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### \*CORRESPONDENCE

Chiara Colombi,  
✉ chiara.colombi@polimi.it

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# Fashion archive abilities. The impact of digital technologies on the development and research of fashion heritage

Chiara Colombi<sup>1\*</sup> and Marcella Martin<sup>2</sup>

<sup>1</sup>Department of Design, Politecnico di Milano, Milan, Italy, <sup>2</sup>Department of Italian Studies, New York University, New York, NY, United States

Fashion heritage—the collective memory embodied in garments, accessories, images, and the history, know-how, and craft techniques behind them—has traditionally been preserved through museums, archives, and exhibitions but, in recent years, has been transformed and reinterpreted in its meanings and means through advances in digital technologies. In 2011, *Vogue* launched the first digital archive of their American magazine, revolutionizing the process of fashion research and preservation of fashion heritage. What was once a tedious process of searching bound issues for references, advertisements, and editorials became a simple search by keyword. Ten years later, in 2021, the Center for Fashion Curation at University Arts London launched the *Exhibiting Fashion* website as an extension of the book *Exhibiting Fashion: Before and After 1971*, which was published in 2014, and its archive continues to grow each year and with each new fashion exhibition. Museum collections have similarly invested in digitizing their holdings in the hopes of facilitating access for researchers and the public alike through keyword searches. In each case, the physical archive has been the impetus for creating an online presence and the progression from physical to digital has been fairly straightforward, where the holdings inform the parameters of online representation through the use of schematic language. However, there are also examples where the archive has been imagined or reimagined through the needs or experience of exhibitions, opening a new sphere of possibilities at the level of conservation of, research on/through, and engagement with fashion heritage. This article considers case studies in which an exhibition informed the process of digitally integrating a fashion archive (and *vice versa*) and the ways in which digital tools can be used to enable different ways of activating the intrinsic knowledge shared by fashion archives, generating new knowledge related to the fashion archive's materials and contents. Case studies demonstrate how digital technologies reawaken and recover lost aspects of fashion heritage, enable new forms of access and reinterpretation, and showcase and preserve craftsmanship and production processes knowledge that might otherwise be lost, in practice and memory. In light of this, the article critically analyzes and systematizes the abilities of integrated fashion archives and exhibitions into an original three-level interpretative model (Augmented Fashion Archive Abilities Model) as a framework for understanding how digital technologies can preserve

the tangible dimensions of fashion; unlock its intangible dimension related to experiences, narratives, techniques, and processes; and innovate the engagement of the public and stakeholders with fashion heritage. Digital technologies offer the opportunity to layer digital experiences and data onto historical artifacts and narratives, and make fashion heritage evolve from a static repository into a hybrid platform where its identity and contents are continually reinterpreted and reactivated, requiring new strategies to support accessibility, sustainable preservation, and engaging forms of presentation and education.

## KEYWORDS

**digital technologies, fashion heritage, fashion archives, exhibitions, digital archive**

## Introduction

### Fashion heritage, archives, and digital technologies

Fashion, as a cultural phenomenon, lies at the intersection of its evolutionary nature and the desire to historicize and preserve it. In the late-1990s, Valerie Steele highlighted this tension in the context of Italian fashion, observing that its history had remained largely unwritten despite the industry's international success. She was writing in the catalogue for the Guggenheim Museum's blockbuster exhibition, *The Italian Metamorphosis: 1943–1968*, where for the first time, Italian fashion was included among the objects that had come to define Italian modernity. The exhibit was one in a series of exhibitions that were organized in New York over a period of roughly 20 years in which Italian fashion and its history were demonstrated for an American audience, paralleling the process of historicization that Italian brands were engaged in back home. They highlighted the affinities between art and fashion, past and present, and culminated in Steele's own exhibit, *Fashion: Italian Style* in 2003. This exhibit was the first to establish an international perspective on the formation of an Italian fashion history, canonizing the timeline of the industry's expansion and identifying style as its defining feature. These efforts can be seen as part of a broader "museumification" of fashion, turning the ephemeral outputs of a creative industry into enduring heritage.

Fashion objects, when contextualized in archives and exhibitions, serve as important cultural artifacts that reflect identity, history, and social change (Clark and de la Haye, 2013). Yet, conserving these artifacts is complicated by their material fragility and by the fact that much of fashion's impact lies in intangible qualities: the movement of a garment on the body, the scent of a perfume, or the stories woven into a brand's mythos. In recent years, scholars have increasingly turned attention to these intangible and ephemeral dimensions of fashion heritage. In particular, Marco Pecorari in *Fashion Remains: Rethinking Ephemera in the Archive* (2021) has explored how "fashion ephemera", such as lookbooks, photos of casting, fashion show invitations, often considered disposable

or not relevant for the construction of heritage, are actually crucial to building fashion narratives and the understanding of the cultural significance of fashion. These ephemeral traces, he argues, "tick in time with the clock of fashion" (2021:16), embodying the zeitgeist and communicating the multifaceted contents of fashion as it relates to design, production, marketing, and communication processes, thereby integrating the meaning of garments. When rediscovered or preserved in archives, such ephemera contributes to the knowability of the archive, as they provide context and additional layers of reading to clothes and brands. Archives can be considered not just a static repository of fashion items but, better, dynamic knowledge reservoirs able to support a complex and multidimensional understanding of fashion and its relations with cultures, society, and publics.

Another expansion of the concept of fashion archive is related to the development of archives by fashion brands and the interplay between preservation and branding. As fashion companies have grown into globalized corporations, many have created in-house archives and heritage departments. Luxury brands use archives as repositories of inspiration for design teams and as marketing tools to authenticate brand identity (Crewe, 2017; Scarpellini, 2011). In fact, the term "brand heritage" (Aaker, 1996; Urde, Greyser, and Balmer, 2007; Hudson, 2015) has been coined and refers to a theoretical concept where a company's past is continually processed into narrations to add value to its present image. Archives in such contexts serve a dual role: they are scholarly resources but also curated narratives that often highlight a founder's story, iconic products and production processes, or historical celebrity clientele to reinforce the brand's aura. Recent initiatives sponsored by brands, such as Gucci Garden in Florence and La Galerie Dior in Paris, blur the line between museum curation and branding, leading scholars to examine issues of authenticity, curatorial independence, and the educational versus commercial functions of fashion heritage displays (Steele, 2008; Petrov, 2021; Augello, 2022).

However, the process of digitizing fashion archives has progressed fairly slowly, especially in certain countries, such as the case of Italy, despite the aforementioned period of historicization and the undoubted relevance of Italian fashion

in the world. This lag can be partly attributed to the segmented nature of the industry: each brand is responsible for their own historicization because no museum (or collection of record like The Costume Institute at the Metropolitan Museum of Art in New York) exists, and because archival materials related to state or governmental entities are managed by individual ministries. As Lucrezia Palandri writes, “As the first country to regulate cultural property, Italy has long set the standard for other nations and continues to do so. However, when it comes to digitization, Italy has been slow to adopt this trend, compared to other countries” (Palandri, 2024:124). For example, the archives of Giovanni Battista Giorgini, the organizer of Italy’s first major fashion shows in the early 1950s, are held by the Archivio di Stato di Firenze (State Archives in Florence). Not only are these materials not digitized, in order to access them within the State Archives it is also first necessary to gain authorization from the Giorgini family. This case is one of many such examples that have thus far inhibited a full historicization of Italian fashion, although many researchers have gained access and have made important contributions to this history by revealing the multifaceted stories contained therein.

Parallel to the evolution of fashion archives, a rich body of literature has emerged around digital technology in museums, archives, and heritage management (Smith, 2006; Cucchiara, Grana, Borghesani, Agosti, Bagdanov, 2011; Othman, Petrie, Power, 2011; Rosner, Rocetti, Marfia, 2014; Monti, Delnevo, Mirri, Salomoni, Callegati, 2018). The concept of digital heritage (UNESCO, 2003) has emerged in response to the digital age, encompassing resources and information generated through digital means such as digital acquisition by 2D and 3D scanning, web/interactive web creation, digital modeling, virtual reconstruction technology, processing and animation, holographic projection, Internet of Things, extended reality that hold enduring cultural and historical value. As digital heritage involves the production, use, and long-term maintenance of digital content across diverse formats such as text, images, video, audio, databases, websites, and software, developed according to specific standards and protocols that ensure their preservation over time, it implies not only the integration of digital technologies into heritage practices but also a reconceptualization of how heritage is collected, documented, studied, managed, presented, and interpreted (Cameron and Kenderdine, 2007; He et al., 2017), leading to the definition of a “digital cultural heritage”. Therefore, rather than being dependent on digital technologies, fashion archives work synergically with them, creating new forms of access, interpretation, and preservation of fashion heritage (Colombi and Vacca, 2016; Lian and Xie, 2024) and, at the same time, enable the identity and value of those very fashion archives to continuously evolve, showing digital technologies’ new potentialities and meanings in the framework of heritage.

