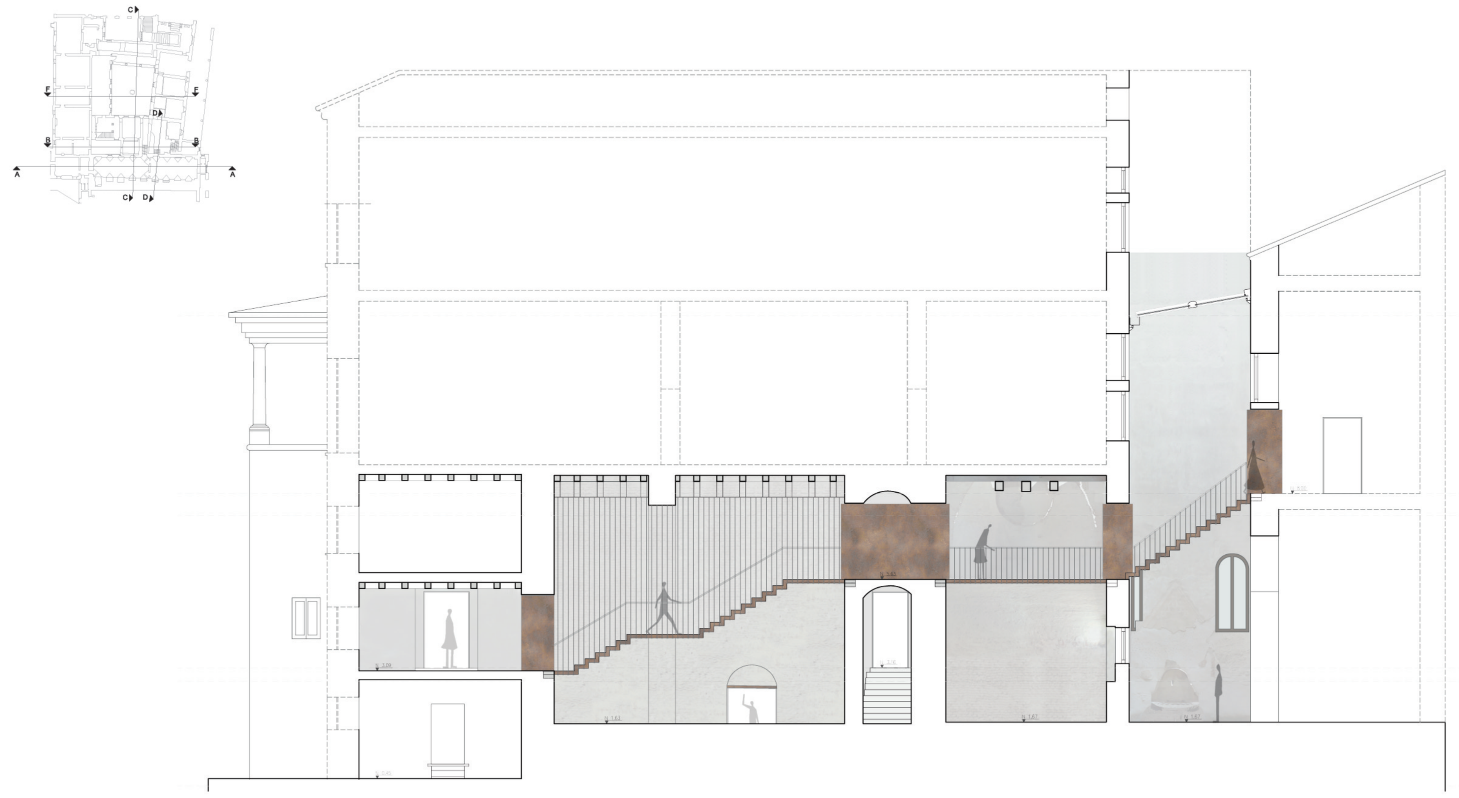


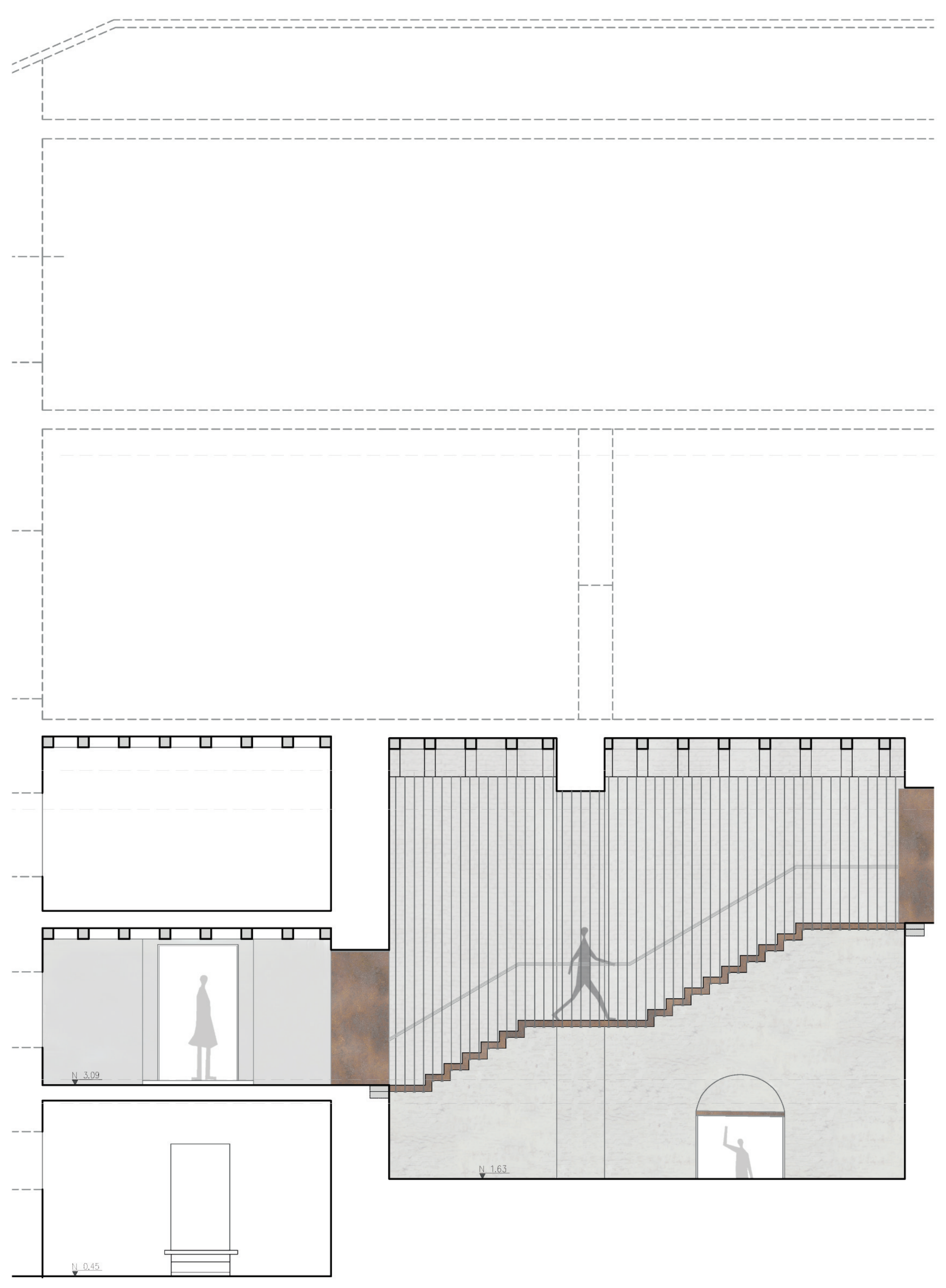
8.REFECTORY VIEW OVER THE WELL

