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A new methodology for reconstructing the building process. The case study of the new Hertziana library in Rome

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Introduction

The Hertziana Library is the Rome-based Italian art history research branch of the Max Planck organisation for the promotion of science in Munich¹. It is located in the urban peninsula of the sixteenth-century district between the via Sistina and via Gregoriana, abutting Trinità dei Monti, near Piazza di Spagna and the Spanish Stairs. The complex consists of a sequence of three buildings, side by side: the sixteenth-century palace of Federico Zuccari, designed by the famous painter as his atelier and home, expanded and remodelled over the centuries many times; the Neubau (New Building), an offspring of the old garden of Palazzo Zuccari following continuous, uncontrolled additions; and the nineteenth-century Palazzo Stroganoff. While the two historic buildings are used to house research workstations and offices, the Neubau contains the library, consisting of an immense legacy of about 270,000 volumes. The complete inadequacy of the building complex, from the viewpoint of fire safety, was confirmed in the mid-nineties when the Fire Department threatened to close it; furthermore, the impossibility of increasing its long-term book capacity eventually sounded the death knell of the building in 1994. In 1995 the management of the Max-Planck Institute decided on a programme of construction, calling for the demolition of the Neubau except for the historic facade, and the acquisition, through a limited competition, of a new project that would ensure compliance with modern safety standards as well as enhanced library capacity. The winner of the competition was the Spanish architect Juan Navarro Baldeweg.

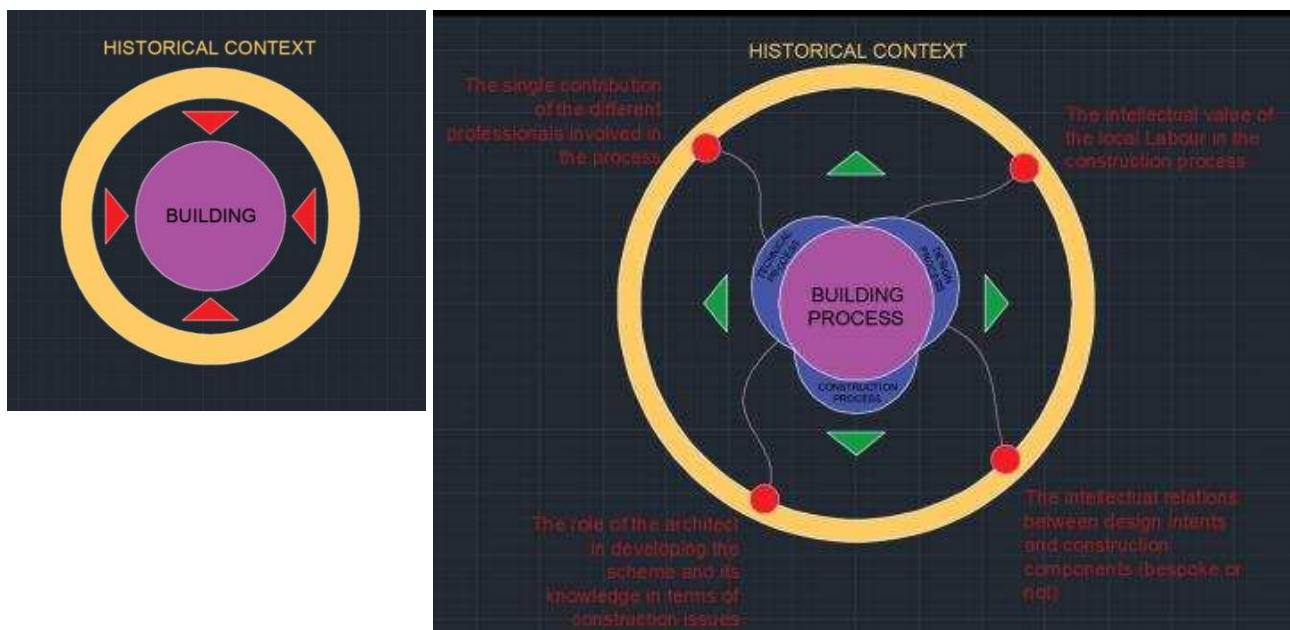


Fig.1 – Diagrams explaining the research methodology at the base of this investigation.

The reason for the intervention: the Bibliotheca Hertziana buildings during the history
Before the reconfiguration of the three buildings, which was completed on 2nd February 2013, the complex suffered from a lack of functional coherence as well as a serious inadequacy in terms of safety and fire prevention. These features resulted from continuous insensitive renovations and expansions by several architects over three centuries since the departure from Rome by Federico Zuccari in 1599, when he left his building incomplete in order to find new job orders across Italy.

