Gustavo Pulitzer Finali: The evolution of Interiors from Victoria I to Victoria II. Towards a Historical and Virtual Reconstruction using 3D Digital Models as a Reconstructive Tool Integrating Archival Sources

Marco Medici, Elisabetta Trincherini

ABSTRACT:

This article explores the interior design of the ocean liners Victoria (1931 and 1951) by Gustavo Pulitzer Finali, tracing a transition from Art Déco luxury to postwar modernism. Based on unpublished archival materials from CSAC Parma, the study combines historical research with digital reconstruction, emphasizing the integration of design, materials, and artworks aboard ships as a reflection of contemporary aesthetic and functional values. Through the use of advanced 3D modeling techniques applied to original drawings, photographs, and material samples, the research reconstructs the interiors of Victoria II, providing new insights into the spatial organization, material culture, and artistic collaborations that characterized Pulitzer Finali's design practice. The article highlights how 3D models can serve as both heuristic and epistemological tools, enabling the critical visualization of lost heritage and contributing to its preservation and dissemination in alignment with current European cultural heritage policies.

Questo articolo analizza il design degli interni dei transatlantici Victoria (1931 e 1951) progettati da Gustavo Pulitzer Finali, tracciando una transizione dal lusso Art Déco al modernismo del dopoguerra. Basato su materiali d'archivio inediti conservati presso il CSAC di Parma, lo studio combina ricerca storica e ricostruzione digitale, mettendo in evidenza l'integrazione tra progetto, materiali e opere d'arte a bordo come riflesso dei valori estetici e funzionali del tempo. Attraverso tecniche avanzate di modellazione 3D applicate a disegni originali, fotografie e campioni materici, la ricerca ricostruisce gli interni della Victoria II, offrendo nuove chiavi di lettura sull'organizzazione spaziale, la cultura materiale e le collaborazioni artistiche che caratterizzarono l'opera di Pulitzer Finali. L'articolo evidenzia come i modelli 3D possano fungere da strumenti sia euristici che epistemologici, permettendo la visualizzazione critica di un patrimonio non più esistente e contribuendo alla sua conservazione e diffusione in linea con le attuali politiche europee per la valorizzazione del patrimonio culturale.

Opening Picture:

Photograph of the Salone delle Feste – Gustavo Pulitzer Finali Archive, CSAC – University of Parma.

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Introduction by Irene Di Pietro (Digital section)

In the essay, the authors retrace the milestones of the research that led to the reconstruction *The Interiors of Gustavo Pulitzer Finali. From the Product Archive to Virtual and Synesthetic Reconstruction,*[1] a research initiative combining substantial archival investigation with a methodology that led to the digitization of the primary sources and the 3D reconstruction of interiors and objects. The main sources, largely unpublished, come from the archive deposited in 1988 at the CSAC (Centro Studi e Archivio della Comunicazione of the University of Parma) and comprise over 16.000 design materials, ranging from drawings of various types (sketches, working drawings, presentation boards, etc.) to material samples (fabric color swatches, etc.) and photographs of models and completed projects[2] (Fig. 1).

1. Historical and Design Context

Gustavo Pulitzer-Finali (1887–1967) was a prominent Italian architect and designer, renowned as a leading figure in early 20th-century naval interior design. Based in Trieste, he championed a modern, functional approach to ship interiors that contrasted with the more traditional, opulent British-influenced styles favored by designers from Genoa.

In 1925, Pulitzer received his first commissions from the Triestine ship-owning Cosulich family, who entrusted him with the design of some interiors aboard the ships *Saturnia* and *Vulcania*. A few years later, in 1930, he was commissioned to design the entire interior of the motor ship *Victoria*, considered the first modern vessel in the Italian civil fleet. This project inaugurated a new generation of ocean liners, such as the *Conte di Savoia*, *Neptunia*, and *Oceania*, built throughout the 1930s and distinguished by radically different structural and furnishing solutions compared to the ships of the early twentieth century.

Conceived as a luxurious high-speed steamer for routes in the eastern Mediterranean, the *Victoria* stood out for its streamlined and aerodynamic silhouette. Unlike earlier vessels, where light-colored superstructures contrasted with dark hulls, here the entire ship was painted white, conveying a sense of lightness and of an elegance that had become "modern".

Before Gustavo Pulitzer introduced this modern sensibility, concerning both functionality and aesthetics, the prevailing design approach aimed to reproduce the experience of a luxurious palace transposed to the sea, the so-called "floating baroque". One need only think of the first-class ballroom created by Adolfo Coppedè aboard the *Conte Biancamano* (1925), or recall Filippo Tommaso Marinetti's 1928 account of a journey aboard the *Giulio Cesare*, which featured interiors furnished, among others, by Ducrot of Palermo, "[...] mi sforzo di ricordarmi che navigo nel salone da pranzo a due piani e cupola, guardando fuggire laggiù, dietro la vetrata, un piccolo mare civilizzato, estraneo, sconfitto, inutile come il fondale sopprimibile di un palcoscenico [...]"[3]

The interiors of the *Victoria*, for which Gustavo Pulitzer won a design competition (the ship was rapidly built and launched in 1931), al-

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though incorporating some refined and luxurious materials, are characterized by a fundamental sense of sober functionality. Decorative elements such as boiseries, faux beams, and coffered ceilings were eliminated and replaced with solutions that responded more coherently to the internal volumes of the ship, giving rise to a novel interior language defined by coplanar surfaces and diffuse lighting.

Although the project can be situated within an aesthetic influenced by the Art Déco style of the time – as evidenced by the use of exotic woods such as Macassar ebony, brass, leather, parchment, and claddings in onyx and travertine, along with refined details in copper and chromed metal – it maintained a restrained functionalism, with structures often exposed in their essential forms. Materials were carefully selected for their performance and durability in marine environments, such as linoleum flooring. Systems were integrated into the wall coverings, and for the first time, the air conditioning function was incorporated into the overall design.

On the eve of the ship's maiden voyage, on June 25, 1931, Pulitzer himself declared in an interview with the Trieste-based newspaper *"Il Piccolo"*:

> *"Non architetture che si sovrappongono a quelle della nave, non finti palazzi, non strutture posticce. L'architettura deve cercare la sua armonia nella genialità del rivestimento, senza alterare gli spazi che gli sono offerti dalle strutture della nave stessa"*[4]

In selecting artworks, Pulitzer once again demonstrated his instinct for harmonizing individual contributions within the overall vision of the project. His role was that of a director capable of orchestrating dialogue among artists, decorators, and designers, each with their own specificity. Even the tableware, highly

refined and designed by Gio Ponti, was conceived as part of a unified aesthetic sensibility.

According to archival documents preserved at CSAC Archive, the artists involved in the 1931 *Victoria* were: Libero Andreotti, Marcello Mascherini, Maryla Lendnicka, Augusto Cernigoj, Elena Fronda, Gio Ponti, and Pietro Chiesa.

