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Adaptive Reuse of Religious and Sacred Heritage: Preserving Material Traces and Spirit of Place

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Abstract: The theme of adaptive reuse, of great topicality for those who deal with built heritage, has its roots in the recent past, dating back to the end of the last century, when the problem of reuse proved to be competitive, for economic and cultural reasons, with respect to total demolition and reconstruction. Since then, various disciplinary and methodological approaches have been confronted with theories and methods of intervention, on an ever-expanding cultural heritage. This article offers a research perspective, with application of a case study of particular relevance to the city of Genoa, Italy. Adaptive reuse, in the text, is specifically dedicated to religious and sacred heritage that has lost its original function but has retained material traces and intangible values. The methodological approach, shared by several European architectural schools, is multi-disciplinary in nature and stems from the need to preserve material traces but, at the same time, preserve the spirit of the place, according to what is defined by the international community. The methodology and results are applied to the enhancement and reuse work for the former Genoa University Library, formerly the church of the Genoese Jesuit College (17th century).

Keywords: adaptive reuse; religious heritage; immaterial values; spirit of place; conservation; technological design; local community

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1. Introduction: Adaptive Reuse and the Multiplicity of Objects, Methodologies and Approaches

Many years have passed since the publication of Aldo Rossi's volume "L'architettura della città", which proposed a vision of the urban settlement as an architectural artefact in continuous evolution over time, whose primary elements, the monuments, were compared to "containers" of cultural memory and signs of collective intention [1].

Beginning with new scientific and economic interests, which saw the recovery and reuse of built heritage as a development factor (1980s), Rossi focused not only and not so much on the concept of "function", but also on that of "permanence" and "immaterial meaning", of "type" and "form". His text addresses the themes of the individuality of urban facts, the criticism of naive functionalism, the transformation processes of cities, typologies, the concept of locus, history and collective memory [2].

The relationship between use and architecture, however, does not stem from the reflections of Aldo Rossi but is intrinsically linked to the history of building: the use of a space is always necessary, as Vitruvius and, after him, the protagonists of the treatise tradition stated. For centuries, buildings conceived and built for particular functions have subsequently been reused for a variety of purposes; the history of architecture itself can be read as a history of reuse and adaptation, between conservation, modification and transformation, well before theorisation and use of the term "adaptive reuse" (as handed down by famous episodes from the ancient world with Hadrian's Mausoleum transformed into Castel S. Angelo, Diocletian's Palace in Split incorporated into the city, the Gothic Cathedral of St Sophia in Nicosia, now the Selimiye Mosque, the Cathedral of Syracuse, which houses the structure of the Greek Temple of Athena, and so on) [3].

The Birth of the Term "Adaptive Reuse" and Its Ambiguities

The end of the last century saw great ferment, in Europe and overseas, in the processes of urban renewal which affected portions of historic cities which had until then been marginalised and "ghettoised". Building recovery is an important opportunity for social redemption (against the so-called gentrification of historic centres), for cultural renewal and for economic drive. These are years in which, however, the intervention on existing buildings is not yet so attentive to traces; the approaches, among which we include the so-called facadism, are still heavily transformative and the quality of the interventions is evaluated more in terms of social impact than conservation of historical and material values [4]. From this season comes a transversal interest expressed by all the disciplines that address interventions on the built heritage on different scales and with different approaches, for the themes of recovery, reuse, rehabilitation, renewal and redevelopment of the cultural heritage [5–7].

It is now unanimously agreed that adaptive reuse can play a key role in strategic urban intervention to address the increasingly urgent issues, as well as the cultural and economic challenges, of managing a redundant and heterogeneous built heritage. The very concepts of reuse and recycling reflect cultural attitudes of our time [8].

The concept of architectural and built heritage expands, in terms of types of objects and scale, as well as the period of construction [9]. From heritage as "monument-document" the term gradually includes the poorest buildings of major and minor historical fabrics, significant in the same way because they are located in landscape and territorial contexts of interest; from heritage as a historical cultural asset to the recent and very recent building production of the 20th century, not just pre-war but also post-World War II [10]; from the architectural artefact of cultural significance to the places of production (as demonstrated by the recent interest also of the Italian Ministry of Culture, which has recently completed a national census of the most significant evaluated architecture of the second half of the 20th century), from material to immaterial and intangible heritage [11].

The built heritage, in all its values and dimensions, at the dawn of the new century, becomes a full part of the four pillars of sustainability, including "cultural" sustainability which fully complements the "environmental", "economic" and "social" ones [12].

An expansion of the field of work and interest corresponds to a "budding" and "hybridisation" of theoretical–methodological approaches, each borrowed from its own scientific sector, and which have been refined, in more recent times, with the introduction of digital technologies, contributing to enriching the wealth of knowledge and overcoming those disciplinary barriers which, until the end of the last century, delimited specific fields of interest and critical aptitudes. From a methodological point of view, the methods of knowledge and analysis are expanded and refined, aimed at acquiring increasingly detailed information to build a diagnostic framework, preventive to intervention, sophisticated and non-invasive. These diagnoses are aimed at resolving a series of technical problems, linked to the inclusion of new uses and the renewed needs of users [13], as well as to regulatory adjustments due to intervening regulatory disciplines (adaptation to seismic risk, adaptation to fire risk, adaptation to the removal of architectural barriers, adaptation to energy saving requirements, adaptation to acoustic requirements, etc.) [14]. Each of these requirements entails specific studies and in-depth exploration, of a multi-disciplinary nature, inducing scientific sectors that up until recently were barely considered intervening on the existing with the aim of adaptive reuse of the built heritage, reuse not only in diagnostic terms but also by refining complex decision-making processes (often based on multi-criteria assessments) for the identification of intervention strategies and solutions compatible with material conservation and redevelopment [15–18].

From the diagnostics of the actual state, cognitive investigations have moved towards forecasting fields, in terms of induced impacts and the consequent mitigation, adaptation and prevention interventions, especially with reference to the climatic and environmental emergencies that are affecting the entire planet (*adaptive reuse and environmental sustainability*). Furthermore, cultural heritage, especially if located in economically, socially and

territorially fragile territories and contexts, has become the trigger for economic and social renewal processes, with interventions often conducted with a bottom-up approach with the active involvement of local communities (adaptive reuse and economic and social sustainability [19–22]. Ultimately, the concept of cultural heritage pervades, although not explicitly, many of the sustainable development objectives that constitute the vital core of the 2030 Agenda [23,24].

Recent advances in adaptive reuse in building and construction also include component and material reuse, construction life cycle assessment, economic evaluation, multi-criteria decision-making and regulatory policies [25].

Behind the term "adaptive reuse" there are therefore an infinite number of fields of interest, both in terms of objects and of skills and, consequently, of approaches, methods and techniques [26,27]; the many words that are hidden, often incorrectly associated as synonyms, behind the term itself: "remodelling", "retrofitting", "conversion", adaptation", "rework", "renovation" or "refurbishment". Rivers of scientific literature have sought to underline the subtle differences between these words, the cultural attitudes that lie behind them, in some cases even controversially, as well as the outcomes that are not always acceptable—in terms of respect for material and cultural resources—of adaptive reuse interventions. It is not, in fact, obvious that the objectives underpinning reuse interventions, as well as the languages, are commonly shared.

More recent work on adaptive reuse increasingly seeks to move beyond a pragmatic, practice-focused approach and investigate adaptive reuse in a more conceptual way, even if, in this methodological approach, recourse is made to long-established disciplines, as is demonstrated in this article.

2. Open Questions: Adaptive Reuse of Religious Heritage and Cultural Sustainability—The Role of Intangible Values in Revitalisation Processes

Within this quick excursus on the evolution of the disciplines that revolve around the theories and practices of adaptive reuse, a small sector of investigation emerges, to which this article is dedicated, paradigmatic of the difficult and complex relationships that are established between legacy of the past, as it has been handed down to us, and the potential inherent in this legacy and useful for directing communities towards renewed uses, the only ones that will be able to guarantee its survival also for generations to come [28].

On the basis of these reflections, an international workshop was organised, as part of the activities of the Conservation network within the European Association for Architectural Education (EAAE), held in September 2015 at the University of Hasselt, in Belgium. The Conservation network has met every two years since 2007 in different places which refer, from time to time, to one of the associated architecture schools, bringing together teachers interested in the topic of heritage conservation and identifying a theme of reflection and experimentation. With a different approach compared to traditional conferences, the workshop develops with study visits to specific objects and with the organisation of participatory thematic tables on the themes of reflection proposed by the organisers. The objective is to stimulate reflections, to facilitate the exchange of opinions and experiences at an international level and to bring unusual and different contributions and points of view within each school, with an actual scientific exchange. Only at the end of the workshop are the documents published, which collect the reflections and experiences of the participants around the theme and the subjects of discussion.

In 2015, the scientific committee identified a theme of interest for Europe, historically the cradle of Christianity, but currently the creator and witness of a slow process of secularisation: the adaptive reuse of places rich in cultural and symbolic values which, however, cannot be readapted to their original function [29]. The title of the 5th Workshop "Conservation/adaptation. Keeping alive the spirit of the place. Adaptive use of heritage with symbolic value" aimed to capture one of the most critical issues in addressing the reuse of sites of cultural importance: the adaptation of cultural heritage to contemporary uses of sites and monuments that contain exceptionally valuable symbolic meanings and values.

In particular, the discussion of the working groups focused on three themes.

1. *Social meaning*

Europe is experiencing fundamental socio-economic changes, moving from an industrial (product-oriented) society to a knowledge-based (service-oriented) society. What will be the future of the vestiges of the industrial past that are strongly imbued with social meaning and collective memory, but which sometimes have limited architectural value?

2. *Commemorative/political meaning*

Intentionally or unintentionally, some buildings or sites carry particular political messages or memories of historical, tragic or triumphant events. Is it appropriate to reuse such buildings or sites? How far can we go to exploit them and keep their memory alive and accessible to the public (musealisation versus Disneyfication)? How can we prevent them from being used in an ideologically incorrect manner?

3. *Religious/sacred meaning*

Religious buildings (churches, sanctuaries, monasteries and other places of worship) constitute a rich part of the European cultural heritage, full of historical, architectural and symbolic value. In Europe, places of worship—whether Catholic, Protestant or Orthodox—reflect specific religious practices and rituals, and their future poses profound questions to contemporary society that have long been the subject of debate. The issue is not new, but it is re-emerging with ever greater urgency in response to pressing local problems.

