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When digital platforms meet tradition: Phygital innovation in the cultural heritage

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ABSTRACT

The digitalization of cultural and creative industries has often followed a path of convergence between physical and digital artefacts, leading to the rise of digital platforms that reshape value chains. However, the cultural heritage sector has undergone a different form of digital transformation. Digital platforms in this field create a "phygital" experience that blends tradition with innovation. This study examines the role of digital platforms in fostering social and economic development in the cultural heritage sector, focusing on Google Arts & Culture, launched by Google in 2011. Through a longitudinal case study, we explore how digital platforms create value for multiple stakeholders—museums, users, and the platform itself—by enhancing efficiency, complementarities, novelty, and lock-in mechanisms. Our findings indicate that digital platforms introduce a more dynamic and complex ecosystem that drives growth and innovation while shifting cultural organizations from integrated supply chains to networks of strategic partnerships. The success of digital platforms in promoting social and economic development depends on museums' ability to internalize legacy knowledge and platforms' capacity to reinterpret this knowledge using advanced digital tools. This research contributes to the literature on innovation and strategic management by demonstrating that, rather than disrupting tradition, digital platforms enhance the cultural heritage experience. Additionally, while platforms like Google Arts & Culture operate under a non-profit model to democratize culture, they capture significant value through data aggregation, which may play a key role in training artificial intelligence systems.

1. Introduction

Digital technologies have become deeply embedded in all aspects of economic and social life, driving transformational changes across various industries. Among these, the cultural and creative industries have undergone profound disruptions, as digital platforms reshape traditional business models and value chains (De Voldere et al., 2017; Wu, 2011). Defined as industries rooted in "individual creativity, skill and talent," cultural and creative industries have the potential to generate wealth and create jobs through the exploitation of intellectual property (DMCS - Department of Culture, Media and Sport, 2001, p. 5). These industries encompass sectors such as publishing, music, film, television, broadcasting, and cultural heritage. The rapid convergence of physical and digital artefacts

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within these industries has radically transformed how value is created and captured (Landoni et al., 2020; Lanzolla et al., 2021; Li, 2020). For example, the music industry has evolved from physical media like vinyl and CDs to streaming platforms such as Spotify, while the film industry has transitioned from video home systems to Netflix. Similarly, in publishing, digital platforms like Amazon have redefined traditional print books, giving rise to e-books. In each of these cases, the convergence between physical and digital artefacts has culminated in the dominance of digital platforms (de Reuver et al., 2018; Veile et al., 2022).

Digital platforms, which serve as software-based infrastructures that facilitate interactions between users, fulfill various functions. For instance, they can act as data aggregators, as seen in Google; enable transactions, as exemplified by Amazon and Netflix; support collaborative content creation, as in the case of Amazon Mechanical Turk; or combine these features, as demonstrated by Spotify (Trabucchi and Buganza, 2020; Trabucchi et al., 2021). Regardless of their specific purpose, digital platforms have reshaped value chains across cultural and creative industries, unlocking new sources of value creation (Amit and Zott, 2001) and driving a shift from traditional linear value chains toward interconnected value networks (Jacobides and MacDuffie, 2013). However, the cultural heritage sector has been slower to adopt and benefit from digital platforms compared to other cultural and creative industries (Russo-Spena et al., 2022). The sector encompasses tangible, intangible, and digital artefacts (including digitalized and born-digital works such as non-fungible tokens [NFTs]) that accumulate symbolic meaning over time and are preserved by public and private institutions, such as museums, libraries, and archives (European Commission, 2014; UNESCO, 2009). Despite its critical role in social and economic development, the cultural heritage sector faces specific challenges regarding digital transformation. These include limited budgets and resources, high-risk factors associated with digitization, and a lack of managerial innovation (Camarero et al., 2019; Green, 2017; Pellet and Flament, 2015). While existing research has explored the user experience (Evrard and Krebs, 2018; Lee et al., 2019), the impact of digital artefacts on strategic objectives (Pesce et al., 2019; Van Zeebroeck et al., 2021), and the preservation of art and culture through digital means (Liao et al., 2020; Wani et al., 2019), limited attention has been paid to how digital platforms can foster social and economic development within the cultural heritage ecosystem (Russo-Spena et al., 2022).

This study aims to address this gap by investigating how digital platforms contribute to value creation and capture within the cultural heritage sector, with a specific focus on Google Arts & Culture, the first digital platform launched in the sector in 2011. Specifically, this research seeks to answer the following questions: (1) What role do digital platforms play in creating and capturing value for stakeholders in the cultural heritage ecosystem? (2) How do digital platforms transform the growth and innovation dynamics of the cultural heritage sector, particularly in evolving traditional value chains into complex ecosystems? (3) How do the legacy capabilities of cultural heritage institutions interact with the digital capabilities of new entrants to drive social and economic development?

Through a longitudinal case study of Google Arts & Culture, this paper presents three key findings: (i) the total value created in the creative value chain results from the combined contributions of various stakeholders—museums, users, and Google—in terms of efficiency, complementarity, novelty, and lock-in mechanisms; (ii) the emergence of a more dynamic and complex ecosystem fosters growth and innovation within the sector, shifting cultural organizations from integrated supply chains to networks of strategic partnerships with digital entrants; and (iii) the platform's ability to foster social and economic development depends on the interaction between museums' capacity to internalize legacy knowledge and the platform's capacity to reinterpret it using digital tools.

This study contributes to the literature on innovation and strategic management by showing that, unlike other cultural and creative industries, digital platforms in the cultural heritage sector do not disrupt the relationship between tradition and innovation. Instead, they serve as a fulcrum that augments and amplifies cultural engagement, creating seamless, omnichannel "phygital" experiences that enhance, rather than cannibalize, traditional modes of participation. However, an important consideration arises concerning the hidden value capture mechanisms of such platforms. Although operating under a non-profit model, digital platforms like Google Arts & Culture accumulate vast amounts of data. This data—on human history, culture, and art—could serve as a critical resource for training artificial intelligence (AI) systems. Thus, while these platforms democratize access to cultural knowledge, they simultaneously create opportunities for AI advancements that rely on this rich dataset.

The remainder of this paper is structured as follows: Section 2 provides a comprehensive review of the literature, offering a theoretical framework for understanding the role of digital platforms in the cultural heritage sector. Section 3 outlines the research methodology, focusing on the longitudinal case study of Google Arts & Culture. Section 4 presents the key findings, highlighting how value creation and capture mechanisms have transformed the cultural heritage value chain into a more dynamic ecosystem. Section 5 discusses the broader implications of these findings within the context of innovation and strategic management, with an emphasis on the interaction between legacy capabilities and digital platforms. Finally, the paper concludes with reflections on the societal and technological impact of digital platforms, particularly exploring how the accumulated data from platforms like Google Arts & Culture could play a significant role in the development of artificial intelligence (AI), potentially shaping humanity's future understanding of culture and history.

2. Theoretical background

Among the cultural and creative industries, cultural heritage shows a low rate of digitalization mainly due to limited budgets and organizational resources (Pellet and Flament, 2015), high investment risk related to capturing the value of a digitized work (Green, 2017), low level of innovation in managerial practices (Camarero et al., 2019), and a reduced number of collaborations and strategic alliances aimed at bringing innovation to the market (De Voldere et al., 2017; Wu, 2011). Unlike other cultural and creative industries such as publishing, advertising, design, video games, television, and music, the full impact of digital technologies in cultural heritage has yet to emerge (Li, 2020).

While many cultural and creative industries are experiencing a far-reaching change in their business models due to digitalization

(Li, 2020; Matzner et al., 2018; Ng and Wakenshaw, 2017), the impact of digitalization in the cultural heritage sector has mostly been confined to the online presence (i.e., website) and onsite visitor experiences (Amitrano et al., 2021; Raimo et al., 2022). However, digitization and connectivity open the door to new types of services and forms of cultural heritage enhancement that go beyond the brick-and-mortar museum, allowing new actors to enter the market (Russo-Spena et al., 2022). Digital platforms are changing traditional linear museum-visitor logic by creating new interdependencies in the creation, dissemination and marketing of content (Dell'Era et al., 2021; Pesce et al., 2019), fostering the emergence of ecosystems (de Reuver et al., 2018; Trabucchi and Buganza, 2020; Veile et al., 2022), and creating new opportunities for the creation and capture of economic value (Li et al., 2023; Ondrus et al., 2015; Papadopoulos et al., 2020; Warner and Wäger, 2019).

Digital platforms in cultural heritage can take various forms: digital counterparts of physical museums for passive content enjoyment (Shephard and Pookulangara, 2020; Westerby and Keegan, 2019), virtual environments for interactive content enjoyment (Milosz et al., 2020), pure digital exhibitions (Ch'ng et al., 2019), and presentation of objects in e-tangible form (Schweibenz, 2018). Research on the digitalization of cultural heritage has evolved from the preservation of artworks and remote access (through the Internet) to onsite visitor enhancement technologies (Cori and Fraticelli, 2018; Heath et al., 2005; Minghetti et al., 2001; Thomas and Mintz, 1998), and finally to the role of digital platforms as aggregators and distributors of content (Pesce et al., 2019; Raimo et al., 2022).