One of the interiors in which this sense of collaboration was most elegantly realized is the dining room, also known as the "Sala delle Sirene" ("Room of the Sirens"). The name of this bright space derives from a pair of sculptures by Libero Andreotti, featuring elongated bodies in a Liberty-inspired stylization. The sirens hold a vase aloft with their left arms, decorated with intertwined dolphins, a distinctly decorative motif.[5]

The walls of the room are adorned with black and gold ceramic decorations on a yellow background. Friezes designed by Gio Ponti, inspired by scenes from ancient Egypt, harmoniously interact with the bas-reliefs by Augusto Cernigoj and the stained-glass panels by Pietro Chiesa. The refined dinner and tea sets, marked with the red emblem of the shipping company and crafted from white and ivory porcelain with fine gold edging, were designed by Gio Ponti for the Richard Ginori manufactory.[6]

The elegant passenger motor ship *Victoria* had a brief lifespan and was tragically sunk in 1942 after being struck by British aircraft during the Second World War. The ship's celebrated elegance and innovation, along with its tragic fate, contributed to the decision to commission a new ship exactly twenty years later,

in 1951. This new vessel, also named *Victoria*, was once again designed by Gustavo Pulitzer and conceived as a tribute in both name and spirit.

For the 1951 *Victoria*, Pulitzer chose to embrace an aesthetic more strongly influenced by the modernist and functionalist trends of the time, characterized by a formal clarity and the use of more restrained materials. The interiors of the new *Victoria* did not directly reprise the characteristics of Art Déco. Instead, they adopted a more measured and rational language, typical of postwar sensibilities: clean lines, uniform surfaces, and the use of materials such as wood, matte-finished metals, and natural fabrics in muted and neutral tones, far from the vivid colors and strong contrasts that had defined the Art Déco style.

The sculptures by Libero Andreotti, reproduced (likely through new castings),[7] created a symbolic and artistic bridge between the two ships; in this instance, one of the works was placed in the ship's writing room.

Both ships represented the finest achievements of Italian design. The first *Victoria* reflected the Art Déco style and the aesthetics of the 1930s, while the second embodied the modern, minimalist elegance of the postwar period, though still preserving a certain classical touch in its decorative details.

The decision to revive the name and some elements of the original ship was not purely commemorative; it also aimed to reinforce the Italian fleet's tradition of excellence and luxury by evoking the legacy of the 1931 *Victoria* and adapting it to the tastes and technological advancements of the early 1950s.

Among the artists involved in the second *Victoria* were Tranquillo Marangoni and Enrico Ciuti, who was responsible for the decoration of the first-class ballroom bar, while in the same space Dino Predonzani created a curious arctic landscape that spanned the entire wall. Many of the furnishings, as extensively documented in the CSAC Archive, were designed by Pulitzer himself. Among them are, for example, the *Londra*, *Vittoria*, *Ceylon*, and *Hollywood* armchairs.

2. Contextualization of 3D Reconstruction in Heritage Research

The practice of three-dimensional (3D) reconstruction has progressively evolved into a robust scientific methodology[8] widely recognized in cultural heritage research.[9] While early uses of digital modeling largely focused on visual documentation of existing structures, contemporary applications of 3D modeling have expanded significantly[10], now incorporating detailed historical research, technical analyses, and advanced interpretative frameworks[11]. As a consequence, digital reconstruction is no longer considered merely illustrative but serves as a powerful investigative tool capable of formulating, testing, and refining hypotheses concerning heritage sites and artifacts.[12] This transformation is underscored by international standards such as the London Charter (2009),[13] which emphasizes methodological rigor, transparency of interpretation, and documentation of uncertainty in heritage visualization projects. Further advancing this trend, recent initiatives such as the EU-funded 4CH project[14] (Competence Centre for the Conservation of Cultural Heritage) and its continuation 3D-4CH project[15] (Online Competence Centre in 3D for Cultural Heritage) are introducing specific guidelines promoting standardized methodologies, interoperability of data, and comprehensive documentation practices.[16] At the policy-making level, the European Commission has explicitly recognized the crucial role of digitization and 3D modeling in heritage preservation and dissemination. In November 2021, the Commission issued a formal recommendation establishing a Common European Data Space for Cultural Heritage, urging all Member States to accelerate the digitization of cultural heritage sites, monuments, objects, and collections. This policy explicitly aims to safeguard heritage at risk from deterioration, disasters, or loss, and to actively foster reuse in diverse sectors including education, sustainable tourism, and cultural and creative industries.[17] In line with this strategic vision, integrated digital models combining archival, historical, material, and spatial data enable researchers to explore lost or altered configurations, enrich historical narratives, and enhance public engagement with cultural heritage through interactive and immersive experiences. Within this broader scholarly and policy framework, the present research employs integrated 3D modeling as a methodologically rigorous means to reconstruct and critically analyze the interiors designed by Gustavo Pulitzer Finali for the lost motorship *Victoria II*, thereby contributing to the ongoing discourse on digital heritage preservation and interpretation.

In the following sections, we pres-

ent a scholarly reconstruction of the *Victoria II* interiors from archival sources, focusing on the methodological framework and epistemological outcomes. We concentrate on how the integrated 3D model – built from original drawings, photographs, and material samples in the Gustavo Pulitzer-Finali archival collection – serves as a means to deepen historical understanding of the ship's design, facilitate spatial analyses that were not previously possible, and vastly improve accessibility of this cultural heritage to both researchers and the general public. The approach follows best practices for digital heritage visualization as outlined in recent European guidelines, ensuring scholarly rigor and interpretative transparency. By "giving form" to archival data in a digital model, we create an interactive knowledge repository that allows the *Victoria II* interior – an important yet little-known chapter of Italian design history – to be studied and experienced in unprecedented ways.

3. Methodology of Digital Reconstruction from Archival Sources

The overall reconstructive workflow was iterative and interdisciplinary, combining architectural research methods with digital modeling techniques. (Table 1) summarizes the main phases of the process and the tools employed in each phased methodology ensured a structured approach, from data gathering to hypothesis-testing and finally to communication of results. In practice, the phases were not strictly linear; there was considerable feedback between them. For instance, initial 3D modeling (Phase 3) often revealed discrepancies that prompted a return to the archival sources (Phase 1–2) to seek clarification or to adjust hypotheses.

2.1 Archival Materials and Digitization

The reconstruction project began with an in-depth study of primary sources from the Gustavo Pulitzer-Finali Archive held at the Centro Studi e Archivio della Comunicazione (CSAC) in Parma. This archive preserves a wealth of documentation related to Pulitzer-Finali's work on ship interiors, including original architectural drawings (plans, sections, elevations), perspective renderings and sketches, black-and-white photographs of completed rooms, correspondence and specifications, as well as material samples (such as textile swatches, wood veneers, and color palettes) from the *Victoria II* project. An initial curatorial selection identified the most significant and informative materials pertaining to the *Victoria II*'s interior outfitting. Priority was given to complete sets of drawings for key public spaces (e.g. the first-class social hall *Salone delle Feste*, the *Sala Soggiorno* lounge, dining room, and cabins), technical drawings of custom furniture pieces, and any photographs showing those spaces after completion.