More recently, scholars have introduced terms like “phygital reality” (Armstrong and Rutter, 2017; Batat, 2019; Mele et al.,

2021; Lawry, 2021; Banik, 2021; Reilly and Dawson, 2021; Batat, 2022) to describe the blending of physical and digital experiences in the cultural sector (Andrade and Dias, 2020). Within fashion, Bertola and Teunissen (2018) note that the fashion industry’s adoption of Industry 4.0 technologies (3D visualization, virtual prototyping, etc.) is also inspiring heritage initiatives to create hybrid experiences that transcend the limitations of physical space.

While traditional exhibitions are largely visual and occasionally tactile, by contrast, digital enhancements can introduce multisensory and interactive dimensions. Andrew Bolton, curator of the Costume Institute at The Met, remarks that when garments enter a museum, “you can’t touch it, you can’t smell it, it can’t be worn. And you can’t hear it” (Heller, 2024). In other words, much of fashion’s sensory reality is lost. To address this, museums are experimenting with technologies such as Augmented Reality (AR), Virtual Reality (VR), and audio or olfactory installations to simulate aspects like movement and sound of a fabric garment or even smell of a perfume-infused dress. Likewise, the integration of haptic technologies, which provide touch feedback, and kinetic installations in exhibits has been proposed as a way to convey the kinetic knowledge of fashion, or how a garment behaves in motion (Calefato, 2021).

Digital technologies, therefore, offer an opportunity to augment the symbolic value of fashion archives and their artifacts by capturing and displaying the often-invisible knowledge, techniques, and narratives embedded in them. This includes leveraging Digital Twin (DT) technology, creating precise 3D digital models of garments or accessories, to allow detailed study and even virtual manipulation without risking the original. This might manifest as interactive exhibits where visitors can virtually mix and match historical garments, or VR reconstructions of past fashion shows where users can “attend” as if they were there.

In the private sector, fashion brands have been investing in the application of digital technologies to reinforce their archival infrastructure while also enabling innovative modes of storytelling and experiential communication. Applications such as the integration of 3D modeling, artificial intelligence, and blockchain enhance both the preservation and the strategic deployment of brand heritage in both physical and virtual environments. Among leading luxury groups, LVMH offers a wide range of references. In fact, the luxury conglomerate has developed a multifaceted strategy for digitally enhancing its archival practices, particularly through the adoption of 3D scanning, digital twin technologies, and AI-powered asset management. For instance, from Dior, one of the brands in the group’s portfolio, the limited-edition B33 sneakers integrate a digital twin, realized through a high-resolution 3D scanning of the real-world product, and a Near Field Communication (NFC)-enabled blockchain certificate via the Aura blockchain consortium, demonstrating how heritage and authentication protocols can converge through digital infrastructure,

supporting the documentation, preservation and circulation of a fashion item (Adegeest, 2023). Moreover, LVMH has partnered with tech firms such as OMI, recognized at the LVMH Innovation Awards in 2025, to develop 3D visualization systems for archival and experiential use. These technologies support the creation of immersive visualizations and facilitate the reuse of archival materials in both exhibition and design processes (LVMH, 2025). LVMH also collaborates with Google Cloud to build internal AI platforms that streamline image recognition, metadata tagging, and digital asset retrieval across multiple brands. These AI tools enable creative teams to reference patterns, silhouettes, and embroidery techniques drawn from decades of heritage collections (Gutiérrez-Ravé Villalón, 2025). These applications demonstrate how digital technologies can support both internal knowledge preservation and external heritage engagement.

Finally, digital innovation in fashion heritage intersects with intangible cultural heritage (ICH) studies. Intangible heritage includes craftsmanship, skills, and practices, and the tacit knowledge passed through generations thanks to apprenticeship and practice. The preservation of ICH is even more complex than the material documentation of tangible assets, as it depends on the existence and memories of communities and individuals (Blake, 2017). In this regard, digital tools open unprecedented possibilities: high-definition video documentation of artisans creating, 3D scanning for motion capture of masters' hands at work to understand the techniques, and even blockchain ledgers to record provenance of handcrafted items. Blockchain technology, famous for cryptocurrencies, has been repurposed in the cultural sector as a way to create immutable records of heritage data. In fashion, some luxury brands have formed consortia to use blockchain for product authentication and traceability, effectively creating a permanent digital "passport" for each item that includes information on materials and craftsmanship. While primarily motivated by anti-counterfeiting and marketing, this development allows the preservation of production data in digital form, which could be useful for researchers and practitioners as well as for the purpose of passing on craft knowledge. Additionally, experiments with Non-Fungible Tokens (NFTs) in fashion, such as digital couture pieces created as NFTs, offer new opportunities not only for transmitting the legacy of fashion heritage but also for generating new knowledge through meta-processing the steps of digitization and digital data production, therefore leading to an augmented knowledge about the underlying creative process and tacit know-how. A study by Wang and Lau (2023) demonstrated how NFTs and digital twins can be used to sustain a traditional craft. They created 3D digital representations of Miao silver jewelry, a Chinese minority handicraft, and minted them as NFTs, finding that this helped "extend the lifespan and increase the commercial value" of the craft by enabling new avenues for sale and experience.

The shift toward an integrated physical-digital approach in cultural heritage leverages technology to both safeguard what is precious but perishable, missing or not accessible and to reinvent how stakeholders engage with fashion cultural heritage.

## Building fashion archives from paper to pixels: the Italian case

Following a period of development and experimentation within the field of fashion museology, the 1990s saw many Italian fashion companies revisiting and reevaluating their role in the culture industry. For some brands like Prada and Max Mara, this involvement spoke directly to their interests in contemporary art and manifested in establishing art foundations. Others saw the broader interest in fashion history as an opportunity to explore their own heritage and began organizing their archives into privately or publicly accessible and viewable spaces. Still others established brand museums, like the Museo Salvatore Ferragamo in Florence, which paved the way for the founding of many similar institutions in the 2000s. As brands are increasingly owned and managed by large parent companies, cultural heritage takes on greater importance and meaning in differentiating one firm from another. The archive has, therefore, become a valuable resource for both generating and engaging new customers and creating a sense of ownership or belonging that maintains relationships with consumers.

In order to understand the process of digitization that has motivated archival engagement in recent years, we propose the emblematic example of the historical relationship between archives and Italian fashion. In the early 1950s, the first research center dedicated to fashion and textiles was established at the Palazzo Grassi in Venice (Augello, 2022). The center staged exhibitions and hosted conferences, providing a critical space for research and historical analysis. Its closure in the 1970s lead to a vacuum in the documentation of Italian fashion just as the industry was expanding internationally under the Made in Italy banner. Other archives endeavored to pick up where they left off, including the Centro Studi e Archivio della Comunicazione at the University of Parma, which focused primarily on fashion illustrations and sketches, and the former Galleria del Costume at Palazzo Pitti, now Museo della Moda e del Costume, which opened in 1983. This collection brought together costume and textile objects from throughout Pitti's museums and became the first repository of historic costume in Italy. The growth of the industry throughout this period, coupled with exhibitions on both sides of the Atlantic, continued to generate newfound interest in the history of Italian fashion.

In the 1980s, the public interest in exhibitions of Italian fashion encouraged an increasing number of brands to reevaluate their archives, and in some cases begin building archives, leading to a variety of outcomes in the following decade. Speaking with

Stefania Ricci, director of the Museo Salvatore Ferragamo in 2022, she described her experience working on the exhibition *La Sala Bianca: nascita della moda italiana* at Palazzo Strozzi in 1992 and the growth of brand archives, saying: “It exploded in the 1990s and 2000s and increasingly so, when everyone thought of creating archives. When I developed the exhibition on the history of the Sala Bianca in 1992, and I worked on many archives, obviously on the companies that had created the Sala, I remember that it was very difficult to find archives; the companies didn’t have many pieces. Ferragamo was truly an exception”.

Exhibitions, therefore, became both the inspiration for the organizing and preservation of company archives and the cause of a more individualized approach that precluded the formation of a centralized museum of Italian fashion. As Ricci described, over the course of the 1990s and early 2000s, more than a dozen Italian fashion brands established museums and foundations. These included the Museo Salvatore Ferragamo as well as the Fondazione Zegna, Collezione Maramotti, Fondazione Roberto Capucci, and more.

