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Revealed Spaces. The Hypogeal Churches of Naples Between Improved Knowledge and New Forms of Expanded Fruition

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Abstract
The search for new forms of use for under-utilised or abandoned ecclesiastical heritage represents one of the main challenges for the culture of conservation, to which is added a further complication, in both physical and perceptive terms, when it comes to the intervention on underground spaces. With respect to this sphere of action, recent experiences, conducted both in Italy and, more specifically, in the Neapolitan context, have proposed a differentiated panorama of solutions and strategies for the valorisation and improvement of the knowledge and use of these structures. Starting with the analysis of these experiments in terms of cultural approaches and operational outcomes, the contribution intends to present the results of an applied research work conducted by the authors in relation to the less-known hypogea of the Congrega dei Bianchi allo Spirito Santo in Naples. This precious and complex space, articulated on several levels, was carefully investigated in historical-evolutionary terms, surveyed with range-based methodology and then analysed in terms of specific constructional features and spatial relationship with the aggregate structures of the urban fabric. This was done to understand its peculiarities, investigate its criticalities and define possible scenarios for extending its use.

Keywords: *hypogeal churches; knowledge; comprehension; revelation; fruition enhancement*

1. Introduction

Within the broader framework of strategies aimed at restoring and exploring new forms of use for the ecclesiastical heritage of historic cities, the regeneration of underground spaces – such as crypts, ossuaries, sacred grounds, and lower churches – presents a particularly challenging design theme. This is primarily due to issues related to their limited accessibility, both physical and perceptual (e.g., the presence of stairs, poor visibility, and restricted dimensions). In this regard, reflecting on recent experiences in Italy – and specifically in Naples – offers an opportunity to assess cultural approaches and functional choices, while also highlighting both the positive outcomes and the recurring critical issues. These issues often concern the risk that new uses and forms of access may perceptually alter the identity and distinctive spatial relationships of these places.

Within this research framework, we developed a multi-scalar strategy for understanding the valuable – yet largely unknown – underground space of the *Congrega dei Bianchi allo Spirito Santo*, selected as an emblematic case from the broader Neapolitan heritage.

The results of this work are presented here. The cognitive phase began with a bibliographic review focused on the historical and evolutionary development of the structure. This was followed by a detailed range-based architectural survey, aimed at constructing a digital twin – a highly informative three-dimensional model that accurately represents the morpho-chromatic and dimensional characteristics of the hypogeal space, as well as its relationship to the overlying architecture and the surrounding urban fabric.

Based on this data and the interpretation of the structure's construction features, vulnerabilities, and issues related to both physical and cognitive accessibility, the research explored both tangible and intangible strategies for enhancing the perception and use of this sacred space. These strategies, which also aim to foster broader community involvement, contribute to the wider ongoing debate on the conservation and adaptive reuse of underground ecclesiastical heritage.

2. Perceive, understand, participate. Some recent experiences

As highlighted in both national and international disciplinary debates, current conservation strategies face the challenge of improving the inclusiveness and accessibility of cultural heritage. The Faro Convention (2005) – as well as the Italian *Piano Nazionale di Ripresa e Resilienza* – emphasizes the importance of expanding community participation as a means of reinforcing cultural identity. This necessarily entails experimenting with multi-scalar actions aimed at enhancing both the physical and perceptual experience of heritage, requiring a careful balance between conservation imperatives and opportunities for communication. This must be achieved without compromising the authenticity of historical architecture, not only in tangible terms, but also in its intangible and cognitive dimensions (Cetorelli & Guido, 2020; Pollone, 2023). In relation to hypogeal spaces and considering both these cultural objectives and the recurring challenges associated with their physical inaccessibility, several recent initiatives have tested various strategies for enhancement and public engagement. These have generally focused on two main approaches: revelation and valorisation. The first involves opening previously inaccessible spaces to the public; the second includes developing solutions to improve accessibility and understanding, as well as defining digital methods for communicating cultural content that may be otherwise difficult to recognize or physically access.

Among the broad array of recent national initiatives focused on the intangible valorisation of underground heritage, one notable example is the immersive restoration of the frescoes in the rock church of Lama d'Antico in the province of Brindisi (2019). This project is part of a wider movement that promotes the use and appreciation of the religious rock architecture typical of Apulia and Basilicata in Southern Italy.

Another example is the virtual relocation of the frescoes in the underground church of *Santa Maria dei Laici in Gubbio* (2021), coordinated by Giorgio Verdiani, Alexia Charalambous, and Gaia Marsili. Additionally, the conservation of the crypt of the church of Sant'Agnese in Agone in Rome (2022) was followed by an insightful museal intervention. This included the installation of interpretive devices and, most notably, a carefully designed lighting system that *reveals* the decorative elements and historical layers of the site, which also contains the ruins of Diocletian's Stadium.

