

Valter Cantino, Francesca Culasso, Gabriella Racca

Smart Tourism



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Valter Cantino
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Preface

A smart tourism approach aims at enhancing tourism development through tailored ICT-driven innovation that empowers tourism entrepreneurs and the tourism sector overall. In other words, the smart use of technology for sustainable and shared supply chain as well as the digital layout for tourism destinations are the mainstems of new business models. In such a way, the tourism destination management may be improved by increasing transparency, demand without intermediation and enabling local governments to make better informed decisions.

Within this context, a research question occurs: *Which is the strategic attitude allowing the enhancement and development of the tourism sector?* Being **SMART** is certainly one response. Indeed, the higher level of smartness in the tourism sector should be achieved by the linkage between the following fundamental key features: **Sustainability, Measurability, Awareness, Recognition, Technology.**

Therefore, this book aims at developing conceptual, empirical, experimental researches and case studies around managerial tools and strategies for improving and re-shaping business models within the field of tourism destination management. The five issues mentioned above are fundamental to achieve an effective and integrated management of tourism strategies.

First, sustainability in tourism involves the promotion of more responsible and efficient tourism strategies including, but not limited to, innovative firm-territory-environment relationship, value co-creation, sustainable financial business models and operations.

Second, according to the measurability of tourism impacts, a more holistic accounting and reporting method should take into consideration the impacts and the effects of the tourism dynamics in more details and within a wider social and economic perspective. In addition, also adequate financial tools to support the management process in measuring impacts need to be better investigated.

Third, in terms of awareness of stakeholders, it fosters integration and participation of all stakeholders throughout the tourism supply chain in terms of individuals and communities' empowerment and human resource strategies for tourism and hospitality.

Forth, recognition of the value of common resources means looking for good and virtuous practices that protect and enhance the common goods and natural areas through regulation and institutionalization, that has been lacking in literature yet.

Last, the role of applied technologies is crucial for tourism processes and procedures. Transparent and trustworthy data are required in order to specifically outline the socio-economic outcomes that support the sustenance of tourism. Therefore, technology could strengthen this aspect by providing innovative information system processes, alternative ways of structuring and qualifying the offer, and managing payment systems, financial instruments and procedures in the tourism sector.

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Unlocking museum digital innovation. Are 4.0 Torino museums?

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This research aims to analyze the Torino museums readiness in the digital technology journey. Our focus is to understand how museums face digital challenges both on the supply side, the perspective of Torino museum managers, and on the demand side, the perspective of visitors' experience. After a first analysis on all Torino museum websites, 15 mystery tours have been conducted in the best ICT ranked museums. A mixed methods research design was employed, integrating quantitative and qualitative methods in data collection and analysis. This paper contributes to the knowledge gap in the area of stakeholders' perceived value of ICT in Torino museums. The main contribution is to raise the awareness of the level of response of the Torino museums to the change required by digital transformation, activating a process of continuous improvement that will enable more effectiveness in the dissemination of knowledge and more engagement in visitors' experiences. This study takes an in-depth look at the opportunities provided by digital technologies to enhance the cultural heritage experience. It could be useful to identify best practices, benchmarks, critical points, and errors to avoid.

Keywords: Digital Innovation – 4.0 Museum – New Technologies – Tourism – Cultural Heritage.

1 Introduction

Over the last decade, digital technologies and the social web have increasingly involved the museum industry, creating spaces for interaction and sharing among the various cultural stakeholders, leading to a constructivist approach of communication and learning (Hooper-Greenhill, 1999; Lazzeretti et al., 2015a). Digital technologies are contributing to reshaping museums' role and mission as producers and distributors of cultural value (Lazzeretti et al., 2015b) and their pervasiveness is transforming many aspects of the cultural offer by attracting and satisfying new audiences. The widespread use of social media is a key strategic trend creating, developing and delivering innovative business models, with services and solutions, where physical and digital boundaries are blurred and visitors are transformed into "prosumers" (Bertacchini & Morando, 2013; Pulh & Mencarelli, 2015). As a consequence of the progressive transformation of stakeholders into solution-holders, museums have started to rethink their business, becoming community-oriented, led by more communicative and inclusive strategies (Cerquetti, 2016; Solima, 2016). Indeed, digital technologies represent extremely useful tools to enhance visitors experience and to unlock cultural values through effective communication strategies (Pallud & Straub, 2014), reaching millions of users through multiple channels: videos, social media, website updates, email campaigns, blog posts, the app, audio guide, in-gallery interactives, digital transactions, and other digital solutions.