This valorization of fashion within the cultural industry was further reflected in the activities of Pitti Immagine Discovery and their most ambitious event, the *Biennale di Firenze*. In the late 1980s, the CEO of Gruppo Finanziario Tessile, Marco Rivetti, joined Pitti Immagine as its new director. The organization that was known for the Pitti trade fairs had declined as the center of fashion moved north to Milan. In an effort to bring attention back to Florence, Rivetti collaborated with Luigi Settembrini, a public relations specialist, on the relaunch of Pitti Immagine Discovery, which would be dedicated to the promotion of the culture of Italian fashion. Their first major exhibition was *La Sala Bianca*, a portion of which would travel to New York in 1994 to become part of the aforementioned Guggenheim Museum exhibition, *The Italian Metamorphosis: 1943–1968*, curated by Germano Celant. Inspired by the possibilities that fashion presented for an examination of contemporary art and culture, Celant, Settembrini, and *Interview* magazine editor, Ingrid Sischy collaborated on the *Biennale*. They paired artists, museums, and fashion designers in unprecedented ways, challenging and expanding the possibilities of fashion curation, while clearing the way for fashion brands to become ever more involved in the art world. Indeed, one of the lasting changes brought about by the *Biennale* was an acknowledgment that the boundaries between the worlds of fashion and museums had been forever altered.

The materials that were circulated to designer brands inviting them to participate in the *Biennale* have been preserved in the archives of Salvatore Ferragamo, the Gianfranco Ferré Research Center at Politecnico di Milano, and Pitti Immagine. As Marco Pecorari (2021) explains in his examination of fashion ephemera, this material contributes to the epistemic qualities of the archive. They also draw attention to the goals expressed by the various organizers of the *Biennale*, from the exhibition’s curators to the

city of Florence. The explanatory documents that appear to have been sent with letters inviting individual designers to participate go into detail about these goals, particularly with regard to Italian fashion and its presence on the international stage. Among the benefits to the Italian fashion system particular attention was given to the idea that the *Biennale*: “could also suggest a more decisive commitment by Italy in the field of culture, identified as a strategic area of intervention in a phase in which the intellectual content (research, innovation, technology) of products and services is becoming increasingly important” (Ufficio Stampa Biennale di Firenze). This emphasis accurately reflects the general feeling in Italy at the time, from a need to better position the country within the European Union and market, to legitimizing their place both as cultural and economic producers on the global stage. Fashion was uniquely positioned to accomplish both of these goals, and exhibitions like the *Biennale*—whether or not they were deemed successful as artistic operations—were seen as a critical means of communicating the culture of Italian fashion.

Nevertheless, the momentum that Italian fashion had generated throughout the 1980s and 1990s was complicated by the digital turn of the early 2000s. On the one hand, exhibitions had been an impetus to create archives, as demonstrated by the *Sala Bianca* in 1992, in addition to inspiring the formation of Italian brand museums. However, as digitization grew in importance, the question of how to translate the value of the archive, exhibitions, and museums more broadly into the digital space was one that the Italian companies and institutions could not easily reconcile. As Palandri explains: “Access, especially after the technological turn, has different ways to be implemented, diverse levels of engagement: from the simple fruition, the mere visit or consultation, to new ways of active participation involving processes of co-design and co-creation” (2024:127). Through initiatives like Europeana and European Fashion Heritage Association (EFHA), institutions across Italy began the process of digitization both to address the challenges of preserving dynamic and ephemeral materials, such as garments, textiles, and fashion ephemera, and to expand accessibility.

While these digital archives have been examined by scholars (Debo, 2018; Pecorari, 2019), these studies do not address the fundamental difference between the digitization of Italian archives and other European entities. In Italy, the integration of digital technology into archives and museums is regulated by the parameters set forth in the Code of Cultural Heritage, particularly Arts. 107 to 108 (Caponigri, 2024:109). In the twentieth century, these articles were intended to prevent Italian cultural heritage from both physical and intellectual damage through the process of creating reproductions. Since the digital turn, “Article 107 has been read to regulate digital reproductions of cultural properties, reproductions which have no physical impact on the tangible cultural property. But as

digital reproductions become part of approved “casts,” justifications for this approval move beyond a link to the tangible object. Other concepts related to the fundamental reasons for preserving and legally recognizing a category such as cultural property become part of the logic” (Caponigri, 2024: 109). In other words, authenticity and preserving cultural value (valorization) have become important aspects within digitization decision making, and in recent years the debate surrounding these “other concepts” has developed into discussions between the Ministry of Culture and the GLAM (Galleries, Libraries, Archives, and Museums) community over Open Access and reuse for scientific purposes and publications (De Angelis, 2024).

Publicly funded digitization projects, including the development of platforms like EFHA, feature archival images and data from Italian institutions such as the Galleria del Costume di Palazzo Pitti and the Gianfranco Ferré Research Center. These archives play a pivotal role in connecting Italy’s historical and contemporary fashion narratives to a broader digital framework. This framework, particularly that which Italy shares with the European Union, has been useful for encouraging the Ministry of Culture to revisit their governance of digital reproductions and the debate is timely, given the advances in digitization since the COVID-19 pandemic. During the lockdowns of 2020, Italian museums and archives adopted online exhibitions, virtual tours, and digitized collections to maintain public engagement. In addition to the migration of archives and museums to digital formats, during the pandemic Milan Fashion Week also moved to a fully digital format, highlighting collaborations between cultural and technological platforms, while ensuring the continued relevance of Italian fashion on a global stage.

Initiatives like the Museo Salvatore Ferragamo’s virtual exhibitions on Google Arts and Culture, which combined historical storytelling with interactive digital tools, exemplified how Italian institutions adapted to new demands. Reviewing these exhibitions at a distance of 5 years indicates where and in what ways they were more or less successful. On the whole, the exhibitions offer valuable insight to the history behind the Ferragamo brand, including an overview of the Palazzo Spini-Feroni headquarters and Salvatore Ferragamo’s life, but the text and images, which are still accessible via Google, do not appear to be born-digital exhibits. The credits for *Audrey Hepburn and Salvatore Ferragamo: The story of an extraordinary woman, myth and symbol of elegance* and *Made in Italy: Salvatore Ferragamo’s ideas, models and inventions* include links to undated PDFs that indicate the exhibitions may have originated in earlier formats during the late 1990s and 2000s (Museo Salvatore Ferragamo, 2025). While the latter exhibition is now missing some images—suggesting these digital exhibitions have also not all been maintained—the *Audrey Hepburn* exhibit is the best example of a digital exhibition transformation (Museo Salvatore Ferragamo, 2025). It harnesses movie clips, historical events, text and images to tell the story of Salvatore and Audrey’s

working relationship over many years (Museo Salvatore Ferragamo, 2025). These materials, therefore, outline the transformative impact of digital innovation on Italian archives and museums, emphasizing their role in shaping the future of cultural preservation and accessibility, and highlighting the importance of preserving Italy’s cultural heritage while adapting to evolving technological and societal needs.

This critical reading of the Italian case is an exemplary demonstration of the potentialities, opportunities and needs of application of digital technologies for the development and research of fashion heritage. The next sections will systematically analyze pathways of innovation of fashion heritage through the use of digital technologies, referring to existing and current practices and case studies.

## Methods

This research adopts a qualitative, case-study-based methodology to develop the proposed *Augmented Fashion Archive Abilities Model* in the context of fashion heritage. The approach is inherently interdisciplinary, drawing on cultural heritage studies, fashion studies, and digital innovation research.

While the study reviewed academic literature, industry reports, and theoretical writings on fashion archives, digital heritage, and related themes, it also includes the use of primary sources activated by the authors, such as interviews and field research in museums and companies’ archives. This preliminary research provided the conceptual grounding for defining the analytical categories to develop an original interpretative model.

Moreover, this research adopts the case study method to support the proposition that digital technologies contribute to innovative modes of engaging with fashion archives, resulting in enhanced experiences and tangible benefits for institutional or brand-based stakeholders as well as for the broader public. Through a combination of desk research and fieldwork, the study investigates various fashion archives and initiatives that operate at different levels of scale and function. This methodological choice is underpinned by several strategic considerations.

First, the case study approach is particularly suitable in contexts where existing scholarly literature is limited, as it allows researchers to explore emerging questions in depth (Yin, 1994). Given the current lack of comprehensive studies on how digital technologies affect the use and interpretation of fashion archives in the textile and fashion industries and considering the theoretical and cultural implications at the levels of experience, management, and research, this method proves especially relevant.

Second, case studies emphasize the importance of real-world context, offering insights that cannot be easily obtained through other methods such as surveys (Eisenhardt and Graebner, 2007;

(Yin, 2008). This exploratory character is critical for examining the evolving role of digital technologies in archival applications.

Third, while individual case studies do not allow for statistical generalization, they do yield experiential knowledge that supports analytical propositions. When multiple cases are compared, they enable the development of interpretative frameworks that may be extended in future research (Nixon and Blakley, 2012). In this context, the case study method provides direct observational evidence and supports the formulation of theoretical insights (Kohlbacher, 2006).

Therefore, the findings presented in this research help address a gap in the current discourse on fashion heritage by examining the diverse applications of digital technologies across both private and public initiatives. The use of a multiple case study design enhances methodological robustness, offering comparative depth and mitigating limitations related to generalizability (Yin, 1994). It enables the identification of consistent patterns across cases while highlighting distinct features of each scenario (Eisenhardt, 1991). For this reason, the multiple case approach is widely employed in fashion-related research, including fashion studies (Granata, 2016), business management (Bonomi, 1989), and design (Bertola and Colombi, 2014).