Building on this foundation, we aim to explore how digital platforms are gaining a foothold in the cultural heritage sector and reshaping the value chain by overturning the traditional linear logic into an ecosystem logic. De Voldere et al. (2017) describe the traditional linear logic of the cultural heritage sector based on four core functions (Creation, Production, Dissemination, and Exhibition), as well as several supporting functions and relationships with other sectors for the provision of ancillary goods and services. Fig. 1 shows our adaptation of the value chain representation in the cultural heritage sector based on De Voldere et al. (2017).

Since all four core functions and the interdependencies are affected by the entry of digital platforms, we use the stylized value chain model adapted from De Voldere et al. (2017) as the overarching framework for mapping changes in the drivers of value creation and capture enabled by digital platforms. To reflect the multifaceted impact of digital platforms, we propose a division of this model into three building blocks, each aligned with our research questions. This division allows us to dissect the transformation introduced by platforms into different dimensions of value creation, ecosystem restructuring, and the interaction between legacy and digital capabilities.

2.1. *Building block 1: value creation and capture in digital-mediated businesses*

In digital-mediated markets, value creation mechanisms are primarily described by Amit and Zott (2001, 2020) through four distinct drivers: transaction efficiency, complementarities, novelty, and lock-in.

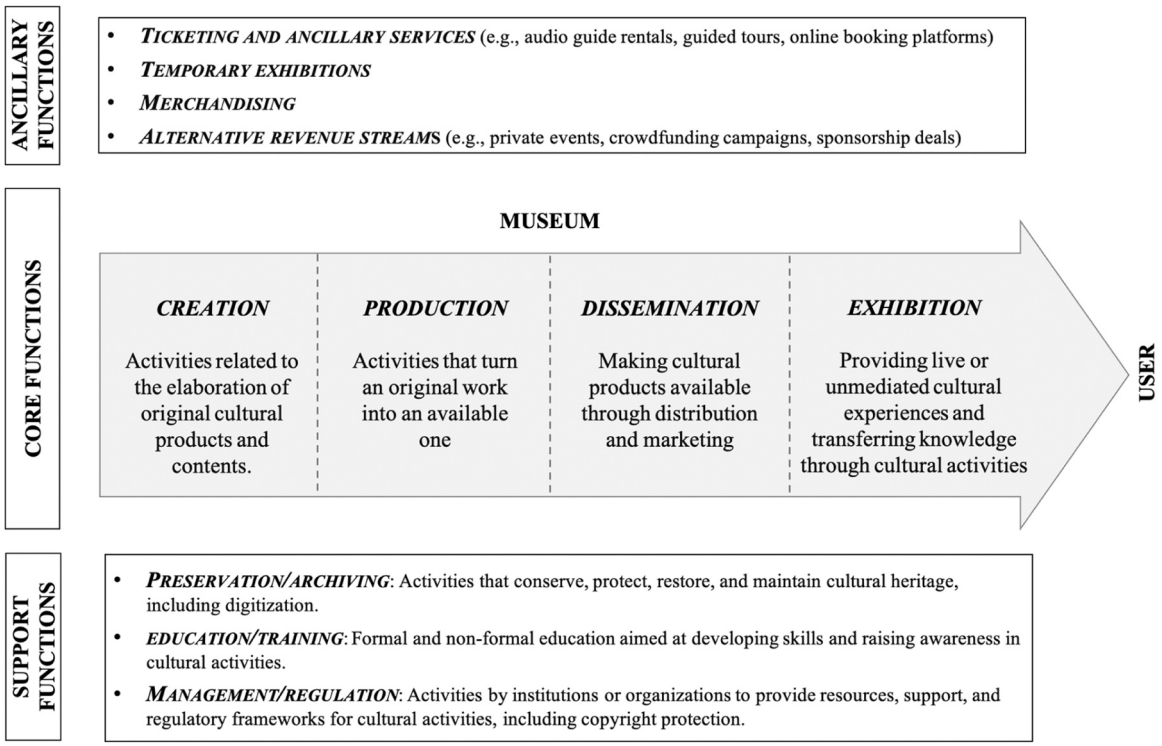

Fig. 1. The creative value chain framework of the cultural heritage sector.

Transaction efficiency. Digital platforms improve the speed and ease of transactions by reducing information asymmetries, search costs, and delivery times (Fu et al., 2021). For example, Google Arts & Culture enhances transaction efficiency by providing a single platform where users can access a wide range of digitized artworks from multiple museums worldwide. This reduces the time and effort users would otherwise spend visiting different websites or physical locations.

Complementarities. Platforms enhance value by integrating diverse elements that reinforce each other, such as combining legacy storytelling capabilities with digital technologies (Tavalaei and Cennamo, 2021). For instance, Google Arts & Culture offers high-resolution images of artworks along with contextual information, virtual tours, and educational content, creating a richer and more comprehensive user experience.

Novelty. Platforms introduce new markets and value propositions by connecting previously unlinked stakeholders and creating new exchange logics (Van Zeebroeck et al., 2021). Google Arts &h Culture, for example, enables museums to reach a global audience and engage users through innovative features like the "art selfie," which matches user-uploaded selfies with artworks.

Lock-in. Platforms build user loyalty through network effects, data accumulation, and complementary product/service development, creating high switching costs (Carolan, 2022). Google Arts & Culture's integration with other Google services (e.g., Google Search, Google Maps) and its vast repository of cultural content make it difficult for users and museums to switch to alternative platforms.

In the cultural heritage sector, platforms like Google Arts & Culture enable museums to digitize and globally showcase their collections, enhancing accessibility and engagement without physical limitations. This increases visibility, audience reach, and new ways of experiencing cultural content (Evrard and Krebs, 2018; Lee et al., 2019).

2.2. Building block 2: industry architecture transformation

Digital platforms disrupt traditional industry structures, fostering ecosystem dynamics that promote growth and innovation (Li et al., 2022; Lucas et al., 2013; Porter, 2014). The cultural heritage sector's traditional linear value chain, with distinct stages of creation, production, dissemination, and exhibition, is being transformed into a complex ecosystem (De Voldere et al., 2017).

Ecosystem logic. Digital platforms transform the linear model into a dynamic ecosystem where various stakeholders interact and co-create value (Iansiti and Levien, 2004; Trabucchi and Buganza, 2020). Museums must adapt from being isolated entities to becoming part of a broader network of strategic partnerships. For instance, Google Arts & Culture collaborates with over 2000 cultural institutions worldwide, creating an interconnected network that benefits all participants.

Unbundling and specialization. Platforms lead to the unbundling of traditional roles within the value chain, allowing cultural institutions to focus on core competencies while leveraging external partnerships for digital innovation (Hagel and Singer, 1999; Wirtz, 2021). For example, museums can concentrate on curating and managing collections, while digital platforms handle the technological aspects of digitization, distribution, and user engagement.

Collaborative Innovation. Platforms enable museums to collaborate with technology companies, enhancing offerings through augmented reality, virtual reality, and other digital tools (Dell'Era et al., 2021; Pesce et al., 2019). Google Arts & Culture's use of high-resolution imaging and virtual tour technology allows museums to offer visitors immersive and interactive experiences that go beyond physical exhibitions.

Google Arts & Culture exemplifies this transformation by connecting museums with a global audience and enabling new forms of interaction and content dissemination, fostering a more dynamic and innovative cultural heritage sector (Russo-Spena et al., 2022).

2.3. Building block 3: interaction of legacy and digital capabilities

The interplay between legacy capabilities of cultural heritage institutions and the digital capabilities of new entrants is crucial for fostering social and economic development (Remane et al., 2017; Verhoef and Bijmolt, 2019). Museums possess deep-rooted knowledge and expertise, while digital platforms bring technological innovation and reach.

Interiorisation capabilities. Museums must internalize and adapt their traditional knowledge to leverage digital technologies effectively, integrating digital skills with existing practices (De Massis et al., 2016; Magistretti et al., 2020). This involves training staff in digital tools and methods, updating curatorial practices to include digital content, and developing new strategies for digital engagement.

Reinterpretation capabilities. Digital platforms reinterpret and enhance traditional knowledge, using AI, machine learning, and immersive technologies to create enriched cultural experiences (Buganza et al., 2015; Liu et al., 2022; Trabucchi et al., 2017). For example, Google Arts & Culture's Art Camera allows for ultra-high-resolution photography of artworks, revealing details that are invisible to the naked eye and providing new insights into the artworks.

Phygital experiences. The fusion of physical and digital elements, or "phygital" experiences, allows for seamless and engaging cultural participation, augmenting traditional museum visits with digital layers (Lanzolla et al., 2023; Liu et al., 2023). Google Arts & Culture's virtual tours and augmented reality features enable users to explore cultural sites and artifacts in ways that complement and enhance the physical experience.

This division into three building blocks allows us to explore the various dimensions of digital transformation in the cultural heritage sector. Building Block 1 focuses on value creation and capture in digital-mediated businesses, Building Block 2 examines the transformation of industry architecture, and Building Block 3 highlights the integration of legacy and digital capabilities. Together, these blocks provide a comprehensive framework for understanding how digital platforms like Google Arts & Culture reshape the value chain and industry dynamics, offering new opportunities for both economic and social value creation.