In recent decades, religious heritage has faced major challenges in several countries: in some of them, a marked decrease in religious practice combined with a general economic decline has caused the abandonment of many churches, chapels, convents and monasteries. Along with presbyteries and other types of service buildings, they tend to be privatised. Over the centuries and throughout Europe, many convents and monasteries have been transformed into military barracks, prisons, hospitals, public offices, private residences and even factories as a consequence of changes in the political, social and religious order of each country. Some of them today host schools, archives, libraries or residences, hotels, resorts, museums and even ministries (such as the Collegio Romano in Rome).

There are profound reasons that explain why, in the modern era, the history of the heritage of religious architecture has been so troubled and complex; and this is true in a number of different geographical, historical and cultural contexts. A large number of religious buildings have survived the political and religious wars, the looting and devastation caused by revolutions, the massive expropriation programs promoted by various states in the 19th century and, finally, the various forms of violence that characterised the "Hobsbawm's Age of Extremes" [30]. In a certain sense, the reuse of former ecclesiastical assets today is not very different from historical uses. However, we have developed more refined cultural tools to pursue this reuse. Today we focus more on knowledge and respect for the past, on the way we imagine the future; indeed, this approach has developed hand in hand with the very notion of cultural heritage and with the ideas that have played a significant role in its gradual formulation.

Compared to other historic buildings and cultural contexts, the meaning of such objects is even more delicate and "intangible". On the one hand, it is now clear that it is not acceptable, nor perhaps legitimate, to compare the value of an unused place of worship to that of other abandoned sites, even if they are deconsecrated places; on the other hand, there are no singular answers to the questions on the opportunity to "revive" these sites, on the possibility of incorporating, in the new functions, a "sacred atmosphere", on the role of the creative design of internal spaces that are generally respectful of spatiality, of matter and symbols.

3. Materials: Adaptive Reuse Interventions on Deconsecrated Dutch Churches as a Point of Critical Reflection

To facilitate discussion in the working groups and to focus groups around rather complex theoretical and methodological topics, a number of case studies located in the

Netherlands and subject of recent reuse interventions were visited, among which were three deconsecrated Catholic churches located in Maastricht: the Minorite monastery, a former Dominican church from the 13th century and the former monastery and church of the Brute Friars from the 15th century

3.1. Regionaal Historisch Centrum Limburg Sint-Peterstraat 7 6211 Maastricht

This centre is located in a former Franciscan convent, built in 1234. The construction of the church, in late Gothic style, began in 1300. After the conquest of the city by Frederik Hendrik, Prince of Orange, in 1632, the monastery was dismantled and the church used as an arsenal (until 1867). The convent buildings were subsequently converted into an orphanage (1640–1690), a military hospital (1685–1798), barracks and prison (until 1917) and finally a sauerkraut factory. For some periods, the complex remained unused, then it underwent projects of restoration, and finally came the extensive damage caused during the Second World War: from 1939 to 1942 important restoration works took place again, when the dilapidated part of the monastery was demolished and a wing was rebuilt in a "historic" style. The monastery church itself had been used as an archive since 1879 and in 1880 it was stripped of its baroque structures: the restoration culture of the time meant that the existing dome was replaced by neo-Gothic pointed arches (Pierre Cuypers, architect of the Rijksmuseum in Amsterdam, dismantled the seventeenth-century dome of the Sea Chapel to recover the Gothic style unity of the building). After further redevelopment works and the addition of new structures (1984–1996), the complex became home to the Provincial State Archives, which houses various documentary material relating to the history of the region. In 1995, the building, owned by the Government Buildings Agency, was again substantially restored, with work including the completion of an underground storage facility (Figure 1). The church now serves as a reading room and exhibition centre for the Limburg Regional History Centre (HistorieMinderbroederskerk–RHCL).

Figure 1. The Limburg Regional History Centre (photo G. Franco, 2015).

The shared perception of the workshop participants was positive: the silence of the prayer and worship space seemed to be preserved in the new silent environment of an archive. However, the symbolic meanings and previous use of its spaces (their orientation, paths, functions) have been completely changed, forgotten and denied, albeit with quality architectural solutions.

3.2. Bookstore Selexyz Dominicanen, Maastricht Dominicanerkerkstraat 1 6211 Maastricht

In 2006, Boekhandels Groep Nederland (BGN) opened a new store in Maastricht: "SelexyzDominicanen". The library is located in the 13th century Gothic church of the former Dominican convent. The church has had secular uses since the French Revolution and most of these functions did not respect the historical and architectural qualities of the church: military station and depot, municipal depot, post office and finally bicycle parking. The convent itself was reused after the French Revolution as a school and demolished in the 1960s. The "EntreDeux" shopping centre was built on the site. The church had needed to be restored for many years, but there were no funds available due to the lack of use of the building. When it was decided to renovate the "EntreDeux" shopping centre, the sentiment was to include the church in this project and to convert it into a shop. However, the developer initially had difficulty finding a tenant for the building due to its specific typology but also its "sacred" value. Ultimately, BGN, a Dutch company, decided to rent the space. One of the difficulties that the planners had to address was the expansion of the commercial plan. The number of square meters required by the new property was almost double that of the available surface area in the church. For this reason, a massive two-story library was placed asymmetrically in the church. Another noteworthy intervention is the lighting plan, which not only highlights the books on sale, but also the church itself. To respect the historic interior as much as possible, most of the lighting is integrated into the new added volume. In SelexyzDominicanen, all the interventions on the building were made explicitly reversible. By introducing the two-story library, the typology of the church is not only respected, but even emphasised. Viewed from the ground floor, the scale of the building is highlighted, while from the upper floors the architectural details can be observed up close. This display of the church's architecture is even more accentuated by the lighting plan (Figure 2).

Figure 2. The bookstore SelexyzDominicanen (photo G. Franco, 2015).

The perception of the participants, in this case, was not unanimous. It was noted how the powerful metal structures altered the spatiality of the church. The dining table of the café, which replaced the main altar in the choir of the late Gothic church, was designed in a cross shape and this provoked indignation among many participants.

3.3. KruisherenhotelKruisherengang 19-23 6211 Maastricht

Even more controversial was the reaction to the third case. A futuristic tunnel through the former portal leads to the church Kruisherenhotel, which houses the reception of a

luxury hotel, conference rooms, a library, a wine bar and a restaurant. In the centre of the nave, under the mezzanine that houses the restaurant, small lounges and services have been positioned. The wine shop is located in the choir, hidden behind this main box. The toilets are set up in a smaller box in the side aisle, with a library on the first floor. At the other end of the building, behind the reception, a glass elevator and walkways connect the church with the hotel rooms. Most of these are created in the convent cells and some in an adjacent Renaissance building or in the new extension, in Corten steel. The city of Maastricht had purchased the convent in 1980, with the idea of using it for the Academy of Fine Arts. It soon became apparent that the city would not be able to pay the enormous conversion costs, and the same problem arose with other projects considered in the 1990s. In 2000, the Chateau Hotels and Restaurant company offered to transform the convent into a luxury hotel, a proposal enthusiastically accepted by the city authorities, on the condition that the operation was reversible and that the monumental value of the complex was preserved (Figure 3).

Figure 3. The bookstore SelexyzDominicanen (photo G. Franco, 2015).

The space of the ancient Gothic naves, the built material and the meanings and ways of using the church were completely distorted and privatised by the function of the new hotel, aggravated by certain design choices of dubious quality [31].

4. Methods

The visit to the religious and reused sites and the participants' reactions enlivened the theoretical–methodological debate already triggered by the questions opened by the scientific committee. The purely commercially inspired projects seem rather more controversial, with pointed arches, soaring Gothic columns and stained-glass windows (both original and 19th century) that are little more than curious reminders of a long-gone past that serve to delight the tourists. The fact is that, from a technical point of view, an adaptive reuse policy tends rather to see the internal space of such structures simply as an empty shell, whose layout and furnishings can be redesigned according to the sensitivity and taste of designers or to user expectations. The meaning and sense, as well as the intangible values of a heritage such as the religious one no longer in use, cannot remain static over time, and current and future meanings overlap with historical ones, sometimes profoundly obscured.

Making these places resonate with contemporary sensitivities involves interventions that evoke a connection not only with the events themselves but with those who were affected by them. One must then critically and methodologically question the relationship between tangible and intangible values, encouraging discussion and debates in order to

develop a new conceptual vocabulary that takes into account the ontological changes of the spirit of place [32].

The spirit of place is not just made of matter, but is the result of the work of the actors who have built, inhabited, managed, maintained and even modified it, also attributing different meanings over time [33]. The spirit of the place is not just matter, but a relational concept, complex and changing synchronically and diachronically. How to adopt, in projects of adaptive reuse of this heritage, the recommendations of the Québec Declaration: Rethinking, identifying the threats, safeguarding and transmitting the spirit of place?

And, moreover, when the meaning of a place is perceived rather than learned, it enters an imaginative space that may belong to the past or future rather than the present. But where should we stop in our imaginative power of re-description [34]? Because, in the case of religious buildings, the criticisms directed at reuse interventions seem to evoke an empathy with the buildings themselves, even if today we are, at least in part, distant from the spiritual and material lives of their previous occupants.

It is therefore necessary to shift attention away from fabric—or matter—to meaning, but this action carries the risk of creating an inverted order of importance in decision-making processes on appropriate uses and, more generally, on the allocation of resources. The heart of the paradox is the interface between the tangible and intangible dimensions of the legacy of the past and is, at the same time, the challenge that conservation must face in the future.

There are many approaches to adaptive heritage reuse, as briefly mentioned in the introductory paragraph. Although these are well-established approaches that also take into account contemporary challenges [35], their application does not guarantee good quality outcomes, as recent studies also show in areas related to tourism development [36].

This contribution intends to demonstrate how the appropriate application of long-established methodologies, starting from the field of conservation and restoration, is a necessary, but not sufficient, condition to guarantee the good quality of the results, which largely depends on the sensitivity, interpretation capacity and creativity of the design act. The knowledge of the heritage, investigated in its historical and material values, in its state of preservation and in its physical traces (as indicated in Section 5 below), must be flanked by an analytical and synthetic pathway that aims to address the complex system of values that, above all, a type of heritage such as the one considered in this article can still express or will express in the future in a potential way [37].