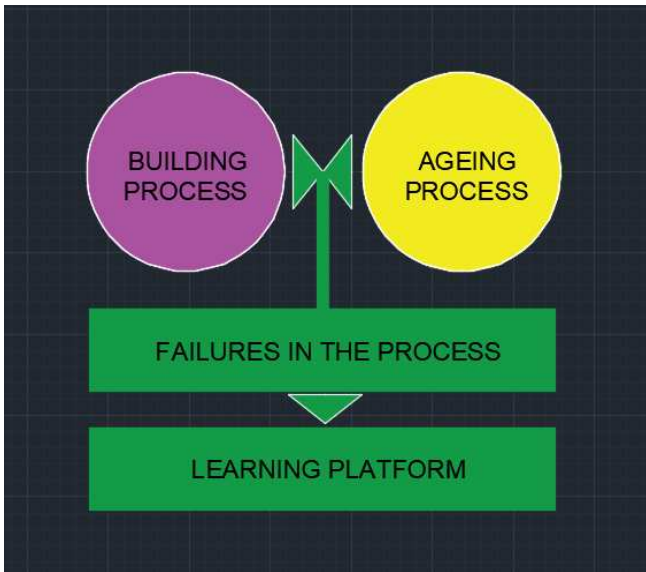


Fig.2 – Diagram showing the research outcome based on turning the building process into a learning platform.

Due to the redevelopment of the sloped area of the Pincio hill, undertaken by the popes Gregory XIII (1572-1585) and Sixtus V (1585-1590), this urban site close to the Spanish Steps had been the location of renewed construction interest, promoted by special papal privileges provided for potential developers². Before the papal laying out of two roads, the short via Gregoriana and the magnificent via Sistina, the area, although full of aristocratic villas, was uncultivated and mostly abandoned since the destruction by the Goths of the ducts in order to disrupt the water supply on the hill. At the end of the sixteenth century, the French monastery of Trinita dei Monti and the residence of the Cardinal of Montepulciano, the future Villa Medici, were the only estates on that site. On 15 June 1587, in a solemn ceremony, Pope Sixtus V brought water to the hill with the reactivation of the Vergine aqueduct. After that key event the development of the estate development was then enabled. In this historical context, the painter Federico Zuccari (1542/1543-1609) decided in 1590 to buy the narrow strip of land between the initial portions of the two new streets in order to build there his atelier and his home. The building was designed in the form of three distinct but adherent volumes: a study with access from the Spanish Steps; the house with access from Via Sistina; and a significant garden with access from Via Gregoriana. The wall of the latter is characterised by a portal in travertine marble and of grotesque appearance, flanked by two windows with the same features. These three components were connected at ground-floor level by a long corridor and narrow vestibule which allow a longitudinal perspective of the whole complex, linking the front access of the atelier with the rear garden at the end of the estate. The plans of the first floor and the ground floor showing the strong relationship that the palace had with its garden courtyard. A loggia frescoed with a bower of roses named ‘Sala Terrena’ on the ground floor and a gallery on the first floor are the connection spaces between the building and the garden. Both spaces were open to the garden with large arches that mark the southern elevation of Palazzo Zuccari. The plan of the garden is more or less square, twenty metres on each side. In the east corner was a small two-storey building which probably housed service rooms and stables. This core is not dated precisely, but it is clearly shown in the plan of the main floor kept in the Museum of Rome, drawn in c.1700. The small building with two levels must therefore be the first one in the fifteenth-century garden, and formed the core of the eighteenth-century ‘House of the Priests’. This small building was followed over the centuries by various additions (not clearly datable) which in time reduced the garden to the narrow palace courtyard seen today.