3. Research method

To address this research question, we carried out an in-depth longitudinal case study of the implementation of Google Arts & Culture. In order to study a "revealing context" in which the phenomena of interest could be "transparently observed" (Yin, 1994, p. 40). We focused on Google Arts & Culture, as it represents an emblematic case of a digital platform which: (i) enters the cultural heritage sector that was traditionally characterized by a low rate of technology implementation; (ii) changes the architecture of the sector by creating new opportunities for the creation and capture of economic and social value for the ecosystem players; (iii) supports the legacy skills of the incumbents in the sector (i.e. museums) by making its digital skills available for free.

In the following, we briefly describe the research setting (Section 3.1) and then move on to the data collection (Section 3.2) and data analysis (Section 3.3) methodologies.

3.1. Case selection and description

Google Arts & Culture (formerly Google Art Project) is an online collection of high-resolution images of artworks exhibited in various museums around the world, as well as a virtual tour of the galleries where they are displayed. The virtual tour allows the works to be viewed in high definition. The project was launched on 1 February 2011 by Google and includes works at the Tate Gallery in London, the Metropolitan Museum of Art in New York, and the Uffizi in Florence. The museum exploration feature uses the same technology as the Street View project, also by Google. Since 2016, a special robotic camera, called Art Camera, has been developed for the digitization of images, which allows photographs to be taken with a resolution of 7 gigapixels (7 billion pixels).

In the first phase of the project, the museums were skeptical about the coexistence of traditional art and its digitization, precisely because they were afraid of losing copyrights and related revenues. For this reason, Google's main objective was to find the right way to collaborate with museums and to discover how to guide users within the platform. The real success of the platform arrived in 2018 when the official app was updated and introduced new features, including the "artistic selfie" (i.e., users can upload a selfie to the

Table 1
Main data sources and use.

Data Sources	Type of Data	Use in the Analysis	Duration / Pages
Semi-structured interviews – First Round (March–September 2018)	6 interviews with Google Arts & Culture representatives, including the Director of Public Policy and Senior Product Managers	Investigating the origins and initial implementation of the Google Arts & Culture platform and its role in the digitalization of the cultural heritage sector.	50–70 min each, approx. 85 pages verbatim
	7 interviews with key representatives from the Van Gogh Museum, including the Director of Digital Strategies and curatorial staff	Understanding how Google Arts & Culture affects the digital strategy of cultural institutions and initial reactions from museum management.	60–90 min each, approx. 110 pages verbatim
Semi-structured interviews – Second Round (October 2018–March 2021)	12 interviews with Google Arts & Culture representatives, including technical leads and product managers	Exploring how the platform's features influence the efficiency, complementarity, and lock-in mechanisms for museums.	55–80 min each, approx. 160 pages verbatim
	23 interviews with museums, including 5 from the Uffizi Gallery, 6 from the Van Gogh Museum, 4 from Museo Nacional d'Art de Catalunya, 4 from the Museum of Modern Art, and 4 from the Rijksmuseum	Delving deeper into how museums interact with the platform, with a focus on digital capabilities and collaboration.	50–85 min each, approx. 265 pages verbatim
Semi-structured interviews – Third Round (April 2022–June 2022)	5 follow-up interviews with Google Arts & Culture representatives, including the Director of Public Policy and Senior Product Managers	Understanding how the platform is adapting to user feedback and evolving its strategies with museum partners.	50–70 min each, approx. 70 pages verbatim
	32 interviews with museums, including 12 from Museo Egizio, 4 from the Uffizi Gallery, 5 from the Van Gogh Museum, 4 from Museo Nacional d'Art de Catalunya, 4 from Museum of Modern Art, and 3 from the Rijksmuseum	Evaluating the impact of the platform on museum visibility, user engagement, and operational strategies.	60–90 min each, approx. 366 pages verbatim
Archival data	Reports on platform implementation, metadata structure, and content digitization protocols	Triangulating interview data to validate technical and organizational impacts on the museum sector.	150 pages
Public Documentation	Museum annual reports and strategic plans	Understanding the external narrative of how museums utilize digital platforms in their strategy.	180 pages
Media Coverage	96 articles on the launch of Google Arts & Culture, museum partnerships, and public reactions	Cross-referencing media analysis with interview data to understand public perceptions of the platform's role in the museum sector.	210 pages
Google Arts & Culture Platform Data	User engagement analytics and platform usage reports	Analyzing how user interaction with the platform influences physical visits and the overall museum experience.	N/A

Total interviews:
- 88 interviews (23 with Google Arts & Culture, 65 with museums)
- Average interview duration: 50–90 min
- Total verbatim pages: 1596 pages

platform, which – through facial recognition and machine learning – processes the data and associates the face with the most similar artwork). With this function, the number of downloads grew exponentially and so did the interest in cultural organizations. Today, there are over 2000 cultural organizations on the platform, compared to just 17 in 2011. On the one hand, small and medium-sized museums have recognized the potential of Google to increase their online visibility and provide functionality that they were not able to develop internally. Moreover, they started leveraging Google's digital expertise in the field of content digitization and indexing. On the other hand, the largest museums have recognized in Google the possibility of experimenting with technologies along the digital frontier such as Artificial Intelligence, Machine Learning, Augmented and Virtual Reality for the creation of new content.

At the user level, Google describes its project as a unique experience in which users can explore a wide range of very high-resolution artworks that allow the details of brushstrokes and patinas to be studied, going far beyond what the human eye could ever see in the gallery. Moreover, they can take a virtual tour of a museum or a cultural site of interest directly from their device, they can build their collections and playlists of artworks to share within the platform or through social networks and they can experiment with Artificial Intelligence and Machine Learning algorithms to discover new meanings related to art and culture.

3.2. Data collection

Our study combined primary data sources (semi-structured interviews and informal observations) with secondary data sources (archival materials and platform data), aligning with standard practices in qualitative research (Patton, 2014). The data collection covered a period of four years, from March 2018 to June 2022, and included three distinct rounds of interviews, complemented by extensive archival research. This combination of retrospective and real-time data allowed us to deepen our understanding of how Google Arts & Culture and its museum partners were navigating the digital transformation of the cultural heritage sector (Pettigrew, 1990). Table 1 presents a detailed breakdown of our primary and secondary data sources.

We established access to Google Arts & Culture after gaining approval from the Director of Public Policy in March 2018. Our sampling strategy focused on diversity across both organizational roles and museum types. We aimed to capture a range of perspectives from Google Arts & Culture's leadership team to various museum representatives from international institutions such as the Uffizi Gallery, the Van Gogh Museum, the Museo Nacional d'Art de Catalunya, the Museo Egizio, the Museum of Modern Art (MoMA), and the Rijksmuseum. This diversity allowed us to triangulate the information provided by different stakeholders and ensure a well-rounded understanding of the phenomenon under study.

3.2.1. Phases of data collection

Phase 1: March 2018 – September 2018. In the initial phase, we focused on building a foundational understanding of Google Arts & Culture's platform and its early collaborations with museums. We conducted 16 interviews, including: 6 interviews with senior staff members at Google Arts & Culture, such as the Director of Public Policy and Senior Product Managers, to explore the platform's goals and its early implementations; 7 interviews with key representatives from the Van Gogh Museum, examining their motivations and early experiences with the platform. These interviews, lasting between 50 and 90 min, generated approximately 195 pages of verbatim transcripts. Archival documents and internal reports provided by Google complemented this phase, offering insights into the historical and operational context of the platform's launch.

Phase 2: October 2018 – March 2021. The second phase deepened our understanding of the platform's functionalities and its evolving role in the cultural ecosystem. This phase involved 35 interviews: 12 interviews with Google staff, including Product Managers and technical leads, aimed at understanding the technological advancements and operational challenges of the platform.; 23 interviews with representatives from six international museums: 5 with the Uffizi Gallery, 6 with the Van Gogh Museum, 4 with the Museo Nacional d'Art de Catalunya, 4 with MoMA, and 4 with the Rijksmuseum. The interviews focused on how the digital platform supported the museums' broader digital strategies and enhanced their visibility. These interviews lasted between 50 and 85 min, generating approximately 425 pages of verbatim transcripts. To ensure the reliability of the data, we conducted cross-referencing between informants and reviewed internal reports from the museums involved.

Phase 3: April 2021 – June 2022. The final phase focused on long-term strategic outcomes and the platform's influence on audience engagement and museum operations. We conducted 37 interviews: 5 interviews with Google Arts & Culture representatives, focusing on their reflections on the platform's trajectory and long-term goals; 32 interviews with museum representatives: 12 interviews with the Museo Egizio, 4 with the Uffizi Gallery, 5 with the Van Gogh Museum, 4 with the Museo Nacional d'Art de Catalunya, 4 with MoMA, and 3 with the Rijksmuseum. The interviews, lasting between 60 and 90 min, yielded approximately 436 pages of verbatim transcripts. During this phase, we also integrated insights from Google's internal user analytics to further understand how digital interactions influenced physical visits to museums.