All selected archival sources were then digitized at high resolution to facilitate detailed analysis and integration into the modeling process. Large-format drawings and blueprints were scanned or photographed with professional equipment to capture fine line-work, dimensions, and annotations. Fragile sketches and renderings were

handled carefully and digitized via high-resolution photography. Material samples (e.g. a piece of patterned carpet or a veneer sample) were likewise scanned or photographed with calibrated color reference, so that their textures and colors could later be applied to the 3D models. This digitization step resulted in a corpus of digital assets: raster images of drawings and photos, each catalogued with metadata about their archival origin and content (Fig. 2 and 3).

2.2 Reconstructive Modeling Process

In Phase 2, reorganizing the sources was crucial for building a correct mental picture of the interiors. The team cross-referenced perspective drawings and period photographs with the technical deck plans and elevations. By aligning these documents, we reconstructed the spatial layout and identified any inconsistencies. One example was discovering slight mismatches between a perspective sketch of the *Sala Soggiorno* lounge and the measured plan: the artist's rendering had subtly stretched certain dimensions for visual effect, which became evident when compared to the scale plan. Such findings underscore the importance of the 3D model as a means to reconcile "idealized" representations with physical reality. In several cases, we noted gaps or ambiguities in the documentation – for instance, missing details for ceiling treatments or lighting fixtures in a room. These were flagged, and hypotheses were formulated drawing on analogous elements from the same ship or period (e.g. inferring a ceiling design by studying a similar lounge on a sister ship, or referencing descriptions in period literature). All assumptions were
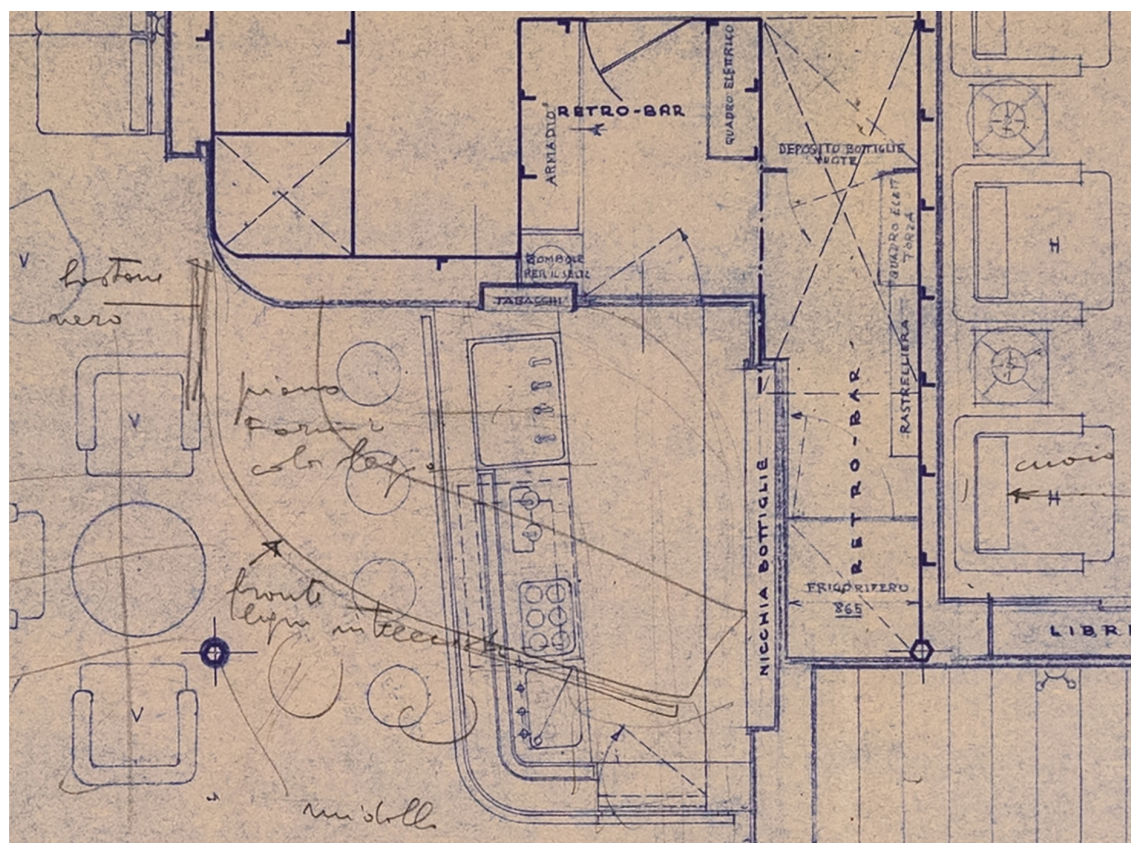
Fig. 02:
Detail of original drawing of the bar in the Sala Soggiorno – Gustavo Pulitzer Finali Archive, CSAC – University of Parma.

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documented so that they remain transparent in the final reconstruction, recording the conjectural aspects of any virtual reconstruction (Fig. 4).

Phase 3: 3D modeling began with importing the 2D CAD plans as a base in the modeling software. The spaces were constructed in three dimensions by extruding decks, bulkheads, and columns according to the measurements given in the plans (converted to the modeling unit scale). Because the or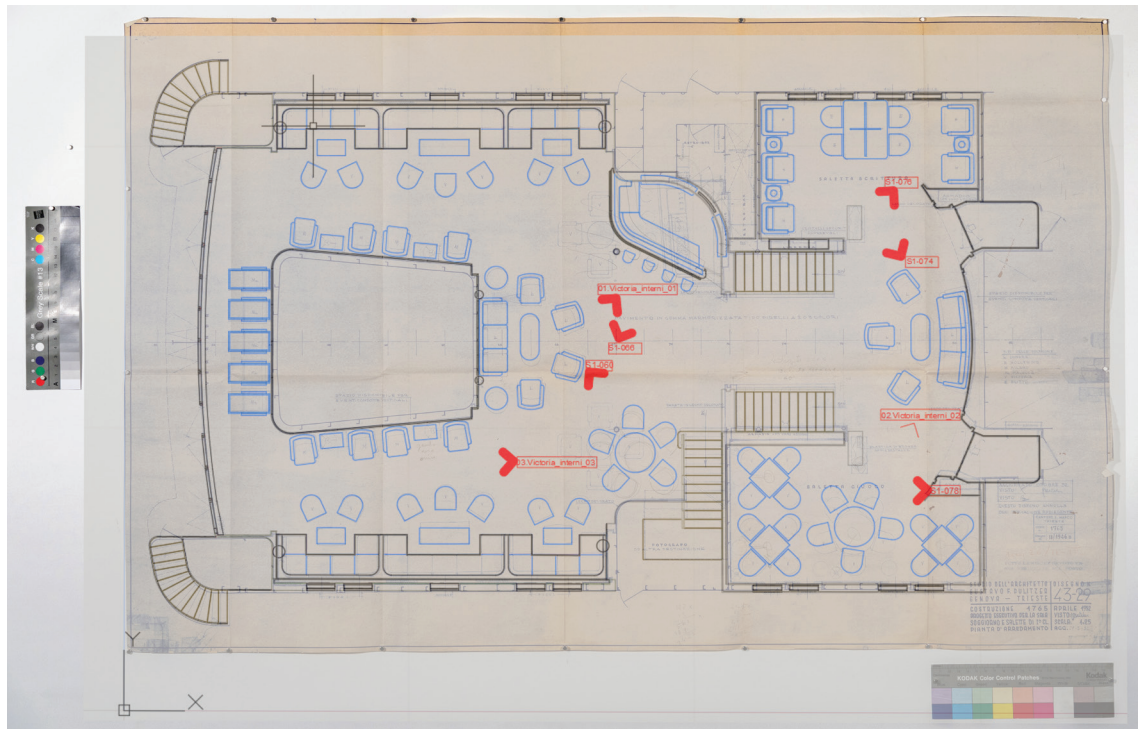iginal drawings were highly detailed, we could model architectural elements with a high degree of accuracy. For example, the exact radius of a coved ceiling corner or the profile of an art-deco decorative molding could be gleaned from sectional drawings. For fixed furnishings (like bar counters, stage platforms, or built-in seating), we followed the designers' drawings to recreate their shapes. A noteworthy aspect of the reconstruction was the furniture modeling. The archive included orthogonal projection drawings of furniture designs, such as lounge armchairs