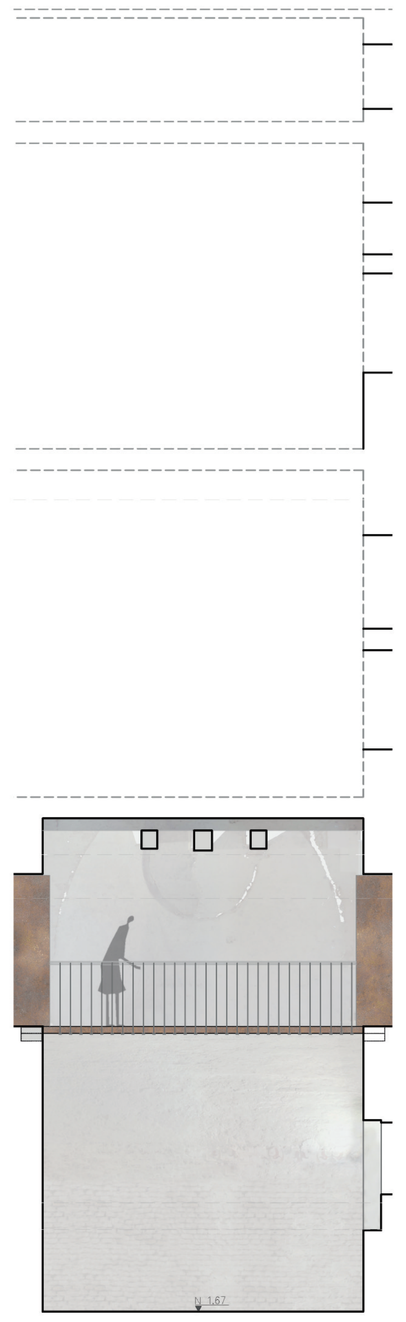


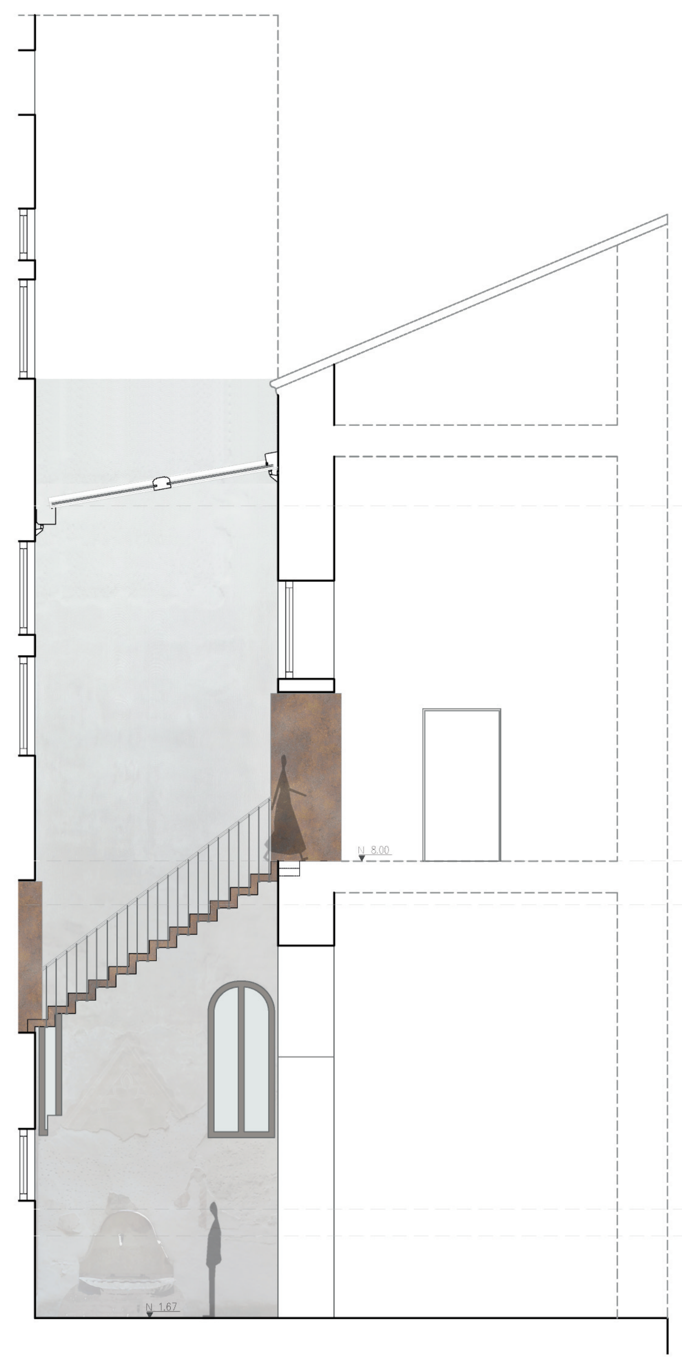
9. EXHIBITION REFECTORY