The exhibitions in this study reflect a diverse case selection strategy, aligning with the research objective of exploring how digital technologies augment fashion archives in varied ways depending on archive type and use case. The goal was to capture a wide range of engagement formats and technological applications. Selection criteria prioritized innovation and relevance within the contemporary fashion heritage landscape. Based on this, the research identified the following as representative cases: the exhibition *Sleeping Beauties: Reawakening Fashion*, held by the Costume Institute of The MET, in 2024, in New York; the traveling exhibition *Gucci Cosmos* launched in Shanghai in 2023; and *Homo Faber: Fashion Inside and Out*, the exhibition part of the inaugural *Homo Faber* event held in Venice in 2018. These examples provide insight to differentiated yet complementary approaches of digital archival innovation in the fashion sector. With regards to scale, the authors chose The Met and the Gucci archive, two collections that represent the breadth of fashion repositories (one, the Costume Institute, which comprises a curatorial department within a larger encyclopedic museum of art, and two, a company archive that is still in the process of being built). The choice of exhibitions, from large format (*Sleeping Beauties* and *Gucci Cosmos*) to smaller and more experimental (*Homo Faber*), begin to address the issue of archive function, and demonstrate the wide range of possibilities of the *Augmented Fashion Archive Abilities* Model.

Given the breadth of the topic, however, the case studies are illustrative rather than exhaustive. The research relies on currently available documentation. For cutting-edge topics like AR in exhibitions or blockchain, some developments are so

recent that academic analyses are limited. To mitigate this, the study includes credible journalism and institutional communications as source material, while critically assessing them through a scholarly lens. Overall, this methodology enables exploring the intersections of fashion heritage and digital technology in depth and to propose a structured model that emerges from concrete examples.

In the next section, this methodology is applied to unpack each analytical level of the *Augmented Fashion Archive Abilities* Model, visualized in Figure 1, drawing out detailed case study evidence and linking back to the theoretical discourse.

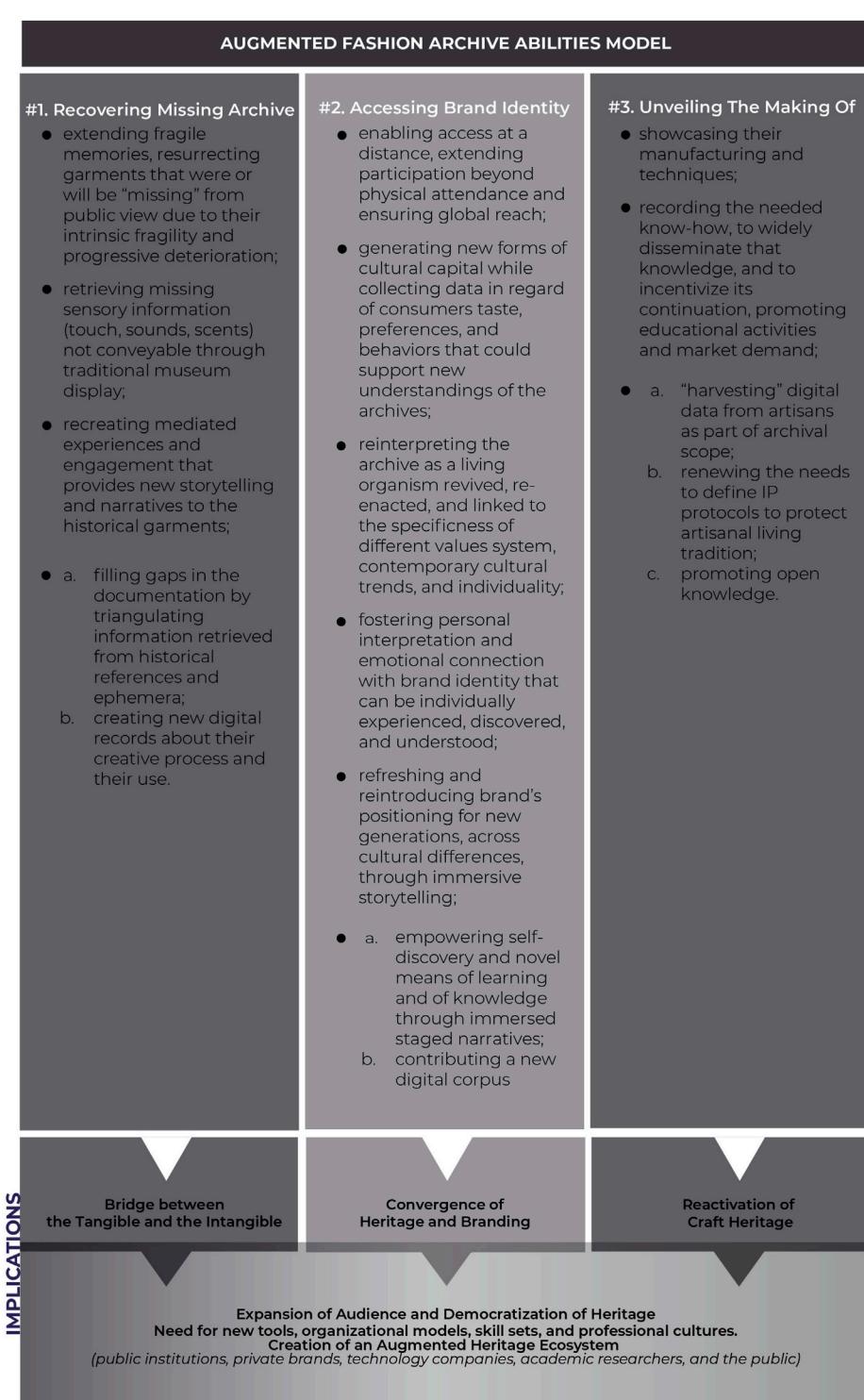
The following interpretive analysis aims at identifying evidence of how digital technology (a) resurrects and recovers lost aspects of fashion heritage, (b) enables reinterpretation of fashion heritage and expands access to brand identity, and (c) preserve craftsmanship generating new forms of engagement and knowledge.

## Results

### Digital technologies in practice: recovering missing archive, accessing brand identity, and unveiling the making of as new abilities of fashion heritage

#### Recovering missing archive

Traditionally fashion archives have been created by gathering a variety of materials: preparatory documents, such as sketches, drawings, mood boards, and fabrication boards; garments and accessories; visual documentation such as photos of shows, backstage and advertising materials; administrative files and correspondence; sectoral publications, and, as previously discussed, by a wide range of ephemera (Pecorari, 2021). The complexity in preserving materials, ensuring their integrity and completeness, maintaining their accessibility, and the related required financial investments represents challenges that historically have led fashion museums and institutions to adopt a conservative approach in their exhibitions and access to archives, proposing to the public a passive role as “viewer from a distance” or, many times, preferring not even to showcase certain pieces to avoid accelerating their decay. While this is an institutionalized cultural approach for many sectors, and in fashion is largely accepted and perceived as the only possibility, fashion exhibitions and archives suffer from cultural impoverishment due to the lack of direct use or access to the multifaceted wearing experience, where fashion reaches its best expression through the senses and embodiment. This section examines how digital technologies can improve on this practice, formulating a new archiving/exhibiting ability defined as *Recovering Missing Archive*. The section discusses the exhibition *Sleeping Beauties: Reawakening Fashion* organized by the Costume Institute at the Metropolitan

**FIGURE 1**

Augmented Fashion Archive Abilities Model (Source: Authors, 2025)

Museum of Art in New York in 2024. As the title suggests, the exhibition highlighted fifteen historical treasures that had been kept “dormant” in the Met’s fashion archive. Rarely displayed due to their delicate craftsmanship and the decay caused by the passage of time, these objects appeared alongside more than two hundred additional pieces from four different centuries. The fragility and ephemerality of such garments, emphasized by the reference to the transience of nature (the theme unifying the three sections of this exhibition), required the museum to keep them lying flat, touched with white gloves only if necessary to visually inspect them, and archived in dark climate-controlled storage. The exhibition aimed at “resuscitating” such garments, once part of the life of their owner and now an inanimate piece of art, engaging the public in their sensorial experience, and expanding the reading of fashion from a limited visual dimension to a more holistic and synesthetic one. By combining a wide range of digital technologies, such as video animation, computer-generated imagery, light projection, sound-scaping and scent-scaping, and artificial intelligence, the exhibition demonstrated a multilayered digital approach to fashion heritage.