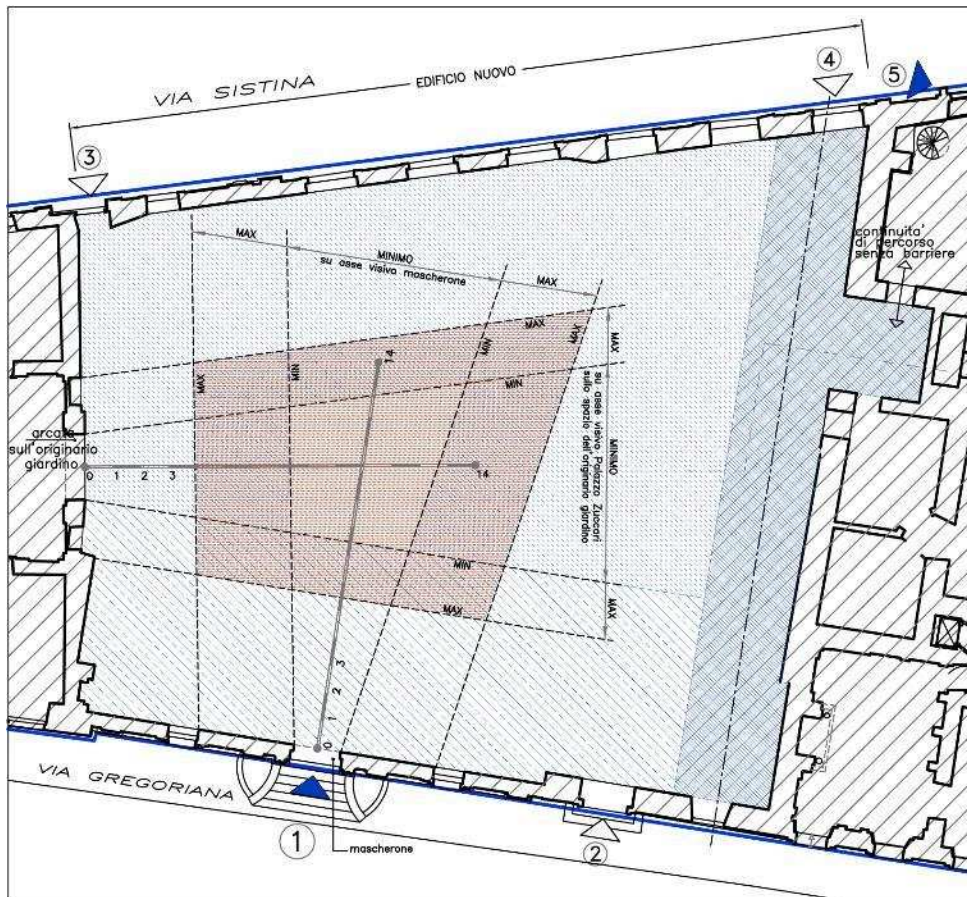
The construction of his Roman palace marked the beginning of the financial decline of Federico Zuccari. To find the huge sums required for the completion of the building Zuccari left Rome in



Fig.3 – Palazzo Zuccari from Trinita' dei Monti (1956).

1599 for a trip in northern Italy in order to find new clients. He died in 1609 in Ancona without returning to Rome, leaving the building only built up to the first floor. The children of Zuccari let the house immediately, in its incomplete state, to the nobleman Marcantonio Toscanella. He, however, completed the building with a scheme that was quite different from the original intention. Indeed, the well-known architect Girolamo Rainaldi completed the residential portion of the building, adding one more floor. With this intervention the residential volume of the building became higher than the atelier portion, contravening the hierarchy established by Zuccari for the three parts of the building.

During this period the garden appears to have had no more building within in its area, as evidenced by a view of Giovanni Maggi of 1625; and this can also be seen in a more precise view of 1676 by Giovanni Battista Falda, where there is a clear distinction between the three parts of the building. However, in the New Map of Rome drawn by Giovan Battista Nolli in 1768, it is clear that the small building on the east corner had already been extended in order to connect it with the main building. After the death of Toscanella the heirs of Zuccari retained the ownership of the building until 1904. In that year, Henriette Hertz, born in 1846 to a Jewish family in Cologne, and after having rented an apartment in the building, bought the entire building. The new owner commissioned the architect Mariano Cannizzaro to renovate and restore the building. This intervention was very powerful: the works significantly distorted the sixteenth-century form of the building, especially the garden. Cannizzaro designed a completely new wing in the garden next to Via Gregoriana. The extension is



PERIMETRO PIANO DI RECUPERO

PRESCRIZIONI

0 1 2 14 ASSE VISIVO LIBERO—MINIMO 14 metri

MIN (filo fisso) BANDI DI OSCILLAZIONE ASSE VISIVO

MAX (filo fisso)

1 INGRESSO PRINCIPALE — Funzione: Ripristino accesso originario dal Mascherone

2 3 4 INGRESSI SECONDARI

5 INGRESSO ACCESSIBILE (disabili)

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ZONA DA DESTINARE PREVALENTEMENTE A COLLEGAMENTI VERTICALI

ZONA DA DESTINARE PREVALENTEMENTE A DEPOSITO LIBRI

ZONA DA DESTINARE PREVALENTEMENTE A SALE LETTURA

Fig.4 – Urban project with the modifications of the General Urban Law

high as the study of Zuccari, consisting of a double-height room for the concerts (Sala Bach) and a third floor ballroom.

