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A DIGITAL READINESS ASSESSMENT FOR CULTURAL INSTITUTIONS: AN EMPIRICAL ANALYSIS IN ITALY

A dissertation submitted for the Master of Science degree in Management Engineering

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ABSTRACT (ENGLISH VERSION)

The museum has always been considered a sacred symbol of culture in which each element is preserved and exhibited as evidence of a past period.

In recent years the need to overcome this traditional vision has been addressed by introducing a more interactive approach to involve the audience through the implementation of new digital technologies. The technological development of museums is a widely discussed topic even if it mainly concerns the application of single technologies in specific contexts, without considering general assessments related to the level of digitalization achieved by the institutions.

The final objective of this Master Thesis is to develop an applicable model for measuring digital performance through the evaluation of the relevant dimensions related to the museum digitalization process. Furthermore, it has been possible to apply this model to the Italian context thanks to a data collection carried out through a survey distributed on a selected sample of institutions. The performed analysis has allowed the identification of common behaviours to several museums and the subsequent classification based on the results obtained: in particular, the different situations concerning the digitalization of cultural institutions have been described. This model can be considered as a valid tool for any type of museum and can support and drive directors and professionals in the definition of future strategic actions to implement.

ABSTRACT (ITALIAN VERSION)

Il museo è sempre stato ritenuto un simbolo sacro della cultura in cui ogni elemento viene preservato e custodito come testimonianza di un periodo passato.

Negli ultimi anni si è accentuata la spinta a superare tale visione tradizionale introducendo un approccio meno statico e più interattivo per coinvolgere il pubblico attraverso l'implementazione di nuove tecnologie digitali. Lo sviluppo tecnologico dei musei è un argomento ampiamente discusso anche se riguarda principalmente l'applicazione di singole tecnologie in contesti specifici, non considerando valutazioni generali relative al livello di digitalizzazione raggiunto dalle istituzioni.

L'obiettivo finale di questa tesi è quello di sviluppare un modello applicabile per la misurazione delle prestazioni digitali, in grado di valutare le diverse dimensioni ritenute importanti per il processo di digitalizzazione dei musei. Inoltre, è stato possibile applicare tale modello al contesto italiano grazie ad una raccolta dati effettuata attraverso una survey distribuita su un campione selezionato di istituzioni.

L'analisi effettuata ha permesso l'identificazione di comportamenti comuni a più musei ed una successiva classificazione sulla base dei risultati ottenuti: in particolare sono state descritte le diverse situazioni riguardanti la digitalizzazione delle istituzioni culturali.

Tale modello può essere considerato come un valido strumento per qualsiasi tipologia di museo e può supportare direttori e professionisti del settore nella definizione di future azioni strategiche da implementare.

EXECUTIVE SUMMARY

The scope of this Master Thesis is to enrich the existing academic literature by creating a model to assess the digitalization level of cultural institutions.
The word "museum" is often used as a synonymous of "cultural institution" because it refers to a heterogeneous group of entities that can be characterized by different typologies and governance. Moreover, the museum cannot be considered as an entity deeply defined: there is no normative that uniquely identifies museums nor a homogeneous certification system for evaluating the technical-scientific standards that describe their operation.

According to the definition provided by ICOM *"A museum is a non-profit, permanent institution in the service of society and its development, open to the public, which acquires, conserves, researches, communicates and exhibits the tangible and intangible heritage of humanity and its environment, for the purposes of education, study and enjoyment"* (ICOM, 2017).

With this respect, lots of scholars have provided their contribution to better define the museum concept. According to the majority of them, museum is a place out of memory which incorporates different experiences and even immaterial objects, where the values related to them are preserved, studied, and communicated to produce knowledge and to interpret facts (P. Nora 1984; P. Van Mensch 1992; M.C. Ruggeri Tricoli 2000; G. Pinna 2003; M.R. Schärer 2007). Its role is not economical but social-oriented as it helps people to learn about society, culture, history and science and it aims to improve the overall cultural level of its population, providing this experience also through entertainment modalities (B. Usherwood 2005; T. Travers 2006). Despite this fact, there are also some more pessimistic viewpoints: from one hand, museum should not become a place for mystifying objective realities and manipulating the interpretations of history while, on the other hand, it should avoid being an abstract place from reality, completely alien to the mechanisms that characterize everyday experience (G. Pinna 2003; A. Lugli & V. Vercelloni 2004). Of course, it does not want to be merely considered as a place of abstraction, because its main function is not only that of preserving artworks that, in the natural course of the world events, would be destined to corrupt and to disappear (A. Lugli & M.T. Balboni Brizza, 2000).

Museums are institutions that have experienced, over the last few years, a transformation that has substantially changed their role, functions and meaning. This process of profound change is still ongoing, stimulated by the need to open more and more towards the outside, using new forms of communication that are strongly influenced by the digital world. Indeed, since the original business model (research and preservation) is no longer sufficient, museums have become entrepreneurs, embracing a new institutional mission: reach the audience. This change has also been reflected in the digitalization process, indeed, if digital technologies have firstly been adopted to support the museum management (such as the cataloguing activity) from the last decades there was a paradigm shift from a curator-oriented to a visitor-oriented. This shift implies the adoption of a business model more focused on customers and on the visit experience (H. Kéfi & J. Pallud, 2011). As regards the technology application, museums usually have pursued incremental innovation (A. Gombault et al, 2016) rather than radical innovation, due to a lower economic impact, time and required resources and due to a lower level of risk related to the overall innovation project. This is why cultural institutions usually tend to adopt innovations coming from other industries (C. Hull & B. Lio, 2006).

During the last decades, studies related to museum performance evaluation have significantly increased due to a development rate (concerning economy and employment) higher than other sectors. As regards the tools currently used, traditional KPIs regarding efficiency/effectiveness are the most implemented: efficiency deals with the museum management capability concerning the inputs-outputs relation instead effectiveness is related to the capability to align the produced outputs with the expectations. These more general measures refer to the process management and do not allow a performance measurement related to the digitalization of the organization: both as digitalization of individual processes and as an overall digital readiness of institutions. Moreover, the academic researches about digitalization in cultural institutions are mainly related to the application of new technologies for the fruition during customers' visits. The limit of the actual researches is that they are case studies focused on single applications not explaining the overall benefits that digitalization can improve. What is missing in the literature is the presence of a measurement system able to assess how much cultural institutions are digitalized.

Hence, to define the scope of this Master Thesis, the following research question has been formulised: *How to measure the digitalization level of Cultural Institutions?*

In order to provide an answer to the research question, an in-depth review of the literature has been carried out concerning this theme. This approach has allowed to frame the research question into the Digital Readiness Model that consists of three main components (Figure 1):

- the proposal of two dimensions (and the related sub-dimensions) to be considered as a reference point for evaluating the digitalization of cultural institutions, which consist in the structure and activity pillars;
- the identification of a set of performance measures to evaluate the digitalization of cultural institutions, formulated as qualitative criteria and then as numerical indicators that can be calculated from the data collected;
- the creation of a positioning map to evaluate the overall digitalization process.

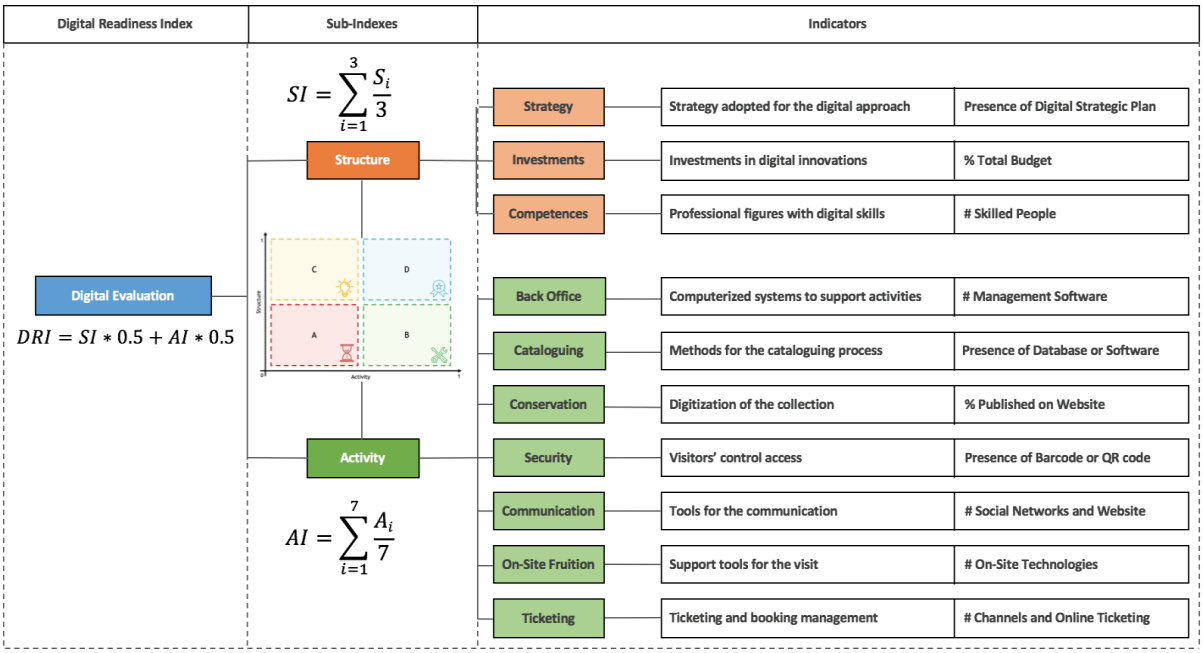


Figure 1 - Digital Readiness Model

The purpose of this model is to assess the digitalization level and the subsequent performances improvement in cultural institutions. It is the reference for a systematic and in-depth evaluation and, at the same time, for a more general one (i.e. independent from the specific museums analysed) since it does not limit itself to provide an organized list of indicators but justifies their formulation on the basis of standard and shared criteria. The proposed criteria exhaust, at least in principle, all the aspects to be considered relevant in the context of cultural institutions.

Indeed, the mere proposal of a set of indicators, although certainly useful for summarizing the results of the research, is not sufficient to analyse the museums' digitalization process.

As regards the first component, the digitalization dimensions, two main pillars have been identified through the literature review. Indeed, the road to a better management of cultural institutions passes through a better digitalization of the activities that must be supported by a policy structure composed by three factors: the presence and formalization of a digital strategy with an adequate investment plan and with the introduction and development of employees' competences as digital skills.

As regards the second component, the digitalization measurement, the criteria used to evaluate the factors composing the Digital Readiness Model are divided in Not Acceptable, Minimum and Improvement, following the methodology already used by the Italian Cultural Heritage Minister for the drafting of the "*Livelli uniformi di qualità per i musei*" with the aim to identify the different criteria through which an institution can be defined as a museum. Instead, the related indicators range between 0 and 1 and they are obtained taking into account all the existing thresholds between the three criteria identified for each factor.

As regards the third component, the positioning map discloses the results obtained by the indicators on a graphical map, providing an overview of the performance scores according to the Structure and Activity Indexes.

The Digital Readiness Model has then been applied to Italian museums because of the total number of cultural institutions (much higher than in other countries) and the arising interest that surrounds this sector: specifically, a survey has been developed in order to collect all the needed data to run the model, by sending questionnaires to a selected "by quota" sample.
Starting from the analysis of the ISTAT dataset "Indagine sui musei e le istituzioni similari" (2015), the sample has been created according to four variables: ISTAT classification of museums and similar cultural institutions according to their typology, ISTAT classification of museums and similar cultural institutions according to their ownership, ISTAT geographical distribution based on the Italian region and number of exhibited goods in order to discriminate on those institutions that had equal values on previous variables.

Thanks to the collected results, it has been possible to apply the digitalization criteria to each survey's question, obtaining a descriptive statistic related to the ten factors composing the Digital Readiness Model. Moreover, through a score assignment on the basis of the previous criteria, it was possible to obtain ten indicators, two sub-indexes (as the weighted average of the indicators they belong) and the final Digital Readiness Index (as the weighted average of the two sub-indexes), used to perform the cluster analysis.

The application of the defined criteria has disclosed that 9% of museums complies with the minimum criteria related to Structure pillar, 8% with the ones related to Activity pillar, only 4% of museums surveyed is able to simultaneously comply with all the minimum criteria while none of them with all the improvement ones. Having defined the criteria, it has been possible to assign the scores to obtain the indicators (Figure 2 and 3).

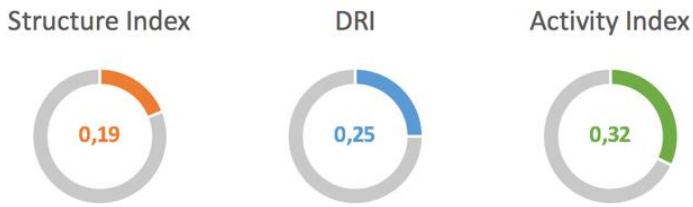


Figure 2 - Overall average score for each index

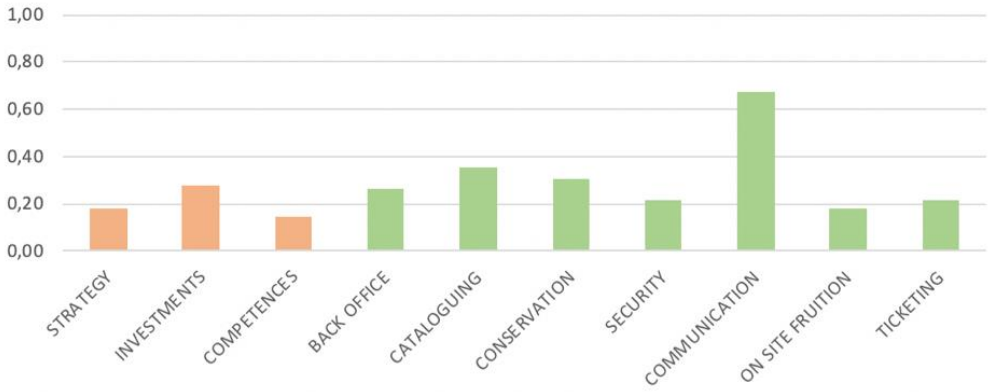


Figure 3 - Overall average score for each indicator

The average score for the communication indicator is noteworthy, as evidence that museums, like any other organization, take care of their online presence to better approach their audience, above all through the website and social networks. In addition, this activity is the simplest and

cheapest to digitalize thanks to the fast diffusion of platforms allowing users to generate contents sharing them online. With the exception of Communication activity, the average result for each indicator is very low considering that they can range from 0 to 1, meaning that the Italian museums are at the beginning of their digitalization process: by the contrary, the negative performance achieved means that there are significant opportunities for improvement.

The creation of the indicators allowed the possibility to represent the two sub-indexes in a positioning map and to perform a cluster analysis according to the digitalization behaviours, as reported below (Figure 4):

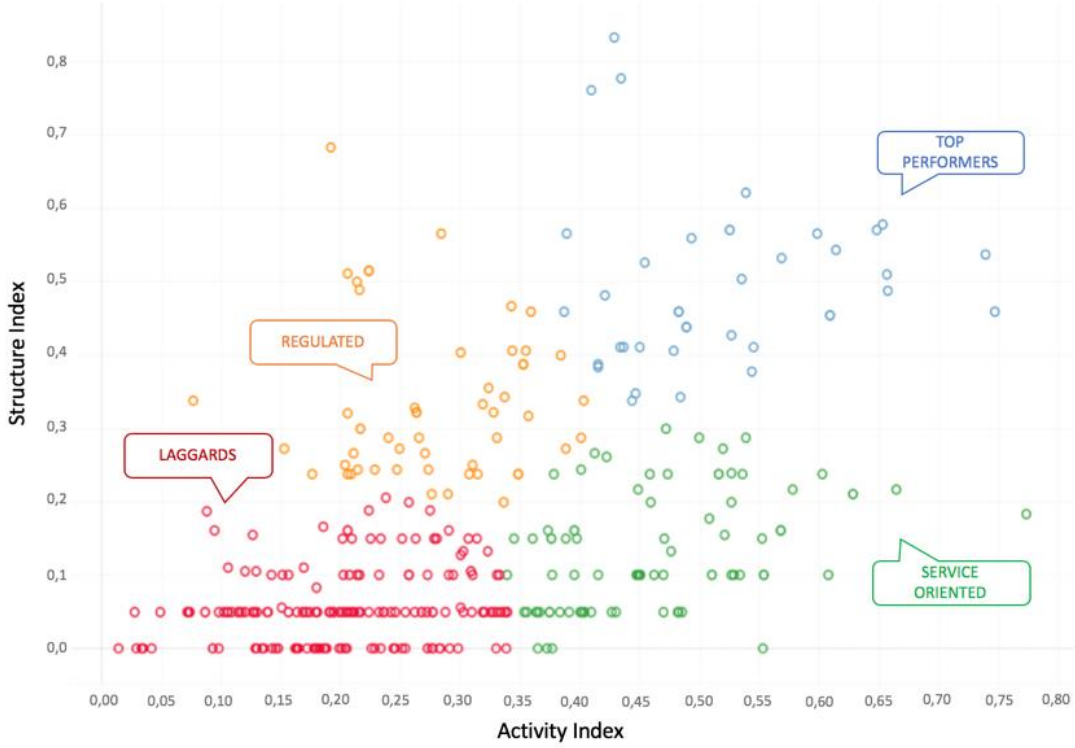


Figure 4 - The final four clusters

Specifically, four clusters have been identified: Laggards (performing the worst result according to digitalization process), Service Oriented (focused on the direct application of digital technologies without having a defined strategy), Regulated (focused on a structured policy but without obtaining satisfactory results in the activities' indicators) and Top Performers (obtaining the overall best result).

This Master Thesis overcomes the literature gaps by presenting the Digital Readiness Model, concerning not only a treatment about the whole digital applications that museum could implement (both considering museum and visitors' perspective) but also a measurement system to detect the digitalization level achieved by each institution.

As regards the managerial implication, useful insights for museum directors, managers, curators or other practitioners have been provided in order to better approach and assess the digital development of their museum. Digital Readiness Model can be represented as a useful toolkit thanks to which any stakeholder can learn about the benefits coming from the right balancing between a structured approach to digital innovation and the implementation of new technologies. In particular, it has also been designed to support four different actions by museum management:

- an overall performance assessment to obtain information on individual institutions by observing their overall Digital Readiness Index score and the scores of the two sub-indexes (Structure and Activity);
- a zoom-in perspective to pinpoint the areas where museum performance could be improved by analysing the scores of the individual indicators;
- further interventions to assess whether progress has been made over time;
- comparative considerations to understand the relative positioning of the museum with respect to what other museums are doing (benchmark tool) or to identify the cluster in which the museum would like to belong in the future (predictive tool).

This research presents four main limitations which are linked to the methodology followed: the first one is that the actual Digital Readiness Index is calculated using a weighted arithmetic average and considering the same weight for each indicator (in order to be neutral with respect to the different digital implementation strategies). The second limit concerns the time-period of the ISTAT document that has been used to select the institutions for the quota sample (the census has been published in 2017 aiming to explore the state of the art of Italian cultural institutions in 2015). The third limit regards the properly English nomenclature of some variables (i.e. technologies proposed to support the on-site) which sometimes have been considered too complicated by respondents when filling in.

The last problem has been that of collecting a sufficient number of responses from institutions with quite heterogeneous characteristics to ensure greater robustness to the analysis.

Unfortunately, sometimes the difficulty has been to find even just an email address or an active telephone number in order to contact specific museum types.

Finally, the Master Thesis also shows three future research directions. First of all, the model has the potential to be applied also in other industries: for this purpose, it is important to identify and define new pillars that are tailor-made for the sector investigated. Secondly, the model application could be further supported by the following analyses: some interviews to those museums representing newsworthy case studies according to the answers collected and the development of an even more detailed dashboard of indicators (i.e. indicators related to the visitors). Thirdly, the application of the model could be tested beyond Italian panorama by extending it also to other countries in order to make some interesting comparisons among the international institutions.

1. INTRODUCTION

The cultural sector is increasingly becoming a landscape characterized by undefined boundaries that tends to progressively includes new forms of expression and languages. On one hand there are frequent forms of external influences that change the traditional interpretative keys adopted by cultural institutions, on the other hand, the need for representation and evaluation model is significantly increasing among this industry to better intercept and understand the meaning of cultural processes. Only a few institutions constitute a reference point in the heterogeneous and changing world of culture, remaining places in which cultural meanings seem to find their objective recognition.

The word “institution” is often used as a synonymous of “museum” when it is preceded by the adjective “cultural”, moreover, it is different from the term "institute" which is instead specific and concrete: *"The museum institute is a materialized form of the museum institution"* (I. Maroevic, 2007). As ISTAT reports, **Museum** is a “*Permanent structure that acquires, conserves, orders and exhibits cultural heritage for the purposes of study, education and study. The modality includes, in addition to the museums, similar institutions such as picture galleries, non-profit art galleries, collections, collections, antiques, treasures, institutes for conservation and exhibition depending on a library or an archival centre, museum containers*”.

In this context, the museum seems to be represented as a “sacred symbol” of culture: indeed, cultural institutions, by definition, are legitimated by the fact of defining, guarding and proposing to the public a testimony of a community's heritage that is destined to become the memory legacy.

However, the reality that museums constitute is certainly not static and predictable: unlike what may appear by referring to the traditional images that drive them, they are institutions that have experienced, over the last few years, a transformation that has substantially changed their role, functions and meaning. This process of profound change is still ongoing, stimulated by the need to open more and more towards the outside, using new forms of communication that are strongly influenced by the digital world.

In recent years, in fact, the push to overcome the traditional vision of the heritage institution has been greatly accentuated, producing interesting innovations concerning organizational and

managerial forms, tariff policies, opening hours, promotion methods and communication to the public, and, last but not least, the same contents offered on-site.
In this way, museums from containers of goods tend to become, not without lively debates and controversies, places of events (spaces that propose, host or offer locations for temporary exhibitions, thematic routes, seminars, cultural activities and other events of various kinds).
The need for transformation is a challenge but also an opportunity to bring new audiences closer together and to exploit the tangible and intangible assets that the institutions themselves preserve and produce.

1.1 OVERVIEW OF THE ITALIAN CULTURAL SYSTEM

In 2017, Italian cultural heritage refers to 4.889 museums and similar institutions, public and private: specifically, 4.026 galleries or collections, 293 areas and archaeological parks and 570 monuments and monumental complexes (see Figure 5).
According to ISTAT, Italy has a wide cultural heritage quantifiable in 1.6 museums or similar institutions every 100 km^2 and about one every 12 thousand inhabitants: moreover, one Italian municipality out of three hosts at least one museum structure. The importance of the museums sector, and in general of artistic and cultural tourism, is related to the peculiarities of the Italian heritage, which is for sure one of the most various and important of the world, as testified by the fact that Italy records the highest number (47) of world heritage sites according to Unesco.

The Italian cultural institutions employ more than 38 thousand operators between employees, external collaborators and volunteers: on average one for every 3.106 visitors (45 thousand in 2015, one for every 2.400 visitors).
In 2017, cultural institutions recorded 119 million € entrance tickets (+7,7% compared to 2015 and +6.4% compared to 2011) specifically: 57.8 million € for galleries and collections, 15.5 million € for archaeological sites and 45.8 million € for monuments (respectively 52.9 million €, 11.9 and 39.3 in 2015 and 53.9 million €, 9.5 and 40.5 in 2011).
As regards the visitors' age, senior citizens represent 19.9% of the total population while young people, between 18 and 25, are less than one fifth (14.4%).

Rome, Florence, Venice, Milan, Naples, Turin and Pisa collect, in their 369 museum structures (of which one third are located only in the capital), almost 59 million visitors, equal to half of the entire museum audience. Specifically, Rome, Florence, Venice and Milan correspond to Italian cities with the greatest tourist attractiveness, considering that, they hosted 23.4 million tourists in 2017 (equal to 38% of the total).

As regard museums, on average, there are just over 27 thousand visitors for each institution, but the polarization is strong: in 2017, the first 20 cultural institutions attracted almost a third of the total visitors (36%), while 29% have registered no more than one thousand visitors per year. Moreover, the territorial differences are remarkable, indeed, more than half (54%) of the museum audience is concentrated in just three regions: 25% for Lazio, 18% for Tuscany and 10% for Campania (ISTAT, 2015).

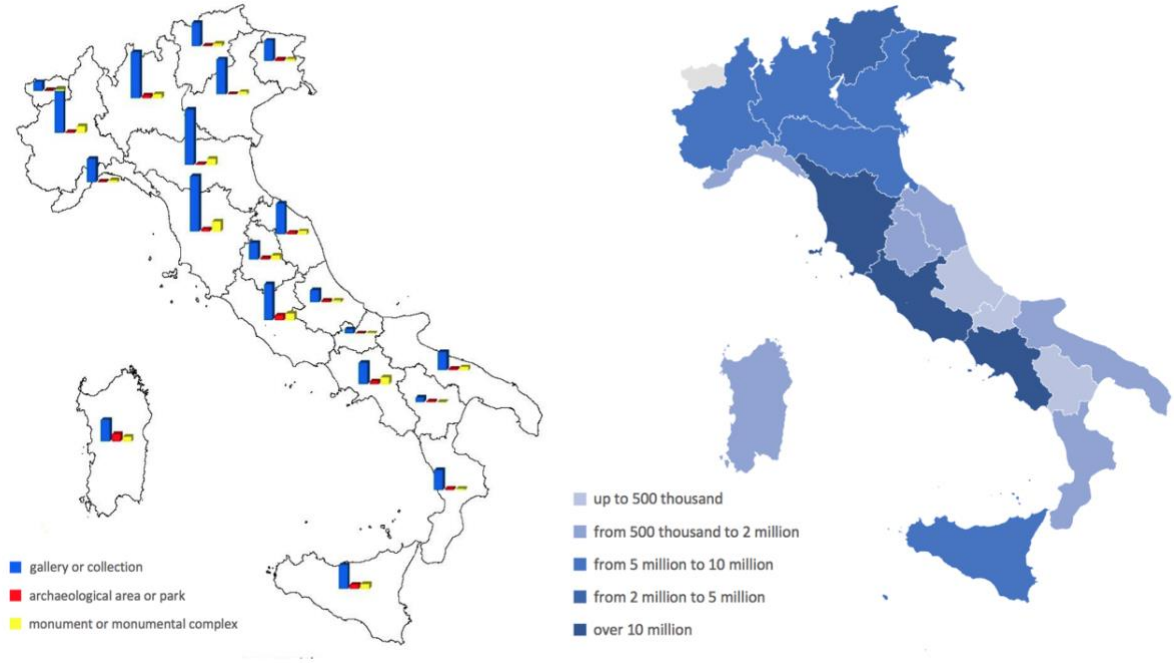


Figure 5 - Cultural institutions type and Number of visitors by region (ISTAT)

A unique definition of cultural institution and the related mission does not exist and this uncertainty directly affects the possibility to measure their performances: the measurement of the outputs and the outcomes vary as the nature of the cultural institution changes. Specifically, if the main objective would be the ability to increase the number of visitors to increase revenues,

the cultural institution cannot simply use the attendance as an indicator because it refers to the customers that really paid the ticket and the ones that visited for free. Indeed, if in 2017, galleries, monuments and archaeological sites in Italy recorded 119 million € entrance tickets, only 67.1 million € are quantifiable as paying visitors: there is not a single simple way to measure the performance even if the objective is clear.

Cultural institutions exist for 2 main reasons: firstly, because someone will visit them and secondly because humanity has a cultural heritage that has to be preserved for the future generation. In particular, before the 80' of the last century, the mission of the cultural institution was related to a custodial approach, "*Traditionally the prime function of museums has been to gather, preserve and study objects. The director was perceived as the keeper of objects, as one who performed the custodial role for the cultural capital of the institution*" as explained by Audrey Gilmore and Ruth Rentschler in "Changes in museum management" (2002).

From the 80', the mission and role of the cultural institutions changed according to the new theories about Public Administration that lead to the New Public Management paradigm "*The key difference between the traditional Public Administration and Public Management is that a public manager is personally responsible for the delivery of results*" (O. E. Hughes, 2012).
This new approach certainly affected the management of the cultural institutions through the introduction of objectives and performance measurement: the mission, indeed, changed from the only efficiency about the collections management, to a more comprehensive view taking in consideration also the long term value generation. Cultural institutions started to be seen as an economic and social actor in the society.

"*Improving efficiency and effectiveness of the public sector involves a major cultural shift as the old management paradigm, which was largely process and rules-driven, is replaced by a new paradigm which attempts to combine modern management practices with the logic of economics, while still retaining the core public service values*" (Organisation for Economic Co-operation and Development – OECD, 1998).

From 2014, Italian museums are gaining attraction towards audience also thanks to some new initiatives settled down by the Ministry, for example: "*Domenica al museo*" which consists in

free site entrances during the first Sunday of each month, "*Una notte al museo*" promoting the entry tickets of the main museums at the price of €1 for several nights and the free entrance for under 18 years old and promotions for millennials (Brambilla, 2014). In addition, since nowadays the emphasis played by the audience is crucial, new initiatives to attract public are set in parallel with social media campaigns, marketing actions and ICT innovations, in order to spread museum presence obtaining more visibility, as private organizations aim to do.

Another important turning point is the reform proposed by the Italian Ministry of Cultural Heritage and Tourism in 2016, conceived by Minister Dario Franceschini, which identified twenty major Italian museums and endowed them with special "autonomy". This means that these institutions will now have a statute, autonomous financial statements and clear managerial responsibilities: all these changes have effectively represented a crucial step for the reform of public cultural institutions providing these museums with a managerial tool and allowing them to compete with the major foreign private and public institutions. This reform, according to Carmosino, moves the focus of these Italian museums from "safeguarding" of their collections, more towards the "promotion" and "communication" to the public (Aedon, 2016).

Furthermore, with the decree of Minister Alberto Bonisoli (9 August 2018), the first Commission for the National Museum System was nominated. The National Museum System consists of a network of museums and other cultural institutions in order to improve the use, accessibility and sustainable management of cultural heritage, coordinated on a regional and provincial basis. In addition to the State cultural sites, also other non-State cultural institutions can access the system on a voluntary basis and through an accreditation system.
The required criteria to activate the system and to achieve the objectives are the uniform "levels of quality": distributed in three areas (organization, collections, communication and relations with the territory), they constitute an important document to verify the minimum standards achieved by the cultural institutions.
Considering the heterogeneity of Italian places of culture (due to historical and territorial reasons), the establishment of the National Museum System and the definition of standards appear as an opportunity for small entities to grow and for the other institution to improve their results thanks to the definitions of new targets to reach (Ministero Italiano per i Beni e le Attività Culturali, *Livelli uniformi di qualità per i musei*, 2018).

1.2 DIGITAL IN CULTURAL INSTITUTIONS

During the last years, many Italian cultural institutions have undertaken a digital transformation process. Analysing the result obtained by the latest ISTAT census on museums, 57% of them have a dedicated website, thus confirming it as the main digital communication channel: despite, only one out of five has the online ticket office. The accounts on social networks (Facebook, Twitter, Instagram) are ranked in the second position of the classification with a 41% degree of adoption while only 25% of these institutions use the newsletter to communicate with their public.

Two categories of visits are presented in this census: on-site and online visit. The on-site category is related to the possibility to use app, QR code, Wi-Fi, audio guides and interactive installations during the visit, instead online category is related to website, social channels and online catalogue & ticketing.

Being a sector still at the dawn of its digitalization, investments are mainly concentrated on online tools, indeed, the support for on-site visits is very low: only 35% offer at least one service. This percentage decreases to 30%, considering those institutions that offer at least one digital service for both the visit category and to 11% for museums with at least two per category. Specifically, interactive installations or virtual reconstructions are adopted only by 20% of the institutions, and a similar percentage is related to the presence of free Wi-Fi (19%) while proximity services, QR code and online catalogue are adopted only by 14% of the cultural institutions. Finally, 27% of the museums do not offer any digital service to the public to support the two types of category. Further results are reported below in Figure 6.

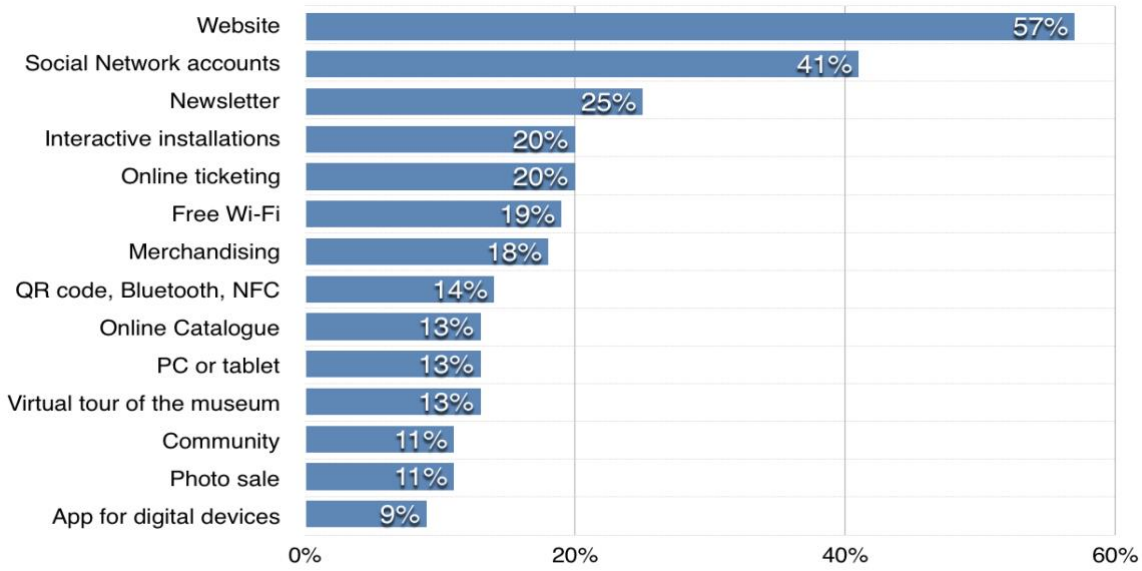


Figure 6 - The services offered by Italian museums (ISTAT)

According to the research made by the Osservatorio Innovazione Digitale nei Beni e Attività Culturali of Politecnico di Milano in 2016, on a sample of 476 Italian institutions (equal to 10% of all museums open to the public), the following results can be found: the online presence of cultural institutions has grown above all on non-proprietary channels, for example, 75% are active on TripAdvisor and, regards online visits, 55% of institutions allow the access to the virtual collection. Translation of the online contents in foreign languages (mainly English) is only available in 54% of the cases.

The percentages are even smaller when investigating the presence of more advanced services such as the possibility of online shopping (6%), making a donation (6%) and crowdfunding (1%). The 52% of museums have at least one account on social networks and only 13% is present in the three most common platforms (Figure 7): the highest presence is on Facebook (51%), followed by Twitter (31%) and Instagram (15%). Moreover, 10% of museums that do not have a website are active on Facebook.

Analyzing the posts on social networks, most of them concern promotions and general information (opening hours and promotions about collections) while those concerning artworks and storytelling are very popular and able to create engagement among the followers of museums' social pages.

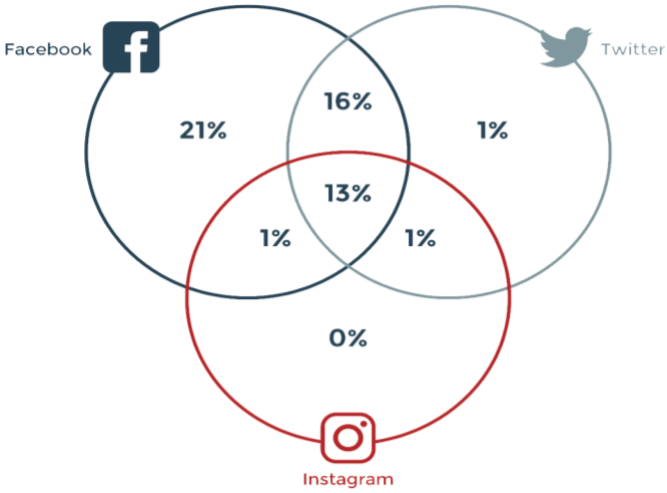


Figure 7 - Museums with official accounts on the main Social Networks

The above considerations, describing the actual Italian situation, sound like an alarm because Italy is still lagging behind the rest of the European countries. This weakness is remarked by Desi index that measures the evolution related to the 2.0 innovation: indeed, Italy is ranked 25 out of 28 in Europe, according to the classification drawn up by the European Commission, followed by Greece, Bulgaria and Romania. Denmark, Finland and Sweden are in the first three positions and they are ahead of almost 30 percentage points from Italy (European average is 10 percentage points far from Italy).

In Figure 8 is reported a schema, for each European Country, with the different components through which Desi index is calculated.

In Italy "*The poor results in terms of digital skills risk stopping the further development of the economy and the growth of digital societies*" (European Commission, 2018).

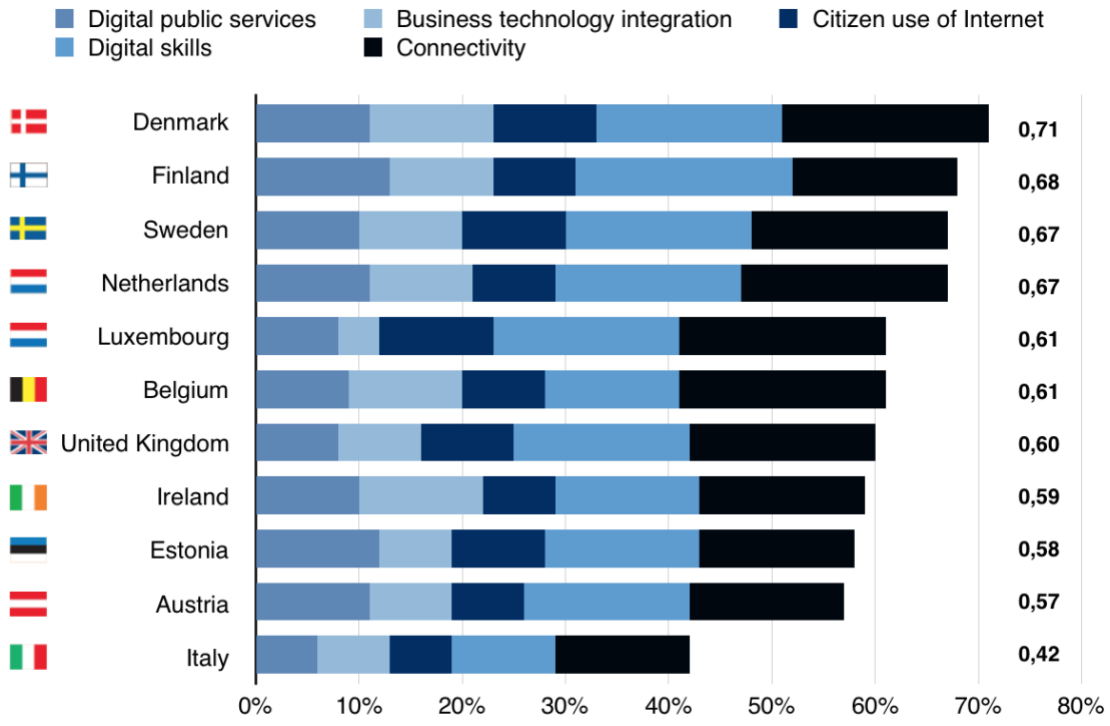


Figure 8 - The DESI ranking list regarding the main European countries

According to an analysis conducted by Oxford Economics (Tourism Economics, 2013) concerning the online content value for the European tourism, if Italy were able to develop its tourism economy by investing in it and aligning itself with the European average, GDP would grow 1% while the tourist demand about 10%, quantifiable in about 250 thousand new job opportunities.

To seize this opportunity, the Italian tourism industry should take the following actions:

- Operators in the sector should further develop their online presence (in multiple languages) as a primary channel for promotion and booking through the use of various platforms.
- Develop content for cultural tourism; given the important role played by cultural tourism in Europe, the Internet offers a great opportunity to promote travel in order to make the cultural wealth of a country known to consumers.
- Public administrations may work together with the private ones to provide contents related to online general information and cultural tourism in a complementary way.
- Use of media to provide feedback and suggestions; this will allow operators to establish long-lasting relationships with their visitors and improve their service over time.

Reasoning in terms of economic contribution, in 2003 the cultural and creative sector produced 2.6% of GDP, against 2.1% of the real estate sector, 1.9% of the food, beverages and tobacco sector, 0.5% of the textile sector and 2.3% of the chemical, rubber and plastic sector.
In the 1999-2003 period, the cumulative growth of the cultural and creative sector was 19.7%, with a positive spread of 12.3% compared to the growth rate of the whole European economy. Already in the middle of the last decade, the cultural and creative industries were therefore a sector of great economic importance and one of the most dynamic components of the entire European system. The available information leads to understanding that the relative weight of the cultural and creative sectors in the European economy from 2006 until today has further increased rather than decreasing.

As for the relationship between culture and innovations, the available data clearly show that the countries with the highest levels of participation in cultural activities are also those that show the greatest innovative capacity.
As can be seen from Table 1, countries that are above the EU 27 average in terms of innovative capacity, as measured by the Innovation Scoreboard, coincide exactly (though with some differences in ranking) with countries above the EU 27 average in terms of active participation of citizens in artistic activities.
The size of the cultural phenomenon is therefore a decisive factor for the economic potential exploitation of this industry.

Ranking Innovation Scoreboard 2008 (UE Countries 15)	Ranking participation in artistic activities - Eurobarometer 2007 (UE Countries 15)
1. Sweden	1. Sweden
2. Finland	2. Luxembourg
3. Denmark	3. Finland
4. Germany	4. France
5. Netherlands	5. Denmark
6. France	6. Netherlands
7. Austria	7. Belgium
8. UK	8. Germany
9. Belgium	9. UK
10. Luxembourg	10. Austria
11. Ireland	11. Ireland
12. Spain	12. Italy
13. Italy	13. Spain
14. Portugal	14. Greece
15. Greece	15. Portugal

Table 1 - European Innovation Scoreboard 2009

1.3 RESEARCH PRESENTATION

Before starting the discussion regarding the objectives of this Master Thesis, it is important to explain what are the main reasons that led to the study of digital innovation in museums.
One of the most important reasons to embrace the digital transformation among cultural institutions is provided by Neal Stimler, art consultant at the Metropolitan Museum of Art in New York, which believes that digital is a fundamental step to pursue the mission of a museum. According to him, the main directors' task should be to digitize the museum's core products (collections, exhibitions, programs and publications) with repeatable workflows in a storable, open and scalable format. The combination of digitization activity, open access and willingness to exploit partnerships widens the value proposition of museum products beyond the limited offer related to the on-site visit with the aim of generating profitability.

There is also another important reason to deal with this opportunity, indeed, according to Eike Schmidt, the Uffizi Director in Florence, digital is an attractive force for the users: in a country like Italy, for which culture represents a real source of wealth, offering digital services to the public to discover cultural heritage is the right approach for museums to become attractive places for all types of users, even for those who would never go there.
Nevertheless, Italian cultural institutions are not showing an overall acceptable level of digital innovation compared to those of other European countries. The main limitations come from the lack of economic resources to invest (especially among smaller institutions and in the public sector), the poor awareness of museum directors to identify the whole benefits related to digitalization, the difficulties in recruiting professionals with digital skills able to combine their competences with managerial and humanistic knowledge. All these arguments are even more accentuated by the digital backwardness context described in the previous section through the Desi Index.

The present study stems from all these assumptions with the intention to provide a contribution to the already existing researches. Indeed, the focus of the Master Thesis is to provide a model for measuring the digitalization process, taking into account all the functions of an organization: the model, in its overall structure and functioning, could be applied in several sectors but, for the scope of this research, it is applied and implemented in the specific area of cultural institutions.

This research applies the model to Italian cultural institutions by detecting the digitalization level of museums and similar cultural institutions (galleries, archaeological sites and monuments), both state, non-state and private, according to ISTAT classification (2017).
The main reasons of this choice are the total number of cultural institutions in Italy (much higher than in other countries), the cultural heritage value perceived by the Italian population and the rising interest that surrounds this sector.

In Chapter 2 it is provided a deep literature analysis of the already existing contributions. Specifically, there will be presented several museum's definitions, objectives and values, focusing in particular on how its mission has been changed over time. Moreover, an overview regarding the state of art related to the actual technologies will be showed. Finally, the discussion will concern a series of indicators with the aim of measuring the digital transformation process (both in cultural and other sectors) being aware of the main criticalities and limitations that affect each methodology. Thanks to the literature review, the main gaps identified have been presented at the end of this chapter and, consequently, the research question has been formalized in order to deal with the gaps detected.
Afterwards, in Chapter 3 there will be showed the methodology concerning the whole Master Thesis: specifically, the approach followed for the realization of literature review, survey (considering the questionnaire design and the sampling of the institutions to which the research is addressed to) and subsequent analyses on the responses collected.
To deal with the research question, a theoretical Digital Readiness Model will be developed in Chapter 4 and applied in the Italian panorama in Chapter 5.
Finally, the last Chapter will summarize all the results achieved and how the Master Thesis could bring value to the whole cultural industry considering both academic and managerial implications. The conclusions will highlight the main benefits and limitations of the developed model and how future researches could overcome the latter, further investigating museums digital transformation.
The roadmap of this Master Thesis is reported below in Figure 9.

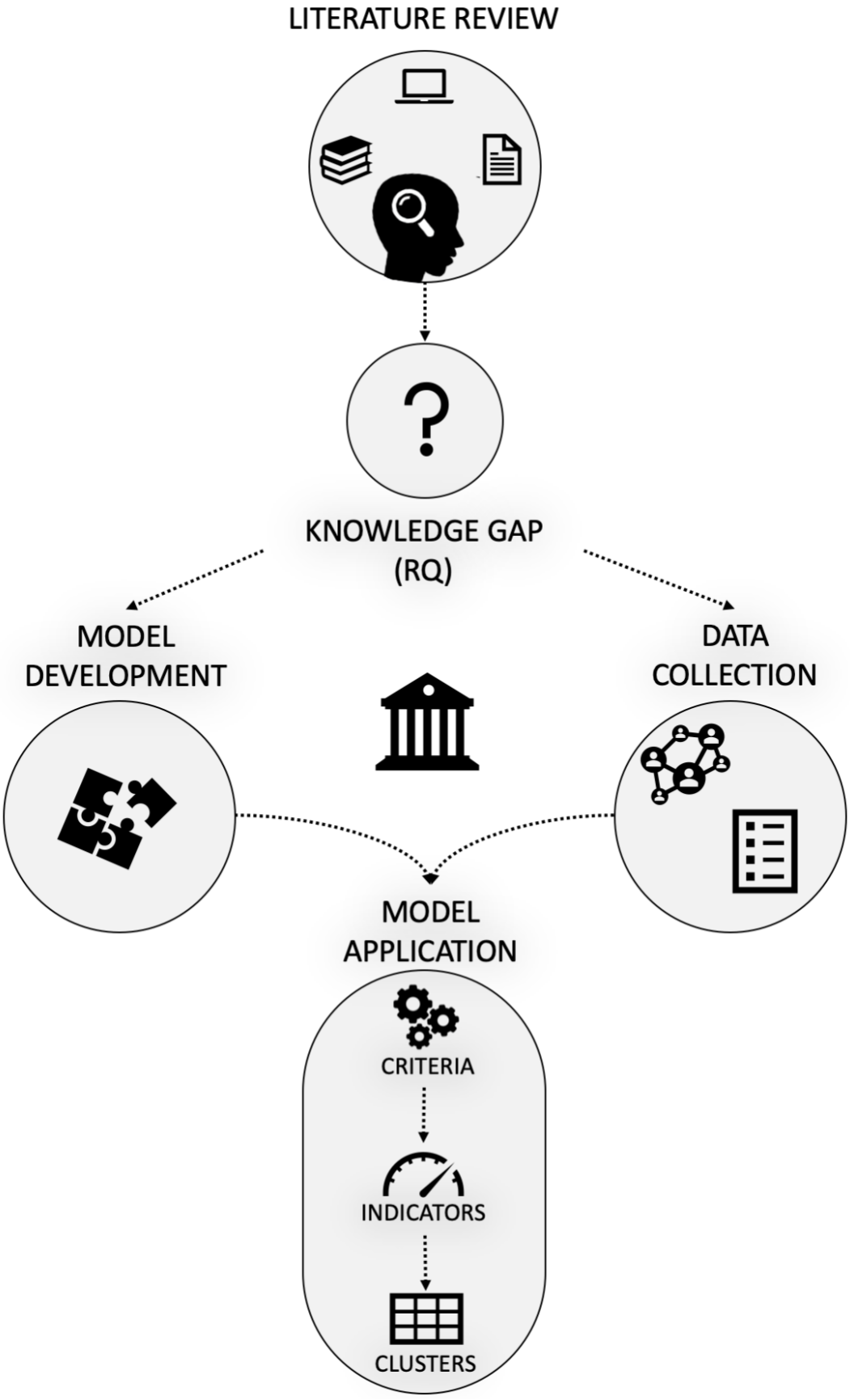


Figure 9 - Master thesis roadmap

2. LITERATURE REVIEW

In this chapter is reported the literature development related to the concept of Museum and the digital innovations introduced in cultural heritage. Specifically, as reported in Figure 10, it is composed of three main parts according to the three keywords of this master thesis: Museum, Digital and Measurement.

The first part, Museum, explains the cultural institution concept that has changed over time, also presenting some classifications and the activities that can generate value. The second part, Digital, is composed of the two main strategies surrounding the technological innovation and adoption with a treatment on the most important technologies present nowadays inside the museums. The third part, Measurement, introduces examples of digital index of different sectors. Finally it has been reported the lack in the literature of a specific tool or instrument to measure the digital readiness in museums.

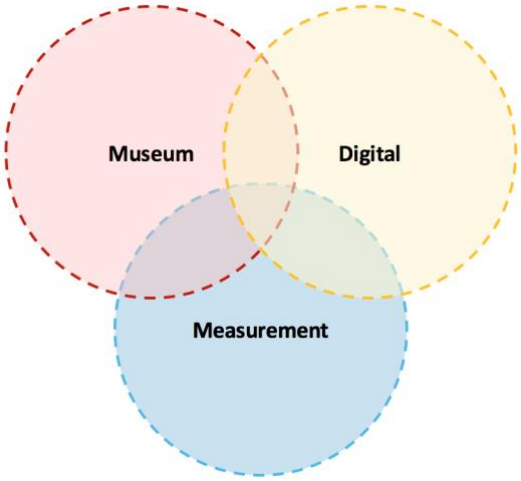
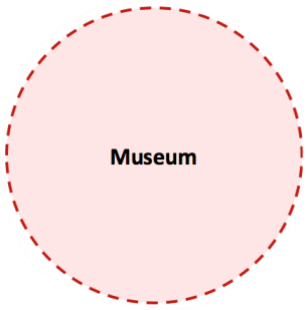


Figure 10 - Literature framework (personal elaboration)

2.1 MUSEUM



The concept of Museum is ancient but has changed over the centuries and nowadays it is possible to recognize a model of museum for every age, identifying its meaning and characteristics. Everyone knows what a museum is, trying to give a definition. This chapter provides a treatment about the museum concept that has

changed from the age of the copper till the present days. Moreover, a series of museum definitions of scholars belonging to different fields is provided to understand a broad and different range of interpretation. Finally, after having defined the activities belonging to a general museum, a treatment on the different type of value generation is presented.

2.1.1 The Evolution of Museums: from their Origins to the Modern Institutions

The habit of collecting and conserving objects has its roots in antiquity and could be considered as an anthropological phenomenon (L. Cataldo, 2007): keeping objects and relics of ancestors was a custom already in prehistory. From the age of copper to Hellenism, the funerary objects found in the tombs of many ancient civilizations are able to document the particular link between man and objects.

Not only that, but the accumulation is also a religious phenomenon: Mesopotamian, Egyptians and Greeks possessed a rich collection that often aimed to enhance a god, a sovereign, or the city itself, mixing mystical intentions to profane intent.

Nowadays, the pyramids, the ziggurats, the Etruscan tombs (in which precious objects and furnishings were collected) and the temples of the Greek cities (in which there were treasures offered to the deities), can be considered a form of museums. Anyway, the original purpose of these collections is very different from that of museums: indeed, these objects were destined to keep company with the deceased or to make sure that the gods were benevolent with him.

According to Greek mythology, the word museum comes from "Mouseion" literally sanctuary of the Muses. The Muses were the nine daughters of Zeus and Mnemosyne, each of them considered responsible and protector of a science or of an art: they were history, dance, astronomy, epic poetry, lyric poetry, sacred poetry, music, comedy and tragedy.

Around the 3rd century BC, King Tolomeo II erected the Museum of Alexandria in Egypt, which today is still considered the first museum of history. According to the historian Enrico Luigi Rossi, it can be considered a meeting place for scholars and teachers, representing for centuries the greatest cultural institution in the Hellenistic world. It is no coincidence that this museum has been broadened with a library that had 490,000 volumes, a housing for the academic community, a refectory that allowed community lunch, a workroom, a botanical

garden, a menagerie, an amphitheatre and an astronomical observatory. At that time, it was considered as a real place of worship that housed a scientific and literary community, which carried out its activities consecrating them to the aforementioned Muses.
Among the figures who have carried on their education at this museum, there are the mathematicians Euclid and Archimedes, the intellectual Eratosthenes and Erofilo, the founder of experimental medicine.

If on one hand, the Greek act of collecting was driven by noble cultural purposes, on the other hand, other motivations have animated this phenomenon in Rome during the imperial age. Indeed, there was a change in the conception of the museum shifting from an educational institution to a private house of treasures.
A large part of the Roman collections consisted of war spoils or objects subtracted through power abuse; the stolen artworks were exhibited on the streets of the capital, as symbols of victory. Greek sculptures were placed in private otium villas (Villa di Adriano in Tivoli and Villa di Tiberio in Sperlonga) according to a precise iconographic project that subtended a cryptic theme, losing their sacred function and acquiring the aesthetic and symbolic value. The patricians began to collect objects to enjoy their sense of beauty and to spread a real taste for collecting artworks.
There are several witnesses about the fact that the Roman nobles' houses hosted large assortments of art and natural objects. An example comes from the Roman historian Pliny the Elder and his work "Historia Naturalis", describing the residence of Emperor Augustus and his collection of giants' bones preserved in his garden (D. Murray, 1904).

In the Middle Ages, there was the confirmation of the same tendency seen during Roman period to acquire special objects from travellers and soldiers. However, these collections were not open to the public due to their spiritual or personal meaning for the owner. The mere act of collecting these objects was very alive at that time, losing the subsequent research actions that were carried out during Greek periods.
Instead, the religious component became a protagonist in the logic of collecting. Firstly, with Charlemagne, and then the Crusades, remnants of martyrs and relics have been accumulated in small rooms and in chapels adjacent to the cathedrals or inside them, which became a destination for the pilgrimage (K. Pomian, 2004).

So, in the cathedrals and in the convents, it is noteworthy the concentration of artworks, which unfortunately were often destroyed or stolen during the wars (N. Friend, 2011).
Moreover, it is difficult to find evidence of collecting in the Middle Ages due to the repression exercised by the Church against those who displayed wealth, considering them as sinners. The Church was the first true artworks keeper and the first to devote a museographic attention to the preparation of collections for relics and archaeological findings (L. Cataldo, 2003).

During Humanism, the passion for ancient art reborn. The evolutionary testimonies of collecting come mainly from Florence: the Medici were certainly the first promoters of this trend. There were some initiatives promoted by Lorenzo il Magnifico, for example the outdoor museum inside the San Marco garden, the preparation of the family collections inside Palazzo Riccardi and the foundation of the Art Academy of Drawing (1563) created to strengthen local culture and to save its most important works from dispersion (C. De Benedictis, 1998).

Compared to the Humanism, the Italian Renaissance improved the museum and the collection concept in an anthropocentric perspective.
The centrality of man emerges as an active and transforming force. Renaissance philosophy takes the cue from the classical world, considering the man itself as the real architect of his own fortune. The dignity of man consists of forging himself and his destiny while during the Middle Ages it was believed that the man was part of a pre-established cosmic order.
This cultural evidence influenced the whole art in Europe, as in France, where Francis I of Valois exhibited in the Fontainebleau castle some works of the greatest Italian artists and promoters of the Renaissance, including Leonardo da Vinci, Michelangelo and Tiziano.
In the same period, there was also a new collecting trend related to a scientific scope: instruments, stuffed animals and human artefacts preserved in spirit represented a first collection trace of science museums. Indeed, it was at this point that the categories of art and science were divided by the necessity of specialization in the fields of knowledge (L. Binni, 1980). A characteristic of that period was also the "wonders room" or in German "Wunderkammer": private collections of rare and particular exhibits, such as corals, fossils or automata (mechanical objects that move on their own).

They represented a typical phenomenon of the sixteenth century, especially in the Nordic countries, which lasted till the eighteenth century favoured by the typical love for scientific curiosities of the Enlightenment. The Wunderkammer was considered a stage in the evolution of the museum concept for what concerns the setting, often elaborated and extravagant, which aimed to enhance the "fantastic" content exhibited: this was just one aspect of what will be the development of the modern museum. Modern Museum is characterized by the opening to the public of private collections of antiques and art objects owned by popes, sovereigns, nobles and civic institutions (B. Benedetti, 2013).

What may be considered the first modern museum in the world was the Capitoline Museums in Rome, during the Popes age. Their creation dates to 1471, when Pope Sixtus IV donated to the city a collection of important bronzes from the Lateran (including the Lupa Capitolina), creating its own museum. Even if the creation dates back to the fifteenth century, these museums have been opened to public visits at the behest of Pope Clement XII in 1734. Probably, it can be considered the oldest museum opened to the public in the world, together with the Belvedere Garden, which was set up in the same papal building to exhibit classical statuary coming from archaeological excavations.

Benedict XIV, the successor of Pope Clement XII, inaugurated the Capitoline Picture Gallery, acquiring the private collections of the Sacchetti and Pio families (Benedetti, 2013).

In the following years, other private, royal and ecclesiastical collections were gradually opened to the public.