First, digital technologies allowed the creation of immersive displays, materializing the inspirational references of the designer, enabling a deep understanding of the design concept, and, above all, delivering a comprehensive experience of its aesthetic and sensorial characteristics. For example, the *Garden Life* gallery showcased a fully embroidered women’s waistcoat from 1,615–1,620, inspired by a full-of-life English garden that was projected with an animation on the domed ceiling of the room. Also, in the *Beetle Wings* gallery, a Dries Van Noten outfit from Fall/Winter 2015/16, decorated with synthetic beetle wing sequins, was accentuated by an animation that recalled the designer’s inspiration coming from the 2002 installation by Jan Fabre, *Heaven of Delight*, at the Palais Royal in Brussels, featuring 1.5 million elytra on the ceiling (The MET, 2024).

Second, the concept of a “Sleeping Beauty” garment was revealed by a computer-generated imagery protocol applied to a ball gown by Charles Frederick Worth, dated ca. 1887. The garment, especially in the bodice portion, showed severe signs of deterioration in the vertical warp threads of its pale green silk satin, while the sturdier horizontal weft threads were still there. Instead, the ivory silk satin, used as a second fabric, remained practically intact. This was identified as an “inherent vice” by the conservators, who refer to any intrinsic characteristics that cause the damage of the very piece, in this case, the innate fragility of the green satin. Due to the poor conservation conditions and the impossibility of remediating it or stabilizing the progression of the damages, the ball gown was laid flat in a glass and metallic display cabinet, exactly as Sleeping Beauty, neither providing a 360-degree view of the ball gown to visitors nor showing its full style and identity when dressed on a body. A complex combined use of digital technologies served the purpose to awaken the ball

gown. The dress was analyzed and reconstructed in a full-scale model and then transferred onto a grid-marked paper pattern to create its digital render worn by a digital avatar. To create a complete experience, the curators decided to show the ball gown at the maximum of its expression, namely, worn while dancing, which required motion capturing the movement of a professional dancer and transferring it to the digital avatar. Finally, the result was shown as a holographic illusion, technically named Pepper’s ghost, where a flat-image projection appears as a three-dimensional object in space, as a sort of fluctuating ghost (The MET, 2024). Therefore, digital technologies allowed for preserving intangible qualities of artifacts (Martin and Vacca, 2018). As Bolton noted, “[...] it’s a way of helping future generations appreciate how it was worn, what it looked like on the body, and how it moved” (Heller, 2024).

Third, the multi-sensory data extraction approach was further developed at the olfactory, tactile, and even auditory levels. Norwegian scent artist Sissel Tolaas used a filtering and pumping system to capture molecules from the garments, which were analyzed using gas chromatography-mass spectrometry and subsequently reproduced and diffused through tubes. These scents appeared in *The Garden* gallery, derived from historical garments by designers such as Yves Saint Laurent for Dior and Jeanne Lanvin, and in the *Smell of A Woman* gallery focusing on the wardrobe of the socialite Millicent Rogers, who was associated with fragrances such as honey, almond, and tobacco (Van Meter, 2024). In the *Dior Garden*, a replica of the miniature of a 2014 *Miss Dior* dress by Raf Simons was paired with a 3D-printed plastic one, surrounded by dark urethane panels cast with the floral embroidered texture of the dress, all to be touched by the visitors to evoke the surface of the petals of the hand-embroidered silk flowers covering the dress. In the *Blurred Blossom* hallway, a recording of the rustling sound produced by the chiné silk fabric of a 1750s–60s robe à la française when in motion, captured in an echo-free chamber at Binghamton University, is diffused, activating for visitors not only a synesthetic experience but also the notion of how much fashion is a living experience that cannot be separated from bodies and its being in relation to space (Noveck, 2024).

Forth, in the *Mermaid Bride* gallery, by scanning a QR code visitors accessed an amiable text conversation with a custom chatbot, developed by OpenAI, and modeled after the New York socialite Natalie Potter, wearer of the wedding dress designed by Callot Soeurs, which, with its theatrical train interlocked with a scallop motif, resembled ocean waves. Generative AI provided a human-like interaction with Potter, who was able to share information about her life, the dress and the times she lived in, thanks to a training based on a curated dataset of letters, newspaper articles, and historical documents, enabling a deeper connection and a more complete understanding of a historical item (OpenAI, 2024).

The case of *Sleeping Beauties: Reawakening Fashion* provides an exemplary demonstration of how fashion heritage can be

augmented, not only reconstructing lost or missing physical and sensorial characteristics of archived items but also recreating a direct experience of those very pieces, extending their life beyond the moment of use or even beyond their destruction and future loss. This case, therefore, shows how the augmented fruition of fashion heritage translates into the concept of *Recovering Missing Archive* by (a) extending fragile memories, resurrecting garments that were or will be “missing” from public view due to their intrinsic fragility and progressive deterioration; (b) retrieving missing sensory information (touch, sounds, scents) not conveyable through traditional museum display that usually create a complete detachment from the viewer to guarantee the preservation of the items; (c) recreating mediated experiences and engagement that provides new storytelling and narratives to the historical garments, without indulging but, better, completing technical explanations through a human-centered approach; and (d) filling gaps in the documentation by triangulating information retrieved from historical references and ephemera and creating new digital records not only about the historical pieces but also about their creative process and their use.

In this regard, Max Hollein, director of The Met, said “This show makes us reflect a bit more on what we need to do to make sure that we keep and maintain the integrity of an object” [...] “It will help us understand how to not only amplify the experience, but to resurrect the total authenticity of the object – and that will have an impact on other areas of the museum” (Heller, 2024). The *Recovering Missing Archive* concept expands the notion of what it is worth preserving in a fashion archive. While curating the exhibition at The Met, Bolton acknowledged that historical garments “1 day come to shreds” (Heller, 2024). This process can be slowed by preserving protocols that deprive the public of even appreciating such items in exhibitions, or by restoration techniques, if possible. The risk of manipulating such items to capture data and create digital copies, sometimes also proper digital twins, will extend their life, assuaging the sense of loss thanks to the production of intangible knowledge, beyond their physical existence. Sound files, motion simulations, digital narrations of the wearing experiences, and other metadata referring to aspects that would otherwise remain dormant or invisible are therefore entitled to enter a fashion archive where these digital entries will enrich its inventory and transcend time and decay, ensuring continuity in the future.

In recent years, the *Recovering Missing Archive* approach, in relation to the aspect of filling the gaps in existing archives, has guided several digital restoration and reconstruction projects (Ding and Liang, 2024). This “filling of the gaps” use has also been the case for haute couture garments that went lost or are no longer retrievable, since as described in the section on Italian fashion above, archival practices were not always relevant or possible for companies and brands. In some cases, garments and even entire collections can be “digitally revived,” by starting from sketches and ephemera, such as fashion show photographs and

videos, or by using computer simulation to virtually construct garments that no longer exist or cannot be found.

## Enabling brand narratives and immersive experiences

Building on this concept, the second ability unlocked by digital technologies, *Accessing Brand Identity*, examines the process of how making fashion heritage more accessible through digital initiatives activates a deeper experience of a brand. By encouraging and developing new storytelling, this process consolidates the brand identity in the mind of its community. It goes beyond just putting archives online; *Accessing Brand Identity* involves curating and presenting archival content in ways that shape image creation and invites engagement, whether by new interpretations, brand narratives, or even user participation. The case of the *Gucci Cosmos* exhibitions (2023–2025) illustrates this level as an example of a luxury brand leveraging physical and digitized archives for immersive public experience and identity-building, effectively turning archival access into an experience.

*Gucci Cosmos* is a traveling exhibition launched in 2023 to celebrate Gucci’s 102-year history. It is described by the fashion house as an “itinerant archival exhibition” (Gucci, 2023b) as it brings the Gucci Archive essence—staged into immersive scenography through a selection of iconic pieces that are held by the company archive in Florence—to global cities including Shanghai, London, and Kyoto.

A brand’s archive is always referred to as the core of the very brand and is mentioned as the hidden place where creatives perform their research to develop their inspiration for the collections. The connection between the intangible values that are foundational and characteristic of a brand and the development of its permanent codes, intended as narratives and tangible features of its products (Bertola et al., 2018), remains theoretical and difficult to fully grasp by non-experts. *Gucci Cosmos*, thanks to the curatorship of Maria Lusia Frisa and the set design of Es Devlin, captures the intangible values of the Gucci Archive not only by showcasing abroad pieces that have never left Florence before, but especially by bringing the myth of Gucci’s origins to life through thematic areas and set-up mechanisms and styling. As Es Devlin has described it: “Instead of visitors learning the Gucci story in their minds when they read the words, I want to come from the gut. I want them to feel it in their gut when they experience the sense of colour, music, emotion” (McInerney, 2023). Accessing the brand identity via the archive is the distinctive approach of the exhibition. Hence, the Gucci Archive, located in the historic Palazzo Settimanni in Florence, is recreated with a series of blue-laquered cabinets, containing ephemera and some of the most iconic bags of the fashion house, in addition to a multitude of archival boxes. The space and the materials are multiplied to infinity through mirrored ceilings, walls, and floors, suggesting that the archive is an infinite source of content whose discovery is a never-ending process.

