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Original
When culture meets digital platforms: Value creation and stakeholders' alignment in big data use / Pesce, D.; Neirotti, P.; Paolucci, E.. - In: CURRENT ISSUES IN TOURISM. - ISSN 1368-3500. - STAMPA. - 22:15(2019), pp. 1883-1903. [10.1080/13683500.2019.1591354]

Availability:
This version is available at: 11583/2743100 since: 2020-12-05T22:01:58Z

Publisher:
Taylor & Francis

Published
DOI:10.1080/13683500.2019.1591354

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12 October 2024

When culture meets digital platforms:

value creation and stakeholders' alignment in big data use

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ACCEPTED ARTICLE

This article has been accepted for publication and undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may lead to differences between this version and the Version of Record.

Please cite this article as:

Danilo Pesce, Paolo Neirotti & Emilio Paolucci (2019) When culture meets digital platforms: value creation and stakeholders' alignment in big data use, Current Issues in Tourism, 22:15, 1883-1903, DOI: 10.1080/13683500.2019.1591354

Permanent link to this document: https://doi.org/10.1080/13683500.2019.1591354

When culture meets digital platforms:

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Research Paper

Abstract

Research on big data has highlighted that a crucial element to create value from data is the capability of aligning different stakeholders' interests. However, it has not yet been investigated empirically how this process of alignment can be realized. We conduct a multiple case study on the two leading platforms involved in the online dissemination of cultural heritage – Europeana and Google Arts & Culture. Our findings reveal that a platform overtakes a rival one when it turns on multiple drivers of value creation in such a way that the drivers contribute to realigning the interests expressed by the stakeholders whose strategic objectives and beliefs were formerly divergent – or simply unrelated – to each other. This capability of realigning different stakeholders' interests is independent of the level of industry-specific knowledge that the platform orchestrator has. The dynamics we document imply that Google has assumed a system integration role in the cultural ecosystem. This generates new trade-offs for museums in the way they generate value for the tourism industry. The paper enriches our understanding of what strategies digital platforms adopt to create value in big data contexts and provides a base to continue the investigation on other ecosystems driven by big data.

Keywords: value creation; big data; digitization; digital transformation; digital platforms; stakeholders' interests; Google Arts & Culture; Europeana.

1. Introduction

In the last decade, the Internet and digital imaging technologies have offered new ways to disseminate cultural content that have important implications for the way cultural heritage contributes to the creation of social and economic value (Glaeser, Kolko, & Saiz, 2001). The implications of these new dynamics go beyond the traditional cultural heritage boundaries and extend their impact across adjacent cultural sectors such as tourism (Del Vecchio, Mele, Ndou, & Secundo, 2018).

The ability to manage data and extract value from their use is now seen as a core capability, and many organizations are building their core business on their ability to digitize and organize information in order to extract value from data (e.g. Google, Amazon, Facebook). In this vein, Günther, Rezazade Mehrizi, Huysman, & Feldberg (2017) theorized that value creation through these 'big' data occurs when organizations realign work practices, organizational models and stakeholders' interests in order to reap the benefits from their use. Such a realignment can consist of a radical departure from the existing ways of doing business, and from the logics, values and beliefs that drive work practices and behaviours in an organization (Rezazade Mehrizi & Lashkarbolouki, 2016).

Among the various industries where digital technologies and big data have become a defining factor (e.g. banking, healthcare, transportation, communications), the cultural heritage industry is currently undergoing a process of digitization and 'datification' that offers new ways of creating social and economic value. Museums and cultural institutions, in particular, are required to develop new ways of disseminating heritage (related to art, science, archaeology, history) through an array of new digital channels, technologies and media (Avery, 2014). Such ways require big data capabilities that are beyond the specialization of museums and they put such organizations in a position in which they have to deal with new partners, thus allowing them to create new

value that none of them could achieve by itself (Adner, 2006).

As cultural heritage is a piece of a wider ecosystem that determines the overall attractiveness of tourism in the geographical area in which they are located, cultural organizations, in their choice of 'going online' have to deal with large volumes of varied data generated by different actors. There are approximately 55,000 museums throughout the world (Museums of the World, 2017) – ideally each maintaining its own website – each with its own artworks. The digitization of artworks can thus enable a better organization of the cultural heritage, with benefits for their dissemination. In this perspective, platform logics can support the organization of the world's cultural information in such a way that it is universally accessible through only one gateway to the digital world. This explains the contemporary initiatives of Europeana – the European Commission's digital platform for cultural heritage from the public sector – and the Google Arts & Culture – the non-profit project from the private sector, launched by Google, which is aimed at giving visibility and access to the heritage owned by thousands of museums over the world. Both initiatives aggregate the contents of museums and make them available through the Internet in a single online space. At least for the time being, the content volume and the geographical scope of Europeana and Arts & Culture outreach any other online aggregator that works, at most, at the local level.

While we have a solid theoretical understanding of how platforms orchestrate and coordinate value network among members to a common innovative effort (Giudici, Reinmoeller, & Ravasi, 2018), we know far less as regard to the process through which the convergence of interests is realized among the actors, for example, museums and tourism institutions, which contribute to the platform with their own contents. This point assumes interest at the moment the platform initiatives launched by Google and by the Europeana project on cultural heritage seem to follow different strategies and to perform

differently in terms of coverage of museums and in the ways through which cultural heritage is made accessible in the digital world.

In order to illuminate this issue, we conduct a multiple case study on the vis-à-vis positioning between the two leading platforms on the online dissemination of cultural heritage. Specifically, we focus on how the two platforms – an industry-specific digital incumbent (i.e. Europeana) and a new digital entrant (i.e. Google Arts & Culture) – have leveraged on the socio-technical features of big data to create value from the heritage owned by museums.

Our study combines multiple data sources (interviews, observations, archival data) and was informed by the value-driver model on the sources of value creation in e-business developed by Amit & Zott in 2001. Cultural heritage offers an interesting industry setting, since multiple stakeholders – with different interests – interact with a value network logic rather than a traditional vertical chain one (Minghetti, Moretti, & Micelli, 2001). Starting from the identification of the value of arts, culture and heritage for the different industry stakeholders, we have separately analysed the market logics and the implications of how Europeana and Arts & Culture create value for the network. The interest of this work lies in the fact that these platforms leverage on different technological capabilities that were either available within (in the case of Europeana) or outside the cultural heritage industry (in the case of Google Arts & Culture). As polar cases in which the process of interest is 'transparently observable' (Pettigrew, 1990), this variety in our theoretical sample allows the effects on value creation due to different drivers and mechanisms, and to different processes of alignment in the interests of the stakeholders involved in the two platforms to be explored.

Our analysis reveals that a platform can overtake a rival one when it is able to offer multiple drivers of value creation that attract members from different industry

contexts and that have different objectives in joining the platform. The platform orchestrator's capability of organizing big data and making part of them available to members is the key condition through which their different interests are aligned. This capability is independent of the level of industry-specific knowledge that the platform orchestrator has.

Our study provides empirical evidence and elaborates on the implications that these dynamics have for tourism and points out the role Google is assuming as a system integrator in the cultural heritage ecosystem by aligning stakeholders' interests and the perceived value of participating in its platform. By doing so, our findings encourage a rethinking of the investments in big data and digital technologies as being developed relationally by the ongoing interaction of multiple stakeholders' interests. In this vein, the paper provides a base to continue the investigation of value creation and convergence of stakeholders' interests in other industries.

2. Theoretical Background

Digital platforms and big data: key features

In the practitioners' literature, the value creation opportunities provided by big data derive from the so-called 3 Vs, that is, volume, velocity, and variety. Günther et al. (2017) re-elaborated this concept and identified two general drivers of value creation through big data: interconnectivity and portability.