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Fig. 04:
Original drawing of the Sala Soggiorno (Gustavo Pulitzer Finali Archive, CSAC – University of Parma) with CAD overlay and identification of photographic vantage points.

and dining chairs that Pulitzer-Finali developed for *Victoria II*. By using these *quoted* (dimensioned) projections, we could model the furniture pieces to the precise proportions intended by the designer, ensuring dimensional accuracy in the 3D scene. For instance, the *Poltroncina tipo Victoria*armchair and the *Nilo 53* chair (names given to specific models of seating) were reconstructed in detail from their blueprints, down to the angle of their backs and the curvature of armrests (Fig. 6). This granular level of modeling enriches the overall authenticity of the reconstructed interiors – the virtual rooms are populated not with generic furniture but with the actual pieces that were designed and used, recreated at true scale (Fig. 5).

During modeling, continuous verification against the archival images was performed. We imported period photographs (e.g. a 1950s image of the first-class dining saloon) into the 3D scene as background plates or as image planes. By adjusting the virtual camera to match the photograph's perspective, we checked if our model aligned with the real scene. This technique helped validate dimensions and the placement of elements. In cases where the model did not align perfectly with a photo, it indicated either a potential error in modeling or a previously unknown alteration in the real space. For example, a photograph of the *Salone delle Feste* showed a different chandelier design than the one in the original rendering, suggesting a last-minute design change. We decided to model both versions (the rendered design and the one visible in the photo) as alternate configurations, noting it as a design variant.

2.3 Accessing and visualizing the 3D model and its data

Phase 4: integration of data added a further layer of richness to the model. Using the digitized material samples (Fig. 7), we created realistic
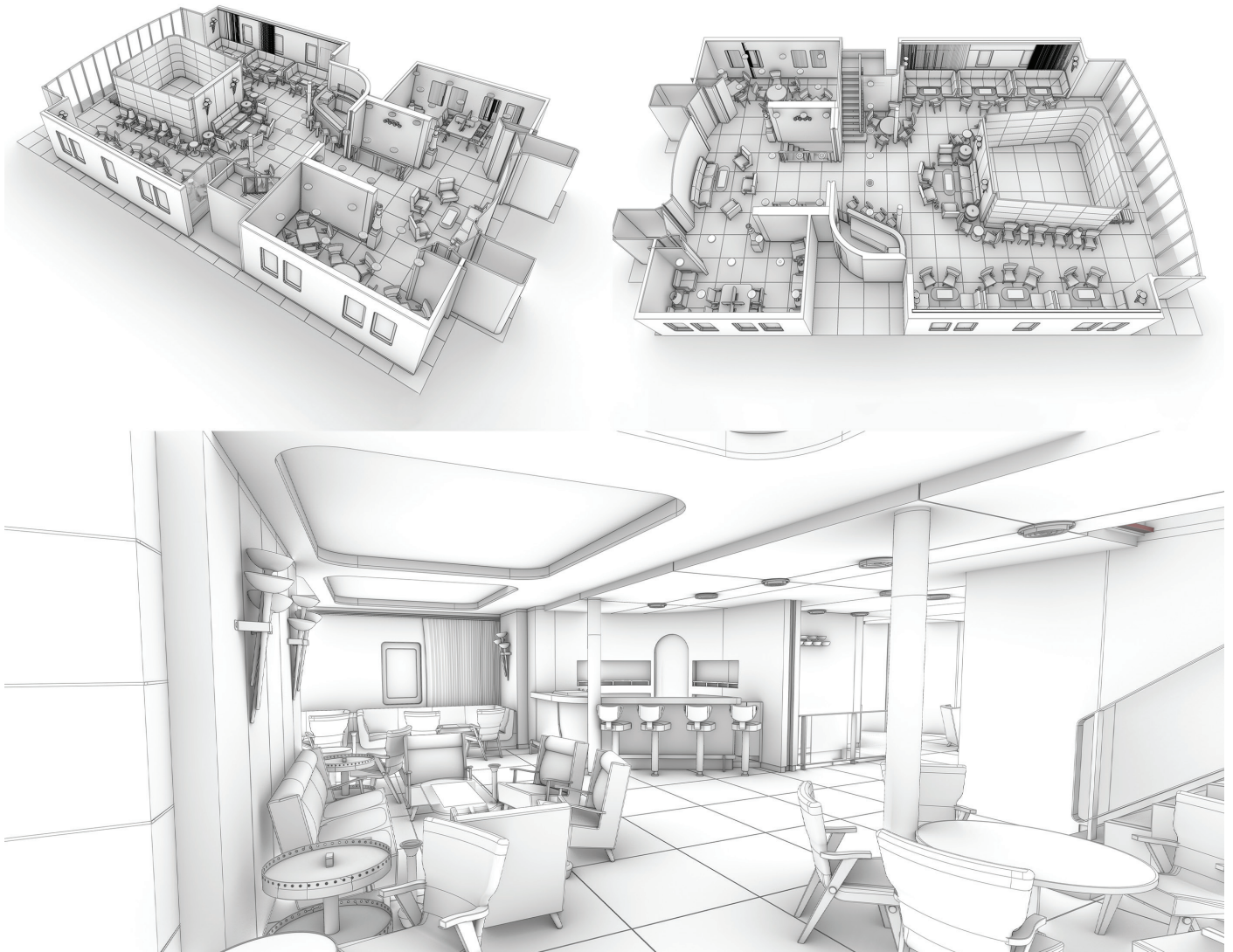
materials and textures in the 3D environment. The honey-colored teak or mahogany wall paneling that was noted in the archives, for example, was simulated by scanning a sample or analogous veneer and applying it as a texture map with appropriate reflectivity. Likewise, fabric patterns for upholstery (if documented) were recreated from archive scans – such as a geometric motif used in carpet runners. The result was a set of materials faithful in color and pattern to the originals, enhancing the visual credibility of the reconstruction. Additionally, we annotated the model extensively: every significant object or architec-

tural feature in the model is linked to its source references. Selecting a virtual object (say, a decorative glass panel or a chair) in the model allows one to retrieve the original drawing or photo of that element, as well as metadata like its designer, materials, and any uncertainties in the reconstruction. This effectively turns the 3D model into an integrated information system – not just a visual replica, but a container for archival knowledge.[18] It realizes the concept of an "integrated 3D model" where diverse archival resources coalesce in a single digital space. The team followed principles from the *4CH project* guidelines and the