In the eight “cosmoses” presented in the Shanghai edition—*Portals*, *Zoetrope*, *Eden*, *Two*, *Archivio*, *Cabinet of Wonders*, *Carousel*, *Duomo*—following a phygital approach, traditional storytelling and historical artifacts are integrated with digital technologies, whose technical development across the decades accompanies the historical evolution of the fashion house, producing a sense of wonder paired with the fascination provoked by the showcased items (L’Officiel Baltic, 2023). In *Portals*, a simple illusion of movement is created with video screens behind two-way mirrors to simulate the ascension and descent of a static reproduction of *The Ascending Room*, the lift of the Savoy Hotel in London, one of the first in the world, where a young Guccio Gucci worked as a porter, observing the rich and sophisticated clients and developing the idea of luggage and bags as luxury symbols.<sup>1</sup> Experiencing a ride on the elevator, visitors enter the Gucci world (Redazione, 2023).

In *Zoetrope*, a pre-film optical illusion is recreated, placing the visitor at the center of a circular room whose walls are covered with screens playing the gallop of a horse in a loop, synchronized with a soundtrack of hooves, a voiceover declaring keywords connected to horse-riding, and a flashing strobe-light. On the walls, the screens are spaced out by carved niches holding archival pieces that materialize the interest for the equestrian world and wealth. These immersive audio-visuals, combining movement, sound, and light, offer a dynamic learning experience of the brand’s permanent codes that rhythmically recur with the evolution of its collection, building a lifestyle. The concept of celebrating a lifestyle is very important when a brand wants to talk to its community (Jones, 2023).

In fact, such themes were later developed, even if in a more traditional way, in the Kyoto edition (Art Kyoto, 2024). In *Two*, 3D video mapping was produced in magnificent scale over two 10-m-tall white resin statues on which gender-neutral suits, such as the 1996 red velvet one by Tom Ford, the 2016 floral version, and one of the 2022 creations from the *Twinsburg* collection by Alessandro Michele, are projected, magnifying for the public not only an iconic item but also a conceptual anchor that the brand pioneered with Ford and let flourishing with Michele (L’Officiel Baltic, 2023). The use of projection technology culminates in the *Duomo* cosmos, where two large-scale reproductions of the dome of Santa Maria del Fiore Cathedral in Florence are decorated with projections of historical and contemporary Gucci designs and patterns. The two domes are juxtaposed, shaping a sort of symbolic cosmic egg (Ancarani, 2023), expressing life, rebirth, and creativity, which for Gucci are rooted in its city of origin and in its archive (Jones, 2023).

Also in the Kyoto edition, a room dedicated to the *Bamboo Bag* was elevated thanks to the collaboration with Monogrid, who

developed a VR journey using motion design, video editing, and 3D production from a bamboo forest to the atelier in Florence where artisanal manufacturing of the bag takes place. Francesco Bernabei, CEO of Monogrid, explained the process, saying: “The immersive power of VR allows us to do more than just inform – it transports audiences into the heart of the story. Here, visitors aren’t just learning about Gucci’s craftsmanship; they’re experiencing it up close and personally” (Monogrid, 2024).

In conjunction with exhibitions in Shanghai and London, Gucci made a leap into Web3, developing a strategy that had already started years ago. In particular, to better connect with Chinese consumers and pop culture, on June 1, 2023 the brand dropped a limited-edition collection of four *Marsper* dolls on the Gucci WeChat MiniProgram to celebrate Children’s Day (Song, 2023), where shoppers could enter a lottery to win a slot to purchase the collectible fashion toy. *Marsper*, a flagship IP virtual character launched by the Chinese LEPOP Group, a provider of IP operations, lifestyle, celebrity management, public relations, and marketing services for luxury brands, was dressed with a red stock-tied blouse paired with the Double G belt from Alessandro Michele’s first Fall/Winter collection in 2015, a GG monogram cape with rhinestone embroidery from the Gucci *Aria* Fall/Winter 2021 collection, the red velvet suit for both women and men from Tom Ford’s Fall/Winter 1996 collection showcased in the *Gucci Cosmos* exhibition, and a second suit with a double-breasted jacket in a pinstriped fabric (Gucci, 2023a). With its motto “Born to Love” and its fashion-forward attitude, *Marsper* comprised the perfect opportunity for brand storytelling that was relevant to Chinese Gen-Z consumers, who were perceived as brand-obsessed, trends-savvy, nationalistic in their cultural interests, and sensitive to aesthetics (Langer, 2019; JingDaily, 2021). Partnering with LEPOP, and embracing local pop cultural phenomena, Gucci engaged consumers, creating new cultural signifiers that bridged heritage and zeitgeist.

The connection between the physical and virtual dimensions went even further with the launch of *Gucci Cosmos* as a 3D immersive and interactive 3D space on the cloud-based platform *Super GG Show* by Tencent (Fabris-Shi, 2023). The experience started with a central plaza overlooked by a futuristic version of the two juxtaposed Santa Maria del Fiore domes, from which eight playful reinterpretations of the exhibition’s physical cosmos branched off. With their own custom avatars, visitors could explore a vintage shop purchasing exclusive digital-only items, creating their personal interpretation of a Gucci style; they were also able to learn the manufacturing process of the item in a digital atelier, and play with flora elements that constitute the brand’s inspiration from nature. This virtual adventure revamped the identity-making and self-expressive power of fashion, where consumers were no longer passive in front of brand content but instead were empowered in a dialogue where they produced personalized content. The bond with the brand was not created simply through product purchases, but it was in

<sup>1</sup> The name *Ascending Room* refers to another illusion created at the time: a disguise, through elegant interior decoration and an evocative name, for the mechanical lift that was scaring hotel customers.

the emotional experience that a consumer lives while building their own way of discovering and getting to know the brand, autonomously and at their own pace.

What Giaccardi (2012) proposes in regards to social media is applicable also in this case: digital technologies enable heritage to be a participatory process where users do not simply receive history, they interact with it and even shape it. Indeed, visitors to *Gucci Cosmos* in the digital realm added their lens to the brand's story. Moreover, in November 2023, *Gucci Cosmos* exited its London physical location, augmenting the experience even more by expanding it to the blockchain-based metaverse gaming platform *Sandbox*, where the London exhibition was mirrored and named *Gucci Cosmos Land*. Gucci offered its customers for 2 weeks the possibility to explore the brand and its iconic products while solving quests and, embracing the voxelated aesthetic, offered the first one hundred players exclusive avatars dressed in Gucci outfits, including one from Sabato Di Sarno's first collection, which debuted in September 2023 (McDowell, 2023). Therefore, gamification on digital platforms is another strategy that allows a brand to activate a brand-themed world with culturally specific habits, immersing consumers in brand storytelling, while achieving rewards and accessing exclusive content, resulting in enhanced engagement and loyalty.

*Gucci Cosmos* illustrates the benefits and complexities of "augmenting" heritage for brand identity.

This case shows how the augmented access to brand identity through digital technologies translates into the concept of *Accessing Brand Identity* through (a) enabling access at a distance, extending participation beyond physical attendance and ensuring global reach; (b) generating new forms of cultural capital, embracing gaming culture and community-building practices, and cultivating fashion collectible craze and online exclusivity, while collecting an unprecedent amount of data in regard of consumers taste, preferences, and behaviors that could support new understandings of the archives; (c) reinterpreting the archive as a living organism rather than a static collection, in which past narratives are revived, re-enacted, and linked to the specificness of different values system, contemporary cultural trends, and individuality, therefore connecting past, present and futures through consumers' experiences; (d) fostering personal interpretation and emotional connection, reinstating the brand identity as a set of elements that can be individually experienced, discovered, and understood, allowing organic participation; (e) refreshing and reintroducing brand's positioning for new generations, making heritage comprehensible across cultural differences through immersive storytelling rather than mere verbal explanation; and (f) empowering self-discovery and novel means of learning and of knowledge, eventually contributing a new digital corpus of (meta)data, moving away from a passive consumption of history in favor of immersed staged narratives, and entitling consumers to new forms of physical and emotional ownership.

In this regard, the *Gucci Cosmos* project demonstrates that an *Accessing Brand Identity* approach through virtual realms can transform archives into a synergetic tool for brand strategy, beyond limiting self-promotion practices. Archives are turned "inside out" and staged as participatory, experiential heritage, instead of being hidden and separated from consumers, and in this spectacularization, their rarity and authenticity are not diminished; in fact, on the contrary, they are amplified as more people can connect with the archive, and more narratives can emerge. Moreover, this case highlights how exhibitions like *Gucci Cosmos* can actively shape archival practices. The use of digital technologies not only enables a different brand narration but also informs the very logic of archiving as it pertains to the archive's ontology: redefining categories, keywords, and search logics in ways that are responsive to experiential engagement. From this perspective, exhibiting archives and archiving exhibitions becomes a form of research and contributes to the natural development of the traditional fashion archive, as archiving is not aimed only at collecting, preserving and narrating chronological stories, but rather enabling dynamic re-readings that generate open-end storytelling and participatory encounters with heritage.