4.1. Material/Immaterial (Tangible/Intangible): Conflicts and Contradictions—Values Assigned, Perceived, Accepted or Rejected

In past eras something of the pre-existing world was preserved or transformed, but it was not the result of the application of a theory, a doctrinal attitude or a fixed and written rule. More realistically, it happened because of the unstoppable and unpredictable forces of history and human needs, opportunities, constraints, resources, resilience, traditions and so on. The reuse of existing buildings has never been an explicit problem, at least not until the 18th–19th century, apart from some very specific cases. Their fate, between conservation, transformation or destruction, was rather determined by their symbolic values, which had to be confirmed, reinstated, claimed or denied and cancelled from time to time, depending on general historical reasons or on the pragmatic opportunity they offered in terms of satisfaction of new needs.

It is not at all clearly deducible to what extent the symbols, meanings and memories—that is, the "immaterial or intangible" side of what we have inherited—are actually incorporated by matter. What happened in the past is consumed and metabolised by the passage of time that we usually call "history". Stones are always necessary and can be useful for the transmission of the "intangible", but they will never be sufficient to guarantee that values, symbols, meanings and memories can pass down through generations. It is true that stones last longer than human lives and for this reason they can guarantee that something passes from one era to another, creating a sort of continuity of our civilization.

However, it may also be the case that the values embedded in those stones are no longer understandable and accepted by a new generation.

Symbols and meanings belong to humanity as a whole or to small social groups and communities. Furthermore, they inevitably change, over time and space, although sometimes unconsciously or non-reflectively. This is particularly true in our "liquid", fragmented but in some ways also "democratic", pluralist, multicultural, multi-ethnic, multi-religious and globalised world [38]. No-one therefore seems to have the right to legitimately say "yes" or "no" to any request for the transformation of existing buildings. History will decide, in the future, whether history still exists [39]. Meanwhile, we must inevitably say "yes" or "no", especially in cultural terms, to the demands posed by our societies.

Where can we then set a fundamental limit/boundary between what is "acceptable" or "prohibited" in the adaptation of an existing building to new uses [40]? How much material can/should we conserve? How should we modulate adaptive reuse towards intangible conservation and the references evoked by previous intangible meanings? What limits could we then place on our current needs/desires in reusing existing abandoned or underused buildings, considering the events of the past?

The answers are not easy and cannot be definitive because they are entwined with the passage of time (i.e., of ourselves), with the sense of individual memory (very short) and with collective memory (which is always somehow constructed artificially and can also be manipulated or invented).

4.2. Functions

The role of function in the creation of a building represents one of the recurring themes of modern architecture. Many scholars have highlighted the contradictions and limits of similar theoretical postulates: the obsessive attention to the structure and function typical of rationalistic architecture has forced the conceptual references of architects within the rigid boundaries of direct correspondence with the tangible needs of human beings [41]. Changes in function, the result of technological and cultural transformations, occur over time and with changing behaviours that depend on the historical and geographical contexts in which they are located and the nature of the building. In this context, a new organic project is generally necessary, balancing the priorities of the function and those of the existing structure.

Unlike what happened twenty-five years ago, current reflections on the meaning of architecture seem to push interventions along the path of innovation rather than that of reconstruction, demonstrating once again the difficulty of building this type of proposition on unique and stable theoretical bases. The theme of reuse appears mostly as an architectural design issue [42]. Thus, the practice of conservation and that of new architectural design met—and often clashed—in the field. The compatibility/function combination has mainly promoted the inclusion of cultural services in religious buildings. For some time, the choice of "superior" cultural activities has contributed to making such conversions socially acceptable, but the economic crisis of recent years has promoted a more inclusive pragmatism, which legitimises almost all changes in intended use to avoid possible demolitions.

Functional reconversion uses various strategies with varying effects. The following can be predicted, in ascending order of invasiveness: the creation of transitory, generally spontaneous adaptations; the organised rearrangement of furniture; the inclusion of technological elements, mostly of utility; actual conservative interventions, accompanied by new furnishings; the insertion of new functional architectural forms; and the profound transformation of buildings [43].

Following the order of these categories, we move from approaches that are similar, in terms of tools and strategies, to the field of interior design towards more fully architectural processes. If we relate the architectural quality of the buildings to the operational choices that concern them, we can notice that non-cultural uses prevail in minor buildings, while "light" cultural functions prevail in the most important buildings. An equally predictable comparison concerns the greater extent of alterations in the first category and the extent of

conservation activities in the second. In a third of the cases, the conservative intervention pursued recreation of the original shapes and colours, while in the other situations the strategies were more elaborate and did not avoid the inclusion of contemporary design.

5. Application to an Italian Case Study: The Former Church of SS Gerolamo and Francesco Saverio and Former University Library

The former church of Saints Gerolamo and Francesco Saverio, annexed and adjacent to the Jesuit College, was built in the mid-17th century by order of Francesco Maria Balbi, in a position set back from the road and still bears the name of the noble Balbi family who had buildings created adjacent to its sides. Strada (today via) Balbi, which was created with the aim of extending the Renaissance fabric of Strada Nuova and Strada Nuovissima towards the west, still today constitutes a pedestrian and public transport hub which is vital for the connection with the Piazza Principe railway station and given the presence of the museum centre of Palazzo Reale (formerly Palazzo di Stefano Balbi) and the humanistic university centre, located in some of the Balbi buildings (Figure 4) [44].

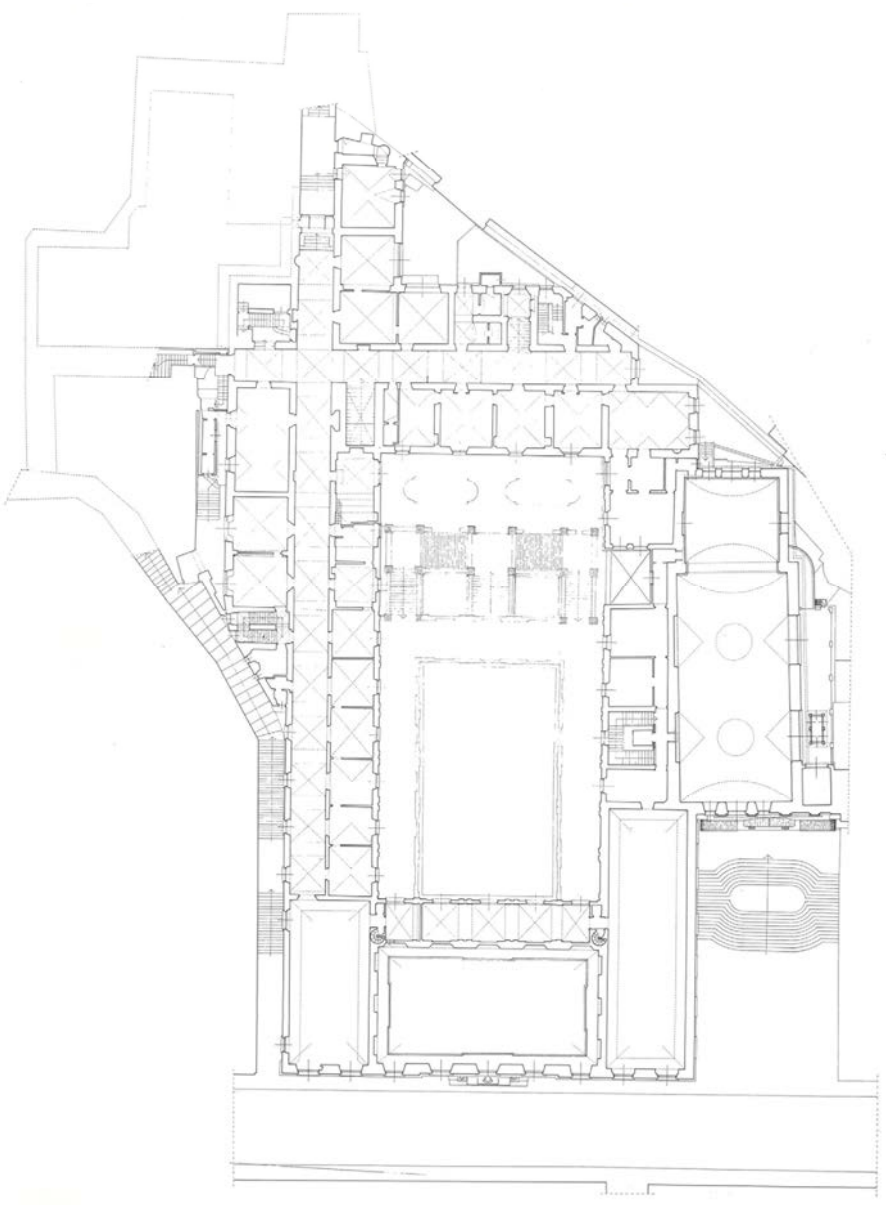

Figure 4. The form Jesuit Collegium, actually the Palace of the University of Genova.

The church has a single nave, four side chapels alternating with choir areas (Figure 5) [45]. The decorative apparatus of the apse was commissioned to Domenico Piola, one of the best-known artists of the period, who collaborated with Paolo Brozzi (1666–1667). Despite the significant modifications, which are covered below, which included the plundering, destruction and whitewashing of the frescoes, the choir space is still preserved. In 1773, after the suppression of the Society of Jesus, the college and the church were used as an institute for higher studies. Today the College is the main seat of the University of Genoa, while the church has undergone important transformations, linked to uses that we would define as "non-adaptive" and which have almost irremediably altered not only the decorative apparatus of the nave, of the side chapels and—probably—of the vault, but the overall spatiality of the sacred environment.