In the eighteenth century, during the Enlightenment, the museum became a useful resource for the society because it had to support the transformation of the visitor into a model citizen, freeing him from tyranny and ignorance. The basic idea is that all men have the right to admire the masterpieces of art, without distinction of wealth or class.

Thanks to the French Revolution, the modern museum has been conceived as a public place where the memories of the past should be kept. Examples of this process are the Jardin des Plants in 1739 (becoming a real educational system through expositions, pavilions and laboratories) and the opening of the Louvre Museum in 1793, in the former residence of the French King, transforming in a museum the building wing which connected the royal castle nucleus with the Jardin Tuileries.

In the same period, other public museums were born throughout Europe: the British Museum in London inaugurated in 1753 and the Uffizi Gallery in 1737, as a donation of Anna Maria Luisa de 'Medici to the citizens of Florence in 1737.

The Napoleonic period introduced the artworks dispersion theme: the museums became synonymous with deposits of artworks, due to the tasks established by the armistices and the idea that they could only be held in the Country of Freedom (i.e. France).
The Louvre, thanks also to new acquisitions, became, in the early nineteenth century, the largest and most spectacular art museum in Europe and the center of a network of new provincial museums that gravitated around it. Thanks to an architectural point of view, it achieved excellent results: divided into deposits and rooms, rational spaces were decorated in a uniform way and set up according to precise criteria of exposure also restoring the zenithal illumination. The artworks have been selected, restored and classified according to the schools they belonged to, and they have been exhibited with a small text guide to help the visitors in the artwork understanding.

During the second half of the nineteenth century, the birth of American museums introduced different innovations and insights into the history of cultural institutions. They arose mainly from private donations and from the exhibitions of large industrialists interested in artworks both as a form of investment and as a symbol of social prestige (L. Binni, 1980). Specifically, American museums introduced three new concepts: firstly, they rejected the classical European vision using department stores as exhibitions. Secondly, from the beginning, it was explicit their didactic orientation that emphasized local pride, lowering museums under the guise of civic institutions to the detriment of a universalistic view. Thirdly, the idea of museum linked to entertainment: "t*o amaze, to amuse, to intrigue, to create a show become shared choices also for educating*" (P.C. Marani, 2006). Few examples are the Metropolitan Museum in New York, the Museum of Fine Arts in Boston and the museums of Philadelphia and Chicago.
During the same century was born the concept of "company-museum" that have influenced the entire world, considering the cultural institution as an entity to be managed in an entrepreneurial way: museums have become places of entertainment focused on contemporary interests and trends, also offering a learning function to the visitors.

With the advent of the twentieth century, it was important for museums not only to embrace the traditional disciplines but also all the other manifestations of contemporary culture, such as photography, architecture, industrial design and film.
In the middle of this century, other two themes arose related to the concept of the museum: the central role of the visitor and the typology of the building. Specifically, if the architecture should remain neutral to favor the content or if it were to play a central role in attracting the public. Mies Van Der Rohe and Frank Lloyd Wright were the exponents of the two principal opposite schools of thought: according to the German architect, the museum was a simple container, that should not interfere with the artworks exposed (V. Magnago, 2001). The American exponent, instead, believed that the building's architecture should be the center of attention, as expressed by the Guggenheim Museum in New York. A new step was attempted in 1977 in Paris with the Center National d'Art et de Culture Georges Pompidou, a project by Piano and Rogers. The challenge was twofold: on the one hand, to create a complex characterized by maximum flexibility, on the other hand, to relate it to the surrounding urban space.

Finally, the last step of the cultural institutions' evolution is the virtual museum, with the aim to put the visitor at the center of the cultural experience. During the current century, thanks to the latest technological developments, virtual museums have radically changed the museum conception: starting from text and images with limited interactivity, they have moved to a consolidated multimedia presence, usable also by different mobile devices such as mobile phones or tablets. Characterized by the three-dimensional environments used in immersive mode, virtual museums can exist without corresponding to a physical location.

Concluding, there is a shift from an object-oriented conception in which museums is a temple of knowledge to a customer-driven approach in which museums review their hidden value and leverage on new technologies to achieve the change of meaning and higher audience engagement. A timeline regarding historical development is reported below in Figure 11:

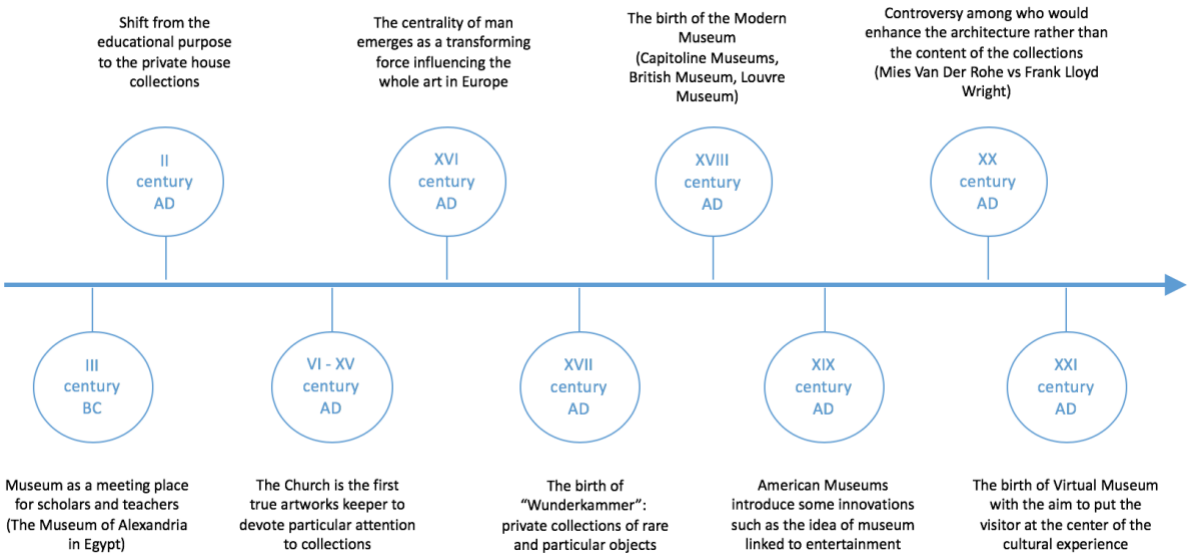


Figure 11 - Evolution of cultural institutions in history

2.1.2 Museum and Collection Definitions

The museum is an institution not deeply defined: both in the case of public museums and private museums, it is not regulated by an organic set of rules related to its specific mission.

Indeed, there is no normative that uniquely identifies museums and similar institutions, nor an official list that identifies these structures nor a homogeneous certification system for evaluating the technical-scientific standards that describe their operation.

The word "institution" is often used as a synonymous of "museum" when it is preceded by the adjective "cultural"; it is different from the term "institute" which is instead specific and concrete: *"the museum institute is a materialized form of the museum institution"* (I. Maroevic, 2007).

In this analysis, the two expressions "cultural institution" and "museum" will be used as interchangeable, empowering the definition and knowing that the term "museum" could indicate both the institution and the building or the place generally assigned to the selection, study and exhibition of the material and immaterial testimonies of humanity and its environment. In addition, similar institutes will also be considered "museum" such as picture galleries, non-profit art galleries, collections, antique trades, institutions for preservation and exhibition dependent on a library or an archival centre and museum containers (ISTAT, 2019).

In this preliminary phase, archaeological sites and historical monuments will also be considered

in the museum category description (ISTAT, 2010). According to the definition provided by ICOM in 2007:

"A museum is a non-profit, permanent institution in the service of society and its development, open to the public, which acquires, conserves, researches, communicates and exhibits the tangible and intangible heritage of humanity and its environment, for the purposes of education, study and enjoyment"

Analyzing the single sentences that compose the definition we can define (ICOM, 2017):
Permanent institution: to carry out its activities, the museum needs to be maintained over time. It needs physical space to live, to integrate and connect itself more and more with the territory in which it is born and develops, allowing to work better.

Non-profit institution in the service of society and its development: the purpose of the museum is not to economically enrich itself, but to improve the cultural level of the population. It is a reference point for the society and a link for research groups and cultural associations.

Open to the public: the museum is the space that welcomes visitors showing artworks. A museum that owns huge collections but cannot be visited or whose content is not available, it has no right to be called a museum. To enrich the population culture, the museum must be designed and built around the visitor.

Acquires, conserves, researches, communicates and exhibits: these aspects reflect the fundamental tasks of a museum. The man's testimonies and his environment must be clearly acquired in the form of objects, books or whatever, but they must be correctly preserved in order to allow the disclosure. Scientific research could not take place without objects that in this case are the collections. The exhibits could not be realized without the collections and without scientific research. The collections would have no meaning without their elaboration and their scientific use, nor they could grow without further research (scientific, technical, artistic).

Tangible and intangible heritage of humanity and its environment: the museum is open to any kind of testimony, be it a story or an object. Anyone must feel free to bring their doubts and questions to the museum because it is born and lives for man. Therefore, the social role of

museums cannot be denied, as they contain material objects that have been created, used and accumulated by a given community in the course of the history and represent a historical testimony, the memory that allows the community to perpetuate itself over the time.

For the purposes of education, study and enjoyment: a museum does not exhibit for its own pride. It exposes a study aimed at learning from the past, understanding the present and planning the future. However, study and education do not disregard pleasure: curiosity and emotions are fundamental to activate certain knowledge processes and to arouse the interest of the observer.

This ICOM 2007 sentence replaces the previous statute related to 1974 that has been used for over 30 years. The substantial difference is one: in the latest version, the reference to intangible assets has been added. The structure of the 1974 definition have the same words of the 2007 version but the order is different. Furthermore, the oldest definition emphasized the function of research, presented in some way as the driving principle of the institution, while in the 2007 version this principle is relegated to the general function list of the museum.

The active use of collections is a key point in the definition of museums, indeed, "*it is through collections and the way they are used to deliver cultural experiences that museums give benefit to the public*" (H. Wilkinson, 2005).
A collection can be defined as "*a set of material or immaterial objects (works, artefacts, archival documents, testimonies, etc.) that an individual or an organization has taken care to collect, classify, select, make it safe and, often, to communicate to a wider public, depending on the nature of the collection, public or private*" (F. Desvallées & A. Mairesse, 2009).
Another definition of the collection is the one given by Pomian: "*any set of natural or artificial objects, temporarily or permanently maintained outside the circuit of economic activities, subject to special protection in an enclosed area arranged for this purpose, and exposed to the public's eye*" (K. Pomian, 1987). In this second case, the concept is expressed emphasizing its symbolic value, to the extent that the collection has lost its usefulness or its exchange value.
Nevertheless, in both cases it is material or immaterial, the collection is at the centre of the museum's activities: "*museums have a duty to acquire, conserve and enhance their collections in order to contribute to the preservation of the natural, cultural and scientific heritage*" (ICOM, 2006). In order to establish a collection, it is necessary that these aggregations of objects form a coherent and meaningful group. It is important not to confuse the collection and

the fund: in the second case, unlike the collection, there is not a real selection of the material and the intention to constitute a coherent group of objects is not always respected.
A list of the definitions explained is reported below in Table 2.

Authors	Definition	Topic	Academic vs Practitioners
Maroevic (2007)	The museum institute is a materialized form of the museum institution	Museum	Academic
ICOM (2007)	A museum is a non-profit, permanent institution in the service of society and its development, open to the public, which acquires, conserves, researches, communicates and exhibits the tangible and intangible heritage of humanity and its environment, for the purposes of education, study and enjoyment	Museum	Practitioner
ICOM (2006)	Museums have a duty to acquire, conserve and enhance their collections in order to contribute to the preservation of the natural, cultural and scientific heritage	Museum	Practitioner
Desvallées & Mairesse (2009)	A set of material or immaterial objects (works, artefacts, archival documents, testimonies, etc.) that an individual or an organization has taken care to collect, classify, select, make it safe and, often, to communicate to a wider public, depending on the nature of the collection, public or private	Collection	Academic
Pomian (1987)	Any set of natural or artificial objects, temporarily or permanently maintained outside the circuit of economic activities, subject to special protection in an enclosed area arranged for this purpose, and exposed to the public's eye	Collection	Academic

Table 2 - Definitions of museum and collection in literature

2.1.3 Thinking about the Museum: Critical Positions

"*Today, nobody thinks the museum as the place of the muses. All have forgotten Tolomeo II and the building he founded in Alexandria, intended as a center of study and activity for artists. Everyone knows what a museum is. And everyone keeps trying to define it*" (M.T. Balboni Brizza, 2000).

In the following paragraphs are provided a series of museum definitions and critical positions by scholars belonging to different fields, some of which are very close to the museum reality. They provide a wide and diversified spectrum of viewpoints.

Museum as Education

A more realistic definition of the museum must free itself from certain principles, such as the one referring to the non-profitable aspect and, at the same time, be more objective and broader as "*a permanent institution, which preserves collections of material documents and produces knowledge from them*" (P. Van Mensch, 1992).

In addition, it should be considered as a "*place out of memory*" (P. Nora, 1984; G. Pinna, 2003) in which the public looks at something that belonged to a previous time and that bears witness to it. By doing so, the process continues beyond that space, acknowledging the message and prolonging its memory. A "*phenomenon, which incorporates different places or territories, experiences and even immaterial spaces, where the things and the values related to them are preserved, studied, and communicated as signs to interpret absent facts*" (M.R. Schärer, 2007). Museums are also a fundamental reference for supporting learning, "*especially informal, family and life-long learning; as a social and recreational space; and for shaping a sense of self and society through preserving cultural heritage and building understanding of other cultures*" (B. Usherwood, 2005).

As it turned out, the traditional conception of museums is the one of a centre of scholarship and curatorial competences shifting over time towards a more and more "*explicitly public-oriented role, helping people to learn about society, culture, history and science, and providing entertainment*" (T. Travers, 2006).

Therefore, more or less consciously, the museum has always transmitted culture and education as its purpose. Education is not intended as the rigid and scholastic one, but the one that cares about progress and improvement for the society.

The museum is becoming more and more a place dedicated to the present and the future, in which people discuss, do, experiment, create:

"*if on one hand it has lost its fundamental nature as a temple of memory and a treasure chest of conservation, on the other hand it has itself become a new creative tool*" (M.C. Ruggeri Tricoli, 2000).

Furthermore, passing from being a place of contemplation to a place of production, the museum has also opened up to some disciplines not related to it. Moreover, interdisciplinary is another prerogative of the new museum, indeed, combining the knowledge of different fields and giving space to collaborations, debates and multi-handed searches obviously give added value to this institution.

Museum as a Complex Dimension

"Each museum is a complex form because in each of its scale coexist (...) a mix of different temporal planes: original space and time of the artworks (...), space and time for subsequent installations (...), of any reconstructions, current space and time, of anyone who, being in front of an object, continues to have feelings (...)" (M.T. Balboni Brizza, 2000).

According to Balboni Brizza, this museum interpretation can be broken down into different levels referring to the space-time dimension. Starting from the first level, the artworks, they were realized for a reason and usually commissioned for other people and before being exposed on the walls of a museum they passed through the hands of many people.
The second level is the setting up of the artworks: someone will have thought about how to exhibit the work for the first time giving it a meaning; maybe, subsequently, a new curator will have changed his mind by changing the color of the wall, the caption, or the lighting. Unlike the first level, here the discussion is not related to the object itself, but the way it is looked and how someone wants others to look at it.
The last level refers to the people that look the artworks: the space and time of those who visit. Space is not only the physical room in which the visitor moves but also the interior space in which emotions and wonder emerge. This is linked to the concept of time: it takes time to walk through the rooms but also to understand, to empathize and get excited. The objects in the

museum are the vehicle for the transmission of messages that go beyond their physical and formal consistency, becoming a symbol of something broader because they deal with ages, riches, thoughts, wills and ideas. This allows the museum to be the perfect "*symbolic place*" since it is the container of these objects (M.C. Ruggeri Tricoli, 2000).

Museum as a Contradiction

Some scholars have given their interpretation about the dangers and contradictions in which a museum often risks falling.

"Most of the time, the museum is used, unconsciously or not, as a tool for mystifying objective realities and manipulating the interpretations of history" (G. Pinna, 2003).

According to Pinna, a museum is a place of mystification because by decontextualizing the objects (moving them away from their original environment and placing them in a totally artificial one), it recreates situations that are not adherent to the reality in which the object was conceived and for which it was produced. This place of creation does not elaborate objective but subjective meanings: therefore, it does not communicate absolute truths, but relative ones. In both cases what is proposed to the public is always a manipulation of reality, which is sometimes realized unconsciously, since an absolute representation of the reality is impossible, but very often corresponds to representations for a vested interest. The institutional role of the museum and its authority together with the intrinsic subjectivity makes museums powerful tools for manipulating memory, history or identity.

Even if Pinna recognizes the extraordinary value of an institution like the museum, he is also concerned about the process of manipulating things, with the aim to convey a message. The danger lies in the non-neutrality of the operation, in the fact that everything is done because of an interpretation and of a communicative will.

However, he is not the only one who thinks that the museum is somehow misleading.

Adalgisa Lugli also states:

"The museum as an abstract place from reality, completely alien to the mechanisms of production and usage of the objects that characterize everyday experience. It does not want to be a place of abstraction, but in reality it has become an environment in which superficial

knowledge is transmitted and received. It is a market of illusions" (A. Lugli & V. Vercelloni, 2004).

Unlike Pinna, Lugli does not think so much that the museum misleads because of the manipulation of the message it transmits but because the message transmitted does not coincide with the reality. It is as if, despite what the museum conserves is "real" (even when it is in virtual format) and has belonged to reality, the museum, extrapolating objects from their context and placing them in a new one, offers completely misleading information, creating a parallel reality that has no points in common with the original one. Adalgisa Lugli also reflects whether the museum can be against the law of nature:

"The museum has been defined an "unnatural" institution because it exists to preserve things that, in the natural course of the events of the world, would be destined to corrupt and disappear" (M.T. Balboni Brizza, 2000).

These words clarify why the museum would be against nature: time passes and things are destined to deteriorate and disappear, but the museum wants to preserve them (and often restore them) immobilizing them in a given time and place.
A list of the definitions explained is reported below in Table 3.

Authors	Definition	Academic vs Practitioners
Van Mensch (1992)	A permanent institution, which preserves collections of material documents and produces knowledge from them	Practitioner
Nora (1984), Pinna (2003)	A place out of memory	Academic
Schärer (2007)	A phenomenon, which incorporates different places or territories, experiences and even immaterial spaces, where the things and the values related to them are preserved, studied and communicated as signs to interpret absent facts	Academic
Usherwood (2005)	A social and recreational space, for shaping a sense of self and society through preserving cultural heritage and building understanding of other cultures	Practitioner
Travers	A public-oriented role, helping people to learn about	Practitioner

(2006)	society, culture, history and science, and providing entertainment	
Ruggeri Tricoli (2000)	It has lost its fundamental nature as a temple of memory and a treasure chest of conservation, on the other hand it has itself become a new creative tool	Academic
Balboni Brizza (2000)	A complex form because in each of its scale coexist (…) a mix of different temporal planes: original space and time of the artworks (…), space and time for subsequent installations (…), of any reconstructions, current space and time, of anyone who, being in front of an object, continues to have feelings	Academic
Pinna (2003)	A tool for mystifying objective realities and manipulating the interpretations of history	Academic
Lugli & Vercelloni (2004)	An abstract place from reality, completely alien to the mechanisms of production and usage of the objects that characterize everyday experience. (…) It does not want to be a place of abstraction, but in reality it has become an environment in which superficial knowledge is transmitted and received. It is a market of illusions	Academic
Lugli & Balboni Brizza (2000)	An "unnatural" institution because it exists to preserve things that, in the natural course of the events of the world, would be destined to corrupt and disappear	Academic

Table 3 - Critical positions about museum in literature

2.1.4 Classification of Museums

According to Brown Goode, cultural institutions may be classified according to the nature of their contents (G. Brown Goode, 1986). The same classification is the one used by UNESCO in 1985 with the aim to introduce a lexicon applied to the museum system for statistical purposes (UNESCO/STC/Q/853). The 11 main typologies are:

1. **Art museums**: containing artworks and applied art. Within this group, there are sculpture museums, galleries of painting, museums of photography and cinema, architecture museums, including permanent art galleries of libraries and archives. "T*he Museum of Art is a depository for the aesthetic products of man's creative genius*" (G. Brown Goode, 1986).

Art museums comprehend the so-called "Art Museum" and "Museum of Modern and Contemporary Art" (ISTAT, 2019): the first category represents artworks and collections (excluding archaeological finds from excavations) dating from the 5th century AD to the end of the 800. Museums of Oriental and Middle Eastern art and those of sacred art are also included. Instead, the Museum of Modern and Contemporary Art collects artworks and collections whose execution dates from the 1900s to the present day. It may also include video artworks, painting, photography, sculpture, digital art, design, installations and other achievements of post-modern art, conceptual, pop, minimalist, informal, performance art and trans-avant-garde.

2. **Historical and Archaeological museums**: they present the historical evolution of a region, district or province for a limited or long-term period. Archaeological museums are distinguished by the fact that their collections are, partly or fully, the result of excavations, dating back to the late medieval period included, having the value of the testimony of ancient civilizations, including extra-European ones. Archaeological museums also include museums of palaeontology and prehistoric/proto-historical archaeology. As regards the Historical museums, they include the museums of historical relics, memorials and archives, the military museums and the museums dedicated to historical figures.

3. **Natural History museums**: they expose subjects related to multiple disciplines such as biology, geology, botany, zoology, palaeontology and ecology. This typology illustrates the phenomena of nature (mainly related to the kingdoms of animals, vegetables and minerals), its origin and its development over time. This typology comprehends collections of non-living animal and plant species, minerals or fossils, organized for public display. Institutions that preserve and exhibit exclusively animal or plant living specimens are excluded (for example botanical gardens, zoos, aquariums, nature reserves, vivaria, eco-parks, etc.).

4. **Technological or Industrial museums:** museums from the first category are connected to one or more sciences such as astronomy, mathematics, physics, chemistry and medicine. Moreover, planetariums and science centres are also included. Technological museums manage collections of machines, tools, models and related projects and drawings. Instead, industrial museums are devoted to manufactures including material and their sources, tools and machinery, products and results, methods and processes and finally, wastes and undeveloped resources. They have the task of preserving and spreading the heritage of

techniques and arts, as well as the testimonies of historical memory and the identity of a company.

5. **Ethnographic and Anthropologic museums:** they present exhibits on culture, beliefs, customs, traditional arts of a population. The purpose of these museums is to illustrate the natural history of man, particularly among primitive and semi-civilized people. They manage collections of materials related to the cultures and characteristics of different populations, including documentation of oral and event testimonies or rituals. Agricultural and handicraft museums are included for which the ethnological interest prevails over the technological and/or artistic, as well as the territorial museums with collections of materials and testimonies related to a particular territory.
6. **On-Site museums:** the main examples are the historical monuments and the archaeological areas, such as architectural or sculptural works and areas of particular interest from an archaeological, historical, ethnological and anthropological point of view.
7. **Zoological gardens, Botanical gardens, Aquariums and Natural reserves:** the characteristic of these natural museum entities is to present living specimens.
8. **Territorial museums**: they illustrate a quite extensive territory to constitute a historical cultural entity. Sometimes they are also ethnic, economic or social, whose collections refer more to a specific territory than to a specific theme or subject. In small communities, it is often advantageous for museums and public libraries to be combined under one roof or one management.
9. **Specialized museums:** they focus their research in a particular area or in a single theme of cultural heritage that is not included in any other category (especially from 1 to 5). Until 2002, this included sacred art, which from then on has been considered a part of fine arts museums.
10. **General museums:** they have mixed collections and cannot be identified by the main subject.
11. **Other museums:** museums that cannot be included in any of the categories above, as Museum of Religion and Worship that are collections of devotional and/or liturgical objects, dedicated to worship, church furnishings and burial sites.

Another classification made by EGMUS (the European Group for Museum Statistics) is based on the ownership (public-private). It is important to make a distinction between the several

entities who have the legal-administrative responsibility of the museum/institute and that could appear as the owners of a collection. The three main categories are:

1. **Public**: which are owned by central, federal, local or regional authorities or other public-owned entities: "*Subject with legal personality, established by law and subject to public law*" (ISTAT, 2019). Examples of public ownership are:
    - General administration of the state (Ministry of Culture, Ministry of Defence, crown heritage, other ministries or bodies of the general administration of the state);
    - Autonomous administration (council or department of culture, entities such as state universities, institutes or schools of every order and level, etc.);
    - Local administration (regional councils, provincial or island councils, town councils, mountain or island communities, union of municipalities, other institutions);
    - Others (public companies, public foundations, research institutes, public law consortia, other public bodies).
2. **Private**: owned by private entities (foundations or associations registered under private law) or families and individuals: "*Subject with legal personality, established by an act of a private nature and governed by private law"* (ISTAT, 2019). Examples of private ownerships are:
    - Ecclesiastical institutions;
    - Others (associations, foundations, cooperatives, societies, individuals, non-state universities, other private bodies).
3. **Mixed**: based on agreements, contracts and partnership between public and private institutions to run a museum. In this type of association/society, the government still has the superintendence nominally and legally, however the company manages itself more like a private company than the government could.

A list of the main museum typologies explained is reported below in Table 4.

Authors	Main Typologies
UNESCO (1985), Brown Goode (1986)	- Art Museums - Historical and Archaeological Museums - Natural History Museums - Technological or Industrial Museums

	- Ethnographic and Anthropologic Museums - On-Site Museums - Zoological and Botanical Gardens, Aquariums and Natural Reserves - Territorial Museums - Specialized Museums - General museums - Others
EGMUS (2004), ISTAT (2019)	-Public (General Administration of the State, Autonomous Administration, Local Administration, Others) -Private (Ecclesiastical Institutions, Others) -Mixed

Table 4 - Models for classification museums typologies in literature

2.1.5 The Value Generation

Defining the impact that museums have on their public and on their territory is one of the most complex challenges for understanding and legitimizing the role of conservation and enhancement of cultural heritage in contemporary societies. Part of this challenge derives from the multiplicity of values that museums generate.

The main distinction is related to the subjects affected by the value generation, the museum itself or the stakeholders related to it. As regards the museum, the aspects that require particularly reflection deal with the ways in which museums generate economic and social-cultural value: as the contrast between "Mercantilism" and "Patronage".

The relationship between cultural and economic value is a still open debate: Bonus & Ronte (1997) have declared that economic value comprehends cultural value instead Throsby (2001) and Hutter & Frey (2010) considered that cultural value has a consequence on economic value, but the two are separate. In addition, Candela & Scorcu (2004) stated that artworks' economic value can be evaluated in principle not considering its cultural value.

Moreover, the museum is considered as a patrimonial asset and not as an economic capital able to produce a significant revenues flow; this aspect is related to the actual lack of interest about museum accountability systems and practices of planning and of management control, which often remain at an elementary level. Indeed, in addition to the margins for the improvement of the strategic and organizational-management development, it arises the need to create a more effective, coherent and systematic museum policy. This new policy should be able to face the

demand flows and physical space utilization in a more equitable and productive way than what usually happens in the absence of strategies specifically designed for the purpose (Aspen Institute Italia, 2012).

As regards the stakeholders involved, it is possible to identify three clusters: the museum is in charge to produce value for a plurality of actors, among which public subjects (the state, in its national and peripheral articulations), scientific and professional communities and visitors. There are also other important stakeholders: the sponsors and donors who financially support the initiatives moved by different reasons, the private individuals as firms and retailers that get an indirect economic benefit from the presence of the cultural institution (for example, homeowners, bars, hotels near museums) and finally the employees and suppliers (S. Baia Curioni, 2008).

With regard to the public authorities (state, regions, local authorities), the institution is responsible for protecting the cultural heritage "public good" in its various components.
The concept is quite broad and can be included within the definition of "public value", which considers the value of public organizations (Keaney, 2006). Therefore, museums create value through the sharing of culture, improving the visitors' social interaction indicators (Belfiore, 2004).
The value generated towards citizenship can not only be traced back to a monetary dimension but can be extended to intangible components as educational purpose and life quality. It is therefore a complex notion of value that is articulated in various forms:

- the existence of the good itself (in present and future periods, with particular attention paid to its protection and conservation);
- its accessibility, as the users must be able to access materially, at a cognitive level, through the information that also allows those who do not have specific preparation to get in touch with the product;
- its symbolic and representative function, with a supporting role in local and national policies;
- its educational and training function throughout the citizens' life cycle;
- its sustainability and economy (effectiveness/efficiency) compared to public indicators, allowing a cultural heritage to become a generator of revenues and profits.

According to Baia Curioni, the second group of stakeholders is made up of scientific and professional communities. A museum institution, having the responsibility to guarantee a proper scientific, technological and cultural treatment of the patrimony it manages, is inserted in the context of the scientific and professional communities (historians, curators and technologists) that define the quality standards for the actions of protection, conservation and enhancement.

The actions related to these communities influence their reputation and judgment in the national and international field, influencing also their ability to acquire resources (for exchange of experiences, loans, co-productions, etc.).

In this case, value creation is purely meritorious, since it depends on the internal articulation of the scientific communities. The elements of the value that can be recognized are:

- the quality and recognition of the museum's scientific and curatorial staff and of the overall cultural projects (identity and positioning of the institution);
- the quality of collections management choices;
- the quality and the sharing of protection and conservation choices and the enhancement programs;
- the accessibility of collections and archives for research activities;
- the accessibility of collections and archives for joint development activities (loans and exchanges).

The third group of stakeholders is made up of individuals. This rather broad category includes all those who are oriented towards a value generated by a direct or indirect relationship with the good in a utilitarian and typically economistic perspective.

Therefore are included: the visitors (with all the related possible segmentations), the private individuals who indirectly benefit from the proximity of the heritage (owners of neighbouring properties, of catering services and of hotels), the sponsors who act for utilitarian reasons (support of brands and products, incentive policies for customers, staff and suppliers), and finally, the customers of business-to-business services, such as companies that relate to the museum for freight charges on spaces, images and brands.

In this case, the value has a mercantile nature, with a logic of cost-benefit and supply substitutability.

2.2 DIGITAL

By analyzing the existing literature, it is possible to understand that innovations, specifically the digital ones, are adopted by museums in an incremental way, implementing technologies developed by other sectors. If digital technologies have firstly been adopted to support the museum management, especially for the cataloguing activity, from the last decades there was a paradigm shift, from a curator (or object) oriented to a visitor-oriented, adopting a business model based on the customer-centric approach and increasing the visit experience. Through the diffusion of personal computers, Internet (in the '80s) and World Wide Web services (in the '90s), many museums began to use these tools not only for a marketing purpose, but also for a better fruition inside the museum and all over the world considering web pages, hypertext links between pages and the latest virtual museum concept. Nowadays museums are characterized by a well-established presence of digital technology to support the management for the operation and communication activities, and the visitors for a better understanding and experience.

2.2.1 Digital Innovation and Adoption in Museums

Considering a cultural institution, Bakhshi identified the basic objectives that should be set (H. Bakhshi, 2012). First of all, there are qualitative objectives as typology of exhibited works, quantitative objectives as number of customers acquired and objectives in terms of education, growth and social. The pursuit of these objectives can be accelerated by technological innovations; indeed, four categories of innovation can be identified in cultural institutions to guarantee a rapid growth offering a real added value to the management and to the culture fruition (H. Bakhshi 2010).

The first category concerns innovation in reaching a new audience. Technological innovations continue to evolve faster and faster and today the methods to reach the public are huge and differentiated. In this context, Bakhshi identifies three micro-categories of innovation. The first micro-category is related to *audience broadening*, to capture a wider slice of the actual audience. Then there is the *audience diversifying* trying to get in touch with new consumers, and finally, the *audience deepening* that allows to intensify the interest and the presence of the audience.

The second category of innovation concerns the development of new forms of art. This is especially true for theatres and cinemas, but it is also valid for museums if we consider how to present artworks. Virtual museums, 3D technologies and augmented reality are innovations that can differentiate the offer and increase the museum attractiveness.

The third category is related to innovation as the creation of value. In this case, it is important the meaning given to the word "value", as there are many ways in which cultural institutions create value. Technologies can provide new experiences to visitors, generating new forms of cultural value that can be translated into new revenue streams, translating the institution's cultural value into an improvement of its financial sustainability. Further creation of value through innovations is represented by the possibility of environmental requalification to regain urban areas that are abandoned, peripheral and degraded. The MAUA, for example, is a redevelopment project of Milanese urban suburbs such as Giambellino, Lorenteggio, Niguarda and Bovisa thanks to the collaboration of street artists. Indeed, fifty murals have been selected around the city that, when framed with the smartphone become alive into true digital artworks: marked on the map, they guide the tourist through an inedited tour of the city's areas, too often forgotten.

The last category concerns innovation as the creation of new business models. New technologies have changed the way cultural institutions identify their audience and present their offer differentiating their previous business models, focusing only on the benchmark with similar models adopted by other institutions. The push towards new business models comes from both the demand and the supply side. Regarding the demand, the shift from an organizational orientation to a consumer orientation has led to new interpretations of value involving much more the customer. On the supply side, the advent of new technologies has driven the growth for restructuring the traditional business models. The rush for digitalization and technological innovation has completely redesigned the museum offers, which today can count on a variety of solutions focusing on different customer segments.

Many types of research have been conducted in literature to draft the adoption of technology in cultural institutions: one of the most important studies is represented by Moore's "Technology Adoption Life Cycle" model (G.A. Moore, 2014), as reported in Figure 12. This model is a review of the Rogers curve related to innovation adoption, indeed, remain the bell shape configuration and the five level of adoption: (1) Innovators, or "*Technology Enthusiasts*", are

innovations early adopters that learn about new technologies as soon as they are available. (2) Visionaries, or "*Early Adopters*", want to obtain new customized high-tech solutions to reduce the time to market because they believe that innovation technology provides competitive advantages. (3) Pragmatists, or "*Early Majority*", adopt applications already proven in term of efficiency and effectiveness. (4) Conservatives, or "*Late Majority*", are followers, risks adverse and they are followers and want to stand out from their competitors. (5) Skeptics, or "*Laggards*", characterized by a conservative approach and reluctant to change, differentiating themselves by the mainstream trends (A. Gombault et al, 2016).

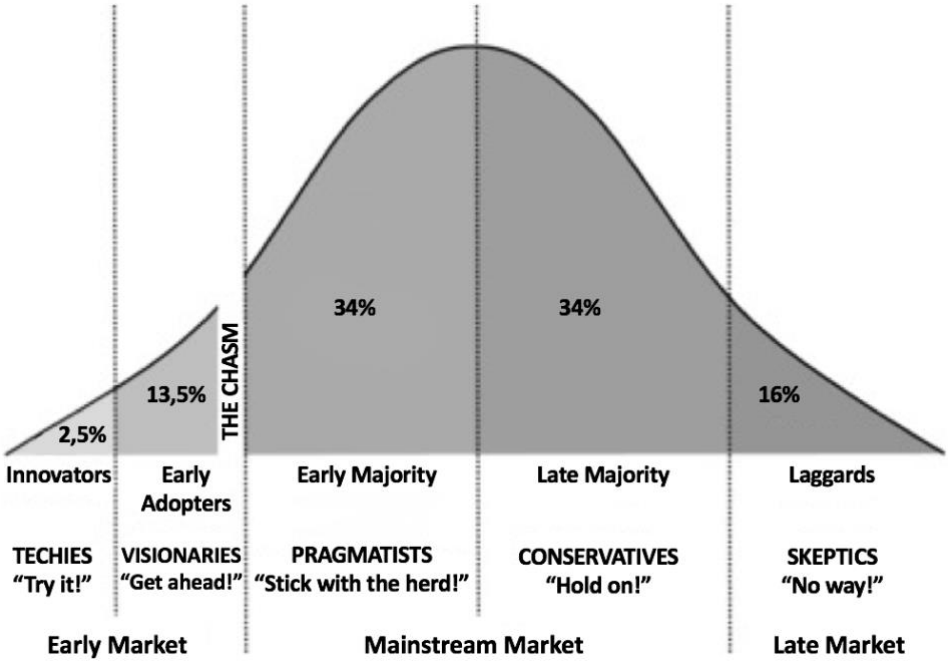


Figure 12 - Technology adoption life cycle model (Moore, 2014)

The majority of cultural institutions remain *Conservative* about the adoption of digital innovation due to financial and administrative problems, lack of vision and unstructured strategy, resistance to change, time and costs (A. Gombault et al, 2016). Moreover, the conservative behaviour about the digitalization process is affected also by the lack of knowledge and skilled personnel and by the risk of heritage denaturation.

Some cultural institutions, instead, are characterized by a *Pragmatic* and *Visionary* level of adoption. Specifically, *Pragmatic* heritage organizations are focused in mainstream and accessible digital technologies, for example interactive application and social media, such as Facebook, due to the possibility to share photos, videos, events or a simple comment. This last

tool is a modern and effective way for promoting cultural news and initiative to the different type of audience: Agostinho Ribeiro, the Grão Vasco museum director explains: "*We are constantly putting information and invitations on our Facebook page. At the moment, we have 4000 likes, we need more, but I've only been director for three months!... we send invitations via Facebook. We don't use Twitter, because we can't put the same scientific information on there as on Facebook*."

Visionary institutions belief ICT as the future for the society, from the cultural heritage to the culinary process, as explained by San Sebastian:

"*It seems that technology is all around us, in everything: the nutritional process, the traceability of food, (...)*" (Basque Culinary Centre).

Cultural institutions usually pursue incremental innovation (A. Gombault et al, 2016) rather than radical innovation, due to a lower economic impact, time and required resources and due to a lower level of risk related to the overall innovation project. This is why cultural institutions usually tend to adopt innovations, in particular the digital ones, coming from other industries already proved in the market (C. Hull & B. Lio, 2006). Examples can be virtual viewers that refers to a technology born for the military industry: virtual reality has existed for many years, but it was not accessible to the public. It was only with the progress of the mobile devices in terms of processing and calculations that this experience was broadened to the public (F. Pontolillo D'Elia, 2017). Of course, the adoption of technology means accepting that there will be a moment in which the technology will reach the end of its life cycle becoming obsolete, hence the need to switch to a new technology generation through a change management process (M. Son & K. Han, 2011).

2.2.2 Two Digitalization Strategies

Some cultural institutions have turned to technological innovation for a market purpose, adopting digital catalogues, online activities, virtual web visits, virtual reality or touch screens on site, to raise the interest of visitors increasing the experience during the visit. Instead, other cultural institutions have adopted a custody strategy, based on conservation, research and acquisition of collections, remaining attached to the core activity of a cultural institution, the preservation of cultural heritage.

As it is possible to understand, in cultural institutions, the digitalization process could be seen for two main purposes: for a *curator-oriented strategy* (mission-based, helping institutions in managing the cultural heritage) and for the *visitor-oriented strategy* (market-oriented, helping customers in understanding the message improving also the experience) which result in different outcomes on performances (H. Kéfi & J. Pallud, 2011).
Overall, digital practices in cultural institutions are structured for preserving cultural heritage, educating visitors providing a memorable experience, communicating with the society and aligning the strategy to new digital opportunities. As regards the application, digital innovation could be applied for back-office activities, front-office activities and web-based services (C. Nigro et al, 2016).

Digital Innovation for Curator–Oriented Strategy

"*The wide spread of digital technologies and internet has revolutionized the ways to approach the study of the artwork, both because the web offers the opportunity to share the scientific research's results on a large scale, and because the digitalization of contents connected to artwork allows to re-contextualize the artwork itself like it wasn't possible until now*"
(S. Intorre, 2013).

In the mid-nineties, the sudden increase in individuals connected to the Internet, first in the United States and then in the rest of the world, led to a radical change in the communication methods all over the world. Initially designed to be used exclusively by computers, the digital contents now travel on a wide range of portable devices such as tablets, smartphones and smartwatches.
That's what Henry Jenkins, in a fundamental essay for the understanding of contemporary communication, calls "convergent culture": a context in which every type of content is digitized and published on sites, platforms and social networks, from public administration services to corporate communication.
Today, in this context, also cultural operators as art historians, academics, librarians and museum directors move their practices reaching a potentially infinite audience.
How can you represent digital information about an artwork or a collection? What information do you want to transmit? In order to answer these questions, the tools for cataloguing and re-

contextualizing the artworks have been dealt with an examination about the information management and about the data storability on the web.

"*The traditional ways of cataloguing involved the storage of the information on a paper medium. The capability to store great amounts of data, to do researches inside them and to communicate this information to external users has produced the elaboration of new approaches to the management of the documents related to artwork and to the ways their data are connected with*" (S. Intorre, 2013).

Before the digital era advent, information about artworks contained in museums and in public or private collections was kept in paper card forms.
The first attempts to overcome this approach, which constituted an information access impediment by external users, consisted in classification systems such as ICONCLASS (created in the fifties of the last century by Henri Van Der Waal, University of Leiden professor, but developed by a group of scholars after his death) which however remained relegated to a secondary resources' role (D. Bearman, 2008).
As for Italy, between 1880 and early 1900, Adolfo Venturi developed the National Catalogue project related to monuments and artworks but only in 1964, Giulio Carlo Argan, through the Ministry of Education patronage and the National Research Council, promoted the creation of a specific body responsible for digital cataloguing: the Central Institute for Cataloguing and Documentation. The advent of digital technology allowed to organize the collection documentation based on object-oriented representation models in order to structure information related to the artwork characteristics.

In the seventies, the computer was considered as a relevant tool to create the catalogue of the collection and the files were mostly inventories processed by machines with mainframe architecture created with a simple data input directly from paper cards.
In the same period, protocols of data management related to collections have been theorized using computer technologies (D. Williams, 2010): some examples are the Smithsonian Institute's SELGEM, the GRIPHOS of the Metropolitan Museum of Art and the Databank Committee and the CHIN of the Canadian Heritage Information Network (D. Bearman, 2008).

In the mid-eighties, the Smithsonian Institution introduced a data model based on relational databases and, in parallel, the commercial diffusion of microcomputers led to a considerable increase in the computing power possibilities. For the first time, attempts have been made to set standards for data organization and communication, firstly by the Museum Documentation Association in England and by the Archives & Museums Informatics in the United States.
However, only in the 1990s a data management model was established, thanks to the work of the ICOM and the International Council on Museums Committee on Documentation (CIDOC): a further evolution in 1994, when the Museum Documentation Association published SPECTRUM (D. Bearman, 2008).

Starting from 2008, the European Community launched the ATHENA project (Access to cultural heritage networks across Europe, http://www.athenaeurope.org), that referring to SPECTRUM, developed the LIDO standard (G. McKenna et al, 2011). The main objective was to aggregate, transform and publish museum data in Europeana, the European digital library founded by the eContentplus community program (http://www.europeana.eu).

According to McLuhan, the information infrastructure evolves parallel to the society and the organization evolution to which it belongs (M. McLuhan, 1964). Since the mid-nineties, the advent of multimedia, Internet and applications (that felt the inclusion of data in complex computer systems) has opened to new approaches to the artworks knowledge management and to new possibilities of information communication to a broader audience than before.
In this context, the researchers started to use the expression "digital object" as "content units composed of data bytes", the metadata (M.T. Natale et al, 2012).

Today the information that surrounds the artworks is a heterogeneous set of data consisting of distinct elements, such as images, texts, videos and sounds through which it is possible to navigate in infinite ways. The possibility of interconnecting these resources generated a narrative potential in the artworks, enabling the user to link information in ways that were not feasible with the old analogical filing systems. Nowadays there are many museums that provide online access to information on their collections and re-contextualize them in the form of essays, quantitative data and digital images (F. Cameron, 2010).

Equally important is how enriched data can be used by linking and contextualizing different elements of the collection. As claimed by Scali and Tariffi, rethinking collection management and multimedia content distribution systems will always have greater effects on how information about collections can be configured and communicated (G. Scali & F. Tariffi, 2001).

The importance of cultural heritage digitization is the object of the Digital Heritage Preservation Chart adopted by the General UNESCO Conference, held in Paris in October 2003: "*Resources in the field of information and creative information are increasingly produced, disseminated, obtained and stored in digital form*".
In the European context, another important project was Minerva, funded by the European Commission and coordinated by MiBACT: developed since March 2002, its first phase was completed in July 2005. The project purpose was to facilitate the creation of a common vision in defining actions and programs for the accessibility and usability of cultural heritage on the web. This project allowed a first approach to the identification of standards for the digitization of cultural heritage.

"*Thanks to new digital technologies, heritage organizations have the ability to store and preserve data in much greater quantity and with better speed, reliability, accessibility, and profitability*" (J. Ray, 2014).

A timeline regarding the historical development is reported below in Figure 13:

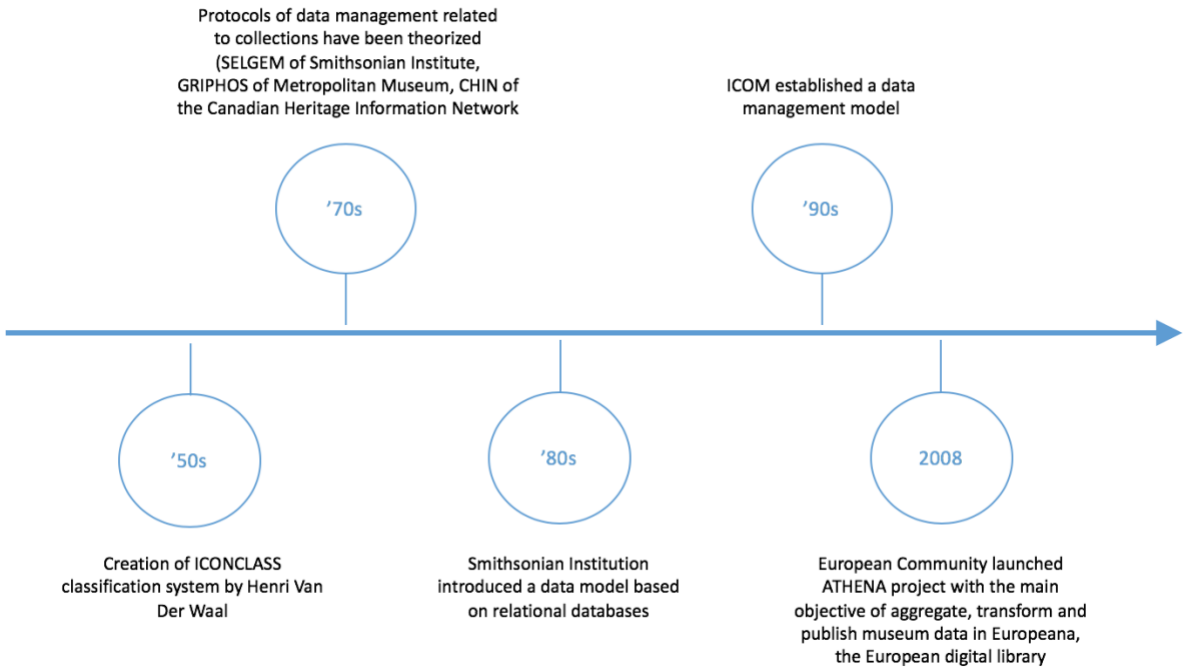


Figure 13 - Evolution of the curator-strategy in history

Digital Innovation for Visitor–Oriented Strategy

Through the diffusion of personal computers, Internet (in the '80s) and World Wide Web services (in the '90s), many museums began to use these tools not only to present and publicize the contents of their collections, but also to make it possible a fruition all over the world considering however that the first Web pages allowed only the use of text, images and hypertext links between pages.

If new technologies have been firstly used for archiving and cataloguing, nowadays, there are extraordinary possibilities in education and in cultural communication (L. Cataldo & M. Paraventi, 2007). Digital innovations in museums exploit the most modern technologies to improve the visitors' fruition and, more generally, the customer experience adopting a business model based on the customer centric approach. The main change is not about the technology used but rather the concept of User-centered Design, meaning that "*the product must adapt to the user, rather than making the user adapt to the product*", as expressed by Courage and Baxter in 2005.

During the last decade, Kelly introduced the "Learning museum" always related to the concept of customer-centric approach (L. Kelly, 2007). Specifically, the author proposed a "6P model":

a person (Person) decide to learn an item (Product) based on a particular process (Process), with a particular objective (Purpose), in a particular place (Place) and with other people (People).
Moreover, Kuflik poses great potential about this principle because visitor chooses what, where, when and especially if learning (T. Kuflik et al, 2011). The three guiding principles suggested are:

- Technology must not be intrusive;
- Nothing must interpose between art and the visitor;
- Nothing should take away the excitement and the pleasure of being able to admire, with one's own eyes, an artwork in a museum room.

Therefore, involvement can be considered a key aspect related to innovation in museums.
Pleasant environment and right sensory stimuli can increase the time spent during a visit improving also the perception and memory of the experience. For example, in 2015, the Museo Civico of Bolzano has launched "Suoni per vedere", a project that recreates an all-around sound environment to improve the fruition and the comprehension. By closing the eyes, visitor can reconstruct the environment in which the artwork was carried out thanks to songs, hymns and rumours. Some cultural institutions have also created involvement through fun experiences to improve the understanding of the exhibitions' content, the so-called "Gamification", especially for the younger as reported in a study of the German Maritime Museum in Bremerhaven (W. Jenner & L. Moura de Araújo, 2009). In this museum, the player takes the role of a young captain of a cog, who has to sail and trade goods. The first part is a sailing simulation, while in the second one, the player has to show his skills as a trader, by selling and buying goods. It shows that the game makes fun and easy the learning process: approximately, 50% of the kids achieved all learning objectives.
In Italy, the National Archaeological Museum of Naples - MANN has released in March 2017 "Father and Son", a real videogame characterized by missions to fulfil and objectives to be realized starting from an engaging storyline: a child who tries to rebuild the life of the archaeologist father. The setting of this videogame is the museum's rooms, leading the user to discover better the precious collections and to enrich the visitor experience. Moreover, is possible to use this game at home, making the experience live virtually.
A schema of the different literature contributions related to the museums' business strategy is reported below in Table 5.

Authors	Strategy - Business Model	Meaning	Activity
Kéfi & Pallud (2011), Intorre (2013), Williams (2010), Bearman (2008), Scali & Tariffi (2001)	Curator oriented strategy - Object centred	Museum in the classical concept of cultural and knowledge temple	Back office
Kéfi & Pallud (2011), Cataldo & Paraventi (2007), Courage & Baxter (2005), Kelly (2007), Kuflik et al (2011), Jenner et al (2009)	Visitor oriented strategy - Customer centred	Museum exploits the most modern technologies to improve the visitors' fruition and the customer experience	Front office and web-based

Table 5 - The two main museum digital strategies in literature

2.2.3 The Virtual Museum

The new ICT technologies can evolve the museum system starting from the information management and museum communication systems, creating a new interactive museum typology. Therefore, museums are working to satisfy a new public and new needs, in which culture, education, communication and entertainment are connected.

Doing so, it is logical to identify which solutions the cultural institutions propose to renew themselves and achieve the objectives set. Virtual museum, interactive museum, multimedia museum and other typologies are the most frequent expressions used to exploit the "new technologies". It is necessary to clarify this concept because the above "definitions" are too often and inappropriately used as synonyms of different things.

In these paragraphs, the expression "*real interactive museum*" indicates a "space-museum" within which technological instruments (whether multimedia, multi-sensory, virtual, etc.) that help the visit and the understanding are installed; moreover, the formula "*virtual museum*" is used to indicate a space that does not exist in reality but only in cyberspace (non-place), which is linked (or not) to a real museum and which essentially uses the Internet to develop and

operate. Both cases are very complex because there are still no clear definitions, objectives and forms (E. Di Vizio & M. Ferrari, 2010).

Real interactive museum expression was born thanks to the San Francisco Exploratorium, a scientific museum founded in 1969 by Frank Oppenheimer. The difference between the traditional museum and this new typology is the direct experience, indeed the visitor becomes the protagonist, along with the objects.
This new fruition way, as Livia Curti Ronconi and Roberta De Ciechi argue, gives the opportunity to "work in three basic directions: to facilitate visitor-museum contact (stimulus function); to spread the museum outside (cultural dissemination function) and, at the same time, to bring the outside world into the museum (function of expanding knowledge)". The strength of an interactive museum is its active place configuration that offers information but also emotional involvement and therefore added value to the visitor experience.
There is a big risk that accompanies the great potential of the new museum: it is to consider technology as the true protagonist of the museum: McLuhan reminds us that "*the medium is the message*" (M. McLuhan, 1967), and technologies must help the user to reconstruct, understand and interpret, not engulfing the contents and not offering a sterile technological scene that, paradoxically, tarnishes the imaginative capacity.

A first definition of a virtual museum, still widely cited in the literature, is that provided by Geoffrey Lewis for an online article of the Britannica Encyclopaedia:
"*A collection of digitally recorded images, audio files, text documents and other data of historical, scientific or cultural interest accessed by electronic means. A virtual museum does not host real objects and therefore does not have the permanence and unique qualities of a museum according to the institutional definition of the term*" (Britannica Online, 1996).

Taking in consideration the definition of James Andrews and Werner Schweibenz about the virtual museum: "*a logically related collection of digital objects composed in a variety of media which, because of its capacity to provide connectedness and various points of access, lends itself to transcending traditional methods of communicating and interacting with visitors…; it has no real place or space, its objects and the related information can be disseminated all over the world*" (J. Andrews & W. Schweibenz, 1998).

The two authors explain contents (collection of digital objects) and tools (a variety of media), emphasizing the added value of virtuality, that is the possibility of allowing experiences and implementing knowledge processes even in the absence of physical objects, a peculiar characteristic of the online virtual museum. Indeed, the ultimate goal of a museum remains the same: to make history and culture known to a heterogeneous public.
Despite the many potentialities, even today, and especially in Italy, the idea of a virtual museum seems to be a simple digital clone of the real museum.

Despite these critical remarks, it is possible to explain some successful examples of an "open" and dynamic online museum. The website of the Metropolitan Museum of New York (www.metmuseum.org) presents an Education section whose purpose is to promote an exploration of the artwork based on links with other objects and the exaltation of its conceptual meaning: "*Exploring ways in which objects relate to each other helps us understand both individual objects and the themes they express*". Even more significant and articulated is the motto of the Whitney Museum website in New York (www.whitney.org): "*Museums are more than bricks and mortar*". This perspective inspired the choices made by the management of the Louvre museum site (www.louvre.edu), which developed communication strategies based on an absolutely transversal concept of ownership "*d'un rassemblement de savoirs qui déborde largement de la cadre de l'art et introduit le visiteur dans le monde foisonnant de la creation artistique, de l'histoire, des religions, des sciences, des milieux de vie et leurs contraints, des espaces et du temps*" – a collection of knowledge that goes far beyond the framework of art and introduces visitors into the world of artistic creation, history, religions, sciences, living environments and their constraints, spaces and time.
Analogous is the approach adopted to enhance patrimony of the History of Science Institute of Florence, the Galileo Museo (www.museogalileo.it), which has developed a complex information system, allowing to explore the collection not as a set of isolated objects, but according to a wide variety of fundamental themes and concepts.

Having defined and explained the virtual museums, for the sake of completeness, it is fair to clarify that there is a second category of virtual museums, not less important or developed: the museums on the Web, non-existing in reality. With regards to this concept, the choice to distinguish virtual museums in (P. Bussio, 2011):

- *traditional virtual museums*, virtual version of a really existing museum: although linked to an existing museum, the online museum should not be conditioned by the physicality of the real one, but should instead make the most of their features to offer users a different experience and with many more possibilities;
- *virtual museums that represent an extension of the real museums*, not for what concerns the visit but for what concerns the artistic heritage knowledge: sections dedicated to artists, art magazines, restoration and projects related to cultural heritage;
- *really virtual museums*, which physically cannot be visited because they are not tangibly real.

The *really virtual museum* is a museum that, unlike the physical one, does not virtually show collections, buildings, exhibition halls, various cultural activities that really exist and that can be traced back to a physically tangible entity (the Museum); while dealing with issues related to works, to existing museum exhibits, it is not based on pre-existing physical collectable models to be emulated, but constitutes its existentialism in the search for hyper-parallel textual, audio-visual modules designed to illustrate original mental-educational paths and intellectually and culturally stimulating.

From the information and the collected opinions, it emerges that the virtual path can represent an integration to the real one, but not an alternative.
Indeed, although the network is a powerful means of communication, it offers a weakened use that can never replace the emotion of the real one, because when it comes to artworks direct contact is undeniably incomparable with the indirect one.

Ultimately, considering true the definition that a museum would be a reservoir of information, the new communication technologies need to be looked as tools to extract information from the museum: tools prepared by the museum and available to users. Each user, according to his interests and according to his learning style, researches and extracts the information that best interests him. This activity makes the learning process personalized, and makes the user independent, as well as offering him an opportunity for "creativity".
A schema of the different literature contributions related to the digital museum typologies is reported below in Table 6.

Authors	Concept	Definition
Di Vizio & Ferrari (2010)	Real interactive museum	*A physical museum in which the installed technologies help the visitors' understanding*
Britannica Online (1996)	Virtual museum	*A collection of digitally recorded images, audio files, text documents and other data of historical, scientific or cultural interest accessed by electronic means. A virtual museum does not host real objects and therefore does not have the permanence and unique qualities of a museum according to the institutional definition of the term*
Andrews & Schweibenz (1998)	Virtual museum	*A logically related collection of digital objects composed in a variety of media which, because of its capacity to provide connectedness and various points of access, lends itself to transcending traditional methods of communicating and interacting with visitors…; it has no real place or space, its objects and the related information can be disseminated all over the world*
Bussio (2011)	Traditional virtual museums	*Virtual version of a really existing museum*
	Virtual museums	*An extension of the real museums, not for what concerns the visit but for what concerns the artistic heritage knowledge: sections dedicated to artists, art magazines, restoration and projects related to cultural heritage*
	Really virtual museums	*A museum that physically cannot be visited because they are not tangibly real*

Table 6 - Definitions of virtual museum and similar in literature

2.2.4 Technologies in Museums

After having discussed which are the digital opportunities for museums, it is possible to analyse which are the new technologies that can be implemented within a museum.

"*Digital tools or technological solutions should not be ends in themselves, but a means to an end*" (Mu.SA, 2017).