Fig. 05:
3D reconstruction of the Sala Soggiorno – Exploded perspective views (top left and top right) and interior perspective rendering (bottom).
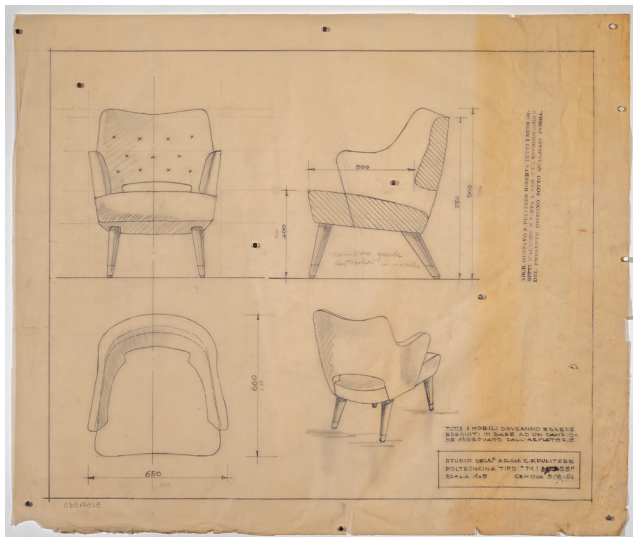
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use of the INCEPTION web platform in this integration (Fig. 8), ensuring that all data is documented and that the model can be updated with new information in the future. Indeed, the model is conceived as a dynamic "digital organism" that can grow as more sources or insights become available.[19]

Finally, Phase 5: immersive visualization prepared the completed model for experiential use. We exported the model into a real-time rendering engine to allow interactive navigation. Care was taken to optimize geometry and textures for smooth performance without sacrificing detail. In the Unreal engine (Fig. 9), we set up lighting scenarios corresponding to the ship's original lighting (mixing warm incandescent interior lights with ambient daylight through portholes or windows). The advanced rendering capabilities permitted simulation of reflective materials like polished wood, brass, and glass, creating an ambiance close to how the spaces might have originally felt. The culmination of this phase was the deployment of the model to both VR (virtual reality) and standard desktop platforms. Users with VR headsets can now virtually step into the *Victoria II* interiors at real scale – walking

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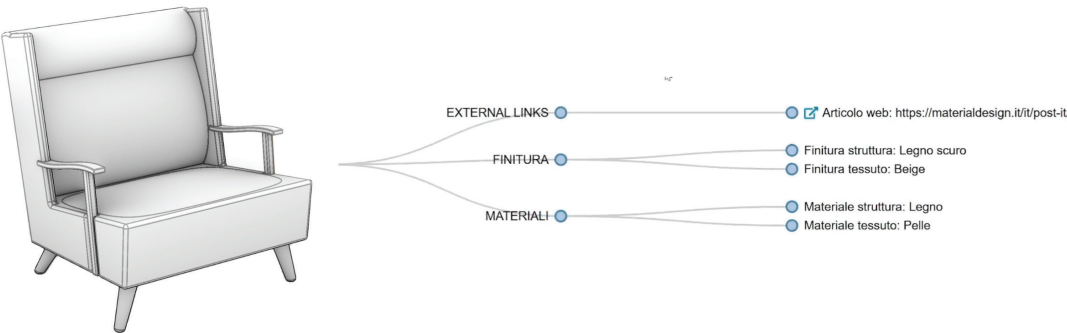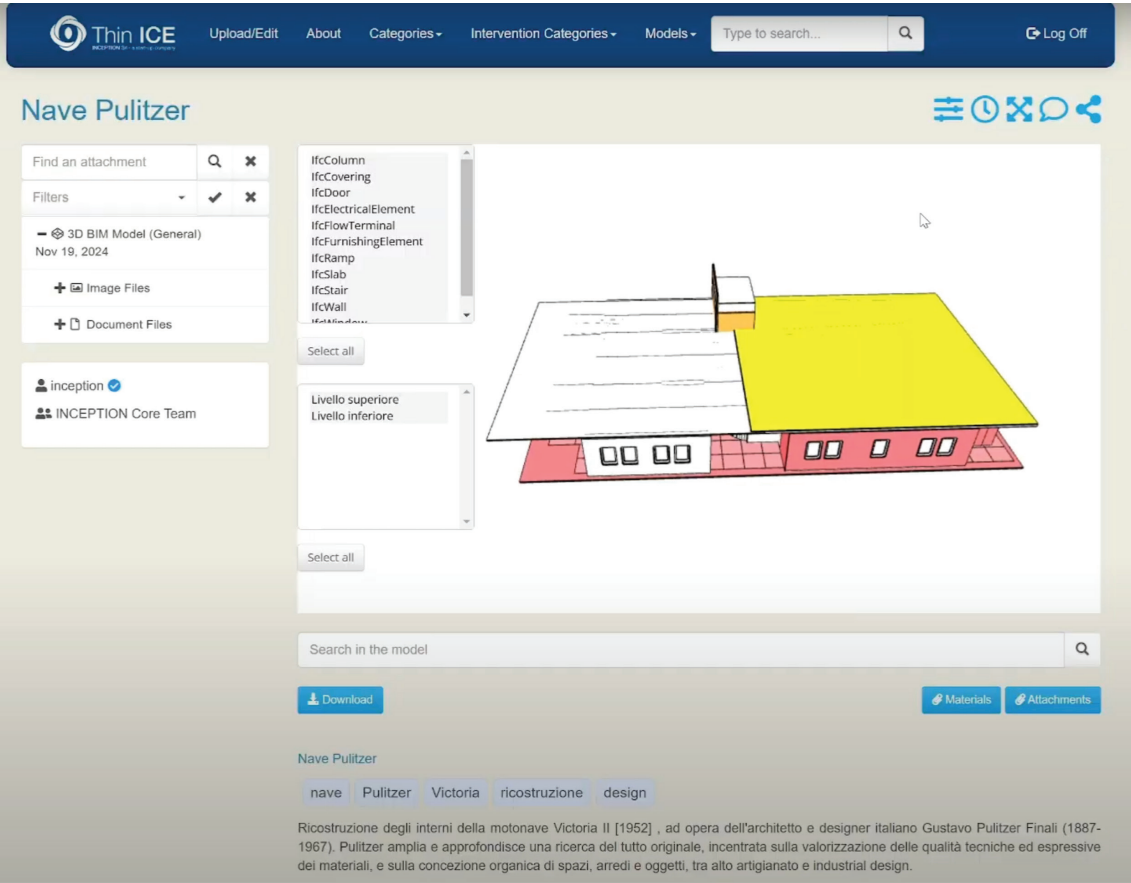
through the grand staircase, standing beneath the domed ceiling of the dining room, or sitting (virtually) in a first-class lounge chair. For broader accessibility, we also prepared a non-VR interactive application and a web-based 3D viewer, so that the general public can explore the reconstructed spaces on standard computers or mobile devices. This aligns with the project's goal of making the reconstruction *accessible to all* via an easy-to-use platform, where one can navigate the model, toggle layers of information, and query metadata for educational purposes. Throughout all phases, an emphasis was placed on scholarly rigor and transparency. Every decision in the reconstruction process – whether based directly on evidence or inferred – was recorded. The final model distinguishes between elements reconstructed with high cer-

Fig. 08: INCEPTION web platform used for the semantic aggregation of source documents within the 3D model with a specific example of one armchair.