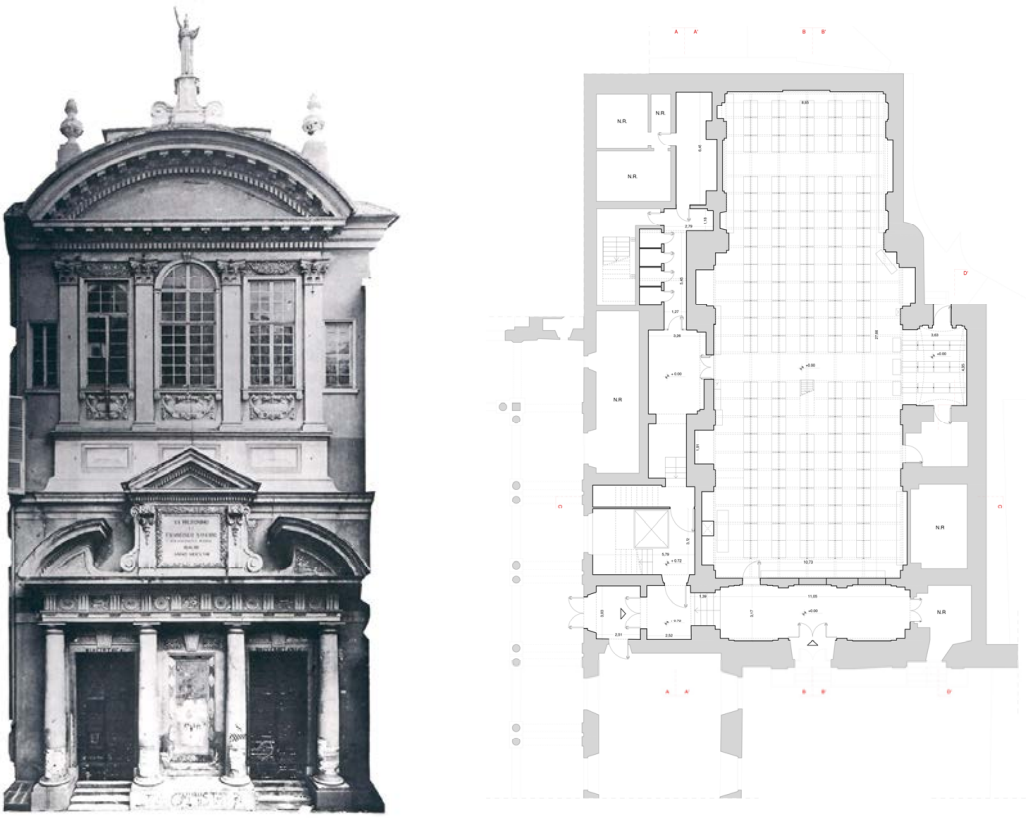

Figure 5. The main façade of the baroque Church and the actual floor plan, still containing the metal shelves of the University Library (in the meantime moved away).

In the transition to the University of Genoa, the church was adapted, in the second half of the 19th century, to house the Natural History Museum. We have little evidence of this first important reuse intervention other than a description in the volume by Federigo Alizeri, the city's historian and literary critic, who mentions the destruction of the altars and the sale of the decorative marbles [46], to leave room for a new use. An unfortunate choice, because the conditions of high humidity of the places would have soon damaged the zoological and anatomical collections, which were immediately transferred to another location, leaving only the geological and mineralogical collection in the former church.

During the First World War, the church was used as a Soldier's House, undergoing further transformations that were not sufficiently documented. The current appearance is due to the last use that the space contained, i.e., the home of the University Library (Figure 5), from the year of its inauguration, in 1934, until 2014, the year of its decommissioning—due to the inadequacy of the depository spaces and the unhealthy conditions—in favour of a new site located not far away, in via Balbi 40 (formerly home to the Columbia hotel). Since

then, the space of the former church has been closed to the public, and its memory confined to those who used it. Its care is entrusted to the Ministry of Culture.

The project for the new headquarters of the University Library was drawn up by the engineer Carlo Fuselli (Chief Engineer of the University Technical Department until 1931, the year of his death) in two stages: a first version in 1926 and a second, completed, in 1928 [47]. The solution adopted, to contain the important book depository and the reading room, was to divide the large hall and the abyssal choir into two spaces, building a large reinforced concrete slab (with Hennebique patent, built by the company G.A. Porcheddu of Turin). The depository space, from ground level to the reinforced concrete floor, was further divided into five floors consisting of a self-supporting shelving system and steel walking surfaces (Lips-Vago patent), while the upper space was completely unusual because above the level of the first frame of the church it was used as a reading and consultation room (Figure 6). An important intervention was also that of the replacement—with relative change of height—of the roofing structure, previously wooden, with reinforced concrete beams and trusses and the insertion of two reinforced concrete skylights and glass roofing, creating two circular cuts in the wall vault of the nave, to ensure greater natural lighting.

Figure 6. The transformation of into University Library (1937). At the left side, the reading room, at the same level of the baroque frescoes of the apse; at the right side, the metal shelves of the book repository, below the reading room.

From 2019 to 2021, the former church was the subject of studies and research by the teachers and students of the School of Specialisation in Architectural Heritage and Landscape of the University of Genoa and, subsequently, of further in-depth studies commissioned by the Regional Secretariat of Ministry of Culture and the Superintendency of Fine Arts, Archaeology and Landscape of the metropolitan city of Genoa to the Directors of the School itself. Researched and studies have been realised by Angela Careddu, Andrea Fenialdi, Cinzia Frongia, Marianna Ghironi, Caterina Lavarello, Luca Marasso, Ambra Pellini, Caterina Politi and Cristiana Tarantino under the scientific responsibility of the board of professors and, in particular, the two Directors of the School, Giovanna Franco and Stefano Francesco Musso [48].

The studies and research, which resulted in project proposals for conservation, redevelopment and adaptive reuse, constituted an important opportunity for the application and in-depth analysis of the critical and methodological approaches that emerged during the previous workshop, coordinated by the School Director herself and the author of this article [49].

6. Results

6.1. The Survey

The survey available at the start of the study was commissioned by the University in the 1980s and published in a volume [50]. The errors and discrepancies found were due

to the complexity of the building itself, which over the years had undergone significant changes from its original configuration through demolitions, new structures and additions. In particular, the large space of the former nave, located under the slab of the reading room, was completely occupied by the metal shelves of the book depository area which, at the time of the survey, largely contained the book heritage of the former library. The presence of these shelves and numerous systems also significantly hindered the survey of the internal wall surfaces and, in part, of the lateral spaces of the choirs and chapels below.

Naturally, the updated technological equipment, compared to what was available at the time, has made it possible to develop various complementary methods, also useful for achieving necessary refinements, based on the needs and characteristics of the environments. The new survey affected all the rooms of the former library, both the central ones (the narthex, the nave, the presbytery, the areas of the chapels and the lateral choirs above) and the adjacent ones (hallways, stairwell, halls, offices, archives, toilets and storage rooms). Even the scale of representation of the published survey proved to be inadequate for the final requirements as many details were missing such as the mouldings of the frames and pilasters, or small niches and recesses in the plans, which were integrated later. The rigorous longimetric method, through the creation of eidotypes on which the reference lines for the linear measurements and the trilaterations necessary for the correct survey of the spaces were indicated, made it possible to identify narrow and confined environments, cluttered with depository material, where using other methods would have been more complex. This method was used for the lateral rooms adjacent to the University Building, arranged on five levels and including offices, stairwell, horizontal distribution spaces, storage rooms, toilets and technical rooms. Furthermore, the longimetric method was applied inside the book depository to identify in detail all the mouldings, pilasters, niches and chapels present in the perimeter wall. It was also used to precisely acquire the structure and composition of the metal shelving, with a millimetric level of detail, fundamental to understand its structural functioning and integration with the existing building, as well as its possible "dismantling".

The topographic survey with total station made it possible to create a topographic network at the level of the reading room, including support and station points both inside the large room and in the corridors that give access to the lateral rooms, thus forming a closed polygonal. This survey formed the fundamental basis for the survey campaign with a laser scanner and the creation of a photogrammetric model of the frescoed parts of the apse.

The laser scanner survey (performed in collaboration with Department DICCA of the University of Genoa and coordinated by Prof. Carlo Battini) was used to survey the large reading room. Thanks to this tool it was possible to interrogate the point cloud to determine and acquire the metric data and the measurements necessary for the renderings, comparing them with those obtained through the longimetric survey (Figure 7). Subsequently, after having resized its extension, the cloud was imported into the CAD. It was thus possible to set the horizontal section planes at the desired height, assigning a cloud slice thickness, useful to display only the points necessary for the operations of returning the desired section and limiting those in the background. The next operation was to "trace" the point cloud, i.e., to vectorise the desired geometric contents, using CAD drawing tools, and thus obtaining line plans and sections. The plan obtained was compared with that resulting from the topographical method. The differences detected between the two renderings were minimal and the level of detail of the plan was similar for both work procedures.

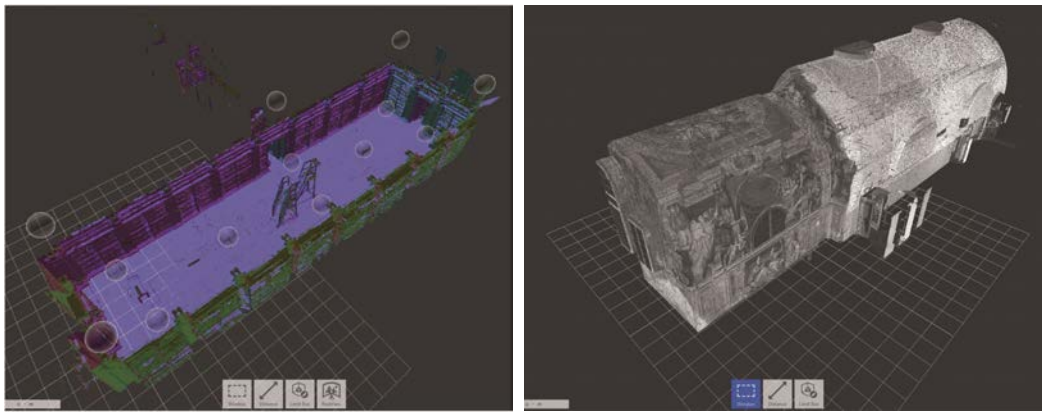

Figure 7. Point cloud form laser scanning of the reading room (Carlo Battini and students of the post-graduate programme, School of Specialisation in Architectural Heritage and Landscape).

The survey in digital photogrammetry with photoscan (performed thanks to the collaboration and assistance of the MARSC Laboratory, in particular of architect Gabriella Garello) and was limited to the frescoed apse of the reading room and the frescoed chapel on the third floor of the side rooms, thereby obtaining—using dedicated software—the three-dimensional model of the two most valuable environments (Figure 8). The georeferencing phase of the model was performed by inserting support points determined through the previous topographic survey. The abundance of points detected ensured a good distribution and an excellent result from the point of view of evaluating residual errors.

Figure 8. The survey in digital photogrammetry of the apse and a side chapel, still decorated (Gabriella Garello and students of the post-graduate programme, School of Specialisation in Architectural Heritage and Landscape).

The generation of the model and the production of orthophotos required careful masking of the images to exclude irrelevant parts. Particularly relevant was the use of the photogrammetric 3D model to extract orthophotos and photoplans, useful as a basis for the subsequent mapping of the frescoed walls.