RFID, NFC and Tag QR

Although QR codes (Quick Response) and RFID tags (Radio Frequency IDentification) are two very different technologies, they can be assimilated under the same category with regard to their application in the museum environment. The radio frequency identification is an automatic data acquisition system composed by two basic components: one (or more) reader and one (or more) transponder, through which data is transmitted via radio waves or electromagnetic pulses.

The RFID transponder (see Figure 14), commonly called tag, is the electronic component that is placed on the objects to be managed. It can look like an adhesive label or a chip a few millimetres in size. The reader is the electronic component able to query the transponder, retrieve and decipher the data contained within it, manage the collisions between the reply messages and interface with an existing information system, for example a computer. It is normally composed of two parts: the control unit and the antennas.

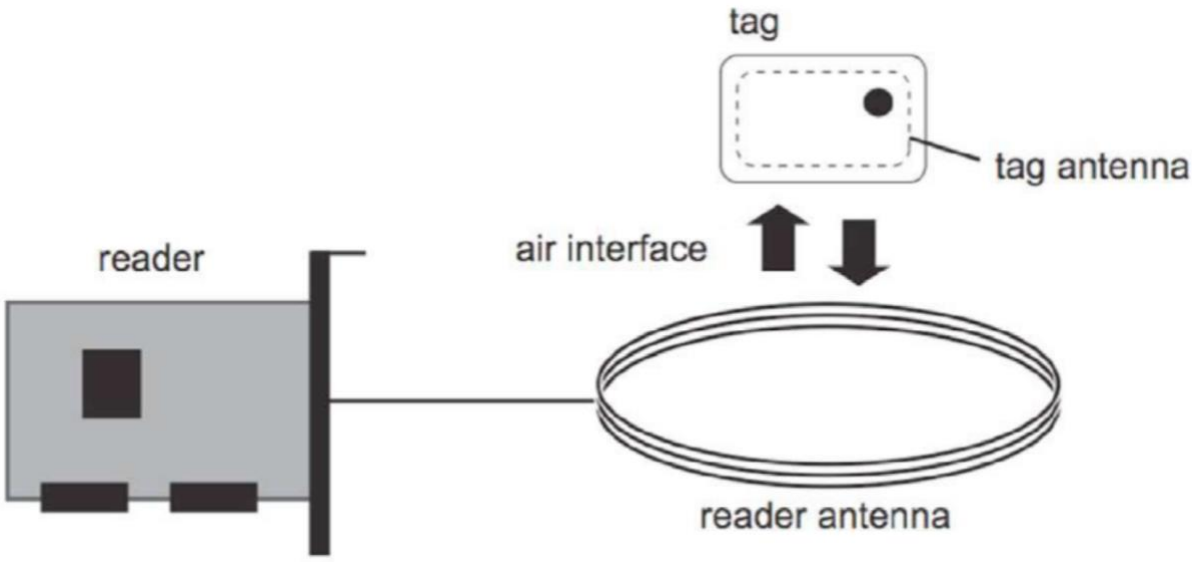


Figure 14 - Example of RFID

In a museum, this technology can be used to provide additional information about the exhibited artworks (see Figure 15). The tag is placed near the artwork, on the label of the caption, while the reader is inside the mobile device managed by the visitor, or it can be applied to objects that, positioned on surfaces containing tags, become interactive, opening contents manageable by users. The mobile device reads the information contained in the tag and requests, through a Wi-Fi network, the additional information stored in the museum server that cannot be contained in the RFID chip.

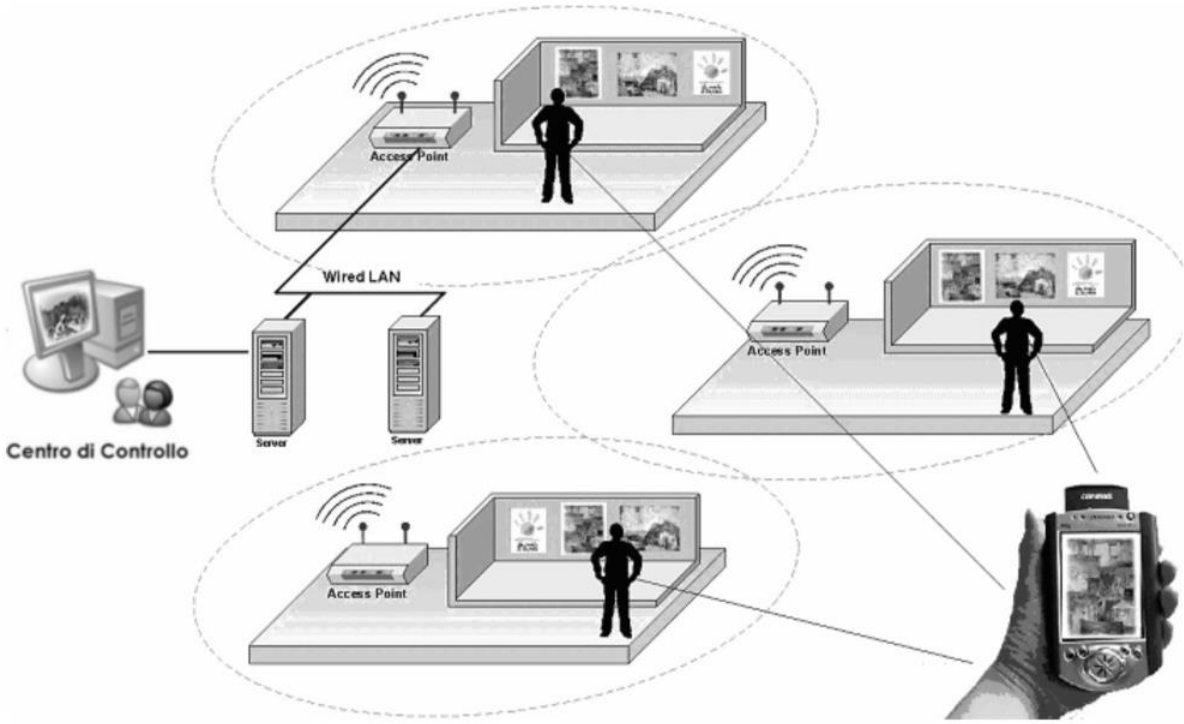


Figure 15 – RFID in a museum

Mobile devices with RFID readers can be made available to visitors, or the museum can simply provide software that can communicate with the label.

Today, these devices have been replaced by visitors' smartphones. However, not all the smartphones are able to read RFID chips and, as a result, two alternative solutions have been developed exploiting the NFC technology (Near Field Communication) and QR codes. NFC is the natural evolution of RFID technology. Moreover, unlike the RFID, NFC allows creating a two-way communication that considerably broadens the communication opportunities through an exchange of information between devices (see Figure 16). Nowadays NFC is widely used, for example, in contactless payment methods.

In 2012, the Pinacoteca Ambrosiana in Milan activated a service based on NFC technology, in collaboration with Samsung Italy. During the visit, it is possible to bring the smartphone closer to the tag positioned near the artwork. In this way, the information in text, audio and video format can be received in real time. It is also possible to save images, buy prints of paintings and tickets for temporary exhibitions, paying directly from the phone and collecting them at the end of the visit at the bookshop.

The use of this technology could bring some advantages, without upsetting a possible strategy based on RFID technology. First of all, it would eliminate the handhelds problem allowing economic savings and great simplification of the entertainment offer. Each visitor can simply use their smartphone, from which the museum could capture interesting information (respecting privacy law) about the visitor himself, thanks to the two-way communication between the devices. Even if the technology is increasing, not all the smartphones are equipped with NFC chips, so the simplest solution seems to be the use of QR codes.

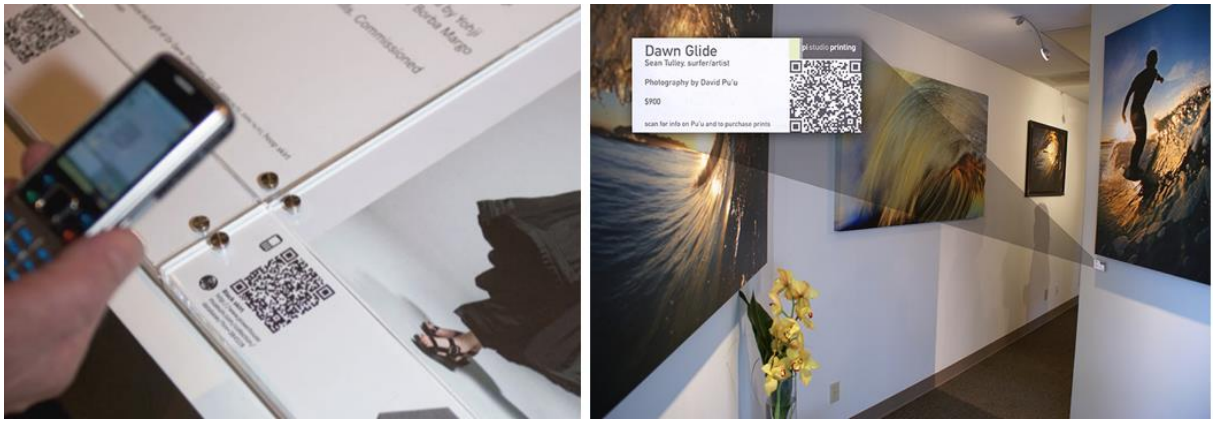


Figure 16 - Example of a device that decodes a QR

A QR code is a sort of square-shaped bar code, composed of black square modules, which combined together form a matrix that can be read by any device with a camera, such as a smartphone or a tablet. The standard of QR codes has a free license, the main reason for its great success. Each QR code contains a very small amount of information, which can be, for example, an internet address, a short text or a telephone number. Its use is widespread in advertising, but can also be implemented in the museum system, applying these codes alongside the exhibited works, in most cases to redirect the user to a specific web page. The public more accustomed to the use of these technologies, although very simple to use, is the youngest, typically under-35. In Italy, the introduction of QR codes in museums was the basis of the "Step by Step 2.0" project, launched by Palazzo Madama in 2014. The idea is to allow the public to visit the building and the collections in a guided but customizable way, in order to increase customer satisfaction through a more participative experience. The QR technology is ready to be used on a large scale in museums thanks to its simplicity, the low investment required and the ease of use compared to NFC and RFID standards.

Interactive Guides

Audio guides have become a standard in every museum over time, offered in various and consolidated methods. Nowadays the classic analogue audio files related to the various artworks of an exhibition have been replaced by applications, which can be consulted via smartphone. Offering an app as a guide allows to insert much more data and insights than a traditional audio guide: images, texts and videos that the visitor can consult only if interested. Obviously, the development of an interactive guide is not as simple and economical as that of a series of QR codes. The interactive guides opportunities have no boundaries if combined with other technologies, from the video content to the geo-localization inside the museum, and certainly represent the future of museum visits (see Figure 17).

Within the museum space, there is also the need to provide information to a large number of people, often simultaneously. In these cases, multi-touch instruments can be used: these are multi-touch tactile surfaces capable of recognizing the presence of multiple fingers or objects simultaneously present on the screen. By touching an icon or a hypertext link on the screens, various functions are activated. Among the most common systems, there are interactive tables, walls and whiteboards. A good example of interactive experience is the multimedia tour proposed by the Tate Modern Museum in London: a handheld with a 45-minute pre-installed tour that used an infrared system and physical location to receive up-to-date information from a local server.

Figure 17 - Examples of interactive panels

3D Technologies

There are two streams in which this type of technology has been developed, one related to audio-visual content (the one that has had the shortest life) and one related to the creation of three-dimensional objects: three-dimensional objects and the recent evolution of 3D printers can have various utilization, mainly related to educational and accessibility purposes (see

Figure 18). Regarding the educational purpose, experiments carried out with elementary and middle school children reveals great appeal (M. Hancock, 2015).

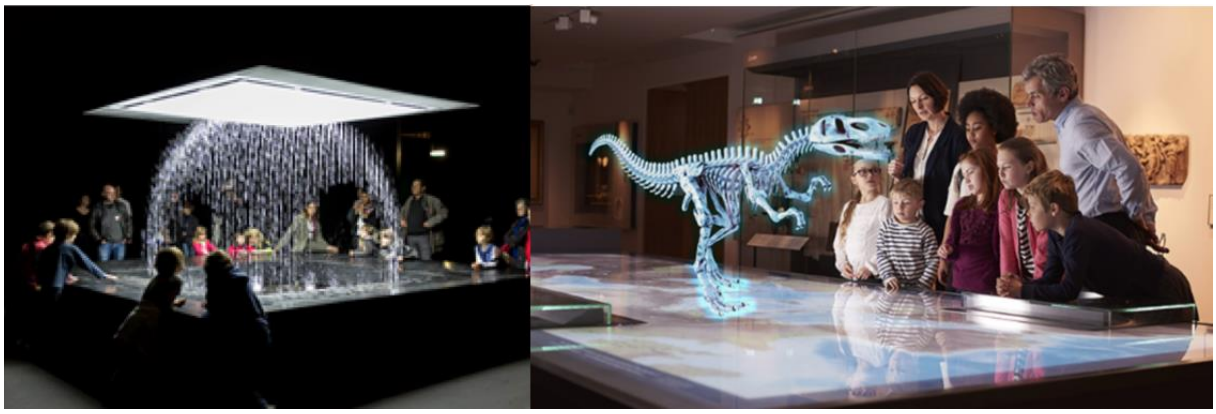


Figure 18 - Examples of 3D technologies

As regards accessibility, in the last decades there was a great interest in solutions that can help people with disabilities to adequately enjoy the cultural heritage. For example, Tooteko is a Venetian company that provided a solution for blind people: a three-dimensional model of what the museum wants to "show" to the blind is elaborated, and then, through the modern 3D printers, the object incredibly faithful to the original is created (see Figure 19). There is also a card that interfaces with a series of NFC sensors: wearing a special ring that can read these sensors, the blind can touch the reproduction of the artwork and receive audio feedback able to explain what he is touching (M. Sabatino, 2016).

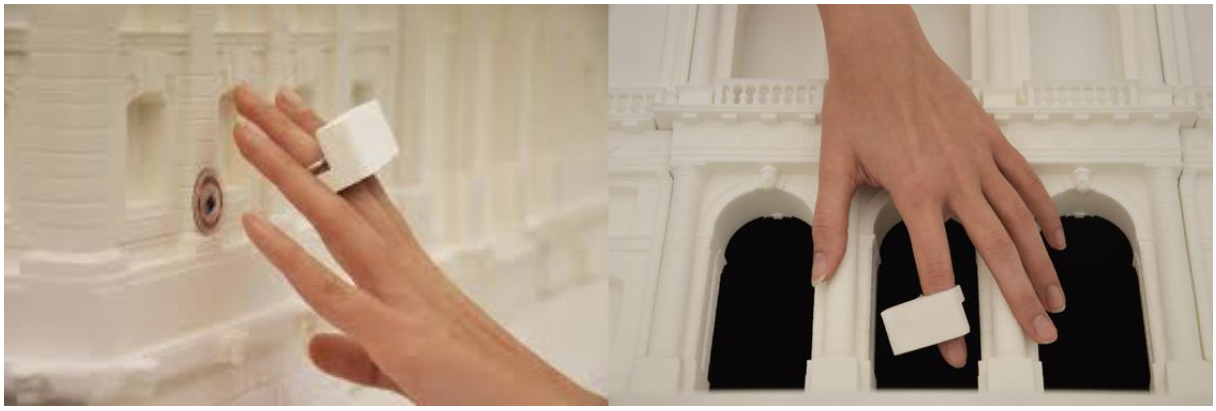


Figure 19 - Tooteko model

Augmented and Virtual Reality

On one hand, in virtual reality, the user interacts with imaginary or no-longer existing objects and, he is isolated from the real world "living" in an abstract place. On the other hand, Augmented reality does not isolate the user from the real environment because it aims at augmenting the real world with information, videos, images and other tools to augment the view the audience has of the object, which would not be possible with human five senses. With VR the real world is substituted by the virtual one, with AR the real world is extended with the virtual notion (see Figure 20).

Virtual reality could be used to reconstruct artworks and historical/artistic environments damaged or destroyed in the past. It is considered a valuable tool for education and divulgation and to enhance more sensorial and even effective storytelling, as it is based mainly on images and sounds rather than notions. Indeed, in cultural context it can be used to make the visitor lives situations impossible to create in physical context: from a simple visit inside the St. Peter's Basilica to the rebuild of an ancient city. The limits are simply those related to the technological techniques for developing content suitable for virtual reality viewers.

The project recently launched by the Historical Museum of the City of Lecce (MUST) reconstructs, through virtual reality, the ancient theatre and the Roman amphitheatre of the city. Another interesting project that helps users to understand the real exhibit and its background information is made by the Railway museum in Japan where, using the camera of a device, is possible to see on the display the exposed locomotive with the landscape that surrounded it during its service life (T. Narumi et al, 2013).

Immersive devices have the advantage of allowing very high sensory involvement. These are wearable devices that can be integrated into clothing. Non-immersive devices, called desktop devices, on the other hand, usually are not able to involve the user sufficiently in order to create a feeling of participation in virtual world events. This is due in part to the impossibility of eliminating the distracting stimuli coming from the outside and partly to the technical difficulty of producing a sense of three-dimensionality on the specific type of screen used.

Figure 20 - Examples of virtual and augmented reality

Localization Technologies Inside Museums

This technology exploits a series of Wi-Fi access points connected to a device (the smartphone) and manages it to identify the position of the device by measuring the strength of the signal coming from each access point. Through these technologies, there is the possibility of creating a map that indicates the routes taken by each person during the visit. This allows the management to check any traffic areas or to understand the position in which the customers prefer to stay. It is also possible to interact with users by using push notifications sent to their smartphones, using systems such as Bluetooth beacons (see Figure 21).

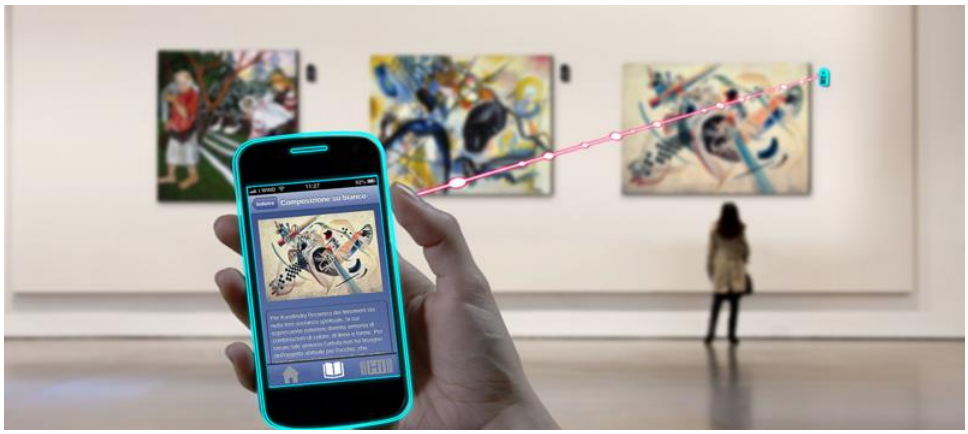


Figure 21 - Example of beacon system

The simplest and most widespread method to exploit indoor location is based on a Wi-Fi network that can interact with users' smartphones or with other devices (such as PDA or iPod) that the user brings with him during the visit. The technology, which can be integrated without problems in a museum, is called "Wi-Fi fingerprinting". This kind of technology, based on Wi-Fi, offers better accuracy than a system based on the GPS signal, which is very limited in a closed environment.

Combined with other technologies it could increase the visit experience: Casa Batllò museum in Barcelona advises its visitors to use their smartphone during the tour because, through the combination of localization technologies and augmented reality, visitors can receive personalized content based on their positions.
This is more a tool for business, dedicated to museum managers, which can improve the visitors route organization and consequently the visit experience by studying the traffic generated in each area, as performed by the Louvre museum in 2010, in Paris: they examined customer's length of stay through Bluetooth tracking system with the final aim of understanding the artwork in front of which visitors stop longer (Y. Yoshimura et al, 2016).

Artificial Intelligence

According to the American Alliance of Museums, the use of artificial intelligence within a cultural institution could be useful for several reasons: to better organize catalogues and collections and to seek continuity and unity even among collections of different agencies (M. Sabatino, 2016).
This is what the Norwegian National Museum tried to do, using machine learning and neural networks to add meta-data to the paintings of the collections. Moreover, there is a whole area of logistics and management which could benefit from the use of artificial intelligence: from entry tickets to the information during the visit.
An interesting example related to the use of artificial intelligence to increase the visitors' experience is represented by the Pinacoteca di San Paolo of Brazil which, in collaboration with IBM, has created "A Voz da Arte", a project that give voice to some selected artworks, able not only to provide information to the visitor, but also to answer possible questions.

Institutional Website

Museum's websites are used by curators to enlarge the experience and to stimulate visitors' interaction. From this perspective, websites are considered a complement to physical museums, a sort of bridge between pre and post-visit.

In 2004, Werner Schweibenz proposed a classification of museum websites, dividing them into four categories (W. Schweibenz, 2004):

- the *brochure museum* is a site that contains basic information about the museum, such as the type of collection, news on services and aims to inform potential visitors;
- the *content museum* presents the museum collections from an object-oriented point of view and invites virtual visitors to explore them online, but the content is not exposed in an educational way;
- the *learning museum* is a site that offers different points of access to virtual visitors, based on their age, background and knowledge, which is built in an educational way and links to additional information that motivates the virtual visitor to learn more about what interests him, to visit the site again and maybe even the real museum;
- finally, the *virtual museum* aims to offer not only information on the collections of an institution but also a link to the digital collections of other museums, allowing the creation of sets of masterpieces that do not have a consideration in reality.

Marty states that if webpages are well-designed, they are useful to boost the attendance of physical museums because web-users are more attracted and then encouraged to visit the museum they have already appreciated online (Marty, 2007).

A well-designed website is defined as a webpage able to reach the four aspects of user experience: entertainment-engagement, escapism, aesthetic, education. Furthermore, it should follow some criteria of web design such as: to present interesting content, doing it in an aesthetically pleasing way, able to arouse emotion, being easy to use, not forgetting about the museum promotion (J. Pallud & D.W. Straub, 2012).

According to Marty's research (Museum websites and museum visitors), "planning a visit" is the first reason for which the visitors of a museum use the website of the institution. Indeed, 70% of museum visitors look for online information before the visit and 89% of the respondents check information online when they are planning to visit unfamiliar museums. The respondents state they are more likely to visit the website and then museum in this order, instead of visiting the museum and then checking the online page. Moreover, online and onsite visitors are not separate entities because visitors are used to check the museum websites before and after the visit, but for different purposes. In the pre-visit, the searching is functionality-driven (as there is the need to be informed about practical issues), while in post-visit is learning-driven. For this reason, the website should be designed to provide a complete and consistent experience according to the target visitors.

Social Media Pages

Social media are defined as "*a group of Internet-based applications that build on the ideological and technological foundations of the Web 2.0, which allows the creation and exchange of user-generated content*" (A.M. Kaplan & M. Haenlein, 2010).

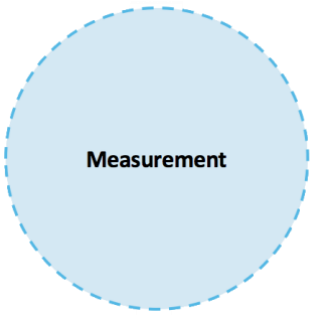
Social media pages (such as Facebook, Instagram, Twitter, YouTube, Pinterest, etc.) have been used by museums as an extension of branding activity. Indeed, the three main objectives are marketing (as a tool for establishing a brand identity), inclusivity (which develops a real online community) and collaborative (promoting collaboration with the audience). Social networks enter in the visitor experience both in pre-visit and post-visit: if the user goes to a museum, probably it would be thanks to positive reviews read on Facebook or for word of mouth from family and friends. In the post-visit moment, the user is more likely to visit the museum social page for a review, for sharing pictures of the artwork or to keep in contact with the museum for future events (A. Russo et al, 2006). Three strategies for web and social media have been drafted by Padilla-Mendélez: defender, analyser and prospector. Defender group of museums has a low number of followers in social media and uses it as a minimal extent of website. Analysers have a medium number of followers in social networking activities while prospectors are the leading group in social networking services and digital technologies (A. Padilla-Mendélez & A.R. Del Aguila-Obra, 2013). As regards the aforementioned technologies, a schema of the main utilization is reported below in Table 7:

Technologies	Main utilization
RFID, NFC and Tag QR	On-site
Interactive Guides	On-site
3D Technologies	On-site
Augmented and Virtual Reality	On-site
Localization Technologies	On-site
Artificial Intelligence	On-site
Institutional Website	Online
Social Media Accounts	Online

Table 7 - Technologies in museums

2.3 MEASUREMENT

The measurement and the evaluation of performance is an essential support for the manager, useful in the decision-making process since it reports information on the actions and on the results, even for the museums. The purpose of performance evaluation is to compare the current results with a predefined target, understanding how to start the increasing value process. Indeed, it is not the end but the starting point: "*Indicators pose questions more than providing answers*" (Arnaboldi & Agostino, 2017).



2.3.1 Performance Assessment in Museum

During the last decades, studies related to museum performance evaluation have significantly increased due to a cultural industry development rate higher than other sectors concerning economy and employment. Moreover, this sector is constantly pushing the growth of other European economies related to information and communication technologies (ICT) and digital innovation (KEA European Affairs, 2006).

To improve museums performance, structured rules are needed for measurement and evaluation. Generally, "performance" means the service in terms of result and the way in which it is achieved, both for individuals and for organizations, with the final aim to obtain the goals. This assessment is used for the planning, budgeting and benchmark phases and is considered both from an external point of view, in terms of positioning with respect to competitors, suppliers and customers, and from an internal point of view, through development actions to increase the museum offer.

The notion of performance has different meanings and it has many definitions: "*Performance is a state of competitiveness of the company that ensures sustainable market presence. Performance is a potential indicator of future results that is due to meet strategic objectives* (…). *The performing company is one that brings together the expectations of all partners: to comply with its contractual obligations and create value for shareholders, employees and customers*" (R.A. Trandafir et al, 2012).

A problem highlighted by many authors regarding the performance evaluation of museums is linked to the concept of cultural value which cannot be expressed only by purely economic terms. This concept is composed by other factors such as social, aesthetic, historical, emotional, educational and symbolic aspects, contributing altogether to the overall value proposition, which is therefore multidimensional (Throsby, 2001).
Furthermore, as argued by Zorloni (2010), the performance comparison includes also a subjective component due to the diversity of the objectives pursued by institutions. In addition, the evaluation process is complicated by the fact that the museum products' quality level perceived by the curators, differs from that perceived by the visitors, by the sponsors and by other relevant stakeholders.

Del Barrio (2009) explained that the difficulty in measuring the museum performance is due to three basic reasons: firstly, because they refer to a huge range of resources often not measurable, secondly because they aim to provide a complex product not often tangible as the education and thirdly because they often are public or non-profit organizations without having a specific focus on the financial results.
As regard to this third reason, Zan (2000) argues that the difficulty of applying management measure derives from the fact that the whole studies regarding this theme has been carried out for profit companies and therefore the measurement emerges as a critical issue.
However, in recent years non-profit companies pointed out the need to unequivocally measure their performance due to the increasing importance that economic dimension has assumed in the management of cultural institutions. In this regard, Gstraunthaler and Piber (2012) observed that the most economic aspects of the management of cultural institutions are becoming increasingly important. As a result, museums implemented many performance measurement tools to guarantee greater management transparency (Gstraunthaler & Piber, 2012).

The main problem is the absence of a unique method to check and verify if the goals have been achieved by museums, as reported by Anderson (2004). If till the '70s museums were only evaluated on the basis of a single criterion (the size and importance of their collection), nowadays their success depends on different factors: conservation, enhancement and customer satisfaction. According to Anderson, the main problem relies on the basis that this change in the interest of museums occurred without a balance between these types of objectives.

According to this problem, Guba and Lincoln proposed the "Four Generation Evaluation" model to demonstrate how the concepts and practices relate to the museum performance measuring have changed:

- The first generation refers to "measurement paradigm", in which the role of the evaluator is exclusively technical. Therefore, it is expected that whoever evaluates must know the different models for performance evaluation without the reference to a specific type of stakeholders
- Instead, in the second generation, the measurement and evaluation of performance compare the results obtained with the organization objectives and mission, but this is more difficult for cultural organizations than for "profit companies" because the objectives of non-profit organizations cannot be related to the profit maximization.
- As regards the third generation, the final judgment on the museum performance requires the opinion of the experts but also the setting of some objectives to be decided before the definition of the evaluation system.
- Finally, the fourth generation is oriented towards a constructive and reactive evaluation. There must be a deep understanding of performance evaluation carried out with the museum and its stakeholders.

2.3.2 Methods to Calculate Museums Performance

In 2011, Camarero proposed a study related to European museums, distinguishing different types of performance: *economic performance* (as the increase in the number of visitors and the creation of jobs and funds), *market performance* (as the visitor perception and the related evaluation in terms of satisfaction, interest and reputation of the museum) and *social performance* (the spread of a positive attitude towards culture).

According to Del Barrio (2009), the methods for evaluating the performance of cultural institutions can be distinguished into two categories: systems that adopt the optimal production frontier and systems that use performance indicators.

As regards the efficient frontier method, it can be calculated through parametric and non-parametric evaluation: while the parametric evaluations estimate ex-ante the production

function and the frontier's shape, influencing in many cases the results, the non-parametric evaluations do not impose a predefined form. Paulus, Mairesse and Taalas were the first authors to apply this technique to the cultural sector. Looking at the museum as an "economic activity", they summarized the performance evaluation of all the museum's activities in a single value, unlike Noble that distinguished five main final activities: collection, conservation, study, interpretation and exhibitions.

Instead, as regard the second category, according to Arnaboldi (2015) in "*Performance Measurement and Management for Engineers*", it is possible to identify three main types of indicators: *Value-based measures* (indicators aiming at measuring the holistically value as Net Cash Flow and the Cost of capital), *Accounting-based indicators* (based on financial statements as Return on Investment and Return on Equity) and *Value drivers* that are important in dynamic sector helping organizations to decide and act in time (non-financial performance indicators as delivery time, resource indicators as human resource turnover and key risk indicators as supplier failure).

Performance indicators are used both by profit and no-profit organizations because they provide information about activities, but it is important to understand what to measure and how to do it. In the '80s, some controversies raised about the management by numbers, especially in cultural organizations, in which performance measures lacked the specifications and the robustness needed for the management (Atkinson et al, 1997). For this purpose, since the 1990s, scholars and professionals have introduced the non-financial indicators, allowing universal monitoring and long-term performance, even if quantitative measurement could still have the lack of qualitative and intangible data, often not measurable.

Non-financial indicators have two main advantages, the timeliness and the long-term orientation (Arnaboldi et al, 2015). The timeliness because they do not need several steps for the evaluation: for example, an indicator based on the production quality can be daily assessed instead a financial impact is visible once the transactions are sustained or committed. The second advantage is the long-term orientation, especially in relation to the accounting indicators, because non-financial indicators are drivers for value creation and competitive advantage if chosen accordingly to the company's critical success factor.

As regard museums, in 1994, Ames suggested considering specific areas and indicators, identifying also the standards that the single cultural institution should reach. The definition of targets is useful to propose guidelines that everyone can follow, clarifying the mission and improving the information system. Of course, always considering that in order to obtain a valid measurement through the indicators, it is necessary to have a sufficient number of useful data. According to the necessity of having data for the creation of structured indicators, in 2009 Turbide and Laurin carried out an analysis based on 95 Canadian performing arts organizations. Specifically, they created a survey through the diffusion of a questionnaire divided into many parts as the tool to collect data (Violino, 2015).

Indicators only provide a part of the real information not giving an exhaustive description of the cultural organization functions. As Pignataro (2011) pointed out, the indicators represent a single dimension, with a partial view of a complex phenomenon. The value of the indicators is linked to their use. As explained by Benington (2007), a unique performance measurement tool to evaluate museums is needed: the adoption of a balanced scorecard could be suitable for museums because this tool, divided into perspectives tailored to the cultural sector, lead to a better overall control as regards the financial and non-financial dimension (Nobili & Dellapasqua, 2017).

Nowadays, the performance measurement system is a still opened debate that has been enriched by the topics of the current decades: the digital readiness.

2.3.3 Measurement of Digital Index in Literature

Because of the scarcity of papers related to the measure of digital readiness in cultural institutions, the research over this topic has been extended to broader industries, in order to obtain information about this theme.

Nowadays, each person generates digital data through comments, clicks or sensor using their digital device. This digital data generation is made not only by the users connected through the internet but also by manufacturing plants, smart meters and tracking systems.

Many studies refer that big data is a driver of business success across a wide range of industries. Firms are investing a huge amount of resources in Big Data projects seeking value creation opportunities, leading digital business strategy and performing better the decision process (E. Raguseo et al, 2018). Big data are so present in our life but even if the relative literature is increasingly growing there is a little knowledge about the factors that determine their adoption. A possible motivation is the nature of big data not representing a single technology or technique but a trend across many areas of business and technology.

A contribution in defining how to construct a digital readiness index is represented by the work of Raguseo, Pigni and Piccoli in "Conceptualization, Operationalization and Validation of the Digital Data Stream Readiness Index", in which they build an indicator as a diagnostic tool to identify organizational areas that need corrective actions. As regards the methodology, they qualified the determinants of DDS readiness based on a survey directed to three hundred organizations and then they conceptualized, defined, operationalized and validated the index by founding its development in the integration of psychological and structural visions of organizational readiness, detecting four dimensions: mindset, skillset, dataset and toolset. (E. Raguseo et al, 2018).
Another contribution related to digital measurement is the Desi index that measures the Country's evolution related to the 2.0 innovation. This indicator is structured as a weighted average of factors, obtaining a single percentage output number between 0 and 1. Zero percent means the lowest level of digital innovation while one the highest. The different components through which Desi index is calculated are digital public services, citizens use of Internet, connectivity, business technology integration and digital skills (International Digital Economy and Society Index, 2018).

A concrete definition and application of a digital readiness index to a public domain is represented by the Cisco's report "Cisco Australian Digital Readiness Index 2018" in which the company has conducted this research to better understand what it means to be digitally ready along with which investments or intervention activities can help countries progress in their digital journey (Cisco, 2018). For the researchers, the country's digital readiness could be identified by the analysis of seven standardized and summed factors (technology infrastructure, technology adoption, human capital, basic human needs, ease of doing business, business and

government investment and start-up environment) with the final purpose to achieve an overall digital readiness score (Cisco Australian Digital Readiness Index, 2018).

This tool was applied for 118 countries uncovering three clusters of digital readiness: Activate (the lowest level, with the need for investments aimed at critical human needs and the development of human capital), Accelerate (middle stage of digital readiness with a need for intervention in critical human needs and human capital development, and a need for making easier the investments in the region) and Amplify (the highest level of digital readiness with a continuing need for human capital development focused on higher level education for greater digitization).

2.4 GAP IN THE LITERATURE AND RESEARCH QUESTION

The digital transformation of museums is in progressive expansion, although there are still not enough tools to measure the digitalization level, as it happens in other sectors.
There are many academic papers dealing with case studies concerning the digital transformation or the implementation of a specific technology by individual cultural institutions but what is missing is a holistic vision able to compare multiple dimensions concerning different institutions.

An ongoing gap in the cultural industry is the lack of an easily, verified and reported set of measures that assess the museum's digital performances. The inability to generate data to support values and purposes is a weakness for museums: "*measures which connect with a museum's mission and core values as well as indicating the organisation's capacity to deliver on that mission*" (A. Babbidge, 2006). The presence of a unique performance measurement system to produce a structured and universal framework is needed even if it is difficult to be met: "*the question of how cultural sector excellence should be judged is a thorny and long-running dilemma*" (C. Bunting, 2010).

Even if in literature there is a contribution in relation to the construction and application of a digital readiness index (Cisco 2018; DESI 2018; F. Raguseo et al. 2018), the academic researches about digital innovations in cultural institutions are mainly related to the application of new technologies for the fruition during customers' visits. The limit of these researches is that they do not explain the overall benefits that digitalization can improve, nor, they do not measure how much cultural institutions are digitalized.

Hence, the following research question has been formulised:

RQ: *How to measure the digitalization level of Cultural Institutions?*

Specifically, the main objective is to develop a measurement system concerning the digitalization process in cultural institutions providing also an in-depth analysis. To reach this objective it is necessary to decline the research into two viewpoints:

- The cultural institutions' structuring level with respect to the strategy formalization, the investments planning and the presence of dedicated competences enabling the digitalization process
- The level of digitalization of museums activities and the most widespread technologies

The following sections try to accomplish this objective. In particular, a model has been proposed in order to define a set of criteria through which a museum can be defined digitalized (Chapter 4). Furthermore, a survey has been developed in order to collect all the needed data to run the model in the context of Italian institutions (Chapter 5).
In the following Table 8, the main gaps highlighted above have been summarized.

Topic	Gap
MUSEUM + DIGITAL	There are many academic researches dealing with case studies concerning the digital transformation or the implementation of a specific technology by individual cultural institutions: what is missing is a holistic vision able to compare multiple institutions. In addition, most of the discussions about digital innovations are mainly related to the application of new technologies for the fruition during customers' visits underestimating all the other activities.
MUSEUM + DIGITAL + MEASUREMENT	The lack of a unique performance measurement system able to produce a structured and universal framework is a missing theme. Several indexes have already been introduced in other sectors able to evaluate the digital transformation process for each company. However, this is not an easy target to be met in the context of cultural industry, even though there are various experiments in this regard.

Table 8 - Possible gaps disclosed through the Literature Review

3. METHODOLOGY

This chapter contains the description of the entire process that has been conducted to develop a model for measuring cultural institutions digitalization. The purpose is to provide more transparency to the reader with respect to the method adopted and the reason behind these choices, in order to answer the research question previously defined.

The structure of this chapter follows the schema adopted during the discussion of the remaining chapters of the thesis. For this reason, the first part aims to explain the methodology behind the literature review process used for the model development. Subsequently, the main considerations regarding the application of the model have been presented: the creation of the questionnaire, the selection of possible institutions subjected to this study and the analysis regarding the collected results.

3.1 LITERATURE REVIEW APPROACH

In this section, it is presented the process through which the literature review has been carried out. The existing literature is really various and full of authors' contributions due to the publication of a large number of researches. However, these papers do not always provide an overall representation of the themes covered in this research.

The synthesis process of the literature is commonly considered an essential step for knowledge widening, thus providing new hints for the research and demonstrating the presence of research gaps. This activity has been accomplished thanks to the concept of "scoping studies" as reported by Arksey and O'Malley (2005): "*a scoping study tends to address broader topics and where many different study designs might be applicable*". This is also valid for this research due to the variety of the investigated areas: indeed, the development has been supported by academic and non-academic sources (such as independent institutions or consulting companies' reports).

In particular, a specific type of "scoping study" has been used: through the analysis of the existing literature, research gaps have been identified and then treated.

Following the framework developed by Arksey and O'Malley, the methodology has been organized into five stages: identification of the research question, identification of relevant studies, studies selection, data charting, and results report.

Identification of the research question

Even if the main scope of this Master Thesis was related to the measurement of the digitalization process in museums, an extensive literature analysis concerning cultural institutions has been performed in order to follow a structured approach. This first step allowed a better knowledge of the topic, consolidating the study direction for the definition of the research question.

Identification and selection of relevant studies

Having defined the research question, academic sources have been selected on the basis of two criteria:

- Well-defined keywords
- Use of Scopus and Web of Science databases

Several keywords such as "digital technologies", "digital innovation", "digital transformation", "digital readiness", "measurement", "performance", "index" combined with "museum". Specifically, the keywords combinations have been used to run a search string on two electronic databases, Scopus and Web of Science, in order to include all the possible papers (see Table 9).

Keywords	Scopus	Web of Science
"museum" AND "digital technologies"	1.424	945
"museum" AND "digital innovation"	126	253
"museum" AND "digital transformation"	108	145
"museum" AND "digital readiness"	7	3
museum" AND "measurement"	1.662	7.039
museum" AND "performance"	1.870	6.072
museum" AND "performance"	758	5.065

Table 9 - Number of results per database

Being the research really wide in the number of outputs, in order to select the most representative articles, only the titles and the abstracts of the first webpages of results have been analysed. All the articles not dealing with Museums, Digital or Measurement have been neglected. At the end of this process, the final number of relevant papers has been 68, constituting the starting point of the literature review. Moreover, a "snowball approach" (D. Agostino & M. Arnaboldi, 2015) has been adopted through the citations review in each of the 68 selected papers: this additional step allowed to find 32 new papers. Finally, through a search engine, also 13 contributions from non-academic sources and works by practitioners have been considered. Figure 22 shows the yearly publication trend of the selected papers

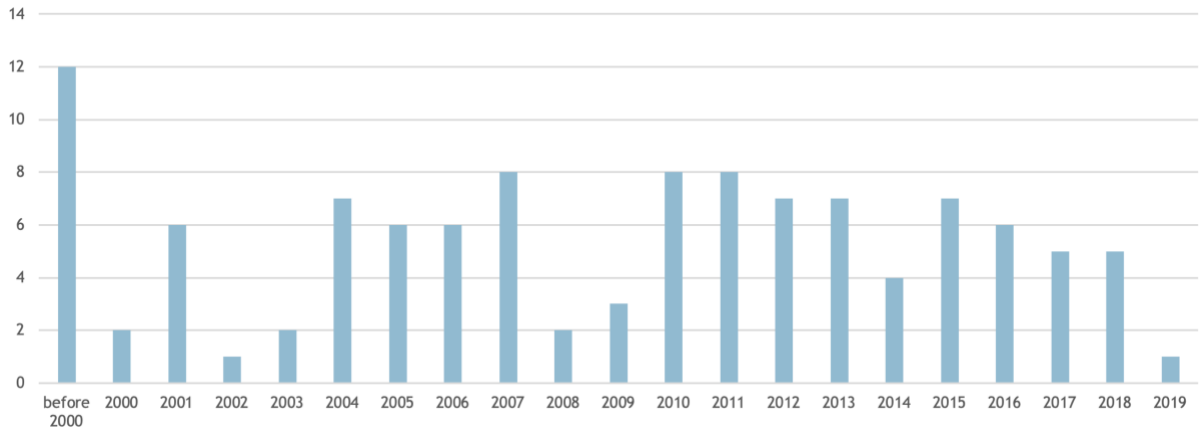


Figure 22 - Publication history of the selected papers

Data charting and results report

The final selection of papers has been divided into three groups:

- papers dealing with the definition of the museums' mission and their role in the society;
- papers describing the digital transformation both in museums and in other sectors;
- papers talking about museum measurement also considering those related to digital performances.

Of course, It has happened that some papers which have been classified in one group, partially have dealt with topics also related to another group. The final classification has been reported in Figure 23.

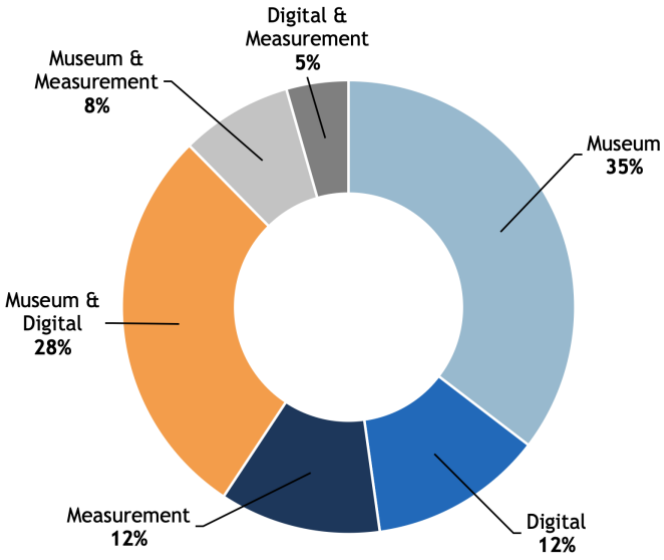


Figure 23 - Research topic of the selected papers

Furthermore, all the materials collected have been classified through an Excel spreadsheet (attached in Appendix A) providing general information as the author(s), title, year, theme (according to the keywords) and the distinction between practitioner or academic document. This structured approach has been useful to write the literature chapter allowing a faster recall of the information needed.

3.2 MODEL DEVELOPMENT AND APPLICATION

Once the general literature analysis has been carried out, the main objective was to provide an answer to the research questions, thus investigating the phenomenon in the practical field. This process would lead to understanding the actual situation regarding the digital readiness among Italian cultural institutions thanks to an empirical approach and therefore contributing, together with the literature review, to the value-added of this work, which is developing a complete and unique model.

3.2.1 Questionnaire Design

Given the exploratory nature of the analysis, it has been necessary to understand which is the most appropriate methodology. The quantitative approach is mainly aimed at measuring phenomena and generalizing the results obtained. The information is acquired through standardized procedures that allow codification, measurement and statistical interpretation of the collected data. As part of the quantitative methodological approach, the most used tool for research carried out on museums is the questionnaire.

"The questionnaire is a particular form of inquiry which consists in placing a certain number of questions, at a specific moment, to a group of subjects chosen in such a way as to be representative of the entire population observed" (Bailey, 1995).

Generally, it is preferred to administer a small number of questions to a rather large number of subjects. Concerning the objectives of the thesis, the information to be acquired must be simple and clear so that it can be translated into variables and then into indicators to be measured.
The type of questionnaire chosen for the analysis is the self-compiled one. For this reason, the interviewee (usually the director of the institution or the curator of the collection) independently answers the questions by filling in online: Opinio software has been used for the realization of the survey.

The survey has been designed starting from the general literature review, the analysis of the ISTAT dataset "Indagine sui musei e le istituzioni similari" made in 2015 but also thanks to the support of the existing questionnaire conducted by Osservatorio Innovazione Digitale nei Beni e Attività Culturali of Politecnico di Milano in 2017. The purpose of this research was to define the state of art for digital technologies in the Osservatorio's museum network, trying to understand the situation of museums that are unaware of digital tools or just not interested, and comparing it with the one of those institutions that leverage consistently on digital innovation.

The final version of the questionnaire is composed of an introductory section which provides a short description of the research objectives and informs the person filling in the questionnaire that the data will be used exclusively in aggregate and anonymous form for statistical purposes (in case of expressed consent to the processing of the data).

Then, it is divided into eight sections:

- Section 1: general data on the cultural institution
- Section 2: strategy adopted for the digital approach
- Section 3: investments in digital innovations
- Section 4: professional figures with digital skills
- Section 5: computerize systems to support the activities
- Section 6: methods adopted for the cataloging process
- Section 7: the digitizing and conservation of the collection
- Section 8: management of the visitors' control access
- Section 9: tools used for the communication
- Section 10: on-site technologies implemented to improve the visitors' experience
- Section 11: Ticketing and booking management

To develop these questions, general guidelines on the creation of a questionnaire have been followed, presented in the MOOC "Survey Research Methodology" by Professor Caniato, for example:

– avoid sensitive and potentially embarrassing questions (for example, instead of a direct question on the number of visitors per year, the possibility of selecting the answer between different intervals). If these questions are needful, they should preferably be included in the final parts of the questionnaire or at least at the end of their section;
– avoid favouring orientations or answers in series (response set). The response set is a tendency to answer to the questionnaire entries in an identical way, whatever the content of the question and it may arise, for example, when many consecutive questions are placed on the same topic;
– avoid double questions that include two or more questions in one proposition;
– avoid ambiguous or inaccurate questions, and, if it is possible, provide a detailed description for more technical questions;
– prefer closed questions to open ones. These questions force the interviewee to respond with one of the options provided while the risk of open ones is that they can bring useless or irrelevant information or have a greater subjectivity in interpretation.

The final version of the questionnaire, consisting of 31 questions, has been administered using the CAWI (Computer Assisted Web Interview) methodology.
The submission of the questionnaire has begun on 7 January 2019 and lasted until 1 April 2019.
The questionnaires have been provided in Italian for each museum. The final version of the survey has been reported in Appendix B.

3.2.2 Sampling Process

As regards the analysis, a sample has been conducted unlike to the possibility to draw up a census because of resources constraint: indeed, as reported by Bollo (2004) there are two alternatives related to the number of people to be interviewed, the census (interview all the population) or the sample (interview a part of the population).
Once defined the above strategy, the "non-probabilistic" sample was chosen due to the possibility to interview some selected cultural institutions from the entire population, moreover, this approach is based on a subjective procedure, that is the result of evaluations and reasoned choices of the researchers of this Master Thesis.
The number of subjects that constitutes the sample is a relevant factor in the data collection phase and, for sure, depends on the breadth of the reference population and the identifiability of the subjects that are part of it: the methodology used for the creation of the dataset refers to homogeneous groups constructed on the basis of their characteristics where the units are selected until they reach the dimensions that reproduce the proportions observed in the population, as Professor Tiziana Laureti and Luca Secondi defined "sampling for quotas" in their paper "Le indagini campionarie, il campionamento".
Before explaining the way in which the sample has been created and the relative amplitude, some considerations must be done. Specifically, the overall number of Italian cultural institutions of the ISTAT report are not all open, therefore, to draft the dataset, those institutions not respondent have been excluded but also the ones that declared to be:

- Close in 2015 (the year in which ISTAT started the analysis)
- Open only for occasional and special events in 2015
- Open less than 100 days in 2015

The result was a decrease of the population to 3.455 Cultural Institutions.

Taking into account these first considerations, it has been possible to reason about the sample size. The sample size is the number of completed responses achieved by the survey. It is called sample because it only represents a part of the group of institutions (or target population) whose opinions or behaviour is important according to the research.

It may be useful to define some key terms such as the confidence interval and the confidence level:

- The *margin of error*, also called confidence interval, is a percentage that indicates how much the survey results reflect the views of the overall population. So, the margin of error is a way of measuring how effective the survey is. The smaller the margin of error, the more confidence is achieved in the results. For example, considering a sample in which 47% of respondents has answered "yes" to a certain question, with a confidence interval of 4%, the percentage of people who would answer "yes" in the event of an interview for the entire population would be between 43% (47% - 4%) and 51% (47% + 4%).
- The *confidence level* expresses the degree of certainty of the results. It is a percentage that reveals how confident you can be that the population would select an answer within a certain range. Continuing with the previous example, selecting 95% as confidence level means that with 95% probability the percentage of people who would answer "yes", in the event of an interview to the whole population would be between 43% (47% - 4%) and 51% (47% + 4%). Researchers commonly set confidence level at 90%, 95% or 99%.

To resume, combining the confidence level together with the margin of error, it is 95% sure that the real percentage of the population that would answer "yes" is between 43% and 51%.

There are three factors that determine the margin of error for a certain confidence level: sample size, percentage and size of the population:

- *Sample size* (n), the larger the sample, the higher the degree of reliability of the answers. This means that, given a certain confidence level, the larger the sample, the smaller the margin of error. However, this is a non-linear relationship: for example, doubling the sample does not halve the confidence interval.
- *Percentage* (p), accuracy also depends on the percentage distribution of responses. For example, if 99% of the sample answers "yes" and 1% "no", the probability of error is

remote, regardless of the size of the sample. In the case of answers that oscillate around 50%, there is a greater risk of obtaining data that are not plausible.

- *Population size* (N), the exact number of units in the group that the research aims to examine. Usually, the size of the population can affect the results only when working with a relatively small group of units.

To calculate the sample size, Cochran's Formula has been used:

$$\text{Sample size} = \frac{\frac{z^2 \times p\,(1-p)}{e^2}}{1 + \left(\frac{z^2 \times p\,(1-p)}{e^2 N}\right)}$$

Where:

- **N** is the population size
- **z** is the z-score
- **e** is the desired level of precision (i.e. the margin of error)
- **p** is the (estimated) proportion of the population which has the attribute in question (usually, it is assumed as 50%)

The z-score is the number of standard deviations a given proportion is away from the mean. To find the right z-score, Table 10 should be used:

Desired confidence level	Z-score
80%	1.28
85%	1.44
90%	1.65
95%	1.96
99%	2.58

Table 10 - z-score for desired confidence level

The amplitude of the sample was finally detected to be 346 as the minimum number of answers, considering a population of 3.455 units, with 95% of confidence that the research reflects the reality and a margin error of 5%. To reach this required number of answers and, assuming a reasonable 35% response rate to the survey, 1000 cultural institutions have been selected for the administration of the same survey. The selection process and the subsequent division into representative subgroups for the population in question is based on the following four variables:

1. ISTAT classification of museums and similar cultural institutions according to their typology
   - Gallery / Collections
   - Archaeological Area or Park
   - Monument or Monumental Complex

2. ISTAT classification of museums and similar cultural institutions according to their ownership
   - State institutions
   - Non-state public institutions
   - Private institutions

3. ISTAT geographical distribution based on the Italian region
   - North: Valle D'Aosta, Piemonte, Liguria, Lombardia, Veneto, Friuli-Venezia Giulia and Emilia-Romagna
   - Centre: Toscana, Umbria, Marche and Lazio
   - South: Abruzzo, Molise, Campania, Basilicata, Puglia, Calabria, Sardegna and Sicilia

4. Number of exhibited goods in order to discriminate on those institutions that have equal values on previous variables

Twenty-seven groups have been created considering the first three variables; each group is composed by a different amplitude, respecting the real distribution of Italian cultural

institutions. Therefore, to rank and select the units to insert inside each band, the fourth variable was used, choosing the Institutions with the highest number of exhibited goods.
A schema of the structure has been reported below in Figure 24 while the overall distribution in Appendix C:

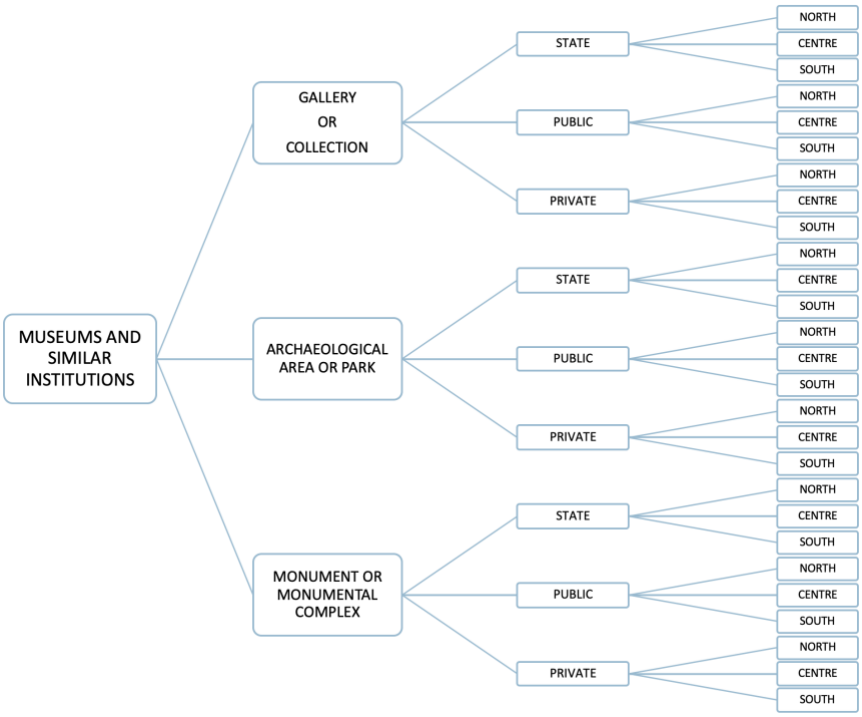


Figure 24 - Structure of the sample

The last phase of the sampling methodology consisted of finding at least one email address for each Italian cultural institution present in the dataset for sending the online format questionnaire. The final dataset containing all the institutions sampled is reported in Appendix D. The total number of respondents is 431 out of 1000 institutions sampled as reported in Appendix E.

3.2.3 Cluster Analysis

Cluster analysis classifies data into clusters (or groups) in a way that the elements belonging to the same group are more similar to each other than the elements belonging to other groups. In general, this type of data classification requires some methods to calculate the distance, or in any case the non-similarity between each pair of data. There are several methods to calculate

this information: the one used in the present work is the Euclidean distance, evaluated through the following formula:

$$d(x, y) = \sqrt{(\sum_{i=1}^{n}(x_i - yi)^2)}$$

where x and y are two vectors of length n.

Clustering methods can be mainly divided into hierarchical clustering, partitioning clustering, density-based methods and Grid methods (E. Mooi & M. Sarstedt, 2011). In particular:

- Hierarchical methods: these approaches carry out multiple divisions into subsets, based on a tree structure and characterized by different homogeneity thresholds within each cluster and inhomogeneity thresholds between distinct clusters. A peculiarity of this method is the fact of not having to establish the number of clusters in advance
- Partition methods: these analyses develop a division of the dataset into a predefined number K of non-empty subsets. Partition methods are appropriate for medium sized datasets and moreover, the number of clusters should be chosen before applying any calculation.
- Density-based methods: they derive clusters from the number of observations locally falling in a neighborhood of each observation. Density-based methods can identify clusters of non-convex shape and effectively isolate any possible outliers.
- Grid methods: these methods first derive a grid structure of the space of the observations consisting of cells. Then clustering operations are developed with respect to the grid structure.

This analysis is based exclusively on the second typology and in particular, K-means analysis has been applied. The K-means clustering is a very simple and fast algorithm in which each cluster is represented by its center (or centroid) which corresponds to the average of the elements belonging to the cluster. The basic idea of the K-means method is to define clusters in order to minimize the total intra-cluster variance.

Several K-means algorithms are available: the one used in the present work is the Hartigan-Wong algorithm (1979), which defines the total intra-cluster variance as the sum of the squares of the distances (Euclidean distance) between the elements of a cluster and its centroid, that is:

$$W(C_j) = \sum_{l=1}^{p} \sum_{i \in C_j} (x_{il} - \mu_l^j)^2$$

in which:

- p is the number of indicators
- x_{il} is the value of the indicator l related to the object i
- μ^j_l is the average value of the indicator l in the cluster C_j

The total intra-cluster variance is therefore defined by the following formula:

$$W = \sum_{j=1}^{k} W(C_j) = \sum_{j=1}^{k} \sum_{l=1}^{p} \sum_{i \in C_j} (x_{il} - \mu_l^j)^2$$

where k represents the number of clusters and its value must be as small as possible.