Interconnectivity refers to the possibility of synthesizing data from various big data sources (e.g. Malgonde & Bhattacherjee, 2014). Information technologies in the domain of data architecture algorithms (e.g. machine learning) increasingly allow actors to integrate heterogeneous sources of data and extract insights from their combinations

(Raguseo, 2018; Raguseo, Pigni, & Piccoli, 2018). Apart from the role of technology, human creativity and experience may also be important to connect and link data, thus leading to new insights being formed (Seddon, Constantinidis, Tamm, & Dod, 2017).

Portability refers to the possibility of transferring and remotely accessing digitized data from one context of application to be used in other contexts (e.g. Lycett, 2013). To illustrate such a concept, Günther et al. (2017) referred to the example of a transportation company that had been collecting geographical data from vehicles navigating through cities and which could sell these data to organizations that dealt with road maintenance to find locations that required repairs. Portability thus means that the value of data can be realized in a different business/industry context from the one where the data originated.

In a digital world, platforms like eBay, Apple, Google and Facebook base their business model on both the interconnectivity and portability features of big data technologies. These two features are crucial for platforms to involve both 'producers' and 'consumers' of data from different contexts and with different interests in the network they orchestrate (Parker, Van Alstyne, & Choudary, 2016). Parker et al. (2016) essentially defined a platform as a nexus of rules and an infrastructure that facilitates interactions between buyers and suppliers, who transact directly with each other using system resources and are generally subject to network effects. The features of interconnectivity and portability can be at the core of the capability of the platform's infrastructure of generating economic value.

In the digital world, the main framework used to describe value creation mechanisms is the model formalized by Amit & Zott (2001), who identified four distinct drivers of value creations on markets mediated by the Internet: transaction efficiency, complementarity, novelty and lock-in.

In general, the creation of value for each participant in a platform occurs through positive network effects. Network effects tend to create winner-take-it all markets and increase the possibility of lock-ins, which reduce the switching costs that prevent producers from leaving the platform.

Along with generating lock-in through network effects, platforms can create value by ensuring complementarities between the activities and the outputs delivered by producers participating in a platform. Platforms can offer both vertical and horizontal complementarities. The first type of complementarity occurs when a platform integrates and coordinates some of the activities performed by two firms that occupy contiguous stages in an industry's vertical value chain. Horizontal complementarities occur when a platform integrates related products and services that are crucial for the satisfaction of a given need in a given bundle, thereby offering customers opportunities for one-stop-shopping.

Transaction efficiency refers to the reduction in transaction costs realized because of the reduction in information asymmetries between buyers (users in our case) and sellers (i.e. cultural institutions), users' search costs, and delivery time. Novelty refers to the creation of new markets that involve previously unconnected parties (e.g. eBay in the late 1990s) or that are characterized by new value propositions or new logics of market exchange or of participation in a supply chain (e.g. sharing economy in the 2010s).

A platform can deploy big data technologies to activate the novelty and complementarity drivers of value creation when it is able to involve different stakeholders with different interests that are potentially complementary in the network it orchestrates. Gunter et al. (2017) identified the realignment of stakeholders' interests as the key precondition necessary for the sharing of big data generated by different sources and stakeholders. Simply said, when firms or individuals inside organizations approach big

data, they are constrained by dominant logics and interests that reflect the ways of doing business which can limit a firm's capabilities of seizing the opportunities of value creation. Those logics and interests can lead an organization to deal with multiple types of possible concerns about the risks in intellectual property protection, privacy regulation, and security protection that can arise from a strategy based on sharing its own data with other parties. Thus, value creation through big data may require stakeholders to develop new business logics, professional norms, value propositions, behaviours and visions related to the way their own data are shared, to the extent they are made accessible without restrictions (Günther et al., 2017), and in the way they are used to produce some benefits for certain users or customers (Raguseo & Vitari, 2018). However, evidence about this process of convergence is lacking.

The cultural heritage industry can be a valuable industry setting to study how this dynamics of convergence in the interest of different stakeholders in using big data occurs. This interest is motivated by the inherent complexity of the value network around cultural institutions and by the fact that the digitization process of artworks entails strong economies of scale and scope that may lead to a rise in firms using platform strategies. These networks involve institutions and firms in such sectors as tourism, education, research, technology development and retail. Within this network, the specialization on digitization processes and the handling of the related big data can be limited, and this explains why many actors in the network opt for being supported and mediated by a platform operating as a network orchestrator.

3. Methodology

Our research was based on a multiple case study on the competition between the two leading digital platforms in the cultural heritage sector: Europeana and Google Arts & Culture. The contemporary initiatives of Europeana (launched in 2008 as a *public* initiative of the European Commission) and Arts & Culture (launched in 2011 as a *private* initiative of the Google Cultural Institute) constitute an adequate theoretical sample in consideration of their similar purpose of aggregating content in a single online space and the substantial differences in the strategic approaches and the in their implementation modes of a digital dissemination strategy. Thus, as polar cases in which the process of interest is 'transparently observable' (Pettigrew, 1990), this variety in our theoretical sample allows the effects on value creation due to different drivers and mechanisms, and to different processes of alignment in the interests of the stakeholders involved in the two platforms to be explored.

3.1 Research setting

The cultural heritage industry. The cultural heritage industry was chosen on conceptual grounds and because of its representativeness since it is undergoing a digitization and 'datification' process that offers new ways of creating social and economic value. Thus, it can be considered a favourable empirical setting to analyse how digitization and big data shape the industry structure and offer new drivers of value creation.

Moreover, since the 1970s, thus before the rise of the Internet and other digital technologies, this industry has been undergoing a process of profound change in the values, beliefs and professional norms that shape the strategic and organizational

behaviours of cultural institutions. In 1971, in his article 'The Museum, a Temple or the Forum', Cameron, the director of the Brooklyn Museum, proposed that museums should evolve from 'temples', devoted to the storage and the preservation of artworks, to a 'forum' devoted to: (a) experimentation and innovation in the way artworks are exhibited and their meanings disseminated; (b) a more open approach to the public.

The vision of museums as temples was rooted in the fact that the way collections were structured for exhibitions reflected logics that were only meaningful to an elite group of curators and reflected the value system of the upper-middle-class. Over the years, the idea of the transition of museums from temples to forums has inspired a vision of the museum as a place of greater responsiveness to the audience, and of greater attention to the engagement of visitors and its educational function. In this vein, many authors and practitioners in the industry have agreed that museums have made a paradigm shift from 'collection-driven institutions' to 'visitor-centred museums' (Anderson, 2004).

Value. From a review of the literature on the economic effects of arts and culture, we distinguished three primary sources of value in digital cultural heritage. First, the usage value that users derive from visiting cultural heritage. Second, the social value which derives from the contribution of cultural heritage to education and the overall wellbeing resulting from the way by which digital technologies enable art museums to make their cultural heritage more accessible to society. Third, the economic value which follows from the way digital technologies allow museums to reduce the costs or envisage new sources of benefits for their visitors (both online and onsite in their galleries) of making their cultural heritage more accessible online (through smartphones, tablets, computers).

In our exploration of value creation, we considered 'value' as the combination of these three broad categories of effects.

Stakeholders. Drawing on previous studies (e.g. N.G. Kotler, P. Kotler, & W.I. Kotler, 2008), we grouped the primary stakeholders of the cultural heritage sector into six categories: (1) users: general public, visitors and art lovers who are interested in arts and culture and can use the digital services of Europeana and Google Arts & Culture; (2) researchers: curators, professionals and academics that may benefit from high-quality content and searchable metadata on cultural heritage; (3) cultural institutions: museums, galleries, libraries, archives which provide content to the digital platforms; (4) tourism institutions: local, national and international tourism bodies interested in improving the attractiveness of cities and local areas for tourists; (5) specialized suppliers: technology vendors and multimedia specialists interested in developing new digital products and services about arts and culture (e.g. games or apps); (6) policy-makers: government departments and other organizations that regulate, protect, encourage and financially (or otherwise) support activities related to arts and cultural heritage.

