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FRAGMENTED OBJECTS/FRAGMENTED DATA. QUANTITATIVE METHODS AND DIGITAL APPROACHES IN THE PROJECT MAPPING SACRED SPACES: FORMS, FUNCTIONS, AND AESTHETICS IN MEDIEVAL SOUTHERN ITALY

1. Introduction

The theme of the symposium *Exploring the Legacy of the Past: Networks and Quantitative Methods in Archaeology and Art History* provides an opportunity to reflect, albeit briefly, on a long-standing epistemological problem. This problem is related to the dialogue between scientific and humanistic disciplines, and thus between matter and form, or analyses of materials versus analyses of artistic forms. In other words, to paraphrase the philosopher of logic Bertrand Russell (1914), between logic and mysticism. As early as 1940, Erwin Panofsky (1938) had begun questioning the dignity of Art History in his famous essay titled *The History of Art as a Humanistic Discipline*. Art History, like all humanistic disciplines – especially those related to visual culture and thus to aesthetic processes of interpretation – should be considered, as Kant (1790, 43) declared, a field intrinsically linked to the subjectivity of the observer. One of the possible definitions of the 'qualitative' method or analysis is that of «an elemental method of research, neither statistical nor numerical, used to characterize the constituent elements of matter and describe their properties; in the social sciences, a method employed to examine subjective human experience using non-statistical methods of analysis» (Cardano, Ortalda 2020, 49). Following this definition, this approach is descriptive by nature, related to language and based on interpretation. By contrast, in the so-called 'hard sciences', methods of analysis of physical and concrete matter are primarily, if not solely, quantitative, based on numerical measurements that are objectively computable and quantifiable.

Two examples will help elucidate these concepts. In the hard sciences – meaning those that pertain to the nature and physics of matter and not to human phenomena and their related cultural production – quality matters less than quantity. In other words, quality is subordinate. For instance, knowing the elemental quality of atoms (for example, Hydrogen and Oxygen) in a molecule is not sufficient to identify the given molecule until the two atoms are understood in a numerical, quantifiable relationship. Only after ascertaining that hydrogen and oxygen are present in a 2:1 ratio, that is, having counted the atoms to find that two Hydrogen atoms exist for every one of Oxygen, can we say that it is an H2O molecule, in other words, water. Thus, quality, in the natural sciences, is always determined after an analysis of quantities.

The second example is closer to the humanities. Looking at mosaics, we can appreciate their qualitative aspects, such as shape, color, iconography, iconology, ornament, and style. Combining formal observations with other data, particularly from coeval sources, allows the work to be contextualized and dated. A pertinent example would be the mihrab of the mosque of Córdoba commissioned by the Umayyad caliph al-Hakam II in 961, traditionally attributed in literature to craftsmen from the Byzantine empire (Etthingausen *et al.* 2001, 84). Only recently has an archaeometric investigation directed by Nadine Shibille confirmed the Byzantine production of some of the glass used in the mosaic *tesserae*. To determine these Byzantine origins, conservators analyzed the glass using highly sophisticated quantitative methods. This enabled the identification of the quantity, quality, and percentage of elements contained in the glass with a resolution of 1 part per million. The techniques adopted (laser ablation coupled with mass spectroscopy) determined the percentage ratio between oxides and identified specific concentrations of Boron that correspond to those in glass produced from raw materials found only on the Anatolian Peninsula (Gómez-Morón *et al.* 2021).

From this example, we can understand well the epistemological limitations to which Panofsky alluded, namely the subjective value of purely aesthetic interpretations. At the same time, as Panofsky also noted, quantitative archaeological or taxonomic methods enable us to broaden our interpretive horizons, add more data to our research, and construct a more solid and reliable «organic situation». In other words, quantitative methods make it possible to objectify subjective analyses and perform what Panofsky (1938, 108) wittily termed «intuitive aesthetic re-creation». Accordingly, we also understand why Panofsky contrasted Archaeology with Art History, placing archaeological disciplines in the scientific realm (as the study of matter) rather than in the humanistic realm (as the study of cultural production).

With this text, we hope to strengthen the conviction, expressed throughout this volume, that Art History would benefit enormously from quantitative methods. Moreover, we believe that Art History, like Archaeology, should be considered equal to any scientific discipline, by virtue of the methods it employs. We aim to prove that the apparent dichotomy between the two disciplinary realms, scientific and humanistic, is baseless and that the scientific method is the only valid epistemological approach for any investigation. Indeed, this is true not only for the disciplines in the so-called hard sciences, aimed at the study of nature, but also for the humanities, which analyze man-made objects, whether archaeological or artistic.

When integrating qualitative, interpretive methods typical of the humanities with quantitative, computational methods typical of scientific disciplines, we must also consider the digital revolution. Digital methods

have productively encouraged the adoption of quantitative methods even in humanistic disciplines such as Art History, especially now when databases are gradually replacing more traditional *corpora*. Furthermore, Digital Humanities emerge as an effective bridge between scientific and humanistic disciplines. In the current historical moment, digital methods not only foster greater permeability between disciplinary approaches but also offer enormous potential and new challenges.