In this scenario, our paper represent a part of a wider project focused on museums and digital innovation, to evaluate how digital technologies are changing the museum offer and the visitor experience. The relevance of the research will provide important suggestions for ways in which museums can boost up visitors experiences and achieve their institutional targets, triggering new forms of competition (Porter & Heppelmann, 2014). Why deal with museums and digital innovation in Torino? The number of museums in Torino since 1990 has more than doubled, ranging from 30 to 62. This museum growth, which is a worldwide phenomenon, should be read, especially for Torino, as one of the effects of a more general urban repositioning process (Gilli, 2015). The "tourismification" (Jansen-Verbeke, 1998) of Torino is a process that has lasted for years, but has been consecrated by hosting a mega-event (Olympic winter games) in 2006.

In the background of the museums' transformation and the digital technologies diffusion in the cultural offer, our study aims to outline how and to what extent digital technologies are spreading in the Torino museum offer. Accordingly, this paper addresses two relevant research questions (*RQs*): *RQ1*) Which strategies and practices guide the Torino museums digital readiness? *RQ2*) These strategies can be clustered into different types of digital strategy approaches?

Our research project implies the analysis both of the supply side, by collecting Museum managers opinions on digital technologies practices, and of the demand side, by analyzing the offer of technological devices and services offered to the visitors. This paper is devoted to analyze the demand side. The remainder of the paper is structured as follows. First, a review of the literature and the theoretical framework of the study are presented. The methodology and results of analysis are then summarized. A discussion of the results and the final conclusions are finally outlined.

2 Literature review

The scientific debate on digital innovation of cultural institutions has been enriched with interesting contributions and many empirical evidences that have deepened explored the ICT technologies impacts, benefits and constraints. Over the past years, digital technologies and the web have gained a greater and more important role in communication and dissemination of knowledge by museums that are riding the wave of digital innovation to respond effectively to the changing needs of their public (Grinter et al., 2002; Camarero & Garrido, 2008; Srinivasan et al., 2009; Proctor, 2010; Bonacini, 2012). The increasing interest of scholars regarding the impact on the museums of the digital era (Parry, 2007; Tallon & Walker, 2008; Jarrier & Bourgeon-Renault, 2012; Parry, 2013; Nigro et al., 2016; Solima & Izzo, 2017) is a consequence of awareness that ICT can be considered, first of all, as a valuable and innovative way for visitor's engagement, promoting edutainment, interactivity, immersive experiences and narrative environments (Bertacchini & Morando, 2013; Cerquetti, 2016), in a visitor-oriented approach (Ballantyne & Uzzell, 2011; Villeneuve, 2013; Di Pietro et al., 2014), but also a way, for the cultural institution, to be more competitive and sustainable, maximizing the value creation for its stakeholders (Camarero & Garrido, 2012; Nigro et al., 2016; Sibilio, 2014). Camarero & Garrido (2008) analyzed the mediating role of technological and organizational innovation between market orientation and socio-economic performance in Spanish, French, British and Italian museums. They find a correlation between technological innovation and museums' economic performance, where the latter refers to their indirect economic effects, such as the increased attendance at the physical museums, as identified by curators' self-evaluation. Likewise, Nuccio & Bertacchini (2016) demonstrated that ICT technology and especially the combination of connectivity and digitalization have the potential to dramatically enhance participation in cultural activities and, at the same time, provide cultural organizations with tools to track and analyze consumer perceptions, sentiments and feelings, thus allowing unprecedented opportunities to reorient and enhance the value proposition of cultural activities and their organizational and managerial practices (Falk & Sheppard, 2006). In this scenario, Lazzaretto et al., (2015b), investigated the adoption of ICT and innovation processes in museums, and their interaction dynamics between the different communities of specialists (museologists,

marketers, technology developers, etc.) involved in digitization projects, within and outside the museum. Nowadays, the use of information and communication technologies, web and social media are transforming museum's business models, broadening their traditional functions through the increasingly widespread use of IoT smart objects and technologies (Camarero & Garrido, 2012; Vicente et al., 2012; Nigro et al., 2016; Solima, 2016).

2.1 ICTs and visiting-experience

Cerquetti (2016), analyzing publications on museum audiences of the last 20 years, investigated the increasing attention paid to audience development, underlining the central role of digital technologies for museum innovation, both for the improvement of service quality and the attraction of new audiences. Digital innovation in museums is crucial for generating more revenue as well as attracting and engaging wider audiences (Camarero & Garrido, 2012). Indeed, the focus of researches regarding the impacts of ICTs on museums has shifted from the mere digitization of collections (Chae & Kim, 2010; Bertacchini & Morando, 2013) towards the creation of two-way interactions between the museum and its audience, as well as the sharing of experiences among visitors. Likewise, Lazeretti et al. (2015a), pointed out the phenomenon of the transition from a transmission model where the museum visitor is a passive receiver to a constructivist approach where communication is understood as a process of sharing, participation and association (Hooper-Greenhill, 1999, Hellin-Hobbs, 2010; Bonacini, 2012), especially in connection with the advent of the Social Web, including new systems of interaction ranging from forums and blogs to social media, which have been emphasized as an opportunity for the formation of online communities who engage in the exchange of knowledge and personal interpretations (Lopez et al. 2010; Fletcher & Lee, 2012). Museums also need to acknowledge that public expectations are changing rapidly, especially for younger audience, for whom digital devices are a normal part of life. Some researchers (Charitonos et al., 2012; Pavlou, 2012) showed the potential of social and mobile technologies as "learning tools" that support and enhance visitor's learning experience, especially for children and young adults. Moreover, in a recent study by Pallud (2017), it has been outlined a new model to assess visitors' interactions and learning with technologies in a museum setting. In her research emerged that technological dimensions elicit emotional reactions such as a sense of immersion, curiosity, enjoyment, and authenticity that will, in turn, lead to a positive and highly learning experience.