In continuity with these experiences, the interventions carried out in Naples in recent years have explored the intersection between tangible and intangible approaches, involving both permanent and temporary solutions. Among the former, particular attention has been given to the underground structures in the Sanità district – most notably, the public opening of the Hellenistic Hypogeum of the Cristallini (2022).

This valorisation initiative followed a rigorous campaign of investigation, digital surveying, and restoration, and incorporates user-friendly methods of engagement, including an audiovisual narrative that conveys the outcomes of the research phase. Regarding temporary – or at least reversible – strategies, the case of the Church of *Santa Maria della Misericordia ai Vergini* is particularly noteworthy. Since 2015, it has hosted the studio of artist Cristian Leperino, where the *Terrasanta* hypogeum has been used for temporary art installations.

These initiatives are especially significant not only for enabling public use of such spaces, but also for fostering strong local community involvement, especially among younger generations, through creative processes and events. Finally, other Neapolitan hypogea have also been sites of temporary enhancement projects, including the crypt of the Church of Santa Luciella, which hosted an art installation by Michele De Lucchi in 2022.

The perceptual strategies and communication methods adopted in these examples – based on expanded accessibility and, more importantly, on the *experiential* involvement of users – demonstrate a commitment to combining intangible and perceptive approaches with more traditional, physical ones. These are carefully calibrated according to the specific characteristics and communicative potential of each heritage site. In many cases, the ethical and cultural value of direct engagement with the material substance of *revealed* architecture is prioritized, deliberately avoiding forms of remote access – even in contexts of difficult physical accessibility.

Nevertheless, the digitalisation processes adopted in some of the projects discussed serve to compensate for inaccessibility through alternative forms of engagement that are truly inclusive. They also offer powerful digital tools for understanding the layered historical transformations of these sites.

3. The hypogeum of the Congrega dei Bianchi allo Spirito Santo in Naples. An experiment of applied research

3.1. The holy space through the centuries

The seat of the *Real Compagnia ed Arciconfraternita dei Bianchi allo Spirito Santo* is located adjacent to the *Basilica dello Spirito Santo*, in an area significantly shaped by the urban transformations that took place during the Spanish Viceroyalty (Colletta 1975; De Fusco 2004). Founded in 1555 – or 1563, according to other sources – the Archconfraternity commissioned the construction of an initial church on the site. This structure was modified in the 1560s to accommodate the construction of the present basilica, which incorporated parts of the earlier building (Rocco di Torrepadula, 2004, pp. 32–33). Rebuilt alongside the basilica between 1580 and 1582 as a single-nave structure, the Oratory included a hypogeal space – likely corresponding to the current vestibule, the first of the three underground rooms visible today. This original space was probably expanded between the 17th and 18th centuries through the enclosure of an area initially used as a courtyard, as suggested by an analysis of historical cartography. This intervention appears to have resulted in the creation of two additional rooms – formally and decoratively distinct from the first – the larger of which was positioned directly beneath the Oratory. In 1729, the building underwent Baroque-style renovations attributed to Ferdinando Sanfelice, Carlo Tucci, and Domenico Punziano, which led to transformations of the altars and decorative schemes. During this same period, the first and second *Terrasanta* (burial spaces) were adorned with exquisite Neapolitan majolica tiles (*riggiole*), crafted by master artisan Gaetano Massa based on a design by Don Muzio Anaclerio (Donatone, 1981, p. 81) (Fig. 1). The decorative program may also have been further enriched by interventions attributed to Mario Gioffredo (Strazzullo, 1955), who, from the mid-

18th century, was also involved in restoration work on the adjacent basilica. Since then, aside from minor additions, the Oratory and its hypogeal spaces have remained largely unaltered to the present day.

Fig. 1 – *A view over the second Terrasanta from the first one. In detail, the majolica tiles and the burials* (Cera, 2024).

3.2. Knowledge through surveying

The process of understanding the *Congrega dei Bianchi*, in its dual articulation above and below ground, necessarily begins with a meticulous architectural survey campaign. The application of contemporary processes and techniques for the digitisation of architectural heritage enables the collection of a wide range of data, which is essential for a deeper understanding of the specific features of the structures under study.