6.2. The Study of the Bulding (Constructive and Structural Features) and Archival Research

An adaptive reuse project of the spaces of the former church and former university library that can be shared and respectful of the methodological approaches referred to in the premises must also be based on a careful study of archival sources [51], aimed at rewriting the history of its conception, of its clients, of the role of the designers and workers, but also to expand its material knowledge, both in the initial construction phase and in subsequent modifications. It is necessary on the one hand to understand the system, the structural conception and the materials chosen for the foundation of the building and for the important transformative interventions (in order to subsequently be able to explore ad

hoc diagnostic campaigns, also in terms of verification of seismic behaviour) but also to delve into the roles and weight that the institutional and professional figures who worked on the former church in the 19th and 20th centuries held, thereby rewriting small stories and correctly classifying the role and authorial value of the various protagonists (more and less known in local history) who took part in the large work site for conversion of the former church into a university library (Figure 9).

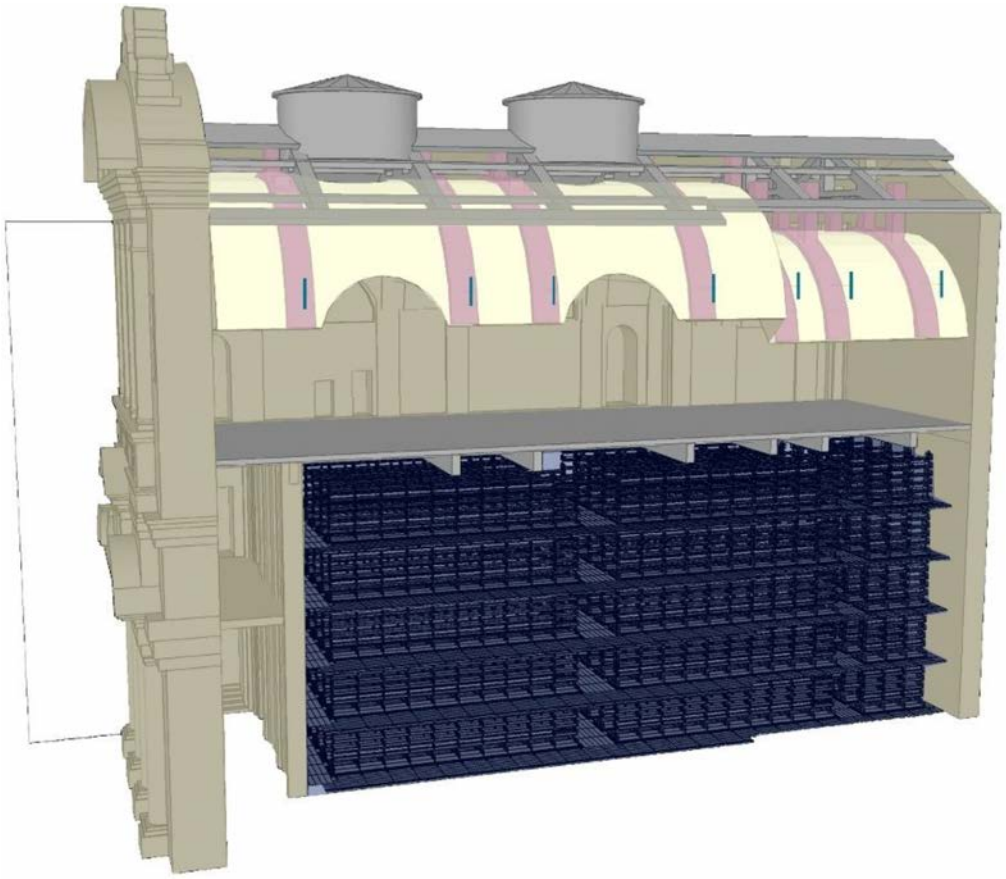

Figure 9. 3D model of the structure (original and reinforced concrete floor and roof) and of the space divided into book depository and reading room (elaboration of the students of the post-graduate programme, School of Specialisation in Architectural Heritage and Landscape).

An in-depth investigation into archive sources contributed to reconstructing a 'micro-history', which lasted just under 10 years (from the first project for the transformation of the complex into a university library, in 1926, to its inauguration, in 1935), through the voices, recorded by archive documents, of the main protagonists of the planning and construction events in question, partly ignored or 'overshadowed' by the 'official' historiography published so far and dedicated to the projects for the former library. The main construction elements that compose the structure are described in the specifications present in the manuscript deed signed by the notary public Gio Luca Rossi, where all the phases and processes necessary for the construction of the church are illustrated [52]. The first items of the specifications address the foundations to be built with the use of "pitched stones, 5 palms and 4 palms" for those intended to support the "pillars", and "of four palms of coarseness, of cinnamon stone" for those intended to support the stone walls. The foundations were designed and built with the same material but used in a different and specialised way: the parts of the foundation intended to support the specific loads of the pillars, the overhead arches and the roof were made with regular blocks, while those dedicated to the perimeter wall partitions intended to receive the loads originating from the ribbed vault and the roofing structures were built with more irregular stone

elements. The vertical structures of the former church consist of a mixed system of partly incorporated reinforcing pillars and continuous walls, according to the Genoese tradition of "walling by making pillars". These construction elements, despite being distinct in the afore-mentioned specifications, are collaborative as the pillars are attached to the wall partitions, constituting a continuous load-bearing wall albeit strengthened in specific points in relation to the loads deriving from the upper structures. The walls therefore have thickenings, with dimensions of 99 × 124 cm and a height of 17.4 m, made of pitched stones, which increase their section and resistance at the reinforcing arches of the vaulted and roofing structures. The specifications refer to the construction of thirteen pillars along the perimeter of the nave plus two to be raised in the choir area. The walls are made of "scapoli" and "tocchetti" stones, a technique widespread in the historic centre of Genoa starting from the 14th century and used until the 19th century, which involves the use of slightly worked or unworked stones.

The structural scheme therefore consists of a self-supporting barrel vault in masonry with a series of extradosed stiffening arches, placed at the pillars reinforcing the perimeter wall. Each arch is equipped with a metal chain to contain the pressures. On the extrados of each arch rest three small solid brick pillars placed at the current reinforced concrete pitch beams, which were once wooden. The secondary structure of the roof is described in the same specifications, where it is prescribed that the joists should be arranged at a distance of 19 cm from each other. The roof, similar to many other hall buildings, consisted of a double pitch covered with slate slabs, supported by a double wooden frame from the planking above. The main structure, consisting of longitudinal and therefore non-pressing beams, was supported by masonry pillars, in turn set on the wall vault. From a purely constructive point of view, the strength of the church wall structures was able to support the important overloads linked to the new function of university library and will be able, after appropriate checks, to support the loads linked to the new uses (in any case lightened compared to the previous ones).

However, archive research, conducted in different fields, has revealed knowledge of an "immaterial" nature, not only in relation to the new uses that occurred in the short period between the end of the 1800s and the first decades of the 1900s but also with reference to the role of the major or minor prominent figures involved in the work and to the resulting material stratifications. The spatial configuration, in its current state, with the division of the large hall space into a book depository area below and a reading room above, is to be attributed to the engineer Carlo Fuselli, while the structural calculation and construction of this and other reinforced concrete works, including the roofing structure, was conducted by the company G.A Porcheddu [53].

The reinforced concrete slab that divides the interior of the church hall and supports the flooring of the reading room below the wall level of the barrel vault is located at a height of approximately 12.5 m above the original walking level of the church. The main structure of the large slab consists of seven beams with a 75 × 32 cm section, placed transversely to the nave, inserted into the perimeter walls at the masonry reinforcement "pillars", at the level of the original cornice, not respecting a constant pitch but following that of the vertical structures of the building at the thickest points. The secondary structure consists of three continuous beams placed longitudinally with respect to the nave with a 45 × 25 cm section. These beams are placed at a distance of approximately 2.55 m from the side walls and have a distance between centres of approximately 2.65 m. The flooring of the reading room above has a cork underlay and consists of linoleum elements (Figure 10).

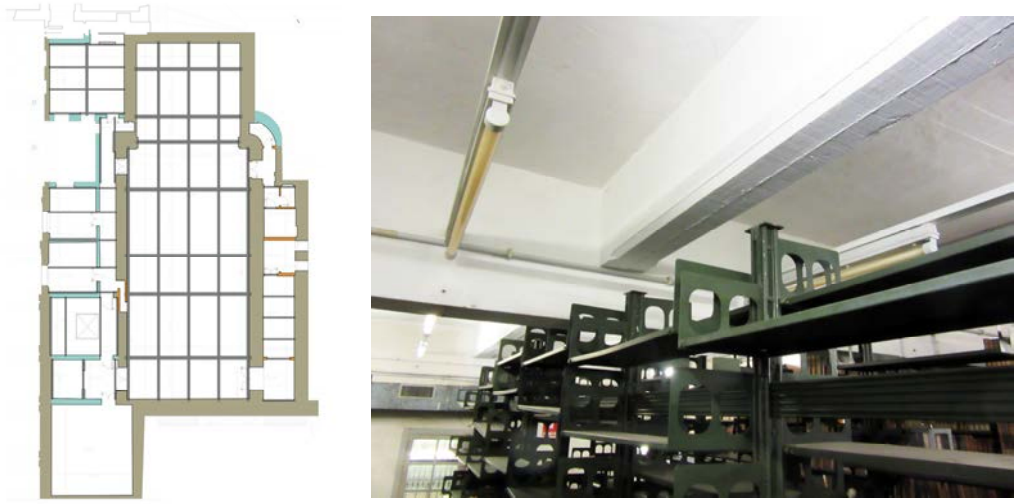

Figure 10. The structural frame of the new reinforced concrete slab built in the early decades of the 20th century to obtain the library storage and reading room above (**left**) and a photograph of the main beams (**right**).

Beams and slab are inserted into the perimeter walls of the former nave of the church at the cornice. The latter has therefore undergone some tampering, with the loss of parts of the painted decorations and stuccos, as well as some of the pilaster strips that decorated the internal walls of the nave, due to breaking of the seats for the insertion of the new structural elements. The static scheme of the reinforced concrete roof structure is not the same for the entire building but varies in its development. The one used in the choir area, where the span to be covered is approximately 9.30 m, differs from the one adopted in the main nave area, where the span is 11 m. In the choir area, two structures similar to trusses are used, suitable to transfer the weight of the reinforced concrete roofing pitches onto the perimeter walls. In the nave area, however, shaped beams are used which directly touch the extrados of the vault below and have two trapezoidal openings with a lightening function. These beams additionally support the two skylights also made of reinforced concrete, placed in offset to the main vault, to provide brightness to the space below.