The selected algorithm is therefore advantageous in terms of computational burden if datasets with a considerable number of entities have to be characterized. However, as a limitation, this method requires the analyst to choose the optimal number of clusters a priori.

To overcome this problem, it should be pointed out that there is no mathematical method able to provide a definitive and infallible answer. Indeed, in order to identify the optimal number of clusters, different methods of interpretation and validation of data consistency can be applied within the clusters with the aim of providing a measure of internal cohesion between the elements of the same group (compactness) and a measure of the separation between a cluster and the others (isolation).

In the present research, the R package called *NbClust* has been used (see Appendix F for the complete R code), which provides 30 different indexes to determine the optimal number of clusters in a dataset. It also provides a function to perform k-averages and hierarchical

clustering with different distance measurements and aggregation methods. This allows the user to simultaneously evaluate different clustering schemes by varying the number of clusters, helping the analyst to determine the most appropriate number of clusters. Figure 25 shows the results achieved through the execution of the aforementioned function.

```
*******************************************************************
* Among all indices:
* 6 proposed 2 as the best number of clusters
* 4 proposed 3 as the best number of clusters
* 8 proposed 4 as the best number of clusters
* 3 proposed 7 as the best number of clusters
* 3 proposed 9 as the best number of clusters

                 ***** Conclusion *****

* According to the majority rule, the best number of clusters is  4


*******************************************************************
```

Figure 25 - Optimal number of clusters according to NbClust

These results are then summarized through a graphical representation in Figure 26.

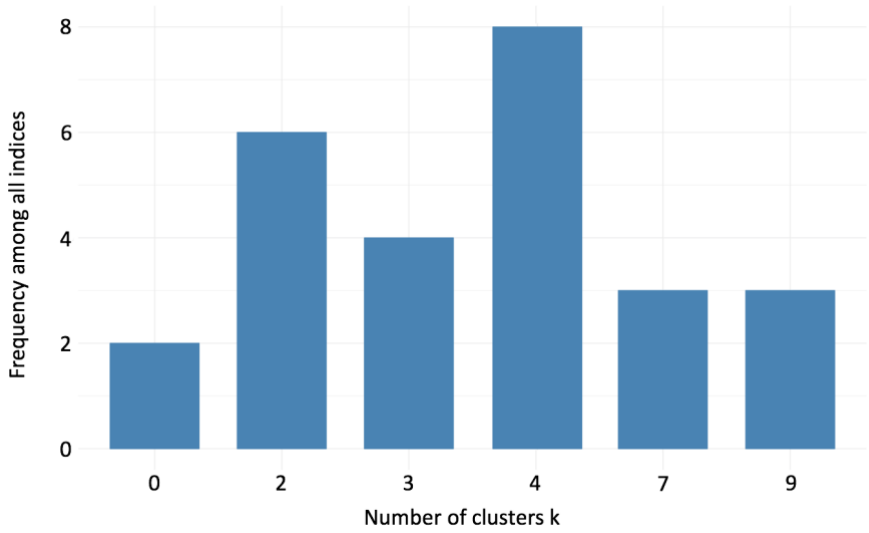


Figure 26 - NbClust 30 indicators graph

In particular, among the various methods proposed, particular attention has been paid to the following methods:

- Elbow method: it considers the total intra-cluster variance as a function of the number of clusters. The optimal number of clusters is determined by the local maximum point of this function (a clear change in the graph line as reported in Figure 27).

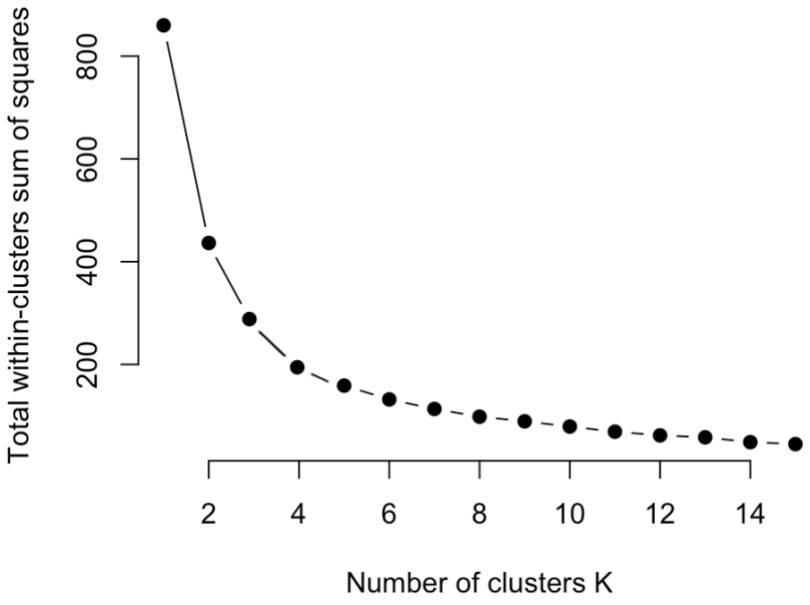


Figure 27 - Elbow method graph

- Average Silhouette method: it evaluates both the average distance between each point from the other points of the cluster to which it belongs and the average distance from the points of the nearest cluster; the higher the average value of this index, the higher the consistency of the analysis for the number k of corresponding clusters. In particular, for each observation i it has been calculated the average dissimilarity a_i between i and all other points of the same cluster to which i belongs. Then, for all the other clusters C it has been calculated the average dissimilarity $d(i,C)$ of i to all observations of C. The smallest $d(i,C)$ is defined as $b_i = \min_c d(i,C)$. The value of b_i can be interpreted as the dissimilarity between i and its "neighbour" cluster (the nearest one to which it does not belong). Finally, the Silhouette width s_i is calculated in this way:

$$S_i = \frac{(b_i - a_i)}{\max(a_i, b_i)}$$

The silhouette plot shows how close each point in one cluster is to the points in the neighbouring clusters (see Figure 28).

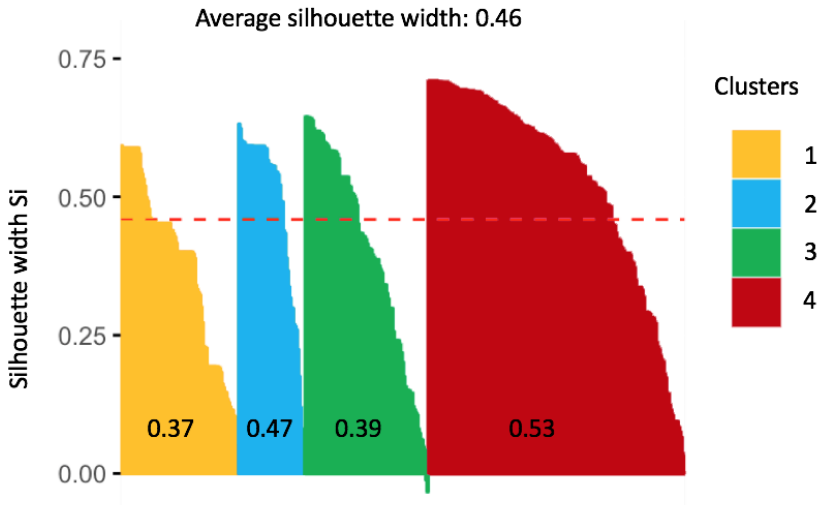


Figure 28 - Clusters silhouette plot

Silhouette width indicator ranges from -1 to 1, where a high value means that the object is adequately matched to its own cluster and poorly matched to neighbouring ones. For this reason, if most objects are related to a value close to 1, then the clustering configuration is appropriate. If many points present a low or negative value, then the clustering configuration could have too many or too few clusters. The result achieved is reported in Figure 29.

Figure 29 - Silhouette measure of cohesion and separation

4. DIGITAL READINESS MODEL

From the literature review, the need for a tool to measure museums' digital performances has been demonstrated: evaluation and monitoring play an important role in benchmarking performance and checking the progress towards the established goals.

Performance measurement in the private sector is not a relevant problem, unlike the public one: introducing an evaluation system in public sector is a complex application because it is linked to several problems (M. Arnaboldi et al, 2015) such as the impossibility to apply managerial tools directly taken from the private sector. As regards the tools currently used, traditional KPIs regarding efficiency/effectiveness are the most implemented: efficiency deals with the museum management capability concerning the inputs-outputs relation instead effectiveness is related to the capability to align the produced outputs with the expectations. These more general measures refer to the process management and do not allow a performance measurement related to the digitalization of the organization: both as digitalization of individual processes and as an overall digital readiness of institutions.

As reported in the literature, measuring the general museum performances is a complex task that becomes even more difficult considering digital performances. Considering that the cultural sector is characterized by a limited budget, the digitalization process is not as predominant as in other sectors. As evidence of this, cultural institutions usually tend to adopt innovations, in particular the digital ones, coming from other industries already successfully proved in the market.

Hence the scope of this Master Thesis, to enrich the existing literature creating a model to assess the digitalization level of cultural institutions.

The Digital Readiness Model consists of three main components (see Figure 30):

- the dimensions of the digitalization, which consist in Structure and Activity pillars
- the measurement of the digitalization, which provides a set of performance measures, formulated as qualitative criteria and then as numerical indicators that can be calculated from the data collected
- the positioning map to evaluate the overall digitalization process

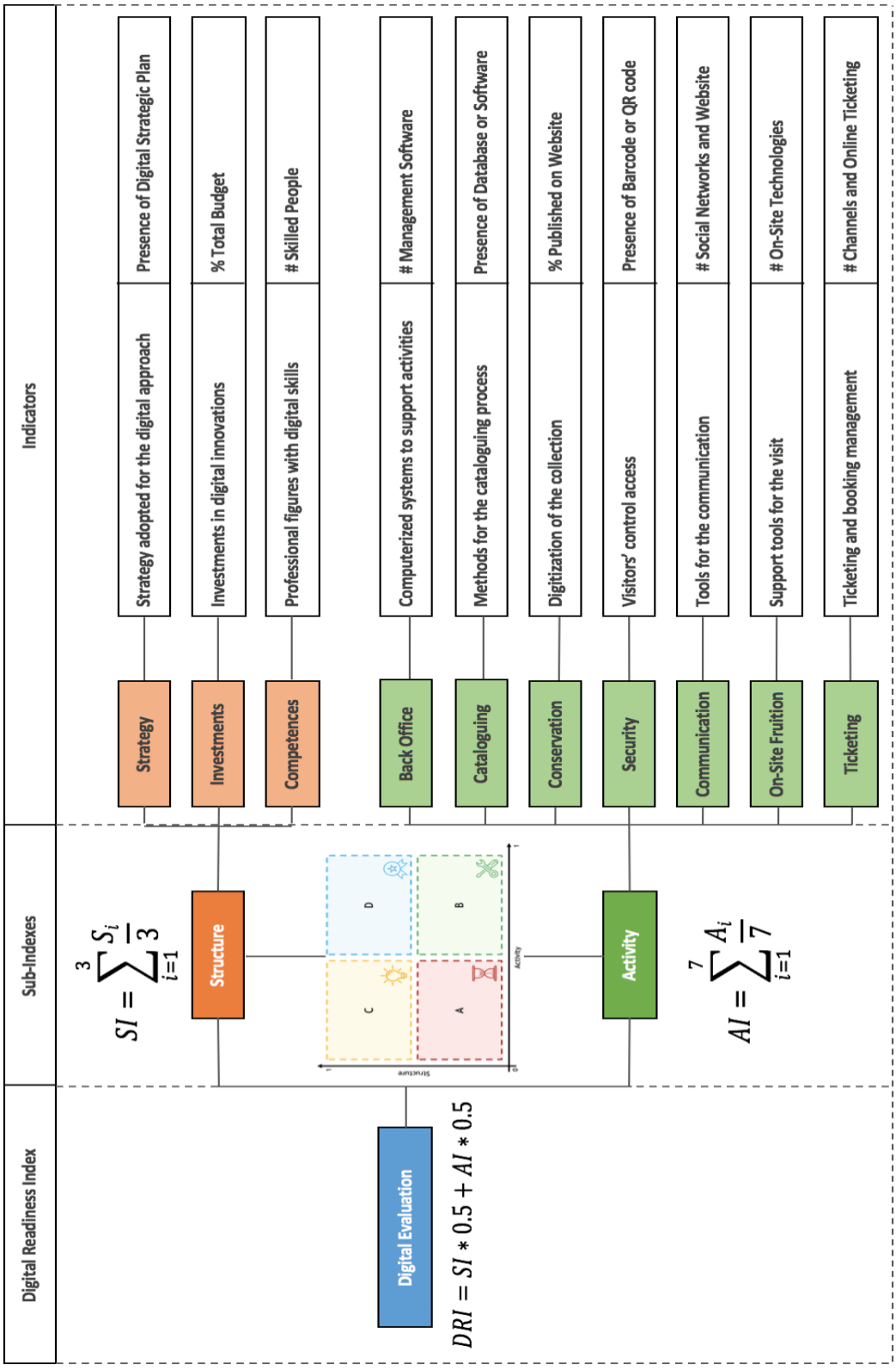


Figure 30 – Digital readiness model

The following sections present the three components of the model coming from the literature review and through which the model has been constructed.

4.1 DIMENSIONS OF THE DIGITALIZATION

The road to a better management of cultural institutions passes through a better digitalization of the activities that must be supported by a policy structure composed by three factors: the presence and formalization of a digital strategy with an adequate investment plan and with the introduction and development of employees' competences as digital skills.
Indeed, the dimensions of the digital transformation refer to structure and activities. Below, it is reported the explanation of the two pillars with their constitutive factors.

4.1.1 Structure Pillar

The first dimension of the model is represented by Structure which has been analysed with reference to three main factors: Strategy, Investments and Competences.

Strategy

Strategy refers to the action plan that an organization aims to pursue and, subsequently, to implement. The importance of structured strategy for digital transformation is widely recognized in literature, where there is a still ongoing debate on the different approaches to adopt.

The impressive improvements in information, communication and connectivity made in recent years have unleashed new possibilities for the organizations: many of them have taken advantage thanks to lower price/performance levels of computing (hardware and software) as well as global connectivity through standard protocols (e.g., Internet and mobile web), adapting their business infrastructure to the new digital era. These digital technologies are fundamentally reshaping traditional business strategy (R. Kohli & V. Grover 2008; A. Rai et al. 2012).

During the last decades, many institutions have adopted a digital strategy following two different approaches: IT Strategy and Digital Business Strategy.
According to Henderson and Venkatraman (1993), the prevailing vision of IT strategy has been that of a functional-level strategy that must be aligned (but essentially subordinate) with the business strategy selected by the organization.

Aron (2013) also agrees with this consideration, indeed according to him:

- *IT Strategy* is a technical answer to a business question: "How will IT help the business win? It assumes the business strategy is set, then considers how to use IT to make that strategy successful. IT Strategy is usually conducted downstream/after business strategy".
- *Digital Business Strategy* is a business answer to a digital question: "How should our business evolve to survive and grow in an increasingly digital world? It is not a separate strategy, but instead a lens on business strategy, indeed all aspects of the business strategy should be rethought through digital considerations" (D. Aron, 2013).

By Analysing the content of digital transformation, Ismail et al. (2017) have been able to position this phenomenon and distinguish it from previous technology-enabled transformations. They stated that the actual degree of complexity in digital transformation exceeds that of previous IT-enabled transformations, as it requires an even more revolutionary approach. Moreover, also the range of potential impact and benefits are also higher compared to the ones related to the previous transformations because there is a change concerning the business dimension:

- Operations: multiple impacts requiring a fundamental redesign;
- Customer experience: a wider impact crossing the firm's boundaries;
- Business model: additional layers of complexity and wide-spanning impacts.

This differentiation is illustrated in Figure 31 thanks to the schematic representation of Venkatraman's diagram for IT-enabled transformations (N. Venkatraman, 1994).

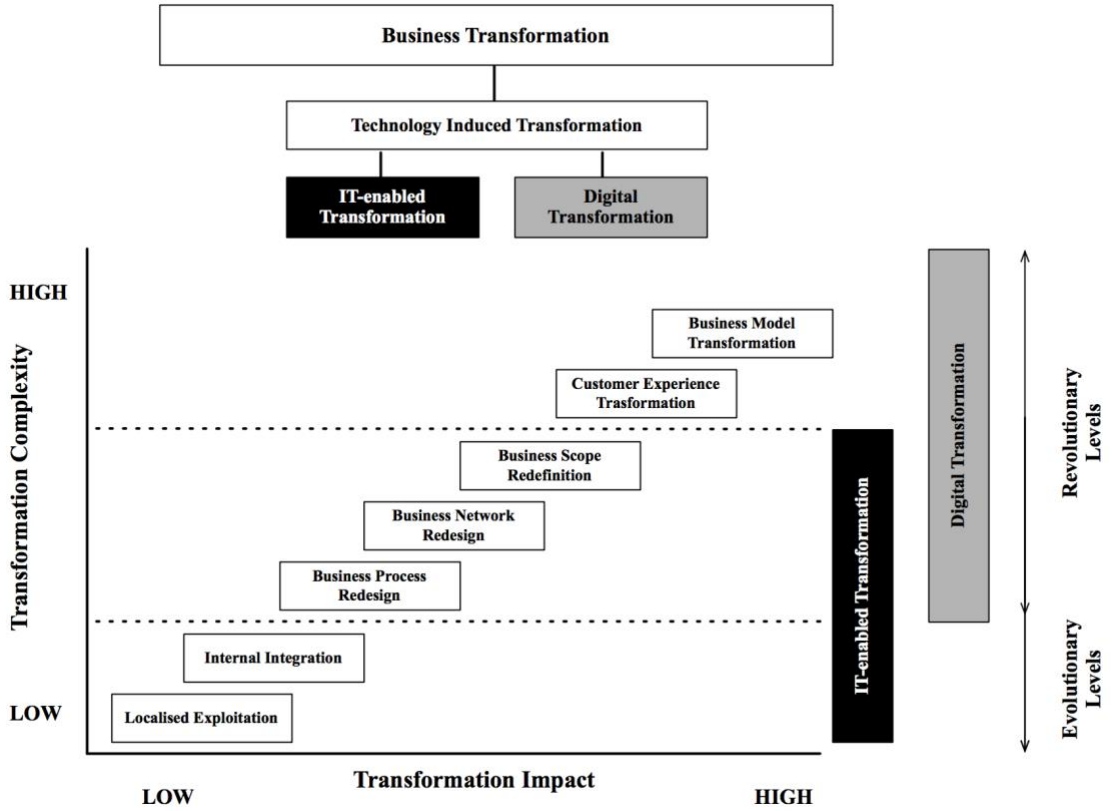


Figure 31 - Positioning digital transformation (Venkatraman, 2014)

According to Bharadwaj et al. (2013), it is the moment to reshape the role of IT strategy, from a functional-level aligned with the business strategy (but always subordinated to it) to a new definition of digital business strategy: "An organizational strategy formulated and executed by leveraging digital resources to bring a competitive advantage to the organization and generate differential value" (Bharadwaj et al, 2013).

Due to the digital characteristics, today it is easier for managers and strategists to grasp and be aware of the strategic implications of technologies inside any organization at all levels.
Nevertheless, companies that are unable to adapt to the digital world will undoubtedly fall victims of "digital Darwinism", where only the most adaptable enterprises, responsive to technological trends, will survive in the competitive landscape (E.I. Schwartz 2001).
Currently, there are many examples of organizations unable to keep pace with digital transformation or which have been plagued with failed attempts that focused solely on technologies without taking broader strategic decision areas into account (G.C. Kane et al. 2015; T. Hess et al. 2016; C. Matt et al. 2014).

Having analysed that there are two main methods to apply a digital strategy, the main purpose is to understand if museums have a digital strategy and, subsequently, how the strategy is structured.

Investments

The second factor of Structure pillar refers to Investments: current literature acknowledges that the amount of money affects the digital transformation.

Moreover, decisions are crucial when introducing new emerging technologies into companies: it is important to explore the role that technologies play to achieve strategic goals (e.g. understand whether they are useful for new business opportunities or a merely support to fulfill current business requirements). Of course, decision areas have a financial element, which revolves around choosing how to finance the digital transformation endeavor, after assessing the financial pressure on the current business (T. Hess et al. 2016; C. Matt et al. 2014).

Examining the firms' strategic assets and capabilities through a digital lens may help managers to pinpoint which existing assets can be leveraged, which capabilities can be used in a new way and whether or not new investments and competencies are needed by the company (G. Westerman & D. Bonnet 2015; T. Hess et al. 2016; K.W. Ross et al. 2017).

As reported by McDonald, leading companies in digital transformation almost double the investment in digital resources compared to the others, planning significantly higher capital investments and intangible resources (M. McDonald et al, 2014).

To conclude, a certain amount of financial resources is required to apply a digital strategy, therefore the desire to know how many museums actually invest in digital technologies is a significant component of the Structure pillar.

Competences

Competences refer to the last factor of Structure pillar: cultural institutions are places in which employees are characterized by many tasks. In 2010 the Italian Ministry of Cultural Heritage defined that the professional profiles inside a cultural institution can be clustered in three macro-areas (ICOM Italia, 2017):

- Auxiliary services
- Administrative and management services for the protection, services for the conservation of heritage and services for the valorisation and use of heritage (the main examples are administrative management operator, technical operator, operator in custody, supervision and reception, administrative assistant, computer assistant, technical assistant, assistant to fruition, reception and supervision)
- Technical and scientific services for the protection, conservation, enhancement and use of the assets (the main examples are archaeologist officer, archivist officer, librarian officer, art historian officer, demo anthropologist officer, engineer officer, conservator officer, diagnosis officer, technologies officer, promotion and communication officer) and administrative and management services for the protection, conservation, enhancement, use of the assets (administrative officer, computer science officer, statistical officer)

The digitalization in cultural heritage is a common request from European policymakers. Existing and new employees need to adopt ICT skills and competences in their daily work to reach what Groupspaces define as "eCulture": "*Culture Jobs need to be enhanced with eSkills to become eCulture Jobs*".

The *eCult Skills* project analyses the skills and knowledge requested for professionals in cultural institutions to become expert in using digital technologies in the cultural industry adopting the "European Framework for e-Competence".

In a recent research, based on the outcome of eSkills project, Mu.SA (Museum Sector Alliance) underlined the need for a mental and cultural shift about services' plan and vision, in which the digital element must become a fundamental part. In doing so, Mu.SA provided emerging role profiles for Museums (Mu.SA, 2017):

- Digital Strategy Manager: "*A strategic role-profile for museums that aim to thrive in a digital environment in line with the overall museum strategy*".
- Digital Collections Curator: "*This role-profile is specialised in preserving and managing born digital materials. Develop online and offline exhibitions and content for other departments*".

- Digital Interactive Experience Developer: "*This role-profile is specialised in designing, developing and implementing innovative and interactive experiences providing a meaningful experience for all types of visitors*".
- Online Community Manager: "*This role-profile is vital for all museums aiming to invest in developing and engaging diverse audiences online and should be fully integrated into the institutional structure*."

These classifications allow to identify 7 main digital role profiles for the museums:

- Social Media & Community Manager: the curator of the institutional social networks, in particular he studies and creates content, manages the discussion phase, the reviews and the users' behaviour on the page
- Digital curator: the responsible for the management, monitoring and conservation of digital resources within the institution
- Digital Marketing Manager: a manager that coordinates all digital marketing activities (e.g. AdWords, social advertising, web analytics)
- Designer/ Game designer: the creator of the contents, games and multimedia installations within the institution. This professional role has the task of creating the best possible experience based on certain circumstances, such as the platform, the genre and the public. Moreover, the designer is the figure primarily responsible for the "fun factor" of the installed applications
- Data Protection Officer: a manager that has to oversee the data protection and implementation strategy to ensure compliance with the GDPR requirements
- Digital Officer: a manager that helps the institution in its growth process by converting traditional "analogue" activities into digital ones, using the potential of modern online technologies and data. In addition, the digital officer oversees trends which rapidly evolve in digital sectors such as mobile applications, social media and related tools
- Digital User Experience Developer: a mixed figure between designer and developer with the task of improving the experience of the website and the interactive content that the institution provides to the public

4.1.2 Activity Pillar

The second pillar of the framework refers to activities. This is the central distinctive element of the proposed measurement model since the major parameter adopted for evaluation is represented by the activities carried out by a museum.

A useful framework to give a first formulation to the managerial dynamics of museums is Michael Porter's Value Chain Model. He developed a representation of the typical processes of a company, also making a distinction between *primary activities*, which directly contribute to the creation of the output (products and services) of an organization, and *support functions*, which do not directly contribute to the creation of the output but are necessary for it in order to be produced.

In general terms, it is possible to affirm that this model is also applicable to cultural institutions to the extent that they are conceived as organizations oriented to value creation and, therefore, are required to produce measurable results in terms of quality and quantity.

Indeed, Porter (2006) was able to adapt his framework to cultural institutions, as reported in Figure 32, introducing new activities but still keeping the distinction between primary and support activities.

The first ones are those reported in the lower part of the model, while support activities are the remaining ones in the upper part.

Figure 32 - Museum value chain (Porter, 2006)

Porter's model is therefore a useful framework for setting up an operational and entrepreneurial representation of the museum organization which, on the other hand, presents significant limits regarding the central question of value.

For this reason, another important model concerning the classification of the museum's activities was provided by Baia Curioni as an alternative analysis. Starting from the review of Porter's model, Baia Curioni's studies propose five main activities in museum management that coexist even if their size and mutual weight may vary according to the institutions considered (S. Baia Curioni, 2008):

- *Collection management*: in the sense of loan choices and artworks circulation. It presents rather different degrees of importance depending on the type of museum institution, on the type of collection and its relative dimensions.
- *Scientific research*: inventory and documentation actions carried out with very variable intensity in response to two main issues. The first concerns historical-critical research activities (dating, attributions, interpretations or contextual reconstructions) or technology (intervention techniques, protection conditions and skills, etc.). Instead, the second includes the inventory and cataloging activities of the collections and of the research documents that become progressively available.
- *Collection care and preservation*: concerning the physical conservation of the works which includes diagnostic and risk detection activities, the planning of the interventions and their execution, security maintenance of the collections (both in external or internal exhibition areas and deposits), the monitoring of microclimatic conditions and exposure to atmospheric agents, the identification of the most suitable technologies for protection, the definition of the safest procedures for the assets transfers.
- *The public offering system*: everything that contributes to qualify the visitor experience and to enhance the value perceived by visitors. The latter depends not only on the individual qualities of the various factors (spaces, collections, etc.) but also on their level of integration and mutual coherence. These factors are: common spaces and services (logistics, fittings, cleaning), the additional services and reception (ticket office, wardrobe, guard, catering, bookstores), permanent or temporary exhibitions (collections, installations, educational and informational equipment), events (activity schedules, dedicated spaces, related services), the communication system (external, coordinated image, internal signage), editorial activity (book, multimedia, internet,

leaflets, maps, etc.), educational activities with schools and other local structures and the quality of the relationships that the staff establishes with the public.

- *The B2B offering system*: concerning the ability to manage the spaces and images rights and the public relations with companies working in the cultural sector.

According to Solima, the set of functions that characterizes a museum can be divided into 3 sub-systems that define the overall offer (L. Solima, 2004): *conservative function* for the protection of collections, *exhibition function* and *service function*, activities related to the enhancement of collections. The presence of the three functions defines the identity of the museum depending on their intensity.

- *Conservation function* represents the basic service of systematic monitoring required for the protection of collections. Supporting the conservation of the artworks, there are registration and cataloguing activities, which are especially important for those museums that have a considerable heritage.
- *Exhibition function* is mainly carried out through the selection of the artworks (evaluating which of these can be displayed in a given area without incurring physical deterioration) and through the choice of the layout and information supports.
- *Complementary services and accessories* complete the provision of museum performances. They include dissemination services, aimed at supporting the museum's knowledge and visiting the structure (guided tours, assistance, marketing); reception services, designed to improve the overall quality of use (parking, booking of entrances, cloakroom, cafeteria, restaurants, shops etc.) and additional services not strictly related to the structure but designed to maximize the degree of exploitation of the available space (the conference room, for example).

A schema of the different literature contributions related to the museums' activities is reported below in Table 11.

Authors	List of Activities
Porter (2006)	- Primary Activities: Assembly and Preservation, Exhibition, Hospitality Services, Marketing & Sales, Visitor Services - Secondary Activities: Firm Infrastructure, Fundraising, Human Resource Management, Program and Content Development, Educational Programs

Baia Curioni (2008)	- Collections Management - Scientific Research - Collection Care and Preservation - The Public Offering System - The B2B Offering System
Solima (2004)	- Conservation - Exhibition - Complementary services and accessories

Table 11 - Classification models for museums activities in literature

As analysed in the literature, there are several models that represent the functions and activities within cultural institutions. As far as the digital is concerned, it is necessary to analyse cultural institutions transversally with respect to the different models presented as this is a phenomenon that involves, or should involve, all activities, without any differentiation based on nature or typology.

Starting from the existent literature, this Master Thesis proposes seven activities that can be referred also to the distinction elaborated by Kéfi and Pallud in 2011 regarding the classification of the adoption strategy between curator oriented and visitor oriented:

- *Curator oriented*: Back office, Security, Cataloguing, Conservation
- *Visitor oriented*: Communication, On-Site Fruition, Ticketing

Back Office

In the organizations, the back office is that function which includes all the company's own activities that contribute to its operational management, such as the production system or the management. As regards the digitalization process of the museums, this activity refers to the presence of software to support the activities for a better management (M. Porter 2006; S. Baia Curioni, 2008; S. Intorre, 2013).

Cataloguing

The cataloguing consists in the classification, registration and description of a cultural asset. Of course, nowadays this activity is processed by digital tools such as spreadsheets and software through selected protocols and standards (L. Solima 2004; M. Porter 2006; S. Baia Curioni 2008; S. Intorre 2013).

Conservation

The aim of conservation activity regards the need to protect and enhance cultural heritage. Cultural heritage includes different categories of goods, ranging from those traditionally considered as artworks (archaeological, architectural, artistic, archival and book) to the intangible assets (as oral traditions or performing arts). The process related to conservation is the digitization (as the activity of converting the physical assets of the collection into digital form, for example texts and photographs) and the publishing of the digital format online on a website (L. Solima 2004; M. Porter 2006; S. Baia Curioni 2008; S. Intorre 2013).

Security

Security is the prevention of intentional acts with the purpose of hitting things or people. Since the advent of the Internet and of the information systems during the last decade of the twentieth century, this activity has been digitalized in every industry thanks to the adoption of tools that help the organizations in controlling people and processes (L. Solima 2004; M. Porter 2006; S. Baia Curioni 2008).

Communication

Communication deals with promoting an experience in order to bring the cultural heritage closer to the customer. Of course, in a broader sense, communication is the act of transmitting a message. It is a fundamental human ability and a very important aspect of modern society. This activity is one of the most digitalized in museums thanks to tools such as websites and social networks able to reach the potential customer through a differentiated multichannel customer strategy (L. Solima 2004; M. Porter 2006; S. Baia Curioni 2008; M. Sabatino 2016).

On-Site Fruition

The advance of technological innovation is able to offer a wide range of multimedia solutions that can make museum spaces more interesting. Modern technologies can offer new possibilities of communication and interaction with users that previously were not possible. Digital development has allowed not only the improvement of technologies already present in museums such as audio-guides or LIS videos but also the creation of new ones such as augmented reality, beacon, QR code and NFC (L. Solima 2004; M. Porter 2006; S. Baia Curioni 2008; M. Sabatino 2016).

Ticketing

In the majority of the cases, ticketing is the main activity through which a museum obtains financial sustainability to allow the continuity of its mission. Thanks to digital transformation, people can book and pay the ticket online without losing time in a queue inside the museum (L. Solima 2004; M. Porter 2006; S. Baia Curioni 2008).

4.2 MEASUREMENT OF THE DIGITALIZATION

The second component of the model is represented by the measurement of the digitalization through a set of criteria and indicators.

The methodology used to assess each pillar and to understand whether and how much a museum is digitalized is based on the identification of minimum and improvement criteria. Minimum criteria refer to the implementation of certain practices that guarantee an acceptable level of museums digitalization. Instead, improvement criteria refer to an improvement of the minimum practices mentioned above.

This methodology has been already used by the Italian Cultural Heritage Minister for the drafting of the "*Livelli uniformi di qualità per i musei*" report to identify the different criteria through which an institution can be defined as a museum (Ministero Italiano per i Beni e le Attività Culturali, 2018).

In the Ministry's final document, three macro areas have been identified (articulated in turn in several sections) to define uniform quality levels:

1. *Organization* (legal status, accounting and finances, structure, activities, staff)
2. *Collections* (monitoring of the conservation status of the heritage, management of handling procedures, increase in assets, temporary/permanent exhibitions, study and research programs, organization of deposits)
3. *Communication and relations with the territory* (relations with the public and communication, relations with the territory and stakeholders)

Considering that the standards chosen by the Ministry offer an overall view to evaluate the Italian museums' performances, the same logic has been adopted for this research, taking into account the focus on digital innovation. In this regard, more specific minimum and improvement criteria have been identified for the two pillars presented in the previous section.

4.2.1 Structure Criteria

In assessing the structure dimension, the indications of a coherent policy aligned to the digital innovation process are represented by the draft of a digital strategic document, the presence of an investment plan in digital technologies and the presence of employees with digital skills. The list of the minimum and improvement criteria used to obtain Strategy, Investment and Competences factors is reported below in Table 12.

	MINIMUM CRITERIA	**IMPROVEMENT CRITERIA**
STRATEGY	Presence of a strategic document with a section related to the digital strategy adopted	Presence of a dedicated digital strategy document.
INVESTMENTS	Invest in digital between 1% and 10% of the total budget	Invest in digital more than 10% of the total budget
COMPETENCES	Presence of at least one of the following professional figures as an external consultant: Social Media & Community Manager, Digital Curator, Digital Marketing Manager, Designer/ Game designer, Data Protection Officer, Digital Officer and Digital User Experience Developer	Presence of more than one of the following professional figures as an external consultant, internal staff or staff shared with other institutions: Social Media & Community Manager, Digital Curator, Digital Marketing Manager, Designer/ Game designer, Data Protection Officer, Digital Officer and Digital User Experience Developer

Table 12 - Overview of the minimum and improvement criteria for structure pillar

4.2.2 Activity Criteria

The list of the minimum and improvement criteria used to obtain each factor related to the Activity pillar is reported below in Table 13:

	MINIMUM CRITERIA	IMPROVEMENT CRITERIA
BACK OFFICE	Presence of at least one of the following management software: Accountability, Purchase, Personnel, Cataloguing, Storage, Ordinary Maintenance, Loans & Handling of artworks, Space Management, Public Services, Education, Ticketing, e-commerce, Fundraising and CRM	Presence of more than one of the following management software: Accountability, Purchase, Personnel, Cataloguing, Storage, Ordinary Maintenance, Loans & Handling of artworks, Space Management, Public Services, Education, Ticketing, e-commerce, Fundraising and CRM
CATALOGUING	Cataloguing process through database or spreadsheets of at least 25% of the collection	Cataloguing process through an open-source, proprietary or tailor-made software
CONSERVATION	Digitization of at least 25% of the collection	Digitization and online publishing of more than 25% of the collection
SECURITY	Adoption of more advanced methods than the simple checking of the entry ticket to control the visitors' access	Barcode or QR code to control visitor access
COMMUNICATION	– Presence of a website within other websites – Presence of at least one social network account	– Presence of a proprietary website or in common with other institutions – Presence or development of an App – Presence of more than one social network account – Reviews management of the social accounts – Visitors data collection through digital tools

ON-SITE FRUITION	Presence of at least one of these technologies: Wi-Fi, Audio-guide, Augmented or Virtual Reality, QR code, Beacon, NFC, Chatbot, Videogames, Video LIS and Blockchain	Presence of more than one of these technologies: Wi-Fi, Audio-guide, Augmented or Virtual Reality, QR code, Beacon, NFC, Chatbot, Videogames, Video LIS and Blockchain
TICKETING	Ticketing on-site with an electronic accounting system	– Ticketing onsite through a database or online ticketing – Possibility to book the tickets through websites, social networks and App

Table 13 - Overview of the minimum and improvement criteria for activity pillar

4.2.3 Digital Indicators

The application of the model aims to measure the museums' digital performances and to provide a quantifiable final result to the reader. For this reason, a set of indicators has been developed following the guidelines and recommendations of the criteria explained in the previous section and adopting the same methodology used for the DESI Report 2018 "*International Digital Economy and Society Index: methodological note*".

The data used in the indicators' calculation have been gathered through the survey related to the digitization of cultural institutions. Those data have been normalised in order to aggregate several answers expressed in different units into the indicators with the aim to obtain the overall readiness index. In particular, normalisation has been performed using the min-max method, which consists of a linear projection of each answer onto a scale between 0 and 1. All the answers have a positive direction (i.e., the logic "higher is better" is applied), therefore, the 0 value in the normalised indicator has been anchored to the minimum values in the answer original scale (unacceptable answers), while the value 1 has been applied to the maximum values in the answer scale (the highest of the improvement criteria). The choice of minima and maxima have been performed carefully taking into account all the existing thresholds between the unacceptable answers for a specific question, the minimum criterion identified and the

different improvement criteria, and subsequently equally distributing the unit score based on the number of total thresholds.

An example of the logic applied is provided in Figure 33, through one of the survey question:

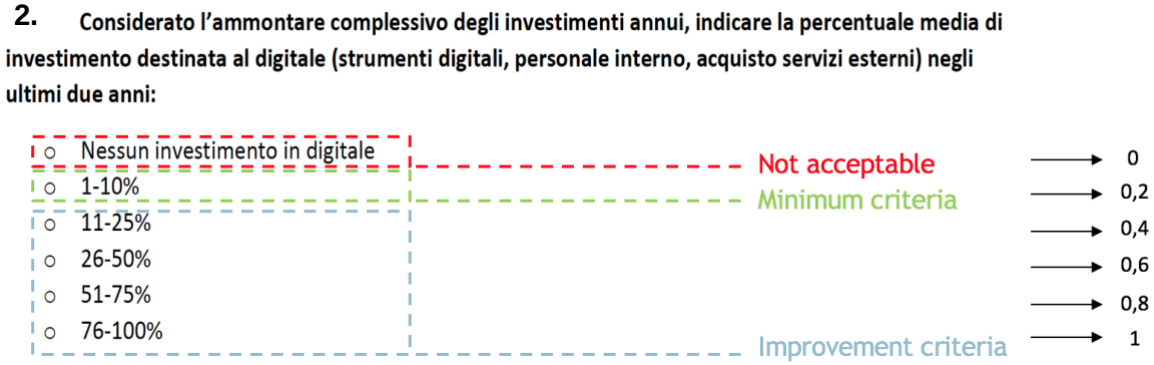


Figure 33 - The logic applied in assessing each answer

The overall table with all possible answers for each question and the relative weights is shown in Appendix G. The final output is the Digital Readiness Index consisting of a two-layer structure. In particular, it is composed of 2 main dimensions (the structure and the activity index), each divided into a set of indicators representing the main section of the survey. The aggregation of indicators into two sub-indexes and of the latter into the overall Digital Readiness Index has been performed using weighted arithmetic averages following the structure of the index. These are not isolated dimensions that contribute separately to the digital development of cultural institutions but are interconnected and all indispensable. For this reason, the same weight for each indicator has been applied. As an example, the top-level DRI score for museum *M* has been calculated using the formulas:

$$Structure\ Index\ (M) = \text{Strategy(M)} * 0.33 + \text{Investments(M)} * 0.33 + \text{Competences(M)} * 0.33$$

$$Activity\ Index\ (M) = \text{Back Office(M)} * 0.14 + \text{Communication(M)} * 0.14 + \text{On Site Frution(M)} * 0.14 + \text{Ticketing(M)} * 0.14 + \text{Security(M)} * 0.14 + \text{Cataloguing(M)} * 0.14 + \text{Conservation(M)} * 0.14$$

$$Digital\ Readiness\ Index\ (M) = \text{Structure Index(M)} * 0.5 + \text{Activity Index(M)} * 0.5$$

Where *Strategy(M)* is the score obtained by museum *M* in the Strategy indicator, and so on for the remaining indicators in the formulas.

4.3 POSITIONING MAP

Once the criteria and indicators to measure digitalization in cultural institutions have been defined, it is possible to plot the results obtained by the indicators on a graphical map.
In particular, the positioning map provides an overview of the performance scores across the two pillars measured by the corresponding Structure and Activity Indexes.

Based on the results achieved through the application of the model, it is possible to obtain four clusters to describe the current situation. These clusters do not have univocally defined boundaries but vary according to the context in which the model is applied: for example, in a more digitalized country, the cluster boundaries will be shifted on the diagonal of the map, assuming higher values. Therefore, the positioning map is useful to define four behaviours that museums tend to assume regardless of the digitalization level of the analysed context:

- those who are late in the digitization process (A)
- those who directly implement new digital tools (B)
- those who start the process by adopting a structured approach (C)
- those who achieve the best results in practice thanks to a structured approach (D)

In Figure 34, it is reported the map according to the four behaviours:

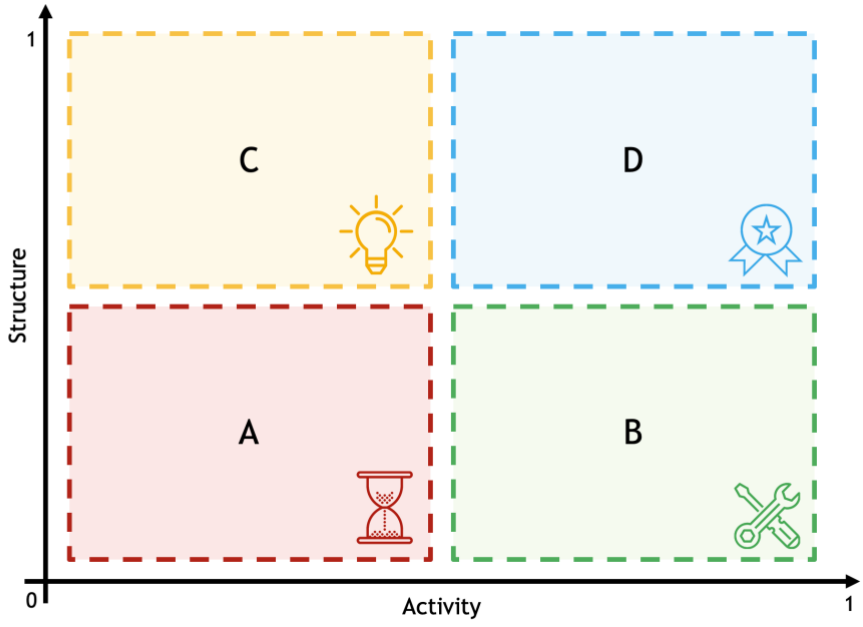


Figure 34 - Positioning map

5. APPLICATION OF THE MODEL IN THE ITALIAN CONTEXT

The analysis in this Chapter has the objective to apply the model measuring the digitalization level of Italian cultural institutions in 2019. Under investigation are both the are the factors that compose the two main pillars of the Digital Readiness Model: the structured digital policy (strategy, investments and competences), the instruments for the relationship with the audience (communication, on-site fruition and ticketing) and the back-end support for different functional areas (back office, cataloguing, conservation and security). Furthermore, the overall evaluation of the model has been performed through the positioning map: thanks to the cluster analysis cultural institutions can be grouped according to the results achieved in the indicators. The positioning map has been used to depict the differences among the clusters for what concerns the behaviours assumed by the museums in the digitalization process.

5.1 MEASUREMENT OF THE ITALIAN DIGITALIZATION

In this section, a descriptive statistic performed on the results of the survey has been illustrated through graphical representation, in order to obtain a preliminary understanding of the phenomenon. In particular, the aim is to apply the theoretical model explained in the previous Chapter to a selected sample of real museums in order to identify if minimum and improvement criteria are respected in achieving the digitalization process. Furthermore, an analytical application of the model has been performed through the indicators to measure how much museums are digitalized.

The following results are based on 431 responses, which were considered valid for the purpose of the analysis, as explained in Section 3.2.2 - Sampling Process.

5.1.1 Criteria Evaluation

Responses are distributed as illustrated in Figure 35 on the basis of their geographical location. Geographical areas have been identified according to the ISTAT classification which group regions in the following way:

- North Italy: Liguria, Lombardia, Piemonte, Valle d'Aosta, Emilia-Romagna, Friuli-Venezia Giulia, Trentino-Alto Adige, Veneto

- Central Italy: Lazio, Marche, Toscana, Umbria
- South Italy and islands: Basilicata, Calabria, Campania, Molise, Puglia, Abruzzo, Sardegna Sicilia

Most of the collaborating entities are located in the North of Italy (48%), in particular in Lombardia and Piemonte (28% of total complete responses).
However, a significant contribution has been given by Lazio (12%) and Toscana (10%), which are the first collaborating region in central Italy.

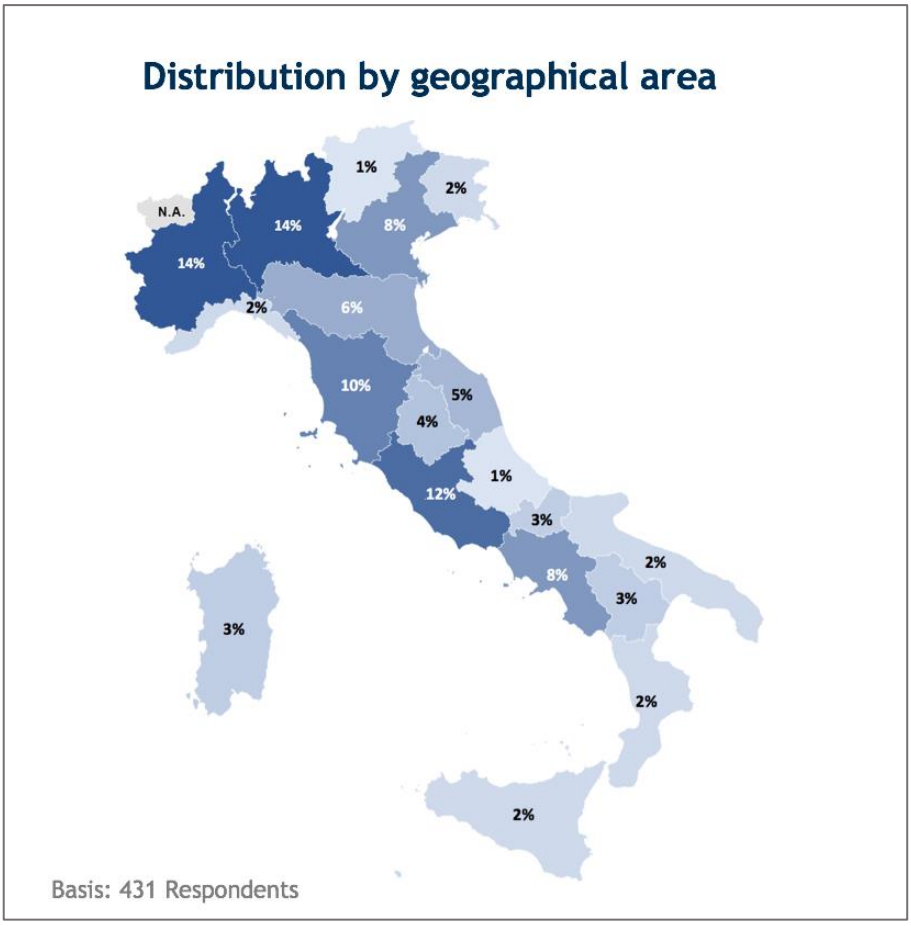


Figure 35 - Distribution by region of cultural institution

During the analysis, particular attention has been also paid to the description of the ownership of cultural institutions. This means finding particular trends according to the several subjects to whom the museum's legal and administrative responsibility is attributed and the availability or ownership of the assets and collections for their fruition.

Almost half of the museums and similar institutions responding to the survey (44%) has a public legal nature, while one museum out of four (24%) is private. The remaining part (32%) are public institutions but state-owned (see Figure 36).

With reference to the public sector, it can be observed that in 60% of the cases, the owner of the institutions surveyed is a municipality, which directly manages the structures owned (equal to 28% of the total sample), as evidence of the fundamental role played by local authorities and municipalities in the promotion of the cultural heritage in the territory.

As for museums and similar institutions with a state-owned nature, they are almost all managed by the Ministry (31%), while a small minority administrated by other consortia (1%).

Instead, museums with a private ownership (24% of the sample) are mainly foundations (11% of the total), recognized associations (3% of the total) and other private entities such as private citizens, partnerships or capitals, cooperative societies, consortia, non-state universities and other subjects (5% of the total) and for the remaining cases ecclesiastical or religious bodies (3% of the total).

The private structures are proportionally more widespread in the North-West regions, where they represent almost half of the museums and similar non-state institutions.

Compared to the national average, museums and similar ecclesiastical or religious institutions, that participated to the survey, are more widespread in the central and southern Italy regions.

The results related to the different types of ownership are reported in Figure 36.

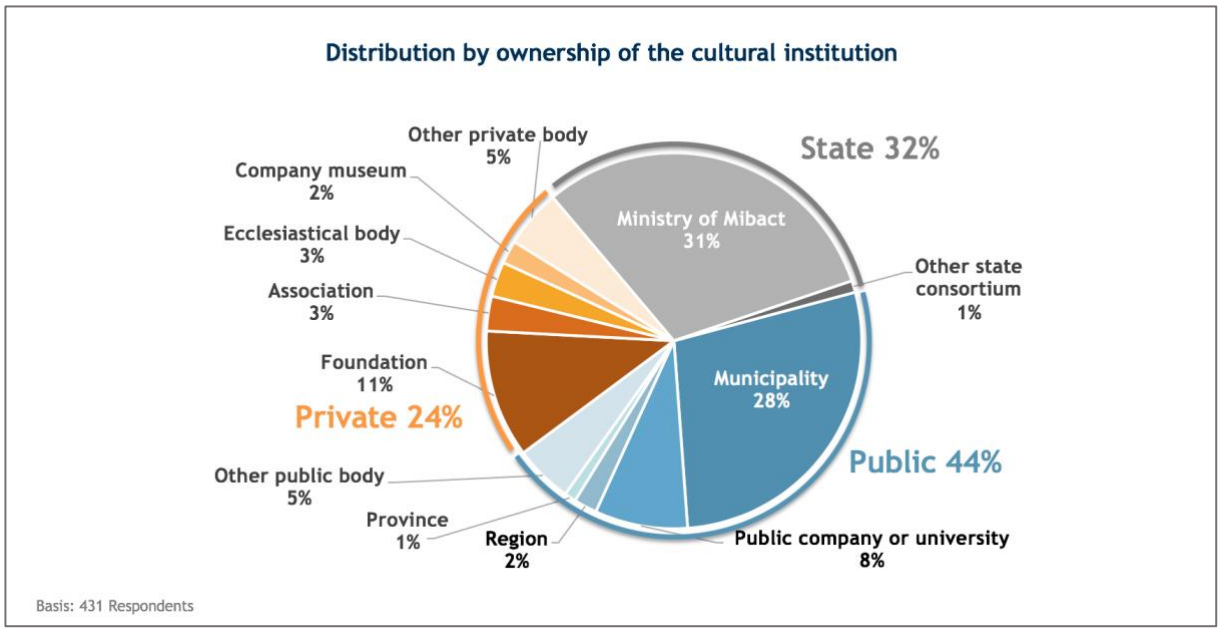


Figure 36 - Distribution by ownership of the cultural institution

Strategy Formalization and Investments Planning

The formalization of the digital strategy through the draft of a specific documentation to support the activity planning is still not widespread among cultural institutions. The results are illustrated in Figure 37. The 77% of respondents claims to do not have any digital innovation strategic plan. Instead, only 23% of total institutions (the remaining part) is able to respect the minimum criterion: in particular, almost 86% of them has a digital innovation plan drafted in a more general document (typically the strategic plan or the annual report) while the remaining 14% respects the improvement criterion, having a dedicated plan to digital innovation.

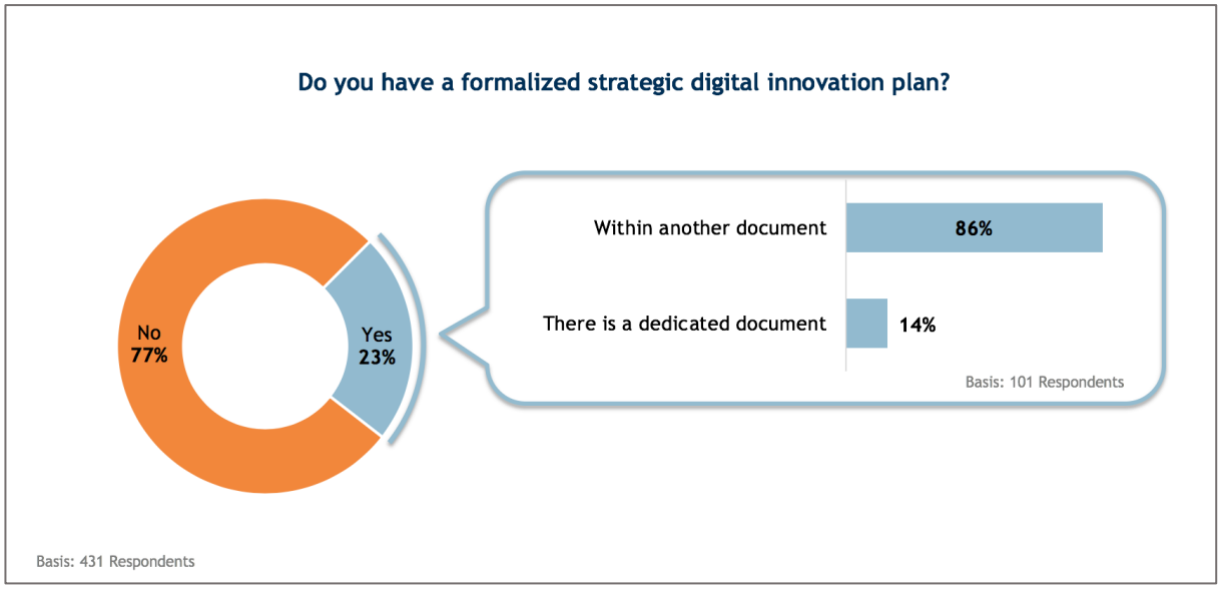


Figure 37 – Formalization of the strategic digital innovation plan

Digital investments are also fairly limited (Figure 38). Answering the question: "*Considering the total amount of annual investments, indicate the average percentage of investment destined to digital (tools, internal personnel, purchase of external services) in the last two years*", 85% of cultural institutions respects the minimum criterion through planned investments in digital assets. In particular, more than one cultural institution out of two (59%) declares investments in digital between 1% and 10% of the total budget and only 6% invests more than 50% digitally.

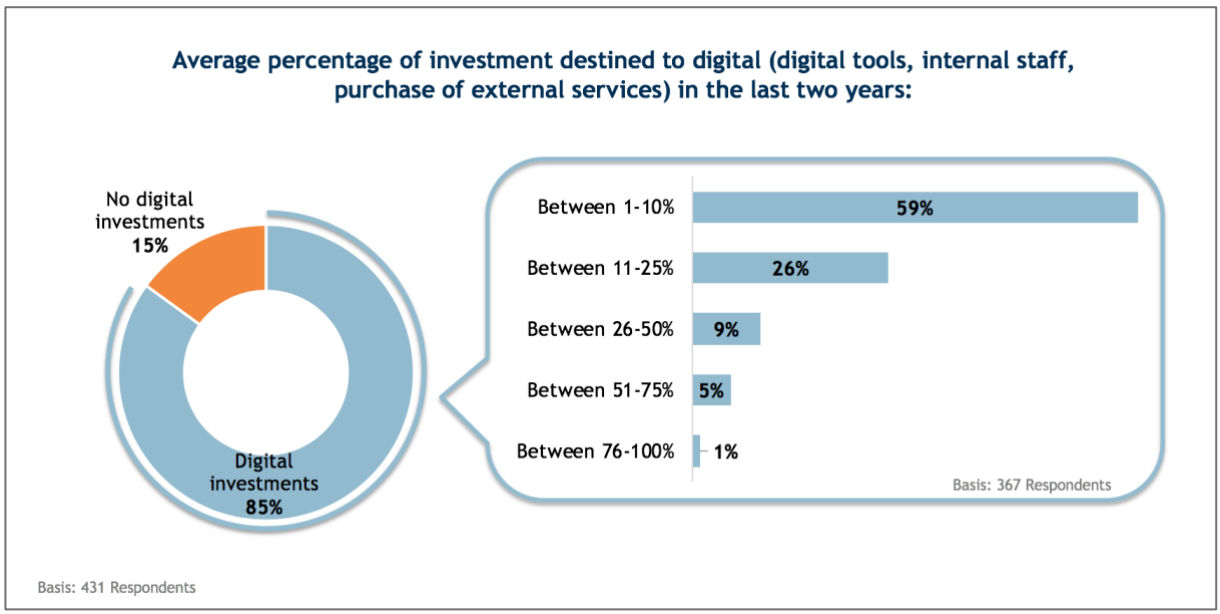


Figure 38 - Percentage of investment destined to digital in the last two years

In this case, it is interesting to evaluate the variability of the answers with respect to:

- their size: *do large institutions invest more?*
- Their form of governance: *do private entities invest more than the public-owned?*

If institutions with more than 50 employees and an annual number of visitors greater than 100.000 can be considered "large", the investment graph is reduced to just two classes: 65% of these museums invests a percentage equal to 1-10% of their overall budget while the remaining 35% invests between 11-25% of the budget. Although it may seem that larger museums invest in digital a low percentage of their total budget, it must be considered that these investments tend to be constant and programmed on an annual basis. So, even if the amount invested in digital is less than a quarter of the total budget, this economic effort still represents a considerable investment.

As for the form of governance, private entities are certainly the type of cultural institutions that invest more in digital. Considering only those who spend more than a quarter of their budget in digital investments, it is evident from the answers that 18% of private invests between 25% and 50% of their total budget while 7% devotes more than half of their digital budget. These percentages are much lower for the public (7% for both the first and the second case) and for the state-owned (only 3% in the first case and 1% in the second).