Following this addition, the elevation along via Gregoriana was brought together, from the northern atelier of Zuccari up to the southern 'House of Priests'. Thus, in order to build up the new wing, the Mascherone sculpture complex was transferred five metres to the south and buffered from the inside. Accordingly the Mascherone lost its function as a garden gate, assuming the role of sculptural decoration only.

The 'new' building was opened in 1908 and immediately became a meeting place for the cultured and cosmopolitan society of Rome. Mrs Hertz' idea was to establish the building as an institution

for the worship of the arts and music. This idea was reinforced by the proposal of a passionate student of the Florentine Renaissance, Ernst Steinmann, to put at its centre a library as a primary tool of scientific research.

On 18 September 1912 Henriette Hertz left the Palazzo Zuccari to the Kaiser-Wilhelm-Gesellschaft zur Förderung der Wissenschaften (future Max Planck Institut), a newly established German institution, as the seat of the Bibliotheca Hertziana, stating that the building could never be used for any other purpose, and that the books could never be removed from its rooms except in cases of absolute necessity. The library opened for the first time at the Tenth International Congress of History of Art, which took place in Rome in October 1912. From January 1913 the library opened regularly under the direction of Ernst Steinmann. On 9 April the same year Henriette Hertz died, and the Kaiser-Wilhelm-Gesellschaft came into possession of the estate.

In the years following the First World War, the growth of the Bibliotheca first involved the acquisition of new spaces: in 1932 the institute reclaimed possession of Hall Bach, previously rented out to a concert organisation; this was converted into a reading room in 1936 with the new name of the "Goethe Room".

In the second half of the twentieth century the activities of the Bibliotheca expanded significantly into architectural heritage due to the exponential increase of books and scientific research in a general climate of economic expansion.

The first major demolition and expansion of the institute occurred between 1962 and 1966, when the old Casa dei Preti was demolished, preserving the historic facades. A new building replaced its eighteenth-century volume on the southern side of the former garden, reducing once again its dimension in plan.

Designed by architect Silvio Galizia, this modern building consisted of five floors, providing storage and reading rooms, and two basement levels.

The project aimed to unify all the buildings previously built inside the garden within a single building called the Neubau. In spite of the demolition of some parts of the construction, the design did not solve the problem of the overall distribution of the buildings within the garden: it was simply an addition with the only purpose of increasing the space.

Following this intervention, the already tricky architectural and functional harmony among the buildings was taken to extremes with the purchase of the nineteenth-century Palazzo Stroganoff. This was the property adjacent to the southern side of Casa dei Preti. The purchase by Bibliotheca Hertziana occurred in 1963, when the Neubau was already under construction in the former garden. The structural skeleton of the Neubau was therefore adjusted during construction in order to align the new floor levels to the Stroganoff ones. Those changes involved architectural choices that were to make the new building of the library dysfunctional immediately after it opened. The Neubau was therefore the result of a series of aggregations progressively carried out without an effective programme for the extension of the institute. In particular, this 1960s intervention suffered from the outset from complete inadequacy in terms of fire prevention. None of the areas of the new building were divided by fireproofing walls, and they were open to a single circulation system that could not be considered a suitable means of escape.

In 1988 new fire prevention regulations came into force in Italy. The library was completely inadequate in terms of all the new safety standards. The Max Planck Institute therefore tried to initiate from 1990-1994 a project for updating the building in terms of fire prevention.

Unfortunately, the project would have resulted in a substantial loss of usable area, requiring, however, a high cost of implementation and administration: therefore the building as so altered would not have provided for the guaranteed use of the Bibliotheca Hertziana in the future.

Thus the Max-Planck Institute in Munich, in the person of the Director General Hans F. Zacher, and with the recommendation of the Executive Director of the Bibliotheca, Professor Christoph Luitpold Frommel, decided to draw up a brief based on the complete demolition of the building, with the exception of the historic facades, and the acquisition of a new project, through limited competition, that would guarantee compliance with the current statutory fire regulations, as well as

a long-term increase of capacity. The competition was won by the architect and artist Juan Navarro Baldeweg³.