3.2.2. Triangulation and secondary data

To enhance the authenticity and credibility of our findings, we triangulated our primary interview data with extensive secondary data sources. These included: (i) Internal reports and technical documentation from Google Arts & Culture, providing details on the platform's digitization processes and metadata management; (ii) Museum annual reports and public strategic plans, offering insight into how cultural institutions integrated Google Arts & Culture into their long-term digital strategies, (iii) Media articles and external reports, which contextualized the collaboration between Google and museums from an outsider perspective.

In total, we conducted 88 interviews (23 with Google Arts & Culture and 65 with museums), with an interview duration of between 50 and 90 min each, producing a total of 1596 pages of verbatim transcripts. This multi-method approach provided a robust dataset, allowing for a rich, triangulated analysis of the digital transformation of the cultural heritage sector.

3.3. Data analysis

Our data analysis followed a structured process consistent with the principles of longitudinal case studies (Langley, 1999; Yin, 1994), adopting an abductive approach (Locke et al., 2008). This method enabled us to iteratively move between the empirical data and existing theoretical frameworks, refining and generating new insights as our understanding deepened.

3.3.1. Step 1: open coding and development of first-order themes

We initiated the analysis by conducting a fine-grained reading of the interview transcripts and archival material, engaging in open coding to identify relevant patterns in the data (Strauss and Corbin, 1998). During this phase, we developed a set of first-order themes that directly reflected our informants' language and perspectives. For instance, museums highlighted the benefits of reaching a wider audience, reducing digitalization costs, and showcasing collections without physical space constraints, which were coded as first-order themes such as "reaching a wider user base" and "no shelf space constraints." We also collected insights from Google Arts & Culture, particularly around how the platform leveraged its digitization and indexing technologies to standardize processes and improve accessibility for museums. These were captured through codes such as "reducing inefficiencies in the digitization process." This stage of the analysis involved iterative discussions among the research team to ensure consistency and resolve any discrepancies in the interpretation of the data.

3.3.2. Step 2: axial coding and development of second-order themes

In the second stage, we engaged in axial coding, where we began organizing the first-order themes into broader, theoretically informed second-order themes (Strauss and Corbin, 1998). This process involved constantly comparing our emerging themes with insights from the literature on digital platforms, ecosystem dynamics, and value creation. Through this comparison, we identified eight second-order themes:

Accessibility. Representing the ability of the platform to remove geographical and physical constraints, allowing museums to reach a broader audience.

Aggregation. Referring to how the platform facilitates the aggregation and curation of content, enabling museums to exhibit more artworks than their physical spaces allow.

Exploitation. Reflecting how digital capabilities allow for the exploitation of both legacy knowledge and new technological possibilities to create enhanced value for museums and users.

Recombination. Highlighting how digital and physical elements are recombined to create new experiences and services.

Experimentation. Referring to the opportunities museums have to experiment with new ways of engaging audiences and leveraging Google's technology.

Customer-centricity. Focusing on the empowerment and involvement of users, as the platform allows for a more personalized and engaging experience.

Customer engagement. Reflecting the ways users interact with the platform and with museums, driving higher levels of engagement and participation.

Interconnectivity. Highlighting how the platform connects previously unconnected parties, fostering collaboration and enhancing network effects.

3.3.3. Step 3: identifying aggregate dimensions

Following the axial coding, we further consolidated the second-order themes into four aggregate dimensions, aligning them with the theoretical framework of value creation drivers in digital platforms (Amit and Zott, 2001). The aggregate dimensions are:

Efficiency. This dimension includes themes such as Accessibility and Aggregation, which highlight how the platform increases efficiency by reducing geographical constraints and enabling content aggregation.

Complementarities. Themes like Exploitation and Recombination reflect how the platform enables new complementarities between legacy museum knowledge and digital capabilities, resulting in the creation of additional value.

Novelty. The themes of Experimentation and Customer-Centricity demonstrate how the platform fosters novel ways for museums to engage with audiences and test new technologies.

Lock-In. This dimension is represented by Customer Engagement and Interconnectivity, highlighting the mechanisms through which the platform creates sustained engagement and connects stakeholders in ways that encourage continued participation.

The final **data structure** (see Table 2) illustrates how first-order themes were grouped into second-order themes, and how these were then aggregated into the broader dimensions of efficiency, complementarities, novelty, and lock-in.

3.3.4. Step 4: building a grounded theoretical model

In the final step, we used our data structure to develop a grounded theoretical model that explains how Google Arts & Culture reshaped the value chain within the cultural heritage sector. The model highlights how the platform enables museums to exploit both their traditional strengths and the affordances of digital technologies to create new forms of value, while also fostering greater interconnectivity and engagement with users. Through the combination of efficiency, complementarities, novelty, and lock-in, the platform helps museums not only reach new audiences but also retain them through enhanced, digitally enabled experiences. Throughout this process, we employed constant comparison techniques (Strauss and Corbin, 1998) to refine our coding structure, cross-validate our findings, and ensure the rigor of our theoretical insights. Feedback from informants and peer researchers further helped to validate our model and interpretations (Lincoln and Guba, 1985). By combining interviews, archival data, and triangulation,

Table 2
Data structure.

Perspective	Exemplary quotes	First-order themes	Second-order themes	Aggregate dimension (Drivers of Value Creation)
Museums	"Museums have been able to connect with audiences they never would have reached through traditional physical visits. The platform has opened doors to global engagement, extending far beyond geographical limits."	Expanding audience reach globally	**Accessibility**	**Efficiency**
	"What's happening is that museums are now interacting with visitors from all corners of the world, thanks to the platform. This kind of reach was simply impossible with just onsite exhibitions."			
	"For many museums, the cost of digitizing collections was a significant barrier. With Google covering those expenses, institutions are now able to digitize and share far more content without being limited by budget constraints."	Reducing digitization costs		
	"Digitisation has always been an expensive process, and many museums couldn't afford it on their own. Google stepping in to handle the financial burden has allowed museums to focus on other aspects of curation and outreach."			
	"Museums typically have a limited number of works on display due to space restrictions. Online, there are no such limitations, and museums can present their entire collections, including items that might never have been exhibited."	Breaking free from physical space limitations		
	"With physical constraints no longer an issue, museums are now able to showcase artifacts and works that would otherwise remain in storage. The platform provides a digital space for the full breadth of their collections."			
	"Small museums, which often struggle to attract attention, are now finding global audiences for their niche collections. The platform offers visibility that wasn't possible in the past."	Global exposure for niche and smaller collections		
	"Some of the more obscure pieces and niche collections are finally being seen by a global audience, thanks to the exposure provided by the platform. It's a significant shift for smaller institutions."			
Users	"Visitors no longer need to navigate multiple museum websites to find specific artworks; the platform centralizes everything in one place, making searches much quicker and more efficient."	Simplifying art discovery with centralized search		
	"For users, it's become much simpler to locate what they're looking for. Instead of searching across various collections, they can now access a wide range of museums and art in just a few clicks."			
	"The platform's design is so intuitive that even users who aren't familiar with digital tools can navigate it effortlessly. It lowers the learning curve significantly for those exploring art online."	Streamlined user learning via intuitive design		
	"Museums have noticed that visitors adapt quickly to the interface. It's straightforward and easy to use, which encourages deeper exploration without the frustration of complex navigation."			

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Table 2 (*continued*)

Perspective	Exemplary quotes	First-order themes	Second-order themes	Aggregate dimension (Drivers of Value Creation)
	"Users love the ability to personalize their experience by creating private collections. It allows them to gather their favorite pieces in one place and revisit them whenever they like."	Enabling personalized curation through filtering tools		
	"The filtering tools are a big hit with visitors. They can organize artworks by themes or time periods and essentially curate their own galleries, which adds a personal touch to the whole experience."			
	"Visitors are able to capture the emotional essence of artworks through the high-quality digital features. Even online, they're connecting with the pieces in a way that mirrors the physical experience."	Recreating emotional art experiences through digital immersion		
	"Thanks to the platform's technology, users can delve into the meaning behind the art, almost as if they were standing in front of it in a gallery. It's about more than just seeing the artwork; it's about feeling it."			
Museums	"For many museums, the platform has significantly increased their visibility. Collections that might have been overlooked are now being accessed by a global audience online."	Boosting global visibility through online presence	**Aggregation**	
	"Smaller museums, in particular, are experiencing a boost in visibility. Their collections are now searchable and viewable worldwide, which wasn't possible before."			
	"Museums are no longer restricted to showing just a portion of their collections. With the platform, they can exhibit a far wider range of pieces that don't always make it to the physical gallery."	Showcasing extensive collections beyond physical limits		
	"There's always been the challenge of space, but online, museums can now share everything—from the most popular works to those that rarely get exhibited. It's a new opportunity to tell a fuller story of their collections."			
Google Arts & Culture	"By standardizing the digitization process across museums, we've been able to streamline operations significantly. It ensures that artworks are digitized uniformly, reducing redundancies and improving efficiency."	Streamlining digitization with standardization and metadata		
	"The platform has introduced a consistent framework for metadata, which allows museums to digitize their collections with much less effort. This standardization reduces the complexity that museums previously faced."			
	"Our advanced digitization technologies allow for ultra-high resolution imaging, and the indexing capabilities ensure that users can find what they're looking for with precision. This is a key advantage that enhances the searchability of vast collections."	Maximizing reach through advanced digitalization and indexing		
	"We've leveraged cutting-edge technology not only to digitize artworks but also to ensure that these digital assets are indexed properly, making the platform highly efficient in content retrieval for users around the world."			