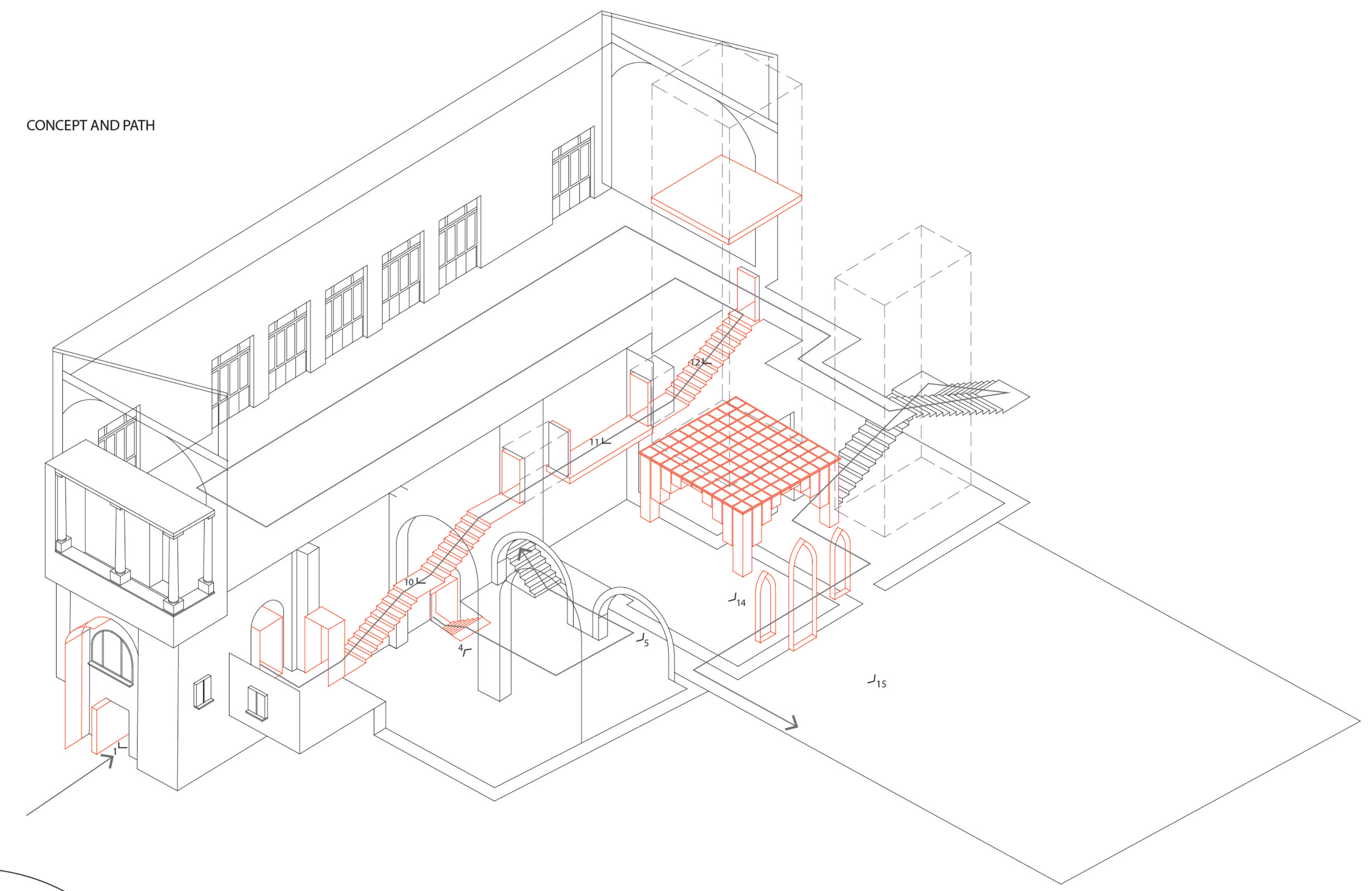


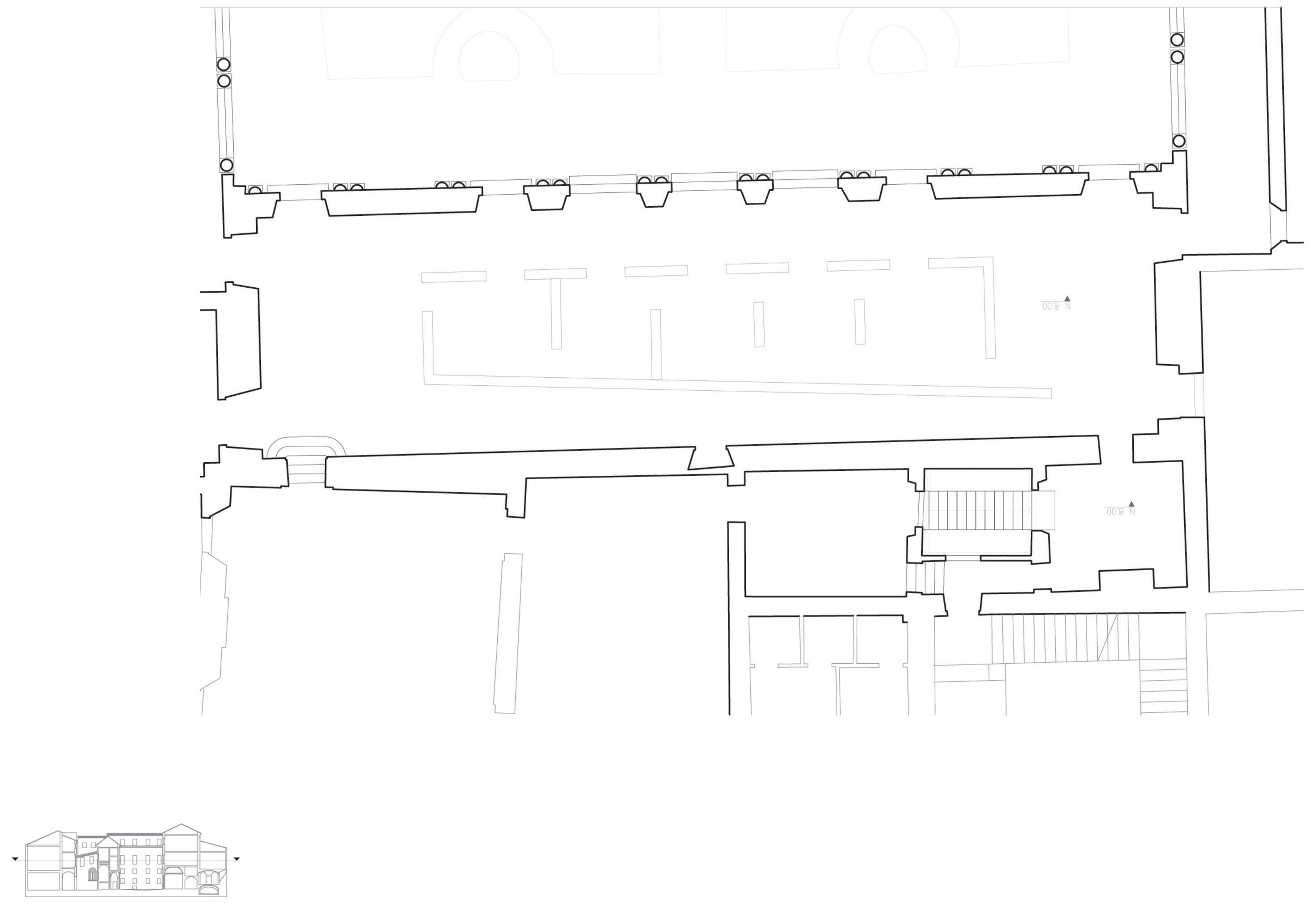