To investigate the unique spatial configuration of the Bianchi's hypogeal spaces and their relationship with the above-ground Oratory architecture, a comprehensive digitisation campaign was undertaken. This survey represents a significant cognitive advancement within the broader analytical framework, particularly in light of the complete absence of existing graphic documentation attesting to the spatial arrangement and condition of the site. Moreover, the use of active optical sensor-based survey techniques – well-established for applications in underground environments – allows for the acquisition of both quantitative data (e.g., dimensions) and qualitative data, such as colour, materials, and state of preservation.

As is customary, the digitisation process was preceded by a preliminary site inspection, which was essential for gaining an initial understanding of the spatial configuration – particularly complex due to its integration within an urban fabric that limits accessibility. This step also included an assessment of site conditions, which informed the choice of appropriate data acquisition equipment and the planning of scanning positions, with the aim of optimising the efficiency and accuracy of the digital survey. During this phase, several critical issues were identified and grouped into two categories: (i) environmental issues of a general nature and (ii) site-specific issues relating to the hypogeal context. The first category includes factors such as natural lighting conditions – affected by the sun's trajectory during the day – and frequent pedestrian and scooter traffic along *Vico Bianchi allo Spirito Santo*, where the entrances to the *Congrega* are located. Both conditions posed challenges for documenting the external areas. The first issue – natural lighting – was addressed, as detailed later, by adjusting the scanning sequence to ensure well-lit acquisitions for the exterior areas (street, entrances, and semi-porticoed courtyard). The second was mitigated by temporarily restricting access to the area in front of the main entrance façade, with its two monumental portals, during scanning. Site-specific challenges primarily involved the complex spatial configuration and extension of the architectural complex, which is structured over two levels, each subdivided into multiple rooms. Compounding this is the limited and uneven lighting in the hypogeal spaces, some of which are in complete darkness. Due to the planimetric and altimetric complexity of the layout, the survey campaign was divided over two days: the first dedicated to the underground areas and the second to the Oratory floor. The

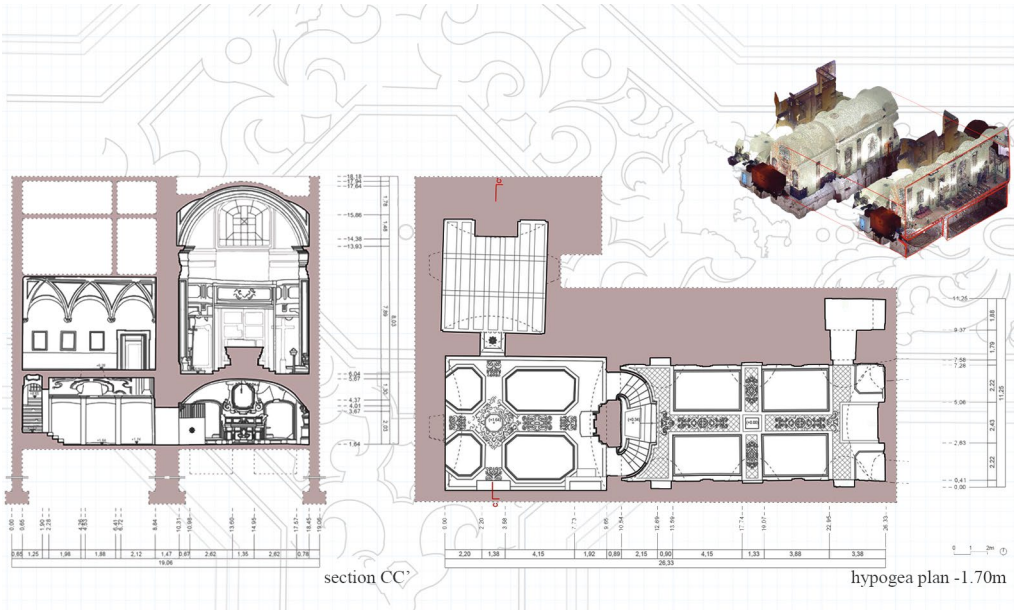

Fig. 2 – *Some bidimensional drawings derived from the TLS point cloud* (Spataro, 2024).

low lighting conditions in the Oratory were resolved using a range-based technique with a terrestrial laser scanner capable of acquiring dimensional data even in the absence of ambient light.