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Table 2 (*continued*)

Perspective	Exemplary quotes	First-order themes	Second-order themes	Aggregate dimension (Drivers of Value Creation)
Museums	"Museums are discovering how to blend their traditional storytelling with digital tools. The platform allows them to take those rich narratives they've always built around their artworks and expand them with new digital experiences."	Bridging legacy expertise and digital tools to transform physical art into digital experiences	**Exploitation**	**Complementarities**
	"The beauty of the platform is that it enables museums to combine what they do best—curating stories around art—with digital capabilities like virtual tours and interactive content, creating a seamless transition from the physical gallery to the digital space."			
Users	"Visitors are getting more value when they can explore a collection of works together, rather than just individual pieces. It creates a richer experience because the pieces complement each other in new ways."	Enhancing value through curated digital collections		
	"What users appreciate is how the platform presents curated bundles of artwork. Seeing related pieces together really enhances the overall experience, making the collection more meaningful than the sum of its parts."			
	"For users, the ability to compare works from different museums in one place is invaluable. It's something that would be almost impossible in the physical world."	Empowering users with cross-museum comparisons		
	"The platform allows visitors to make direct comparisons between similar artworks or themes from various museums, which adds a new dimension to how they engage with the content."			
Google Arts & Culture	"The platform's technology has made it possible to reach audiences who might never have set foot in a museum. We're bridging geographical gaps and giving users the tools to explore on their own terms."	Leveraging technology to expand reach, remove barriers, and empower users globally		
	"Through the use of technology, we've empowered users to engage with cultural content in ways that weren't previously possible. Whether they're in a remote village or a major city, they can now explore the world's museums without any barriers."			
Museums	"Museums are now creating new types of experiences that blend traditional exhibitions with digital enhancements, like augmented reality or interactive displays, offering visitors something they wouldn't find in a typical gallery visit."	Creating innovative products and services through digital-physical synergy	**Recombination**	
	"What's happening is that museums can now combine their physical collections with digital features, creating complementary services such as virtual tours or online learning tools, which really enrich the visitor experience."			
Users	"Visitors are using the platform not just for art, but as a learning tool in education. Schools and teachers are incorporating it into their lessons, making art more accessible in classrooms worldwide."	Expanding technology's impact across education and tourism sectors		
	"We've seen tourists use the platform to plan visits, but it's also being adopted in educational contexts, where students can explore cultural heritage in ways that go beyond textbooks."			

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Table 2 (*continued*)

Perspective	Exemplary quotes	First-order themes	Second-order themes	Aggregate dimension (Drivers of Value Creation)
Museums	"The association with Google gives museums a certain credibility and visibility. Many institutions are eager to partner because of the brand's global reach and strong reputation."	Leveraging Google's brand to attract and retain museums	**Experimentation**	**Novelty**
	"Museums are drawn to the platform partly because of Google's reputation. They know that being part of it brings a level of trust and authority that can attract new visitors."			
	"Museums are constantly looking for ways to enhance their partnership with Google. The more they engage with the platform, the more benefits they see, especially in terms of visibility and audience engagement."	Strengthening museum partnerships with Google through shared incentives		
	"There's a clear incentive for museums to deepen their relationship with Google. By optimizing their digital presence, they can drive more traffic both online and to their physical locations."			
	"What's great is that museums maintain full control over their content. They decide what gets uploaded and how it's presented, which helps ensure their intellectual property remains protected."	Empowering museums with full control over content and copyrights		
	"Museums appreciate that they're in charge of uploading their collections. It allows them to maintain control over their copyrights, which is essential when working with digital platforms."			
Google Arts & Culture	"The platform often acts as a gateway for real-life visits. Users explore online, then come to the museum in person to experience the artworks firsthand."	Driving higher visitor engagement with digital-to-physical museum experiences		
	"Visitors frequently use the platform as a starting point, and we've noticed many come back for a physical visit after discovering the museum online."			
	"The feedback systems allow users to contribute to the platform, whether through reviews or suggestions, which adds a layer of interactivity and personal investment in the museum experience."	Enabling users to co-create value through feedback and engagement tools		
	"Visitors are now able to co-create value by leaving feedback or sharing insights, which helps both the platform and the museums improve the overall experience for future users."			
Users	"What's really happening is that users feel more empowered. They can explore collections online, and then connect that experience to their in-person visit, which motivates them to engage even more deeply."	Empowering and engaging users through seamless online-offline experiences	**Customer-centricity**	
	"Users are becoming more involved because they can experience art in their own time, in their own way, whether that's through an online tour or a visit to the actual museum. It's making them feel more connected."			
	"There's a growing sense of community among users. They're interacting more, sharing collections, and discussing the art they've seen. It's fostering a virtual space for cultural exchange."	Fostering deeper user interaction in vibrant virtual communities		

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Table 2 (*continued*)

Perspective	Exemplary quotes	First-order themes	Second-order themes	Aggregate dimension (Drivers of Value Creation)
	"Users are now connecting through the platform, creating virtual communities where they can discuss their experiences, compare collections, and build a shared appreciation for the arts."			
Google Arts & Culture	"We use data-mining techniques to better understand user preferences, which helps us tailor the content and features of the platform. It's all about delivering a more personalized experience."	Harnessing data-mining to personalize services and tailor user experiences		
	"The platform leverages data to refine and enhance the user experience. By analyzing visitor behavior, we're able to customize the services and products offered, ensuring that users find exactly what they're looking for."			
Museums	"Museums are now reaching audiences far beyond their local visitors. The platform has opened up interactions with people from around the globe, expanding our traditional audience."	Engaging a broader, global audience	**Customer engagement**	**Lock-in**
	"By using the platform, museums are able to engage with a much wider user base. It's not just about the local community anymore, we're talking about visitors from every corner of the world."			
	"Since joining the platform, we've seen a notable increase in traffic to our website. People discover us online and then visit our site to learn more or plan a visit."	Driving significant traffic increases to museum websites		
	"The platform has acted as a funnel, driving more visitors to museum websites. It's been a game-changer in boosting our online presence."			
	"Museums now have innovative ways to promote their collections, whether through virtual exhibitions or interactive online content. It's a new frontier for sharing culture."	Innovating new strategies for promoting art and culture		
	"With the platform, promoting art has taken on a whole new dimension. We're able to experiment with different digital formats that engage users in ways traditional marketing couldn't."			
	"For users, the platform has transformed the way they discover art. They're no longer limited to physically visiting a museum; they can explore collections from multiple institutions all at once."	Revolutionizing user experiences through innovative art discovery methods		
	"The experience for users is completely different now. They can uncover new works or artists they might never have encountered before, all through a more dynamic and immersive platform."			
Google Arts & Culture	"As users interact more with the platform, it learns from them. The more they engage, the better the recommendations and search results become, making the experience more tailored."	Enhancing result accuracy through user-Google interactions		
	"User interaction is helping refine the platform's accuracy. The feedback and behavior patterns allow for a more customized experience, where users get results that match their interests more closely."			
	"The platform is continuously expanding with new services that complement its original offerings. Virtual reality experiences and digital educational tools are just the beginning."	Developing new, complementary products and services for enhanced engagement		

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Table 2 (*continued*)

Perspective	Exemplary quotes	First-order themes	Second-order themes	Aggregate dimension (Drivers of Value Creation)
	"Google is always exploring ways to add value for users and partners, creating complementary products like virtual tours or interactive learning modules that enhance the overall experience."			
Museums	"Museums are now able to connect with audiences instantly, regardless of their location. The speed and reach of information on the platform have removed the barriers that used to exist."	Harnessing the Internet for seamless interconnectivity and global reach	**Interconnectivity**	
	"Thanks to the platform, museums no longer face the geographical limits of their physical space. They can share information and collections quickly with a global audience."			
Users	"For users, the platform has completely democratized access to art. No matter where they are in the world, they can explore collections that would have been out of reach."	Democratizing art by eliminating geographical and physical barriers		
	"The power of the platform is that it eliminates the barriers of distance. Anyone can view masterpieces from across the world, creating a more equitable access to culture."			
Google Arts & Culture	"What the platform has achieved is connecting institutions and users that wouldn't have had the chance to interact before. It brings together museums, artists, and visitors from across the globe."	Bridging previously disconnected entities through Google's platform		
	"Google has created a bridge between museums and audiences that were previously disconnected. This level of interconnectivity fosters new relationships and collaborations."			

we aimed to enhance the reliability and validity of our conclusions.