2.2 Museums' Web and Social Media

Web and Social media enable museums to redesign traditional products and promote new cultural experiences by involving a worldwide network of potential visitors, who could take part in the production of the cultural service, both before

and after visits (Marty, 2007). Consequently, a proper understanding of how museum visitors use these digital museum media in their daily lives is critical for the success of museums in the digital era (Padilla-Meléndez & Del Águila-Obra, 2013). The comparative study of Lopez et al. (2010) on the presence of Web 2.0 spaces in museum websites, has shown that the use of ICT to encourage participation and collaboration on museum sites is still very poor and far more widespread in the United States than in Europe. The reason may, however, be sought in the progressive shift of online interactions from the museum individual site to its profile open on global social networking platforms such as Facebook, Instagram, Twitter, Snapchat. As highlighted by Hellin-Hobbs (2010), social media play the strategic role of participation and two-way communication between museum and visitors in a dynamic relationship that is not limited to mere information exchange, but rather pursues learning objectives and co-production of knowledge (Fletcher & Lee, 2012; Pulh & Mencarelli, 2015). On this topic, researchers founded that the use of social media by museums may be categorized into few organizational frames: a) marketing, which promotes the face of the institution, b) inclusivity, which develops a real and online community and c) collaborative, which goes beyond communication and promotes collaboration with audience. In a similar vein, Padilla-Meléndez & Del Águila-Obra (2013) presented a theoretical framework for understanding the online strategies of the 40 worldwide most physically visited museums, pointing out their use of Web and social media, as well as their sources of online value (efficiency, novelty, lock-in, complementarities) and some measurements of Internet performance. The museums' online strategies has been categorized as defender, analyzer and prospector.

2.3 Digital devices and interactive technologies IoT based

Nowadays museums are involved in the advent of the "Internet of Things" (IoT) era, with the opportunity to improve their visitors' experience and achieve their institutional targets, triggering new forms of competition (Porter & Heppelmann, 2014), thanks to the growing adoption of smartphones and context-aware technologies that give mobility to the user that is potentially "always on" (Solima, 2016). GPS, tagging technologies such as Quick Response (QR) codes and Radio Frequency Identification (RFID) or iBeacons and a multitude of specific "apps", have been used successfully for museums' innovative experiences. QRCode is a barcode used to store smartphone-readable information after downloading an app. Unlike the QRCode, the RFID code also allows visitors to track the visit paths (this is also the case for apps on smartphone and audio-pen). One could note that this is a useful information about the behavioral profile of the visitor, as well as the under-or-over-use of the exhibition halls (Solima, 2013); hence the possibility of rationalizing flows and optimizing itineraries (Yoshimura et al., 2014). In addition, this service can also perform a "indoor mapping" function (Martin-Brualla et al., 2014; Ijaz et al., 2013): visitors can locate their position on the map and reach faster the places they are interested to. The Augmented Reality (AR) is

a digital exploration of an environment through a camera on the mobile device, which is able to superimpose “layer” information, usually in text form, to the images that come show on the display. Different from the AR is the Virtual Reality (VR) namely, a digital reconstruction of an environment where visitors are immersed and can interact with the digital content, even by manipulating - in a virtual way - the objects in it (Solima, 2016; Guidazzoli et al., 2014). On this topic, Carrozzino & Bergamasco (2010) tested immersive Virtual reality (VR) as one of the most appealing and potentially effective technologies to communicate cultural content. They presented some examples showing that this technology, thanks to its compelling and appealing features, might act as a “picklock” particularly useful to target segments of the public, especially young people, more comfortable with new media than with traditional communication means. To remain relevant to the public, break down barriers to participation and unlock learning, museums need to take digital strategies seriously and ensure that their services can be accessed through the digital devices people use every day.