In what follows, we will pursue large-scale quantitative methods and digital approaches from two different perspectives. First, starting with the greatest amount of potential data available for our field of investigation (i.e. liturgical furnishings of medieval sacred spaces throughout Southern Italy), we will reduce the scale to concentrate on a qualitative analysis of a single object, whether whole or in fragments. Second, we will again analyze and manage a large amount of data, but this time based on a single case study in order to determine its quality.

2. Scaling and database approaches

We will begin with the first point, introducing the scope of investigation and objectives of the Project Mapping Sacred Spaces: Forms, Functions and Aesthetics in Medieval Southern Italy (https://www.biblhertz.it/en/dept-michalsky/sacred-spaces). This project investigates Christian sacred spaces and liturgical practices in medieval Southern Italy (11th-14th centuries), under the direction of the authors with Manuela Gianandrea (Sapienza University in Rome) and Tanja Michalsky (Bibliotheca Hertziana – Max Planck Institute for Art History). The Bibliotheca Hertziana and Sapienza University have collaborated on this project since 2018, and most recently were joined by the University of Siena. Since 2020, the project has offered a collaborative platform for an international group of specialized scholars, comprising art historians, architects, and digital scientists. Our colleagues are based at universities in Rome, Naples, Salerno, Venice, Heidelberg, and Cambridge.

Historical research on medieval sacred architecture requires an investigation that reconstructs an important component of its space, as many liturgical areas, their furnishings and decorations have been lost. Of course, such reconstructions by nature necessitate some speculation, though they should be carried out as reliably as possible using scientific methods. This preliminary reconstruction also enables us to investigate the perceptual dimension of the sacred in its original historical setting, comprised of spatial-sensory experiences that both included and excluded different actors through barriers, screens, and curtains. Other experiences involved the interaction of ritual and devotional practices with sensory stimulation aided by images, materials, colors, lights, sounds, and scents (Palazzo 2014; Pentcheva 2017; Bedros, Scirocco

2019). Moreover, only through this contextual analysis is it possible to reconstitute the intrinsic and extrinsic relationship between architectural spaces and their artifacts, a crucial aspect that art historical research has begun to consider only in recent decades (Piva 2006).

The remarkable role liturgical furnishings such as altars, ambos, ciboria, and enclosures had and still have in the art historical sphere should not be underestimated. Southern Italian liturgical furnishings have always enjoyed special attention as distinctive, local products since the advent of the discipline of Art History (Scirocco 2020). This is thanks to the large amount of extant documentation, despite much physical displacement, transformation, and destruction, and because of their formal and material qualities. Medieval architecture is quite difficult to see in its original state after having undergone so many transformations and restorations, and a very high percentage of Italian medieval liturgical furnishings are now lost or decontextualized. For a variety of reasons, including the Catholic Church's reforms throughout the Italian Peninsula and the functional and aesthetic demands of the Renaissance and Baroque periods, most medieval furnishings have not survived or have been dismantled and rendered fragmentary. In many cases, these decontextualized elements have been recombined in other ensembles or repurposed (Gianandrea, Scirocco 2018; Longo, Scirocco 2022).

Thus, one of the first objectives of the Mapping Sacred Spaces Project is to analyze the scattered evidence pertaining to eleventh- through fourteenth-century liturgical installations and to reconstruct the more monumental furnishings, such as enclosures, ambos, altars, and ciboria. These structures defined the sacred space of Southern Italy in terms of its form, function, and aesthetic values. This project promotes an approach based on established methodologies in Archaeology and Art History. Our approach also exploits the potential offered by the Digital Humanities and includes liturgical studies, archaeometrical approaches, and scientific investigations of materials (Longo 2011; Longo, Giarrusso 2011, 2014; Gianandrea, Longo 2020; Longo, Scirocco 2021, 2022).

Our census of monuments and sites documenting the locations and material traces of medieval liturgical furnishings held in Southern Italy currently counts 338 records. A digital map displays all this data (Fig. 1), which in its full implementation can be queried from the macroscale (territorial) down to the microscale (architectural components, fragments and decorative patterns). Already, the systematic collection and mapping of this data forms the basis for a research corpus dedicated to liturgical furnishings produced in Southern Italy between the eleventh and fourteenth centuries (a tool that may also prove useful in the future for institutions dedicated to conservation and preservation). This, however, is not the primary objective of the project and does not exhaust its potential for present and future research.