The winning proposal

The architect, who is based in Madrid, used the term “*genius loc*” in his competition report, arguing that this urban site itself had suggested to him his project proposal⁴. This was an idea of architecture that evoked history by combining in a delicate filigree, with a few effective contemporary intuitions, the epochs and characters who, over the centuries, have inhabited the site on Trinità dei Monti. This diachronic conception of architecture follows the designer’s own poetics, for this is a man who has little patience with the composition of formalistically assembled objects and is more inclined towards the architectural exploration of the four essential factors that serve to root the space in a frame composed of its surroundings: light; gravity; the horizon; and the hand. ‘At times my works have been deliberately simple, devoted to the investigation of just one of these factors; in other cases they are more complex, pluralistic, combining more than one factor’. “As when we shine the artificial light of a torch into a dark environment, perhaps to study underground archaeological ruins, with gentle but hasty movements that quickly reveal the outlines and quality of the existing parts uncovered, in the same way the pencil of the architect moves on paper, outlining the first sketches of the project, tracing and retracing in lengths of graphite the new masses in play”⁵. These are masses that exist only when the natural light strikes them and for this reason they are formally bent to its will: the light becomes the catalyst of the project, transforming itself in the new library into its textural correspondent, fulcrum and expressive centre of gravity of the whole building: the new courtyard. A faceted cone of glass, a conventional device for the distribution of rays of sunlight, is sunk into the original garden in clear formal independence from the rest. Set back from the glass element of the courtyard, however, are the floor slabs of the five levels above ground which were conceived as a system of balconies projecting outward over a central opening. The project, therefore, does not consist of an architectural mass set between the two historic buildings, but with its delicate encompassing profile of its terraces and suave inspiration of changing scenes, gives a contemporary identity to the complex: a reconfiguration; an emptiness; a lack of fullness. Baldeweg, in this project, was strongly influenced by the original spaciousness of the site, and dilates the perception of the observer by setting new outlines on the perimeter so as to restore the original perspective in the ancient garden, in particular what could be seen from Palazzo Zuccari and the original entry of the Mascherone. It is the confluence of the visual perspective from the Sala Terrena of Palazzo Zuccari and the view from the gate-sculpture that has created the trapezoid form on which, in elevation, all the new elements are framed, from the glassed cone to the terraces. The Mascherone door had been walled shut, but is restored in Baldeweg’s project, to become the new entrance to the library. We are attracted by a series of open, transversal views that permit the observer to perceive the dimensions of the sixteenth-century spaciousness. In addition, the spatial memory of the garden is charged with magnetism, in a subtle play of temporal allusions: towards Palazzo Stroganoff the projecting balconies graduate downward, alluding formally to the monumental terraced system of semi-circular walls that adorned the slopes of the pincio between the 1st century B.C. and the 1st A.D., attributed to the gardens of Lucullus's villa. The dynamic, ethereal profile of the balconies at the different floors, obtained with a continuous play of alignments and displacement of the railings, is volumetrically clinched by the only element of the project that germinates from the soil; founded on it is a full partition going all the way to the top, tilted to increase its static severity and symbolising a monumental retaining wall. This wall, parallel to via Sistina, gives substance to the unglazed side of the court, and divides the different functional areas of the library: it separates one wing of the building from the central vacuum, along the noisy via Sistina, where Baldeweg has placed the book archives; the open projecting balconies and the rooms on the quiet side, along via Gregoriana, are the reading rooms and studies. The tilted wall, filled in with white-painted bricks, also provides a fraction screen for the sun's rays that break on its surface and illuminate the reading rooms through the faceted glass.