4. Findings

4.1. New value creation opportunities at the ecosystem level

Google Arts & Culture, launched in 2011 as the Google Art Project, was conceived as a digital platform designed to collaborate with cultural institutions. The platform aimed to "bring Street View technology indoors," allowing users to virtually explore museums and cultural sites (Kennicott, 2011). By fostering partnerships with museums and cultural organizations, the platform sought to create a shared digital archive and facilitate collaborative cultural projects.

Initially, the platform's main tools included virtual maps, which allowed users to tour museum spaces, and digital galleries showcasing key works from participating institutions. As one interviewee described, the platform's features have evolved significantly since its launch:

> *"The platform offers many features. The Zoom function, for instance, allows users to view details that are invisible to the naked eye. The digitization quality is exceptional, with 7-gigapixel resolution revealing every single aspect of a work. With Virtual Reality and the Google Cardboard viewer, users can literally immerse themselves in artworks. Moreover, users can conduct thematic searches of collections, filtering by color or historical period. Virtual tours are also available, and with Street View technology, you can enter the world's top museums. Sharing content—whether paintings, collections, or albums—on social media is just a few clicks away. Museums can even create 'online exhibitions' consisting of texts, images, and videos on specific themes."*

These features demonstrate the platform's potential for effective communication and engagement. However, to fully realize its potential, the platform must align the interests of various stakeholders, including museums, users, and Google. Our analysis reveals that the total value generated within the creative value chain is the sum of the value created for each stakeholder. Table 2 outlines how we coded these value drivers from each stakeholder's perspective.

4.2. Shifts in industry architecture towards an ecosystem logic

The entry of Google Arts & Culture has catalyzed a fundamental shift in the traditional industry value chain, where processes such as content innovation, infrastructure management, and customer relationship management were once centrally controlled by vertically integrated entities. This shift is illustrated in Fig. 2.

As Fig. 2 shows, the boundaries between customer relationship management, infrastructure management, and product innovation have become increasingly blurred in the cultural heritage sector. However, unlike in other creative industries (e.g., music or film), no actor has been replaced or cannibalized by the digital platform. Instead, the balance of power has shifted. Museums, which previously acted as gatekeepers, continue to play a pivotal role as content providers. Yet, online intermediaries like Google challenge traditional value chain structures by introducing new models for content creation, distribution, and promotion.

By making content accessible through Google's platform, museums can expand their global reach, attract more visitors, and provide additional layers of information that enhance the user experience. This, in turn, generates renewed interest in both virtual and onsite visits, as users can begin their experience online, visit the museum in person, and later return online for further exploration. This multichannel approach enhances customer engagement without cannibalizing traditional ticket sales.

The new architecture is characterized by a value network, where relationships between actors are mutually beneficial, as detailed below:

Museums and google. Museums provide content, which Google digitizes and indexes. Gaining access to this content is essential for digital distributors. While the role of museums remains strong, digital platforms like Google challenge traditional power dynamics by offering alternative distribution models.

Museums and users. Cultural consumption largely remains anchored in the physical world, especially for the emotional aspects of museum visits, which cannot be fully replicated online. However, the platform enables users to prepare their visits online and later return to deepen their understanding. This multichannel approach fosters new engagement opportunities and increases physical visits.

Google and users. Google offers global access to cultural content, fostering the democratization of art and culture. In exchange, users contribute data, helping the platform scale and create personalized services. Collectively, these dynamics reflect the increasing adoption of an ecosystem logic in the cultural heritage sector, as articulated by one of our interviewees:

> *"Museums must transition from being institutions that merely preserve memory to becoming platforms for user-generated experiences and co-creation. New technologies offer opportunities to reorganize the museum experience, engaging audiences in entirely new ways."*

Table 3 compares the major shifts in the role of museums, highlighting their transition from "content providers" to "creative platforms" within this ecosystem.

Many of the shifts described in Table 3 are the result of the radical reorganization of knowledge and culture brought about by the Internet, information and communication technologies, and other disruptive changes in how we share ideas and organize content. As it is increasingly difficult for large organizations to remain innovative, we are witnessing a shift from large museums with vast collections to small, flexible, and dynamic cultural centers of science and art. Moreover, new technologies are being introduced at a rapid pace, enabling a more participatory user experience. Audiences are becoming accustomed to 'real-time' information, requiring museums to

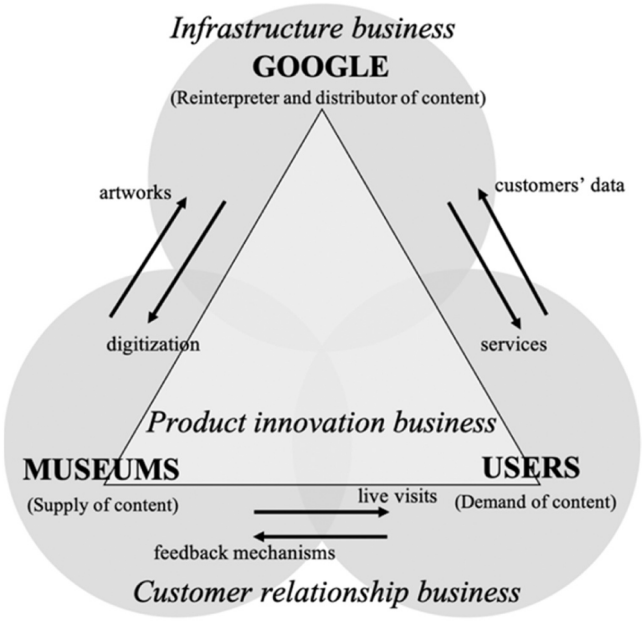

Fig. 2. The new ecosystem logic in the cultural heritage sector.

develop new skill sets. This also poses a significant challenge for cultural institutions, demanding greater agility and flexibility.

Creative platforms enable museums to transition from a 'dative' approach, where curators develop content that is then 'pushed' out to visitors, to an 'ablative' approach, where platforms completely reshape the hierarchy of social participation in the digital heritage industry. These platforms do not merely give visitors a voice (e.g., Instagram, Facebook or Twitter); instead, they foster the development of experiences that are more valuable and engaging for users. As a direct result of this transformation, whereas 20th-century cultural institutions typically maintained rigid boundaries between 'curators' and 'visitors' – between the inside and the outside – these boundaries are now becoming more permeable and flexible. Consequently, museums are evolving from content providers to creative platforms.

4.3. Interiorization and reinterpretation capabilities: the drivers of ecosystem transformation

Our findings suggest that the transformation toward an ecosystem logic is underpinned by two key capabilities: interiorization and reinterpretation.

Interiorization capabilities refer to the ability of museums and curators to absorb knowledge that can enhance the industry. Museums excel at developing storytelling experiences that interpret and disseminate cultural content. However, they often struggle to fully realize these capabilities in digital environments due to a lack of technological expertise. Reinterpretation capabilities, in contrast, are the strengths of digital platforms like Google, which can leverage technological advances to complement the legacy knowledge of museums. By bridging these two capabilities, a new model emerges, blending museum expertise with digital innovation to create a seamless "phygital" experience for users. As one interviewee explained:

> *"Google Arts & Culture allows the creation of digital exhibitions that merge curatorial knowledge with cutting-edge technology to increase user engagement. By combining the storytelling skills of museums with Google's expertise in Artificial Intelligence and Augmented Reality, new forms of knowledge and meaning can emerge."*

This combination allows museums to redesign how content is organized and presented, facilitating the creation of new cultural experiences for global audiences. Importantly, digital platforms provide this opportunity without requiring museums to build in-house digital expertise, thus transforming the museum's online presence from a virtual shop window into a dynamic hub for new services.

> *"The platform helps museums move from a mere virtual showcase to a full digital counterpart of the physical museum. By combining digital technologies like AI and augmented reality with curatorial knowledge, museums can provide new, enriched experiences for visitors."*

This shift aligns with the growing need for cultural institutions to adapt to changing market demands, especially in the wake of disruptions like the COVID-19 pandemic, which forced cultural institutions to rethink how they deliver experiences to a global audience. Museums must now integrate digital expertise with traditional knowledge to create compelling, hybrid experiences that bridge the gap between onsite and online participation.

5. Discussion

This study has explored the role of digital platforms, specifically Google Arts & Culture, in reshaping the value chain of the cultural heritage sector through the lens of value creation opportunities (Amit and Zott, 2001; 2020). Our findings reveal that digital platforms offer significant potential to enhance value creation at the ecosystem level by fostering efficiency, complementarities, novelty, and lock-in mechanisms among stakeholders.

First, **efficiency** is a major driver of value creation for both museums and users. The platform enables museums to reach a wider audience, overcoming physical and geographical limitations while providing users with easier access to global collections. Museums no longer face constraints related to physical shelf space, and users benefit from reduced search costs, being able to view collections from multiple institutions in one place. As Evans and Wurster (1999) highlight, the combination of reach and richness enhances the overall user experience, making it more personalized and tailored to individual preferences. Users can curate their own private collections and explore detailed content in ways that were previously impossible. This process is reinforced by the scalability of the platform, which aggregates demand and brings new value to cultural artifacts through a more customized experience (Fu et al., 2021).