3 Methods

This paper canvases the relationship between digital technologies and museums in the context of a so-called participatory culture (Jenkins et al., 2015). It draws on multiple sources of data (semi-structured interviews, observations, information from websites, internal documents, publications and institutional communication of the museum) collected and analyzed with an ethnographic approach, taking a constructivist learning perspective (Magliacani, 2008, Hohenstein & Moussouri, 2018) to map the digitization readiness of Torino museums and their effectiveness on the visitor’s engagement and user experience.

The combination of diverse data sources reinforces result triangulation and leads to more specific insights (Stake, 2013; Yin, 2003). Interviews with the museum’s management, conducted according to the methods designed by Brinkmann & Kvale (2015), aimed to understand the internal perspective of technological aspects about the digitization process and its role within the overall marketing and communication strategies. Data analysis was carried out by using open and axial coding techniques (Strauss & Corbin, 1998) for identifying and linking the qualitative data collected to the research question. Particular attention has been paid to coding separately the categories of objective descriptive data on the one hand, and of interpretative data based on perceptions and opinions on the other.

The institutional websites of these museums has been analyzed through an ICT Facilities Evaluation Form, which aimed at mapping all the technological services announced by each museum on the web. The technological services under investigation have been grouped according to their reference to one of the three phases of fruition of the museum “product” (Nigro et al., 2016):

- a) antecedent (or pre-visit) phase: evaluation of the services - offered on the official website and related social media - that have an impact on the decision to visit a given museum;
- b) concurrent or visiting phase: evaluation of the technological facilities available to the visitor during the visit;
- c) subsequent (or post-visit) phase: evaluation of the web services dedicated to test visitors' satisfaction and to activate in them attitudes of loyalty.

New technologies are not only useful in the visit phase, offering unforgettable and more interactive experiences to their visitors, but they also play an important role in the decision-making phase (before the visit), facilitating the choice thanks to on-line virtual tours and on-line ticketing; moreover, ICT are important after the visit, enabling a visitor's fidelity through initiatives aimed at meeting customer needs. Despite evidence from several studies illustrated the different points of view through which ICT and museums have been studied over the years, no research has mapped in a comparative way the broad digital readiness of the museum offer in a comprehensive city context.

After this first phase of analysis, some mystery tours (Munsters, 2010) in those museums that invest more in ICT (they have been called "the Top15") has been played, trying to give a first evaluation from the visitor's point of view. The mystery tour method consists in structured participant observation in which one or more (in this case two) mystery clients visit individually the museum, testing and evaluating the digital technology services offered during the visit through a previously prepared questionnaire. These two confederate 'tourists' visited individually the 15 museums each at different times of the week but always during peak times. The features of our two mystery clients were: being males, middle-high education, aged between 20 and 25. Comparing the results of the mystery tour performed by the two mystery clients they reach a consensus percentage of 60% (Cohen K test), that is, a fair degree of reliability (Munsters, 2010). This paper reports the main results of the first part of the research.

4 Mapping 4.0 Museums in Torino

Torino's museums are 62 (www.comune.torino.it). From them we selected those a) with website of their own, and b) open to the public in accordance with a fixed timetable (i.e., excluded those visitable by reservation): their number is 42. The situation of Torino could be considered rather good: 66.6% of the museums fulfilled these requisites, whereas, according to surveys at a national level, only 57% of the museums are in a similar situation (ISTAT, 2015).

We analyzed the institutional websites of these museums through an ICT Facilities Evaluation Form aimed at mapping all the technological services of the

three phases of fruition of the museum (Nigro et al., 2016) announced by each museum on the web.

As for the pre- and post- visit phase the Evaluation Form first verified the possibility to book online (either directly or through an external site) and to enter the contents of the museum (virtual catalog, photo and museum descriptions, video and virtual tours). Secondly, we have investigated, for each museum, the presence of social media, of the newsletter, of the press review, of blogs/forums, of an interactive map to reach the site and, finally, the possibility of purchasing souvenirs online. In addition, we have asked by phone whether a) there is a free admittance to Wi-Fi (with or without the obligation, as a precondition, to register the account), and b) visitors are allowed to take pictures in the museum (these photos are often posted on social media and shared with a wide audience of potential new visitors). Finally, we have verified the usability of the museum website through smartphone, both in terms of upload speeds (through the Google Page Speed Insights program), and in terms of web page viewing (through the Mobile-Friendly Program test). These two tests were directed to check whether a) the website was readable through a smartphone and b) the web design adopted was of an adaptive type, with a separate website specifically created for mobile devices, or of a responsive type, using the same pc-readable website, which fits the shape and size of the smartphone screen (Mich & Peretta, 2016). The following tables (table 1 - 4) show which technological facilities are offered by our museums, and how many.

Table 1 ICT facilities offered on the museum websites (N=42).