While the tension between control and openness persists—as brands carefully orchestrate their narratives even as they share them with consumers and questions about how to manage intellectual property (IP) with heritage access arise—digital technologies, and in particular Web3, offer archives the possibility to become part of an ecosystem of fashion heritage where brands, cultural and research institutions, and different professionals, from curators and historians to designers and data scientists, collaborate to activate new languages and produce new artistic and cultural experiments that would be unthinkable within the confines of a purely physical archive.

## Unveiling the making of

The third analytical level of the *Augmented Fashion Archive Abilities* Model focuses on the intersection of fashion heritage and craftsmanship. Fashion heritage is not only about preserving finished products or images; it is also about safeguarding the knowledge and techniques that produce those items, which are the living heritage of artisans, designers, and makers. This aligns with the concept of Intangible Cultural Heritage as defined by UNESCO: "The "Intangible Cultural Heritage" means the practices, representations, expressions, knowledge, skills – as well as the instruments, objects, artefacts and cultural spaces associated therewith – that communities, groups and, in some cases, individuals recognize as part of their cultural heritage. This intangible cultural heritage, transmitted from generation to generation, is constantly recreated by communities and groups in response to their environment, their interaction with nature and their history, and provides them with a sense of identity and continuity, thus promoting respect for cultural diversity and human creativity" (UNESCO, 2024: 5). Intangible Cultural

Heritage, including traditional craftsmanship, is often passed down through apprenticeships and are at risk of fading away in an industrialized and globalized market. Digital technologies are now being harnessed to document and perpetuate these craft processes in ways not previously possible, as demonstrated by the case of the exhibition *Homo Faber*, since its first edition in 2018.

*Homo Faber* is a biennial initiative organized by the Michelangelo Foundation in Venice and is dedicated to celebrating and sustaining European craftsmanship at large, including fashion. The inaugural 2018 edition, subtitled *Crafting A More Human Future*, featured VR experiences to immerse the visitors in the world of the artisans. Organized in different sections and rooms, it showcased *Singular Talents* where The Colossus of Venice, a giant digital guide, carried the public literally into the work of three master artisans, depicting how the different internal mechanisms of a robot function, how chemicals bond the colors in enamels that are used to create beautiful decorative objects, or how hard stones are combined to shape mosaics. In the same section, in front of screens displaying immersive videos of twelve unique craftsmen's ateliers, including a London-based feather-maker, wearing goggles, the visitor could also interact with virtual tools and make virtual objects, contributing to a better understanding of how craftsmanship processes are delivered and the distinctiveness and exclusivity of highly specialized expertise and skills, which in many cases have almost disappeared ([Homo Faber, 2018a](#); [Michelangelo Foundation, 2018](#)).

VR was also the digital technology chosen in the section *Pour L'intelligence de la main* curated by the Bettencourt Schueller Foundation. VR videos made it possible to enter secluded artisans' workshops that were not usually open and accessible to the public, or in different and distant parts of Europe, stepping in not only to the physical space where crafts are made, but also into the personal creative dimension of the masters ([Homo Faber, 2018b](#)). Moreover, in 2020 *Homo Faber* launched its digital platform, a curated online tool mapping and connecting artisans all over the world. The Guide is organized in three chapters—*Artisans*, *Experiences*, and *Destinations*—enabling a multifaceted connection with the community of craftsmen and organizations, such as museums and shops, that animate the world of exceptional handcrafted products. Direct contact with the artisans is encouraged to commission and order their masterpieces, or, thanks to the component NextGen, which is dedicated to young artisan and craft students, to get into fellowship and ambassador programs, nurturing virtuous relationships for the continuation of craftsmanship.

This case is exemplary of how digital technologies applied to access the processual dimension of excellent and unique products, such as haute couture or high-end fashion products and components, can enable the concept of *Unveiling The Making Of* as an ability to showcase and preserve fashion heritage. In fact, digital technologies shift the attention from

the materiality of the products to the processual dimension of know-how and skills, adding value to the practice of showcasing and preserving craftsmanship.

First of all, both digital repositories that are integrated with textual and audiovisual content and VR solutions allow for the recording and systematization of craft knowledge that is usually left for oral transmission, and therefore at risk of being fragmented or lost. From a cultural policy perspective, the *Homo Faber* case study illustrates how digital tools can complement policy measures with actions promoted by private and non-profit sectors to fill the gaps that public institutions might not be able to cover. As described in the case of Italy above, the lack of a dedicated museum of fashion splinters the process of preserving craft knowledge by industry and region, sometimes even to a single municipality.

Second, audiovisual and VR content in particular can become educational resources not only in regard to the artisans' history and background but, more importantly, to their techniques, competencies, and creative approach. The immersive and interactive nature of VR aligns with the new learning style of digital native generations, stimulating their interests and providing content that is otherwise difficult to access. Expanding the possibility of transmission of the living tradition of craftsmanship, digital technologies address a key challenge in craft heritage: inspiring the next generation to value and possibly pursue these skills. From simple dissemination activities, bridging physical, generational and cultural distances, we move to the creation of awareness and the enhancement of knowledge through educational activities. In other words, VR simulations, AR tutorials, and digital twins represent a promising set of tools to train new artisans, especially in regard to those techniques and traditions that are tied to specific fashion products and cultures. Such records not only allow the presentation of fashion heritage but also build a new repository of knowledge, which demonstrates the minutiae of the manufacturing process in far greater detail than an archive of sketches and garments that future curators, historians, and designers would benefit from to advance in their understanding of the cultural and artistic landscape. This kind of repository would also bring new datasets and metadata, already viable for computational studies, and open up new frontiers of research and AI applications.

Third, beyond preservation, showcasing craft processes and knowledge enhances craftsmanship in a sort of spectacularization that exalts its exceptionality, adding value and enabling a deeper appreciation. Secrets revealed, and atelier and private creative spaces opened to the public with immersive experiences, foster a more personal and emotional connection and the interactive dimension offered by VR and AR pushes participation even further. This personal connection may result in an effective stimulus for renewed demand in craft productions, more democratic in its composition than the profound knowledge and expertise of collectors, which would aid the economic

sustainability of heritage crafts, and therefore activate an important engine for their preservation.

The *Unveiling the Making of* level of the *Augmented Fashion Archive Abilities* Model underscores that A) preserving fashion heritage does not simply imply looking backward at existing artifacts, but also looking forward to maintaining the chain of transmission, showcasing their manufacturing and techniques. B) Digital technologies provide tools to record the needed know-how, to widely disseminate that knowledge, and to incentivize its continuation, promoting educational activities and market demand. C) This opens new possibilities for cultural institutions, and fashion archives that could start “harvesting” digital data from artisans as part of their archival scope, while renewing the needs to define IP protocols to protect artisanal living tradition and promoting open knowledge without disconnecting it from the cultural and human context where it was generated and nurtured.

## Discussion

The analysis of case studies across the three levels of the *Augmented Fashion Archive Abilities* Model —*Recovering Missing Archive, Accessing Brand Identity, Unveiling the Making of*— demonstrate the multi-dimensional impact of digital technology on fashion heritage. Considering the initial discussion of Italian fashion archives, the Model attempts to address the ethical and critical implications of both the process of digital transformation and the alternative; in other words, a continued conservative approach to archiving and exhibiting fashion. As the history of Italian archiving shows, the lack of digital innovation has hampered both the development of these archives and their availability to the public through ongoing policy issues, protectionism, and insufficient funding. There is a need at the curatorial and ministerial levels to structure the collection of metadata associated with particular collections, especially those that are public facing, for digital applications. The following conclusions shed light on the possibilities introduced by the *Augmented Fashion Archive Abilities* Model to systematize the process of archiving in the twenty-first century, with an eye to use in exhibitions and the future.

## Bridging the tangible and the intangible

Digital augmentation allows intangible features such as the sensorial experience of wearing a fashion item and the contextual narratives of its use to be captured, represented, and shared together with physical artifacts, moving to an experience conservation paradigm, where the aim is to conserve not just the object but the experience it embodies. Moreover, by bridging the tangible and intangible, visitors or users can develop a deeper understanding of an artifact via how it functioned or was

perceived in its time, enhancing personal interpretations. This resonates with the idea of augmenting the symbolic value of artifacts (Colombi and Vacca, 2016) by layering interpretation onto the artifact. However, ensuring accuracy and authenticity in these augmentations becomes a challenge as these digital recreations risk being speculative. Curators and technologists must work closely, and involve historians, to ground the augmentations in research. The *Sleeping Beauties* case demonstrates how an exhibition needs to become a research project as an exhibit, with the museum investing in study before display. This kind of interdisciplinary R&D approach should become standard practice for augmented fashion heritage projects, blending conservation science, history, and digital design.