3.2 Data collection

Following prescriptions for case-based research (Yin, 1984), our study relied on multiple sources of data.

Archival research. We used archival documents, mostly produced by Europeana and the Google Cultural Institute (strategic plans, corporate directories, business plans), archival research in the business press and other secondary sources, such as websites and other publicly available documents and videos. These data helped us draw up profiles of the platforms, trace their recent history from 2008 to 2018 for Europeana and from 2011 to 2018 for Google Arts & Culture, and identify the mechanisms through which the platforms create value for stakeholders.

Moreover, many high-quality data about tourism institutions and policy-makers were obtained from government archives, cultural policies, tourism policies, tourism institution documents, regulation policies, and national and international press. These data were collected to gather information on the broad cultural ecosystem, in order to triangulate and deepen our analysis on the different stakeholders' interests and document the value created by Europeana and Arts & Culture for tourism institutions and policy-makers when this did not come directly from our primary data sources.

Semi-structured interviews. Archival research helped us prepare semi-structured interviews, which were aimed at collecting detailed information on the two platforms. We interviewed at least one members of the board for each platform. The selection of our informants was aimed at collecting data from directors or project managers who were in a good position to be informed about (a) the mechanisms of value creation for the different groups of stakeholders, and (b) the strategic plans around the enhancement of these mechanisms.

The interviews generally lasted about one hour and a half. In order to ensure reliability, two researchers were present at all the interviews. Given the content of the interviews, the researchers were not always allowed to use a recorder. However, detailed notes were taken and, after each interview, they were compared, integrated and transcribed. Following Miles & Huberman's prescription (1984), transcriptions were supplemented with contact summary sheets in which the essential data and insightful quotations that could help future theorizing were reported.

Following Eisenhardt (1989) and Burgelman (1983), we also conducted interviews with cultural institutions whose importance became clear during the data collection. Specifically, we conducted semi-structured interviews with three international cultural organizations present in both Europeana and Arts & Culture. We used these data

to triangulate and deepen our analysis of repertoire enrichment and to document the use of the two digital platforms from the perspective of their direct strategic partners: museums. We interviewed 13 industry experts from art museums in Italy (the Uffizi Gallery in Florence), Spain (the Museum Nacional d'Art de Catalunya in Barcelona) and the Netherlands (the Van Gogh Museum in Amsterdam). The selection of three specific museums from different countries allowed us to control for any extraneous variation, while the focus on international museums constrained variation due to size differences among them. The average length of each interview was about one hour and a half. The interviewed experts were directors, heads of digital strategy, heads of marketing and art curators. In order to corroborate and triangulate data with our core dataset on Europeana and Google Arts & Culture, the interviews with the selected cultural institutions took into consideration (a) how museums participate in the two platforms, (b) the motivations, the value seen and concerns about joining the platforms, (c) what types of data were shared with the platforms and under what restrictions and (d) what the differences were in using Europeana, Arts & Culture and the museum's own website for different groups of stakeholders as well as what the main pros and cons were for these stakeholders.

Other sources. We used other sources, such as the two digital platforms' websites and the Arts & Culture official app, to familiarize ourselves with the setting and to integrate and corroborate evidence from primary data and archival reports.

Moreover, one of the researchers participated in several conferences and workshops in industries where he interacted both formally and informally with different stakeholders in the industries, including (a) the 'Museum Computer Network' conference on advancing digital transformation in museums (Pittsburgh, 2017); (b) the 'Innovation and Cultural Heritage' conference (Brussels, 2018); (c) the 'Museum: Vison 2026' workshop (Turin, 2016).

3.3 Data analysis

Our analysis combined coding techniques from grounded theory building (Locke, 2001) with multiple case study analysis (e.g. Eisenhardt, 1989; Pettigrew, 1990; Yin, 1984). The former helped us to systematically track the value creation mechanisms concerning how Europeana and Arts & Culture made sense of the different stakeholders' interests. The latter helped to capture the approach and strategy that each platform has implemented to deal with the different stakeholders of the cultural ecosystem.

As is typical of case-based research (Yin, 1984), we started from a within-case analysis in order to become intimately familiar with each case as a stand-alone entity. Our first step was the creation of a detailed chronological description of Europeana and Arts & Culture. Through this process, the unique patterns of each case started to emerge, and we began to observe the key junctions between the two cases.

In the next step, we moved to a cross-case search in order to establish patterns. Following Eisenhardt (1989), we selected two dimensions to look for within-group similarities coupled with intergroup differences: value creation and stakeholders' interests. In the first-order analysis, which tried to adhere faithfully to informant terms, we used in-vivo codes to distil the categories through which Europeana and Arts & Culture create value for the different groups of stakeholders. We started to look for similarities and differences between the main categories. Two researchers conducted this first step independently and generated the first-order codes while resolving occasional differences through discussion.

We then gave those categories labels, considering the two levels of value creation and the stakeholders' interests simultaneously, and we coded them at the more abstract second-order theoretical level of themes (Gioia, Corley, & Hamilton, 2013). During this process, some of the interview data suggested that some concepts were viewed by cultural

institutions as having contradictory implications for stakeholders. We, therefore, went back to the field to corroborate our data with cultural institutions and, through another round of coding, we were able to track all the oppositions we encountered in our database.

Once the concept development process had led to theoretical saturation (Glaser & Strauss, 1967), we distilled the emergent second-order themes even further into second-order 'aggregate dimensions' of: efficiency, complementarities, lock-in and novelty. We built two data structure representations (Table 1 for Europeana and Table 2 for Arts & Culture) of how we progressed from raw data to concepts and themes while conducting the analysis.

In the final round of the analysis, we examined how the drivers of value creation can attract all the different stakeholders' interests over the entire ecosystem (Table 3), and, as can be observed in Figure 1, we developed a model that captures the informants' experience in theoretical terms.

4. Findings

The digitization of the museum content

Digitization and connectivity are essential ways of highlighting cultural and scientific heritage, of inspiring the creation of new content and of encouraging new digital services to emerge. Through online accessibility, the digitization process of cultural heritage helps to democratize access and to develop the information society and the knowledge-based economy (European Council of Ministers on the launching of the Europeana prototype, Brussels, 20 November 2008).

The digitization of cultural objects from physical to digital artifacts is a functional prerequisite that is necessary to enact the pipeline of big data generation. The digitization process essentially includes the digital photography of cultural objects, accompanied by

the relevant information (metadata) and narrative content of the resulting file. The process can be conducted autonomously by museums (as in the case of Europeana) or in collaboration with the digital platform (as in the case of Google Arts & Culture). In both cases, the metadata and the narrative content are provided exclusively by museums.

Once digital shooting has been completed, and the metadata created, the object is 'ingested' into the platform's digital system. The ingestion entails uploading the digital copy of the physical object (i.e. the digital image) and its specific metadata (i.e. the content) by means of standardized interfaces made available by the same platform. In the ingestion stage, the object starts its transformation into what could be defined as a digital artifact, that is, a 'digital twin' of the physical object made of bits that incorporate the museum-specific knowledge about the piece of art translated into metadata.

Once digitized and ingested, the digital artifact is ready to be indexed. The indexing process makes the digital artifact available on the platform and renders it searchable within the system, thus enabling the browsing of the object and its content, or metadata. However, the creation of a digital artifact is not enough to reap the benefits of leveraging on large volumes of varied data. The *conditio sine qua non* to exploit this opportunity is the presence of an integrated infrastructure that supports the interconnectivity and portability features described above.