Both the trusses and the beams are not placed at the extradosed arches that stiffen the vault and the masonry pillars placed on them. This causes the weight of the roofing to rest on the masonry, which is characterised by greater resistance. Furthermore, the perimeter walls, in addition to being different from the pillars in terms of construction technique, are weakened by the presence of the arched windows of the nave and the voids relating to the side chapels, the choirs and the niches.

The beamwork that supports the roof is inserted onto the trusses and shaped beams using dedicated slots (no. 3 for the trusses, no. 5 for the beams). The latter consists of a continuous inclined slab in reinforced concrete on which the slate roofing layer is placed.

The roof structure does not rest directly on the load-bearing masonry of the side walls but on a reinforced concrete curb, of similar dimensions to those of the roof frame beams, which allows the weights of the roof to be unloaded onto the underlying walls and their respective foundations in a distributed manner. Subsequently the load distribution of the roofing structure that exists today is modified compared to the original structure.

6.3. The Management of Data Archived in GIS System

The need to organise the huge quantity of data, information and documents, textual and iconographic of various kinds, acquired during the historical analysis phase of the former Church of SS Gerolamo and Francesco Saverio, led to the creation of an information system that integrated information of various types, geometric, numerical and documentary. The structuring of the cognitive path in the QGIS context has thus allowed various types of information to be condensed into a single container, accessible remotely by all users.

The specific information relating to individual environments can therefore be consulted through a searchable and interconnected floor plan, where each user can also implement and update the information already present. The survey plans and all the photographic documentation acquired were imported into the QGIS environment so that, in each environment, it is possible to query the optical cones present and view the related shot. Each optical cone is connected to a series of attributes that contain various types of information, including author, capture date, orientation and any additional notes. Furthermore, with a similar procedure, it was also possible to insert historical information, archive documents, iconographic sources and historical photos referring to a specific environment. Another point in favour of the use of the GIS tool is the possibility of accessing and modifying the information contained in the project and of having updated information that can be shared with the working group at any time (Figure 11).

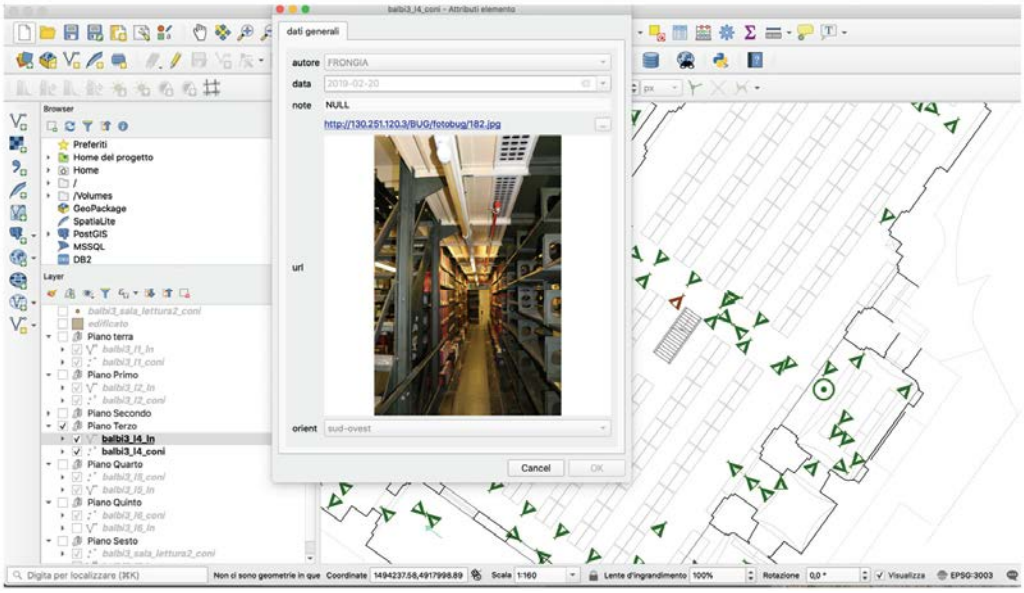

Figure 11. Image of the GIS interface showing the photographic documentation (elaboration of the students of the post-graduate programme, School of Specialisation in Architectural Heritage and Landscape).

6.4. The Analysis of the State of Conservation and Degradation Phoenomena

The prolonged abandonment to which the building has been subjected since its decommissioning, combined with some "fragility" persists in the construction system or in the presence of accidental events such as the breaking of the glass of a skylight on the roof and of some fixtures in the large former reading hall, in some lateral choirs and in various rooms annexed to the former church. This and a sunken position with respect to the adjacent buildings have required a careful study of the macro and micro agents, causes and phenomena of degradation, of which only a brief mention is made in this article despite the extensive work performed as part of the research activities (infiltration of rainwater, percolations, saline efflorescence on the frescoes, exfoliations of the colours, disintegration and pulverisation of the plaster, stains, mould and areas affected by biodeteriogenic attacks). Inefficient, broken or missing fixtures also make it possible for birds to enter and the consequent accumulation of droppings or carcasses.

6.5. Indications for the Architectural and Functional Project: Considerations on Lost Spatiality and Compatible New Uses

The former church of Saints Gerolamo and Francesco Saverio is a State-owned asset, once granted for use to the University Library of Genoa and then to the Ministry of Culture. In agreement with the Superintendency of Archaeology, Fine Arts and Landscape of the Metropolitan city of Genoa and with the Regional Secretary of the Ministry of Culture, the

entire building, with the exception of the ground floor, will be used to house the Library of the Superintendency itself and other institutes of the Ministry of Culture. In this way and only partially, the last use that the former church hosted is confirmed, with all the functions connected to it (storage rooms, offices, consultation rooms, services). However, unlike the time when the entire space was used as a university library, and public access was through a side entrance, the new project plans to make the ground floor accessible to a large audience, with the possibility of hosting conference and exhibition hall, conventions and concerts. The set of meanings that the former church maintained for almost the entire 20th century is therefore confirmed, albeit partially. The idea was to make the building accessible in all its parts, connecting the various environments and simultaneously studying functions suited to its architectural and spatial characteristics that could "make it come alive" at different hours of the day. The new functions will also open up to a wider and more diversified user base, while ensuring that no interference is created between the various uses and users.

However, the adaptive reuse project does not intend to consider the now desacralized and heavily transformed space as untouchable and unchangeable. In line with the methodological principles recalled at the beginning, we attempted to give a non-arbitrary answer to the question concerning the possibility, lawfulness and opportunity of intervening, modifying it, on the ancient space. This historical space is now difficult to perceive due to the division of the room into two independent floors, the clogging of the lower space with the shelves of the book deposits and, above all, the impossibility of seeing the cycle of frescoes except from the reading room floor, at an unusual distance. As a result, the space loses its sense of unity and "traditional" type perception, reviving, at least in part, the spirit of the place and the possibility of experiencing its beauty in communion.

6.6. Entrances and Accessibility

Accessibility represents a mandatory objective to eliminate or overcome the architectural barriers currently present in the architectural complex, with interventions that aim to:

- Intervene on external paving to eliminate or attenuate differences in level and discontinuities as far as possible;
- Create new accessible toilets on the floors;
- Adapt the existing stairs with the installation of handrails on both sides, to guarantee their usability/safety for a wider range of users;
- Overcome differences in height through the construction of ramps and lifts/personnel lifts;
- Create internal podo-tactile paths, to make the building accessible also to persons with visual disabilities;
- Install adequate magnetic induction systems for the use of conference rooms by persons with hearing disabilities.

6.7. Spatial Configuration and Adpatbility Thresholds: Considerations on Lost Spirit of the Place

The new use therefore requires important modification interventions, following a path and a process hopefully shared with the protection bodies which, before the in-depth study on the artefact, implicitly attributed a historical-artistic value also to the metal shelving of the book depository beneath the reading room, erroneously considered by the literature to be the work of the most significant witnesses of Genoese architecture of the period. Both the shelving and the reinforced concrete floor are in fact historical evidence of interest, an important example of engineering and architecture from the 1930s and episodes of the diachronic processes that accompany the life of every architectural work. A fundamental part of the design process was to understand to what extent these twentieth-century structures should be preserved and to what extent—and how—they could be modified both to reconfigure, even if partially, a lost unity, and to allow a new perception of it (Figure 12).

Figure 12. 3D model of the proposal for an adaptive reuse of the form Library and former church as the new library for the Genoa Superintendence of the Ministry of Culture (elaboration of the students of the post-graduate programme, School of Specialisation in Architectural Heritage and Landscape).

The new interpretation of the recent history of the former Church, made possible following the discovery of unpublished archive documentation and the cross-reading of such documents, has reduced the authorial value of the book depository, resulting in agreement, with the protection bodies, on an attitude that is less conservative and more aimed at "selective conservation". The attempt to restore, at least in part, an internal visual unity of the spaces will therefore be fundamental in order to allow for a complete and more immediate understanding of the sacred spirit of place. It was therefore planned to preserve an "intact" portion of the existing metal shelving, as evidence of a historical phase of the building, leaning against the counter-façade of the former church, to reconstitute, as far as possible, the spatiality of the hall towards the apse.

6.8. Changes in the Structural System

In order to obtain greater spatial permeability between the large volumes of the building, ideally reaching a new formal unity, and to allow greater natural lighting at the lower levels of the "metal machine", it was initially considered to demolish the "large slab" both in the apse area, and above the shelving at the skylights also using walkable glass surfaces. However, removing part of the slab, keeping the shelving at the levels below, would be too complex and expensive. It was decided to make holes inside the reinforced concrete slab of the former reading room at areas free from shelving on the levels below, following structural consolidation work on the beams affected by partial cutting. Holes were thus made in the slab of the fifth floor which allowed, on the one hand, re-proposal of the original points of view of the frescoes from the ground floor and, on the other, guaranteeing better natural lighting towards the lower rooms. The various intervention hypotheses have always taken into account the maintaining of a small portion of the slab in order to be able to cover the area of the apse and to preserve the existing masonry. This would allow both observing of the frescoes from a privileged position, also from an educational point of view, and being able to monitor and restore the pictorial decorations, thereby avoiding the onerous use of scaffolding (Figure 13).

Figure 13. View of the new public space at the level of the former reading room and of the big "holes" in the reinforced concrete fool that allow to perceive, form the ground floor, the original holy space (elaboration of the students of the post-graduate programme, School of Specialisation in Architectural Heritage and Landscape).