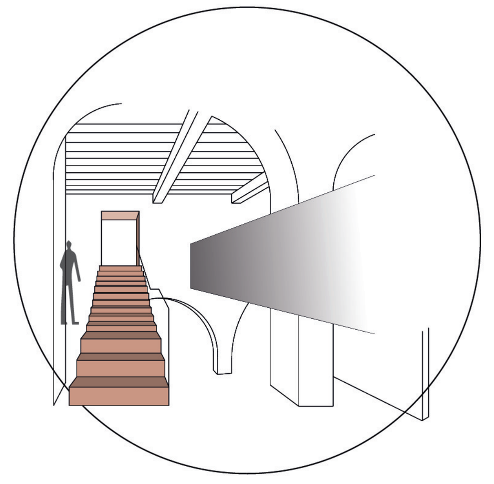




CONCEPT AND PATH



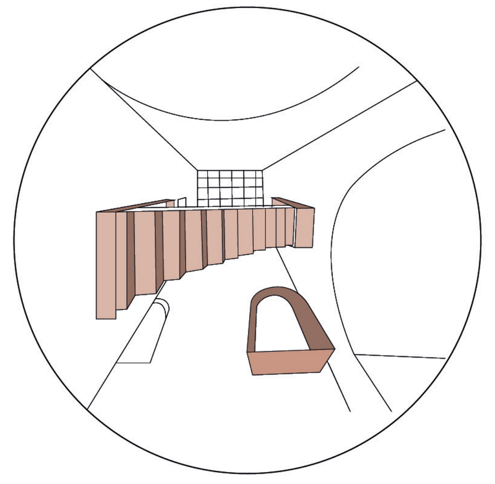




10. STAIRCASE

11.BRIDGE OVER THE CHURCH

12. STARCASE OVER THE WELL



13. WELL

14. SANTA CROCE

15. SANTA CROCE'S FACADE