4.1 The rise of 'Europeana' from the cultural heritage sector

> *'Europeana is the EU's most visible expression of our digital heritage and reflects the ambition of Europe's cultural institutions to make our common and diverse cultural heritage more widely accessible to all'. (Neelie Kroes, Vice President of the European Commission, 2010).*

Europeana is Europe's digital platform for cultural heritage, and it has promoted the richness and the diversity of over 54 million digitized objects from more than 3,700 cultural organizations since 2008. Launched in 2008 as a prototype, and operating as a full service since 2010, it is the organization that has been tasked and financed by the European Commission with developing its digital platform. The Europeana Foundation is a team that is made up of around 60 people who work with over 1,500 cultural heritage professionals, researchers and policy-makers to mobilize the cultural community across Europe. As pointed out by a Senior Data Specialist of Europeana:

> *'Europeana is a platform that connects users directly to authentic and curated material. […] Our strategy is to democratize access to cultural heritage, through an open platform, so it can be used and enjoyed across national borders for work, learning or pleasure'. (Nuno Freire; Senior Data Specialist Europeana)*

Europeana has framed its strategic plan around four strategic pillars to create value for its most important stakeholders: users, cultural organizations, policy-makers, specialized suppliers (e.g. technology vendors and multimedia specialists) and tourism institutions.

The first pillar of value creation for Europeana is aggregate content. The platform intends to assemble the most trustworthy collections of Europe's cultural heritage. Europeana controls descriptive metadata and not the creation of digitized artifacts. Given the breadth and width of its content – museum artifacts, books, photography, audio and video files – and the different cultural organizations on board – from museums and libraries to public and private foundations – the platform operates more as a dedicated search engine than as an aggregation platform per se. Content providers only upload

thumbnail images and metadata of their digitized collections onto Europeana. This means that the users, once they have identified the items that interest them, through the platform's filtering tools, can only navigate through low-quality resolution and a limited number of the relevant metadata on each artifact, and are subsequently directed, through hyperlinks, to the museum's own website. However, by opening up access to online cultural heritage, increasing the social and economic benefits and removing the barriers to access, Europeana plays an important advocacy role with European policy-makers.

The second block of value creation is accessibility to facilitating knowledge access and knowledge transfer in the cultural heritage sector. Since the requirements of professional figures and education research communities are overlapping but distinct, Europeana aims at developing collaborations between the elements of this complex information system.

> *'We will promote dialogue and collaboration between librarians, curators, archivists and creative industries, to work together in common interest areas [in the digital ecosystem]'. (Europeana Strategic Plan 2011-2015)*

The searching and filtering options are the easiest ways to use and understand the platform, as tools are provided to search for metadata records and media in the Europeana repository and to interact with cultural data in much the same way as Wikipedia does.

The third pillar of value creation is the dissemination of cultural heritage to users 'wherever they are and whenever they want it' (Europeana Strategic Plan 2011-2015), while making the cultural content as findable and understandable as possible. The platform offers teachers and students the possibility of sourcing learning objects that have the potential to enhance teaching and learning (e.g. a teacher can use Europeana results on smartboards). Moreover, promoting distribution through partnerships, for example in the tourism sector, allows one to interpret and re-purpose content for a specific audience and to create services for cultural explorers and travellers. For example, Europeana and

Google's Niantic Labs have successfully completed a pilot project to integrate curated cultural content in Google's Field Trip app. The project was started in 2014 and was aimed to promote the dissemination of cultural content in the tourism sector. The app – developed by a Google internal startup – recognizes where people are and allows them to explore and discover more about their surroundings.

Finally, the last pillar of value creation pertains to engaging users in new ways of participating in their cultural heritage. Application program interfaces (APIs) and widgets make Europeana's content available on cultural (e.g. Wikipedia), social networks and blogs. The platform also encourages user-generated content. For example, in the '1914-1918' collection on the First World War, Europeana called for contributions in order to share digitized images of family memorabilia from the war period (e.g. a scanned copy of a picture, postcard, diary, uniform) together with a short story. In this case, this co-creation was aimed at creating and sharing a common identity about how the war touched the local populations in European countries.

Table 1 represents the data structure of our analysis and shows the means by which Europeana is delivering value to different stakeholder groups. Table 1 also provides a graphic representation of how we progressed from raw data to concepts (first-order codes in column 1) and themes (second-order codes in column 2) in conducting the analyses. Column 3 shows the aggregate theoretical dimensions derived from capturing the in-vivo code of our data in theoretical terms (informed by the value-driver model proposed by Amit & Zott). Column 3 is dealt with in more detail in the discussion section.

Table 1 about here

4.2 The entry of a digital platform from outside: the rise of Google Arts & Culture

On February 2011, the Google Cultural Institute – a non-profit branch of Google – launched its Art Project (now known as Arts & Culture) as a cooperative research initiative with 17 museums in the US and Europe. With this project, Google launched its own web and mobile platform about artworks, where users can access high-resolution images of artworks housed in the initiative's partner museums. The Arts & Culture platform comes from the application of Google competencies in digital imaging and indexing. By curating a vast collection of worldwide digital artworks, the value proposition is consistent with Google's mission of 'organizing the world's information and making it universally acceptable and useful' on the Internet. In this vein, digitizing artworks would have introduced two types of benefits for Google: (1) increasing the time users spend in a day on Google's platform and generating more data for their individual profiling; (2) enhancing the role and the reputation of Google in creating value at the societal level by inventing a way of accessing art that is free and which removes geographical barriers.

As the Director of the Google Cultural Institute mentioned:

> *'Experiencing art should no longer be reserved just for 'regular' museum-goers or those fortunate enough to have important galleries on their doorsteps but should be made available to a whole new set of people who might otherwise never get to see the real thing up close'. (Amit Sood, Director of the Google Cultural Institute, 2011)*

Google Arts & Culture develops its value proposition around five main building blocks in order to create value for its most important stakeholders: users, cultural organizations, policy-makers, specialized suppliers (e.g. technology vendors and multimedia specialists) and tourism institutions.

The first value creation block is related to organizing information by leveraging on its previous capabilities of digitization and indexing. Arts & Culture offers an unlimited content hosting space, an advanced image processing technology, and searching and indexing tools through which cultural institutions can control, manage and access their digital assets and metadata with Google collection management support. Moreover, through this collaboration, museums are able to deploy Google's Street View technology to offer online navigation of their interior rooms and corridors, and include a digitized copy of some of their artworks in a repository of hundreds of ultra-high-resolution digitized images of paintings and sculptures from the partner collections.

In fact, users can zoom in to a brushstroke level of image details through the platform. In 2011, digitizing artworks in ultra-high-resolution was a complex technical challenge that required time, specialized and expensive equipment, and experts in digital imaging. To do this, Google deployed a robotic camera that was capable of capturing gigapixel images composed of one billion (10^9) pixels (picture elements) with approximately 1,000 times more detail than the average digital camera. Furthermore, Google was rapid in improving the cost performance of the technology, which was achieved by adding more automation to the digitalization process. The increased efficiency of digital image capturing and the fact that the digitization costs were handled by Google allowed Arts & Culture to move from 17 cultural institutions in 2011 to over 1,400 in 2018, including the top and less important museums in the world, but also to achieve a rich tier of local excellence.

This is particularly valuable for policy-makers and tourism institutions since Google Arts and Culture is bringing traditional and local heritage, food, festivity, spirituality and adventure to users in the form of online exhibitions in collaboration with national institutional bodies. For example, in partnership with the Ministry of Tourism,

as part of its international tourism campaign 'Incredible India', the exhibition takes viewers on a journey to some of the most iconic destinations in India. Talking about India as a destination of diverse experiences, Union Tourism Minister K. J. Alphons said:

> *'India is an iconic destination that offers unique experiences of climate, geography, culture, art, literature, and food. […] Through our partnership with Google, we want to engage new and global audiences and offer them immersive content in a never-before-seen manner'. (K J Alphons, Union Minister of State for Electronics and Information Technology, Culture, and Tourism in India, 2018)*

The same is happening in many other countries, where Google is developing partnerships with institutions whose mission is to promote tourism and the local heritage at the international level (e.g. the Grand Tour of Italy realized in partnership with the Youth Committee of the Italian National Commission for UNESCO).