Following this preliminary work, the digitisation phase was carried out using a phase-shift terrestrial laser scanner, the FARO Focus3D S120, selected for its suitability to the spatial dimensions and linear extension of the site – well within the instrument's effective range (up to 100 m without noise). The scanning network was organised along a linear path with stations positioned approximately 7 metres apart. To minimise the need for post-processing and clean-up of the point cloud, no artificial targets were used; instead, scans were aligned during processing using only geometric features. This approach preserved both the geometric and chromatic fidelity of the data, avoiding interference from extraneous architectural elements. As previously mentioned, the colour data were also recorded during acquisition, enabling the identification of potential discolourations, such as those caused by moisture. A total of 41 scans were performed, using a resolution of 1/8 and a quality factor of 4x. The resulting point cloud, roto-translated and registered, consisted of approximately 10 million points. The discrete model achieved a high level of accuracy, with an average alignment error between scans of around 1.6 mm. Clipping boxes were used to generate orthomosaics by sectioning the point cloud along horizontal and vertical planes at different heights, which were then used to produce two-dimensional drawings, including plans and key sections.

The digitisation process thus enabled the detailed architectural documentation of both the hypogeal and above-ground structures, with precise dimensional annotations. Specifically, the hypogeum of the *Congrega dei Bianchi allo Spirito Santo* comprises three interconnected vaulted rooms – each with a barrel vault – arranged in an L-shaped plan. These spaces are situated on staggered levels, with a total height

difference of approximately 2 metres between the first room – immediately accessible from the staircase – and the final room, which has no exit.

Access to the hypogeum is via a steep, multi-ramped staircase that leads to a vestibule with a square plan measuring 6.20 x 6.20 m. This room features three mirrored niches along the side walls of the stair landing. Opposite the staircase, a short, vaulted corridor leads to the first main hypogeal chamber, which is rotated 90° relative to the vestibule and has a more rectangular layout (9.66 x 8.45 m). This space is more elaborate in terms of decoration, featuring stucco work, a richly decorated marble altar topped with a fresco, and several *terre sante* (holy soils) and sarcophagi – two larger ones centrally placed to guide movement toward the altar, and two smaller ones against the rear wall. On either side of the altar, two lowered elliptical arches provide access, via an 18th-century-style pincer staircase, to the third and final chamber. This room, aligned with the previous one, is the largest and has a more rigid spatial articulation. The side walls are punctuated by niches set within thick masonry, framed by pilasters and topped with a moulded cornice that marks the springing line of the vaulted ceiling. The lunettes above are adorned with motifs representing the rays of the Holy Spirit. The chamber contains six *terre sante*: four rectangular ones arranged in a cruciform layout on the floor, and two smaller polygonal ones near the brick rear wall. These are located beneath two *bocche di lupo* (wolf mouths) that connect with the original entrance façade of the church (Fig. 2).

3.3. Constructive features and state of conservation

The acquisition of detailed surveys and the subsequent production of drawings incorporating accurate orthophotos enabled the analysis of the material and constructional components of the architecture, as well as the interpretation of its state of conservation. The survey revealed masonry predominantly composed of roughly squared blocks of yellow tuff, bonded with lime-based mortar, with limited brickwork inserts attributable to consolidation interventions. The barrel vaults, built using the same material, have an average keystone thickness of approximately 0.4 metres. The laser scanner survey also allowed for the accurate reconstruction of the vault geometries, revealing slight deformations in the three vaults. However, these deviations were interpreted as physiological – typical of aged masonry structures – rather than indicative of structural collapse, thanks to the centimetric accuracy of the data. Nevertheless, monitoring measures have been planned to ensure continued assessment. Rich stucco decorations highlight the geometry of the vaults, the pincer staircase, and the wall surfaces. Majolica tiles featuring floral motifs embellish the bands of paving that outline the perimeter of the tombs.

Although the masonry does not appear to exhibit significant structural instability, it does show signs of deterioration – along with the decorative elements and majolica flooring – primarily due to the underground setting, and more specifically, to high humidity levels. Observable deterioration phenomena include widespread detachment of material, the presence of efflorescence and sub-efflorescence, material loss of varying degrees, biological patinas, and swelling. As is standard in conservation methodology, the diagnostic phase was followed by the development of guidelines aimed at mitigating the causes of damage. Only brief references to this aspect are provided here. The proposed interventions were formulated according to a principle of minimal intervention, with the goal of addressing the identified pathologies while preserving the site's authenticity (Fig. 3).