<i>WEB TECHNOLOGIES</i>	<i>N^g</i>	<i>%</i>	<i>WEB TECHNOLOGIES</i>	<i>N^g</i>	<i>%</i>
Direct online booking	8	19	Press review	6	14
Online booking through external site	8	19	Blog/forum	3	7
Virtual catalog	12	29	E-mail for complaints/requests	11	26
Photos/descriptions of the museum	39	93	Online purchase of merchandising	9	21
Video of the museum	21	50	Interactive maps of the museum	8	19
Virtual tour of the museum	6	14	Interactive map to reach the museum	31	74
Newsletter	20	48	Traditional map to reach the museum	5	12

Source: authors' elaboration from the museum websites.

As for the pre-visit services, in 38% of our museums it is possible to purchase a ticket online. The corresponding percentage of the Italian museums is 6.6% (ISTAT, 2015); However, before any comparison, we should note that this 38 % has been calculated within the 'privileged' sample (N=42); when the universe of Torino museums is considered (N=62), this percentage becomes 30%. Almost

every museum (93%) has pictures and descriptions of the museum; half of them also offer a video on it, but only a few allow visitors to make a virtual tour (14%). Five of the six museums that offer a virtual tour of the museum on the institutional web are included within Google Arts & Culture (formerly Google Art Project), an online collection of high resolution images of works present in various museums throughout the world, as well as a virtual tour of the galleries where they are exhibited. The percentage of the museums that have a digital catalog of the works (29%) is good (even when corrected: 19%), especially when compared to the national average (13.4%; ISTAT, 2015). A newsletter is present in 48% of the cases (32% when corrected): 24.8% the Italian percentage (ISTAT, 2015); this means that the investment in social media by Torino museums may have diminished the importance attributed to the newsletter. As expected, blogs and forums on the sites have virtually disappeared due to the advent of social media (7% versus 11.1% of the national average; ISTAT, 2015; less than 5% the corrected percentage). Surprisingly, the possibility of buying online souvenirs and other items is not diffuse: only 21% of our museums (corrected percentage: 14%) offer online shopping, and the range of the souvenirs to buy is not very wide, apart from some museums like, for example, the Egyptian Museum. Surveys carried out on a sample of more than 400 Italian museums by the Osservatorio Innovazione Digitale nei Beni e Attività Culturali (Digital Innovation Observatory on Cultural Heritage, Politecnico of Milano) indicate a much more limited 6% for online purchasing (www.osservatori.net), but an international survey on 40 most-visited worldwide museums, shows that these museums have the online store in the 72,5% of the cases (Padilla-Meléndez & del Águila-Obra 2013).

What about the use of the smartphone to access the museum website? More than one third of our museums (35,7%, N=15; 24,1% the corrected percentage) are not readable by smartphone. Within those with a readable site, the adaptive solution, that is completely optimized for mobile devices, ensuring a best user experience, is present in only one case (2,3%); the others (61,9%; N= 26) have chosen a responsive mode, a web design that fits exclusively to the shape and the size of the device screen. As for the upload speed of the museum websites, we could add that little more than one fourth (28.5%; N=12) have a considerably good loading time (between 51- 70%). Furthermore, the two websites with an excellent loading time (more than 71%) cannot be accessed through smartphone.

Let's go to the visit phase. Table 2 shows the technological services available during the visit.

Table 2 ICT services offered during the visit (N=42).

<i>FIXED TECHNOLOGIES</i>	<i>N^o</i>	<i>%</i>	<i>MOBILE TECHNOLOGIES</i>	<i>N^o</i>	<i>%</i>
projection screen	20	48	audio-guide	8	19
touch screen and/or interactive table	12	29	video-guide	1	2
QR and RFID technologies	4	10	audio-pen	1	2
3D screen	2	5	app for smartphone	4	10
work and play station	2	5	free Wi-Fi	13	31
virtual reality	0	0	audio-guide for blinds	3	7
olfactory technology	2	5	video-guide for deafs	1	2

Source: authors' elaboration from the museum websites.

Plainly, the most used technologies are the fixed ones, with a majority of projection screens (48% of the museums) and touch screens (29%). This could suggest that visits still have a 'passive' dimension, mainly based on sight and listening, with little interactive and multi-sensorial implications. However, these figures (even when corrected: 32 and 19 % respectively) may be considered positive, since only 19.5% of the Italian museums have space for video projections, interactive layouts and / or virtual reconstructions (ISTAT, 2015).

Among the technological innovations adopted within the internal itineraries there are the QRCode and the RFIDCode. We have found the QRCode/RFID technologies only in four museums; their aim is to give information about the exhibited works. The lowest percentages found in our museums concern interactive technologies such as work and play-station (5%), despite the fact that these technologies are liked by both children and adults. We find them only in two museums: the Risparmio Museum and the Car Museum (hereafter MAUTO in the text). Again, we found immersive technologies such as 3D video and cartoons in only two museums (5%; Cinema Museum, Risparmio Museum). Finally, a word about virtual reality. We have not found examples of virtual reality in Torino museum exhibition design.