In this vein, the non-profit nature of the Google 'Arts & Culture' initiative, and the fact that cultural institutions continue to maintain the copyrights of the uploaded content was decisive in persuading museums (and organizations as a whole) to develop their Internet visibility on the Google platform. As Google's initiative has a non-profit purpose, cultural institutions are generally willing to give Google a non-exclusive, royalty-free, worldwide license to use, reproduce and distribute such content. Google has the exclusive right to use the thus obtained gigapixel images for the first five years, and after that period, museums would have full control of them.

The second pillar of value creation is accessibility in terms of 'digital twinning', here intended as the capability of reaching a global audience by mimicking the experience they could have in a physical gallery, but without the constraints imposed by the physical context. In providing global access to culture, Arts & Culture enables users to virtually tour museums and galleries and to explore physical and contextual information about artworks, thus giving them exclusive access to hard-to-reach places. The 'walk-through'

feature (enhanced by the possibility of having immersive virtual reality experiences) is based on Google's Street View technology, and it allows visitors to enjoy a sharper layout and ambience of museums and galleries than when consulting a guidebook.

Through filtering tools, users can search and access digitized copies of artworks hosted in a variety of physical collections in museums all over the world. Moreover, these tools can support researchers (and curators in particular) in the content retrieval and selection needed to curate temporary exhibitions, and scholars in conducting their research. As one of our informants observed:

> *'Indexing competences were deployed to provide advanced filtering tools, based on the ability to specify tags and descriptive metadata about an artwork. Through metadata, users can browse the content and the collections of the different cultural institutions involved. They can also search by artist and popularity, filter to search for artworks according to the used material, country, date, colours and typology'. (Giorgia Abeltino, Global Director Public Policy Google Cultural Institute, 2016)*

In this vein, the zero-marginal-cost for the distribution of digital goods makes it possible for visitors to access an abundance of digitized artifacts whose access can be offered to multiple devices at no price (e.g. on the mobile app, on the website, on users' wrists with Android Wear, on TV screens with Chromecast Backdrop, etc.).

Moreover, in order to attract visitors, the Arts & Culture platform can count on complementarities with other existing technologies in the Google set of application (e.g. Google Maps and Google Now) and the related real-time information that is of interest to tourists. As one of our informants explained:

> *'When travelling near a cultural institution, Google Now users see a card showing the museums' opening hours, a highlight of the museum's collection, the directions, popular times, live visit information, waiting times, typical visit durations, and nearby points of interest, such as restaurants and shops'. (Giorgia Abeltino, Global Director Public Policy Google Cultural Institute, 2016)*

Linking together people and their online practices in order to enact a form of algorithmic cultural recommendation has allowed latent and tacit consumer needs from different markets to be captured, and specific services to be created for cultural explorers and travellers fully-integrated in Google Maps.

The third block of value creation is related to the dissemination of digital artifacts and the curating of online exhibitions with partner museums and other stakeholders, such as national and international institutions. High-resolution digital imaging allows museums to share their collections and to easily start new collaborations for the virtual re-bundling of artworks that are stored in different museums and galleries. For example, in 2016, the Royal Museum of Fine Arts in Brussels, together with eight museums from around the world, launched the Bruegel Unseen Masterpiece project on the Arts & Culture platform. This initiative offers online visitors the chance to immerse themselves in Bruegel's work by honing into different paintings exhibited in different museums throughout the world. Cultural institutions can also curate online exhibitions with platform-integrated storytelling tools, such as a high-res zoom viewer, expertly narrated videos, viewing notes and maps. At the same time, users can join a community of like-minded people and 'stay in the know on all things cultural', and they can share their thoughts on social media channels. Users can also join live-streamed conversations with experts that are broadcast on Google+ and ask questions in real time.

The fourth pillar of value creation for Arts & Culture is related to engaging users in using the platform in order to learn about arts and culture in new ways that enhance the entertainment dimension. The high-resolution digital imaging of artworks increases the engagement of users by strengthening the educational dimension of the online experience on the platform. Users of Arts & Culture can zoom into details that would not be captured by the naked eye during an inspection of the real copy. Before high-resolution digital

imaging, only researchers were able to analyse these traits through such means as microscopes available in laboratories that required a physical inspection of the artworks. Today, these features have been made accessible to the general public. This contributes to 'democratizing' access to specialized knowledge about art and to breaking down the distinction between users, art lovers and professional figures. As one of our informants retrospectively observed:

> *'While images in a text book let users understand the overall structure of a painting, gigapixel technology allows them to see how the artwork was made and to recognize an artist's 'signature strokes'. (James Davis, Programme Manager Google Cultural Institute, 2017).*

Users can also create their own personal list of favourite cultural items in the same way as music playlists are created on Spotify or iTunes, share it on social media, write reviews, share photos, answer questions, add or edit places, thus acting as local guides in the digital world. To do this, they need to log in using their Google account. In this way, their preferences can be used to predict their interests and behaviour, thus contributing to the enrichment of the amount of data and analytics that partner museums receive in exchange for their collaboration.

The final dimension is that of value creation through which Arts & Culture offers its participants new technology-based opportunities in the experimentation of new logics and approaches to disseminate art and culture in new ways. Such experimentation can involve museums, technology and multimedia specialists, users and policy-makers, thereby enlarging the number and type of stakeholders involved in the platform. In doing this, over the years, Arts & Culture has also been able to embody new technological features in the fields of artificial intelligence, machine learning, and virtual and augmented reality. For example, the platform applies a series of image recognition algorithms, based on machine learning, to understand the artwork content independently

from the descriptive metadata supplied by museums. Using over 4,000 tags and keywords (e.g. sun, moon, stars) generated by artificial intelligence, users can browse artworks in a similar way to how they 'Google' words on the web. Moreover, professionals can explore an interactive 3D landscape created by machine learning algorithms that have organized thousands of artworks on the basis of visual similarity to find new pathways. All these forms of participation allow the 'experiments' on other digital platforms (e.g. social media) to be shared, thus creating a community where new meaning can be formed.

Google Arts & Culture is also integrated with virtual and augmented reality features. With Google Expeditions and Google Cardboard, a teacher can guide students through collections of 360° scenes and 3D objects and point out interesting sites and artifacts along the way. Apart from the educational purposes, Arts & Culture has recently refreshed the app with all-new augmented reality features through which users can see real-size artworks in front of them and explore paintings in their own rooms.

The Google platform also favours gamification, namely the practice of providing game experiences in non-game contexts with the aim of generating learning along with entertainment. In these games, smartphones become the media that substitute video guides to access content. Google has recently developed an experiment that matches users' 'selfies' with art from the collections of museums on Arts & Culture through a 'visual similarity' index, which is calculated by machine learning algorithms. Since, in just a few days, people took more than 30 million selfies (Luo, 2018), this possibility seems particularly attractive to museums in order to engage with new, young audiences. From the technology vendor and artist perspective, Google developed 'Tilt Brush', a 3D virtual reality painting application, where movement in a 3D space creates brush strokes that are repeated in the virtual environment.

Table 2 represents the data structure of our analysis and shows the means by which Europeana is delivering value to different stakeholder groups. Table 2 also provides a graphic representation of how we progressed from raw data to concepts (first-order codes in column 1) and themes (second-order codes in column 2) in order to conduct the analyses. For the sake of completeness, column 3 shows the aggregate theoretical dimensions derived from capturing the in-vivo code of our data in theoretical terms (as described in the model proposed by Amit & Zott). Column 3 is dealt with in more detail in the discussion section.