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tainty (supported by direct archival documentation) and those that are hypothetical (labelled as such, with notes on the rationale). By adhering to the best practices (e.g. documentation, transparency, authenticity), the project ensures that the 3D reconstruction serves not as a fanciful digital replica but as a true research tool, one that other scholars can interrogate and even contest. This methodological care underpins the epistemological value of the model, as discussed next.

4. Results of the Reconstruction and Spatial Analysis

The 3D reconstruction of the *Victoria II* interiors resulted in a detailed virtual environment representing the ship's design as it stood in the mid-1950s. Key public spaces – including the *Sala delle Feste* (first-class ballroom/social hall), the *Sala Soggiorno* (lounge), the first-class dining room, the smoking lounge, and typical first-class and second-class cabins – were modeled with full architectural detail and furnishings. The fidelity of the reconstruction enables a range of spatial analyses and observations that were previously impossible using only the 2D archival documents. One immediate outcome was the ability to visualize the intended spatial experience of these interiors. Standing a virtual camera inside the model, we can for the first time since the ship's demise observe the rooms from any viewpoint – including those not captured in historical photos. For example, the *Salone delle Feste* can be viewed from the stage looking outward, or from the upper balcony level downwards, providing perspectives that yield insight into sightlines and the room's volume. This helps confirm historical accounts of the space's design effect. Contemporary descriptions praised the lounge's open-plan design and harmonious proportions;
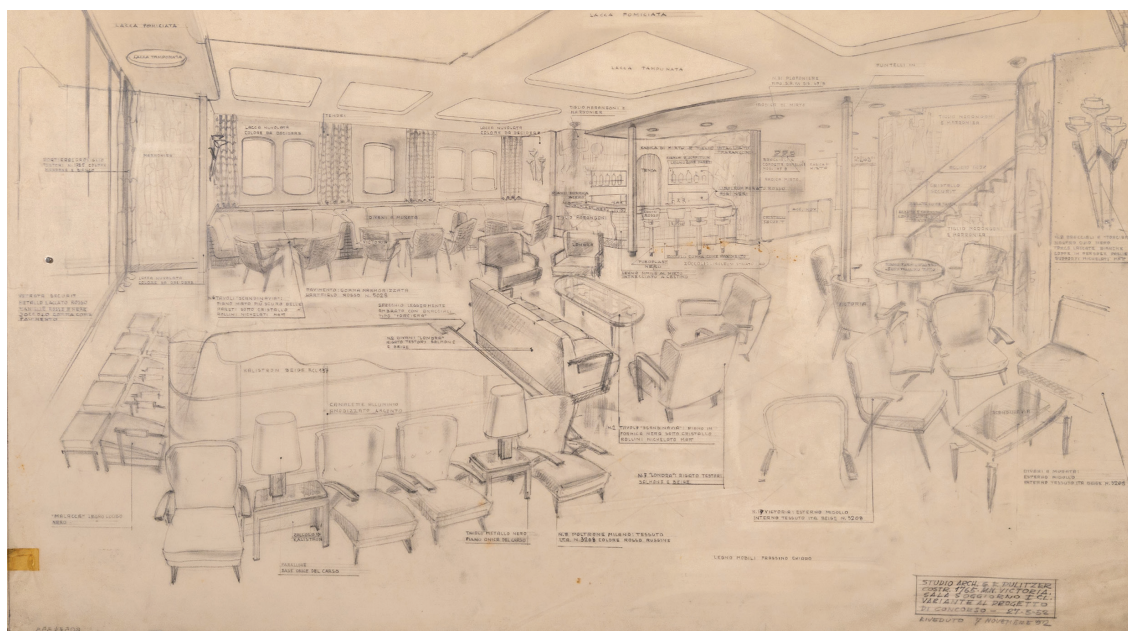
our model validates these descriptions by showing how the spacing of columns and the coffered ceiling geometry create an impression of spaciousness relative to the ship's beam. Precise digital measurements in the model reveal, for instance, that the ceiling height in the ballroom was about 4.2 meters – exceptionally tall for a ship of this size – which explains the grandeur noted in passenger memoirs. Such quantitative spatial data could not be easily obtained from fragmented drawings alone, but the model integrates the pieces into a measurable whole.

The reconstruction also enabled a comparative analysis between the original drawings and the realized spatial configurations. In particular, the case of the Sala Soggiorno offered an instructive example of how visual conventions in archival materials may affect interpretation (Fig. 10). The original perspective drawing depicts the lounge with what appear to be floor-to-ceiling fading panels on the central structure. However, this choice was not a literal design proposal; rather, it served as a representational strategy to enhance spatial legibility by visually opening the interior toward the viewer. Archival plans and photographs confirm that the executed design in fact featured wood paneling with integrated shelving in that location. To explore this interpretative ambiguity, we reconstructed two configurations in the 3D model: one with the rendered transparent panels, and one reflecting the actual wooden partition. This allowed us to assess how such visualization choices affect spatial perception and the understanding of interior articulation. While the transparent wall offered a more expansive and luminous view comparable with the original perspective view by Pulitzer Finali, the authentic wood-paneled version conveyed a more intimate, enclosed ambiance. This exercise highlights how 3D modeling can clarify the intent behind visual representations and provide a critical platform to distinguish between descriptive clarity and design reality. It reinforces the role of reconstruction as a methodological lens for interpreting archival drawings, especially when they employ graphic conventions for narrative or compositional purposes rather than literal documentation. During the modeling, the team uncovered a number of incongruities and corrections. For example, one photograph of the first-class smoking room showed a decorative scheme (furniture placement, light fixtures) that did not perfectly match the available drawings. By interrogating the model and sources further, we discovered that the smoking room had undergone a minor refit during the ship's service (perhaps during a mid-1960s renovation when the ship changed owners). We documented both configurations in the model on separate layers. This finding underscores an epistemological point: the act of modeling can identify inconsistencies that prompt deeper archival digs, potentially correcting or enriching the historical record.[20] Here, a 3D approach led us to discover evidence of an undocumented alteration. It also speaks to the accuracy of the model – to reconcile the model with the photo, we had to adjust object placements, thereby refining the model to reflect the most likely actual arrangement at a given date. Each such refinement increased the model's validity as a representation

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Fig. 10: Comparative visualization of the Sala Soggiorno. From top to bottom: original perspective drawing for spatial clarity (Gustavo Pulitzer Finali Archive, CSAC – University of Parma); 3D reconstruction with glass panels reflecting the drawing's visual convention; 3D reconstruction with wood paneling as built, based on technical drawings and photographic documentation.