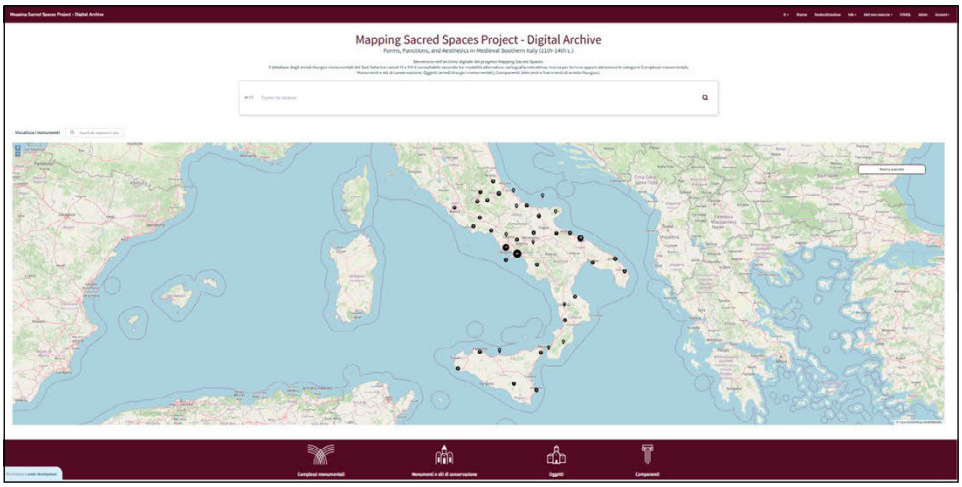

Fig. 1 – The Mapping Sacred Spaces Digital Archive. Homepage: graphic interface showing the map displaying the census of monuments and sites and documenting the locations of medieval liturgical furnishings material traces held in Southern Italy (currently 338 records).

The need to collect and compare a considerable amount of data on scattered or decontextualized objects and fragments at different spatial and temporal scales required systematic organization. We organized our data according to the project's research questions and created a digital archive connected to an interactive map. Its main functions and outputs are:

1. Organize knowledge:
   a. Collect and organize conserved and/or documented material with historical and technical data, and localize this information;
   b. Organize new data that emerges from research results;
   c. Trace or suggest relationships among objects and/or sites.
2. Answer research questions:
   a. Show and map data according to specific queries;
   b. Visualize meaningful relationships among entities.
3. Raise new research questions.

Combining interpretative complexity with quantitative methods is obviously the challenge we are dealing with. Using the monumental complex of the Cathedral of Saint Andrew the Apostle in Amalfi as an example, we briefly show how the database is organized on different scales corresponding to three hierarchical levels, ranging from monument to fragment (Fig. 2). The first level (Level A - Monuments and Collections) concerns monuments, museums, or other sites of historic preservation that contain objects and

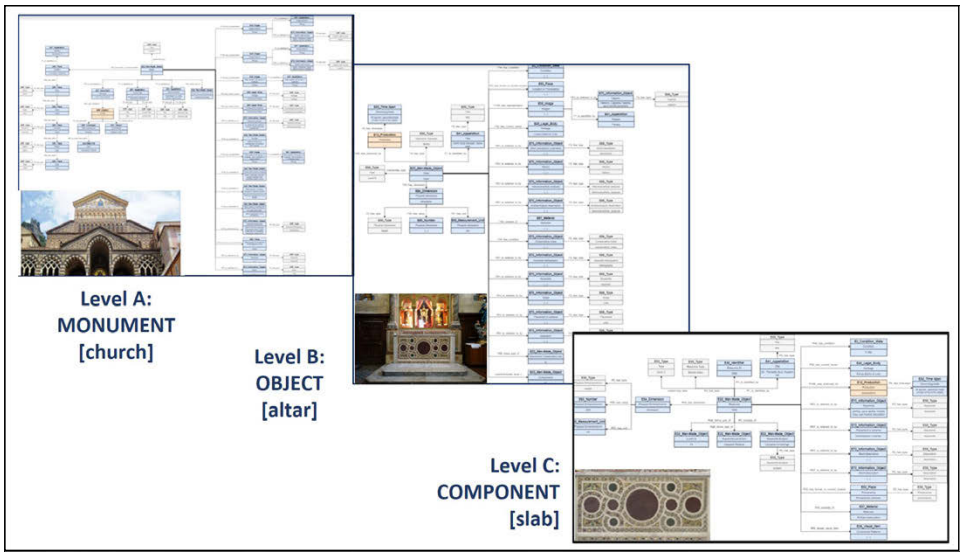

Fig. 2 – The hierarchical organization of the MSS-Digital Archive corresponding to three different ontologies and scales, ranging from monuments to components.

fragments, whose location is mapped in the building's plan. The second level (Level B - Objects) includes monumental objects, by which we mean preserved medieval liturgical installations (pulpits, ciboria, etc.), or post-medieval monumental assemblages made by reusing fragments of medieval furnishings. In the Amalfi case, this level includes two Counter Reformation pulpits, Baroque and neo-medieval altars, and contemporary liturgical furnishings. Our Level B example is an early twentieth-century neo-medieval altar made with elements from late twelfth-century furnishings. The third level (Level C - Components) catalogs the *in situ* components of these monumental objects or fragments that have scattered, placed on the same scale. In this case, we consider a marble screen reused in the altar that is likely to have come from a medieval ambo.