Table 2 about here

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5. Discussion

Table 3 offers a comparative analysis on the value creation mechanisms enacted by Europeana and Arts & Culture by grouping the mechanisms illustrated in Tables 1 and 2 in function of the different stakeholders' interests in the online dissemination of cultural heritage. Comparing and contrasting columns 3 and 4 of Table 3, two main facts emerge. First, Google has been able to enact multiple and more powerful drivers of value creation than Europeana. Second, Google has been more able to meet the multiple interests expressed by different categories of stakeholders and to realign them through the portability of data about heritage in various domains that are related to research, technology development, promotion of the local tourism industry and the local cultural heritage. The following paragraphs discuss these points in detail.

Table 3 about here

5.1 Efficiency-related drivers of value creation

The comparative analysis of the third and fourth column in Table 3 points to transaction efficiency as one of the primary value creation drivers enabled by digital platforms when leveraging on the interconnectivity feature of big data. Such efficiency enhancements are achieved in two ways. The first is by reducing search costs that users and researchers bear to access digitized copies of artworks. Moreover, the reduction in the search costs is made possible by the active involvement of museums and other experts in the platform as content providers. In this vein, the two digital platforms offer a broad aggregation of artworks from different collections and from different museums in a single virtual place.

The second way of achieving efficiency enhancements is related to the reduction in the costs necessary to acquire real visitors and to accompany them to physical galleries. In this regard, Arts & Culture offers museums more value as it allows users to easily access and navigate the collection of any cultural institution by providing links and hyperlinks to the official museums' websites.

5.2 Complementary-related drivers of value creation

By hosting a bundle of goods together, the two digital platforms can convey more value than the total value of having each of the goods separately on every single museum's website. This feature draws on the concept of complementarities among strategic assets as a source of value creation (Amit & Zott, 2001), which in turn can act as a driver of network externalities (Gulati, 1999). By comparing and contrasting columns 3 and 4 in Table 3, it is possible to see that both platforms have the potential to offer vertical complementarities related to combining and integrating digitization capabilities with the capabilities of a museum of generating narrative content around artworks. However, we found limited evidence of vertical complementarities being generated by Europeana, since the platform operates more like an online repository of digitized

artworks (in low resolution) and metadata on such artworks. This reduces the interest of museums in contributing to Europeana, since the platform cannot allow them to express their core capabilities of developing narrative content around artworks.

Furthermore, Table 3 shows that only Arts & Culture is able to offer stronger horizontal complementarities (i.e. offering a 'one-stop-shop' logic in tourism) about which users can access a plenitude of content and information related to culture, arts, restaurants, hotels and other points of interest that are not available on Europeana. In doing so, Google offers museums the possibility of leveraging on the portability that narrative content and digitized artworks can have on the multiple loci available in its digital ecosystem, which integrates different domains like maps (Google Maps, Street View), search engines (Chrome), social networks (Google+), operating system (Android), and is accessible from a variety of devices (computers, smartphones, watches). For example, through the Android and the Chrome systems, Arts & Culture offers its users information about the opening hours of museums, popular times, live visit information, the expected waiting times, the duration of the visits, directions, traffic information and nearby points of interest, including restaurants, hotels and shops. This encourages museums to join the platform in order to facilitate visitors to retrieve the information useful to plan a visit to their physical galleries, thereby reducing their costs for acquiring customers. This type of horizontal complementarity also increases the interest of local tourism institutions in advocating and promoting the use of the platform with the local museums, hotels, restaurants and any other actor involved in cultural heritage and tourism. In doing so, these actors can increase the attractiveness of a local area, thus allowing for end-to-end integration (Karmarkar, 2010) in the provision of a touristic experience. As such, Arts and Culture wins over Europeana as it is part of a broader platform (e.g. Google) that acts as a system integrator for tourism and cultural heritage.

5.3 Lock-in and value creation

Our analysis reveals different lock-in effects generated by the studied platforms. Columns 3 and 4 in Table 3 reveal that the relative benefits offered to users by Arts & Culture are higher than the incentives to stick with the network established by Europeana. Specifically, the integration of Arts & Culture with the set of services offered by Google (e.g. Google Maps, Google Chrome, Google Now, Google Street View, Google +, YouTube and Google Mail) enhance lock-in by enabling users to customize information to their individual needs in a variety of ways. For example, Arts & Culture allows users to create their personalized list of favourite artworks, whereas Europeana does not offer this kind of customization feature. This feature is only possible if Arts & Culture's users decide to log onto the platform with their Google account. In doing so, Arts & Culture can leverage on the knowledge Google has on each user (concerning demographics, interests and behaviours) and propose artworks that better match their socio-demographic profiles (applying the same mechanism already used by Google on YouTube). Thus, Arts & Culture can use the portability of its data to lock-in users to its platform, a mechanism that Europeana – at the time of this study – could not deploy. Arts and Culture also uses portability to create lock-in through the loyalty programs built on Google Maps through the orchestration of a community of local guides that are engaged, by means of a gamification system, in providing knowledge about given points of interest (including museums) in a local area.

Even museums are locked-in on the Arts & Culture platform since they give Google a non-exclusive, royalty-free, worldwide license to use, reproduce and distribute high-resolution copies of their artworks for five years. In the first years of the Arts and Culture initiative, this significantly reduced the interest museums had in contributing to the platform since their fear was that they would be in a situation of relational dependence

and lock-in in the use of their digitized collections. Many museums also feared that a digital player with no specialization on cultural heritage could disseminate their collections in a way that would be very divergent from the one made by the museum in the offline world (galleries, traditional and printed publications). However, our data suggest that the risk of developing relational dependencies was mitigated by those museums that had more resources to invest in online dissemination. Such museums have eventually developed an online dissemination strategy that is based on putting their digital content and data on their proprietary website and using their presence on Arts & Culture just to exploit the platform in order to attract visitors to their own websites. The Van Gogh Museum is an excellent example of this strategy: although most of the digital content and data are located on the official website of the Van Gogh Museums, the museum has a good presence on Arts & Culture that is motivated by its willingness to reach a global audience. Moreover, despite the risk of developing relational dependencies, the interest of museums in being involved on the platform may be motivated by the opportunity of 'learning new things' about how digital technologies can be applied to disseminate art and culture in novel ways. This point is related to the value creation mechanisms connected to novelty, which are explained below. In general, museums overcome the fear of somebody from outside the industry (Google) disseminating content in ways that could be very different and non-appropriate in reference to the principles that are well-established in the museum and in the community of art experts. What was decisive to this end was the intention of Google to explore novel ways of disseminating art and of enlarging its audience, which is a strategic objective that is well-rooted in the mission of every museum.

5.4 Novelty and value creation

Digital platforms support cultural organizations in providing new dimensions of value creation that are related to the introduction of new products or services (e.g. digital images in ultra-high resolution), new methods of dissemination (e.g. customization, experimentation, co-creation and gamification) and new ways of doing business. For example, the possibility offered by digital platforms to experience the global cultural heritage 24/7 and for free represents a discontinuity in the traditional structure of transactions between cultural organizations and users. This represents a fundamental pillar for the creation of 'equality of cultural opportunity', which Cameron (1971) suggested for his vision of museums as forums. This pillar espouses the interest of policy-makers in making art dissemination more democratic and knowledge more accessible, thus breaking down the distinction between users and researchers.

Unlike Europeana, Arts & Culture has a dedicated section for experiments which encourages users to 'try experiments at the crossroads of art and technology'. By combining cultural data with machine learning and artificial intelligence techniques, Arts & Culture takes users on the scenic route by showing hidden paths, surprising connections, masterful works by unknown artists or the hidden beauty of mundane objects.

Our data analysis shows that by using digital technologies to experiment with art, Google Arts & Culture realigns the interest of multiple stakeholders by enhancing new dimensions of value creation. For users, experimenting with art, science and history content creates 'a feeling of fullness which can be taken as reality' (Bolter & Grusin, 1999). For cultural institutions and policy-makers, the forms of experimentation made available by Google create new entertainment opportunities of providing game experiences in non-game contexts with the aim of generating learning along with

entertainment. Moreover, artificial intelligence tools for pattern recognition and machine learning algorithms for pattern matching enhance the research opportunities for researchers and academics, while augmented and virtual reality encourage the development of new products and services by specialized suppliers.