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of reality.

Another result of the reconstruction is a comprehensive catalog of furnishings and decor elements, extracted and modeled from the archives. Many of these items (lighting fixtures, chairs, tables, artworks) can now be studied in detail as 3D objects. Scholars of design can examine, for instance, the form of a Pulitzer-Finali armchair in three dimensions and understand its ergonomics or stylistic details better than from a flat drawing. The model effectively creates a digital inventory of design artifacts, some of which no longer exist physically. This digital preservation of individual objects contributes to the broader preservation of design heritage. It also enabled collaborations – for instance, a textile expert was consulted when applying fabric textures, and their analysis of the pattern informed a better understanding of 1950s Italian maritime textiles. Thus, the reconstruction has interdisciplinary reach, linking architecture, interior design, material culture, and even conservation science (through questions of material simulation).

Crucially, the reconstructed model has proven to be a powerful educational tool for spatial analysis. Architecture students and researchers can step inside the virtual *Victoria II* and perform analyses akin to those they would in a real building: studying circulation routes, sight lines, lighting distribution, and human scale. For example, we evaluated the visibility of a mural placed in the *Salone delle Feste* from various parts of the room – confirming that its position was optimally chosen to be visible from both ground floor and balcony. We also analyzed the layout for its adherence to safety norms of the time (exits, distances, etc.), finding that the design cleverly balanced elegance with regulatory requirements (e.g. the distance between fire bulkheads). These kinds of analyses demonstrate that a historical space, once virtually reconstructed, can be systematically evaluated using contemporary spatial analysis techniques, opening new research questions about the design's functionality and performance. In summary, the results of the *Victoria II* interior reconstruction are twofold: a rich virtual environment that faithfully represents a lost masterpiece of Italian ship design, and a set of new insights gained from using that environment as a research tool. The 3D model confirms much of what was intuitively known from archives – for instance, that Pulitzer-Finali's design was remarkably consistent with his modernist ethos and was executed with a high level of craftsmanship – but it also uncovers new details, variations, and questions that advance our understanding of mid-century maritime design. It stands as a digitally resurrected fragment of history that one can inspect and explore in depth. The next section discusses the broader implications of this work, particularly how such integrated 3D models enhance historical knowledge and public engagement with cultural heritage.

5. Discussion: Epistemological Value and Public Accessibility

The reconstruction of the *Victoria II* interiors from archival sources illustrates the significant methodological and epistemological value that

3D digital models bring to cultural heritage research. At a fundamental level, the 3D model served as a synthesis of knowledge – it integrated disparate archival documents into one coherent representation[21]. In doing so, it transformed two-dimensional, often fragmented historical data into a holistic three-dimensional understanding of the ship's interior environment. This transformation is epistemologically powerful: it is a process of *in-formatio* in the original Latin sense of "giving form" to information. By literally giving form (in digital space) to the Victoria II's design, the project generated new information that was not explicit in the archives alone – spatial information, experiential information, and integrative interpretations.

One key epistemological benefit is the model's ability to facilitate visual and spatial reasoning. Historians and designers examining archival plans can now step into an immersive visualization of those plans. The human ability to understand space is greatly enhanced by 3D experience; thus, scholars can notice aspects that might evade detection in 2D drawings[22]. In this project, the 3D model allowed researchers to perceive subtle design features – for example, how a sequence of spaces aligned along the ship's axis creates a dramatic enfilade vista when viewed in perspective, or how ceiling heights varied by area to denote hierarchy of rooms. These observations deepen the historical understanding of Pulitzer-Finali's design strategies. They also allow us to pose new questions: for instance, did the layout of *Victoria II* influence later cruise ship interior designs in terms of flow and sightlines? With the virtual model, such questions can be explored more readily by comparing it with models of other ships or buildings.

Another value lies in how the model enables the verification and testing of historical hypotheses. The 3D reconstruction process is inherently an act of interpretation – requiring the researcher to make choices on how to fill gaps, which must be justified with evidence or logical inference. As such, it externalizes the researcher's hypotheses in a tangible form that can be examined and critiqued by others[23]. In our case, when we hypothesized a certain configuration for an unseen detail (like the pattern of a ceiling or the design of a curtain), we implemented it in the model, effectively creating a visual hypothesis. This could then be evaluated for plausibility: does it fit physically? Is it stylistically consistent? If new evidence emerges (say, a newly found photograph), the hypothesis can be adjusted or rejected. The model thus acts as a platform for iterative knowledge building, where hypotheses are not just abstract but visible and testable in a simulated environment. This echoes principles from the London Charter that encourage using visualization as a means of research inquiry, not just presentation. Our project demonstrated that making a 3D model is not a mere end product; it is part of the research thinking process, often revealing things in "the making" that one would miss otherwise. For instance, only by modeling a particular chair did we realize its proportions were unusually large – which led to an archival inquiry confirming that chairs were intentionally oversized to anchor them against ship movement. Such

interconnected insights are a direct result of the reconstruction methodology.

The integrated 3D model also greatly contributes to enriching and valorizing existing documentation with new interpretative perspectives. It brings together historical, technical, and material data into a single analytical framework. In practice, this meant that historians, architects, and even lay observers could derive more meaning from the archives when seen through the lens of the model. For example, a plain technical blueprint gains new life and context when the viewer can see the 3D space it describes, overlaid with the original drawn lines. The project effectively augments the archival record: the digital model is a new form of documentation that complements, and indeed enhances, the traditional records. It does so by adding dimensionality and interactivity – two qualities that paper documents lack. From an epistemological standpoint, this augmentation allows for multi-sensory engagement[24]. While still visual at core, the immersive model can simulate acoustic properties or even tactile suggestions (via haptic interfaces) of the space, enabling researchers to ask how the spaces might have sounded or felt, not just looked. Such questions move us closer to comprehending the lived experience of historical spaces, bridging the gap between objective documentation and subjective human experience.