The planned cuts on the large reinforced concrete slab are intended to promote the perception of what must have once been the spatiality of the church and allow light to spread to the space located at the lower elevations.

The cuts change the current structural behaviour of the slab, which is why different types of intervention are planned at the critical points affected by the cuts (Figures 14 and 15):

- Consolidation of main beam abutments cantilevered from the masonry with insertion of tubular steel struts;
- Consolidation of secondary beam abutments cantilevered from the masonry with the same type of intervention;
- Consolidation of secondary beams supported by the stumps of the main beams inserting additional reinforcing metal armours;
- Consolidation of the cut slab with insertion of steel structures and new casting and insertion of a steel box profile as a perimeter closure.

This type of intervention, although of a certain invasiveness, interferes with the masonry in a punctual manner, at the only points affected by the anchoring of the reinforced concrete beams inserted in the early decades of the twentieth century. These are, moreover, sections of masonry already compromised by major consolidation.

The housing of the main floor beams of the large reading room was, in fact, achieved by cutting into the existing masonry to a depth of about 60 cm and making wide bearings reinforced with 4 bars of 12 mm diameter at each beam. This method of anchorage replaced the first design, which consisted of the insertion of the large attic resting on double rows of reinforced concrete pillars, in favour of a solution without ground bearings, with a structural system of beams embedded from wall to wall [53].

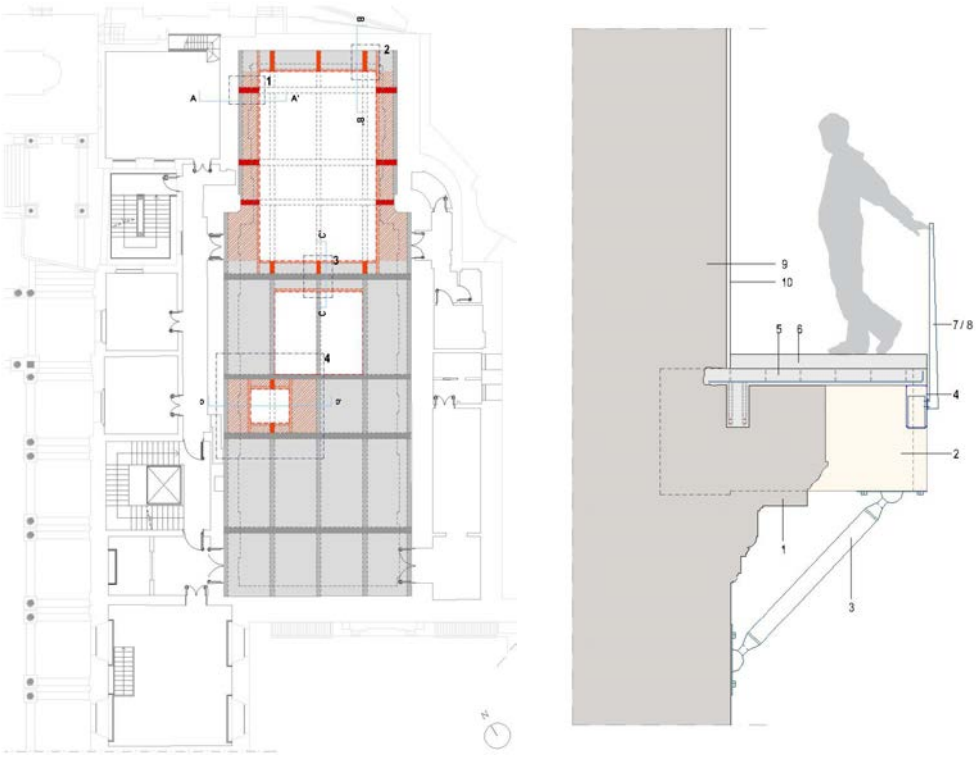

Figure 14. On the left, plan of the structural frame of the reinforced concrete slab of the reading room (former library) with indication of the cuts to be made to make the walkway possible along the entire frescoed apse. On the right, detail section of the walkway made by cutting into the slab. 1. Existing cornice. 2. Consolidated section of existing beam. 3. Tubular steel strut. 4. New steel beam on the edge of the walkway. 5. Existing reinforced concrete slab to be consolidated. 6. New paving layer. 7. Railing upright. 8. Safety glass slab. 9. Existing masonry wall. 10. Frescoed surface (elaboration of the students of the post-graduate programme, School of Specialisation in Architectural Heritage and Landscape).

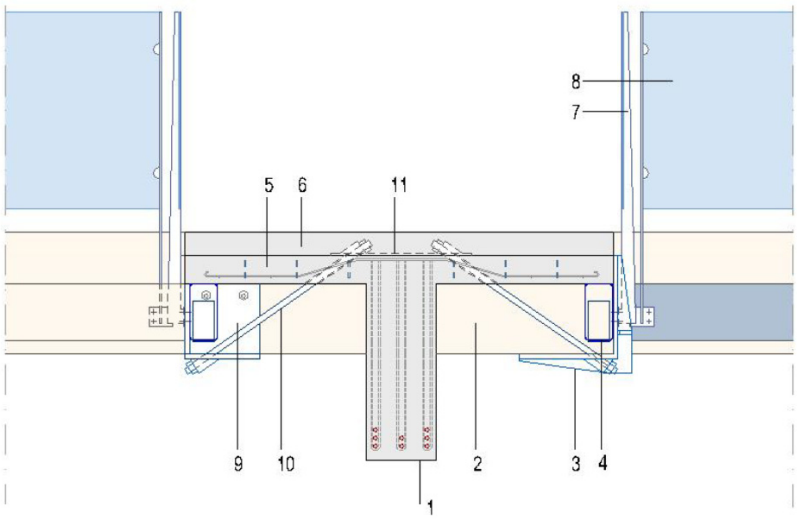

Figure 15. Section C-C (see Figure 14). 1. Existing primary beam. 2. Consolidated section of existing beam. 3. Hot-dip galvanised S355 ribbed plate, 18 mm thick. 4. Steel profile on the edge of the walkway. 5. Existing reinforced concrete slab to be consolidated. 6. New paving layer. 7. Railing upright. 8. Safety glass plate. 9. U-shaped plate for anchoring the tie-rod. 10. Steel tie-rod. 11. Plate for upper anchorage of symmetrical tie-rods (elaboration of the students of the post-graduate programme, School of Specialisation in Architectural Heritage and Landscape).

As a result, the project provides, on the one hand, for the preservation of a historical phase of a certain importance, without necessarily removing it entirely, opting for a "selective" demolition with techniques that do not destroy the pre-existence and, on the other hand, introduces a new value, in the possibility, for the public, to walk along the new walkway thus created and admire the frescoes from a close position. A lighting system specifically designed for the space below the new walkway and above, with spotlights, emphasizes the decorative and architectural value, revealing a space that is no longer perceptible (Figure 16).

Figure 16. Detailed views of the walkway and lighting solutions for the sacred space of the church to be enhanced and returned to public use (elaboration of the students of the post-graduate programme, School of Specialisation in Architectural Heritage and Landscape).

6.9. Changes in the Depository Shelving

Once the role, even a minority one, of the most valuable artists who worked in the renovation project of the new university library had been clarified, and the approval had therefore been agreed by the protection bodies to the partial dismantling of the metal shelving, the reuse project, however, intended to maintain a portion of it, not only as a historical but also a functional testimony, after having analysed the assembly methods in detail (this specific inquiry was made by Cristiana Tarantino). The storage structure consists of steel elements, self-supporting and created by the company SIEB; the shelving, however, was made by the company Lips Vago of Milan, leader of the time in the construction of steel bookcases. During the archival research it was possible to find little or no information about the structure of the metal shelves of the book depository. In fact, no archive of the Lips Vago company appears to exist, nor have any exhaustive reports or drawings of the completed project been found. The only documents in which the design of the metal structures appears are those of the architectural project drawn up by the engineer Carlo Fuselli, certainly not exhaustive for the purposes of a structural analysis, both as they represent an initial state of the project, different from the one subsequently created, and for the scale of representation adopted. The only relevant information that derives from these documents is that relating to the value of the design load weighing on the pillars of the shelving, equal to 12,000 kg.

In fact, the metal structure of the shelving consists of five superimposed self-supporting levels organised on five parallel rows which extend longitudinally and occupy the entire volume of the hall, between the walking level and the reinforced concrete cement floor of the reading room, also occupying, on the right side, the space of the side chapels. In fact, in subsequent times, shelves and filing cabinets were added to the original system simply placed against the perimeter walls and located at all levels. The connections of the various levels of the "machine" are guaranteed by a metal ladder with a ramp in a central position and by a small ladder positioned on the left side of the storage area. The metal structure of the book storage area is self-supporting and the entire load is supported by flat uprights which, when coupled, constitute the pillars of the space frame (Figure 17).

Figure 17. View of the conserved and restored shelves form the ground floor (facing main entrance and street), of the new staircase and of the upper space (elaboration of the students of the post-graduate programme, School of Specialisation in Architectural Heritage and Landscape).

The coupled behaviour is guaranteed by the connection of the flat uprights of two consecutive modules, achieved using clamps. The combination of these twinned elements constitutes the pillars that punctuate the shelving modules longitudinally and the storage corridors transversely. The connections of the elements mainly consist of nails and bolts. The pillars are also connected to each other through stiffening elements. The walkways on each level are made of solid and perforated sheets, fixed on L-section crosspieces. They transfer the load to the pillars through perforated and nailed rectangular plates on the internal surfaces of the twin elements of the pillars. On each of the two uprights, which constitute the composite pillars, a notched profile is nailed externally which constitutes the shelves anchoring guide.

Various hypotheses were taken into consideration regarding the number and position of metal modules to be maintained. A first possibility was to envisage dismantling both along the transversal and longitudinal axis of the hall. This possible solution was immediately discarded due to the reduced width of the hall in relation to its height. Various transversal "cuts" were then considered with the possibility of preserving a portion of modules in a central position of the nave to create a full-height atrium immediately after the counter-façade, to promote the spatiality of the hall towards the apse. In this way, static structural problems were solved by keeping the metal machine anchored on three sides. At

a perceptive level, the effect of initial "oppression" felt when walking through the spaces in their current state was deliberately maintained. On the side facing the apse, different disassembly configurations of the metal modules were taken into consideration. Initially a stepped "cut" was thought of with the aim of creating a series of views and balconies facing the full-height space and the frescoes. Alternatively, it was chosen to maintain a clear vertical section that is the same for all levels of the shelving. This layout avoids structural and distribution complications that would have been created with the previous solution. The final design choice translates into having a complete view of the entire functioning of the machine at the various levels and at the same time making it visitable and accessible.