Among the mobile technologies belonging to the "Information centered" macro area (La Rocca, 2014), although the traditional audio-guides prevail (19%), the smartphone apps begin to appear (10%). On the whole, they are more fitting for visitors' requirements, shaping the visit in relation to their interests and time availability. Midway (technologically speaking) between the audio-guide and the app is the audio-pen (present only in one of our museums); this is an optical reading pen that, pointed to a printed media (map, image, text), starts an audio commentary. The Venaria Reale is the first Italian museum site to experience this recent innovation, which in France is in use at the Royal Palace of Versailles. Finally, video-guides are present only in one of our museums as a replacements for audio-guides (Egyptian Museum). Still very limited in our museums is free Wi-Fi, present in less than one third (30%) of the sample. Besides, it is offered with limitations: only for downloading the smartphone app and/or just for visiting the

museum website and/or only for a limited time).¹ However, this percentage (even when corrected: 21%) is better than the national one (18.6%; ISTAT, 2015).

Table 3 Museums presence on social media (N=42).

<i>SOCIAL MEDIA</i>	<i>Nº</i>	<i>%</i>	<i>SOCIAL MEDIA</i>	<i>Nº</i>	<i>%</i>
Facebook	40	95	Youtube	25	60
TripAdvisor	40	95	Pinterest	23	55
Twitter	33	79	Flikr	15	36
Wikipedia	29	69	Snapchat	1	2
Google+	27	65	Vimeo	1	2
Instagram	27	64			

Source: authors' elaboration from the museum websites.

Finally, the social media. Their presence in our museums is quite high: 95% for Facebook and Trip Advisor, and from 60 to 80% of the major social media. The comparison (when corrected: 63%) with the national data (ISTAT, 2015) is positive, since only 40.5% of the Italian museums are present on at least one of the major social media. Good results also if you consider international museums, as it appears from a survey conducted by Padilla-Meléndez & del Águila-Obra (2013) on 40 worldwide most-visited museums (i.e., 67,5% of them are on Facebook). Since one of the more typical social activities is to post a photo taken at the museum, we asked our 42 museums whether taking photographs was permitted: over 76% of them answered yes, though with some restrictions (no commercial purpose, no flash, no temporarily exhibited works).

This part of the research was completed through an e-mail survey, to check the response rates of our museums via e-mail. Each of them received an e-mail asking information about the visit. One fourth of them did not reply, and among the non-respondents there are some important museums, such as the Cinema Museum, the Risorgimento Museum and the Rivoli Castle.

The second phase of our research started with the selection, among the 42 museums, of the 15 museums that, according to our analysis of the websites, emerge as those more equipped with ICT facilities. It may be interesting to note that 8 out of 15 were born after 2000; the others (some of them born in the nineteenth century, like the Egyptian Museum) have been undergoing major renovations during the last 10 years (except Madama Palace, renovated in 1997). Among these museums there are many differences: some exhibit only intangible contents (e.g., Risparmio Museum, Resistenza Museum), and technological facilities (video, touch screen, etc.) that are indispensable to their very existence. Others have both tangible and intangible contents (e.g., Spazio La Stampa, Cinema Museum), and need many technological facilities; in most cases, however, they are

¹ Data about the Wi-Fi connection were collected through phone calls (July 2017) to our 42 museums; although called more than once, 4 museums never replied.

traditional, objects-based museums (sculptures, paintings, historical documents, ancient remains a.s.o.; e.g., Madama Palace, Modern Art Gallery), and here technology affords the visit but a support. Table 1.4 lists the Top15s according to a downward scale of technological equipment. Other relevant information (ownership; year of foundation and of renovation; number of visitors) are supplied.

Table 4 ICT facilities most equipped Museums in Torino (N=15).

<i>N.</i>	<i>NAME</i>	<i>OWNERSHIP</i>	<i>YEAR</i>	<i>RENOVATION</i>	<i>VISITORS NUMBER 2016</i>
1	MAUTO – Car Museum	public	1932	2011	181.366
2	Risorgimento Museum	public	1908	2011	147.227
3	Venaria Reale	public	2007	-	994.653
4	Juventus Museum	private	2012	-	165.829
5	Cinema Museum	public	1958	2013	688.215
6	Madama Palace	public	1863	1997	313.028
7	Egyptian Museum	public	1824	2015	847.300
8	Spazio La Stampa	private	2012	-	n.d.
9	Risparmio Museum	private	2012	-	n.d.
10	Resistenza Museum	public	2003	-	13.974
11	Giovanni e Marella Agnelli Gallery	private	2002	-	42.360
12	GAM –Arte Moderna Gallery	public	1959	2009	248.292
13	MAO - Arte Orientale Museum	public	2008	2015	111.759
14	Diocesano Museum	private	2008	-	11.089
15	Borgo and Rocca Medievale	public	1942	-	142.576

Source: authors' elaboration from the museum websites and from the Osservatorio Culturale del Piemonte 2016 data (www.ocp.piemonte.it).