To conclude this paragraph with some initial considerations, Table 14 clearly shows that three institutions out of four have no strategic innovation plan and, of these, one out of two invests less than 10% of the total annual budget with the aim of accelerating the digitalization process. The remaining institutions (which implement a formalized digital plan, at least included within another generic document) also invest on average less than 10%. Certainly, the most positive result is that only 15% of all museums do not invest in digital at all.

	No digital investment	1-10%	11-25%	26-50%	51-75%	76-100%
No	14,3%	36,4%	17,6%	6,4%	1,0%	0,2%
Yes, within another document (e.g. strategic plan)	0,2%	11,4%	4,3%	1,4%	3,3%	0,0%
Yes, there is a dedicated document	0,2%	1,9%	0,2%	0,2%	0,0%	0,7%

Table 14 - Comparison between strategy formalization and digital investments

Competences

In museums, one of the most important aspects refers to the presence of professional employees with digital skills (Figure 39). All the cultural institutions indicated for each professional figure whether it is present (with internal staff, external consultants or shared with other institutions) in order to respect the minimum criterion (only 36% of the total population) or totally absent from the staff (the remaining 64%).

The Digital Curator is the most widespread professional figure as dedicated internal staff (74%), confirming the need to have certified skills on the conservation of resources in digital format.

The second most present professional figure in the digital environment is linked to communication: indeed, the Social Media Manager is present in 73% of the institutions as an internal figure and in 27% of the cases as an external consultant or as an expert shared with other institutions.

The Digital Officer deserves specific attention as it plays a pivotal role in addressing and implementing a coherent and sustainable innovation plan. It is more present in institutions as internal staff (63%) rather than as external consultants (17%).

The Data Protection Officer is a figure that is gaining more prominence in recent years, as it has the task of supervising the data protection strategy and must guarantee compliance in terms

of GDPR requirements. Its diffusion rates are similar to those of the Digital Officer, i.e. 56% of institutions has this figure internally, 23% prefers it as an external consultant while 21% as a shared figure with several institutions.

Museums are born with a very precise mission: to preserve the cultural and historical heritage in order to become everyone's heritage. To do so, it must be accessible and attractive, with effective communication about its offer to the public. Therefore, museum marketing does not only consist of owning a website for booking tickets online or subscribing to the newsletter. It serves to construct an Omni-channel communication strategy, which can involve and integrate multiple platforms and devices, differentiating the contents to be disclosed and aiming to improve customer engagement. According to the results of the survey, a professional figure able to coordinate all digital marketing activities is present internally in 61% of the responding institutions.
Moreover, even less attention is given to the figures of Developer and Designer, which are fundamental staff for the creation of innovative contents in a modern and virtual key. With regard to the first category, the percentage of internal User Experience Developers is only 19%, but it rises to 63% considering the external consultants. Similar percentages also for designers: indeed, only 15% of museums claims to have it as internal staff, 26% as shared figure and 67% as an external consultant.

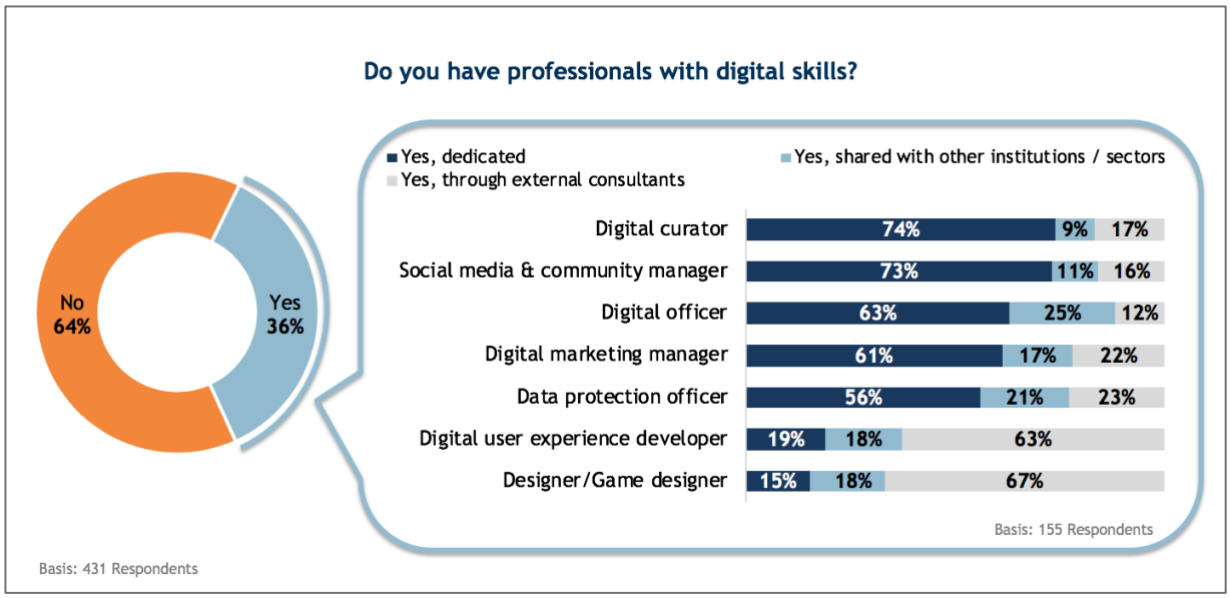


Figure 39 - Professionals with digital skills in cultural institutions

Back-office

The quality of the service provided and the efficiency of the cultural institutions depends on the fact that digital technologies can have an important role, although still little exploited. Figure 40 shows which type of computerized management systems support the organizations. Italian cultural institutions are still little digitalized for back-office activities, despite the fact that just over two museums out of three declare that they have at least one computerized system supporting these activities: 32% of them does not have any computerized support system for the museum management, breaking the minimum criterion imposed for this activity. The remaining 68%, which instead obtained an acceptable result, has the following characteristics: as for the management of commercial services, 33% has a ticketing software, 23% a system for educational activities, 16% for services such as bookshops and restaurants, and 8% for space rental.

As for analysis and monitoring activities, 31% has a customer relationship management (CRM) software (managed independently or in common with other institutions) and 25% has a software for reporting.

The opportunities for a better management of these activities are therefore remarkable. Having tools that can improve and automate the contact management, for example, should become a priority for all those institutions that are focusing their strategic objectives on expanding their audience and on engaging and retaining visitors already reached.

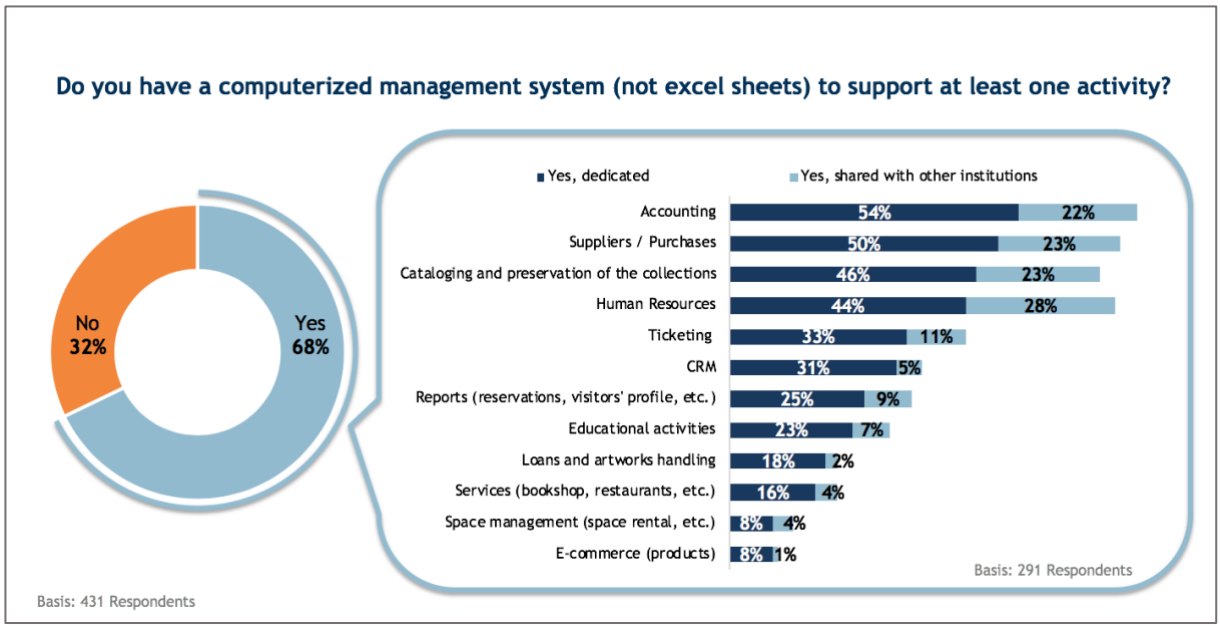


Figure 40 - Computerized management system (not excel sheets) to support the main activities

Cataloguing

As reported in Back Office section (see Figure 40), 68% of the museums claims to have a computerized cataloguing system but the paper catalogue is still very widespread: as reported in Figure 41, 80% of museums performs this activity through paper catalogue and almost half of these institutions catalogue more than half of their collection in this way. The second most adopted solution (usually carried out in parallel with the cataloguing on paper) is made through an electronic database (such as Microsoft Excel or Access) with 73% of preferences. In this case, around 64% of these museums catalogues more than half of the collection using this method. The automated software that should perform this operation are certainly less used: only 24% has a proprietary software available (a standard paid software), 17% has an open source software (usually a free software, that allows code modification and improved features by the users), while a tailor-made software is used by 17% of the institutions (a paid software specifically developed for each organization according to their needs). On average, considering the museums belonging to these three last categories, 51% of institutions is able to catalogue more than half of their available collection, as reported in Figure 41.

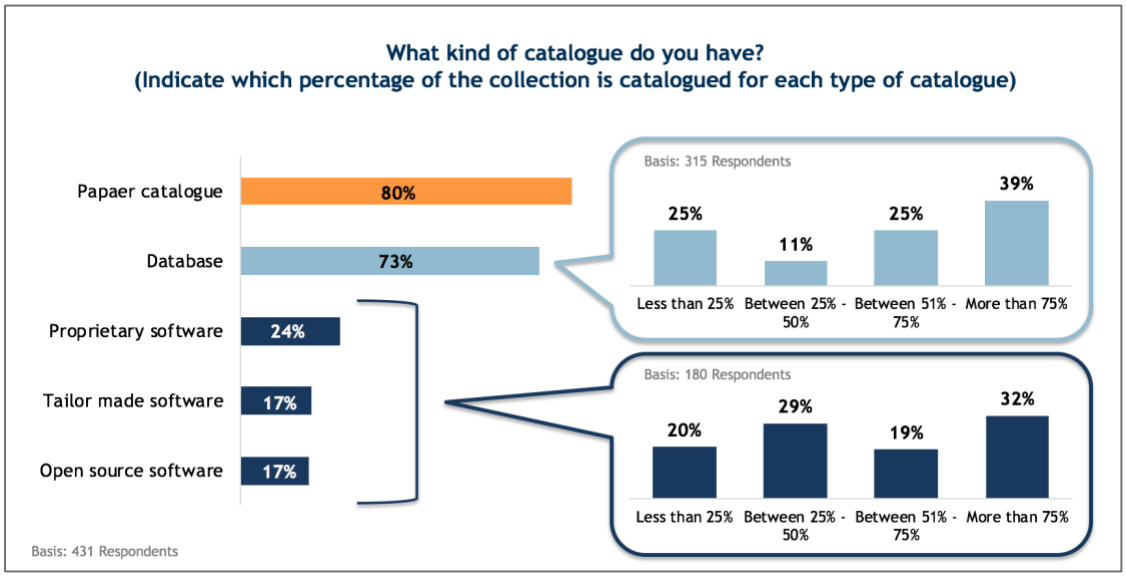


Figure 41 - Type of catalogue used and percentage of the already catalogued collection

The systematic approach and frequency of the cataloguing process are quite heterogeneous: as shown in Figure 42, 46% of institutions carries out this process occasionally while the other 54% continuously: of these, 52% has a defined cataloguing strategy, instead, the remaining 48% carries out a continuous cataloguing but in the absence of a defined strategy.

For these data, there are no particular differences with respect to the form of governance (public, state, private) or to the geographical location of the museums.

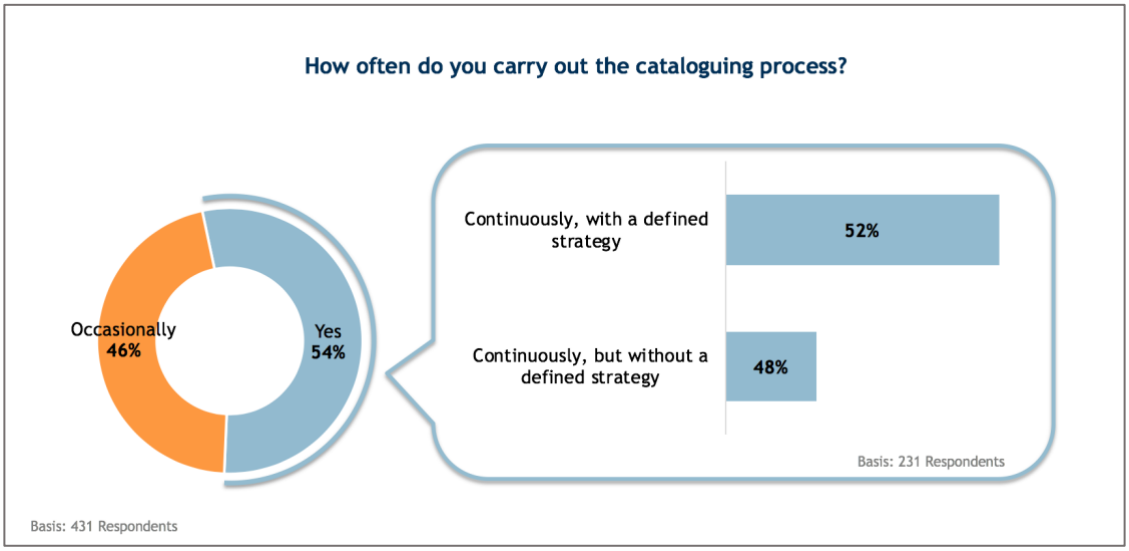


Figure 42 – Frequency of the cataloguing process

Cataloguing through digital tools allows museums to link a large amount of information in reference to a single artwork. This additional information, called metadata, may concern not only descriptive data of the artwork but also technical information useful to the curators of the institutions. Indeed, another survey investigation regards the level of metadata dissemination. Figure 43 shows the results regarding the adoption of metadata: 51% of the responding museums declares that they used them for cataloguing.

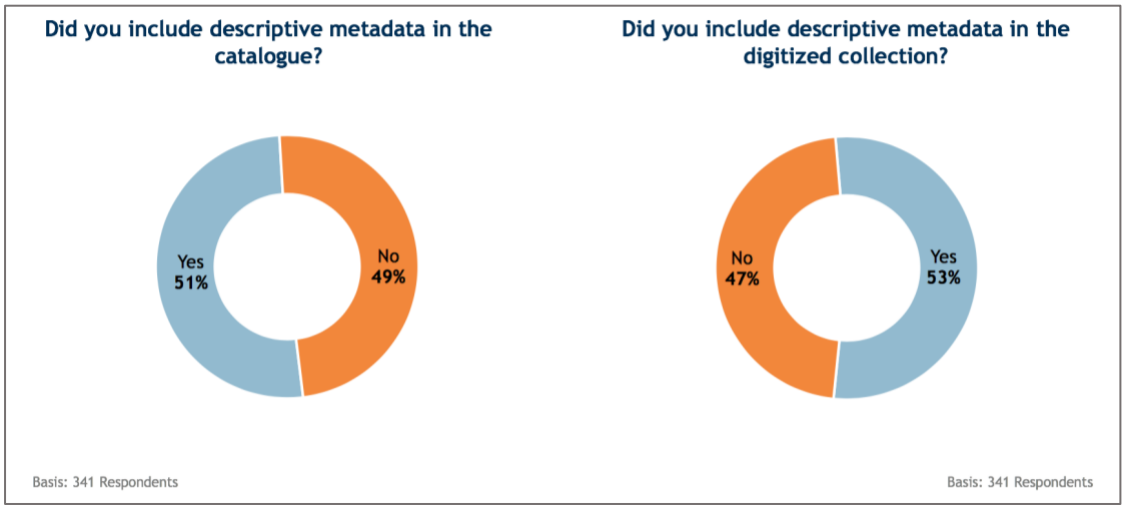


Figure 43 – The use of descriptive metadata

Conservation of the Collection

Most of the museums are able to exhibit only a portion of the potential available heritage and the data collected testify the presence of an important non-usable artistic deposit, as reported by ISTAT.

Although digitalization represents one of the new frontiers for cultural heritage dissemination policies, it is an important opportunity to provide quality digital contents to users referring to the collections. It is important to remind that "digitized goods" are preserved in digital format through IT systems, containing their identity and description.

Many museums perform this activity, indeed only 21% of the institutions does not digitize their collection, not respecting the minimum criterion. The remaining 79%, ranges from 29% of institutions that have digitized only a small percentage of the total collection up to 51% performing it for more than half of their heritage (see Figure 44).

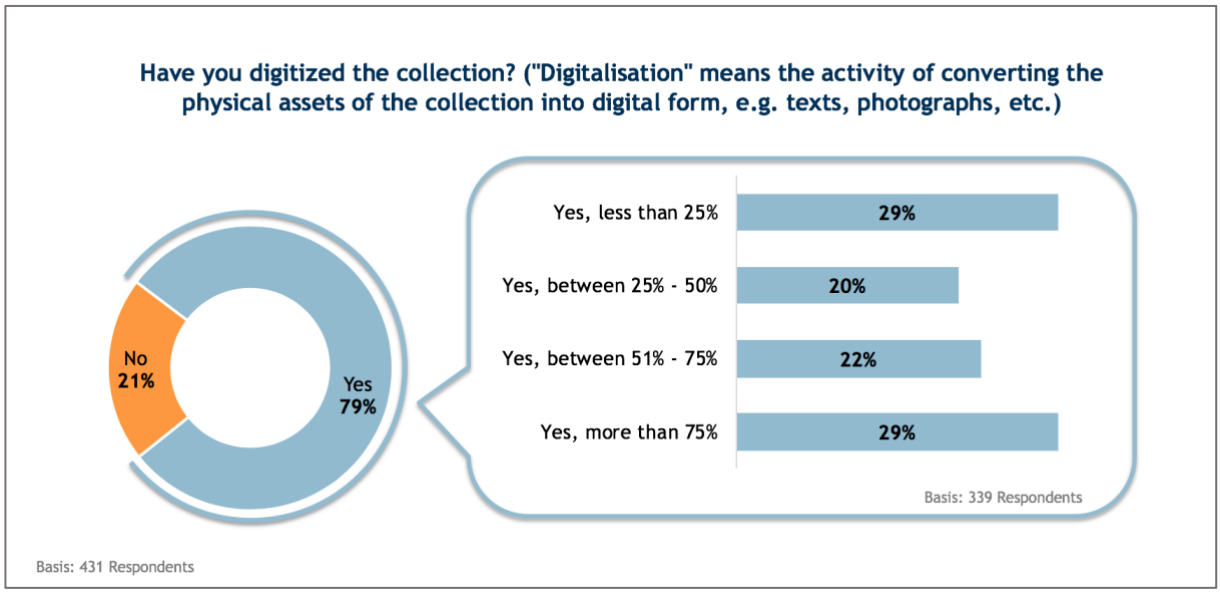


Figure 44 – Digitization of the collection

Anyway, not all digitized artworks are available to the public. Indeed, dealing with goods "accessible through the Internet", the reference is made to those artworks accessible on the web in digital format, for scientific and/or informative use.

As reported in Figure 45, the collection is published only by 39% of museums, of these, 53% through their own website, 32% through a website shared with other institutions and 15% through other sites.

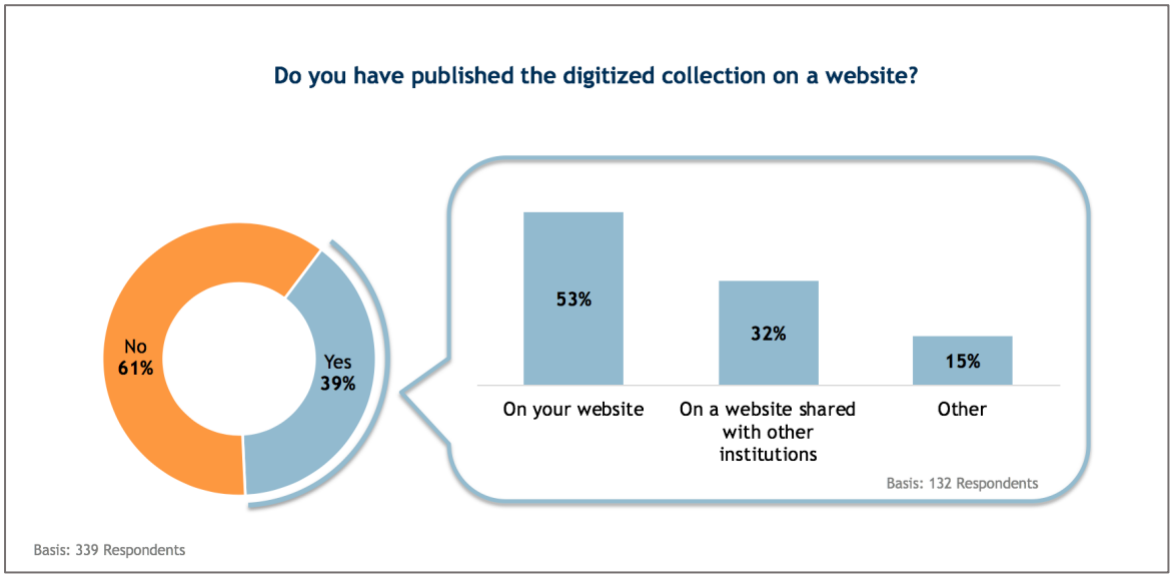


Figure 45 – Release of the digitized collection on a website

Finally, a comparison regarding the museums that have both their collection digitized and published online has been made. As shown by the data in Figure 46, there are still many museums that find themselves behind in this digitalization process. However, an interesting consideration is that over a third of the museums that published the collection digitized on a website (35%), performed this activity for at least half of their collection.

Considering the whole conservation activity there are no substantial differences between private, public and state museums.

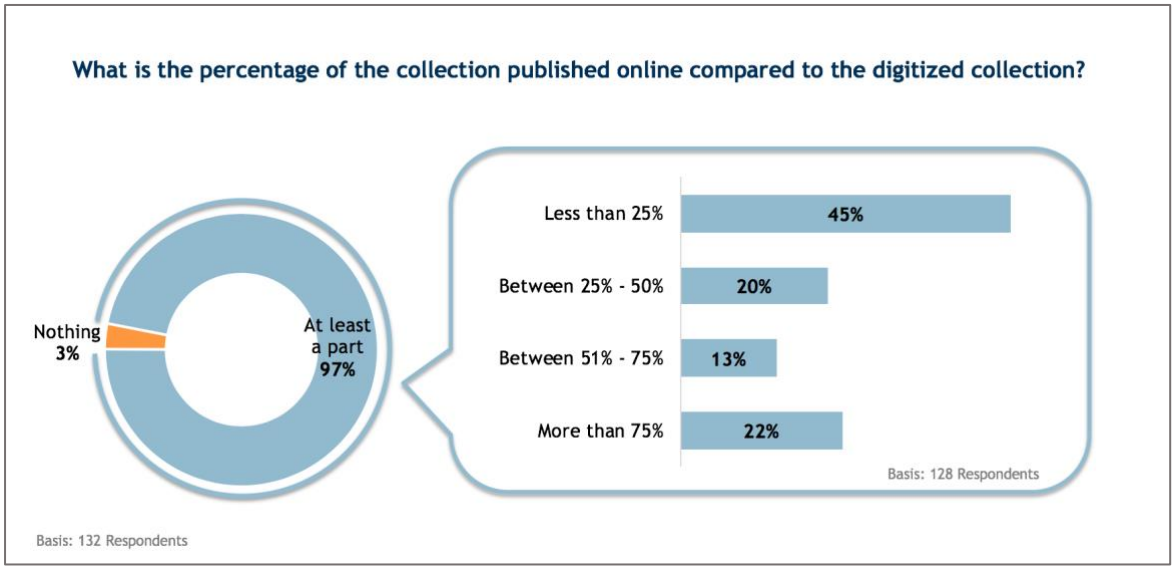


Figure 46 - Percentage of the collection published online compared to the total digitized

Security

With reference to access control, there is the possibility for improvement. In fact, considering the 92% of the cultural institutions that claim to provide an entrance control, 74% simple checks the ticket at the museum entrance, while 38% uses also a paper sheet or an Excel file for the access accounting. Instead, 14% of respondents uses a barcode reader (to support the reading of printed tickets) and only 5% the QR code reader (Figure 47). For these data there are no particular differences with respect to the form of governance (public, state, private) or to the geographical location of the museums.

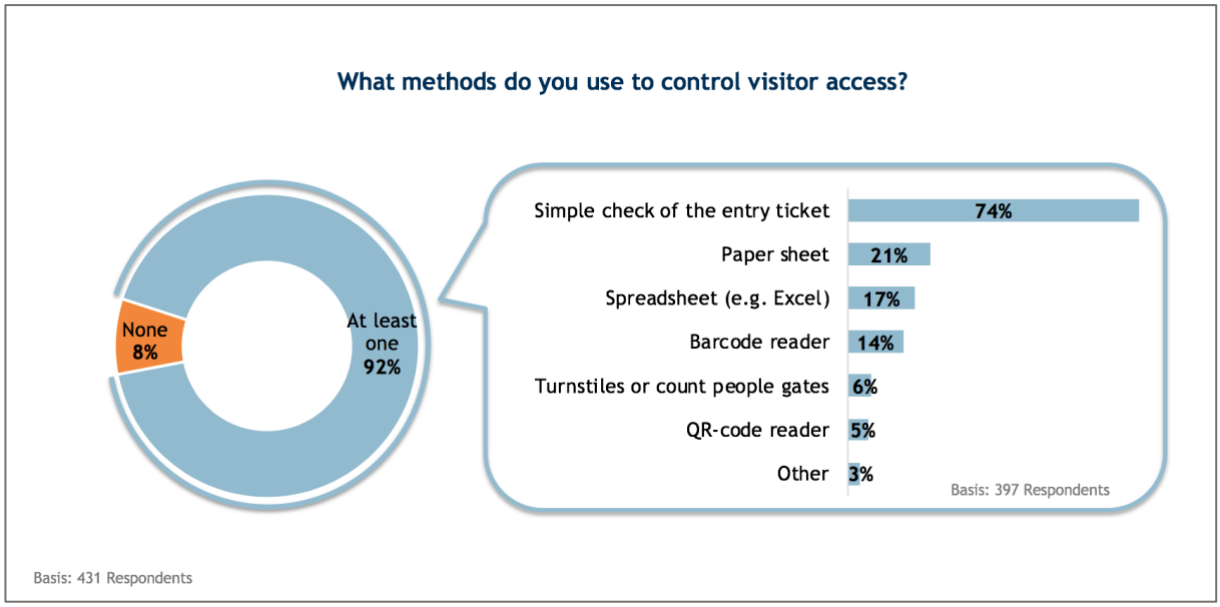


Figure 47 – Main methods to control visitors' access

Communication

Italian museums focus their communication activities mainly through their own channels (website and social networks) while third-party channels, which are those favoured by users, are still not valued enough.

From the following analysis (see Figure 48), it emerges that 98% of museums respects the minimum criterion of having at least one website: specifically, 75% has a site related to its cultural institution while, the remaining is characterized by an institutional webpage within other websites (for example, it is very common that civic museums share the webpage with the municipality). The 2% of museums not respecting the minimum criterion belongs to public institutions.

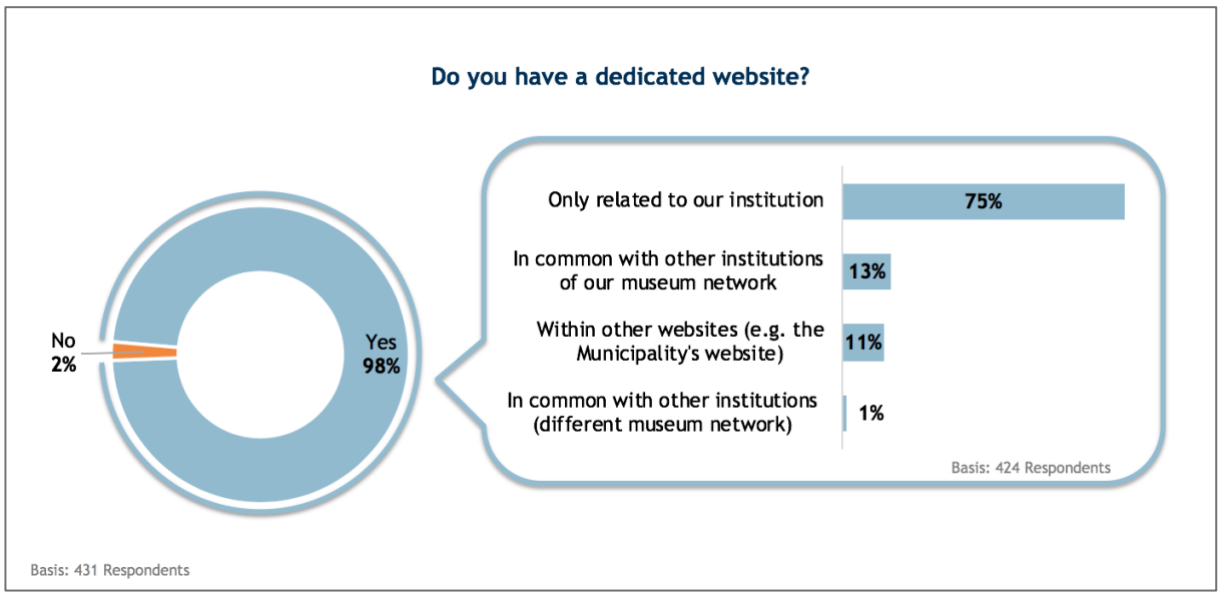


Figure 48 - Dedicated website among cultural institutions

Dealing with those institutions that have their own website, the following consideration can be made: although this class consists mostly of public museums (due to the high number of survey respondents belonging to this typology) only 70% has a web page independent from any other cultural institution or administrative body (see Figure 49). Instead, 90% of all private museums claims to have a proprietary website, as it was probably expected.

Focusing the attention on the second most populous class, over one state museum out of three shares the web page with other cultural institutions. In fact, state museums are often managed by the same pole or they are inside the same network, especially those geographically closer. A fundamental factor for enhancing the scattered cultural heritage of Italy is the ability of museums to organize themselves in a network, to promote synergies through the integration of resources and services and to achieve advantages in terms of visibility and efficiency.
This sharing of governance also allows an even more substantial sharing of resources such as apps, web pages, social channels, professionals with transversal skills and so on. Considering instead the totality of public and private museums, very few belong to this category: in the first case only 1% of respondents while in the second just the 3% (Figure 49).

The third significant result regarding this topic is the one related to museums which publish all the information within other web pages such as those of local administrations (municipality,

province, region). One public museum out of five adopts this type of solution. In particular, it is mostly the municipalities webpages that collect information such as sightseeing timetables or the presence of events regarding the several civic institutions (Figure 49).

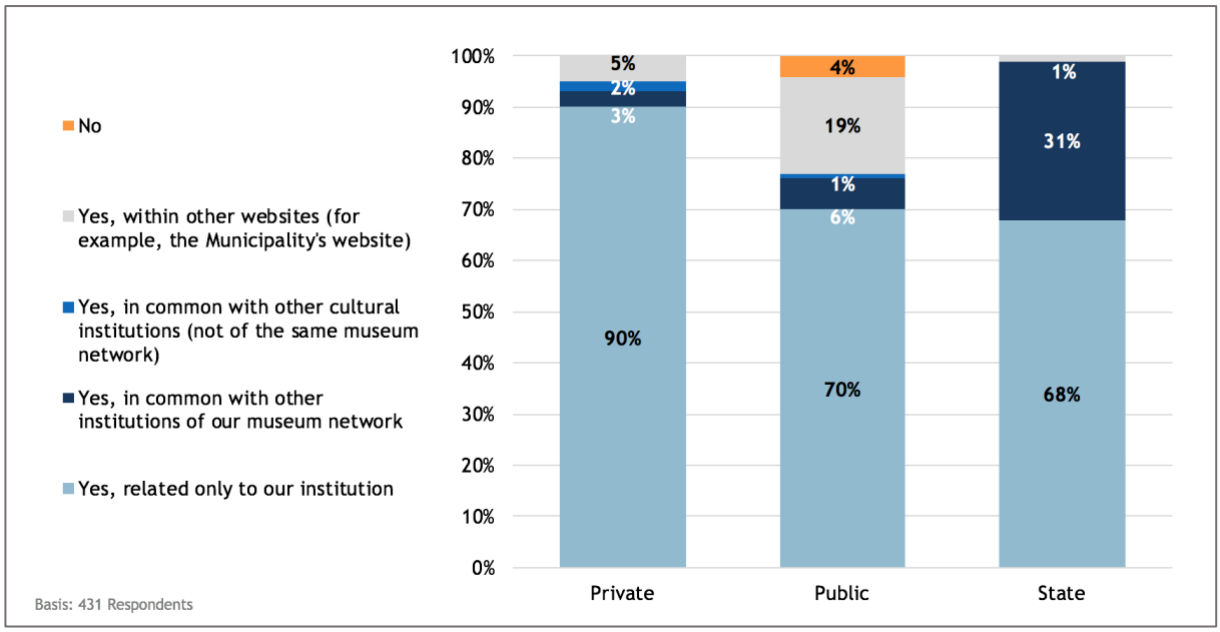


Figure 49 - Classification of answers related to websites by museum typology

A less widespread tool compared to websites is related to the apps for smartphones or tablets that can be downloaded from any mobile store. The percentage of institutions that have at least one app available is only 17% (see Figure 50). The state-owned museums are those with higher positive percentages: just over one state museum out of five declares to already have a downloadable application while considering the remaining, 72% plans to insert it in short times. This result is largely attributable to the "iMiBAC" project launched in 2010 by the Italian Ministry of Cultural Heritage and Activities and Tourism to promote art and culture through new communication tools, enriched with other dedicated applications related to cinema, music and UNESCO sites. In particular, "iMiBAC TOP 40" is an app in which there are 40 museums and most visited archaeological areas in Italy, that can be downloaded for free from the stores and institutional websites. Each place of culture is described through a card with general access information and a rich iconographic gallery. There are numerous sections that implement the utility of the application by expanding its contents: most of them can be consulted even without an internet connection such as mapping of museums and related cultural routes, GPS detection of the user with signalling of the places of culture present nearby, general information on access,

contacts, information on entrance tickets and brief historical-critical sheets on museum collections and archaeological excavations. There is also the possibility of sharing information on museums through Facebook.

Slightly lower is the result collected on private museums: although the percentage of museums with at least one app available is around 19%, one private museum out of three declares not to be interested in any kind of app.
A final consideration is the presence of apps in relation to the geographical position of the museum: among the museums with at least one app, those located in the north are about the double (20%) compared to those in the south of Italy (10%).

Regarding the app features, the percentages have been reported in Figure 50. Most of them (77%) contain information about support services for the visit such as access to heritage, organized visits with or without guides and reproductions (video, photographic, cinematographic, television) of the heritage in compliance with copyright law.
Instead, 60% of respondents provides information about the artworks during the visit, such as short descriptions or additional multimedia material, while only 8% grants the possibility to book or buy the entrance ticket.

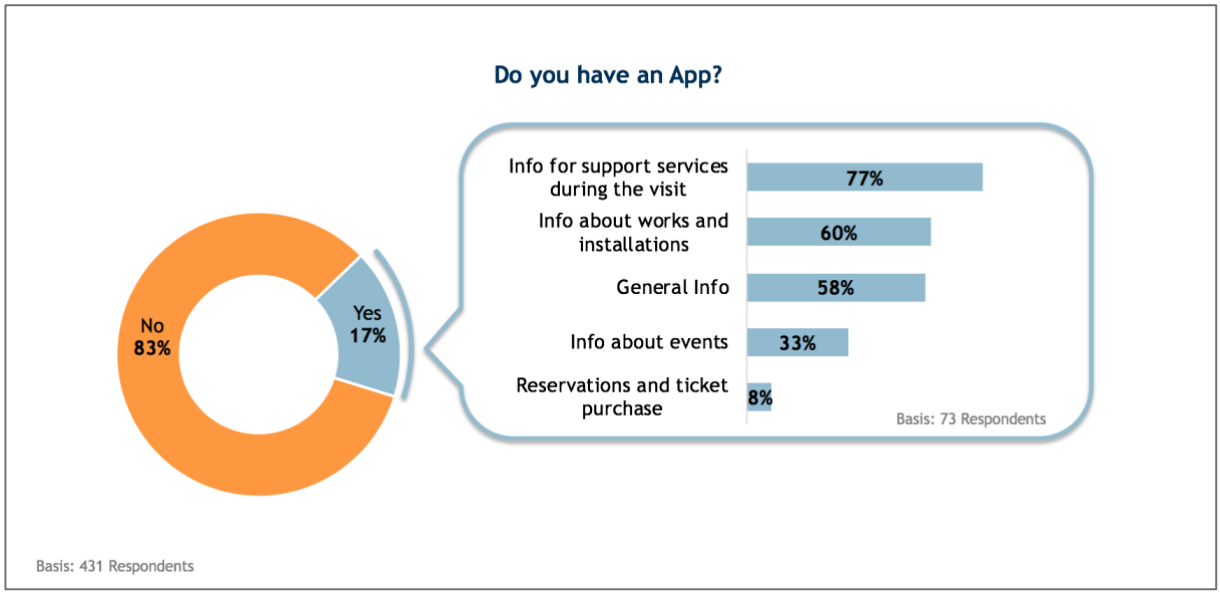


Figure 50 – Museums Apps and their functionalities

Coming back to the proprietary channels, cultural organizations who have successfully opened up to new audiences have efficiently used their webpages and social media. Thanks to this process, they have been able to listen to their current and potential users and to encourage the construction of a community whose strong elements are non-spatiality (relying exclusively on a virtual place) and the immediacy of communication. In addition, the "Franceschini reform", tried to empower the use of social network through experimentation conducted on the Italian autonomy museums, to better exploit targeted marketing activities.

According to the survey results, 94% of museums is present on at least one social media (Figure 51): Facebook is confirmed as the most widespread channel with 91% of the preferences, followed by Instagram (68%) and Twitter (51%). About 47% of museums is present in the three most common social networks (Facebook, Instagram, Twitter) while only 31% manages more than three social channels.

The relationship between social media and the world of culture constitutes a rather strategic theme in the scenario of contemporary cultural communication. In most cases, cultural institutions provide technical information to the visitors also through social media (timetables, ticketing, openings and special initiatives, etc.). However, among the contents that are more successful, there are storytelling related to the collections. This result demonstrates the need for a content marketing strategy also in this field.

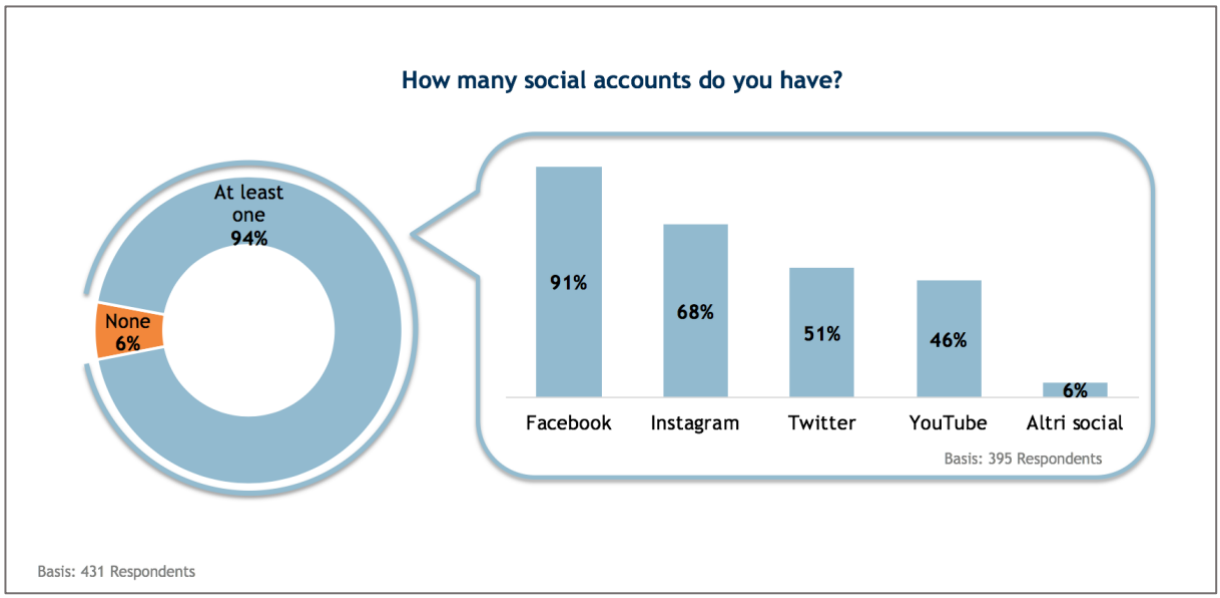


Figure 51 – Museums and social media

Reviews are an important tool for institutions to understand their strengths and weaknesses with a view to continuous improvement. Furthermore, encouraging these actions is fundamental because it allows activating the virtuous circle that leads to retention and the attraction of new audiences.

Almost all social networks provide to professional users and companies simple and immediate indicators such as the number of followers and the coverage of a post or a tweet, or even more complex data, such as the demographic distribution of fans, their geographical origin or their actions on the page (specifically Facebook).

Even a simple analysis of these data can help to offer important indications for building or improving cultural institutions' social strategy. In fact, over 4 institutions out of 5 declare using analytical tools provided by social networks to monitor their own channels (see Figure 52).

Sometimes, however, it is necessary to constantly monitor what happens in social channels, for example through an active and constant search for hashtags, URLs and keywords in order to better understand the target market and the main players, whether they are potential customers or competitors. Only 2% of respondents carries out monitoring activities using ad hoc analytical tools: usually these are third-party platforms that use the available tools (via API) to aggregate a series of data. Not only, but they also offer different options for displaying the data and a higher number of indicators, allowing the monitoring of specific keywords and the alerts on any critical issues.

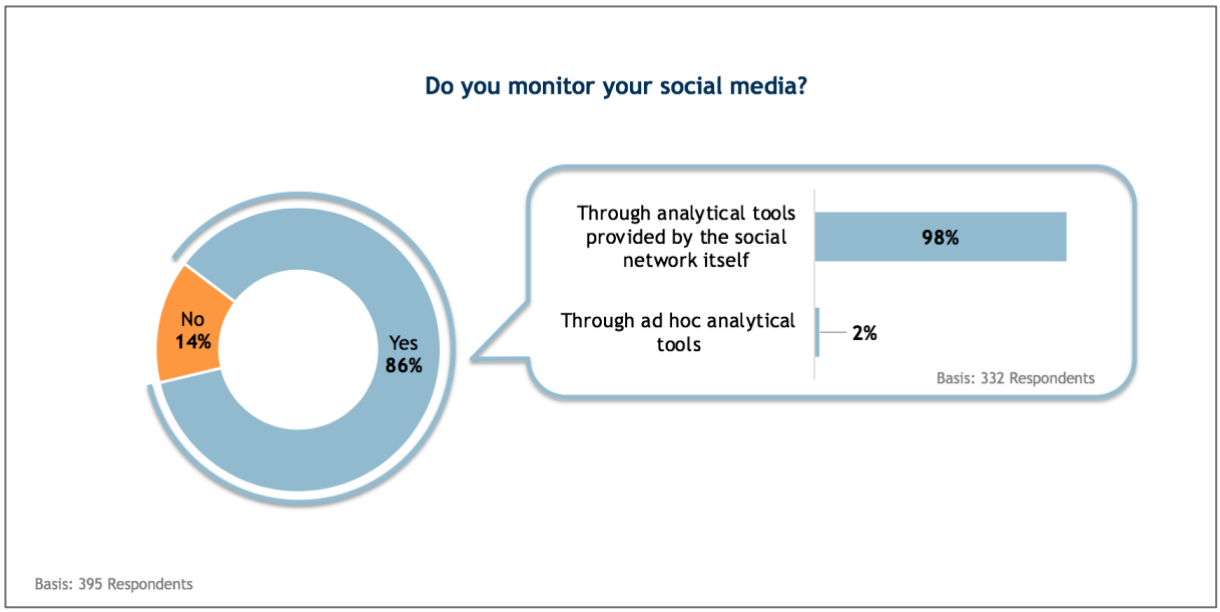


Figure 52 - Social media channels monitoring

As regards the review management, just over nine out of ten museums claim to collect data on visitors at least during one of the phases that include pre, during and post visit. In particular, 36% collects and subsequently analyses data on visitors in digital format, while a significant percentage, the remaining 64% of respondents, carries out this process via paper collection (Figure 53).

The collection of data on current and potential audience of Italian museums, over the past few years, has been entrusted to the initiatives of individual institutes, composing a very fragmented overall picture. This circumstance prevented the development of a shared methodological approach and therefore of any possibility of making reliable comparisons between the different surveys, as well as developing assessments between organizations.

The result of all this process is therefore that the variegated and composite universe of Italian museums visitors appears as a picture with uncertain boundaries.

Indeed, very little is known about museum visitors, including those who visit state-owned museums, which are the most visited institutions in Italy. In fact, there are few museums that know how many annual visitors they have, their socio-demographic profile and their attraction level from a territorial point of view.

It is necessary to reason also in qualitative terms answering questions like: why and with whom they visit the museum, what expectations they have, what they are interested in, what kind of information on the permanent collections they would like to receive, how they would like to receive them (if through traditional media, such as captions and hall panels, or through digital tools, like app and augmented reality), when they would like to receive them, such as before, during and/or after the visit. Furthermore, once the visit experience is over, what they have learned from this experience and what they have appreciated most among the services offered by the museums, what was their overall level of satisfaction, whether they plan to make other visits to other museums, etc.

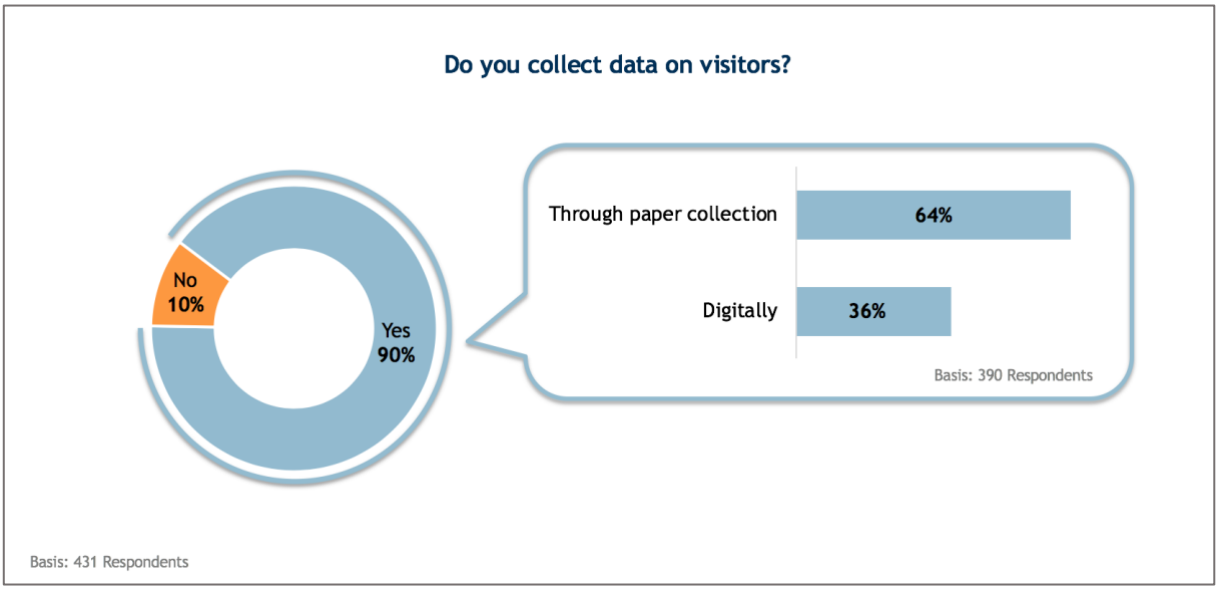


Figure 53 - Data collection about museum visitors

On-Site Fruition

Analysing the behaviour of museums with respect to the adoption of digital technologies to support the on-site visit, the situation reflects a poor presence of digital tools.

As shown in Figure 54, 60% of total respondents is able to respect the minimum criterion of implementing at least one digital technology to enhance the cultural experience.

In particular, 97% of these institutions provides Wi-Fi to visitors and 59% the audio guides (although they cannot be completely defined as digital instruments).

As mentioned before, virtual reality (26%) and augmented reality (19%) are beginning to spread and they are the technologies that have the greatest interest from museums (50% and 47% respectively say they intend to implement them in the next months). These tools allow the transmission of contents ("immersing" the visitor in the historical age of the collection) in a manner that is often playful and interactive, making the museum more attractive even for a younger audience and for families with children. Videogames (with a diffusion level of 17%) are the previous step of virtual and augmented reality tools, used with the purpose of interaction and engagement, allowing the game even in the post-visit. Moreover, virtual reality and videogames can also be an element of attraction to the cultural institution: the user who uses it at home can be encouraged to visit the on-site attraction at a later time.

The less common technologies certainly include Chatbot, NFC and Blockchain with very similar percentages. Starting with the first one, three museums out of four say they are not

interested in this type of technology able to simulate a conversation with a human being. Only 5% of museums claims to have a chatbot system that acts as a digital assistant and facilitates the museum visit.

Relying on an instant messaging app, such as Telegram or Facebook Messenger, the museum chatbot starts an automatic and immediate conversation in which the user/visitor is guided, through predefined options, to find answers to his questions. *Pierrot* of the Museion in Bolzano, *MAXXI chatbot* of the XXI Century Museum of Arts in Rome, *BorBot* of the Royal Palace in Caserta and *MartMuseumBot* of the Mart Museum in Trento and Rovereto are examples of chatbot of some of the most important museums of Italy.

Dealing with NFC, 74% is not interested in this technology while only 3% declares to have installed tags in the proximity of the artworks in order to access additional information regarding its history, the artist, other findings, reviews and criticisms.

Finally, as far as Blockchain is concerned, 76% of respondents is not interested in this technology and only 1% says they use it. In this regard, blockchain allows the transfer within a totally decentralized infrastructure not only of currencies but also of information, agreements and contracts. In other words, everything that has been or will be digitized (or dematerialized) can move into a blockchain system. All the results have been reported below in Figure 54.

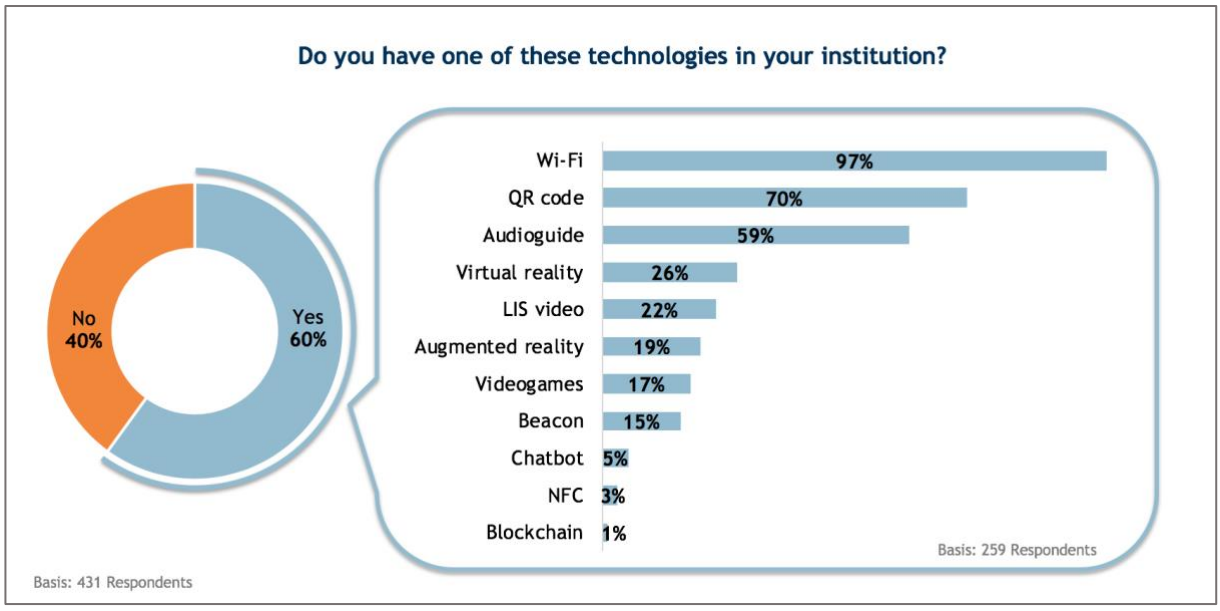


Figure 54 – Digital technologies implemented in cultural institution

Ticketing

In general, the pricing policy applied by museums and similar institutions seeks to promote free visits, anyway, it is still possible to distinguish between cultural institutions that apply a completely free tariff plan and those that apply a paid regime.

Analysing the data, it could be observed that just over three museums out of four (77%) have a ticketing system. Going into the details of the institution typology, nine state-owned museums out of ten claim to have a ticket office, while the percentage is slightly lower for public museums (73%) and even less for private ones (69%).

If, on one hand, 77% of museums claims to have a ticketing system, on the other hand, only 24% allows the online purchase of the ticket. Furthermore, only 10% of institutions allows the entrance without having the ticket printed and this could be a strong constraint for those tourists that have difficulty in printing the ticket purchased online.

The most used typology of ticketing is still the one detached from the paper block at the museum entrance. As much as the 56% continues to use this policy, unlike the 36% prefers to print the ticket at the moment and count it on an electronic database (Figure 55).

For the ticketing activity, there are no particular differences with respect to the form of governance (public, state, private) or to the geographical location of the museums.

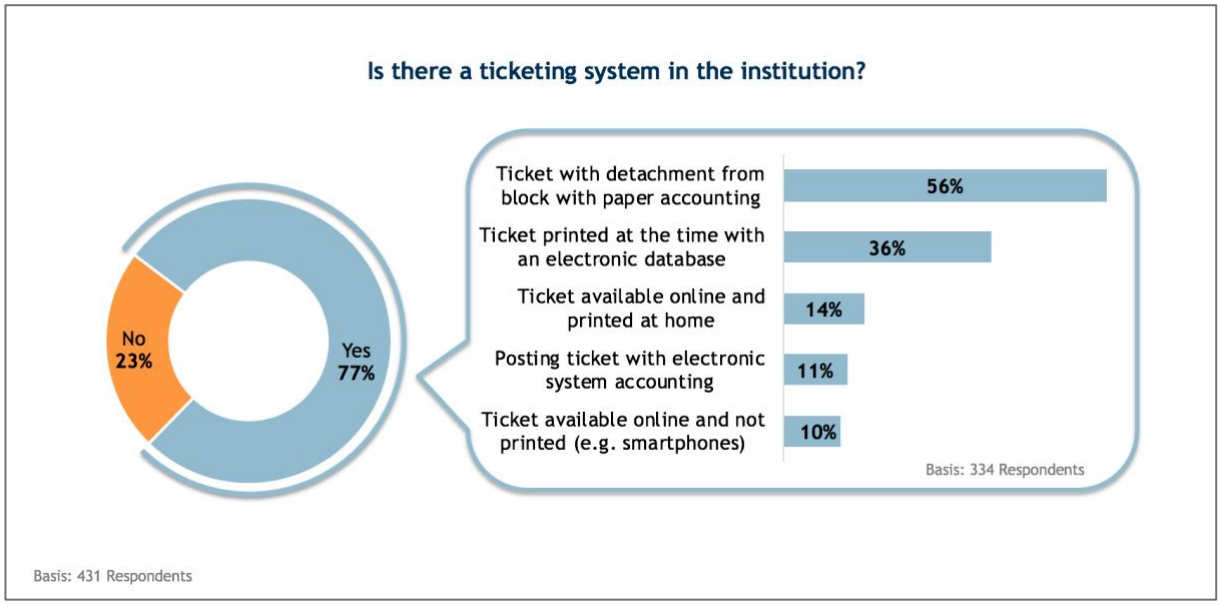


Figure 55 - Ticketing systems in cultural institutions

Moving forward, it is important to emphasize the objective difficulty of many structures to quantify the revenues realized in the absence of a systematic tool for entrances registration and for revenues accounting. Furthermore, taking into account the widespread resistance of private economic subjects to provide information on their business volume, it must be assumed that the data shown in Figure 56 can estimate by default the actual economic value of ticket revenue for the year 2018. The objective is not to go into details of the funding flows because the survey has the purpose of analysing only the revenues realized through the sale of tickets, ignoring any financing such as sponsorships, private or public financing, revenues realized through the provision of paid services like educational activities, guided tours, editorials activities, etc.

Figure 56 shows the data for ticket revenue in 2018 only for the institutions that responded to the survey as a single entity.

The largest class of museums is certainly the one with less than 20.000 € as annual revenues (about 39% of preferences) and specifically, one public museum out of two is in this group (47%); instead, the second largest class is that of museums that do not have revenues from the ticket office (23%). Considering the whole category of public museums, those with revenues under 50.000 € per year are the 87% while this percentage related to private and state-owned institutions is lower: 68% in the first case and 58% in the second. Instead, museums with annual revenues higher than 100.000 € are only one out of five: in this case, the percentages according to the ownership are 35% for state-owned, 25% for private and only 10% of the public museums.