4. Cultural-aware strategies for the enhancement of fruition

In defining the most suitable strategies for the enhancement of the case study, both the site's potential and its critical issues were prioritised, while also focusing attention on the inherent

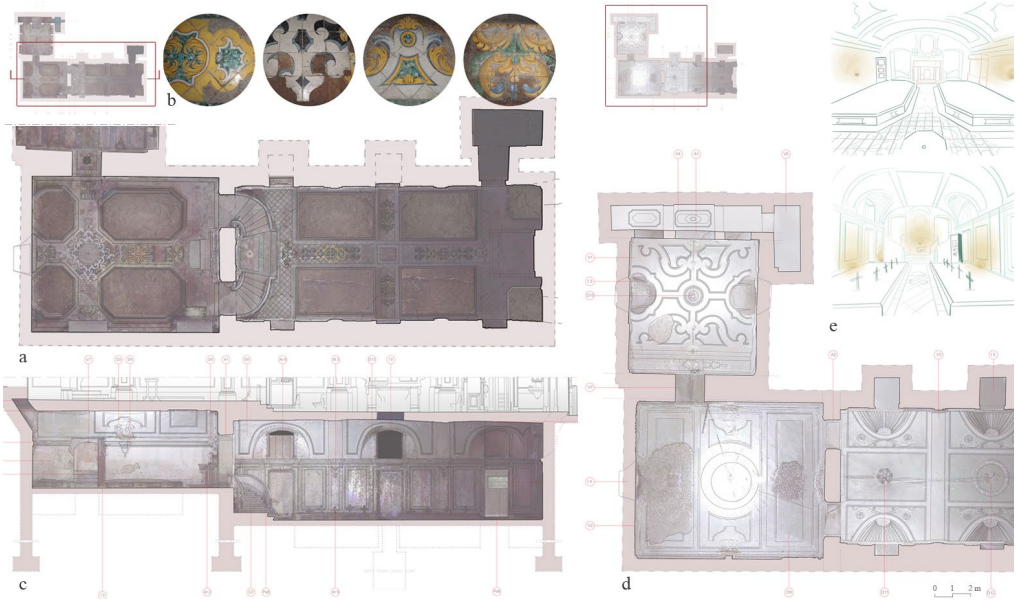

Fig. 3 – *Material-constructive interpretation of the hypogeal spaces: a) plan (excerpt); b) details of the tiled floor; c) longitudinal section; d) hypography (excerpt); e) possible strategies for the expansion of cultural fruition* (Spataro, 2024).

vocations of the hypogea and the Congrega to which they belong. The hypogea of the *Bianchi allo Spirito Santo* are distinguished by their central location within the city's historical fabric, well served by public transport. They are situated near the educational facilities of the Department of Architecture at the University of Naples Federico II and are directly connected to the adjacent *Basilica dello Spirito Santo*. These factors, combined with the morphological characteristics revealed through surveys and in-depth investigations, make the site particularly suited to new functions that would physically and perceptually open the architecture to the wider community. However, the selection of appropriate forms of participatory use must take into account several critical issues identified during the research. These include: the inconspicuous location of the Congrega's entrance in relation to the main thoroughfare, Via Toledo, which currently limits its visibility; and the limited accessibility of the site for certain user groups, especially individuals with reduced mobility, due to the vertical distribution of the complex, accessible only via stairs.

In response to these considerations, the proposed strategy first includes installing directional signage from the main street and at the entrance. Given the impossibility of ensuring physical access to all areas of the Congrega, two distinct routes – differentiated by accessibility level – have been proposed. The first itinerary, fully accessible to users of all mobility levels, is confined to the ground-floor spaces. Within this area, the Oratory is envisioned to host not only religious services but also concerts, graduation ceremonies, and book presentations. The *Sala del Governo* may be adapted for mixed use by the Archconfraternity of the Bianchi and as a study room for students from the nearby Department of Architecture. Accessibility to the ancillary service areas in between will be improved through the addition of ramps and step aids. In

these accessible spaces, multimedia totems, project panels, and tactile maps will be installed to convey information about the hypogea to users unable to visit them in person. These same spaces will also be part of a second, partially accessible route, which would allow access to the complex via the external ramp and enable direct entry into the church by overcoming existing level changes and steps.

As for the hypogea, physical access will be restricted to the stairways, which – being particularly steep and narrow – do not permit the implementation of barrier-free solutions. Consequently, these spaces will be musealised through temporary exhibitions and an appropriate lighting system. At the same time, in order to convey the complexity of the site's historical stratification and promote broader understanding, compensatory measures are planned. These include the use of the digital 3D model as a narrative tool. Through interactive multimedia totems located on the ground floor, visitors will be able to explore the hypogeal spaces virtually, interacting with the three-dimensional survey model enriched with annotations on the site's construction history and decorative elements. The proposed measures aim to foster a deeper understanding and appreciation of the site, encouraging its enhancement through community engagement and active involvement in the architectural heritage, valued both for its material and immaterial significance.

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Authorship

Although this contribution is the result of joint research by both authors, Valeria Cera is responsible for paragraph 3.2, while Stefania Pollone authored paragraphs 2, 3.1, and 3.3. Paragraphs 1 and 4 were co-written by both authors.

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