Together with digital scientists working on the project, we implemented different ontologies based on CIDOC-CRM for each level (A - B - C). These ontologies respond to the descriptive, historical, and relational matters at the center of our investigation. The database, created with the support of an outside firm (Advance Service, Crete) and implemented by and integrated into the data management system of the Bibliotheca Hertziana - MPI by Dr. Alessandro Adamou with the collaboration of M.A. Polina Voronova, provides a series of semantically modeled fields for specific research questions. These include the provenance of objects and fragments, the techniques used, the

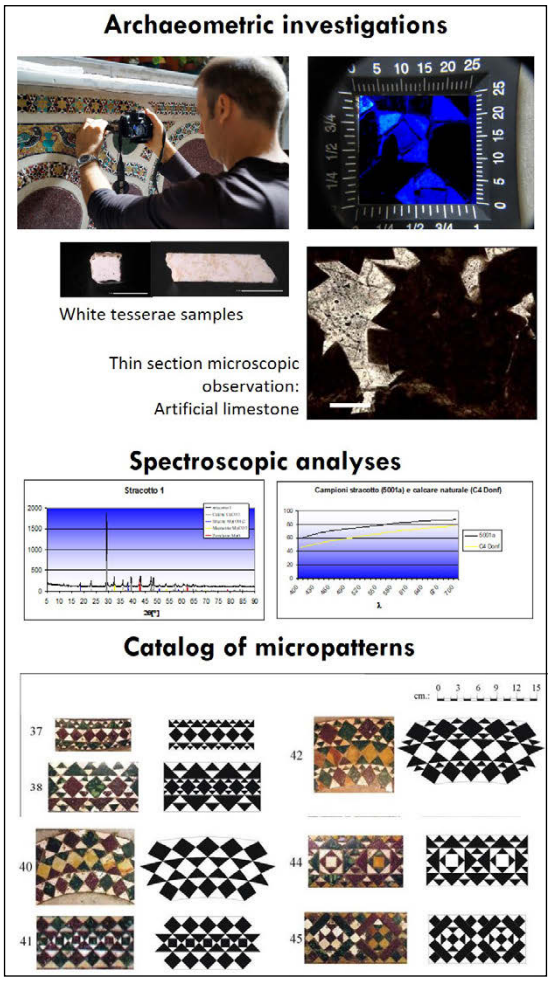

Fig. 3 – Archaeometric investigations, including UV observation, petrographic, colorimetric and multispectral analysis to identify employed materials, and cataloguing of *opus sectile* ornamental patterns.

ornamental patterns employed, documented but lost objects and fragments, and different types of relationships among objects and historical actors.

The slab fragment embedded in the neo-medieval altar underwent different types of archaeometric investigations to identify and distinguish its materials, including UV observation, petrographic analysis, and colorimetric and multispectral analysis. We also took reliefs, surveyed, and catalogued the

ornamental motifs (Fig. 3). This information enabled us to create horizontal relationships between different artworks and sites, again permitting a consideration of geography beyond individual case studies. The investigation considers, on the one hand, the chronology of the object, its original and current functions, visual forms and style, and historical context. On the other hand, it also factors in measurements, mapping, the analysis of the materials used, and processing techniques. As already noted, the integration of the qualitative analysis with the quantitative data represents one of the most ambitious challenges of the Mapping Sacred Spaces Project.

In its fullest development, the digital archive will provide large scale critical and scientific cataloging of thousands of artifacts scattered throughout Southern Italy. It already provides smaller scale tools for single case studies while also offering all available data to attempt the most reliable reconstructive hypotheses possible.

3. Case study: the reconstruction of the choir and ambo of Monreale cathedral in the late twelfth century

Turning now to a single case study involving complex data, we will focus on liturgical spaces in the cathedral church of Monreale, the center of a Benedictine complex founded by the Norman King William II in 1172 and elevated to an episcopal see in 1183 (Krönig 1965; Dittelbach 2003) (Fig. 4a). We focus here on the fragmentation and substantial disappearance of a key component of the medieval building, namely the double choir screen with its attached ambo, dismantled in 1658 at the behest of Archbishop Ludovico Alfonso de Los Cameros. Corresponding to this void is a considerable amount of data to systematize, consisting of either extant material evidence or textual and graphic sources related to the lost elements. This amount of data requires the implementation of an appropriate system for its management and interpretation, which will then facilitate the formulation of one or more reconstruction hypotheses related to the lost objects.