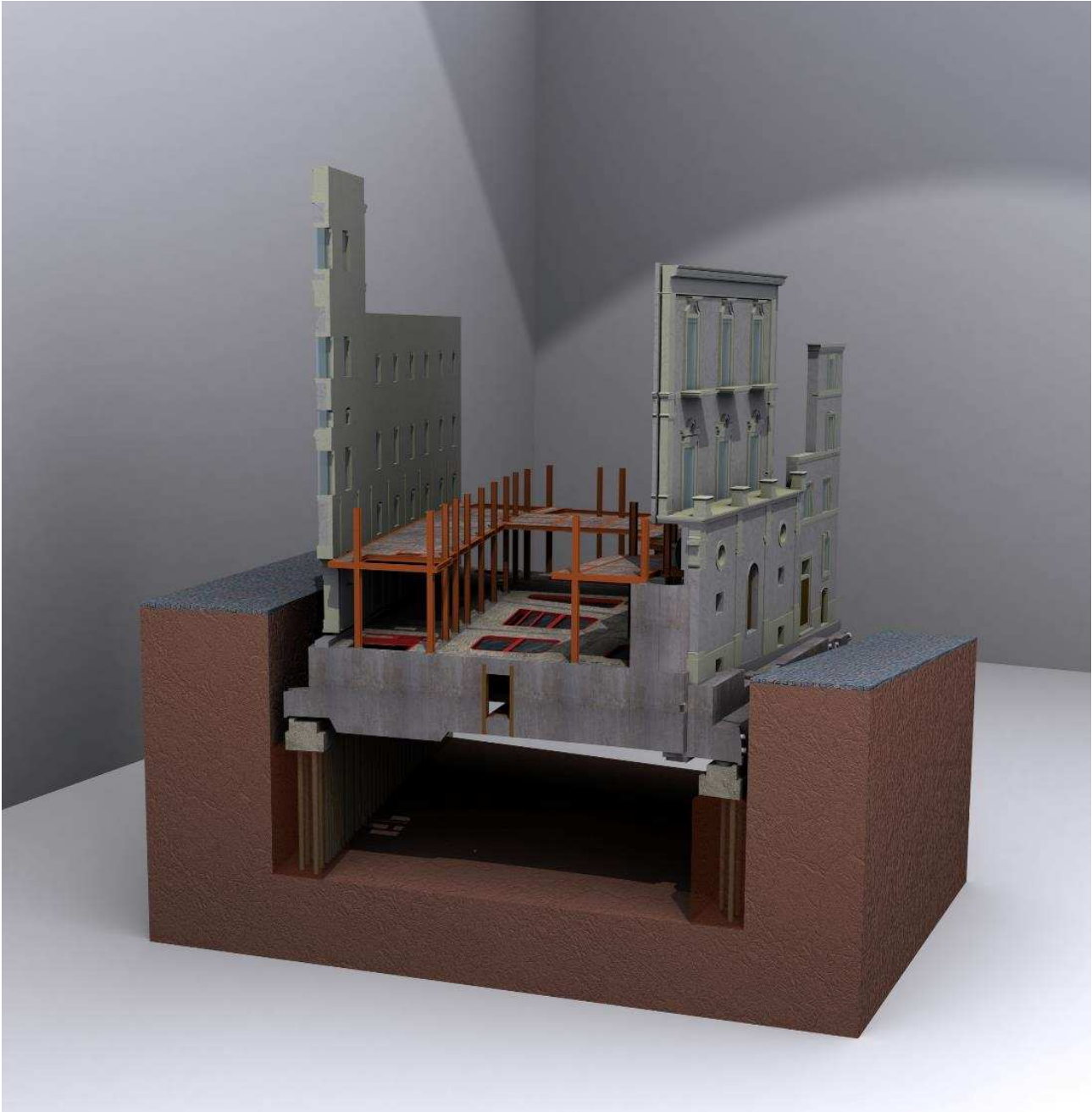


Fig.5 – Virtual model of the structural solutions.

The difficult path towards the construction

Immediately after the announcement of the winner, the institute faced two major problems which delayed the start of the construction for almost eight years. The first issue was legislative; the second one was archaeological. In 1996, following the announcement of the winner, nothing happened for a year during which the director of the Institute, Christoph Luitpold Frommel, had to struggle tenaciously and stubbornly against the juridical lack, in the city of Rome, of a procedure to approve the demolition and reconstruction of a building in the middle of the historic centre of the city, in violation of the specifications of the General Zoning Plan. Indeed the zoning law provides for only 'conservation, restoration or refurbishment' as the interventions allowed in that area. The project's administrators were aware of potential legal proceedings and could not endorse the complex process of demolition and reconstruction in the historical centre. The Building Commission would have never approved a project based on the total demolition of a building just a

few metres from Piazza di Spagna and its reconstruction, in line with a project that did not yet have the detailed drawings required to comply with current building regulations. The assistance of the Roman architect Enrico Da Gai, appointed by the Max-Planck Institute to untie the bureaucratic knots for approval of the project, was fundamental at this point Da Gai, on behalf of the Hertziana Library, and the architect Paolo Riccetti, for the city of Rome, then tried to modify an existing urban planning procedure, in liaison with the city council and in particular with the Department of the Historical City⁶.

Thus the procedure agreed on was an 'Urban Restoration Plan'⁷, signed jointly by the architect Enrico Da Gai for the Bibliotheca Hertziana and architect Paolo Riccetti for the City of Rome, comprising of a planning project aimed at serving different purposes, such as:

Making it clear that a blighted area of the historic centre does not conform to the historical urban texture of the city; demonstrating that this urban situation arose from the construction of the Neubau; showing that there are no possible interventions for restoring the urban harmony of the area except for demolition and reconstruction; demonstrating that a new contemporary building, that is respectful of the urban history of the site and matches the characteristics, the technical standards, the outlines and diagrams listed in the 'Restoration Plan', was the optimal, and exclusive, solution to solve functional problems and degradation of the area.