5.5 Value creation and convergence in stakeholders' interests

Google Arts & Culture achieved an advantage over Europeana in realigning the multiple stakeholder's interests and in engaging them in sharing data with the platform. This is due to Google's capacity to enact all four mechanisms of value creation defined by Amit & Zott (2001) when combining interconnectivity and portability.

Figure 1, which qualitatively emerged from the analysis of our data, illustrates this process of convergence and alignment of interests between the platform's owner and the multitude of stakeholders participating in the platform, and extends the value-driver model proposed by Amit & Zott in e-business. In other words, Figure 1 shows that each single value driver enacted by the platform contributes to creating value for a specific group of stakeholders. Only by enacting all four value drivers together can the platform attract all the different stakeholders' interests, thus creating higher value over the entire ecosystem. In other words, the higher the platform's capability is to enact multiple value drivers on the online world through interconnectivity and portability in big data, the higher the convergence in the interests expressed by different stakeholders in joining the platform, and the higher the value created in the platform ecosystem.

Figure 1 about here

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6. Conclusion

This paper has taken steps toward extending the analysis on the evolution of the cultural heritage sector by means of digital platforms and has discussed how digitization and big data are shaping this process by enabling new ways of creating value and of espousing the different types of interest expressed by the different types of stakeholders.

Our findings document how Google Arts & Culture has been more effective than its main rival platform – Europeana – in competing on the variety, customization and experimentation of artworks accessible online and in offering a one-stop-shop logic for all the relevant content and information. Specifically, our empirical evidence shows how Google Arts & Culture has enhanced the four drivers of value creation, namely efficiency, complementarities, lock-in and novelty, as defined by Amit & Zott (2001), more than Europeana. The fact that Google's platform has been able to enact these drivers jointly is at the same time both the reason for and the consequence of having favoured a process of convergence in the interests expressed by different stakeholders through the big data's sociotechnical features of interconnectivity and portability.

In raising this issue, our contribution is twofold. First, we contribute to research on value creation from big data and its supporting technologies. Specifically, we document how a process of convergence and alignment of interests between platform owners and participants can enable the creation of value from digitization and big data. We show that the portability mechanism assumes a central role in this process as it allows one to leverage on large volumes of varied data generated by different actors (museums, specialized suppliers, users, scholars, the platform orchestrator and others) and to reuse them in valuable ways in other industry contexts, such as education, tourism and content generation in the multimedia sector. This confirms the socio-technical nature of the portability feature of the big data concept. The stakeholders that have joined and that

exchange services on Google Arts and Culture represent a more heterogeneous network of actors than the actors in the ecosystem developed by Europeana. The needs, strategic beliefs and interests of many of the actors in this network were divergent at the beginning, and the Arts and Culture initiative has realigned them toward a convergent direction. Interconnectivity and portability emerge from the research as being more important than industry-specific knowledge in favouring such a process of alignment of interests expressed by different stakeholders.

The second contribution we point out is related to our evidence that shows the role big data have in changing the structure of industries – such as tourism – which are dominated by well-established business logics. In this vein, through the mechanisms documented in the paper, Google is assuming the role of system integrator in the cultural heritage ecosystem. This raises important managerial and policy-making implications in the cultural heritage industry and in its supporting and related industries, such as tourism.

The most evident implication is that cultural organizations are required to experiment with digital platforms in multiple and novel ways to create economic and cultural value in order to make their collection visible online. Second, new managerial tensions and trade-offs are emerging for museums since big data and online platforms put them in a more complex networks of stakeholders. Among such tensions, the most evident one is between 'open' and 'closed' approaches in the museums' online dissemination strategy. On the one hand, reasons related to maintaining brand identity and controlling the content disseminated online push museums toward vertically integrated strategies based on reducing the amount of collaboration and content given to digital platforms such as Google. On the other, since Google Arts & Culture is emerging as a platform in which a city, a region or a country is in competition with other areas to attract real (and not virtual!) international flows of tourism, policy-makers and local tourism institutions are

pushing museums toward more collaborative approaches with digital platforms. Institutions and policy-makers in the educational context can apply the same logic.

This reasoning and the conflicting objectives museums have to face in the way they decide on how to 'go-online' paves the way to future studies that could apply: (a) the institutional theory, to understand how digitization and big data are shaping the industry structure and the institutional forces at work in the industry; (b) theoretical approaches based on the concept of ambidexterity to understand how to balance a museum's digital presence on different media in order to align the different logics and interests expressed by a composite array of multiple stakeholders.

Acknowledgements

The authors would like to thank Giorgia Abeltino, James Davis and Valeria Gasparotti (Google Cultural Institute), Conxa Rodà (Museu Nacional d'Art de Catalunya), Jacqueline Duerinck and Martijn Pronk (Van Gogh Museum), and Eike Schmidt and Marzia Faietti (Uffizi Gallery) for their valuable input. We would also like to show our gratitude to Ian Brunswick and Danny Browne (Science Gallery Dublin), Chiara Bernasconi (MoMA), Christian Greco, Samanta Isaia, Paola Matossi L'Orsa and Enrico Ferraris (Museo Egizio), Marcela Sabino (Museu do Amanhã), Carlotta Margarone (Palazzo Madama) and Eva degli Innocenti (Museo Nazionale Archeologico di Taranto) for sharing their pearls of wisdom with us during the course of this research. We also extend special thanks to guest editors and two anonymous reviewers for their insightful suggestions which were critical to the development of the paper.

Disclosure statements

No potential conflict of interest has been reported by the authors.

Funding

This work has been partially supported by 'Ministero dell'Istruzione, dell'Università e della Ricerca' Award 'TESUN-83486178370409 finanziamento dipartimenti di eccellenza CAP. 1694 TIT. 232 ART. 6'.

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Tables

Table 1 - Europeana in-vivo code (data table): value creation for different stakeholder groups

First-order concepts Value creating activities and beneficiaries in parentheses *(stakeholders)*	Second-order themes	Aggregate dimensions Drivers of value creation
• Online visibility *(cultural institutions)* • Promoting European cultural heritage in the online world *(cultural institutions)* • Facilitating online aggregation of artworks while maintaining close control of IPRs *(cultural institutions)*	**Aggregate** *'Building the open trusted source of European heritage'*	Efficiency
• Searching for cost reductions (e.g. through filtering tools) *(users, researchers)*	**Access** *'Facilitating knowledge access in the cultural heritage sector'*	
• Facilitating content and knowledge sharing *(users, researchers)* • Creating an online retrieval system to make artworks widely available to instructors and schools *(policy-makers)* • Encouraging partnerships to deliver content in new ways *(tourism institutions, specialized suppliers)*	**Disseminate** *'Making heritage available to users wherever they are, whenever they want it'*	Complementarities
• Engaging users in content co-creation (e.g. providing family memorabilia on a First World War collection '1914-1918') *(users)*	**Engage** *'Cultivating new ways for users to participate in their cultural heritage'*	

Table 2 - Google Arts & Culture in-vivo code (data table): value creation for different stakeholder groups