This intervention also alters the static system of the racking as it removes a constraint on horizontal displacement in the longitudinal direction. To consolidate the shelving, the following is planned: the stiffening of the frames in the plane of the longitudinal axis of the church and the stiffening of the flat frames of the floors (Figures 18 and 19).

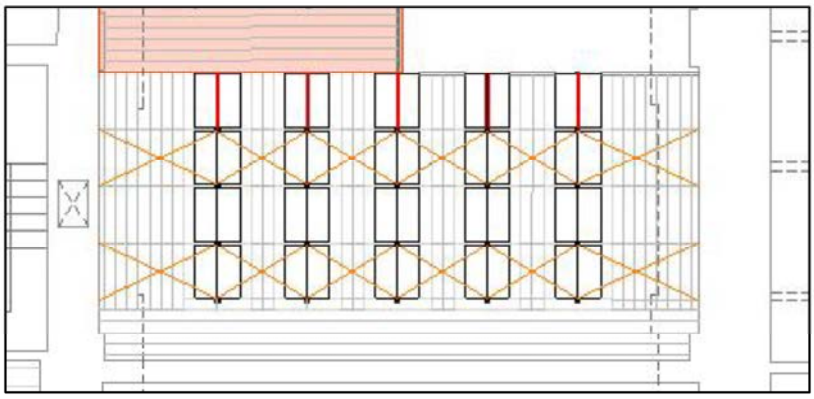

Figure 18. Detailed plan of a section of scaffolding. The red colour indicates bracing structures in the horizontal and vertical planes (elaboration of the students of the post-graduate programme, School of Specialisation in Architectural Heritage and Landscape, C. Tarantino).

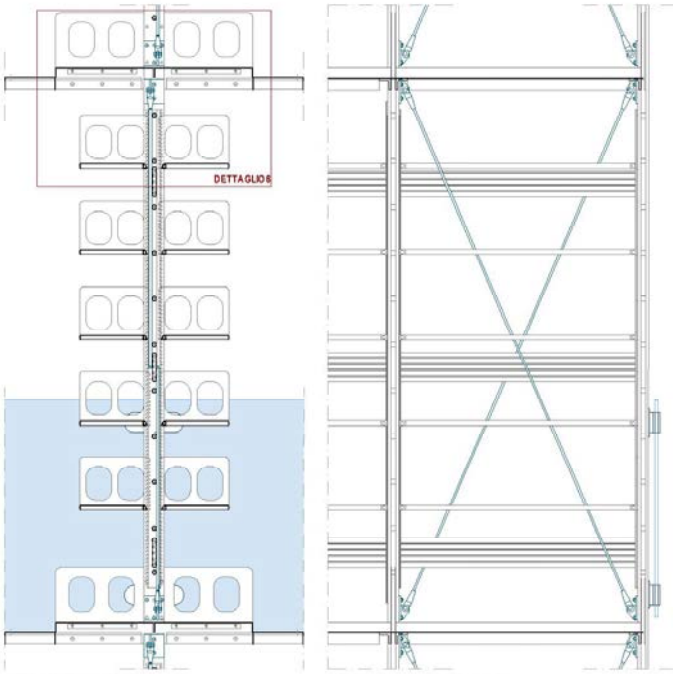

Figure 19. Section and elevation of the scaffolding system (elaboration of the students of the post-graduate programme, School of Specialisation in Architectural Heritage and Landscape, C. Tarantino).

6.10. The New Vertical Elevator System, Technical Reversibility

The adaptive reuse project also included a new lift system and staircase serving the shelving. Inside, the addition of a lift is planned to overcome architectural barriers and to provide direct connection with the floor of the former reading room. The choice regarding the placement was preceded by several possible solutions, investigating the hypothesis of integrating the new lift system within the same metal shelving by orienting it longitudinally or transversally, or of inserting it in one of the side chapels. The final design idea involved placing the new stair-lift system inside the hall, in the space freed up by the removal of the previous shelving and placing it against the preserved ones. This choice made it possible to resolve structural problems, constituting a static constraint on the free side of the "metal machine", and to directly connect all the levels of the shelving with the ground floor of the central hall and the floor of the former reading room. The use of a self-supporting metal structure reduces the visual and structural impact, giving transparency and lightness, and makes it easily removable if required or should use of the product be changed. The compositional language used is recognisable and stands out from the rest of the building due to the "contemporary" materials used (steel and glass), but at the same time it places itself in material and architectural dialogue with the surroundings, resuming its alignments and dimensional characteristics. The position inside the hall was also studied taking into account the structural beams (main and secondary) of the fifth-floor slab. The design choice of the new "staircase" and its positioning, in investigating the spatial, architectural and technical relationships of the new element with the preserved portion of shelving and, therefore, the possibility of its insertion inside or outside of it, will have to find architectural constructive solutions that can solve and combine the functional and safety needs with the formal ones, given the importance that this element will assume in relation to the space in front. The use of constructive solutions for this new element, of a metallic nature, which can be assembled "dry" and self-supporting, would make it possible to reduce its visual and structural impact, giving transparency and lightness, and would make it easily removable if required or in the event of change of use of the artifact. The compositional language must be recognisable and must communicate with the surroundings, continuing, where possible, the alignments and dimensional characteristics [53].

6.11. Conservation and Restoration of Artistic Decoration

The restoration of the decorated surfaces of the former Church must be of a conservative nature and must ensure the permanence of the stratigraphic signs and traces that characterise the building in its general configuration, as evidence of its various past uses, first as a "church" and after as a "library". The operational methodology of the intervention must be based on the principle of conservation, working first of all for the elimination of the causes of deterioration described above, to then identify the intervention techniques applicable to the present deterioration phenomena. The choice of the intervention techniques must envisage the use of materials that are compatible with the existing ones and which can guarantee the "retractability" of the surfaces. The design approach to the treatment of the "lacune" will in any case need to preserve the current state, guaranteeing the conservation of all the materials that compose the various layers that emerge to be seen, albeit mitigating their impact on the overall perception of the decorated parts. The parts of a fresco that are not usually visible, for example the preparatory drawing, the engraved paths, the sinopia, etc., are, in fact, important evidence of the techniques and process of creating the fresco itself. With the aim of conserving the image of the work of art and of the preparatory techniques, the intervention will therefore have to guarantee the conservation of the current state.

6.12. Plant Equipment

The building must be equipped with new systems for air treatment (where necessary) and for heating/cooling of the internal environments. As it is a cultural asset subject to protection pursuant to art. 10 paragraph 1 of Italian Legislative Decree 42/2004 (Code of

Cultural Goods and Landscape), the project to improve the energy performance of the building may derogate from the obligations and from certain specific minimum requirements. The new plant equipment is necessary, first and foremost, to guarantee preservation of the decorative systems and frescoes present in the apse but also to make the existing spaces effectively usable and liveable by the public, in view of their re-functionalisation. Machines, distribution networks and terminals must be designed so that they can be inserted within the spaces, respecting the historical-architectural value and multi-layered material consistency of the architectural complex. These elements must, as far as possible, be hidden from view or integrated into external furnishing elements, in any case avoiding further destruction and the removal of existing architectural, construction and formal elements.

7. Discussion and Conclusions

The workshop was asked to reflect on how to preserve the "material/tangible" and "intangible/intangible" values, positive or negative, of certain existing buildings with a view to reusing them. However, there is also another aspect in which the contrasting terms emerge. This is the evaluation of the results of any reuse process. In this regard, we should at least clarify in what ways we might say that the values embedded in a building/site are positive or negative: for whom, on what basis, under what conditions and for how long?

The same is valid when evaluating the results of any reuse intervention. We know, in fact, that values, meanings, symbols and memories—individual and collective—as they are and as they are perceived, change over time and can be a reason for union, but also for division, between the people involved. It is then necessary to examine the real meanings of the terms "positive" and "negative" within the various dimensions: individual–collective, private—-public, superficial–deep.

Finally, we must consider that some interventions are the result of deliberate processes and design choices, while others appear to be the consequence of random sequences of uncontrolled events. In any case, we must never forget that the quality of each intervention is almost indefinable, but is undoubtedly linked to the quality of the processes underlying the adaptive reuse, of the materials and construction solutions adopted, of the spatial organisation and of the depth and clarity of thought that supports every choice.

The specific case, and other similar cases, are, however, not free from risks, research gaps and conflicts, which arise from the complexity of the operations, diagnostic, planning and procedural, which are required in operations of similar size and which also depend on the economic availability of the property. For this reason, it is necessary to equip oneself with a comprehensive program modulated according to priorities and financial availability, without losing sight of the overall project but, at the same time, keeping in mind that preventive knowledge cannot be achieved in an unlimited way nor used as justification of all future choices.

From the studies carried out, as a first and immediate result, a number of situations of fragility and the correlated risk factors for the future of the former church are revealed, on which to intervene with works of "extreme urgency" which can be summarised as follows:

- Inefficiency of rainwater outflow systems from roofs and its disposal (overflow of gutter channels with insufficient section, partial blockages, breakages, etc.), especially in the parts in contact with the adjacent building of the University of Genoa, with which there is also a complex situation of spatial and functional "interference" which in turn requires a clear future solution in management terms;
- Inefficiency of the fixture system and consequent risk of rainwater penetrating into the building;
- Total obsolescence of the systems and the need to remove the relative ducts and distribution networks, pending new installations, to be designed in relation to future uses, in compliance with the relevant current legislation;
- Inadequacy and non-compliance with the rules of the current system of accessibility and outflow of users in safe conditions, which will need to be radically rethought in relation to the new possible uses [53].

The long preparatory work aimed at returning a hidden asset to the community is an opportunity to open the debate on conservation, restoration and new challenges opened up by adaptive reuse.

An action of a declaredly transformative nature which not only modifies the existing but which deliberately introduces new uses and produces new "forms" can sometimes allow or help the maximum conservation of the artefact. It all depends on how much it actually affects its body.

The material is not a fetish in itself, nor does it represent the only value, meaning or interest of the artefact inherited from the past. However, memories, symbolic values, traces of lives, skills or rituals and everything immaterial that can be linked to it (already known or yet to be discovered) will only be able to survive our actions if these do not change its physical and formal consistency more than is strictly necessary to guarantee its stability and durability.

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