Second, **complementarities** between museums' legacy capabilities and Google's technological prowess create new value

Table 3
Comparing and contrasting the main changes in museums underpinning the new industry architecture.

Museums as "content providers"	Museums as "creative platforms"
Large	Small
Slow	Fast
Stable	Agile
Interactive	Participatory
Dative (to or for)	Ablative (by, with or from)
Enclosed	Porous
Linear	Ecosystem

opportunities. Museums leverage their historical expertise in curating and storytelling, while Google's technologies enable these narratives to be extended into the digital realm. This combination generates new complementary products and services, such as virtual tours, digital exhibitions, and personalized educational experiences. The "gigapixel" technology developed by Google enables users to engage with artworks on a new level of depth, thus adding layers of value to the traditional museum experience. As Fig. 3 illustrates, the digital platform does not replace museums but integrates with them, strengthening their position as content providers while enabling them to reach broader, digitally-engaged audiences. This interplay of complementary capabilities aligns with network

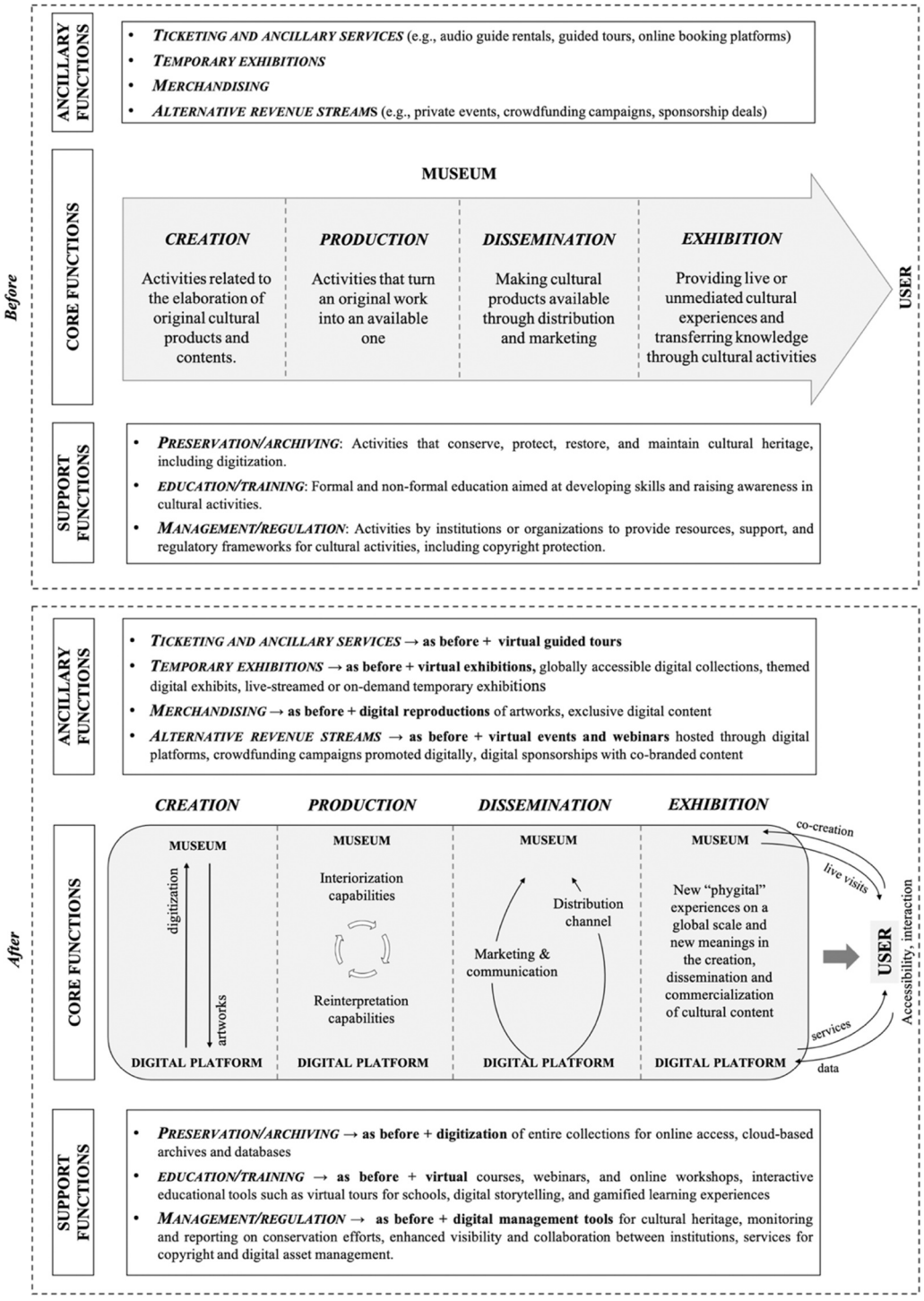

Fig. 3. The creative value chain before and after the entry of digital platforms.

theory's emphasis on partnerships as a source of value creation (Tavalaei and Cennamo, 2021).

Third, **novelty** emerges as museums and users benefit from new modes of interaction and content creation. The platform has transformed the way cultural heritage is disseminated, allowing users to access digitized content that is not restricted by the physical constraints of traditional exhibitions. For example, the ability to zoom in on high-resolution images of artworks or to experience digital replicas provides users with a hybrid "phygital" experience, combining both digital and physical aspects of cultural interaction. This shift from a linear value chain to an ecosystem logic, as represented in Fig. 3, enables museums to expand their reach, collaborate with new partners, and experiment with new technologies such as NFTs or augmented reality (Lanzolla et al., 2023).

Fourth, **lock-in mechanisms** are strengthened as museums and users continue to engage with the Google Arts & Culture platform. The platform fosters long-term relationships between stakeholders by providing value-added services, creating high switching costs, and building trust through Google's brand reputation. Museums retain control over their content and copyrights, deciding what and how to share on the platform. The collaboration is further incentivized by the potential for increased visitor numbers, both online and in person, as users are often enticed to visit the physical museum after experiencing the digital version. This dynamic is part of the larger ecosystem logic, where interactions between actors provide reciprocal benefits and reinforce stakeholder engagement. As shown in Fig. 3, this transition from a linear to an ecosystem-based model blurs the boundaries between content creation, distribution, and exhibition, creating a more circular, interdependent value network.

5.1. Theoretical contribution

From a theoretical perspective, this study contributes to the literature on innovation and strategic management in several ways. First, our findings highlight how digital platforms transform traditional industries by introducing ecosystem logics, particularly in sectors where tangible and intangible assets coexist. Unlike other sectors where digital platforms disrupt and replace incumbent actors, in the cultural heritage sector, platforms act as enablers of new value creation without displacing traditional institutions. This contributes to the literature on platform-based ecosystems (Trabucchi et al., 2021; Pesce et al., 2019) by showing that museums and digital platforms can coexist symbiotically, each benefiting from the other's strengths.

Second, the recombination of legacy knowledge and digital technologies introduces a novel theoretical construct that we define as "phygital recombination." This construct captures the hybridization of physical and digital experiences and shows how digital platforms can enhance, rather than diminish, the traditional value proposition of cultural institutions. The interaction between museums' interiorization capabilities (developing and curating knowledge) and Google's reinterpretation capabilities (leveraging digital tools to enhance cultural experiences) offers a new lens to examine how innovation occurs through the recombination of distant knowledge bases (Katila and Ahuja, 2002; Messeni Petruzzelli and Savino, 2015).

Finally, our findings challenge traditional views of value chain disintermediation by showing that digital platforms in the cultural heritage sector act more as facilitators of content dissemination rather than disruptors. Instead of eroding the role of museums as gatekeepers of culture, platforms like Google Arts & Culture enhance their ability to reach new audiences and engage with them in more meaningful ways. This has important implications for strategic management and ecosystem governance, particularly in industries where cultural preservation and innovation need to be balanced.

5.2. Practical implications

Our findings offer valuable practical insights for museums and other cultural institutions, particularly those with limited digital infrastructure or a weak digital culture. The case of Google Arts & Culture illustrates how even institutions with minimal digital capabilities can leverage platform-based technologies to expand their reach and create new value for their audiences. For organizations in regions with underdeveloped digital infrastructures, partnerships with platforms like Google enable access to global audiences without requiring significant in-house technological expertise. In this way, digital platforms democratize cultural access, allowing smaller institutions to compete on a global stage. Emerging markets stand to benefit significantly from the scalability of digital platforms, as they provide a cost-effective solution for showcasing heritage without the logistical and financial barriers typically associated with international exposure.

The Covid-19 pandemic has further underscored the need for cultural institutions to rapidly adapt to digital solutions, both to maintain audience engagement and to ensure the continuity of cultural activities. During lockdowns, when physical spaces were closed, museums accelerated their digital transformation efforts, relying on platforms like Google Arts & Culture to keep their collections accessible to a global audience. These platforms have played a crucial role in ensuring cultural access during periods of social distancing, offering new modes of interaction with art that had previously been considered supplementary to physical experiences.