The 15 museums have been investigated with the mystery tour technique. This has also allowed us to compare what is announced on the website with the technological equipments actually available during the visit, both in the layout and in the services (e.g., free Wi-Fi). This comparison reveals lights and shades. In some cases (e.g., audio-guides and projection screens) there are more technological devices than those announced; in other cases it is the opposite, as (for example) for touch screens: announced by 10 museums, they are present only in six of them. Regarding their effective functioning, the result of our research is on the whole positive: despite the fact that any technological equipment needs constant maintenance, the running rate is 99%, albeit some rare troubles in QRcodes and projection screens. The only technology that has real problems is the free Wi-Fi connection, existing in 8 museums, but working only in 5.

The mystery tour in the 15 museums was intended to provide an evaluation, by the end user, of the technological services available during the visit. Of every

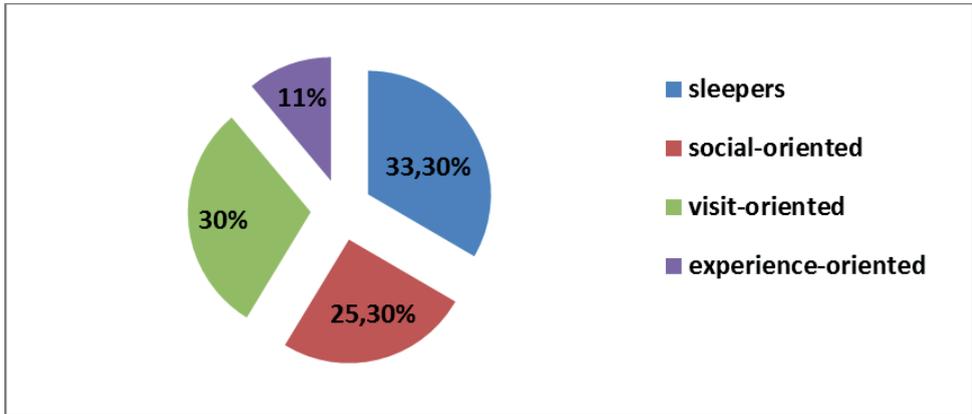
technology (when present), the mystery client, beside noting the number of copies, had to weigh both its operation and its user-friendliness (easy, medium, difficult). Finally, he/she had to weigh whether this technology had an informative character (substitute for traditional billboards) or a narrative one (storytelling), and to consider whether it had interactivity characteristics. As to easiness of use, our two mystery clients have appreciated as “easy” all the ICT services, both fixed and mobile. Except for the workstations, that develop different contents, all these technologies have been conceived as a substitute for traditional billboards. However, our mystery clients have noticed some important exceptions. Among the audio-guides / audio-pen (N = 8): in the halls of the Egyptian Museum dedicated to the former director Schiaparelli, a video represents him (through an actor) while passionately telling his many archaeological missions in Egypt and the constitution of the museum collections. Still at the Egyptian Museum, the video-guide use partly storytelling (N=1). Generally, smartphone apps (N = 4) are didactically featured; however, our mystery clients have appreciated the ability of the MAUTO app to go deep into the theme, allowing visitors to know the specifics of each single engine; similarly appreciated the virtual tour of the Madama Palace app. As for fixed technologies (QR and RFID Code; N = 4), it has been noted (for example) that the Risparmio Museum, through the RFIDCode, uses storytelling in a targeted way, to allow younger visitors (children and adolescents) to enjoy complex contents; in the QRCode, however, the traditional mode of information prevails, as well as in the totem/ interactive maps (N = 1) and in the 3D projections (N = 1). As to the interactivity these technologies could permit, it is present only in the work and play station (N = 2), within the interactive workshops of the Risparmio Museum and of the MAUTO. It may be interesting to note that, despite the fact that almost all the museums contacted on the phone had answered that taking pictures was permitted, several places in these museums exhibit prohibition signs.

5 Discussion and conclusion

This paper is intended to analyze the present offer of digital technology services in Torino museums. The scenery emerging from our analysis is characterized by lights and shadows. Some findings confirm that most of the museum institutions have fully understood both the importance of the museums in the tourism development of the city and the importance of digital communication technologies to enter a visitor-oriented perspective. Most Torino museums no longer are self-referential institutions, only devoted to research or to conservation, but institutions "open to the public", trying to attract visitors, to meet their expectations and to increase their loyalty by daily communicating museum activities through social media. However, the panorama of the Torino museums is not uniform. Four types of museums emerge from our analysis. They could also be read as chronological phases, on the assumption that investments in

digital technologies occur gradually and involve in a different way the areas of the museum, from marketing and communication to the exhibit design.