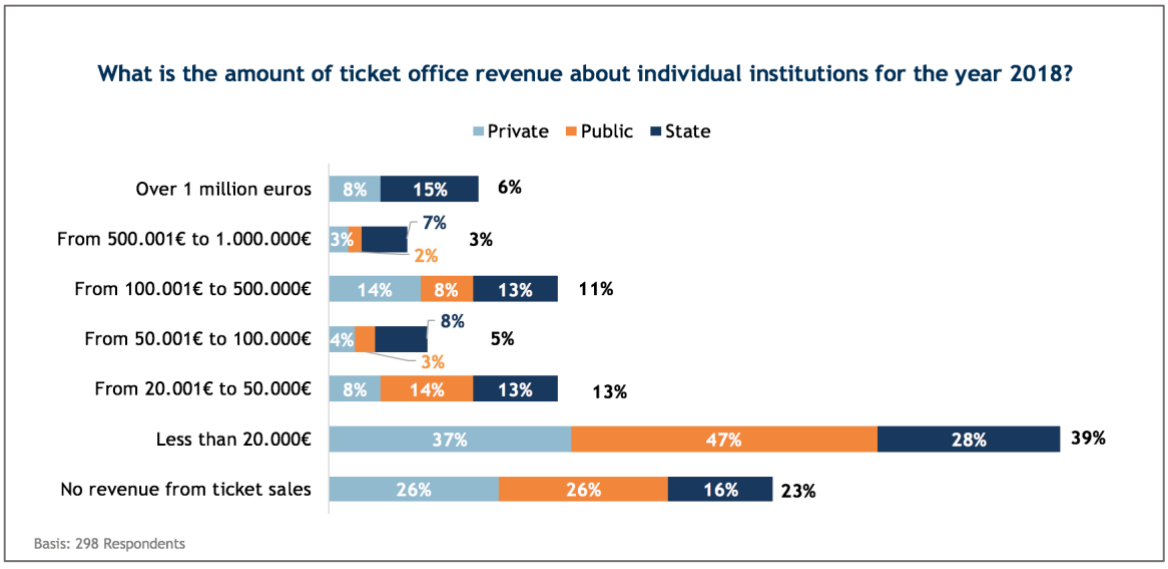


Figure 56 – Total amount of ticket office revenues from individual institutions (year 2018)

The majority of Italian museums are small entities but, in recent years, there is a tendency to carry out initiatives to promote their coordination constituting museum circuits, consortia or other forms of cooperation in the territory, in order to achieve synergies and economies of scale. The majority museum systems are therefore represented by a polycentric and multi-faceted network composed of many different interconnected and cooperating realities to enhance plurality and limit fragmentation. As a result, adhering to a wider circuit, these "minor" institutions can overcome their problems of notoriety and accessibility achieving greater visibility and efficiency gains.

In Figure 57 the data for ticket office receipts in 2018 are therefore reported for all those respondents who have classified themselves as part of a pole or a museum network.
The results for museum poles are slightly different compared to single institutions. The largest class is always the one with less than 20.000 € as annual revenues, even if compared to the previous case it is halved in terms of preferences (only 20%). About one museum pole out of two declares revenue below 50.000 € per year (46%), and the composition is as follows: 56% of public institutions, 33% each for private and state-owned. The poles with annual revenues higher than 100.000€ are 38% with a prevalence of private networks (66%). The percentages for the remaining typologies of institutions are lower: 50% for state-owned and 25% for public.

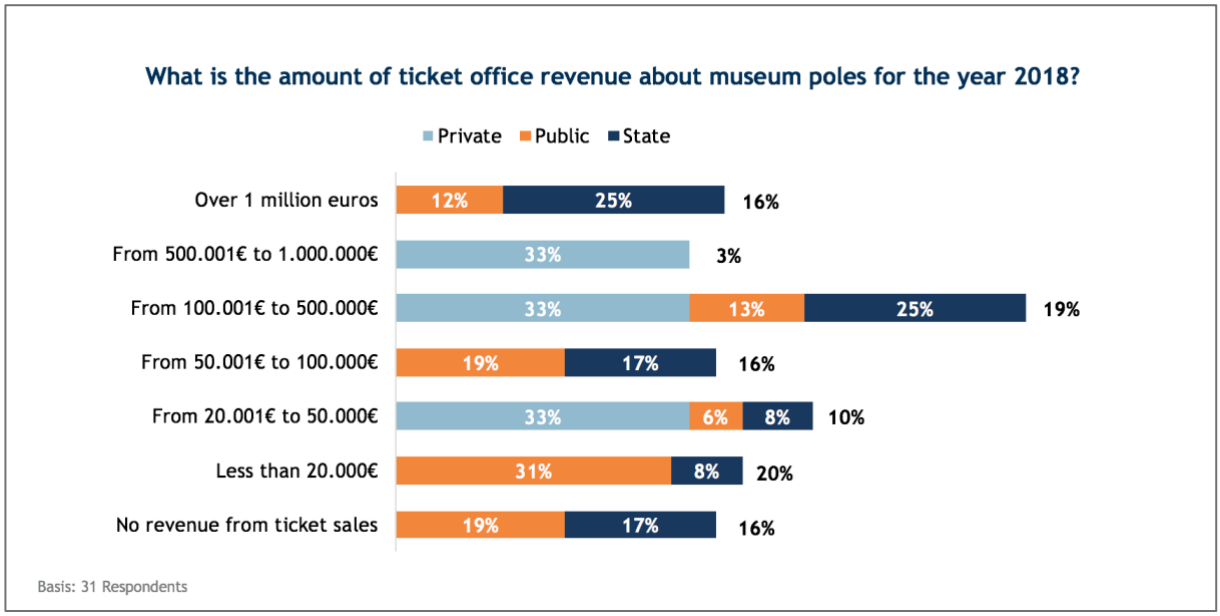


Figure 57 - Total amount of ticket office revenues from museum poles (year 2018)

The on-site ticketing is not the only channel through which customers can book and pay the museum tickets even if it represents the main one. As reported in Figure 58, the other ticketing channels are not so implemented: for example, 10% of museums provides online ticketing through their website and social networks, while only 1% of respondents grants this option through the institution's app.

This trend is not aligned with other tourist services. In fact, according to the Digital Innovation Observatory in Tourism (2018), 81% of tourists book online at least one service before each holiday, such as amusement parks (73%), relaxation and wellness activities (75%) and guided tours (69%). These data show the high predisposition of the users to use the Internet to plan their vacation in advance but, many museums are still unprepared.

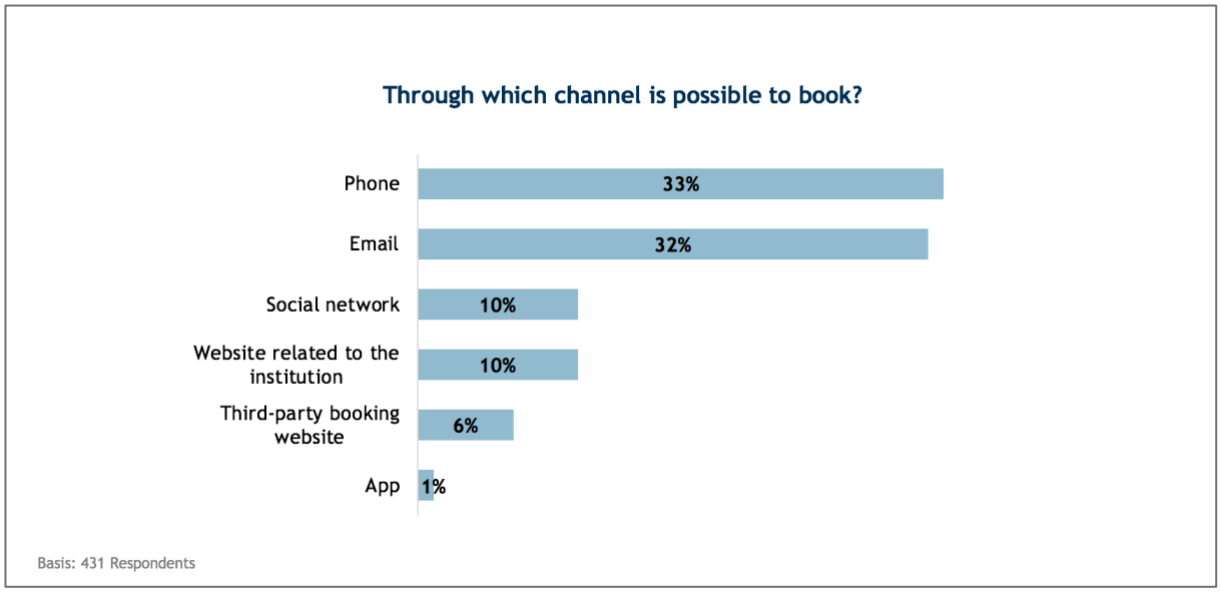


Figure 58 – Available channels for booking a visit

One of the positive trends is the spread of cumulative entrance cards (such as cultural card events of the Region or tourist cards for visiting the city), an important tool for supporting cooperative promotions between institutions in the same territory: 55% of museums is part of a network, even if those who provide virtual cards (exhibited directly from a mobile device without the need of a physical card) are still little exploited (see Figure 59).

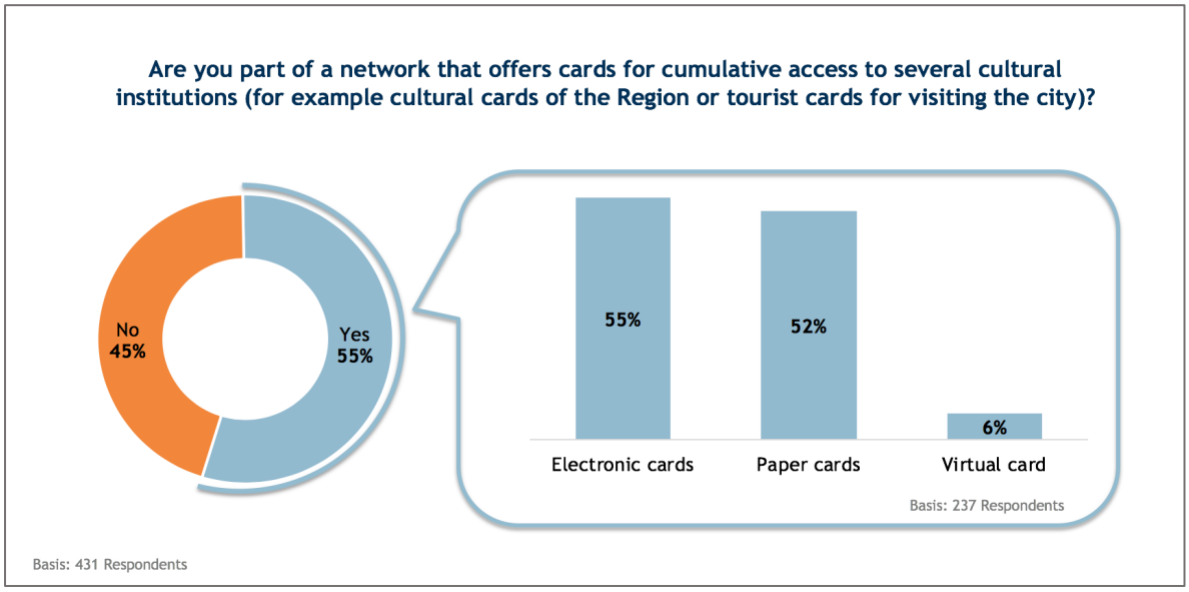


Figure 59 - Networks offering cards for cumulative access

Overall Criteria Considerations

This paragraph will summarize all the minimum and improvement criteria and the target achieved by museums which participated to the survey.

Starting from the structural part, illustrated in Table 15, it is evident that the two most critical dimensions are those of strategic planning and of digital competences available in the institutions. In the first case, there are very few institutions (less than one out of four) with documentation to support strategic choices in the digital environment; instead, as regards the competences, the number of museums that cannot meet the minimum criterion is high (65% in total). Nevertheless, whoever relies on an expert with digital skills, usually manages to allocate him on more than one activity: the threshold of the minimum criterion is not so simple to be achieved but, once overcome, it is possible to appreciate very positive results regarding the improvement criteria (one institution out of three). In total, only 13% of museums surveyed are able to simultaneously comply with all the minimum criteria.

	Not Sufficient	Minimum Criteria	Improvement Criteria
Strategy	77% (330)	20% (87)	3% (14)
Investments	15% (64)	50% (215)	35% (152)
Competences	65% (278)	1% (3)	34% (150)
TOTAL	87% (375)	12% (52)	1% (4)

Table 15 - Minimum and improvement criteria respected for structure pillar

Instead, as regards the adoption of minimum criteria for the activity pillar, the situation is quite heterogeneous and specific for each individual activity. Communication is the activity to which greater attention is paid by museums, also thanks to the growing role that social networks and websites have played over the years (indeed 69% has implemented both tools). The improvement criteria percentage is also interesting (23% of total institutions is in this category) because, in order to reach it, the development of an App, the collection of visitors' data and the monitoring of users' comments on the social pages are required.

Moreover, the overall level of on-site fruition is positive: only 15% has not passed the minimum criterion, while according to the remaining, 27% has implemented at least one technology and 58% more than one. This result shows an increasing level of technology adoption within the institutions, at least as regards the guided tour experience or the proposal to the public of revisited contents in a modern and virtual key.

Instead, the result of ticketing activity is more critical: if, on one hand, it is not so easy to identify a minimum criterion for institutions that offer a totally free experience to the visitor and therefore do not have a ticket office, on the other hand, a museum that is defined modern and, above all digital, should at least implement on its website the possibility to choose the most convenient time for the visit, even if it is free. Unfortunately, only 27% of museums has respected this criterion.

As regards back-end activities, the cataloguing has the lowest percentage of not sufficient criteria: indeed, 40% makes the cataloguing process through a database and 42% through dedicated software. Same percentages are similar also for conservation because 35% have respected the minimum criterion (digitization of at least 25% of the collection) and 44% the improvement condition (by publishing online more than 25% of the digitized collection).

Regarding the overall situation of the back-office, the minimum criterion has not been respected by 33% of institutions but the majority of the remaining museums have been able to achieve directly the improvement criterion. This happens because, once a back-office management software is implemented, it is usually able to automate multiple tasks simultaneously.

Finally, security activity is still poorly digitalized, as evidenced by 65% of institutions that continues to check visitors' entrance by simply looking their ticket (not complying with the minimum criterion of implementing a more advanced method).

All the final results are reported in Table 16, taking into account that only 12% of museums is able to simultaneously comply with all the minimum criteria for the activities.

	Not Sufficient	Minimum Criteria	Improvement Criteria
Back Office	33% (140)	4% (19)	63% (272)
Cataloguing	18% (79)	40% (172)	42% (180)
Conservation	21% (92)	35% (150)	44% (189)
Security	65% (280)	19% (81)	16% (70)
Communication	8% (33)	69% (298)	23% (100)
On site Fruition	15% (66)	27% (114)	58% (251)
Ticketing	65% (283)	27% (116)	8% (32)
TOTAL	88% (379)	11% (50)	1% (2)

Table 16 - Minimum and improvement criteria respected for activity pillar

The outcome of the descriptive statistics has disclosed that 9% of museums complied with the minimum criteria related to Structure pillar and 8% with the ones related to Activity pillar. Only 4% of museums has been able to simultaneously comply with all the minimum criteria while none of them with all the improvement ones.

5.1.3 Indicators Evaluation

Defined the minimum and the improvement criteria and presented the survey results according to them, in this section it is provided an analytical application of the model to better understand the Italian museums' digitalization process.

According to Section 4.2, the 2 pillars and their relative components can be analytically evaluated by assigning a score to each survey questions used for the creation of the Digital Readiness Model. The final result is the creation of a Digital Readiness Index obtained by the average of 2 main indexes:

- **Structure index**, as the weighted average of 3 indicators (Strategy, Investments and Competences)
- **Activity index**, as the weighted average of 7 indicators (Back-office, Communication, On-site fruition, Ticketing, Security, Cataloguing and Conservation)

The representation of the 2 indexes regards the 431 survey respondents is reported below, in Figure 60:

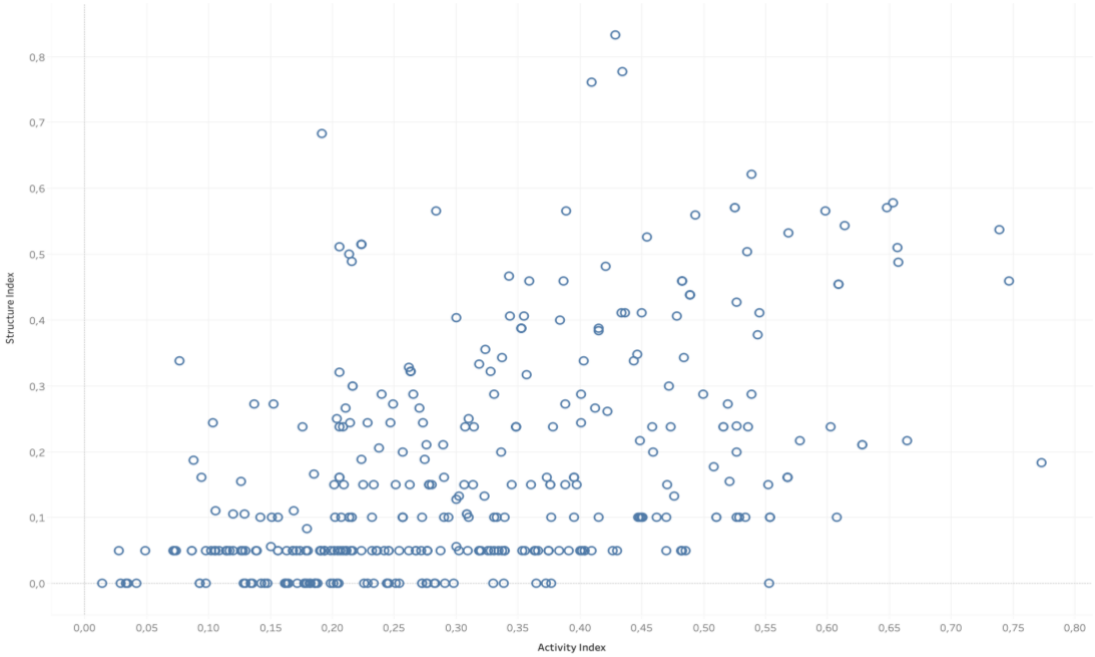


Figure 60 - Distribution of respondents according to structure and activity index

It is possible to glimpse a trend that relates to the implementation of structured policies with the digitalization of the activities with the exception of some outlines. Many observations are concentrated in correspondence with the horizontal axis, meaning that these museums are characterized by some digitalized activities without having a structured policy or a clear strategy implemented. As a result, these museums pursue this innovation process without having in mind a feasible and long-term direction, generating a misalignment between the already defined museums' mission and how to achieve it.

The average score obtained for each indicator is reported below in Figures 61 and 62:

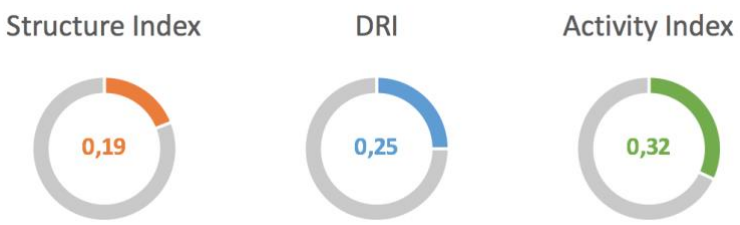


Figure 61 - Overall average score for each index

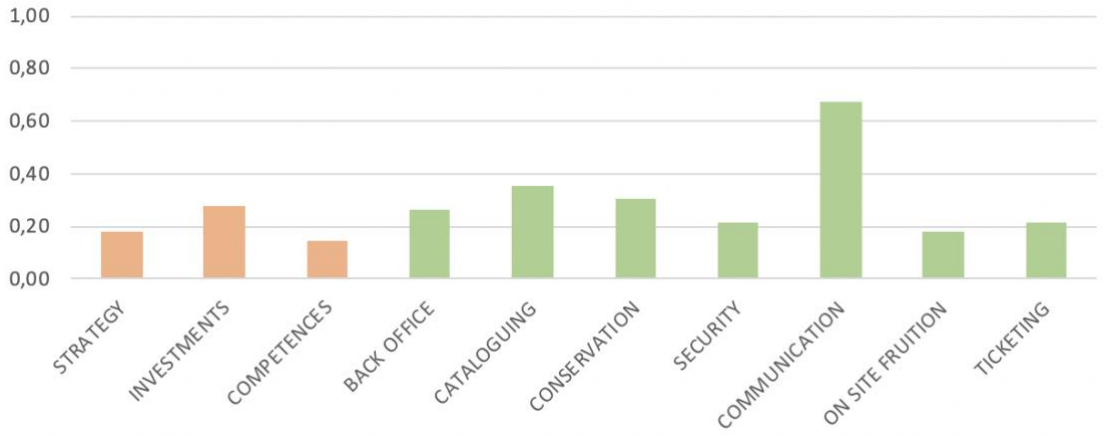


Figure 62 - Overall average score for each indicator

The average score for the communication indicator is noteworthy, as evidence that museums, like any other organization, take care of their online presence to better approach their audience, above all through the website and social networks. In addition, this activity is the simplest and cheapest to digitalize thanks to the fast diffusion of platforms allowing users to generate contents sharing them online. With the exception of Communication activity, the average result for each indicator is very low considering that they can range from 0 to 1, meaning that the Italian museums are at the beginning of their digitalization process

5.2 ITALIAN POSITIONING MAP

As reported in the Methodology Chapter, to better analyse the museums' behaviour related to the digitalization process, a K-mean cluster analysis has been performed on the basis of the distribution of respondents according to Structure and Activity Indexes, identifying 4 optimal number of clusters: Laggards, Service Oriented, Regulated and Top Performers. The clusters representation is reported below in Figure 63:

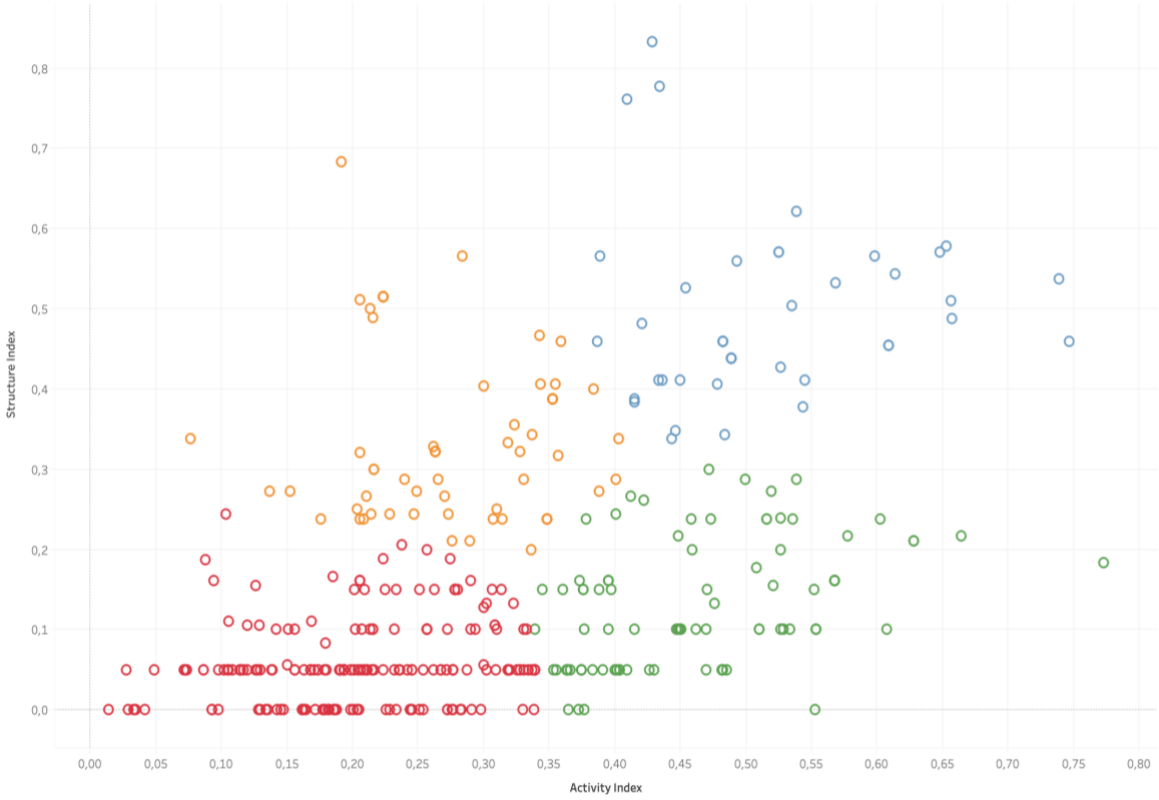


Figure 63 - K-mean analysis output

The four clusters are divided according to the colour:

- Red colour refers to the "***Laggards***" cluster, composed of 196 museums
- Green colour refers to the "***Service Oriented***" cluster, composed of 94 museums
- Orange colour refers to the "***Regulated***" cluster, composed of 90 museums
- Blue colour refers to the "***Top Performers***" cluster, composed of 51 museums

According to the cluster analysis, in the following paragraphs are reported the descriptions of the 4 groups highlighting the significant achieved results.

5.2.1 Laggards

This cluster relates to museums that obtained the worst scores in all the indicators that compose the Structure index and the Activity index, as it is possible to analyse below in Figure 64.

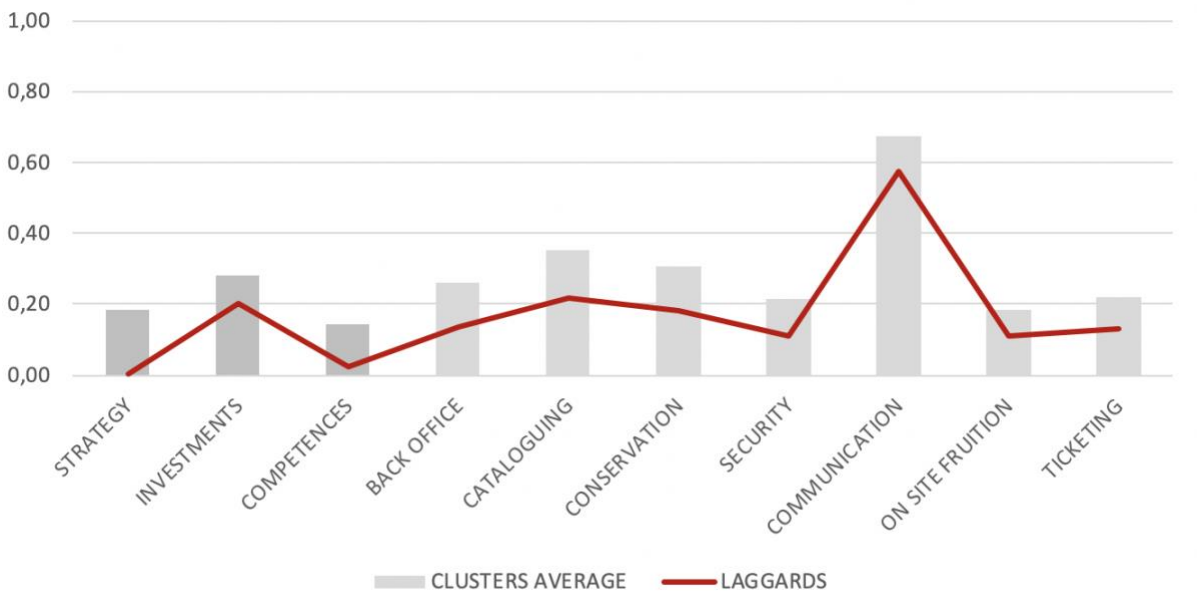


Figure 64 - Trend of laggards cluster

Museums belonging to this cluster performed significant low result in two indicators: Strategy and Competences. Indeed, only 1 out of 196 museums has drafted the digitalization strategy in a document and only 12% has professional employees with digital skills.

If the Investment indicator had been lower than the result obtained, the main consideration could have been that these museums do not intend to approach the digitalization process. Instead, being this indicator not so negative compared to the result obtained by the other clusters (as reported in Figure 69), it is possible to conclude that the institutions belonging to the Laggards cluster could be distinguished among two situations:

- museums that didn't start the digitalization process
- museums that invest in digital without having a structured strategy, with the result of wasting money as reported by each activity indicator score.

5.2.2 Service Oriented

This cluster refers to museums that have decided to begin the digitalization process by implementing digital tools for the activities without having a structured policy, however obtaining positive results as reported below in Figure 65.

Figure 65 - Trend of service oriented cluster

In this case, the lack of structuring has not involved a waste of money as happens in Laggards cluster, indeed these museums have perfectly managed some activities obtaining the best results in Security and Communication among all the four clusters.

As regard Security activity, 30% of these museums uses a barcode tool to control customer access while 14% uses the QR code scan. Instead, for what concern Communication:

- 99% declares to have a website, specifically, 89% has a website related only to the museum and not in common with other institutions
- 97% has at least one social network account, of these, all the museums have Facebook and 41% Facebook, Twitter, Instagram and YouTube.

Other significant results are achieved in On-Site Fruition and Ticketing: for what concerns the first activity, 74% of the institutions provides free Wi-Fi, 44% QR code tool and 28% one technology between augmented or virtual reality. As regards the second activity, 26% of the museums offers the possibility of booking tickets online and, of these, 56% through the institution's website.

5.2.3 Regulated

Opposite to the Service Oriented cluster, museums belonging to the Regulated group have decided to begin the digitalization process by adopting a structured approach, rigorously defining all the strategic decisions but without achieving satisfactory results concerning activities digitalization, as reported below in Figure 66.

Figure 66 - Trend of regulated cluster

Regulated cluster obtained the best result as regards the Investment indicator, indeed, 24% invests in digital more than a quarter of their total budget. The negative result is that the Activity index achieves a score of 0.28 meaning that they fail to implement technologies for which they invested in. Specifically, they obtained the worst result in Security, considering that 69% of museums controls the visitors' access through the count of the paper entry tickets, while only 9% uses barcode tools and none of them QR code scans. Aligned with Laggards cluster, other unsatisfactory results are achieved in Cataloguing and Conservation: only 27% uses a cataloguing software and even less (9%) has digitized more than half of the collection.

Museums in this cluster could belong to one of the following situations:

- museums that started the digitalization process late, emphasising only the definition of a structured strategy and waiting for digital tools implementation
- museums that have a consolidated digitalization process but are failing to achieve the expected results, meaning that they are actually wasting the money invested.

5.2.4 Top Performers

This cluster refers to museums characterized by high performances in almost all the field analysed, both considering Structure and Activity indicators, as reported below in Figure 67.

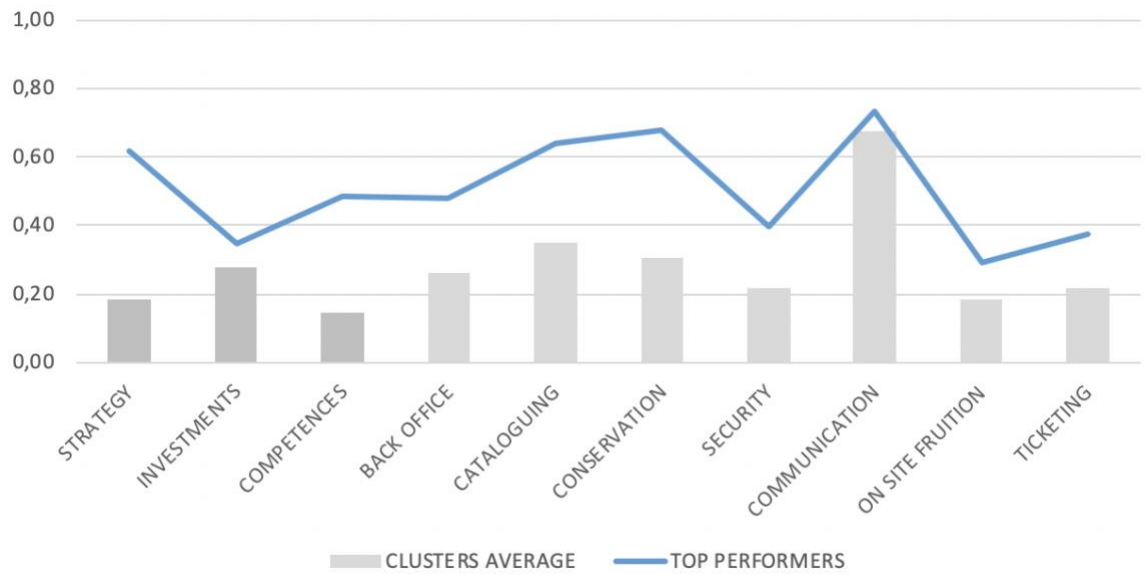


Figure 67 - Trend of top performers cluster

Top Performers represent the most digitalized museums, achieving the best score in the following indicators: Strategy, Competences, Back Office, Cataloguing, Conservation, On Site Fruition and Ticketing. As regard Strategy and Competences, 76% of them has a digital strategy defined in a document (of these, 23% in a specific document related only to digital innovation) while 96% has professional employees with digital skills.

As regards the activities, noteworthy is the results obtained in Conservation, in which 98% has digitized the collection (of these 42% performs it for more than half of their collection).

Other two significant results refer to the Back Office and Cataloguing indicators: specifically, 96% of museums has at least one management software and 90% catalogues the collection through a software. Museums belonging to this cluster could be distinguished among the following situations:

- museums that have undertaken the digitalization process as soon as it was possible, obtaining a significant positive final result
- museums that were born recently with the influence of an already established digital environment.

5.2.5 Cluster Considerations

As regards the ownership, Figure 68 shows the four clusters percentages according to the different type of museums: Private, Public and State.

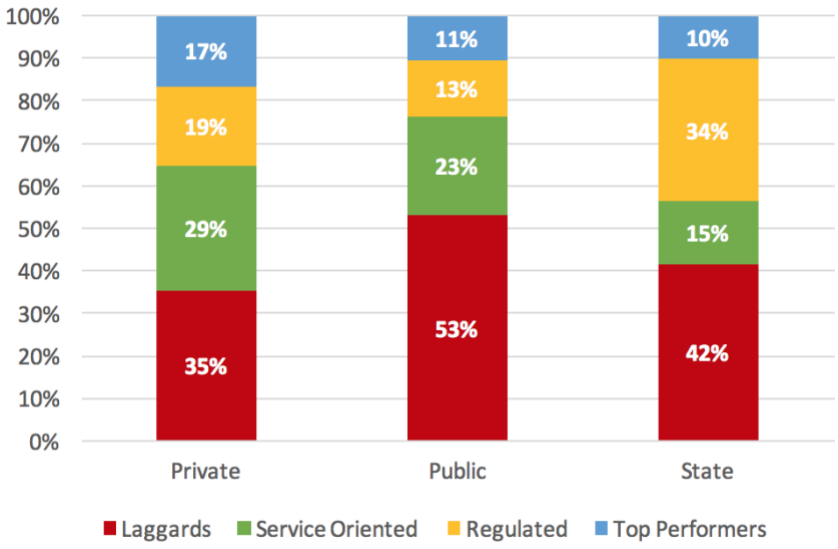


Figure 68 - Clusters distribution among the three typologies of institutions

According to the ownership, the private museum is the category with more digitalized institutions (17% of the entire group) due to a fast management that allows investing effectively in resources, both with regard to technologies and skilled personnel. Moreover, this consideration is also demonstrated by the fact that 29% of private museums refers to the Service Oriented cluster, the ones that achieved good results in the digitalization of the activities. Finally, private museums do not have to follow rigorous procedures, as instead happens for the public and the state, only 19% of private museums belongs to the cluster of the regulated.

Public museums are the worst with regards to the digitalization process, indeed more than the half of them refers to the Laggards cluster. This result may be due to a too fragmented public management committed to the single local administrations.

Finally, state museums, that are directly controlled by the Italian Ministry of Cultural Heritage, must follow a rigorous set of norms and procedures, indeed, 34% of them refers to the Regulated cluster, meaning that they adopt a structured approach for the digitalization process.

An overview of the whole results achieved by each cluster is reported below in Figure 69 and in Table 17 (the worst result between all the clusters are highlighted in red while the best one in blue):

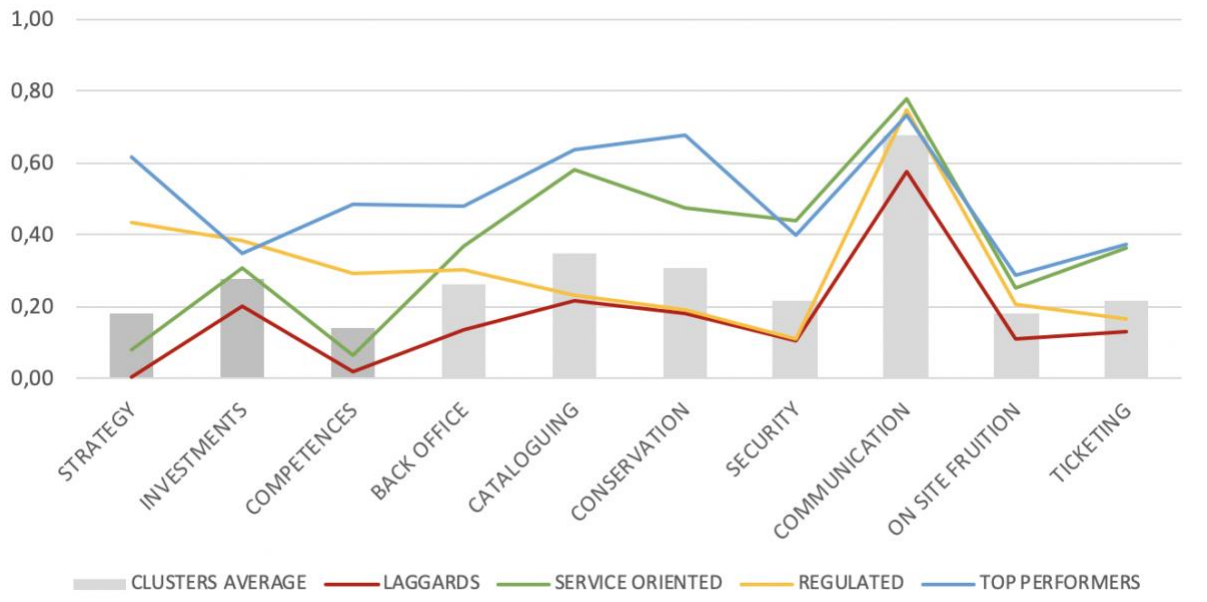


Figure 69 - Overall trend of the four clusters

	CLUSTERS AVERAGE	LAGGARDS	SERVICE ORIENTED	REGULATED	TOP PERFORMERS
STRUCTURE INDEX	0,19	0,06	0,13	0,35	0,49
ACTIVITY INDEX	0,32	0,21	0,47	0,28	0,51
DRI	0,25	0,14	0,30	0,32	0,50

Table 17 - Three index scores according to the four clusters

Through the cluster analysis five main considerations are proposed:

- Analysing the museum composition for each cluster, as reported in Figure 63, it is possible to understand that about the half of the institutions belong to the "Laggards" cluster meaning that the digitalization process in Italian Museums is still at the beginning.
- Considering that the Digital Readiness Index ranges from 0 to 1, the average scores of Top Performers is equal to 0.50 meaning that there can be improvements also for these museums.

- Top Performers museums invest a lot in digitalization, but they are not those who invest more than everyone, meaning that they are able to better select the investments obtaining excellent results thanks to their structured approach.
- Regulated museums are very similar to Laggards as regards the activity indicators, with the exception of Communication (the simplest activity to digitalize) and of Back Office, which are usually the first steps to be implemented to achieve the digitalization process, a sign that it is possible to observe a first result.
- Even if Regulated and Service Oriented clusters are very different, almost opposite, they obtained a very similar DRI value, meaning that they are very focused only on the digitalization pillars they planned to follow.

6. CONCLUSIONS

The final Chapter aims to underline the main findings of this Master Thesis, together with contributions for academicians and implications for museums practitioners. To conclude, the main limitations of present research and the future directions for further researches have been acknowledged.

6.1 MASTER THESIS FINDINGS

This Master Thesis proposes a model to assess the digitalization level of cultural institutions. The developed model outlines three core contributions (see Figure 70):

- the proposal of two dimensions (and the related sub-dimensions) to be considered as a reference point for evaluating the digitalization of cultural institutions, which consist in the structure and activity pillars;
- the identification of a set of performance measures to evaluate the digitalization of cultural institutions formulated as qualitative criteria and then as numerical indicators that can be calculated from the data collected;
- the creation of a positioning map to evaluate the overall digitalization process.

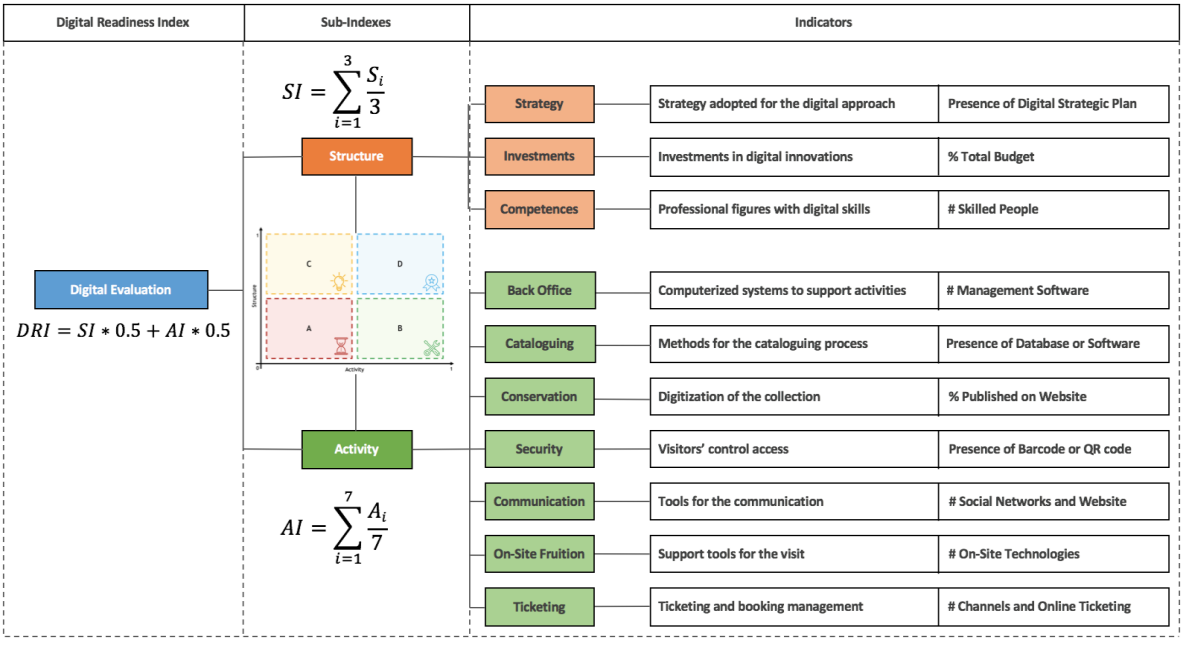


Figure 70 - Final model proposal

This model stands for a guide for the assessment of the digitalization level and subsequent performances improvement in cultural institutions: in particular, it proposes an assessment for each single activity or dimension/sub-dimension and more aggregated digitalization indexes. It is the reference for a systematic and in-depth evaluation and, at the same time, for a more general one (i.e. independent from the specific museums analysed) since it does not limit itself to provide an organized list of indicators but justifies their formulation on the basis of standard and shared criteria. These criteria exhaust, at least in principle, all the aspects to be considered relevant in the context of cultural institutions. In fact, the mere proposal of a set of indicators, although certainly useful for summarizing the results of the research, is not sufficient to guide the digitalization process of the analysed museums.

The Digital Readiness Model has been applied through an in-depth analysis of the Italian cultural sector. The first result is the direct assessment of the museums which respect the minimum and improvement criteria identified by the model: only 4% of museums has been able to simultaneously comply with all the minimum criteria while none with all the improvement ones. The second result achieved consists of a clustering of the museums' behaviour according to the indicator scores (see Figure 71):

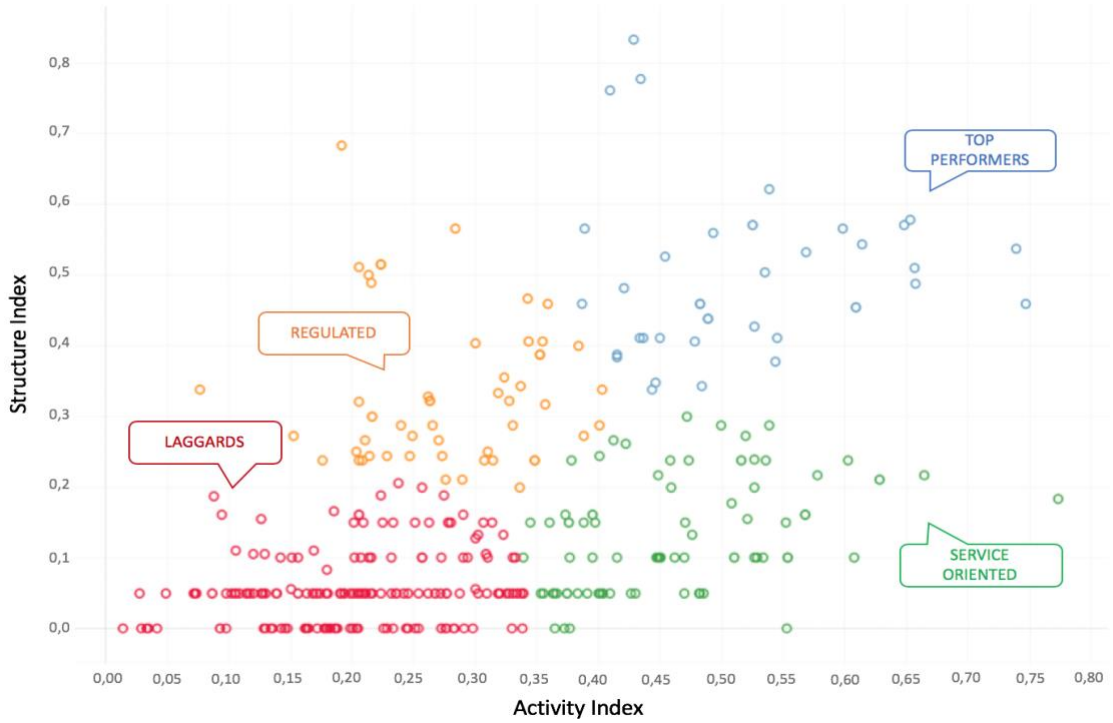


Figure 71 - Final clusters composition

Specifically, four clusters have been identified:

- Laggards, performing the worst result according to the digitalization process;
- Service Oriented, focused on the direct application of digital technologies without having a defined strategy;
- Regulated, focused on a structured policy but without obtaining satisfactory results in the activities' indicators;
- Top Performers, obtaining the overall best result.

The positioning of each museum refers to the specific context in which the model is applied, while the four quadrants provide more general guidelines on the level of digitalization of cultural institutions and support the identification of improvement or corrective actions (as reported in Section 6.1.2 - Managerial Implications).

By applying the model in the specific case of Italian museums, it is possible to point out the following considerations:

- Museums respecting only the whole Structure minimum criteria can be related to the ones belonging to the Regulated cluster and those respecting only the whole Activity minimum criteria can be related to the ones belonging to the Service Oriented cluster. Of course, the institutions belonging to the clusters are higher in number compared to the ones respecting the criteria due to the possibility to obtain a high indicator score even if not respecting all the minimum criteria for the considered pillar. However, the groups' composition is well balanced: museums respecting only minimum activity criteria are 9% and the ones respecting only minimum structure criteria are 8% while, in the cluster analysis, Service Oriented museums are 22% and Regulated are 21%.
- From the analysis, it emerges that communication is the activity in which museums achieve the most satisfactory result, confirming itself as a low-cost and effective activity to arouse customers' interest. Even the on-site fruition has achieved encouraging results, demonstrating that, in recent years, museums have implemented a business model related to the visitor-oriented strategy. This result also reflects the huge dissemination in literature of papers dealing with technologies implementation in museums that allow better customer satisfaction.

- The performance achieved by Top Performers cluster, who do not reach an average DRI level higher than 0.5, reflects the fact that no museum has been able to satisfy all the improvement criteria while only an institution has respected the improvement criteria for the activity pillar. This result is aligned also with the DESI index reported in Chapter 1, meaning that there are significant opportunities for improvement even among institutions later in this process.

The academic contributions to overcome the ongoing gap in the literature and the main benefits for the museum management are depicted in the sections below.

6.1.1 Academic Contributions

As analysed in the literature, there are two main gaps concerning the assessment of digitalization in cultural institutions:

- Many papers deal with visitor-oriented activities, above all communication and on-site fruition, unlike those that refer to the application of technologies to support museum activities (C. Courage et al. 2005; L. Kelly 2007; W. Jenner et al. 2009; E. Di Vizio et al. 2010; T. Kuflik et al. 2011; T. Narumi et al. 2013; M. Sabatino 2016). Even fewer are the papers that investigate the strategies adopted by museums regarding the digital transformation (C. Hull et al. 2006; H. Kéfi et al. 2011; G.A. Moore 2014; A. Gombault et al. 2016).
- Even if there are so many papers related to the implementation of particular digital technologies, there is a lack of researches concerning the possibility to assess the digital transformation through a measurement system (Cisco 2018; DESI 2018; E. Raguseo et al. 2018).

This Master Thesis overcomes the above-mentioned gaps by presenting the Digital Readiness Model, concerning not only a treatment about the whole digital applications that museum could implement (both considering museum and visitors' perspective) but also a measurement system to detect the digitalization level achieved by each institution. The academic gaps and the related contributions provided in this research have been summarized in Table 18:

Academic Gaps	Academic Contributions
Papers dealing only with visitor-oriented activities concerning the museum digitalization	In-depth study of the digital transformation in cultural institutions considering all the activities and the different implementation strategies
Lack of tool to measure the digital transformation in cultural institutions	Measurement model based on the key concepts found in literature and the construction of a set of synthetic indicators to quantify the digital transformation phenomenon in the cultural sector

Table 18 - Academic contributions

6.1.2 Managerial Implications

This section aims to provide useful insights for museum directors, managers, curators or other practitioners in order to better approach and assess the digital development of their institution. Indeed, this is a useful toolkit thanks to which any stakeholder can learn about the benefits coming from the right balancing between a structured approach to digital innovation and the implementation of new technologies. In particular, the model has also been designed to support four different actions by museum management:

- *Overall performance assessment*: to obtain a general characterisation of the performance of individual cultural institutions by observing their overall Digital Readiness Index score and the scores of the two sub-indexes (Structure and Activity).
- *Zooming-in*: to pinpoint the areas where museum performance could be improved by analysing the scores of the individual indicators
- *Follow-up*: to assess whether progress has been made over time.
- *Comparative analysis*: to cluster cultural institutions according to their index scores, comparing institutions in similar stages of digital development. On one hand, this model is useful to understand the relative positioning of the museum with respect to what other museums are doing, therefore as a benchmark tool to find good practices to follow. On the other hand, it could be used as a strategic predictive tool: once the cluster in which the museum would like to belong in the future has been identified, looking at the institutions already belonging to that cluster, museum managers could get an idea of the strategic movements to be made in subsequent periods to reach the new positioning.

Below there are some guidelines regarding possible evolutionary paths in terms of digital performance achieved over time. Bearing in mind that digital transformation is usually specific for each museum, there are, however, standard evolutionary paths common to different institutions.

Starting from Laggards situation, usually in this group there are institutions that have no particular interest in changing their situation, those still at the beginning of their digitalization process or those who have already made investments in digital technologies but sporadically or without following a clear strategy. The suggestion for these museums could be to adopt a more systematic approach, defining strategic objectives to be achieved in a given period of time also suitable for the available resources, in order to avoid further investments that could be counterproductive. Such planning should allow these museums to progress in the direction of Regulated cluster.

This second cluster is usually composed of museums which have started the digitalization process late but are in the process of being structured, or museums with a consolidated digitalization path and with clear objectives but not achieving the expected results. A possible solution would be to activate synergies or partnership with external companies, for example, startups or other suppliers, in order to offer customized technological solutions tailored to the needs expressed by the individual institutions. This combination of culture and technology would be fundamental to relaunch the art and tourism sector, encouraging the growth of these institutions in the direction of Top Performers.

The opposite situation to Regulated cluster is represented by Service-Oriented: museums that without having a well-defined strategy have started the process of digitization by implementing new technologies to support the different activities. Although this approach can lead to satisfactory results, it is always better to be supported by a structured long-term strategy that takes into account all available resources.

To conclude, Top Performers is the smallest cluster in the analysed panorama: these few museums have undertaken the digitalization process by integrating effectively and efficiently all the aspects previously mentioned, thus obtaining a positive final result. Furthermore, in this context, there are also museums born recently under the influence of a digital environment, which can serve as an example of good practices for those who are still at the beginning of the digitalization process.

6.2 LIMITATIONS AND FUTURE RESEARCH

The discussion of the main limitations that characterize this research could be a starting point for those practitioners aiming to use and apply the model in different contexts. Furthermore, at the end of this section, some possible suggestions to overcome these limitations will be provided to the reader.

6.2.1 Main Limitations

The main limitations concerning this research concern the weights for calculating the indicators used in the model and the specific application of the model to the Italian context.

The actual Digital Readiness Index is calculated using a weighted arithmetic average, anyway, the same weight for each indicator has been applied in order to be neutral with respect to the different digital implementation strategies (i.e. the choice between curator-oriented and visitor-oriented approach). This is surely one of the most relevant limitations of the model since some indicators could be more relevant than others, taking also into account the difficulties in achieving a certain level of digital performances, as it happens with the different dimensions of other digital indexes (i.e. DESI index).

The ISTAT census dataset represents a solid starting point for the selection of cultural institutions subjected to the questionnaire on which this research is based, nevertheless, the main limitation of this document concerns the time-period: the census has been published in 2017 aiming to explore the state of the art of Italian cultural institutions in 2015. For this reason, recently established institutions are not listed in the ISTAT dataset. As a consequence, these museums have not been included also in the present research, thus missing the opportunity to analyse entities born in an already evolving context with regard to digital innovation.
To solve this problem, the sampling of museums for subsequent applications of the model will have to be based on a more recent version of the ISTAT census or on an alternative but equally reliable source.

Another limitation is related to the wording of some questions, which are usually considered too complicated by respondents when filling in. In particular, the main questions which appear

not so clear concern some technologies proposed to support the on-site visit or specific digital-related professionals. Indeed, the properly English nomenclature of these variables has been one of the problems to be managed during the data collection phase, despite the fact that respondents have been provided with a brief Italian description of the same variables.
The risk is that of having partially correct answers or subjected to cognitive biases of interpretation, with the consequent possibility of falsifying the results achieved.
However, this problem should be limited as the number of responses collected is reasonably sufficient to represent a good sample of investigation.
Sometimes, the information requested was not available to the respondent who for this reason was forced to suspend the compilation to consult someone more proficient. In many of these cases, the filling in has not been terminated, remaining permanently incomplete and therefore not useful for the analysis (this tendency has been more frequent in public and state museums, often run jointly with more institutions or managed indirectly by other entities).

Finally, another problem was to collect a sufficient number of responses from institutions with quite heterogeneous characteristics to ensure greater robustness to the analysis.
Unfortunately, the response rates of some types of institutions (e.g. museums in southern Italy in general) have been below expectations. In this case, the difficulty has been to find even just an email address or an active telephone number in order to contact these museums. One solution would be to find more effective and faster data collection methods, able to arouse greater interest in those who fill out the questionnaire (for example, using a software to show the final score achieved at the end).

6.2.2 Future Research

As regard the future improvements, the Master Thesis leads to the identification of several research directions. First of all, the model has the potential to be applied also in other industries: for this purpose, it is important to identify and define new pillars that are tailor-made for the sector investigated.

For what concern the cultural sector, the model application could be supported by the following analyses:

- some interviews could be carried out considering those museums representing newsworthy case studies according to the answers collected.
- the development of an even more detailed dashboard of indicators may be a further objective (introducing some analysis related to the visitors, to carefully evaluate the impact of technologies, the level of satisfaction and the content sharing level on social media). Furthermore, a discussion about the different weights for the various activity indicators could be deepened, or even indicators characterised by different weights according to the different missions for each institution.

The final consideration is closely linked to the context in which the survey has been conducted. As previously said, this research has been performed only on the Italian panorama for several reasons: the total number of cultural institutions (much higher than in other countries), the arising interest that surrounds this sector, but also the constraints related to time and available resources. Analysing institutions from other countries would have led to different results given that the cultural sector strongly depends on the legal, political and regulatory environment where it takes place: indeed, thanks to the greater applicability of the model, some interesting comparisons could emerge also providing a better support to practitioners.