In addition to collecting all available fragmentary evidence pertaining to medieval liturgical furnishings (Fig. 4b), we conducted several archaeological and archaeometrical observations on-site. This included the analysis of materials used in the mosaics and in the *opus sectile* floor and wall coverings. Such work made it possible to verify the authenticity of large segments still *in situ* and to identify the original floor elevations and the precise topographical areas in which the monumental twelfth-century liturgical furnishings had been located prior to their dismantling in the mid-seventeenth century (Longo, Scirocco 2020, forthcoming). Remnants of the Norman period liturgical furnishings include marble fragments from the wall coverings of the two screens and from the supports of the pulpit, a large number of red porphyry

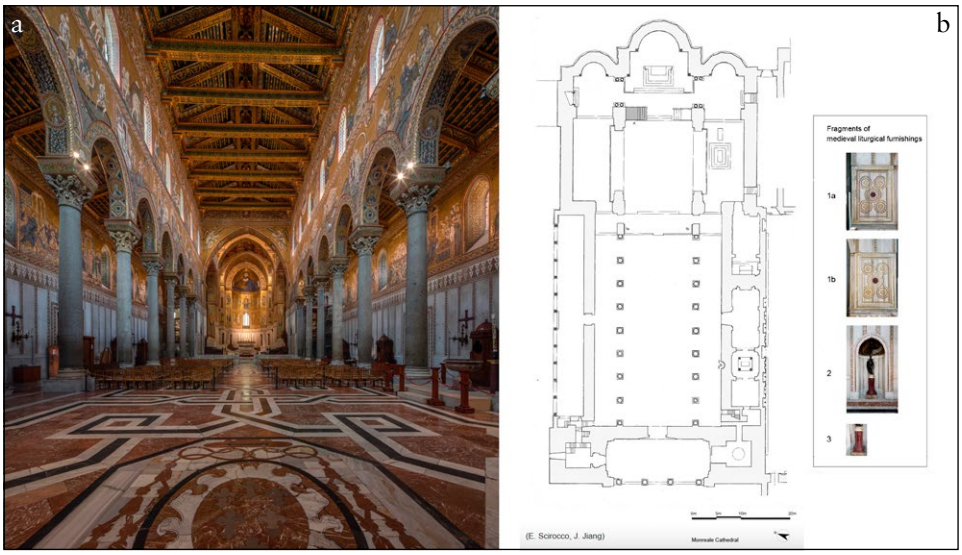

Fig. 4 – a) Monreale (Palermo), Santa Maria La Nuova cathedral, interior view looking East (Bibliotheca Hertziana – MPI, Roberto Sigismondi); b) plan of Monreale cathedral (elab. E. Scirocco, J. Jiang from Krönig 1965), with mapping and numbering of the extant remaining components and fragments of the medieval liturgical installation.

fragments, and two cipollino marble panels with a quincunx motif in the walls at the entrance to the presbytery (Fig. 4b, 1a-1b). Indeed, the cipollino panels are not far from their original location, where they once decorated the western facade of the choir's second wall. The preservation of a niche with mosaic decoration, now relocated on the wall of the southern nave, is exceptional (Fig. 4b, 2). It was once the apsis of a small chapel dedicated to Saint John the Baptist, which was situated beneath the ambo and hosted the baptismal font. This font consisted of a now-lost Roman *labrum* made in Spanish *brocatello* and supported by a sculpted porphyry column, which is still next to the aforementioned niche in the southern nave (Fig. 4b, 3). This, in sum, represents the state of the existing material data. From here, we had to begin an attempt to recover the sumptuous apparatus of liturgical furnishings of the church founded by William II of Sicily.

The research was initiated in 2009 (Scirocco 2010, 2016). Beginning 2018, it has been developed, enhanced, and perfected through the joint study of the two authors of this text (Longo, Scirocco 2020). Our research has demonstrated the unreliability of prior reconstruction proposals, which were widely accepted by subsequent studies (Figs. 5a-b). One is the graphic reconstruction (1698) developed by Gaetano Lazzara about forty years after the