It is crucial to clarify that the requirements, the outlines, and the zoning diagrams of the 'Urban Restoration Plan' were made on the basis of the Baldeweg drawings. Therefore the Baldeweg building was the only one able to match the prescriptions of new Urban Plan and, for this reason, the only architectural project that could be approved by the Building Commission.

The plan defines requirements and very detailed instructions for the design of the new building such as functional distribution and a fixed alignment of walls, floors and partitions in order to restore the historical perspective from the Palazzo Zuccari to the new building within the former garden. All these characteristics were drawn from the winning design. Thus in the urban drawings is it possible to recognise the building of Baldeweg, not through architectural plans but simply with areas of different colors, as is conventional in urban planning drawings.

This sequence of steps provides a precedent for a planning tool where, usually, an urban plan should normally have been approved before the adoption of a design project for buildings in a specific area. Therefore the project of the New Bibliotheca Hertziana had a special approval process especially designed for it⁸.

Archaeology

Following approval of the planning matters, the institute and the designer had to deal the problem of archaeology. Given the certainty that no contemporary structure would ever have seen the light in a place so pregnant with history, and whose sediments are scattered throughout every existing element, the architectural project has deferred to the cause of archaeology, and thus gained the right to be built. In a demonstration of the stratification and interpretation of the past, the project acquired acrobatic powers as it prepared for a final examination of the construction plans which were prepared jointly by Baldeweg and Da Gai. The three underground floors planned by Baldeweg, were completely redesigned to permit the installation of an immense static device designed by Da Gai and built by the engineers of Tekno IN of Rome. A plate three metres high, with pre-compressed ribs, comprised the beams of a bridge system resting on just two strips of land outside the building on which the entire building stands. Under this base, which the experts call the 'beam floor', the archaeology lies undisturbed⁹. The structure designed in this way does not support only the building, but also becomes a direct instrument of the historic study of the ancient structures: special slots in its enormous base made it possible to remove the soil from the site so as to permit a slow, meticulous stratigraphic archaeological investigation; all while, above it, the metal structure of the new building was being rapidly assembled. This bold structural solution also made it possible to invest new subterranean spaces that root Baldeweg's project even further in history: a floor with a railing, six metres below the entrance level hanging from the beam floor, will give a view of the

Lucullian exedra, parts of which were uncovered during the most recent works of expansion of the Neubau (1967)¹⁰ as well as others that are being discovered now, integrating the archaeology at last into a contemporary space.

The Construction: a craft approach

A decade passed from the beginning of the construction until the opening of the library. The archaeological problems were the main cause of this substantial delay. Since the beginning of the demolition phase, it had been evident to the building contractor that the technical requirements of the project would justify the deployment of unconventional construction methods led by a craft approach.

A continuous succession of difficulties characterised the ten years of work: the environmental problems of an area enclosed by two ancient roads a few metres wide in the heart of the city of Rome; the severe lack of space for vehicles and construction machinery; a sophisticated management scheme to provide precise indications about which parts of the old building were to be progressively removed to supply room for the new structure; and the complex logistics of storing materials. The works was not conducted on a time schedule composed of a regular succession of phases: in fact, the construction management of the site was based on the simultaneous interaction of a number of processes. The phases of execution did not follow each other in a step-by-step sequence such a 'demolition before construction', but overlapped chronologically. This means that during the period of construction, some parts of the Neubau contributed substantially to the construction of the contemporary one.

The main problem faced by the builder was the inaccessibility of the site area which was restricted by two adjacent historic buildings (Palazzo Zuccari and Palazzo Stroganoff) and by the historical facades. All material – such as debris from demolition, or the casting of concrete for the foundation system, or the metal components for the new structural skeleton, or the glass panel of the glass facade – was put in place with a precise and strict sequence of crane moves. No gap wide enough on the facade was available to provide a quick connection between the interior of the building to the small loading area located outside along via Gregoriana. Overall, in order to better understand the logistics involved in the construction, it is important to note that during the demolition and reconstruction different kinds of structures were in place within the original void of the Zuccari garden at the same time. For several years the structure of the old building, the provisional elements that braced the facades during the demolition phases and portions of the new structure were all located within the narrow site. One of the aims, for instance, was to use the skeleton of the Neubau to brace a portion of the historical facade, and in so doing reduce the impact of provisional elements. In particular the most complex phase was the construction of the massive base/bridge in pre-stressed concrete. To start the construction of this large ribbed slab to support the building, works were managed in three different areas. Only a craft approach from the builder could guarantee high quality standards when assembling the massive wooden formwork. No portions of the structure were precast. The carpenters first assembled the rails which would hold pre-stressed ribs three metres high; within a month, the entire footprint of the future buildings had been covered by this unique and non-standard formwork. Iron bars were then put in place in order to erect the thick cages that would reinforce the ribs before casting the material. In order to construct the ribbed slab, the 'craftsmen' of the construction firm were required to extricate themselves from tight spaces, bend bars into dense tangles, assemble timber work in various alignments, and ensure the concrete filled every single space of the formwork, all the while respecting the highest standards of safety. The casting of all the concrete had been conducted by transporting small quantities of concrete from the mixer parked on Via Gregoriana, within the construction site, and only through a collecting basket hanging on the crane. To make this phase even slower all the casting had been scheduled during the early hours of the morning before the traffic of the historic centre became a further obstacle for the mixer in order to reach the loading area.