APPENDIX

A. LIST OF PAPERS

	YEAR	AUTHORS	TITLE	LANGUAGE	TYPOLOGY	KEYWORDS RELATED
1	1998	J. Andrews, W. Schweibenz	*The Kress Study Collection Virtual Museum Project: A new medium for old masters*	English	Academic Paper	Museum & Digital
2	2004	M.L. Anderson	*Metrics of success in art museums*	English	Academic Paper	Museum & Measurement
3	2015	D. Agostino, M. Arnaboldi	*A Measurement Framework for Assessing the Contribution of Social Media to Public Engagement: An empirical analysis on Facebook*	English	Academic Paper	Measurement
4	2017	D. Agostino, M. Arnaboldi	*Financial Analysis – Accounting Finance and Control slides*	English	Practitioner Report	Measurement
5	2005	H. Arksey, L. O'Malley	*Scoping studies: towards a methodological framework*	English	Academic Paper	Measurement
6	2015	M. Arnaboldi, G. Azzone, M. Giorgino	*Performance Measurement and Management for Engineers*	English	Practitioner Report	Measurement
7	2013	D. Aron	*The Essence of Strategy*	English	Academic Paper	Measurement
8	2012	Aspen Institute Italia	*I musei italiani*	Italian	Practitioner Report	Museum
9	2005	A. Babbidge	*Forty years on*	English	Academic Paper	Museum
10	2010	H. Bakhshi, D. Throsby	*Culture of Innovation: An Economic Analysis of Innovation in Arts and Cultural Organizations*	English	Academic Paper	Museum & Digital
11	2012	H. Bakhshi, D. Throsby	*New technologies in cultural institutions: theory, evidence and policy implications*	English	Academic Paper	Museum & Digital
12	2008	S. Baia Curioni	*I processi di produzione del valore nei musei*	Italian	Academic Paper	Museum
13	2000	M.T. Balboni Brizza	*Il museo come forma complessa*	Italian	Academic Paper	Museum
14	2007	M.T. Balboni Brizza	*Immaginare il museo. Riflessioni sulla didattica e il pubblico*	Italian	Academic Paper	Museum
15	2008	D. Bearman	*Representing Museum Knowledge, in Museum Informatics – People, Information, and Technology in Museums*	English	Academic Paper	Museum & Digital
16	2004	E. Belfiore	*Auditing culture*	English	Practitioner Report	Museum & Measurement
17	2013	B. Benedetti	*Il concetto e l'evoluzione del museo come premessa metodologica alla progettazione di modelli*	Italian	Academic Paper	Museum
18	2013	A. Bharadwaj, O.A. El Sawy, P.A. Pavlou, N. Venkatraman	*Digital business strategy: toward a next generation of insights*	English	Academic Paper	Digital
19	1980	L. Binni, G. Pinna	*Museo: storia e funzioni di una macchina culturale dal Cinquecento a oggi*	Italian	Academic Paper	Museum
20	2004	A. Bollo	*Il museo e la conoscenza del pubblico: gli studi sui visitatori*	Italian	Academic Paper	Museum
21	1996	Britannica Online	*Virtual museum*	English	Practitioner Report	Museum & Digital
22	1896	G. Brown Goode	*On the classification of museums*	English	Academic Paper	Museum
23	2010	C. Bunting	*Achieving great art for everyone –A review of research and literature to inform the Arts Council's 10-year strategic framework*	English	Academic Paper	Museum
24	2011	P. Bussio	*I musei in rete*	Italian	Academic Paper	Museum & Digital

25	2010	F. Cameron	*Museum Collections, Documentation, and Shifting Knowledge Paradigms, in Museums*	English	Academic Paper	Museum & Digital
26	2016	C. Carmosino	*Il completamento della riforma organizzativa del Mibact: i nuovi istituti autonomi e il rafforzamento dei poli museali*	Italian	Academic Paper	Museum
27	2007	L. Cataldo, M. Paraventi	*Il museo oggi: linee guida per una museologia contemporanea*	Italian	Academic Paper	Museum & Digital
28	2018	Cisco	*Cisco Australian Digital Readiness Index*	English	Practitioner Report	Digital & Measurement
29	2005	C. Courage, K. Baxter	*Understanding Your Users: A Practical Guide to User Requirements Methods, Tools, and Techniques*	English	Academic Paper	Measurement
30	2018	V. Dara	*Innovazione nei musei: quando la tecnologia rinnova l'arte*	Italian	Academic Paper	Museum & Digital
31	1998	C. De Benedictis	*Per la storia del collezionismo italiano. Fonti e documenti*	Italian	Academic Paper	Museum
32	2007	J. Benington	*From private choice to public value?*	English	Academic Paper	Measurement
33	2009	M.J. Del Barrio	Journal of Cultural Heritage	English	Academic Paper	Museum & Measurement
34	2010	E. Di Vizio, M. Ferrari	*Proposta per un Museo - Il caso dei Musei di Giuseppe Pellizza da Volpedo*	Italian	Academic Paper	Museum & Digital
35	2001	B. Deloche	*Il museo virtuale*	Italian	Academic Paper	Museum & Digital
36	2009	F. Desvallées, A. Mairesse	*Concetti chiave di museologia*	Italian	Academic Paper	Museum
37	2018	European Commission	International Digital Economy and Social Index (DESI)	English	Practitioner Report	Digital & Measurement
38	2002	A. Gilmore, R. Rentschler	*Changes in museum management*	English	Academic Paper	Museum
39	2016	A. Gombault, O. Allal-Chérif, A. Décamps	*ICT adoption in heritage organizations: Crossing the chasm*	English	Academic Paper	Museum & Digital
40	2012	T. Gstraunthaler, M. Piber	*The performance of museum and other cultural institutions*	English	Academic Paper	Museum & Measurement
41	2001	E.G. Guba, Y.S. Lincoln	*Guidelines and checklist for constructivist evaluation*	English	Academic Paper	Measurement
42	2011	N. Friend	*A review of museum literature and a personal critique museology: the evolution of a socially conscious institution*	English	Academic Paper	Museum
43	2015	M. Hancock	*Museums and 3D Printing: More Than a Workshop Novelty*	English	Academic Paper	Museum & Digital
44	2016	T. Hess, C. Matt, A. Benlian, F. Wiesböck	*Options for Formulating a Digital Transformation Strategy*	English	Academic Paper	Digital
45	2005	E. Hooper - Greenhill	*I musei e la formazione del sapere. Le radici storiche, le pratiche del presente*	Italian	Academic Paper	Museum
46	2012	O.E. Hughes	*Public Management and Administration*	English	Academic Paper	Measurement
47	2006	C. Hull, B. Lio	*Innovation in non-profit and For-profit organizations: visionary, strategic, and financial considerations*	English	Academic Paper	Measurement
48	2006	KEA European Affairs	*The economy of culture in Europe*	English	Practitioner Report	Museum & Measurement
49	2013	S. Intorre	*Digitalizzare l'opera d'arte, metodi e strumenti*	Italian	Academic Paper	Museum & Digital
50	2017	M.H. Ismail, M. Khater, M. Zaki	*Digital Business Transformation and Strategy: What Do We Know So Far?*	English	Academic Paper	Digital
51	2010	ISTAT	*I Musei e gli Istituti Similari non Statali*	Italian	Practitioner Report	Museum
52	2015	ISTAT	*I musei, le aree archeologiche e i monumenti in Italia*	Italian	Practitioner Report	Museum
53	2019	ISTAT	*I Musei e gli Istituti Similari non Statali*	Italian	Practitioner Report	Museum

54	2009	W. Jenner, L. Moura de Araújo	*Hanse 1380 - A Learning Game for the German Maritime Museum*	English	Academic Paper	Museum & Digital
55	2015	G.C. Kane, D. Palmer, A.N. Phillips, D. Kiron, N. Buckley	*Strategy, Not Technology, Drives Digital Transformation*	English	Academic Paper	Digital
56	2010	A.M. Kaplan, M. Haenlein	*Users of the world, unite! The challenges and opportunities of Social Media*	English	Academic Paper	Digital
57	2006	E. Keaney	*Public value and the arts: literature review*	English	Academic Paper	Museum
58	2011	H. Kéfi, J. Pallud	*The role of technologies in cultural mediation in museums: An actor-network theory view applied in France. Museum Management and Curatorship*	English	Academic Paper	Museum & Digital
59	2007	L. Kelly	*Visitors and learners: Adult museum visitors' learning identities In "Proceedings of ICOM-CECA"*	English	Academic Paper	Museum
60	2011	T. Kuflik, O. Stock, M. Zancanaro, A. Gorfinkel, S. Jbara, S. Kats, J. Sheidin, N. Kashtan	*A visitor's guide in an active museum: presentations, communications, and reflection*	English	Academic Paper	Museum & Digital
61	2011	T. Laureti, L. Secondi	*Le indagini campionarie, il campionamento – Statistica per le ricerche di mercato*	Italian	Academic Paper	Measurement
62	1983	A. Lugli	*Naturalia et mirabilia. Il collezionismo enciclopedico nelle Wunderkammern d'Europa*	Italian	Academic Paper	Museum
63	2004	A. Lugli, G. Pinna, V. Vercelloni	*Tre idee di museo*	Italian	Academic Paper	Museum
64	2001	V. Magnago Lampugnani	*Musei per un nuovo millennio: idee, progetti, edifici*	Italian	Academic Paper	Museum
65	2006	P.C. Marani, R. Pavoni	*Musei. Trasformazioni di un'istituzione dall'età moderna al contemporaneo*	Italian	Academic Paper	Museum
66	2007	I. Ḿaroevic	*Verso la nuova definizione del museo*	Italian	Academic Paper	Museum
67	2007	P.F. Marty	*Museum Websites and Museum Visitors: Before and After the Museum Visit*	English	Academic Paper	Museum & Digital
68	2014	C. Matt, T. Hess, A. Benlian	*Digital Transformation Strategies*	English	Academic Paper	Digital
69	2014	M. McDonald, R. McManus, L. Henneborn	*Digital Double-Down: How Far Will Leaders Leap Ahead?*	English	Academic Paper	Digital
70	2011	G. Mckenna, S. Rohde-Enslin, R. Stein	*Lightweight Information Describing Objects: the international harvesting standard for museums*	English	Academic Paper	Museum
71	1964	M. Mcluhan	*Understanding media: the extensions of man*	English	Academic Paper	Digital
72	1967	M. Mcluhan	*The medium is the message*	English	Academic Paper	Digital
73	2018	Ministero Italiano per i Beni e le Attività Culturali	*Livelli uniformi di qualità per i musei*	Italian	Practitioner Report	Museum
74	2011	E. Mooi, M. Sarstedt	*Cluster Analysis – A Concise Guide to Market Research*	English	Academic Paper	Measurement
75	2014	G. A. Moore	*Crossing the chasm*	English	Academic Paper	Digital & Measurement
76	2017	Mu.SA	*Museum Professionals in the Digital Era. Agents of change and innovation*	English	Practitioner Report	Museum & Digital
77	1904	D. Murray	*Museums: their history and their use*	English	Academic Paper	Museum
78	2013	T. Narumi, T. Kasai, T. Honda, K. Aoki, T. Tanikawa, M. Hirose	*Digital Railway Museum: An Approach to Introduction of Digital Exhibition Systems at the Railway Museum*	English	Academic Paper	Museum & Digital
79	2012	M.T. Natale, S. Fernández, M. López	*Handbook on virtual exhibitions and virtual performances*	English	Academic Paper	Museum & Digital

80	1984	P. Nora	*Luoghi della memoria. La Repubblica, la Nazione, la Francia*	Italian	Academic Paper	Museum
81	2016	C. Nigro, E. Iannuzzi, M.Petracca, V. Montagano	*L'adozione delle ICT in un campione di musei europei*	Italian	Academic Paper	Museum & Digital
82	2013	A. Padilla-Mendélez, A.R. Del Aguila-Obra	*Web and Social Media usage by museums: Online Value Creation*	English	Academic Paper	Museum & Digital
83	2012	J. Pallud, D.W. Straub	*Effective website design for experience-influenced environments: The case of high culture museums*	English	Academic Paper	Museum & Digital
84	2003	G. Pinna	*Il museo è un luogo di mistificazione?*	Italian	Academic Paper	Museum
85	2003	G. Pinna	*Proposta di definizione del museo*	Italian	Academic Paper	Museum
86	2004	K. Pomian	*Dalle sacre reliquie all'arte moderna. Venezia, Chicago dal XIII al XX secolo*	Italian	Academic Paper	Museum
87	2007	K. Pomian	*Collezionisti, amatori e curiosi: Parigi – Venezia, XVI-XVIII secolo*	Italian	Academic Paper	Museum
88	2017	F. Pontolillo D'Elia	*L'evoluzione veloce della virtual reality visori 3d*	Italian	Academic Paper	Digital
89	2018	E. Raguseo, F.Pigni, G.Piccoli	*Conceptualization, Operationalization and Validation of the Digital Data Stream Readiness Index, Journal of Global Information Management*	English	Academic Paper	Digital & Measurement
90	2014	J. Ray	*Putting museums in the data curation picture*	English	Academic Paper	Museum & Digital
91	2017	K.W. Ross, I.M. Sebastian, C.M. Beath	*How to develop a great digital strategy*	English	Academic Paper	Digital
92	2000	M.C. Ruggieri Tricoli	*I fantasmi e le cose. La messa in scena della storia nella comunicazione museale*	Italian	Academic Paper	Museum
93	2006	A. Russo, J. Watkins, L. Kelly, S. Chan	*How will social media affect museum communication?*	English	Academic Paper	Museum & Digital
94	2016	M. Sabatino	*Musei e innovazione, Arricchire l'esperienza di visita attraverso le nuove tecnologie*	Italian	Academic Paper	Museum & Digital
95	2001	G. Scali, F. Tariffi	*Bridging the collection management system multimedia exhibition divide: a new architecture for modular museum systems*	English	Academic Paper	Museum & Digital
96	2007	M.R. Schärer	*The exhibition - theory and example*	English	Academic Paper	Museum
97	2001	E.I. Schwartz	*Digital Darwinism: 7 Breakthrough Business Strategies for Surviving in the Cutthroat Web Economy*	English	Academic Paper	Digital
98	2004	W. Schweibenz	*The development of virtual museums*	English	Academic Paper	Museum & Digital
99	2004	L. Solima	*L'impresa culturale. Processi e strumenti di gestione*	Italian	Academic Paper	Museum & Measurement
100	2011	M. Son, K. Han	*Beyond the technology adoption: Technology readiness effects on post-adoption behaviour*	English	Academic Paper	Digital
101	2001	D. Throsby	*Economics and Culture*	English	Academic Paper	Museum & Measurement
102	2013	Tourism Economics	*L'impatto dei Contenuti Online sul Turismo Europeo*	English	Academic Paper	Museum & Digital
103	2012	R.A. Trandafir, L.D. Truicã, E.C. Spãtariu	*The Performance Analysis*	English	Academic Paper	Measurement
104	2006	T. Travers	*Museums and galleries in Britain: economic, social and creative impacts*	English	Academic Paper	Museum
105	2005	B. Usherwood	*Relevant repositories of public knowledge. Perceptions of archives, libraries and museums in modern Britain*	English	Academic Paper	Museum

106	1992	P. Van Mensch	*Towards a Methodology of Museology*	English	Academic Paper	Museum
107	1994	N. Venkatraman	*It-Enabled Business Transformation - From Automation To Business Scope Redefinition*	English	Academic Paper	Digital
108	2015	G. Violino	*La valutazione della performance dei musei*	Italian	Academic Paper	Museum & Measurement
109	2015	G. Westerman, D. Bonnet	*Revamping Your Business Through Digital Transformation*	English	Academic Paper	Digital & Measurement
110	2005	H. Wilkinson	*Collections for the future*	English	Academic Paper	Museum
111	2010	D. Williams	*A brief history of museum computerization, in Museums in a digital age*	English	Academic Paper	Museum & Digital
112	2016	Y. Yoshimura, A. Krebs, C. Ratti	*An analysis of visitors' length of stay through non-invasive Bluetooth monitoring in the Louvre Museum*	English	Academic Paper	Museum & Digital
113	2010	A. Zorloni	*Managing performance indicators in visual art museums*	English	Academic Paper	Museum & Measurement

B. QUESTIONNAIRE

Questionario Digitalizzazione Istituzioni Culturali 2018-2019

Buongiorno,

sono Deborah Agostino, Direttore dell'**Osservatorio Innovazione Digitale nei Beni e Attività Culturali** della School of Management del **Politecnico di Milano** (https://www.osservatori.net/it_it/osservatori/innovazione-digitale-nei-beni-e-attivita-culturali).

L'Osservatorio ha deciso di analizzare il livello di diffusione dell'**innovazione digitale all'interno delle istituzioni culturali italiane attraverso un'indagine** cui la invitiamo a partecipare. La compilazione del questionario richiede non più di 10 minuti.

I **risultati** dell'indagine verranno inviati **a tutti i rispondenti** e saranno **presentati** in occasione del Convegno che l'Osservatorio terrà a Milano nel maggio 2019**.**

I dati saranno utilizzati esclusivamente in forma aggregata ed anonima a scopo statistico. La serietà che abbiamo dimostrato negli anni su questo aspetto è garanzia di estrema attenzione e correttezza. A questo link (https://www.osservatori.net/it_it/privacy-policy-survey) potete trovare l'informativa sul trattamento e l'utilizzo dei dati.

Per qualunque esigenza, restiamo a disposizione agli indirizzi email e ai recapiti telefonici sotto indicati.

Certi che la ricerca potrà dare risultati rilevanti per indirizzare il percorso di innovazione delle istituzioni culturali italiane, vi ringrazio in anticipo per l'attenzione.

Il team di ricerca:

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PRIVACY

1. **Al fine di poter utilizzare le sue risposte e proseguire con la compilazione del questionario, le chiediamo di esprimere il consenso al trattamento dei dati personali:**

- o Esprimo il consenso al trattamento dei miei dati da parte degli Osservatori Digital Innovation per l'invio di survey con finalità di Ricerca. Consapevole che il mio consenso è puramente facoltativo, oltre che revocabile in qualsiasi momento, con la sottoscrizione della presente dichiaro di aver preso visione dell'Informativa Privacy (https://www.osservatori.net/it_it/privacy-policy-survey). Tutti i dati che verranno forniti rimarranno all'interno del gruppo di Ricerca e non verranno divulgati all'esterno, se non in forma anonima e aggregata
- o Nego il consenso al trattamento dei miei dati da parte degli Osservatori Digital Innovation per l'invio di survey con finalità di Ricerca

2. **Per poterle inviare la Ricerca dell'Osservatorio ed escluderla da eventuali solleciti a compilare la Survey, le chiediamo di compilare la seguente tabella con i suoi dati.**

Nome

Cognome

Ruolo all'interno dell'istituzione

E-mail

ANAGRAFICA

3. **Denominazione dell'istituzione culturale:**

4. **Specificare la regione sede dell'istituzione culturale**

- o Abruzzo
- o Basilicata
- o Calabria
- o Campania
- o Emilia Romagna
- o Friuli Venezia Giulia
- o Lazio
- o Liguria
- o Lombardia
- o Marche
- o Molise
- o Piemonte
- o Puglia
- o Sardegna
- o Sicilia
- o Toscana
- o Trentino Alto Adige
- o Umbria
- o Valle d'Aosta
- o Veneto

5. **Specificare il comune sede dell'istituzione culturale**

6. **Specificare la tipologia dell'istituzione culturale**

- o Museo, galleria e/o raccolta
- o Area o parco archeologico
- o Monumento o complesso monumentale
- o Altro (specificare):

7. Specificare il soggetto titolare

- Ministero dei Beni e le Attività Culturali (MiBAC)
- Comune
- Ente ecclesiastico o religioso
- Fondazione
- Museo d'impresa
- Altro ente pubblico o privato:

8. Specificare il numero medio di visitatori annui

- Meno di 5.000 persone
- Da 5.001 a 10.000 persone
- Da 10.001 a 50.000 persone
- Da 50.001 a 100.000 persone
- Da 100.001 a 500.000 persone
- Da 500.001 a 1.000.000 persone
- Oltre 1.000.000 di persone

9. Specificare il numero dipendenti dell'istituzione culturale (anno di riferimento 2018)

STRATEGIA

10. Avete un piano strategico formalizzato dell'innovazione digitale?

- Sì, esiste un documento dedicato
- Sì, all'interno di un altro documento (es. piano strategico)
- No

INVESTIMENTI

11. Considerato l'ammontare complessivo degli investimenti annui, indicare la percentuale media di investimento destinata al digitale (strumenti digitali, personale interno, acquisto servizi esterni) negli ultimi due anni:

- Nessun investimento in digitale
- 1-10%
- 11-25%
- 26-50%
- 51-75%
- 76-100%

COMPETENZE DIGITALI

12. Avete professionisti con competenze dedicate al digitale?

- Sì
- No

13. Specificare quali professionisti sono presenti (alla stessa persona possono corrispondere più ruoli). Cliccando su ogni ruolo appariranno le descrizioni delle diverse voci.

	Sì, personale interno	Sì, consulenti esterni	Si, condivisi con altri settori/istituzioni	No, non disponibile
Social Media & Community Manager				
Digital curator				
Digital Marketing Manager				
Sviluppatore				
Designer/ Game designer				
Data Protection Officer				
Digital Officer				
Digital User Experience Developer				
Digital Strategy Manager				
Altro: _____				

BACK OFFICE

14. Avete un sistema gestionale informatizzato (non fogli excel) a supporto di almeno un'attività?

- Si
- No

15. Specificare quali sistemi gestionali informatizzati avete a disposizione:

	Si, dedicato	Si, condiviso con altre istituzioni	No, non disponibile
Contabilità			
Fornitori/acquisti			
Gestione personale			
Catalogazione e conservazione e manutenzione ordinaria delle collezioni			
Prestiti e movimentazione opere			
Gestione degli spazi (affitto spazi, …)			
Servizi al pubblico (bookshop, ristorazione, …)			
Attività didattiche			
Ticketing			
e-Commerce di prodotti			
Fundraising			
CRM (Customer Relationship Management) e gestione contatti			

Reportistica (prenotazioni, profilo visitatori, …)			
Altro. Specificare: _____			

CATALOGAZIONE

16. Che tipo di catalogo avete? Indicare quale percentuale della collezione è catalogata con ciascun tipo di catalogo (indicare 0 laddove non sia presente la modalità)

	0	0 - 25%	26% - 50%	51% - 75%	> 75%
Catalogo cartaceo					
Catalogo su database (es: Excel, Access)					
Catalogo su software open-source (ovvero, un sistema in cui è possibile modificare autonomamente i codici sorgente)					
Catalogo su software proprietario (es: SIRBeC)					
Catalogo su software tailor-made (ovvero, creato appositamente sulle specifiche funzionali richieste dall'istituzione)					

CONSERVAZIONE DELLA COLLEZIONE

17. Avete digitalizzato la collezione? (Con "digitalizzazione" si intende l'attività di conversione dei beni fisici della collezione in forma digitale, es. testi, fotografie, ecc.)

- ○ Sì, < 25%
- ○ Sì, 25% - 50%
- ○ Sì, 51% - 75%
- ○ Sì, > 75%
- ○ No

18. Avete pubblicato la collezione digitalizzata su un sito web?

- ○ Sì, sul proprio sito web
- ○ Sì, su un sito web in comune con altre istituzioni
- ○ No
- ○ Sì, altro (specificare):

19. Qual è la percentuale della collezione pubblicata online rispetto alla collezione digitalizzata?

- ○ 0%
- ○ < 25%
- ○ 25% - 50%
- ○ 50% - 75%
- ○ > 75%

SICUREZZA

20. Quali modalità utilizzate per controllare gli accessi dei visitatori?

- Stacco del biglietto di ingresso
- Lettore di codice a barre (pistola)
- Lettore di QR-code (ovvero, un codice a barre quadrato contenente informazioni leggibili tramite scansione da smartphone)
- Tornelli o varchi conta persone
- Foglio cartaceo
- Foglio elettronico (es: Excel)

COMUNICAZIONE

21. Avete un sito web dedicato?

- Sì, relativo solo alla nostra istituzione
- Sì, in comune con altre istituzioni della nostra rete museale
- Sì, in comune con altre istituzioni culturali (non della rete museale)
- Sì, all'interno di altri siti web (ad esempio, sito web del Comune)
- No

22. Avete un'App?

- Si
- No ma prevediamo di inserirla
- No e non ci interessa

23. Quali account social avete?

- Facebook
- Twitter
- Instagram
- YouTube
- Nessuno
- Altro (specificare):

24. Eseguite attività di monitoraggio e gestione delle recensioni? (es. recensioni Tripadvisor, Google maps, ecc.)

- Si, leggendo le recensioni e rispondendo dove necessario
- No
- Si, con strumenti analitici ad hoc (specificare):

25. Raccogliete dati sui visitatori?

- Sì, tramite raccolta cartacea
- Sì, in digitale
- No

FRUIZIONE IN LOCO

26. Quali di queste tecnologie sono presenti nella vostra Istituzione?

	Si, è presente	No e non ci interessa	No, l'avevamo ma l'abbiamo tolta	No, ma prevediamo di inserirla
Wi-Fi				
Audioguida				
Realtà aumentata				
Realtà virtuale				
QR-code				
3D display				
Pannelli interattivi				
Beacon				
NFC				
Chatbot				
Videogiochi				
Video LIS (Lingua dei Segni Italiana)				
Blockchain				

TICKETING

27. È presente un sistema biglietteria nell'istituzione?

- Si
- No

28. A quanto ammontano le entrate della biglietteria per l'anno 2018?

- Non ho entrate derivanti dalla vendita dei biglietti
- Meno di 1.000 euro
- Da 1.000 a 2.500 euro
- Da 2.501 a 5.000 euro
- Da 5.001 a 10.000 euro
- Da 10.001 a 20.000 euro
- Da 20.001 a 50.000 euro
- Da 50.001 a 100.000 euro
- Da 100.001 a 500.000 euro
- Da 500.001 a 1.000.000 euro
- Oltre 1 milione

29. Quale tipologia di biglietteria è presente nell'istituzione?

- o Biglietto a distacco da blocchetto con contabilizzazione cartacea (o scontrino)
- o Biglietto a distacco con contabilizzazione su sistema elettronico
- o Biglietto stampato al momento con banca dati elettronica
- o Biglietto acquistabile online e stampato a casa
- o Biglietto acquistabile online e non stampato (ad esempio, visibile da smartphone)

30. Tramite quale canale è possibile prenotare?

- o Telefono
- o Mail
- o Sito web relativo all'Istituzione
- o Sito web di prenotazioni di terze parti
- o Social network
- o App
- o Altro (specificare):

31. Fate parte di un network che offre card per l'accesso cumulativo a più istituzioni culturali (ad esempio card culturali della Regione o card turistiche per la visita della città)?

- o Sì, card cartacee
- o Sì, card elettroniche (cioè card di plastica con le informazioni memorizzate all'interno del microchip o della banda magnetica presente nella tessera elettronica)
- o Sì, con card virtuali (cioè card non fisica visualizzabile da smartphone)
- o No

C. PER QUOTA SAMPLE DISTRIBUTION

VARIABLE 1	NUMBER	P%	VARIABLE 2	NUMBER	P%	VARIABLE 3	NUMBER	P%
GALLERY OR COLLECTION	2861	82,81%	**STATE**	187	5,41%	**NORTH**	39	1,13%
						CENTRE	80	2,32%
						SOUTH	68	1,97%
			PUBLIC	1632	47,24%	**NORTH**	706	20,43%
						CENTRE	511	14,79%
						SOUTH	415	12,01%
			PRIVATE	1042	30,16%	**NORTH**	539	15,60%
						CENTRE	277	8,02%
						SOUTH	226	6,54%
ARCHAEOLOGICAL AREA OR PARK	215	6,22%	**STATE**	92	2,66%	**NORTH**	21	0,61%
						CENTRE	30	0,87%
						SOUTH	41	1,19%
			PUBLIC	108	3,13%	**NORTH**	15	0,43%
						CENTRE	19	0,55%
						SOUTH	74	2,14%
			PRIVATE	15	0,43%	**NORTH**	1	0,03%
						CENTRE	2	0,06%
						SOUTH	12	0,35%
MONUMENT OR MONUMENTAL COMLPEX	379	10,97%	**STATE**	97	2,81%	**NORTH**	29	0,84%
						CENTRE	37	1,07%
						SOUTH	31	0,90%
			PUBLIC	164	4,75%	**NORTH**	63	1,82%
						CENTRE	47	1,36%
						SOUTH	54	1,56%
			PRIVATE	118	3,42%	**NORTH**	49	1,42%
						CENTRE	42	1,22%
						SOUTH	27	0,78%
	3455	100,00%			100,00%		3455	100,00%

D. SAMPLE

	CULTURAL INSTITUTIONS
GALLERY ***STATE*** ***NORTH***	MUSEO NAZIONALE DI RAVENNA
	MUSEI REALI DI TORINO
	MUSEO NAZIONALE ATESTINO
	MUSEO ARCHEOLOGICO NAZIONALE PALAZZO ROCCA
	MUSEO ARCHEOLOGICO NAZIONALE DI AQUILEIA
	MUSEO ARCHEOLOGICO NAZIONALE DI PARMA
	MUSEO D'ARTE ORIENTALE
	MUSEO ARCHEOLOGICO NAZIONALE DI ADRIA
	MUSEO ARCHEOLOGICO DI QUARTO D'ALTINO
	MUSEO ARCHEOLOGICO NAZIONALE DI FERRARA
GALLERY ***STATE*** ***CENTRE***	MUSEO ARCHEOLOGICO NAZIONALE DI FIRENZE
	GALLERIA NAZIONALE DELLE MARCHE
	MUSEO ARCHEOLOGICO NAZIONALE 'GAIO CILNIO MECENATE'
	MUSEO NAZIONALE DEL PALAZZO DI VENEZIA
	MUSEO NAZIONALE DEL BARGELLO
	MUSEO ARCHEOLOGICO NAZIONALE DELLE MARCHE
	MUSEO NAZIONALE ETRUSCO DI VILLA GIULIA
	MUSEO ARCHEOLOGICO NAZIONALE DELL'UMBRIA
	MUSEO NAZIONALE PREISTORICO ED ETNOGRAFICO 'L. PIGORINI'
	MUSEO DEGLI ARGENTI
	MUSEO NAZIONALE ROMANO - TERME DI DIOCLEZIANO
	ISTITUO CENTRALE PER LA DEMOETNOANTROPOLOGIA-MUSEO NAZIONALE DELLE ARTI E TRADIZIONI POPOLARI
	MUSEO NAZIONALE ROMANO - PALAZZO MASSIMO ALLE TERME
	MUSEO ARCHEOLOGICO NAZIONALE
	CRYPTA BALBI
	GALLERIA PALATINA E APPARTAMENTI MONUMENTALI PALAZZO PITTI
	GALLERIA D'ARTE MODERNA DI FIRENZE
	MUSEO NAZIONALE ARCHEOLOGICO CERITE
	MUSEO ARCHEOLOGICO DELL'AGRO FALISCO E FORTE SANGALLO
	MUSEO NAZIONALE ETRUSCO DI ROCCA ALBORNOZ
	MUSEO NAZIONALE ROMANO IN PALAZZO ALTEMPS
GALLERY ***STATE*** ***SOUTH***	MUSEO NAZIONALE DEL PALEOLITICO D'ISERNIA
	MUSEO ARCHEOLOGICO NAZIONALE DI PAESTUM
	MUSEO ARCHEOLOGICO NAZIONALE
	MUSEO DI SAN MARTINO
	CITTA' ROMANA E PARCO ARCHEOLOGICO DI TURRIS LIBISONIS
	MUSEO NAZIONALE ARCHEOLOGICO - ETNOGRAFICO 'GIOVANNI ANTONIO SANNA'
	MUSEO DI CAPODIMONTE
	MUSEO NAZIONALE DELLA CERAMICA 'DUCA DI MARTINA'
	MUSEO ARCHEOLOGICO NAZIONALE
	MUSEO ARCHEOLOGICO NAZIONALE 'DOMENICO RIDOLA'
	MUSEO NAZIONALE JATTA
	MUSEO NAZIONALE ARCHEOLOGICO DI EGNAZIA 'GIUSEPPE ANDREASSI'
	MUSEO ARCHEOLOGICO NAZIONALE DI METAPONTO
	MUSEO ARCHEOLOGICO NAZIONALE G. ASPRONI
	MUSEO ARCHEOLOGICO NAZIONALE D'ABRUZZO - VILLA FRIGERJ
	MUSEO E PARCO ARCHEOLOGICO NAZIONALE
	MUSEO 'DIEGO ARAGONA PIGNATELLI CORTES'
	MUSEO SANNITICO DI CAMPOBASSO
GALLERY ***PUBLIC*** ***NORTH***	MUSEO BOTANICO-ERBARIO
	MUSEO STORICO GIUSEPPE BECCARI
	CASA CARDUCCI
	SISTEMA MUSEALE DI ATENEO
	MUSEO DI SAN DOMENICO
	CIVICO MUSEO DI STORIA ED ARTE E ORTO LAPIDARIO
	MUSEO STORICO DELL'ARMA DI CAVALLERIA
	MUSEO CIVICO DI STORIA NATURALE

MUSEO CIVICO ARCHEOLOGICO
CENTRO DI DOCUMENTAZIONE DEL TROTTO E DEL CAVALLO 'VARENNE'
MUSEO CIVICO DI SCIENZE NATURALI MARIO REALINI
MUSEO ZOOLOGICO DELL'ISTITUTO SUPERIORE PER LA PROTEZIONE E LA RICERCA AMBIENTALE (ISPRA)
MUSEO TIPOGRAFICO 'F. LIBASSI'
MUSEI CIVICI - PALAZZO DEI MUSEI
MUSEO CIVICO ARCHEOLOGICO
MUSEO CIVICO 'CRAVERI' DI STORIA NATURALE
LA FABBRICA DEI SUONI
MUSEUM LADIN CIASTEL DE TOR
ASTUT - ARCHIVIO SCIENTIFICO E TECNOLOGICO
MUSEO DEGLI USI E COSTUMI DELLA GENTE TRENTINA
MUSEO UNIVERSITARIO GEMMA 1786 - MUSEO MINERALOGICO E GEOLOGICO ESTENSE
MUSEO CIVICO ARCHEOLOGICO ETNOLOGICO
GIARDINI BOTANICI HANBURY - CENTRO UNIVERSITARIO DI SERVIZI
MUSEO DEL BIJOU DI CASALMAGGIORE
MUSEO CIVICO DI STORIA NATURALE DI VERONA
MUSEO DEL TERRITORIO
MUSEO CIVICO DI STORIA NATURALE GIACOMO DORIA
MUSEO DI ARCHEOLOGIA LIGURE
MUSEO CIVICO GOFFREDO BELLINI
MUSEO DEL GUSTO
CIVICO MUSEO SARTORIO
CIVICO MUSEO ARCHEOLOGICO
SÜDTIROLER LANDESMUSEUM FÜR VOLKSKUNDE / MUSEO PROVINCIALE DEGLI USI E COSTUMI
MUSEO ETNOGRAFICO DELLA VAL VARATELLA
CASTELLO DELLA MUSICA - MUSEO DEL DISCO E MUSEO DELLA LIUTERIA
CASA MUSEO RAFFAELE BENDANDI
MUSEO CIVICO DI STORIA NATURALE DI TRIESTE
MUSEI DI STRADA NUOVA
MUSEO CIVICO ANDREA TUBINO
MUSEO TECNICO NAVALE DELLA M.M.
MUSEO CIVICO DI SCIENZE NATURALI ENRICO CAFFI
L'ATLANTE DEI SUONI
FONDAZIONE MUSEO CIVICO DI ROVERETO
CASTELLO DEL BUONCONSIGLIO - MONUMENTI E COLLEZIONI PROVINCIALI
MUSEI CIVICI D'ARTE ANTICA - MUSEO CIVICO MEDIEVALE
MUSEI CIVICI D'ARTE ANTICA - MUSEO D'ARTE INDUSTRIALE 'DAVIA BARGELLINI'
MUSEO CIVICO ARCHEOLOGICO E DI SCIENZE NATURALI 'FEDERICO EUSEBIO'
CIVICO MUSEO DI STORIA NATURALE
CIVICO MUSEO TEATRALE 'CARLO SCHMIDL'
MUSEO ARCHEOLOGICO DEL FINALE
MAG MUSEO ALTO GARDA | MUSEO DI RIVA DEL GARDA
MUSEI CIVICI DI PADOVA
MUSEO BOTTACIN E MUSEO DI ARTI APPLICATE E DECORATIVE- PALAZZO ZUCKERMANN
MUSEO NATURALISTICO ARCHEOLOGICO VICENZA
MUSEI CIVICI (pavia)
MUSEO DELLA REGINA
PALAZZO MADAMA - MUSEO CIVICO D'ARTE ANTICA
MUSEO DI ANTROPOLOGIA CRIMINALE 'CESARE LOMBROSO' DELL'UNIVERSIT└ DI TORINO
Museo di Palazzo Poggi
MUSEO DELLA CIVILTA' CONTADINA 'ISTITUZIONE VILLA SMERALDI'
MUSEO STORICO DEI LUCCHETTI, COLLEZIONE 'VITTORIO CAVALLI'
MUSEO ARCHEOLOGICO DEL FRIULI OCCIDENTALE
MUSEO DEL CASTELLO. COLLEZIONI CIVICHE ARCHEOLOGICHE U. FORMENTINI
MUSEO CIVICO POLIRONIANO
MUSEO CIVICO DI BORMIO
MUSEO CIVICO 'GIOVAN BATTISTA ADRIANI'
ORTO BOTANICO
MUSEO DELLA BATTAGLIA
MUSEO DI STORIA NATURALE DI VENEZIA
MUSEO STORICO DELL'ACCADEMIA MILITARE
MUSEO DI STORIA NATURALE E ARCHEOLOGIA
MUSEI CIVICI - SEZ. DI ARCHEOLOGICA E STORIA NATURALE
MUSEO DELLA FIGURINA

MUSEI CIVICI DI PALAZZO FARNESE
MUSEO DELLA CITTA' Luigi Tonini
CIVICO MUSEO 'REVOLTELLA' E GALLERIA D'ARTE MODERNA
MUSEO DI ETNOMEDICINA ANTONIO SCARPA
MUSEO ETNOGRAFICO E DELLA STREGONERIA
MUSEO CIVICO DI SCIENZE NATURALI ALESSIO AMIGHETTI
SISTEMA MUSEALE URBANO LECCHESE - POLO MUSEALE DI PALAZZO BELGIOIOSO
MUSEO DEL LAVORO POVERO E DELLA CIVILTA' CONTADINA MAZZOCCHI BERTOLOTTI
RACCOLTE D'ARTE APPLICATA, MUSEO STRUMENTI MUSICALI
MOSTRA PERMANENTE DEL GIOCATTOLO DELLA TRADIZIONE POPOLARE
MUSEO DELLE SCIENZE
MUSEO DEL PO
MUSEO DI DOCUMENTAZIONE DELLA CIVILTA' CONTADINA FRIULANA
MUSEO CIVICO 'CARLO VERRI'
MUSEI CIVICI DI VARESE
MUSEO LOCALE DI GUDON
CIVICO MUSEO DI STORIA NATURALE DON MICHELANGELO AMBROSIONI
ALPENFAUNA MUSEUM 'BECK PECCOZ' - MUSEO REGIONALE DELLA FAUNA ALPINA
MUSEO CIVICO ETNOGRAFICO ALTA VAL BREMBANA
MUSEO ETNOGRAFICO 'LABORANTES'
MUSEO ETNOGRAFICO DEL FRIULI
MUSEO E ORTO BOTANICO DELL' UNIVERSITA' DI GENOVA
MUSEO ETNOGRAFICO PERMANENTE DEL PONENTE LIGURE FRANCO FERRERO
ORTO BOTANICO LORENZO ROTA
CIVICO MUSEO ARCHEOLOGICO
MUSEO DELLA SECONDA GUERRA MONDIALE DEL FIUME PO
MUSEO CIVICO DI SCIENZE NATURALI
MUSEO DI ANATOMIA UMANA 'LUIGI ROLANDO' DELL'UNIVERSIT L DI TORINO
MUSEO DELL'AERONAUTICA GIANNI CAPRONI
MUSEO CIVICO DELLA CERAMICA
MUSEO ARCHEOLOGICO DELLA VALLE SABBIA
MUSEO CIVICO ANTONIO PARAZZI
CIVICI MUSEI E GALLERIE DI STORIA ED ARTE
MUSEO DEL CAPPELLO BORSALINO
NATURA - MUSEO RAVENNATE DI SCIENZE NATURALI 'ALFREDO BRANDOLINI'
MUSEO DELLA VITA CONTADINA CJASE COCE'L
MUSEO ETNOGRAFICO LADINO E GRANDE GUERRA
MUSEO DI STORIA CONTADINA
CASA DELLA RESISTENZA VALPOLCEVERA
MUSEO DEL COSTUME E DELLE TRADIZIONI DELLE GENTI ALPINE
MUSEO CIVICO ARCHEOLOGICO 'LUIGI FANTINI'
MUSEO DELLA PREISTORIA 'LUIGI DONINI'
GALATA MUSEO DEL MARE
MUSEO CIVICO
CIVICO MUSEO STORICO GIUSEPPE GARIBALDI
MUSEO CIVICO DI LENTATE SUL SEVESO
MUSEO DEL TESSILE E DELLA TRADIZIONE INDUSTRIALE
MUSEO INTERNAZIONALE DESIGN CERAMICO - CIVICA RACCOLTA DI TERRAGLIA
MUSEO DELL'OMBRELLO E DEL PARASOLE
MUSEO DI SCIENZE ARCHEOLOGICHE E D'ARTE DELL'UNIVERSITA' DI PADOVA
MUSEO CORRER
MUSEO NATURALISTICO DIDATTICO 'PATRIZIO RIGONI'
MAR - MUSEO ARCHEOLOGICO REGIONALE
MUSEO DELL'ARTE FABBRILE E DELLE COLTELLERIE
MUSEO DELLA FRUTTA 'FRANCESCO GARNIER VALLETTI'
MUSEO CIVICO 'ANTONIO GIACOMELLI'
MUSEO DI ANATOMIA PATOLOGICA DELL'UNIVERSIT L DEGLI STUDI DI PADOVA
MUSEO DI ARTI E MESTIERI 'P. LAZZARINI'
MUSEO DELL'AGRICOLTURA E DEL MONDO RURALE
MUSEO D'ARTE ORIENTALE EDOARDO CHIOSSONE
MUSEO DELLA CIVILTA' CONTADINA
MUSEO PALAZZON TRADIZIONI DELLA GENTE DI LUSIANA
MUSEO DEL RISORGIMENTO E DELLA RESISTENZA
MUSEO DELLA CITTA'
MUSA MUSEO DEL SALE di cervia

	CIVICO MUSEO ARCHEOLOGICO ANTIQUARIUM PLATINA
	CA' REZZONICO
	MUSEO DELLA CERAMICA G. ROI E MUSEO REMONDINI
	MUSEO DEL VETRO
	CIVICO MUSEO ARCHEOLOGICO E DELLA CITTA'
	MUSEO CIVICO A. OLMO E GIPSOTECA D.CALANDRA
	MUSEO STORICO DELLA TERZA ARMATA
	MUSEO DEI GRANDI FIUMI
	MUSEI CIVICI TREVISO
	MUSEO PROVINCIALE DEL VINO (SÜDTIROLER WEINMUSEUM)
	MUSEO ANATOMICO 'G.TUMIATI'
	CASA MUSEO VILLA MONASTERO
	MUSEO DEL GIOCATTOLO
	MUSEO PROVINCIALE DI TORCELLO
	MUSEO DI ARTE SACRA
	MUSEO ARCHEOLOGICO DEL COMPITO 'DON GIORGIO FRANCHINI'
	MUSEO CIVICO DI SCIENZE NATURALI
	MUSEI DI MONDAINO
	MET-MUSEO DEGLI USI E COSTUMI DELLA GENTE DI ROMAGNA
	MUSEO CIVICO AMEDEO LIA
	MUSEO DEMOLOGICO GIACOMO BERGOMI
	MUSEO CIVICO DI STORIA NATURALE
	MUSEO D'ARTE E TRADIZIONE CONTADINA
	MUSEO CIVICO
	MUSEI DI GIUSEPPE PELLIZZA DA VOLPEDO
	MUSEO D'ARTE PREISTORICA
	CIVICO MUSEO ARCHEOLOGICO
	MUSEO CIVICO 'GIANANDREA IRICO'
	MUSEO DELLA SCUOLA SCHULMUSEUM
	MUSEO COLLEPIETRA DEL COMUNE DI CORNEDO (MUSEUM STEINEGG)
	CASTELLO PRINCIPESCO
	TOURISEUM - MUSEO PROVINCIALE DEL TURISMO
	PALAIS MAMMING MUSEUM
	MUSEO DELLA MACCHINA DA SCRIVERE PETER MITTERHOFER
	MUSEO DELLA CARTOLINA E DEL COLLEZIONISMO MINORE 'SALVATORE NUVOLI'
	MUSEO DELLA CIVILTA' CONTADINA DELLA VALLARSA
	MUSEO CIVICO DI BELLUNO
	MUSEO DELLA GUERRA 1914-18 'FORTE TRE SASSI'
	MUSEO CIVICO DI STORIA NATURALE 'LA TERRA E L'UOMO'
	MUSEO DI ARCHEOLOGIA E SCIENZE NATURALI 'G. ZANNATO'
	MUSEO CIVICO DEL RISORGIMENTO
	CENTRO AMBIENTALE ARCHEOLOGICO MUSEO CIVICO PIANURA DI LEGNAGO
	MUSEO GEOPALEONTOLOGICO
	MUSEO DEL SIGILLO
	MUSEO DEL PATRIMONIO INDUSTRIALE
	MUSEO CIVICO DI BELRIGUARDO
	SIMUS - MUSEO BOTANICO (Herbarium Universitatis Senensis)
	SISTEMA MUSEALE DELL'UNIVERSITA' DEGLI STUDI DI FIRENZE
	RACCOLTA D'ARTE 'UGO UBALDI'
	MUSEO DI STORIA NATURALE E DEL TERRITORIO - CENTRO ATENEO UNIVERSIT L DI PISA
	MUSEO ITTICO 'A. CAPRIOTTI
	MUSEO CIVICO DI ZOOLOGIA
	MUSEO DI BIOLOGIA - ORTO BOTANICO
GALLERY	MUSEO DI MINERALOGIA
	MUSEO AGRARIO TROPICALE DELL'ISTITUTO AGRONOMICO PER L'OLTREMARE
PUBLIC	MUSEO DI STORIA NATURALE DEL MEDITERRANEO
	Museo della Nostra Terra
CENTRE	MUSEO CIVICO ARCHEOLOGICO E PALEONTOLOGICO
	MUSEO REGIONALE DELLA CERAMICA DI DERUTA
	MUSEI CAPITOLINI
	MUSEO ARCHEOLOGICO E D'ARTE DELLA MAREMMA/MUSEO D'ARTE SACRA DELLA DIOCESI DI GROSSETO.
	MUSEO DI STORIA DELLA MEDICINA
	MUSEO STATALE CIVICO BRANCALEONI
	MUSEI DEL CASTELLO DEI CONTI OLIVA. MUSEO DEL LAVORO CONTADINO MUSEO DI SCIENZE DELLA TERRA
	GALLERIA DI STORIA NATURALE DELL'UNIVERSITA' DEGLI STUDI DI PERUGIA

MUSEO DI MERCEOLOGIA (RACCOLTA DELL'ISTITUTO DI MERCEOLOGIA)
SIMUS - MUSEO NAZIONALE DELL'ANTARTIDE FELICE IPPOLITO
MUSEO ETRUSCO GUARNACCI
CASA DEL BOCCACCIO
MUSEO ETNOGRAFICO DELLA LUNIGIANA
MUSEO ETNOGRAFICO 'DON LUIGI PELLEGRINI'
MUSEO COMUNALE DEL FIGURINO STORICO
MUSEO CIVICO ALBANO 'MARIO ANTONACCI'
MUSEO CIVICO 'ADOLFO KLITSCHE DE LA GRANGE'
MUSEO STORICO DELLA COMUNICAZIONE
POLO MUSEALE PALAZZO FELICI
MUSEO CIVICO DI PALEONTOLOGIA DI EMPOLI
MUSEI DI VILLA BACIOCCHI - MUSEO ZOOLOGICO E CENTRO DI DOCUMENTAZIONE ARCHEOLOGICA DELLA VALDERA
PINACOTECA CIVICA
MUSEO DEI FOSSILI E MINERALI DEL MONTE NERONE
MUSEO DELLE TRADIZIONI POPOLARI DI CANEPINA
MUSEO 'LA REGGIA DEI VOLSCI'
MUSEO DI ZOOLOGIA DELL'UNIVERSITA' 'LA SAPIENZA'
MUSEO INTERNAZIONALE DELL'ETICHETTA DEL VINO
MUSEO DI STORIA DELLA MEZZADRIA 'SERGIO ANSELMI'
MUSEO ARCHEOLOGICO E PINACOTECA DEL PALAZZO MALATESTIANO
MAM - MUSEO ARCHIVIO DELLA MEMORIA
ARCHIVIO MUSEO DEI MALASPINA
MUSEO PINACOTECA COMUNALE
MUSEO DELLE ARTI E TRADIZIONI POPOLARI
MUSEO DI STORIA NATURALE DELLA MAREMMA
COMPLESSO MUSEALE SANTA MARIA DELLA SCALA
MUSEO DELLA CITTA' DI AQUINO KHALED AL ASAAD
MUSEO ARCHEOLOGICO DEL TERRITORIO TOLERIENSE
MUSEO DELLE ARTI MONASTICHE 'LE STANZE DEL TEMPO SOSPESO'
MUSEO DI STORIA NATURALE E DEL TERRITORIO
MUSEO DELLA TERRA PONTINA
MUSEO DI VILLA CARUSO BELLOSGUARDO
MUSEO ARCHEOLOGICO DEL TERRITORIO DI POPULONIA
MUSEO DELLE ORIGINI
MUSEO DI GEOLOGIA
POLO MUSEALE CITTA' DI SISTO V
MUSEO CIVICO ARCHEOLOGICO DELLE ACQUE
MUSEO ARCHEOLOGICO E AREE ARCHEOLOGICHE DI MONTELUPO FIORENTINO
MUSEO DI STORIA NATURALE
POLO MUSEALE PALAZZO DE CASTELLOTTI
MUSEO ARCHEOLOGICO COLFIORITO (MAC)
MUSEO DEI FUNGHI E DEI FOSSILI
MUSEO DELLA CIVILTA' CONTADINA VALLE DELL'ANIENE
MUSEO STORICO MILITARE ALPINI - FORZE ARMATE - ALPINO CAV. EMANUELE GALGANI
MUSEO ARCHEOLOGICO DI SEZZE
PALAZZO TRINCI
MUSEO TERRITORIALE DEL LAGO DI BOLSENA
MUSEO ARCHEOLOGICO, SPEZIERA DI SANTA FINA, GALLERIA D'ARTE MODERNA E CONTEMPORANEA 'RAFFAELE DE GARDA'
COMUNE DI BASSIANO
MUSEO CIVICO PALAZZO DEI CONSOLI
MUSEO NAPOLEONICO
Museo Archeologico del Casentino "Piero Albertoni"
MUSEO DELL'ARTE CLASSICA (GIPSOTECA)
MUSEO CIVICO FERRANTE RITTATORE VONWILLER
MUSEO DEL SANTUARIO DI SAN NICOLA
MUSEO DELLA CERAMICA
MUSEO STORICO GRANATIERI DI SARDEGNA
MUSEO CIVICO, ARCHEOLOGICO E DELLA COLLEGIATA
MUSEO CRIMINOLOGICO
MUSEO STORICO DELL'ARMA DEI CARABINIERI
MUSEO DEMOETNOANTROPOLOGICO DEL GIOCATTOLO
MUSEO CIVICO GIOVANNI FATTORI

	MUSEO DELLA GRAFICA
	MUSEO CIVICO PER LA PREISTORIA DEL MONTE CETONA
	MUSEO DI ANATOMIA COMPARATA
	MUSEO ARCHEOLOGICO COMUNALE
	MUSEO DELLA PREISTORIA DELLA TUSCIA E DELLA ROCCA FARNESE
	RACCOLTA DIDATTICA DI BUCINE
	MUSEO CIVICO ARCHEOLOGICO 'ISIDORO FALCHI'
	MUSEO DELLA FIGURINA DI GESSO E DELL'EMIGRAZIONE 'G.LERA'
	MUSEO CIVICO ARCHEOLOGICO E PINACOTECA 'EDILBERTO ROSA'
	MUSEO CIVICO ARCHEOLOGICO 'A.GENTILONI SILVERJ'
	museo novecento
	ANTIQUARIUM DI POGGIO CIVITATE
	MUSEO DEMOANTROPOLOGICO 'I VECCHI MESTIERI'
	MUSEO STORICO DELLA GUARDIA DI FINANZA
	MUSEO DELLA CITTA' E DEL TERRITORIO
	PINACOTECA CIVICA
	MUSEI DI PALAZZO DUCALE - MUSEO CIVICO, PINACOTECA, COLLEZIONE DI GRAFICA -
	CASA-STUDIO FERNANDO MELANI
	MUSEO DEL CRISTALLO
	LA CASA DEI RACCONTI
	MUSEO ARCHEOLOGICO DI MASSA MARITTIMA
	MUSEO DEL PAESAGGIO
	MUSEO CIVICO DI RIETI
	MUSEO CIVICO 'DUILIO CAMBELLOTTI'
	MUSEO 'PIETRO CANONICA' A VILLA BORGHESE
	MUSEO ARCHEOLOGICO ARTIMINO 'FRANCESCO NICOSIA'
	MUSEO DI PALAZZO VECCHIO
	MUSEO CIVICO E DIOCESANO LA CASTELLINA
	GALLERIA CIVICA D'ARTE CONTEMPORANEA G.B. SALVI - MAM'S
	MUSEO CIVICO ARCHEOLOGICO 'PIETRO E TURIDDO LOTTI'
	MUSEO ARCHEOLOGICO
	MUSEO ARCHEOLOGICO COMPRENSORIALE DEL MUGELLO ALTO MUGELLO E VALDISIEVE
	MUSEO ARCHEOLOGICO 'R. BIANCHI BANDINELLI'
	MUSEO DEL MARE E DELLA COSTA 'M. ZEI'
	Museo Archeologico del Chianti senese
	MUSEO CIVICO CITTA' DI OSIMO (SEZIONI ARTISTICA E ARCHEOLOGICA)
	MUSEO ETNOGRAFICO DELLA MEZZADRIA SENESE
	MUSEO ARCHEOLOGICO ALTO MUGELLO
	MUSEO CIVICO
	POLO MUSEALE PALAZZO LEOPARDI
	MUSEO DELLA CALZATURA 'CAV. VINCENZO ANDOLFI'
	PARCO E MUSEO VULCANOLOGICO
	MUSEO DELLA CIVILTA' CONTADINA
	MUSEO DELLO SBARCO ALLEATO-22 GENNAIO 1944
	MUSEO DI PREISTORIA E PROTOSTORIA DELLA VALLE DEL FIUME FIORA
	MUSEO DELLA CASA CONTADINA
	MUSEO STEFANO BARDINI
	MUSEO CIVICO ARCHEOLOGICO DI NEPI
	MUSEO ARCHEOLOGICO DI ORBETELLO
	MUSEI CIVICI DI PALAZZO MOSCA
	MUSEO ARCHEOLOGICO COMUNALE
	MUSEO ARCHEOLOGICO REGIONALE 'PIETRO GRIFFO' DI AGRIGENTO
	MUSEO DEL SANNIO
	MUSEO ARCHEOLOGICO REGIONALE EOLIANO 'LUIGI BERNABO' BREA A LIPARI
	MUSEO ARCHEOLOGICO REGIONALE 'PAOLO ORSI'
GALLERY	CENTRO MUSEI DELLE SCIENZE NATURALI
	CASA MUSEO 'LUIGI CAPUANA' E BIBLIOTECA COMUNALE LUIGI CAPUANA
PUBLIC	BIBLIOTECA MUSEO LUIGI PIRANDELLO
	MUSEO NATURALISTICO 'FRANCESCO MINA' PALUMBO'
SOUTH	MUSEO DI PALEONTOLOGIA E GEOLOGIA 'GAETANO GIORGIO GEMMELLARO'
	MUSEO PROVINCIALE CAMPANO
	MUSEO REGIONALE DI KAMARINA
	MUSEO DEL CARBONE
	MUSEO CIVICO DELLA CULTURA MATERIALE
	MUSEO DI STORIA NATURALE DEL VULTURE

MUSEO MINERALOGICO
MUSEO REGIONALE CASA MUSEO ANTONINO UCCELLO
MUSEO IRPINO
MUSEO DEL MARE
MUSEO CIVICO 'EMANUELE BARBA'
MUSEO ARCHEOLOGICO REGIONALE DI GELA
MUSEO DI ZOOLOGIA 'PIETRO DODERLEIN'
MUSEO REGIONALE DELLA CERAMICA DI CALTAGIRONE
CASA MUSEO IS LOLLAS DE IS AIAIUSU
MUSEO ARCHEOLOGICO FERRUCCIO BARRECA
MUSEO CIVICO ETNO-ANTROPOLOGICO E ARCHIVIO STORICO 'MARIO DE MAURO'
MUSEO UNIVERSITARIO DELL'UNIVERSITA' G.D'ANNUNZIO
POLO MUSEALE CIVICO CERIGNOLA (MUSEO DEL GRANO)
MUSEO PROVINCIALE SIGISMONDO CASTROMEDIANO
MUSEO STORICO DELLO SBARCO IN SICILIA - 1943
MUSEO DELLA VITA E DELLE TRADIZIONI POPOLARI SARDE
CASA MUSEO GIOVANNI VERGA
MUSEO REGIONALE DI AIDONE
MUSEO ETNOGRAFICO DI MORIGERATI
MUSEO COMUNALE CITTA' DI SAVOCA STORICO-ETNO-ANTROPOLOGICO
ECOMUSEO DELLA MONTAGNA SARDA O DEL GENNARGENTU
MUSEO ARCHEOLOGICO SANTADI
Museo di Zoologia
MUSEO ETNOGRAFICO 'ANTICO MULINO AD ACQUA LICHERI'
MUSEO CALABRESE DI ETNOGRAFIA E FOLKLORE 'R. CORSO'
CISMUS - Centro Interdipartimentale di Servizi per la Museologia Scientifica
MUSEO DI SCIENZE NATURALI BELVI'
MUSEO ARCHEOLOGICO DORGALI
MUSEO ARCHEOLOGICO REGIONALE DI CENTURIPE
MUSEO CIVICO DI STORIA NATURALE
ANTIQUARIUM COMUNALE DI IRGOLI
MUSEO CIVICO DEI BRETTII E DEGLI ENOTRI
MUSEO ARCHEOLOGICO PROVINCIALE FRANCESCO RIBEZZO DI BRINDISI
MUSEO CIVICO CARLO GAETANO NICASTRO
MEOC (Museo Etnografico Oliva Carta Cannas)
MUSEO CIVICO ARCHEOLOGICO 'BIAGIO GRECO'
MUSEO REGIONALE INTERDISCIPLINARE DI ENNA
MUSEO ETNOGRAFICO 'SA DOMO MANNA'
MUSEO ARCHEOLOGICO REGIONALE DI MARIANOPOLI
MUSEO REGIONALE DI TERRASINI
MUSEO ARCHEOLOGICO ROMUALDI
MUSEO DELLE CIVILTA' E DEL COSTUME D'EPOCA
MUSEO CIVICO PIETRO CAVOTI
NUOVO MUSEO ARCHEOLOGICO CIVICO DI UGENTO
MUSEO DI MINERALOGIA
MUSEO ARCHEOLOGICO DI PALAZZO CAPPELLANI
GALLERIA D'ARTE MODERNA E CONTEMPORANEA 'R. GUTTUSO'
FONDAZIONE CULTURALE MUSEO CIVICO DI BISACQUINO
MUSEO ARCHEOLOGICO ETNOGRAFICO PALAZZO ATZORI
MUSEO 'SA DOMU NOSTA'
ANTIQUARIUM ARCHEOLOGICO
MUSEO DELL'ABRUZZO BIZANTINO ED ALTO MEDIOEVALE
CIVICO MUSEO ARCHEOLOGICO ALLE CLARISSE
MUSEO CIVICO DELLA PIETRA CHIARA MARINELLI
PERCORSO MUSEALE MONUMENTALE SEHUIENSE
MUSEO ARCHEOLOGICO DI PALAZZO PANITTERI
CASA MUSEO DELLA TECNOLOGIA CONTADINA 'TIU VIRGILIU'
MUSEO 'BALDASSARE ROMANO'
MUSEO CIVICO DI SCIENZE NATURALI 'ANGELO PRIOLO'
MUSEO INTERDISCIPLINARE REGIONALE DI MESSINA
MUSEO ETNOGRAFICO 'SU MAGASINU 'E SU BINU'
PINACOTECA PROVINCIALE DI SALERNO
MUSEO DEMOLOGICO DELL'ECONOMIA, DEL LAVORO E DELLA STORIA SOCIALE SILANA
CIVICO MUSEO ARCHEOLOGICO 'VILLA ABBAS'
MUSEO ETNO-ANTROPOLOGICO DELLE MADONIE