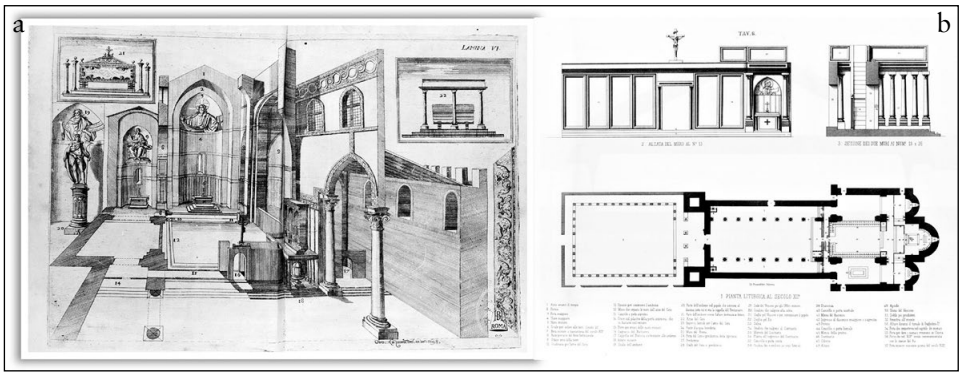

Fig. 5 – a) Gaetano Lazzara, interior view of Monreale cathedral: drawing (print on paper) with section showing the hypothetical reconstruction of the medieval furnishings (from Del Giudice 1702, tav. VI); b) hypothetical reconstruction of the medieval liturgical installations of Monreale cathedral according to Domenico Gravina. Frontal and side views of the choir screen with the attached ambo, and reconstructive plan of the church (from Gravina 1859, II, tav. 6).

destruction of the medieval furnishings (Del Giudice 1702, tav. VI). In 1859, Domenico Gravina proposed the second and very influential reconstruction (for a first critical re-evaluation, Zorić 2009) based on the detailed inventory drawn up in October 1658 during the dismantling of the ambo and the choir walls (Gravina 1859, I, 55-58, II, tav. 6).

The 1658 inventory, published by Gravina and preserved in its original form at the Monreale Cathedral Archive[1], is an extraordinary source. It provides an ordered and detailed list with the quantity, dimensions, and location of all the architectural and structural elements that comprised the furnishings, adding notes about their constituent materials and decorations. These include the enclosures between the transept and the three naves (the two «choir walls», the «right wing wall» and the «left wing wall», as they are called in the inventory), all the architecture of the ambo (from the columns to the upper part of the platform and the access stairs), and the underlying chapel of Saint John the Baptist (floor, apse, altar, and baptismal font). Thanks to the inventory, all the parts (a few hundred) that once constituted the microarchitecture of this lost twelfth-century liturgical setup could therefore be available virtually. However, their ideal reconstruction into a reliable and verifiable model generates a series of doubts and choices that require assistance and reconciliation with other data and this is where the quantitative approach comes into play. Still, potential contradictions and ambiguities might be solved by using comparative and qualitative analysis.

[1] The Authors thank Father Nicola Gaglio for facilitating its consultation.

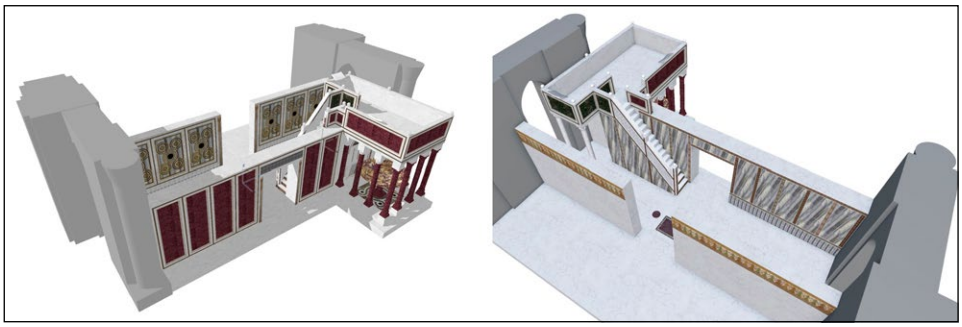

Fig. 6 – Views of the 3D model reconstructing the medieval choir screen with the attached ambo in the cathedral of Monreale: left, western (exterior) side; right, eastern (interior) side. HBIM created by R. Longo and E. Scirocco in collaboration with P. Kuroczyński and K. Argasiński (Hochschule Mainz and the Warsaw University of Technology) (funding: Bibliotheca Hertziana - Max Planck Institute for Art History, Project nr. BH-P-21-26).

Correlating the 1658 inventory with other older sources containing direct information about the liturgical setup of the Monreale choir when it was still in existence has been crucial. These sources include a map of the Monreale complex attached to the 1590 *relatio ad limina*, held in the Vatican Apostolic Archive (AAV, Congr. Concilio, Relat. Dioec., 574A, Schirò 2009), and early modern textual descriptions (De Caumont 1418/1858; Alberti 1567; Lello 1588,1596). All the information extracted from the interpretation of these graphic and textual sources has been cross-referenced in a synoptic table, with simple Excel worksheets. Next, we tried to visualize the results yielded from the dialogue between the data in a reconstruction (or virtual anastylosis) by using the possibilities offered by 3D digital modeling. After making several attempts beginning in 2014, which were not fully convincing due to the difficulty interpreting certain sections, we expanded the scope of the investigation by including precise surveys of the architecture and archaeological evidence *in situ* and by studying the material and technical aspects of the surviving artifacts. This work enabled the development of a new proposal, a 3D model made in collaboration with Piotr Kuroczyński and Karol Argasiński from Hochschule Mainz and the Warsaw University of Technology using HBIM methodology (Heritage Building Information Modeling), previewed for the first time here (Fig. 6). Current studies on this site and the latest knowledge about similar cases in the surrounding geographic area support the reliability of this proposal.