Even if, as I have shown, the construction of the ribbed slab represented the most complex phase of the Hertziana library construction, the assembly of the new steel skeleton was not so easy to manage either. In fact, the construction of the metal structure was far removed from the logic of standardisation as seen in ordinary steel buildings. The entire skeleton was also the result of a craft approach in terms of design and construction. Many technical features made the steel components unique. For instance, the different geometry of each floor resulted in a total lack of standardisation both during the construction phase in the factory and during the assembly process on site. Medium and large segments were lowered into the void of the former garden in a tight sequence of supplying and bolting, in order to solve the problem of the progressive narrowing of space available for the storage of the steel components.

Conclusion

At the same moment in which the steel structure was assembled, the archaeological excavation was about to discover fragments of the Lucullan villa. After a year-long campaign of excavations it was possible to understand the dimensions of the ruins and afterwards modify the design of the last basement floor to incorporate the newly found archaeological remains within the contemporary building. Now, after the opening of the New Hertziana Library, the idea of the terraced strips of the gardens of Lucullus that is conceptually united in the project's original concept is now tangible as one ascends to the different levels of the future building. The user of the new library is able now to see both the archaeology that inspired it and its contemporary interpretation: at one and the same time.

Reference:

¹ The Max Planck Society is an important national institution for research which, although funded by the German State (both by the Federal Government, and by the Länder), maintains its autonomy and should not be considered a government agency.

² Deciding to move the urban barycentre of Rome from Campus Martius to the Esquiline, the Quirinal and the Pincio, Sixtus V issued a bull in 1587, which were guaranteed benefits and tax breaks to those who had settled in these areas; in the bull "was also guaranteed stable exemption from contributions to the arts and corporations to all the craftsmen and artists who had moved within a specified period of time.": B. Müller, *Casa Zuccari a Firenze e Palazzo Zuccari a Roma: casa d'artista e casa dell'arte*, in E. Hüttinger (Edited), *Case d'artista dal Rinascimento a oggi*, Turin 1992, p.102.

³ Actually the competition was won by Baldeweg and Alex Von Branca ex-equo. Therefore the committee asked the two designers to deliver (by November 1995) a study of the project, providing precisely the capacity of the books for each level. After this the commission opted for the Baldeweg's proposal.

⁴ J.N. Baldeweg, *Ristrutturazione della Bibliotheca Hertziana, Roma*, in "Zodiac", n.17, March-August 1997, p.153.

⁵ L. Cardelicchio, (2009). *La luce e la mano: J.N.Baldeweg and the New Bibliotheca Hertziana*, EDA Esempi di Architettura, vol. 6, pp. 62-65.

⁶ *Dipartimento Città Storica e Auditorium* is a special branch of the planning department of City of Rome. During the Hertziana Library Enquiries the section was directed by the architect Maurizio Cagnoni.

⁷ Art. 27, law 457/1978

⁸ By resolution of the City Council of Rome of 12 April 1999, the plan was adopted, followed by Resolution n. 231 of the Municipal Council of 12 December 1999, which was approved.

⁹ L. Cardelicchio, (2009). *Un ponte nel sottosuolo di Roma*, *Metamorfosi*, vol. 59, pp. 30-35.

¹⁰ About the archeological excavations of 1967 see: Klaus Parlasca, *Wandmosaik eines nymphäums unter der Bibliotheca Hertziana in Roma*, in *Mitteilungen des Deutschen Instituts Archaeologischen Roemische Abteilung*, vol. 95, 1988, pp.159-186.

And also, Gert Kaster, *Die Gärten des Lucullus. Entwicklung und Bedeutung der des Bebauung Pincio-Hügels in Roma*, Thesis in architecture delivered at the Technische Universität München on 05/10/1973. Supervisor: prof. Gottfried Gruben. Supervisor: prof. Herbert Weirmann.