First-order concepts Value creating activities and beneficiaries in parentheses *(stakeholders)*	Second-order themes	Aggregate dimensions Drivers of value creation
• Providing online visibility to museums and other cultural institutions *(cultural institutions)* • Sustaining the museums' digitization process of their cultural heritage *(cultural institutions)* • Promoting excellence and local traditions *(policy-makers, tourism institutions)*	**Aggregate** *'Leveraging on our digitization technologies and indexing capabilities'*	Efficiency
• Providing access to artworks in high resolution and with 360° virtual tours *(users, researchers)* • Searching for cost reductions (e.g. through filtering tools) *(users, researchers)* • Accessing a platform through multiple digital channels/devices *(users, tourism institutions, specialized suppliers)* • Providing real-time updated information about a physical gallery (e.g. opening hours, directions, popular and waiting times) *(users)* • Integrating a museum's content in the local touristic ecosystem of the city *(tourism institutions)* • Providing cultural institutions with analytics on their online attractiveness *(cultural providers)*	**Access** *'Reaching a global audience by publishing content on multiple platforms anytime, anywhere'*	
• Facilitating the sharing of knowledge and digitized copies of artworks *(users, researchers, museums)* • Providing storytelling tools *(cultural institutions)* • Co-creating exhibitions by involving different museums *(cultural institutions)* • Making an online retrieval system available to schools and instructors by providing specific educational tools (e.g. Augmented Reality) *(policy-makers)* • Creating partnerships to deliver content in new ways *(tourism institutions, specialized suppliers)*	**Disseminate** *'Bringing artworks and artifacts to life and creating beautiful stories'*	Complementarities
• Powerful zooming with images in ultra-high resolution *(users, researchers)* • Google set of services and ease of use *(users)*	**Engage** *'Getting involved in the global community by*	Lock-in

• Curation and sharing of a museum's own art collections *(users)* • Loyalty programs based on user-generated recommendations and information about museums and other points of interest on Google Maps • *(users, tourism institutions)*	*curating, connecting and sharing'*	
• Providing access to Google's proprietary virtual and augmented reality apps for cultural heritage *(users)* • Exploring Artificial Intelligence tools for pattern recognition and matching related to artworks in an open source fashion, in order to encourage innovation from specialized suppliers and museums *(cultural institutions, specialized suppliers, policy-makers)* • Providing tools to create art digitally (e.g. Tilt Brush) *(users, specialized suppliers)*	**Experiment** *'Magic happens when technology meets culture'*	Novelty

Table 3 - Comparative analysis of the value creation mechanisms enacted by Europeana and Arts & Culture for different stakeholders' groups

Stakeholder category	Stakeholders' perspective on the value of digital platforms in sustaining the online dissemination of cultural heritage	Value created by Europeana for the stakeholder category	Value created by Google Arts & Culture for the stakeholder category
Users	Accessing the cultural heritage through meaningful and inspiring online experiences	• **Efficiency** *(search costs reduction)*	• **Efficiency** *(search costs reduction)* • **Novelty** *(experimentation through digital technologies)* • **Lock-in** *(higher switching costs for users)*
Researchers	Reducing costs for searching and exploiting primary resource materials for research purposes	• **Efficiency** *(search costs reduction)*	• **Efficiency** *(search costs reduction)* • **Novelty** *(new inspection tools)*
Museums and other cultural institutions	Extending the collection's visibility to a wider community	• **Efficiency** *(costs for promoting brand awareness)*	• **Efficiency** *(in visitors acquisition costs)* • **Complementarities** *(horizontal and vertical)* • **Novelty** *(experimentation through digital technologies)* • **Lock-in** *(higher switching costs for museums)*
Specialized suppliers	Developing innovative digital products and services around arts and culture	• **Complementarities** *(limited evidence of vertical complementarities)*	• **Complementarities** *(horizontal and vertical)* • **Novelty** *(gamification through digital technologies)*
Tourism institutions	Promoting tourism in a region and attracting touristic inflows		• **Complementarities** *(horizontal and vertical)*
Policy-makers	Multiple interests: 1. Preserving cultural heritage 2. Building awareness about local cultural heritage 3. Promoting local tourism by giving online visibility to local cultural heritage	• **Efficiency** *(in building online visibility for cultural institutions)*	• **Efficiency** *(in aggregating online local cultural institutions from different fields)* • **Complementarities** *(vertical)* • **Novelty** *(new ways to disseminate art)*
Features of Big Data used to create value		• **Interconnectivity**	• **Interconnectivity** • **Portability**

Figures

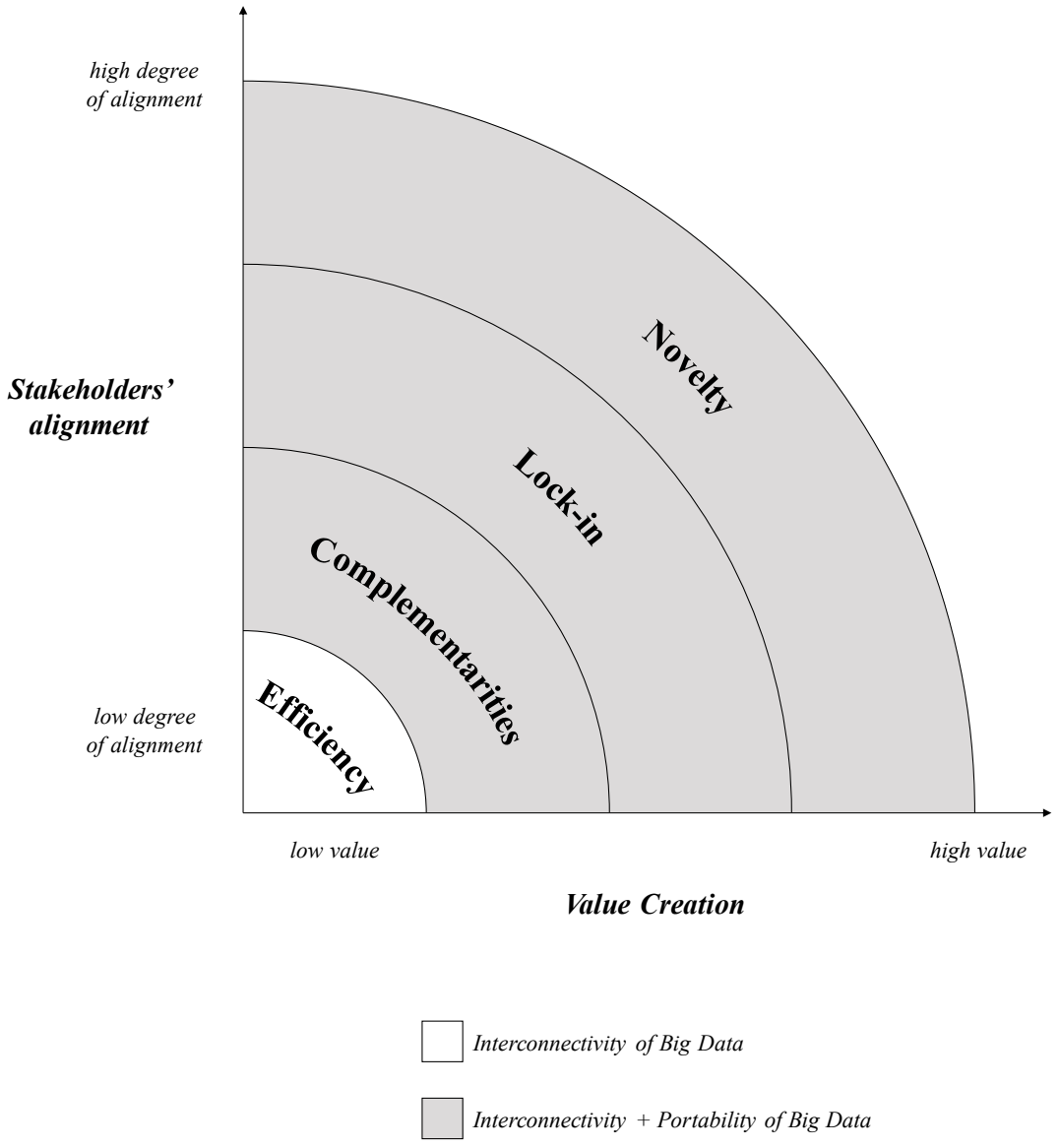

Figure 1 - Value creation and stakeholders' alignment

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