Let us briefly outline the main parts of the reconstructed medieval liturgical furnishings of Monreale cathedral, made around 1180, that survived with minimal modifications until 1658. The division between the central nave and the space occupied by the monks' choir in the presbytery was made with two parallel walls. The more external one was covered with porphyry slabs

surrounded by marble bands with ornamental motifs in *opus sectile*. The other, more internal wall had cipollino marble slabs and mosaic decoration in quincunx, also surrounded by bands with *opus sectile* decoration. The ambo, which rested on the more external wall and extended into the central nave towards the west, consisted of two parts: one towards the nave, dedicated to the reading of the Gospel, and the other towards the presbytery, i.e., towards the inside of the choir, dedicated to the reading of the Epistle. The first part incorporated red porphyry, and the second part featured green porphyry. The ambo housed the chapel with the baptismal font and the aforementioned apsidiole embellished with mosaics.

Thanks to the model, we were able to deduce the following dimensions: 4.2 m in height for the first wall (in relation to the nave) and 4.4 m for the second. At its peak, the ambo reached 5.5 m, and the underlying chapel measured 3.5 m on each side. Overall, the margin of error in the model's measurements is relatively low, estimated to be between five and eight cm. This margin results from an approximation inherent in the sources, such as: 1) the imprecision of the textual information itself (e.g., «1 cane and 3 scarce palms»); 2) the conversion from the Sicilian palm measurement system to the metric decimal system; 3) the mounting systems between individual architectural elements in the overall system (for example, the inventory provides the total measurements of the dismantled porphyry slabs. However, the size of those slabs, if inlaid in frames or pilasters within the wall's structure, would be two or three centimeters smaller). In the end, after holistically reconstituting the individual components listed in the inventory, thanks to the integrated analysis of sources and material data, the resultant reconstruction differs significantly from the historical proposals of Lazzara and Gravina and is perfectly consistent with the construction and aesthetic systems in Norman-era Sicilian sacred spaces.

Our goal of creating a model that would serve as a repository for research data, organized not in tabular form (as in our Excel worksheets), but in a topographical and three-dimensional form, motivated our decision in favor of a HBIM to reconstruct a completely lost ensemble even if this technology and approach are more typically used for surveying existing buildings (Attenni *et al.* 2022; Del Pozzo *et al.* 2024). Appearing as annotated links to the individual architectural elements, the sources and justifications for the reconstruction can thus be queried and verified by the scientific community, just like footnotes in a written text. However, the scientific community has not yet reached unanimity, either among the different disciplines involved or within Art History itself, qui regarding standards for 3D models. Areas under debate, among others, include shared open-access infrastructures for publishing and annotating three-dimensional reconstruction models, the assessment of the scale of uncertainty, and standards for the publication of

three-dimensional research-based models as scientific products (Apollonio 2016; Camerlenghi *et al.* 2023; Cazzaro 2023; Kuroczyński *et al.* 2023; Foschi *et al.* 2024; Papadopoulos 2024; Ioannides *et al.* 2025).

We therefore chose our first group of annotations for the HBIM model according to the needs of our case study. Currently, the model contains only a few annotations; however, the goal for the next few months is to incorporate all related metadata and paradata into the model and publish it, making it available according to FAIR principles (https://www.go-fair.org/fair-principles/). The metadata include function, dimensions, and constituent materials of the elements represented in the model (with reference to the controlled vocabularies of the Getty Research Institute's Art & Architecture Thesaurus®: https://www.getty.edu/research/tools/vocabularies/aat/). Components modeled on real extant objects specify their current location and conservation conditions. The paradata include the sources used to create the modeling, position, and texture of the individual components in the HBIM. We also indicated whether the historical existence of a given component represented in the model is hypothetical or not.

To evaluate the degree of reliability of the representation, for this specific case study, we decided to use a three-part scale of uncertainty: low, medium, and high, with a note describing the reasons for each choice made. For example, consider one of the panels with a quincunx motif mounted on the second choir wall (Fig. 7). Here, the uncertainty level is considered low because the slab with the quincunx is preserved, and its relationship to the depicted wall is definite, confirmed by all textual sources prior to 1658. The only imprecise data point is the exact position of this specific panel on the wall. In the model, we placed it in the second available slot from the left. However, there is no way to know whether this was its original position among the six possible on this wall. This missing data is ultimately negligible for the purposes of this reconstruction, since the six panels were almost identical. After we apply this criterion to all constituent parts of the model, the levels of uncertainty will be elucidated in the overall model through color coding.