## Expanding audience and democratizing heritage

By allowing access, digital technologies democratize archives beyond on-site scholars or elite and expert circles. A broader audience brings diverse perspectives and potentially more inclusive narratives. Researchers from different cultural backgrounds might reinterpret a fashion item’s significance in ways the original archivists did not foresee, adding layers to its story (Rocamora, 2017). But also, visitors can access materials and knowledge that was previously kept just for experts and research purposes, potentially expanding the audience of reference. This participatory aspect (Simon, 2010) refers to a crowdsourced knowledge model where users actively engage, re-curate, or even remix heritage content, therefore becoming part of a heritage’s extended narrative. This kind of approach has already been incorporated in some archival practices in the form of social tagging, as in the Brooklyn Museum’s *Click! A Crowd-Curated Exhibition* (Brooklyn Museum, 2018), or in an improvement of metadata, as in the European Fashion Heritage Association’s project *CrowdHeritage* (EFHA, 2018).

From a policy perspective, expanding access aligns with the mandates of many public institutions to promote education and community engagement. Initiatives like EFHA were publicly funded on the rationale that cultural heritage should benefit all citizens and industries. While the open-source paradigm in cultural heritage leads to cultural and economic benefits thanks to a heritage-driven modernization of cultural and creative industries, democratization via digital transformation poses issues related to new dimensions of accessibility, cultural colonization, and IP. For example, the digital divide does not permit everyone to have equal access or the tech literacy to benefit from digitally produced or mediated heritage content. Furthermore, cultural bias can also be introduced: if mainly large brands or Western institutions with resources to digitize dominate digital fashion heritage, then lesser-known or non-Western heritage might remain underrepresented. International

partnerships and capacity-building, such as EFHA, and participatory projects where communities can contribute their fashion heritage, such as digital storytelling websites for indigenous fashion traditions, could mitigate these risks. Finally, in regards to IP issues, the trade-off between full or partial protection and Open Access as described in the Italian case above requires cultural policy to evolve in favor of more permissive, but clearly regulated use of historical fashion materials, at least for non-commercial educational purposes, as the cultural value generated through research, education, and innovation tends to outweigh potential loss of exclusive control.

## The convergence of heritage and branding

A thought-provoking aspect of the proposed model is the convergence of fashion heritage preservation with branding and consumer engagement, particularly visible in the *Gucci Cosmos* case. This convergence produces positive synergies while raising ethical questions. On the one hand, brand involvement brings funding and creative vision to heritage projects. Luxury fashion houses have the means to design and produce spectacular exhibitions and invest in digital innovation that can undoubtedly increase interest in fashion heritage among the public. Also, brands ensure their archives are perfectly maintained, preserving the brand history and indirectly contributing to the broader preservation of fashion history. However, brand-led storytelling can become self-celebratory, appearing more as a marketing campaign than a cultural heritage exhibition. For cultural legitimacy and to avoid this narrative bias, brands often appoint museum curators or external experts, and exhibition content includes references to history and culture in addition to products. Therefore, to maintain scholarly integrity, collaborations between brands, providing resources and archives, and public institutions or professionals, providing curatorial rigor and methodology, are once again necessary to develop the concept of Augmented Fashion Heritage further. From a policy perspective, this convergence also suggests new models for funding and managing fashion heritage. As public grants for heritage are often limited, and fashion collections have sometimes been neglected in traditional museums, brands could mitigate institutional inertia through Corporate Social Responsibility (CSR) programs or foundations, sharing a portion of their proprietary digital content on a public platform, like Europeana, or activating educational initiatives, such as the case of Armani/Silos in Milan where workstations, video projections, and touchscreen tables are available to the public for consultation and research.

## Reactivation of craft heritage

By capturing processes and techniques through digitization, crafts that might risk erasure due to generational turnover and

the progressive decrease of the younger age groups' interest can be safeguarded for the future. This form of sustainability extends beyond the material dimension of produced artifacts, fostering the transmission of intangible knowledge and ensuring that skills embedded in the making processes continue to inform contemporary cultures. The creation of digital models of artisanal processes also expands educational possibilities. Technologies such as digital twins, AR, and immersive realities provide new learning experiences, offering learners the opportunity to engage directly with the embodied knowledge of master artisans even when physical access to them is limited. Once again, the collaborative dimension, in this case between artisans and technologists, is key to fruitful results. The design of effective augmented training modules depends on the depth of engagement of craftspeople in order to transfer the details and nuances of the manipulation processes of matter and specific tools. In this way, the artisan's tacit expertise can be translated into interactive digital guidelines that support learning and practice. These tools, while not substitutes for direct and in-person apprenticeship, create hybrid and scalable educational frameworks that blend tradition and innovation, making craft knowledge more widely accessible and adaptable to contemporary contexts. Therefore, digital technologies not only enable the cultural preservation of craft but, even more importantly, reactivate craft heritage as a resource for cultural, educational, and creative innovation.

## Disciplinary and managerial implications

The incorporation of digital technology into fashion heritage requires institutions to rethink not only the tools they use but also their organizational models, skill sets, and professional cultures. What once could be managed by curators, conservators, and archivists alone now demands the collaboration of interdisciplinary teams. Expertise in areas such as data science, interaction design, and immersive media is increasingly essential. Fashion heritage professionals must be trained in digital literacy, while technologists need to acquire an understanding of fashion's cultural content to ensure that digital projects for fashion heritage remain rooted in heritage ethics rather than being driven solely by technological drivers. This crossing of skills favors the emergence of new hybrid figures, such as the digital curator, whose responsibilities extend beyond the care of physical collections to include the management, interpretation, and storytelling of newly generated data. From a managerial perspective, partnerships with technology firms, gaming platforms, or blockchain consortia can provide vital expertise and infrastructure, yet they also raise questions about governance and control, particularly in regard to IP rights management and ethical use of heritage. Digital preservation policies and recommendations appear to be needed as much as those applied to traditional fashion heritage. At the same time, the

conservation issue is also emerging for Augmented Fashion Heritage, whose applications and development require long-term investments to keep the digital assets accessible and meaningful thanks to the update and maintenance of servers, software, and metadata. For this purpose, a collaborative approach between cultural institutions, policymakers, and funding bodies is essential to ensure that digital fashion heritage is not treated as a temporary experiment but as an integral and enduring component of cultural preservation.

## The augmented heritage ecosystem

In light of the previous point, the emerging ecosystem for Augmented Fashion Heritage, involving public institutions, private brands, technology companies, academic researchers, and the public, is configured as a dynamic entity where contents flow online and offline, professional curators dialogue with user communities thanks to digital technologies, and educational interests pervade commercial practices. Issues like standardizing metadata for fashion items, ensuring interoperability of digital archives, protecting intellectual property while encouraging reuse, and funding collaborative initiatives across sectors should be discussed at a systemic level in order to preserve the co-creative dimension of the augmented fashion archive. While cultural management education should incorporate digital strategy to prepare future professionals for this blended field, the *Augmented Fashion Archive Abilities* Model could serve as a pedagogical tool indicating a comprehensive range of issues, from conservation science to community engagement and tech innovation. The Model is not merely a descriptive categorization, but a call to action for the cultural sector to actively embrace digital augmentation as a means to enhance cultural value. In this context, Fashion and Heritage sees a shift in their traditional time perspectives. Fashion, a fast-forward and future-oriented discipline and industry, sees in the historical dimension of Heritage its opportunity to be continuously reimagined and innovated, thanks to digital technologies that are powerful enablers of new content. In the same way, Heritage becomes more connected to the future than to the past because of the opportunities offered by digital engagement, making heritage content fundamental to the public's experience of contemporaneity. The foundations laid by the analysis of best-in-class case studies suggest that, in the near future, the development and research of Fashion Heritage will be more accessible, more interactive, and more resilient as a result of digital augmentation practices.

## Limitations

The article adopts a qualitative and descriptive approach that limits the generalizability and a more systematic assessment of

the development of Fashion Heritage augmented by digital technologies. Moreover, the intrinsically dynamic nature of digital technologies and their fast-paced evolution may result in the loss of the article's relevance due to the rapid obsolescence of its content. Future research could not only improve these methodological limitations, developing evaluation metrics and pilot initiatives that can assess the *Augmented Fashion Archive Abilities* Model, but also deepen a) the issues regarding policies and recommendations for IP frameworks and rights, and cross-stakeholder governance, and b) the relationship between institutional curatorial practices and bottom-up engagement to better discuss their implications.

## Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

## Author contributions

Conceptualization, CC; methodology, CC; validation, MM; resources, CC and MM; writing – original draft preparation, CC and MM; writing – review and editing, CC and MM. All authors contributed to the article and approved the submitted version.

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The author(s) declared that generative AI was used in the creation of this manuscript. During the preparation of this work the author(s) used ChatGPT for sentence reformulation and syntax improvement, as well as for simple English spell-checking. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication. The authors remark that no hypotheses, discourse logic, and conclusions of the entire article were the result of the use of a system that integrates (Generative) AI.

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