Below, we explore the practical implications of digital platforms across the four core functions of the cultural value chain: Creation, Production, Dissemination, and Exhibition, particularly for institutions in contexts with underdeveloped digital infrastructures or where the pandemic has drastically altered traditional operations.

Creation. Digital platforms open up new avenues for the development of cultural content by integrating emerging technologies such as augmented reality (AR), virtual reality (VR), and non-fungible tokens (NFTs). These tools enable innovative forms of cultural products, such as virtual tours powered by Google's Street View technology, which allow users to navigate museum spaces remotely, or digital art pieces created as NFTs. This transition to digital forms not only responds to changing visitor preferences but also allows museums to collaborate with technology vendors, researchers, and art enthusiasts as co-creators of cultural content.

In contexts with limited digital infrastructure, such as emerging markets, digital platforms provide the technological foundation necessary for experimentation with new forms of content. These platforms offer an accessible entry point for institutions that lack the

resources for significant in-house investments, allowing them to showcase their unique cultural heritage on the global stage.

Production. Digital platforms have redefined the role of museums as gatekeepers of knowledge, transforming them from physical "temples" of cultural heritage into global forums where knowledge is preserved and made accessible. Traditionally, museums curated and protected cultural content within their walls, but now, digital platforms enable them to reinterpret and digitize their collections, offering users more dynamic and interactive forms of content.

Museums that may have weaker digital cultures or that are located in regions where technological adoption is slower can leverage platforms like Google Arts & Culture to bypass traditional barriers to digitization. Through partnerships, museums can outsource much of the technological expertise required for digital production, allowing them to focus on content curation while relying on the platform's digital capabilities for global dissemination.

Dissemination. Digital platforms have revolutionized the dissemination and marketing of cultural content, enabling bi-directional, interactive communication between museums and their users. By using advanced data profiling and personalized content delivery systems, platforms like Google Arts & Culture allow museums to tailor content to the preferences and needs of their audiences, shifting from passive broadcasting to active user engagement. This transformation allows users to take an active role in the dissemination process, contributing feedback and engaging as co-creators of cultural narratives.

For smaller institutions in emerging markets, these platforms provide tools to promote their collections globally, overcoming traditional barriers to visibility and access. Through scalable marketing tools, museums with limited resources can tap into global markets and engage with international audiences, competing with larger, better-funded institutions.

Exhibition. At the exhibition level, digital platforms enable the creation of "phygital" experiences, where physical and digital worlds converge to create immersive and interactive exhibitions. These experiences can range from digital replicas of physical exhibitions to entirely new digital creations that complement or extend traditional museum exhibits. The Covid-19 pandemic accelerated the need for museums to integrate digital components into their exhibition strategies, offering virtual exhibitions, augmented reality experiences, and online access to digitized collections when physical access was restricted.

Museums in regions where physical access is limited due to logistical, financial, or crisis-related barriers can particularly benefit from this model. Virtual exhibitions and digital engagement ensure that cultural heritage remains accessible to a global audience even during periods of restricted mobility. Moreover, these digital exhibitions offer the added advantage of interactivity, allowing users to explore artifacts in ways that would be impossible in physical spaces, such as zooming in on details or accessing multimedia content related to the exhibit.

Practical implications for emerging markets. Cultural institutions in emerging markets face distinct challenges, such as limited financial resources, underdeveloped digital infrastructure, and diverse cultural dynamics. Platforms like Google Arts & Culture allow these institutions to overcome these barriers by democratizing access to culture and fostering global engagement. In these regions, digital platforms enable institutions to display their collections on a broader international stage, contributing to their social and economic development without substantial financial investment. Our findings also emphasize the potential for digital platforms to facilitate cross-border cultural exchanges and collaborations with global technology providers. This enables institutions in emerging markets to improve their technological readiness and expand their visibility in the global cultural ecosystem. By collaborating with global platforms, institutions in emerging markets can access new audiences and markets, establishing themselves within a broader network of cultural exchange.

Actionable strategies for institutions with limited infrastructure. To bridge the digital divide, we recommend three actionable strategies for cultural institutions, particularly those in emerging markets or regions with underdeveloped infrastructure: (i) form strategic alliances with platforms and external partners to leverage shared digital resources; (ii) invest in public-private partnerships to develop digital infrastructure while maintaining cultural authenticity; (iii) enhance digital capabilities incrementally through staff training and capacity-building programs, allowing institutions to progressively adopt digital technologies while preserving their cultural mission.

Sectoral benefits for education and tourism. Beyond cultural institutions, digital platforms also provide significant benefits for the education and tourism sectors. Platforms like Google Arts & Culture offer schools and universities access to high-quality cultural content, fostering new educational opportunities for students and educators. The tourism sector can benefit from "phygital" experiences as well, enabling potential visitors to explore cultural sites remotely before engaging with them in person. These virtual experiences deepen visitor engagement while promoting international tourism for cultural institutions in both developed and emerging markets.

Risks and challenges. While digital platforms present numerous opportunities, they also pose challenges that must be addressed. Over-reliance on platforms risks centralizing control over cultural dissemination in the hands of a few large technology companies. Cultural institutions must carefully balance the benefits of platform partnerships with the need to retain ownership and control over their content and curatorial processes. Investments in digital transformation must also be accompanied by human resources capable of ensuring the quality and integrity of digitized cultural heritage.

6. Conclusion

This study investigated the transformative role of digital platforms, particularly Google Arts & Culture, in fostering social and economic development within the cultural heritage sector. Through the lens of innovation management and value creation, our findings show that digital platforms generate substantial value for multiple stakeholders—museums, users, and the platform itself—through efficiency gains, complementarities, novelty in cultural experiences, and lock-in mechanisms. These drivers collectively redefine the traditional value chain, reshaping the industry architecture into a more interconnected and dynamic ecosystem.

Our research demonstrates that digital platforms help museums overcome geographical and physical limitations, enabling users to access cultural content more easily and personalize their experiences. The efficiency gains are particularly evident in the elimination of traditional "shelf space" constraints, reducing search costs for users. Additionally, digital platforms foster new forms of collaboration by combining museums' legacy curatorial expertise with the technological capabilities of companies like Google, leading to new opportunities for innovation. Our findings also highlight the emergence of a "phygital" model, blending physical and digital experiences that enhance user engagement and deepen cultural interaction. Moreover, Google's global reach and reputation strengthen the platform's ability to lock in both users and museums, reinforcing its central role in the cultural ecosystem.

6.1. Limitations and future research directions

While this study offers valuable insights into the digital transformation of the cultural heritage sector, it is important to acknowledge its limitations. The reliance on a single case study limits the external validity and generalizability of the findings. Future research should expand the scope by examining multiple digital platforms and cultural institutions across different geographic and cultural contexts to assess the broader applicability of these conclusions. Furthermore, future studies should explore potential risks posed by digital platforms, particularly concerning how museums might safeguard the authenticity and integrity of their content in an increasingly digitized world.

In addition to addressing these limitations, future research could explore how other sectors, such as education and tourism, might benefit from the technological innovations offered by digital platforms. For instance, Google's ultra-high-resolution imaging and digital twins provide unique opportunities for students and educators to engage with cultural content in novel ways, potentially democratizing education by offering high-quality cultural experiences at minimal cost. Similarly, the tourism industry could leverage these platforms to create immersive travel experiences that transcend physical boundaries, facilitating virtual cultural exchanges and new forms of engagement.

6.2. AI and the future of cultural heritage

One of the most promising areas for future research lies in the role of artificial intelligence (AI) within these digital ecosystems. While platforms like Google Arts & Culture already use advanced technologies like gigapixel imaging and virtual reality, the potential for AI-driven personalization and content generation remains underexplored. AI could revolutionize the way cultural heritage is curated and experienced by automating certain processes, generating predictive models for personalized cultural journeys, and deepening user engagement. However, this evolution raises ethical concerns, including the risk of algorithmic bias and the potential homogenization of cultural experiences. Future research should examine how AI might democratize cultural access without distorting or commodifying cultural heritage.

A particularly provocative line of inquiry concerns the role that digital platforms may play in developing AI systems. While Google Arts & Culture operates on a non-profit basis to democratize cultural access, it also accumulates vast amounts of data on art, history, and human interactions with cultural artifacts. This unique dataset could become a critical asset for training AI systems, especially large language models (LLMs). The long-term value of Google's investment in digitizing cultural heritage might extend beyond mere democratization of access—it could also lie in the strategic use of this data to train AI models capable of interpreting and contextualizing culturally rich content.

This intersection of digital platforms and AI opens up a new frontier in cultural preservation and reinterpretation. As platforms amass vast datasets on human history and culture, critical questions arise regarding who controls the narrative of cultural heritage as it is digitized, analyzed, and potentially reshaped by AI systems. Understanding the dynamics of this relationship will be essential not only for the future of the cultural heritage sector but also for the broader development of AI as a cultural and societal force.

CRediT authorship contribution statement

Danilo Pesce: Formal analysis, Validation, Data curation, Investigation, Writing – original draft, Conceptualization, Methodology, Writing – review & editing. **Claudia Franzè:** Investigation, Writing – original draft, Data curation, Conceptualization, Visualization, Methodology.

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