In the end, we reconstructed the precise locations of the different components of the choir screens and the ambo of Monreale closely adhering to historical and archaeological data. Furthermore, the widely documented materials and decorations used in the model provide qualitative information essential to understanding the aesthetics of the furnishings. Assessing specific patterns in the ornamental *opus sectile* was not always possible, but for the 3D model we used designs resembling the original elements preserved *in situ* in the same building, i.e., the Cathedral, the Diocesan Museum, and the exhibition rooms near the Cloister Terraces.

A reconstruction model is inherently a virtual surrogate, an abstract and distilled idea of a lost original, whose real, historical qualitative features are only

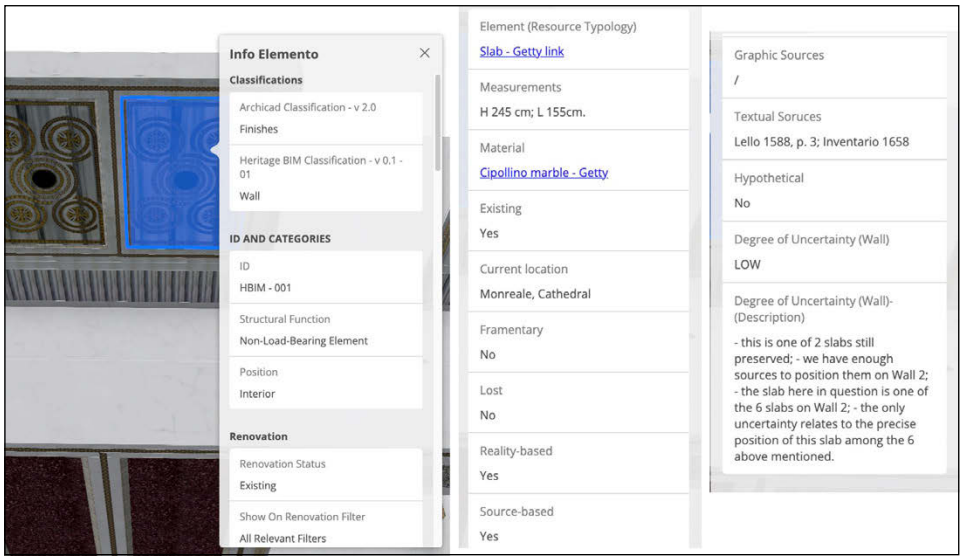

Fig. 7 – HBIM annotations with assessment of uncertainty for one of the panels with a quincunx motif mounted on the second choir wall. The annotation describes the reasons for the choice made within a three-degree scale of uncertainty (on the right).

available to us through fragmentary material evidence, and therefore destined to remain incomplete. This evidence and its degree of interpretation, however, can be integrated into the HBIM model and the metadata and paradata we applied to it (for the different aspects involved, Münster *et al.* 2024). Additionally, we would like to emphasize that the 3D modeling efforts were not undertaken solely with the intention of 'reconstructing' something lost. Trying to reassemble the whole also responds to the hermeneutic and epistemological need to cope with the large amount of available but fragmented information related to this exceptional case study. Modeling in 3D has proven to be an indispensable heuristic tool, which inevitably subjects hypotheses to verification and possible correction. Above all, it provides a dynamic tool that represents the current state of research while also being capable of modifications as new data and hypotheses emerge (Camerlenghi *et al.* 2023).

4. Conclusions: taxonomy and analytical synthesis

In conclusion, our experiences with this project as we have briefly presented them have yielded insights beyond results particular to specific research. We have deduced how Art History would benefit from quantitative and network approaches. We define 'network' not only as a web of relationships and

exchanges between different case studies, but also as one of interdisciplinary work. More broadly, we have underscored the need to question traditional distinctions between scientific and humanistic disciplines and to welcome holistic research approaches and practices. In so doing, we aim to usher in a new aspect of knowledge that balances mysticism and logic.

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ABSTRACT

According to a traditional distinction, quantitative and qualitative research approaches are the exclusive domain of the hard sciences, the former, and the humanities, the latter. Taking as its starting point E. Panofsky's reflections on the disciplinary status of Art History in relation

to its method of investigation (1940), this paper aims to demonstrate the anachronism of the hierarchy between disciplines based on the adoption of quantitative or qualitative methods, in favour of a more transversal scientific methodology. Looking at Art History in particular, it is undeniable that the digital revolution has enabled and strongly stimulated quantitative approaches and at the same time fostered transdisciplinary collaborations between different scientific areas. Based on these premises, the article presents the research methodologies and some results of the project Mapping Sacred Spaces: Forms, Functions, and Aesthetics in Medieval Southern Italy, in which the management of a large amount of fragmentary data is addressed. These are either fragmented artistic artefacts scattered over a wide geography, to be analysed at different topographical scales, or a single case study to which a large number of sources and research materials are linked, requiring a systematic and simultaneous management of data. In particular, a preview of the digital archive of the project will be offered, while the preliminary reconstructive 3D model (realised with HBIM technology) of the choir screens and ambo of the Cathedral of Monreale (c. 1180) will be presented for the first time.