Chart 1 Types of museums in relation to digital technologies investments (N= 62).



Source: authors' elaboration data.

The first type, "sleepers" (33.3%), includes museums that, beside not being open to the public on a daily basis but only on reservation, do not have a stand-alone website but rely on the website of the institution to which they are connected. These museums, independently from their scientific value, only marginally participate to the tourist circuit of the city, and their investments in new technologies are minimal. The "social-oriented" museums (25.3%; we use here the definition by Nigro et al., 2016) are those that invest only in the direction of the social media and of the web services (from the online booking to the possibility of buying souvenirs online). Their presence on the social media has also the function of daily communicating with their followers and creating their own audience. However, here the use of new technologies is only directed to the pre- and post-visit phase, not to the visit, as is the case of the Borgo and Rocca Medioevale or of the Museum of Decorative Arts - Accorsi Foundation. As for the "visit-oriented" museums (30.1%), they not only are present on social media, but treat the new digital technologies as a tool to improve the visit. In this group we find those museums that (for example) have seen the advantages in switching from a fixed to a digital billboard, that can hold much more information (Resistenza Museum) and that also can more flexibly modify / upgrade contents at no extra cost. This group also includes those museums that, for example, have invested in apps on smartphones or in audio-pens to meet foreign visitors (Risorgimento Museum and Venaria Reale).

Finally, the "experience-oriented" museums (11.1%), beside being present on social media and having invested in the digitization of their 'contents', view the visit as an immersive experience. Some museums have chosen technologies that offer directly involving experiences, such as 3D screens (Cinema Museum) or maxi screens surrounding the visitor (Juventus Museum); others have chosen more

interactive technologies, such as work and play station (Risparmio Museum); in other museums, in line with contemporary tourism trends, the focus is on storytelling (Mountain Museum) and/or on multi-sensory (music, sounds, scents, smells; Egyptian Museum and Juventus Museum). The majority of these museums have been founded a few years ago, or undertook important processes of renovation in the last years.

To sum up: Torino museums have surely understood the importance of new technologies to meet an increasingly 'digitalized' audience. However, this process, beside being gradual, is conditioned by intrinsic features of the museum, such as the type of management (that means also a different organizational chart), the budget that is available, the year of foundation (a new museum can be designed as digital from the beginning) and the nature of its collections. The 'content' of a museum is doubly important: first, in terms of tourist appeal (some themes attract tourists more than others), and this, in its turn, is more attractive for potential investors; second, because some contents, such as the immaterial ones, are more immediately convertible into digital form than traditional goods, such as statues or paintings.

The presence on social media by Torino museums is evident, even more when compared with national and international statistics. This presence, that is a first step for a museum that wants to introduce digital innovation, does not have high costs since, at least in a first phase, it does not need hiring dedicated professionals. However, the necessity of 'technical' professionals remains, especially when a museum wants to use social media to define target oriented marketing strategies. Finally, as for the visit, we have observed that most museums are still traditionally using the new technologies: digital media are often but a copy of the paper version, although they may store more information. But these information are almost always delivered in a traditional way, as a school teacher from his chair: a sort of teaching, instead of narrating and storytelling, more directly involved with emotions. Finally, seldom (so far) learning takes place in an interactive way, or rests on multi-sensory experiences. The limit of our research is that it was conducted taking into account the information available on the museums' websites. This means that some museums may have services that maybe do not appear on the web: in this case, the deficit would not be in the services, but in the museum digital communication effectiveness.

Our study aimed to outline how and to what extent digital technologies are spreading in the Torino museum offer, at a time when new technologies are becoming increasingly important in the cultural offer. The research offers relevant implication for the museum management allowing, firstly, to improve the readiness of the museums on the digitization of their business model and, secondly, to increase their competitiveness through more effective visitor's engagement strategies.

Summary

This research aims to analyze the Torino museums readiness in the digital technology journey. In particular we were interested in understand which strategies and practices guide the Torino museums digital readiness and to understand if these strategies can be clustered into different types of digital strategy approaches. The scenery emerging from our analysis is characterized by lights and shadows. Some findings confirm that most of the museum institutions have fully understood the importance of digital communication technologies to enter a visitor-oriented perspective. However, the panorama of the Torino museums is not uniform. Four types of museums emerge from our analysis that they could also be read as chronological phases, on the assumption that investments in digital technologies occur gradually and involve in a different way the areas of the museum, from marketing and communication to the exhibit design. Wearable devices, digitalization, user-centered design, augmented & virtual reality, digital identity, the internet of things and robots/drones will be, certainly, of particular significance for museums in the next years.

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