Beyond the scholarly domain, the 3D reconstructed model has enormous value for public accessibility and education in cultural heritage[25]. The interior of Victo*ria II* no longer exists in physical form, which ordi-

narily would confine public understanding to a few old photographs and descriptions. Now, with the virtual model, a broad audience can be invited to *explore* this lost environment in an intuitive way. Virtual reality showcases, interactive museum kiosks, or web-based 3D tours can present the *Victoria II* interiors to people who may never read an academic paper or visit an archive. This democratization of access aligns with the project's goal of an accessible platform for all. It transforms archival research into an experiential narrative – for instance, a museum exhibit could allow visitors to "time-travel" onto the mid-century ocean liner, walking through its salons as they learn about 1950s design and travel culture. The emotional impact of such an experience can be profound (hence the notion of "emotional graphics" mentioned in the research): seeing history reconstructed around you can create a personal connection to heritage that reading a document cannot match. This emotional engagement can foster greater public interest in preservation and understanding of design history. Furthermore, the model's accessibility features, such as layer filtering and metadata interrogation, mean that it can serve users of varying interests and expertise. A casual user might simply enjoy the visual spectacle, whereas a student might toggle on an annotation layer to see informative notes about each room, and a researcher might dive into the metadata to find archival references for a specific feature. The ability to *filter by layers and query metadata*[26] in a user-friendly way exemplifies how an integrated model can act as an interactive *catalogue raisonné* of a

complex work. In a single platform, one can both experience and study, play and learn, thereby blurring the line between education and entertainment (but always rooted in factual research, avoiding the trap of mere "edutainment").

It is worth noting that while the 3D model provides clear benefits, it does not replace original archives or traditional scholarship – rather, it supplements them. The process has reinforced the importance of rigorous archival research; the model is only as good as the sources and interpretations behind it. However, once created, the digital reconstruction becom*es a sustainable form of heritage preservation in* its own right. It can be stored, copied, and migrated to new formats over time, ensuring that the essence of the *Victoria II* interiors remains available to future generations even if physical artifacts continue to dwindle. In the context of risk management for cultural heritage, digital models offer a backup of knowledge – should physical archives be damaged or lost, the digital amalgamation retains much of their informational value (with proper documentation).

In conclusion, the *Victoria II* interior reconstruction demonstrates that an integrated 3D digital model is a powerful epistemic tool: it deepens historical insight, provides a testbed for hypotheses, and makes heritage accessible in engaging ways. The project also models a workflow that can be applied to other lost interiors or sites – particularly those where rich archival data exists but the subject is inaccessible or destroyed. In an era where digital technology is increasingly entwined with heritage work, this case stands as evidence that careful, research-driven 3D visualization can lead to *"new interpretative perspectives"* and significantly *"enhance the understanding of cultural heritage"*. The integrated approach of combining archival rigor with digital reconstruction paves the way for more such endeavors, suggesting that the future of heritage studies will be as much about building knowledge in virtual space as it is about excavating it from the archives.

6. Conclusion

The interdisciplinary reconstruction of Gustavo Pulitzer-Finali's *Victoria II* ship interiors underscores the methodological and epistemological strengths of 3D digital modeling for cultural heritage. By meticulously converting archival drawings, photographs, and material samples into an immersive, navigable virtual environment, the project not only resurrected a lost mid-century design icon but also unlocked new avenues of inquiry and public engagement. The scholarly structure of the endeavor – guided by charters and best practices in digital heritage – ensured that the 3D model functions as a reliable repository of knowledge, where every virtual element is traceable to historical evidence or clearly identified conjecture. The process of "giving form" to archival data proved to be an act of research discovery in itself, revealing design variants, inconsistencies, and spatial qualities that deepened understanding of Pulitzer-Finali's work and the context of 1950s Italian liner design. From an epistemological standpoint, the case study demonstrates that a digital reconstruction can be

far more than a visual replica – it becomes a dynamic tool for thinking, akin to a laboratory where historians and designers simulate the past to test hypotheses and gain insights. The *Victoria II* model showed how integrating diverse sources into one 3D space can produce a sum greater than its parts: the combination of technical plans with visual and material data yielded a comprehensive picture that neither alone could provide. This integrative model, continually augmentable with new data, aligns with the concept of a growing "digital organism" of knowledge and serves as a blueprint for future projects. Equally important are the implications for heritage communication. The ability to step aboard a virtual *Victoria II* closes the distance between contemporary audiences and historical environments. It transforms scholarly outputs into experiences – inviting global audiences to learn about Italian modernist design by strolling through its digital facsimile. This experiential access is invaluable for education, outreach, and even tourism (imagine a virtual museum of Italian ocean liners where *Victoria II* is one of the exhibits). The reconstruction thus contributes to both the preservation and the dissemination of cultural heritage. It resonates strongly with international calls to digitize and share heritage content widely.

In summary, the project affirms that 3D digital reconstruction, when executed with academic rigor, has dual benefits: it advances scholarship by providing a new modality of analysis, and it enhances public understanding by providing an engaging window into history. Gustavo Pulitzer-Finali's *Victoria II*, once a fad-

ing memory preserved in archives, is now accessible as a rich, interactive digital artifact – a testament to how modern technology can illuminate and propagate the legacy of design masters and their creations. As we submit this work to the broader museum and heritage discourse, we envision that it will spur further discussions on standards, methods, and creative possibilities of virtual reconstructions. The lessons learned here reinforce that the melding of archival science, design history, and digital modeling can yield outputs that are academically robust and widely inspirational, ensuring that "important pages" of our cultural heritage, like the story of *Victoria II* and Italian ship design, continue to be known and appreciated in the digital age.

Endnotes:

1   Scientific coordinator: Davide Turrini. Research team: Loreno Arboritanza, Matteo Bevilacqua, Marco Mancini, Marco Medici, Eleonora Trivellin, Elisabetta Trincherini. The project is part of the 2023 FIRD Project (Dipartimental Research Integration Fund) at the University of Ferrara, Department of Architecture.

2   The archival units, catalogued and inventoried, are dated between 1939 and 1967.

3   Marinetti 1928, p. 77; cited in Fochessati 2004, p. 230.

4   Pulitzer 1931, cited in Riccesi 1985, p. 72.

5   For these works, the artist created various studies, as evidenced by the plaster casts preserved in Pescia at the Libero Andreotti Gipsoteca, where the artist's imagination gave shape to mythological marine figures in different iconographic interpretations of sirens or women born of the sea. For the complete list of works in the Andreotti Gipsoteca, see Casazza, 1992.

6   For these topics, see Frulio et al. 2016.

7   The original sirens from the 1931 Victoria ended up, after being salvaged, at Allerton Garden in Hawaii, while the fate of those from the 1951 ship remains uncertain.

8   Guidi, Russo 2011.

9   Friedrichs 2018.

10   Gherardini, Sirocchi 2022.

11   Croce, Caroti et al 2020.

12   Quattrini, Pierdicca et al. 2017.

13   London Charter, https://londoncharter.org/

14   The 4CH project - Competence Centre for the Conservation of Cultural Heritage. https://www.4ch-project.eu/

15   The 3D-4CH project - Online Competence Centre in 3D for Cultural Heritage. https://www.3d4ch-competencecentre.eu/

16   Medici, Fernie 2022.

17   European Commission 2021.

18   Maietti, Di Giulio et al. 2018.

19   Iadanza, Maietti et al. 2019.

20   Münster, Apollonio et al. 2018.

21   Medici, Maietti 2023.

22   Paes, Arantes, Irizarry 2017.

23   Adamopoulos, Rinaudo 2019.

24   Spadoni, Carulli et al. 2023.

25   Cecere, Colace et al., 2024.

26   Bonsma, Bonsma, et al 2018.

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