	CASA MUSEO 'G.MAZZARINO'
	MUSEO ARCHEOLOGICO PROVINCIALE DI POTENZA
	MOSTRA ARTIGIANATO E ANTICHI MESTIERI
	ANTIQUARIUM
	MUSEO DI PALEONTOLOGIA E SCIENZE NATURALI DELL' ASPROMONTE
	ANTIQUARIUM - MUSEO CIVICO COMUNALE
	MUSEO DELLA CIVILTA' CONTADINA
	ANTIQUARIUM FILIPPO BUONOPANE
	ISTITUZIONE MUSEO CIVICO
	Centro museale 'Musei delle Scienze Agrarie - MUSA'. UniversitÓ di Napoli Federico II
	MUSEO STORICO DELLA SALINA DI MARGHERITA DI SAVOIA
	MUSEO CIVICO DI PALEONTOLOGIA E PALETNOLOGIA 'DECIO DE LORENTIIS'
	MUSEO ARCHEOLOGICO COMPRENSORIALE
	MUSEO REGIONALE 'Saro Franco'
	MUSEO CIVICO CASTELLO URSINO
	COLLEZIONE MUSEOLOGICA BOTANICA
	MUSEO DEL COSTUME E DELLA MODA SICILIANA
	MOSTRA PERMANENTE DI ARCHEOLOGIA E ANTROPOLOGIA
	MUSEO CIVICO 'GIOVANNI MARONGIU'
	MUSEO DI CIMELI STORICO MILITARI
	CASA MURGIA
	MUSEO DI PALEOBOTANICA ED ETNOBOTANICA
	MUSEO DI BIOLOGIA MARINA 'PIETRO PARENZAN'
	POLO MUSEALE CASA ZAPATA
	MUSEO ARCHEOLOGICO REGIONALE LILIBEO DI MARSALA
	GALLERIA COMUNALE D'ARTE MUSEI CIVICI
	MUSEO DELL'OSSIDIANA
	MUSEO DELL'ALTO TAVOLIERE DI SAN SEVERO
	MUSEO CIVICO ARCHEOLOGICO DI BISACCIA
	FONDAZIONE MUSEO ETTORE GUATELLI
	LOUISIANA JAZZ CLUB MUSEUM
	COLLEZIONE BAGNI EGART MUSEO REALE E IMPERIALE (K.u.K. Museum Bad Egart)
	IL MUSEO DEL VILLANO DI VILLA BADOER FATTORETTO
	CASA NATALE DI ANTONIO ROSMINI
	MUSEO NAZIONALE DEL SOLDATINO 'M. MASSACCESI'
	MUSEO DEL BOTTONE
	BIBLIOTECA D'ARTE E DI STORIA SAN GIORGIO IN POGGIALE
	MUSEO DELLE ARTI RURALI
	PRIMO MUSEO ITALIANO DELLA PIPA
	CASA ZEGNA
	MUSEO DON BOSCO DI STORIA NATURALE E APPARECCHIATURE SCIENTIFICHE DEL LICEO VALSALICE
	MUSEO CAMILLO LEONE
	MUSEO ETNOGRAFICO DELLA CIVILTA' E DEL LAVORO IN POLESINE
	MUSEO ENTOMOLOGICO 'NEL REGNO DELLE FARFALLE' ONLUS
	MUSEO DEL VINO 'VIGNETI PIETRO PITTARO' (CODROIPO)
GALLERY	MUSEO TIBALDO GIANCARLO
	MUSEO INTERNAZIONALE DELLE CERAMICHE IN FAENZA
PRIVATE	ISTITUTO ALCIDE CERVI
	MUSEO ETNOGRAFICO C'ERA UNA VOLTA
NORTH	MUSEO UOMO NEL TEMPO (MUSEUM ZEITREISE MENSCH)
	MUSEO DI SCIENZE NATURALI DEL COLLEGIO S. FRANCESCO
	MUSEO DEL FALEGNAME TINO SANA
	MUSEO ETNOGRAFICO 'SGURI'
	MUSEO DI PREDELLI GIANNI
	COLLEZIONE ETNOGRAFICA MUSEO RUTTAR MARIO
	MUSEO NAZIONALE DELLA FOTOGRAFIA CINEFOTOCLUB
	MUSEI DEL COLLEGIO MELLERIO ROSMINI
	MUSEO ARTISTICO E STORICO DI PALAZZO BORROMEO
	MUSEO STORICO ITALIANO DELLA GUERRA ONLUS
	MUSEO DEL PRECINEMA - COLLEZIONE MINICI ZOTTI
	MUSEO DEL MODELLISMO STORICO
	MUSEO CARNICO DELLE ARTI POPOLARI 'MICHELE GORTANI'
	RACCOLTA DI COSE MONTESINE
	FONDAZIONE PALAZZO CORONINI CRONBERG ONLUS
	MUSEO NAVALE INTERNAZIONALE DEL PONENTE LIGURE

COLLEZIONE PRIVATA DI STORIA CONTADINA
MUSEO DEI CUCHI
FONDAZIONE EMILIO CARLO MANGINI
Fondazione Artistica Poldi Pezzoli 'Onlus'
MUSEI MAZZUCCHELLI
MUSEO ARTI E MESTIERI DI UN TEMPO
MUSEO DELLE ANTICHITA' EGIZIE
MOSTRA DELLA GUERRA BIANCA ADAMELLINA 1914-1918
MUSEO ETNOGRAFICO DELLE TRADIZIONI POPOLARI
FONDAZIONE POLLI-STOPPANI (ONLUS)
MUSEO STORICO 'LA ZONA CARNIA NELLA GRANDE GUERRA'
MUSEO DI STORIA NATURALE 'A. STOPPANI'
MUSEO DELLA FARMACIA DI BRESSANONE
MUSEO DEI SOGNI, COSCIENZA, MEMORIA E PRESEPI
MUSEO DEI COMBATTENTI
STORIA NATURALE E SCIENZE NATURALI - CENTRO DIDATTICO IL PENDOLINO
MUSEO DELLA CIVILTA' CONTADINA DI PIACENZA
MAGAZZINO DEI RICORDI - MUSEO DI ARTE, CULTURA E AGRICOLTURA
MUSEO NAZIONALE DEL RISORGIMENTO ITALIANO
ACQUARIO E MUSEO ETNOGRAFICO DEL PO
MUSEO DELLE CONTADINERIE E DEL GIOCATTOLO ANTICO
MUSEO DEL MOBILE E DELLA CULTURA VALLIGIANA 'ABITARE IN VALLE'
MUSEO ETNOGRAFICO DEGLI ZATTIERI DEL PIAVE
MUSEO DIOCESANO DI VICENZA
FONDAZIONE FIORONI MUSEI E BIBLIOTECA PUBBLICA LEGNAGO
MUSEO NAZIONALE DELLA SCIENZA E DELLA TECNOLOGIA LEONARDO DA VINCI
MUSEO ETNOGRAFICO DELLA VAL TREBBIA
GALLERIA ALBERONI
MUSEO STORICO MILITARE CULTURALE 'VIDOTTO' - CASA DEL BERSAGLIERE
MUSEO DELLA CIVILTA' SOLANDRA
MUSEO CLARENCE BICKNELL
MUSEO NUMISMATICO DELLA FONDAZIONE BANCA AGRICOLA MANTOVANA (BAM)
MESSNER MOUNTAIN MUSEUM FIRMIAN
MUSEO STORICO NOVARESE 'ALDO ROSSINI'
MUSEO E PINACOTECA DIOCESANI
MAGI'900 - MUSEO DELLE ECCELLENZE ARTISTICHE E STORICHE
FONDAZIONE CARIPARMA
GALLERIA DELL'ACCADEMIA TADINI
MUSEO DEL PROFUMO
MUSEO MINERALOGICO E NATURALISTICO
PALAZZO BORROMEO E GIARDINO DELL'ISOLA MADRE
MUSEO DELLE DONNE (FRAUENMUSEUM)
CENTRO DOCUMENTAZIONE LUSERNA ONLUS- DOKUMENTATIONSZENTRUM LUSERN ONLUS
MUSEO LA ROCCA DELLE FIABE
MUSEO CASA DEL PODESTA'
MUSEO ETNOGRAFICO COUMBOSCURO DELLA CIVILTA' PROVENZALE IN ITALIA
MUSEO DI ARTI DECORATIVE ACCORSI - OMETTO
MUSEO DIDATTICO DELLA SETA
MUSEO DELLA VITA CONTADINA NELL'OTTOCENTO
CASA DELLE CONTADINERIE
PICCOLO MUSEO DI BAMBOLE E ALTRI BALOCCHI
MUSEO DEL PARMIGIANO REGGIANO - CIVILTA' CONTADINA E ARTIGIANA DELLA VAL D'ENZA
MUSEO DELL'AVIAZIONE
MUSEO DEL GIOCATTOLO E DEL BAMBINO
MUSEO DI PIO MARIANI
MUSEO DIOCESANO PALAZZO VESCOVILE
1915 - 1918 COLLEZIONE ROVINI
MUSEO STORICO DEL FRIULI OCCIDENTALE
MUSEO DELLA GUERRA BIANCA IN ADAMELLO
MOSTRA PERMANENTE DELLA GRANDE GUERRA IN VALSUGANA E SUL LAGORAI
MUSEO DEL LINO
Museo della Calzatura di Villa Foscarini Rossi
MOSTRA DI PRESEPI ANTON STABINGER - KRIPPENSAMMLUNG VON ANTON STABINGER
MUSEO ARCHEOLOGICO LOMELLINO
MUSEO DI CULTURA POPOLARE

	MUSEO DELLA FRUTTICOLTURA SUDTIROLESE
	MUSEO BAGATTI VALSECCHI
	MUSEO PALEONTOLOGICO 'MICHELE GORTANI'
	FONDAZIONE MUSEO 'GLAUCO LOMBARDI'
	FONDAZIONE MUSEO DELL'OCCHIALE ONLUS
	MUSEO VALDESE
	PINACOTECA REPOSSI
	MUSLI-MUSEO DELLA SCUOLA E DEL LIBRO PER L'INFANZIA (FONDAZIONE TANCREDI DI BAROLO)
	MUSEO MINISCALCHI ERIZZO
	MUSEO DELL'UOMO E DELL'AMBIENTE
	CENTRO DI DOCUMENTAZIONE DELL'INDUSTRIA ITALIANA DELLE PIASTRELLE DI CERAMICA
	MUSEI DEL SEMINARIO VESCOVILE
	MUSEO D'ARTE CINESE ED ETNOGRAFICO
	CASA BRUSESCHI - PICCOLO MUSEO DELLA CASA CARNICA
	ESPOSIZIONE CIMELI STORICI MILITARI
	CA' DA SITTA - MUSEO DI CIVILTA' CONTADINA
	Museo Casa Museo Pietro Malossi
	MUSEO CABRINIANO DI CODOGNO
	LA MACCHINA DEL TEMPO - MUSEO STORICO ALFA ROMEO
	MUSEO DELLA BASILICA DI SANT'AMBROGIO
	Kartellmuseo
	RACCOLTA MUSEALE FRANCO LEONI
	MUSEO ETNOLOGICO MISSIONARIO
	MUSEO NAZIONALE DELLA MONTAGNA DUCA DEGLI ABRUZZI
	PINACOTECA DI VARALLO - MUSEO CALDERINI
	MESSNER MOUNTAIN MUSEUM RIPA
	MUSEO AGRICOLO DI BRUNNENBURG (CASTEL FONTANA)
	MUSEO DELLA GRAPPA E DEL VINO VILLA DE VARDA
	MUSEO DEL LABORATORIO FARMACEUTICO FOLETTO
	MUSEO MINERALOGICO E PALEONTOLOGICO DEL CENACOLO ITALO MUS
	MIM BELLUNO - MUSEO INTERATTIVO DELLE MIGRAZIONI
	FONDAZIONE MUSEO DELLO SCARPONE E DELLA CALZATURA SPORTIVA
	MUSEO DELLA CIVILTA' CONTADINA O.N.L.U.S.
	MUSEO DIOCESANO D'ARTE SACRA
	MUSEO MINERALOGICO KIRCHLER
	MUSEO DEGLI ALPINI
	MUSEO DELLA BASILICA
	MUSEO DELLA SCUOLA - SCHULMUSEUM
	COLLEZIONE NAVARINI (MUSEO DEL RAME)
	CENTRO DI DOCUMENTAZIONE DELLE ARTI GRAFICHE 'GRIFANI-DONATI 1799'
	MUSEO DI STORIA NATURALE DELL'ACCADEMIA DEI FISIOCRITICI
	MUSEO DI PIANA DELLE ORME
	Accademia Georgica
	MUSEO 'STIBBERT'
	CASA LEOPARDI
	MUSEO STORICO ETNOGRAFICO DEL MINATORE E CAVATORE
	CASA MUSEO DI IVAN BRUSCHI
	MUSEO E ISTITUTO FIORENTINO DI PREISTORIA
	KEATS-SHELLEY HOUSE
	MAEC (MUSEO DELL'ACCADEMIA ETRUSCA E DELLA CITT L DI CORTONA)
GALLERY	ISTITUTO DI STUDI PIRANDELLIANI
	SOCIETA' DI STUDI FIUMANI
PRIVATE	MUSEO CASA DI ZELA
	COLLEZIONE ACTON - VILLA LA PIETRA
CENTRE	CENTRO DI SCIENZE NATURALI DI GALCETI
	MUSEO AGOSTINELLI
	MUSEO DELLA CIVILTA' CONTADINA E ARTIGIANA
	FONDAZIONE MORI - MUSEO STORICO DEL TROTTO
	MOLINO DI MENICONE
	MUSEO DELLA CATTEDRALE DI ANAGNI
	MUSEO STORICO DELLA LINEA GOTICA
	MUSEO DELLA CIVILTA' CONTADINA DI CASA D'ERCI
	FONDAZIONE SCIENZA E TECNICA DI FIRENZE - MUSEO, GABINETTO E PLANETARIO
	ANTICO PALAZZO DEI VESCOVI E MUSEO DELLA CATTEDRALE DI SAN ZENO
	MUVIT MUSEO DEL VINO

	MUSEO DELL'INFANZIA
	MUSEO ETNOLOGICO DELLE APUANE 'Luigi Bonacoscia'
	STUDIO MORETTI CASELLI - MUSEO LABORATORIO DI VETRATE ARTISTICHE
	GRUPPO AVIS MINERALOGIA PALEONTOLOGIA SCANDICCI (Scienze della Terra) G.A.M.P.S.
	MUSEO DELLA CASA CONTADINA
	MUSEO-ANTICO TESORO DELLA SANTA CASA DI LORETO
	MUSEO 'MARIA SOFIA GIUSTINIANI BANDINI' PRESSO IL CASTELLO DI LANCIANO
	RACCOLTA RURALE CASA ROSSI
	MUSEO FRANCESCANO DELL'ISTITUTO STORICO DEI CAPPUCCINI
	MUSEO DEI MEZZI DI COMUNICAZIONE
	MUSEO CIVICO DI STORIA NATURALE
	IL MONDO DI TONINO GUERRA
	MUSEI DI S.AGATA - ARTE SACRA E ARCHEOLOGIA
	MUSEO DEL LAVORO E DELLE TRADIZIONI POPOLARI DELLA VERSILIA STORICA
	MUSEO DELLA CIVILTA' CONTADINA CASA DEI
	MUSEO DELLE ARTI E MESTIERI, DELLA CASA E DELLA CIVILITA' POPOLARE
	MUSEO 'V.F. PIERSANTI'
	ISTITUTO E MUSEO DI STORIA DELLA SCIENZA - MUSEO GALILEO
	TESTIMONIANZE DI VITA RURALE NELLA BASSA VALLE DEL FOGLIA
	CENTRO DI DOCUMENTAZIONE E RICERCHE SULLA SECONDA GUERRA MONDIALE
	MUSEO DEL COLLE DEL DUOMO
	MUSEO SALVATORE FERRAGAMO
	COLLEZIONE GIUSEPPE CULTRERA - MUSEO DELLA CERAMICA, DELLA SOCIETA' TARQUINIENSE, D'ARTE E STORIA
	CASA MUSEO DI PALAZZO SORBELLO
	MUSEO LEONARDI
	MUSEO ETRUSCO DI POPULONIA - COLLEZIONE GASPARRI
	PALAZZO BALDESCHI AL CORSO
	FONDAZIONE MUSEO DEL CALCIO
	MUSEO TIPOLOGICO INTERNAZIONALE DEL PRESEPIO 'ANGELO STEFANUCCI'
	MUSEO DIOCESANO DI LIVORNO
	VILLA MUSEO GIACOMO PUCCINI
	MUSEO OVOTECA 'OVO PINTO'
	MUSEO DELLO SBARCO DI ANZIO
	GALLERIA DORIA PAMPHILJ
	MUSEO E PINACOTECA INTERNAZIONALE DEL PRESEPIO
	MUSEO UGO GUIDI
	MUSEO ETIOPICO G. MASSAIA
	MUSEO DEL DUOMO
	Fondazione Casa Buonarroti
	PALAZZO VITI
	MUSEO DELL'OLIVO E DELL'OLIO
	FONDAZIONE MONTANELLI BASSI
	MUSEO LEPINO DELLA CIVILTA' CONTADINA
	MUSEO DIOCESANO PRENESTINO DI ARTE SACRA
	MUSEO DIOCESANO DI CIVITAVECCHIA-TARQUINIA
	MUSEO AZIENDALE 'GORI & ZUCCHI' (UNO A ERRE)
	MUSEO DEL CENTRO CAPRENSE IGNAZIO CERIO
	MUSEO ETNO-ANTROPOLOGICO 'NELLO CASSATA'
	CASA MUSEO RIBEZZI-PETROSILLO
	RACCOLTA PRIVATA GEOLOGICA, MINERALOGICA E MALACOLOGICA P.D'AGOSTINO
	MUSEO MALACOLOGICO DI VIESTE
	MUSEO MISSIONARIO CINESE E DI STORIA NATURALE
GALLERY	POLIMUSEO PROVINCIALE A. ZARINO
	MUSEO ETNOGRAFICO GALLURAS, il museo della femina agabbadora
PRIVATE	FONDAZIONE 'FAMIGLIA PICCOLO DI CALANOVELLA'
	MUSEO GIUSEPPE WHITAKER
SOUTH	MUSEO CORREALE DI TERRANOVA
	MUSEO MINERALOGICO CAMPANO
	MUSEO MANDRALISCA
	MUSEO DELLE GENTI D'ABRUZZO
	ECOMUSEO LUOGO DELLA MEMORIA
	MUSEO - PINACOTECA E PRESEPE MONUMENTALE DEI FRATI CAPPUCCINI
	MUSEO DELLA LIQUIRIZIA 'GIORGIO AMARELLI'
	MUSEO DEL MARE DELL'ISOLA D'ISCHIA

	VILLA MUSCAS CENTRO DELLA CULTURA CONTADINA
	MUSEO ETNOGRAFICO 'LE ARTI ANTICHE'
	MEAM - MUSEO ETNOGRAFICO AFRICA-MOZAMBICO
	MUSEO NATURALISTICO - FONDAZIONE IRIDIA
	MUSEO DI PULCINELLA, DEL FOLKLORE E DELLA CIVILT└ CONTADINA
	MUSEO DELL'ARTE DELLA TECNOLOGIA CONFETTIERA
	MUSEO DIOCESANO DEL SANTUARIO PONTIFICIO DELLA BEATA VERGINE DEL ROSARIO
	MUSEO ETNOGRAFICO 'FRANCESCO PRELORENZO'
	MUSEO ECCLESIASTICO DELLA CONCATTEDRALE BASILICA DI SAN SABINO
	MUSEO ETNOGRAFICO CERIGNOLANO STUPPIELLO
	CASTELLO GIUDICALE ELEONORA D'ARBOREA MUSEO DEL RISORGIMENTO E COLLEZIONE DI CEROPLASTICHE
	MUSEO EOLIANO DELL'EMIGRAZIONE
	FONDAZIONE DEI MUSEI CIVICI
	MUSEO ETNOGRAFICO 'SAN NILO'
	MUSEO DEL GIOCATTOLO 'PIETRO PIRAINO'
	MUSEO DEL GIOCATTOLO
	MUSEOBOTTEGA DELLA TARSIALIGNEA
	MUSEO DELLE ARTI E DELLE TRADIZIONI POPOLARI DI RICCIA
	MUSEO STORICO DELLA CAMPANA GIOVANNI PAOLO II
	MUSEO DELLA CIVILTA' CONTADINA DEL SALENTO
	CENTRO STUDI NATURALISTICI DEL POLLINO 'IL NIBBIO'
	MUSEO DIOCESANO PROVINCIALE DI ARTE SACRA
	MUSEO DIOCESANO DI BARI-BITONTO
	MUSEO " EX VOTO dei SS.MM. ALFIO FILADELFO CIRINO "
	MUSEO LABORATORIO DELLA CIVILTA' CONTADINA DI MATERA
	MUSEO DIOCESANO ARTE SACRA
	MUSEO BIOLOGIA MARINA E PALEONTOLOGIA
	MUSEO DEL SOTTOSUOLO DI LATIANO
	MUSEO DIOCESANO DI SASSARI
	MUSEO DEL PALMENTO
	MUSEI DELLA BASILICA SANTUARIO SAN MICHELE ARCANGELO
	MUSEO DELLA CIVILTA' CONTADINA 'L'ANGOLO DELLA MEMORIA'
	MUSEO DELLA CIVILT└ CONTADINA 'MICHELE RUSSO'
	MUSEO CASA MANNO
	COLLEZIONE SPADA ANTICHI STRUMENTI MUSICALI
	MUSEO DELLA GUERRA PER LA PACE
	PIO MONTE DELLA MISERICORDIA
	MUSEO DEL MARE DI NAPOLI - FONDAZIONE THETYS
	MUSEO INTERNAZIONALE DEL PRESEPIO IN MINIATURA 'Guido Colitti' - fondato nel 1932.
	MUSEO DI SAN NICOLÊ
	MUSEO CULTURA E MUSICA POPOLARE DEI PELORITANI
	MUSEO NAZIONALE ETRUSCO 'POMPEO ARIA' E AREA ARCHEOLOGICA
	MUSEO ARCHEOLOGICO NAZIONALE E ZONA ARCHEOLOGICA DI LUNI
	PARCO ARCHEOLOGICO E ANTIQUARIUM
AREA	AREA ARCHEOLOGICA E ANTIQUARIUM DI VELEIA
STATE	AREE ARCHEOLOGICHE DI AQUILEIA (FORO ROMANO, PORTO FLUVIALE)
	BASILICA PALEOCRISTIANA DI CONCORDIA SAGITTARIA
NORTH	PARCO NAZIONALE DELLE INCISIONI RUPESTRI
	PARCO ARCHEOLOGICO DEL TEATRO E DELL'ANFITEATRO
	PARCO ARCHEOLOGICO NAZIONALE DEI MASSI DI CEMMO
	PARCO DELLE INCISIONI RUPESTRI CON RUPE MAGNA DI GROSIO
	FORO ROMANO E PALATINO
	SCAVI DI OSTIA ANTICA E MUSEO
	IPOGEO DEI VOLUMNI E NECROPOLI DEL PALAZZONE
AREA	COMPLESSO ARCHEOLOGICO DI MALBORGHETTO
STATE	VILLA DI LIVIA
	VILLA DEI QUINTILI \TENUTA DI S.MARIA NOVA
CENTRE	TEATRO ROMANO E ANTIQUARIUM
	COMPRENSORIO ARCHEOLOGICO DI MINTURNAE E PONTE BORBONICO REAL FERDINANDO
	AREA ARCHEOLOGICA DI VILLA ADRIANA
	AREA DEL FORO E DOMUS PRIVATAE DELLA CITTA' ROMANA DI VOLSINII
AREA	MUSEO ARCHEOLOGICO 'LA CIVITELLA'
	PARCO ARCHEOLOGICO DELL'AREA URBANA
STATE	TEMPIO DELLE TAVOLE PALATINE
	AREA ARCHEOLOGICA DI HERAKLEIA

SOUTH	MUSEO E PARCO ARCHEOLOGICO NAZIONALE DI SCOLACIUM
	PARCO ARCHEOLOGICO DI IUVANUM
	ANTIQUARIUM E ZONA ARCHEOLOGICA DI CANNE DELLA BATTAGLIA
	ANTIQUARIUM NAZIONALE DI BOSCOREALE
	VILLA MARITTIMA E ANTIQUARIUM DI MINORI
	AREA ARCHEOLOGICA 'NURAGHE LOSA'
	PARCO ARCHEOLOGICO DI ELEA-VELIA
	PARCO ARCHEOLOGICO E MUSEO ALL'APERTO DELLA TERRAMARA DI MONTALE
	MUSEO DELLA VALCHIAVENNA
AREA	IL COVOLO DI BUTISTONE 'IL CASTELLO NELLA ROCCIA'
	BRIXIA PARCO ARCHEOLOGICO DI BRESCIA ROMANA
PUBLIC	PARCO DELLE INCISIONI RUPESTRI DI GROSIO
	MUSEO DIDATTICO DELLA RISERVA NATURALE E INCISIONI RUPESTRI PASPARDO
NORTH	S.A.S.S. - SPAZIO ARCHEOLOGICO SOTTERRANEO DEL SAS
	TEATRO ROMANO
	SCAVI CHIESA PALEOCRISTIANA DI SAN LORENZO
	CRIPTOPORTICO FORENSE
	AREA ARCHEOLOGICA E MUSEO 'LA FENICE'
	DOMUS ROMANE DI PALAZZO VALENTINI
AREA	MUSEO ARCHEOLOGICO 'TIFERNUM MATAURENSE'
	MUSEO DEI FORI IMPERIALI NEI MERCATI DI TRAIANO
PUBLIC	CASE ROMANE DEL CELIO
	MUSEO DI CASAL DE PAZZI
CENTRE	MUSEO CIVICO ARCHEOLOGICO - AREA ARCHEOLOGICA LA CUMA
	AREA ARCHEOLOGICA DI VIA DELL'ABBONDANZA
	PADIGLIONE ESPOSITIVO 'GUGLIELMO LERA' - AREA ARCHEOLOGICA 'MASSACIUCCOLI ROMANA'
	MUSEO REGIONALE INTERDISCIPLINARE DI CATANIA
	PARCO ARCHEOLOGICO DI HIMERA
	COMPLESSO NURAGICO AREA DI SANTA CRISTINA
	AREA ARCHEOLOGICA DI PALIKE'
	AREA ARCHEOLOGICA TEATRO ANTICO E ANTIQUARIUM DI TINDARI
	Parco Archeologico di Solunto
	PARCO ARCHEROLOGICO DI MONTE IATO
AREA	AREA ARCHEOLOGICA 'SU MULINU'
	PARCO ARCHEOLOGICO E ANTIQUARIUM DI S.LEUCIO
PUBLIC	PARCO ARCHEOLOGICO VALLATA DEL SAN PASQUALE ARCHEODERI
	PARCO ARCHEOLOGICO DI NAXOS
SOUTH	VILLA ROMANA DI PATTI
	AREA ARCHEOLOGICA PARCO FORZA
	VILLAGGIO NURAGICO 'NURAGHE APPIU
	PARCO ARCHEOLOGICO E PAESAGGISTICO DELLA VALLE DEI TEMPLI
	NURAGHE ADONI
	PARCO ARCHEOLOGICO DEI DAUNI 'PASQUALE ROSARIO'
	AREA ARCHEOLOGICA DI ANTAS (TEMPIO PUNICO ROMANO)
	PARCO ARCHEOLOGICO E NATURALISTICO DEL TACCU DI OSINI
AREA PRIVATE NORTH	ARCHEOPARC VELTURNO
AREA PRIVATE CENTRE	DOMUS ROMANA LUCCA CASA DEL FANCIULLO SUL DELFINO
AREA	MUSEO DIOCESANO DI ISCHIA
	CATACOMBE DI NAPOLI
PRIVATE	CENTRO VISITE DELLA GROTTA DI LAMALUNGA
SOUTH	
	CASTELLO DI RACCONIGI
	PARCO DEL CASTELLO DI RACCONIGI
	MUSEO NAZIONALE DI VILLA PISANI
MONUMENT	CASTELLO DUCALE DI AGLIE'
	FORTEZZA DI SAN LEO
STATE	LA VENARIA REALE
	ABBAZIA DI POMPOSA E MUSEO POMPOSIANO
NORTH	PALAZZO BESTA
	CASTELLO DI CANOSSA E MUSEO NAZIONALE 'NABORRE CAMPANINI'
	CAMERA DI SAN PAOLO

MONUMENT STATE CENTRE	MUSEO NAZIONALE DELLA CERTOSA MONUMENTALE DI CALCI
	VILLA LANTE
	ANFITEATRO FLAVIO (COLOSSEO)
	PALAZZO ALTIERI
	ABBAZIA DI CASAMARI
	MUSEO NAZIONALE DI CASTEL SANT'ANGELO
	ABBAZIA GRECA DI SAN NILO
	MONASTERO DI SAN BENEDETTO SACRO SPECO
	MONASTERO DI SANTA SCOLASTICA
	BASILICA DI S. FRANCESCO - AFFRESCHI DI PIERO DELLA FRANCESCA
MONUMENT STATE SOUTH	REGGIA DI CASERTA
	CERTOSA DI SAN LORENZO
	CASTEL SANT'ELMO
	MONUMENTO NAZIONALE DEI GIROLAMINI
	ABBAZIA DI SAN CLEMENTE A CASAURIA
	CHIESA SAN PIETRO AD ORATORIUM
	CERTOSA DI SAN GIACOMO
	CHIESA DI SAN DOMENICO AL CORSO
	CHIESA DI SAN PIETRO IN ALBA FUCENS
	TAVERNA DUCALE
MONUMENT PUBLIC NORTH	CERTOSA MONUMENTALE
	COMPLESSO MUSEALE CASTELLO DI BARDI
	MUSEO CIVICO DI PALAZZO TE
	MUSEO ROCCA SANVITALE
	COMPLESSO DI SAN PIETRO E MUSEO ARCHEOLOGICO
	PALAZZINA DI CACCIA DI STUPINIGI
	ROCCA SFORZESCA - COLLEZIONI D'ARMI E DI CERAMICHE
	MUSEO DELLA ROCCA DI DOZZA
	VILLA FARAGGIANA
	FONDAZIONE CAMILLO CAVOUR-CASTELLO CAVOUR
	RACCOLTA MUSEALE MEMORIA DELLA COMUNITA'
	CASTELLO DI ISSOGNE
	PALAZZO VERTEMATE FRANCHI
	MUSEO DEL CASTELLO SCALIGERO DI TORRI DEL BENACO
	ROCCA ESTENSE- PINACOTECA COPPELLI
	SACRO MONTE DI CREA
MONUMENT PUBLIC CENTRE	CASTELLO DEI CONTI GUIDI - MOSTRE PERMANENTI
	CASA MUSEO PASCOLI
	PARCO ARCHEOMINERARIO DI SAN SILVESTRO
	MUSEO DELLA ROCCA DI CAMPIGLIA
	MUSEO DEL CASTELLO E DELLA CITTA' DI PIOMBINO
	MUSEO DELLE ARMI ANTICHE ROCCA MEDIEVALE
	MUSEO DI SANTA MARIA NOVELLA
	CHIESA DI SAN FRANCESCO
	CHIESA DI SANTA MARIA NUOVA
	MUSEO CIVICO CONVENTO S. FRANCESCO
	CAPPELLA BRANCACCI
	PALAZZO DEI PRIORI DI VOLTERRA
MONUMENT PUBLIC SOUTH	MUSEO CIVICO 'F. L. BELGIORNO'
	COMPLESSO MINERARIO DI MONTEVECCHIO (MINIERA DI PICCALINNA, PALAZZINA DELLA DIREZIONE E POZZO SANT'ANTONIO)
	MUSEO DELLA CERAMICA DEL BORGO CASTELLO
	MUSEO STORICO - CASTELLO NELSON
	COMPLESSO MONUMENTALE SAN FRANCESCO
	MUSEO CASTELLO DUCALE
	SACRARIO DEI CADUTI D'OLTREMARE - SACRARIO MILITARE DI BARI
	MUSEO DELLE SOLFARE DI TRABIA TALLARITA
	CASTELLO DI SALERNO
	CASTELLO NORMANNO - MUSEO CIVICO
	CASTELLO DI MONTALBANO ELICONA
	COMPLESSO MONUMENTALE BELVEDERE DI SAN LEUCIO
	MUSEO CIVICO DEL CARRO DI PAGLIA E DEI MISTERI DI CARTAPESTA
	CASTELLO DELLA ZISA
MONUMENT	ABBAZIA AGOSTINIANA DI NOVACELLA

PRIVATE ***NORTH***	IL VITTORIALE DEGLI ITALIANI
	CASTELLO DI PRALORMO
	Musei del Castello di Compiano
	ROCCA DI ANGERA
	COMPLESSI MONUMENTALI DI SAN MARTINO E SOLFERINO - SOCIETA' SOLFERINO E SAN MARTINO
	CASTELLO
	CASTEL COIRA
	CASTELLO DI MORSASCO
	VILLA DURAZZO
	MUSEO DELLA BASILICA DI SANT'EUSTORGIO
	FONDAZIONE OPERA CAMPANA DEI CADUTI
	MUSEO DEL DUOMO
MONUMENT ***PRIVATE*** ***CENTRE***	COMPLESSO MONUMENTALE DI SANTA CROCE
	MUSEO E RIFUGI SMI DI CAMPO TIZZORO
	MUSEO DEL PALAZZO PICCOLOMINI DI PIENZA
	IL GRANDE MUSEO DEL DUOMO - Firenze
	MUSEO DI PALAZZO ORSINI
	CASTELLO ODESCALCHI
	CASTELLO PALLOTTA
	MUSEO DELLA CONTRADA DELLA SELVA
	SINAGOGA E MUSEO DI ARTE E STORIA EBRAICA DI FIRENZE
	MUSEO DEL SANTUARIO DELLA MADRE DEL BUON CONSIGLIO
MONUMENT ***PRIVATE*** ***SOUTH***	CATACOMBE DEI CAPPUCCINI
	MUSEO DI STORIA LITURGIA E DEVOZIONE
	MEMS - MUSEO DI ERICE LA MONTAGNA DEL SIGNORE
	MULINO AD ACQUA 'CAVALLO D'ISPICA' - MUSEO IN GROTTE
	MUSEO ETNOANTROPOLOGICO DELLA CIVILTA' CONTADINA
	COMPLESSO MONUMENTALE DONNAREGINA-MUSEO DIOCESANO DI NAPOLI
	MUSEO DIOCESANO MELFI
	MUSEO DELLA BASILICA DI S.SEBASTIANO
	COMPLESSO MUSEALE DELL'AUGUSTISSIMA ARCICONFRATERNITA DEI PELLEGRINI
	MUSABA - PARCO MUSEO LABORATORIO SANTA BARBARA

E. LIST OF RESPONDENTS

	CULTURAL INSTITUTIONS	STRUCTURE INDEX	ACTIVITY INDEX	DRI
1	PINACOTECA DI BRERA Museo Autonomo Statale	0,54	0,74	0,64
2	MAV - MUSEO ARCHEOLOGICO VIRTUALE	0,83	0,43	0,63
3	MUSEO ARCHEOLOGICO NAZIONALE NAPOLI (MANN)	0,58	0,65	0,62
4	MAXXI - MUSEO NAZIONALE DELLE ARTI DEL XXI SECOLO	0,57	0,65	0,61
5	MIM BELLUNO - MUSEO INTERATTIVO DELLE MIGRAZIONI	0,78	0,43	0,61
6	LA VENARIA REALE	0,46	0,75	0,60
7	Archivio Storico Farmigea	0,76	0,41	0,59
8	MUSEO INTERNAZIONALE DELLE CERAMICHE IN FAENZA	0,51	0,66	0,58
9	CATACOMBE DI NAPOLI	0,57	0,60	0,58
10	MART - MUSEO DI ARTE MODERNA E CONTEMPORANEA DI TRENTO E ROVERETO	0,62	0,54	0,58
11	MUSEO NAZIONALE DELLA SCIENZA E DELLA TECNOLOGIA LEONARDO DA VINCI	0,54	0,61	0,58
12	GALLERIA NAZIONALE D'ARTE MODERNA E CONTEMPORANEA DI ROMA	0,49	0,66	0,57
13	PINACOTECA ACCADEMIA CARRARA	0,53	0,57	0,55
14	MUVIT MUSEO DEL VINO	0,57	0,52	0,55
15	MUSEO DELL'OLIVO E DELL'OLIO	0,57	0,52	0,55
16	TEATRO OLIMPICO	0,45	0,61	0,53
17	MUSEO DEL RISORGIMENTO E DELLA RESISTENZA	0,45	0,61	0,53
18	PINACOTECA CIVICA DI PALAZZO CHIERICATI	0,45	0,61	0,53
19	MUSEO CIVICO DEL RISORGIMENTO (Bologna)	0,56	0,49	0,53
20	MUSEO DEL MARE DI NAPOLI - FONDAZIONE THETYS	0,50	0,54	0,52
21	MUSEO BAGATTI VALSECCHI	0,53	0,45	0,49
22	PALAZZO MADAMA - MUSEO CIVICO D'ARTE ANTICA	0,41	0,55	0,48
23	MUSEO NAZIONALE DELL'AUTOMOBILE	0,18	0,77	0,48
24	ISTITUTO E MUSEO DI STORIA DELLA SCIENZA - MUSEO GALILEO	0,43	0,53	0,48
25	MUSEO CIVICO PER LA PREISTORIA DEL MONTE CETONA	0,57	0,39	0,48
26	GALLERIA D'ARTE MODERNA DI FIRENZE	0,46	0,48	0,47
27	GALLERIA DEL COSTUME DI PALAZZO PITTI	0,46	0,48	0,47
28	GALLERIA PALATINA E APPARTAMENTI MONUMENTALI PALAZZO PITTI	0,46	0,48	0,47
29	GIARDINO DI BOBOLI	0,46	0,48	0,47
30	MUSEO DELLE PORCELLANE	0,46	0,48	0,47
31	MUSEO DEGLI ARGENTI	0,46	0,48	0,47
32	MUSEO DI ANATOMIA PATOLOGICA DELL'UNIVERSIT L DEGLI STUDI DI PADOVA	0,44	0,49	0,46
33	MUSEO BOTANICO-ERBARIO	0,44	0,49	0,46
34	MUSEO DI MACCHINE 'ENRICO BERNARDI'	0,44	0,49	0,46
35	MUSEO DELL'EDUCAZIONE DELL'UNIVERSITA'DEGLI STUDI DI PADOVA	0,44	0,49	0,46
36	MUSEO DI GEOLOGIA E PALEONTOLOGIA	0,44	0,49	0,46
37	MUSEO DI MINERALOGIA - UNIVERSITA'DEGLI STUDI	0,44	0,49	0,46
38	MUSEO DI SCIENZE ARCHEOLOGICHE E D'ARTE DELL'UNIVERSITA' DI PADOVA	0,44	0,49	0,46
39	MUSEO DI STORIA DELLA FISICA	0,44	0,49	0,46
40	MUSEO DI ZOOLOGIA	0,44	0,49	0,46
41	MUSEO SALVATORE FERRAGAMO	0,38	0,54	0,46
42	SCAVI DI OSTIA ANTICA E MUSEO	0,48	0,42	0,45
43	MUSEO VALTELLINESE DI STORIA E ARTE	0,41	0,48	0,44
44	GALLERIA ESTENSE	0,22	0,66	0,44
45	MUSEO LIDIA LIACI DEL DIPARTIMENTO DI BIOLOGIA - UNIVERSIT L DEGLI STUDI ALDO MORO - BARI	0,68	0,19	0,44
46	GAM - GALLERIA CIVICA D'ARTE MODERNA E CONTEMPORANEA	0,41	0,45	0,43
47	PARCO ARCHEOLOGICO NATURALISTICO DI BELVERDE E ARCHEODROMO	0,57	0,28	0,42
48	MAO MUSEO D'ARTE ORIENTALE	0,41	0,44	0,42
49	MUSEO IRPINO	0,46	0,39	0,42
50	CAM - CASORIA CONTEMPORARY ART MUSEUM	0,41	0,43	0,42
51	IL VITTORIALE DEGLI ITALIANI	0,24	0,60	0,42
52	CASA ROSSINI	0,21	0,63	0,42
53	MUSEI CIVICI DI PALAZZO MOSCA	0,21	0,63	0,42
54	AREA ARCHEOLOGICA DI PAESTUM	0,34	0,48	0,41
55	MUSEO ARCHEOLOGICO NAZIONALE DI PARMA (pilotta)	0,29	0,54	0,41
56	MUSEO NAZIONALE PREISTORICO ED ETNOGRAFICO 'L. PIGORINI' (museo civiltà)	0,46	0,36	0,41
57	REGGIA DI CASERTA	0,47	0,34	0,40
58	Archivio Luciano Caruso	0,39	0,42	0,40
59	MUSEO DI CAPODIMONTE	0,38	0,42	0,40

60	Fondazione Artistica Poldi Pezzoli 'Onlus'	0,35	0,45	0,40
61	GALLERIA NAZIONALE DELL'UMBRIA	0,22	0,58	0,40
62	MUST MUSEO DEL TERRITORIO VIMERCATESE	0,27	0,52	0,40
63	COMPLESSO MUSEALE SANTA MARIA DELLA SCALA	0,29	0,50	0,39
64	MUSEO DEL CENTRO CAPRENSE IGNAZIO CERIO	0,40	0,38	0,39
65	PALAZZO BESTA	0,34	0,44	0,39
66	MUSEO DELLA CERAMICA (Montelupo)	0,24	0,54	0,39
67	MUSEO DI PALAZZO ORSINI	0,30	0,47	0,39
68	FONDAZIONE PLART, PLASTICHE E ARTE DI MARIA PIA INCUTTI - PALIOTTO	0,24	0,53	0,38
69	MUSEO ASSOCIAZIONE 'CIRCOLO ARTISTICO POLITECNICO' - CARAVITA DI SIRIGNANO	0,41	0,35	0,38
70	CRIPTA E MUSEO DI S. ANASTASIO	0,24	0,52	0,38
71	SITO ARCHEOLOGICO DELLA DOMUS ROMANA	0,24	0,52	0,38
72	MUSEI MAZZUCCHELLI	0,41	0,34	0,37
73	FONDAZIONE SCIENZA E TECNICA DI FIRENZE - MUSEO, GABINETTO E PLANETARIO	0,34	0,40	0,37
74	MUSEO ERBARIO DIPARTIMENTO DI BIOLOGIA AMBIENTALE	0,39	0,35	0,37
75	MUSEO CIVICO DI ZOOLOGIA	0,39	0,35	0,37
76	MUSEO DELL'ARTE CLASSICA (GIPSOTECA)	0,39	0,35	0,37
77	MUSEO DI ANATOMIA COMPARATA	0,39	0,35	0,37
78	MUSEO DI ANTROPOLOGIA 'GIUSEPPE SERGI'	0,39	0,35	0,37
79	MUSEO DI CHIMICA	0,39	0,35	0,37
80	MUSEO DI FISICA	0,39	0,35	0,37
81	MUSEO DI GEOLOGIA	0,39	0,35	0,37
82	MUSEO DI IDRAULICA	0,39	0,35	0,37
83	MUSEO DI PALEONTOLOGIA	0,39	0,35	0,37
84	MUSEO DI STORIA DELLA MEDICINA	0,39	0,35	0,37
85	MUSEO DI ZOOLOGIA DELL'UNIVERSITA' 'LA SAPIENZA'	0,39	0,35	0,37
86	TEMPIETTO SUL CLITUNNO	0,52	0,22	0,37
87	TEATRO ROMANO E ANTIQUARIUM (Gubbio)	0,52	0,22	0,37
88	PALAZZO DUCALE (Gubbio)	0,52	0,22	0,37
89	IPOGEO DEI VOLUMNI E NECROPOLI DEL PALAZZONE	0,52	0,22	0,37
90	MUSEO ARCHEOLOGICO NAZIONALE DELL'UMBRIA (Perugia)	0,52	0,22	0,37
91	MUSEO ARCHEOLOGICO STATALE E TEATRO ROMANO (Spoleto)	0,52	0,22	0,37
92	MUSEO ARCHEOLOGICO NAZIONALE (Orvieto)	0,52	0,22	0,37
93	NECROPOLI ETRUSCA 'CROCIFISSO DEL TUFO'	0,52	0,22	0,37
94	AREA ARCHEOLOGICA DI CARSULAE	0,52	0,22	0,37
95	MUSEO NAZIONALE DEL DUCATO DI SPOLETO	0,52	0,22	0,37
96	VILLA DEL COLLE DEL CARDINALE	0,52	0,22	0,37
97	CASTELLO BUFALINI	0,52	0,22	0,37
98	MUSEI CAPITOLINI	0,16	0,57	0,36
99	MUSEO DI SCULTURA ANTICA GIOVANNI BARRACCO	0,16	0,57	0,36
100	MUSEO CARLO BILOTTI ARANCIERA DI VILLA BORGHESE	0,16	0,57	0,36
101	MUSEO DELL'ARA PACIS	0,16	0,57	0,36
102	MUSEO DI ROMA	0,16	0,57	0,36
103	MUSEO NAPOLEONICO	0,16	0,57	0,36
104	MUSEO 'PIETRO CANONICA' A VILLA BORGHESE	0,16	0,57	0,36
105	MUSEO MARTINI DI STORIA DELL'ENOLOGIA	0,20	0,53	0,36
106	ilCartastorie - Museo dell'Archivio Storico del Banco di Napoli	0,51	0,21	0,36
107	MUSEO NAZIONALE DEL PALEOLITICO D'ISERNIA	0,50	0,21	0,36
108	CASA MUSEO DI IVAN BRUSCHI	0,24	0,47	0,36
109	GALLERIA BORGHESE	0,10	0,61	0,35
110	MUSEO NAZIONALE DELLA PREISTORIA DELLA VALLE CAMONICA	0,49	0,22	0,35
111	KEATS-SHELLEY HOUSE	0,40	0,30	0,35
112	MUSMA - MUSEO DELLA SCULTURA CONTEMPORANEA MATERA	0,15	0,55	0,35
113	SISTEMA MUSEALE URBANO LECCHESE - POLO MUSEALE DI DI PALAZZO BELGIOIOSO	0,24	0,46	0,35
114	SCAVI DI ERCOLANO	0,29	0,40	0,34
115	MUSEO DEL TERRITORIO BIELLESE	0,18	0,51	0,34
116	FONDAZIONE MUSEO 'GLAUCO LOMBARDI'	0,26	0,42	0,34
117	Iseo Alessandria Città delle Biciclette	0,34	0,34	0,34
118	GALLERIE DELL'ACCADEMIA	0,36	0,32	0,34
119	MUSEO NAZIONALE ETRUSCO DI VILLA GIULIA	0,27	0,41	0,34
120	PINACOTECA NAZIONALE DI BOLOGNA	0,16	0,52	0,34
121	FONDAZIONE ANTONIO E CARMELA CALDERARA	0,32	0,36	0,34
122	Parco Archeologico del Colosseo	0,22	0,45	0,33

123	PINACOTECA REPOSSI	0,27	0,39	0,33
124	MEOC (Museo Etnografico Oliva Carta Cannas)	0,20	0,46	0,33
125	MUSEO NAZIONALE ARCHEOLOGICO CERITE	0,10	0,55	0,33
126	MUSEO NAZIONALE DEL PALAZZO DI VENEZIA	0,10	0,55	0,33
127	MUSEO ARCHEOLOGICO NAZIONALE (Tarquinia)	0,10	0,55	0,33
128	MUSEO NAZIONALE ETRUSCO DI ROCCA ALBORNOZ	0,10	0,55	0,33
129	FONDAZIONE 'FAMIGLIA PICCOLO DI CALANOVELLA'	0,33	0,32	0,33
130	MUSEO DI STORIA NATURALE E DEL TERRITORIO - CENTRO ATENEO UNIVERSIT└ DI PISA (Calci)	0,32	0,33	0,32
131	MUSEO DELL'ARPA VICTOR SALVI	0,24	0,40	0,32
132	FONDAZIONE PALAZZO CORONINI CRONBERG ONLUS	0,10	0,53	0,32
133	MUSEI REALI DI TORINO	0,10	0,53	0,31
134	PARCO E MUSEO DEL VOLO - VOLANDIA	0,10	0,53	0,31
135	MUSEO DI STORIA NATURALE DELL'ACCADEMIA DEI FISIOCRITICI	0,15	0,47	0,31
136	MUSEO STORICO MILITARE CULTURALE 'VIDOTTO' - CASA DEL BERSAGLIERE	0,29	0,33	0,31
137	MUSEO CIVICO POLIRONIANO	0,24	0,38	0,31
138	MAEC (MUSEO DELL'ACCADEMIA ETRUSCA E DELLA CITT└ DI CORTONA)	0,10	0,51	0,31
139	MUSEO DEL DUOMO	0,10	0,51	0,31
140	MUSEO ARTI E MESTIERI DI UN TEMPO	0,13	0,48	0,30
141	COLLEZIONE CIVICA D'ARTE (MUSEP - museo civico etnografico)	0,33	0,26	0,29
142	FORTE DI GAVI	0,24	0,35	0,29
143	ABBAZIA DI VEZZOLANO	0,24	0,35	0,29
144	CASTELLO DI RACCONIGI	0,24	0,35	0,29
145	CASTELLO DI SERRALUNGA D'ALBA	0,24	0,35	0,29
146	CASTELLO DUCALE DI AGLIE'	0,24	0,35	0,29
147	VILLA DELLA REGINA	0,24	0,35	0,29
148	PALAZZO CARIGNANO	0,24	0,35	0,29
149	MUSEO ARCHEOLOGICO NAZIONALE DI METAPONTO	0,32	0,26	0,29
150	TEMPIO DELLE TAVOLE PALATINE	0,32	0,26	0,29
151	MUSEO ARCHEOLOGICO NAZIONALE 'DOMENICO RIDOLA'	0,32	0,26	0,29
152	AREA ARCHEOLOGICA DI HERAKLEIA	0,32	0,26	0,29
153	MUSEO ARCHEOLOGICO NAZIONALE DELLA SIRITIDE	0,32	0,26	0,29
154	MUSEO ARCHEOLOGICO NAZIONALE DELL'ALTA VAL D'AGRI	0,32	0,26	0,29
155	TEATRO ROMANO (grumento nova)	0,32	0,26	0,29
156	MUSEO ARCHEOLOGICO NAZIONALE DEL MELFESE 'MASSIMO PALLOTTINO'	0,32	0,26	0,29
157	AREA ARCHEOLOGICA DI VENOSA	0,32	0,26	0,29
158	MUSEO NAZIONALE D'ARTE MEDIEVALE E MODERNA DELLA BASILICATA	0,32	0,26	0,29
159	MUSEO ARCHEOLOGICO NAZIONALE DELLA BASILICATA 'DINU ADAMESTEANU'	0,32	0,26	0,29
160	MUSEO ARCHEOLOGICO NAZIONALE DI MURO LUCANO	0,32	0,26	0,29
161	SEDE ESPOSITIVA IN PALAZZO DUCALE	0,32	0,26	0,29
162	MUSEI CIVICI (Pavia)	0,10	0,47	0,28
163	MUSEO DIDATTICO DELLA SETA	0,10	0,46	0,28
164	MUSEO 'DIEGO ARAGONA PIGNATELLI CORTES'	0,25	0,31	0,28
165	MUSEO CIVICO ALA PONZONE	0,16	0,39	0,28
166	MUSEO DELLA CIVILTA' CONTADINA CASCINA IL CAMBONINO VECCHIO	0,16	0,39	0,28
167	MUSEO ARCHEOLOGICO	0,16	0,39	0,28
168	MUSEO INTERNAZIONALE E BIBLIOTECA DELLA MUSICA	0,00	0,55	0,28
169	MUSEO DI STORIA NATURALE DELLA MAREMMA	0,29	0,27	0,28
170	MUSEO DI ETNOMEDICINA ANTONIO SCARPA	0,24	0,31	0,28
171	CIVICO MUSEO ARCHEOLOGICO (Milano)	0,10	0,45	0,28
172	Museo Archeologico del Casentino "Piero Albertoni"	0,10	0,45	0,27
173	GALLERIA NAZIONALE DELLE MARCHE	0,10	0,45	0,27
174	MUSEO DELLA FARMACIA DI BRESSANONE	0,15	0,40	0,27
175	Complesso Monumentale di San Francesco - Museo Civico	0,10	0,45	0,27
176	MUSEO ARCHEOLOGICO NAZIONALE (taranto)	0,24	0,31	0,27
177	Museo di Villa Bernasconi - La casa che parla	0,15	0,39	0,27
178	MUSEO DELLA GUERRA BIANCA IN ADAMELLO	0,27	0,27	0,27
179	COLLEZIONE SPADA ANTICHI STRUMENTI MUSICALI	0,20	0,34	0,27
180	MUSEO CIVICO DEI BRETTII E DEGLI ENOTRI	0,05	0,49	0,27
181	MUSEO CASA MANNO	0,16	0,37	0,27
182	MUSEO ARCHEOLOGICO E D'ARTE DELLA MAREMMA/MUSEO D'ARTE SACRA DELLA DIOCESI DI GROSSETO.	0,05	0,48	0,27
183	MUSEO DI SAN DOMENICO	0,05	0,48	0,27
184	PALAZZO TOZZONI	0,05	0,48	0,27
185	ROCCA SFORZESCA - COLLEZIONI D'ARMI E DI CERAMICHE	0,05	0,48	0,27

186	MUSEO CABRINIANO DI CODOGNO	0,29	0,24	0,26
187	PALAZZO FALLETTI DI BAROLO	0,32	0,21	0,26
188	MUSEO ARCHEOLOGICO (Priverno)	0,15	0,38	0,26
189	CASTELLO DI TORRECHIARA	0,15	0,38	0,26
190	VILLA DEI QUINTILI \TENUTA DI S.MARIA NOVA	0,27	0,25	0,26
191	SISTEMA MUSEALE DELL'UNIVERSITA' DEGLI STUDI DI FIRENZE	0,05	0,47	0,26
192	MAUSOLEO DI TEODORICO	0,24	0,27	0,26
193	PARCO DELLE INCISIONI RUPESTRI CON RUPE MAGNA DI GROSIO	0,30	0,22	0,26
194	PARCO DELLE INCISIONI RUPESTRI DI GROSIO	0,30	0,22	0,26
195	Museo Castiglioni	0,10	0,42	0,26
196	MUSEO DI STORIA NATURALE E ARCHEOLOGIA (Montebelluna)	0,15	0,36	0,26
197	MUSEO DELLA LIQUIRIZIA 'GIORGIO AMARELLI'	0,21	0,29	0,25
198	MUSEO DELL'ARTE FABBRILE E DELLE COLTELLERIE	0,10	0,40	0,25
199	MUSEO DELLA BASILICA (Gandino)	0,15	0,35	0,25
200	BATTISTERO DEGLI ARIANI	0,24	0,25	0,25
201	LA FABBRICA DEI SUONI	0,21	0,28	0,24
202	MUSEO NAZIONALE DEL RISORGIMENTO ITALIANO	0,05	0,43	0,24
203	MUSEO ARCHEOLOGICO REGIONALE LILIBEO DI MARSALA	0,27	0,21	0,24
204	MUSEO DELLA SECONDA GUERRA MONDIALE DEL FIUME PO	0,10	0,38	0,24
205	MUSEO TEATRALE ALLA SCALA	0,05	0,43	0,24
206	MUSEO ARTE OLEARIA E CONTADINA 'LUDOVICO NOIA'	0,24	0,23	0,24
207	ORTO BOTANICO LORENZO ROTA	0,19	0,27	0,23
208	MUSEO DELLA CATTEDRALE DI ANAGNI	0,15	0,31	0,23
209	MUSEO DEL PAESAGGIO	0,05	0,41	0,23
210	BASILICA DI SANT' APOLLINARE IN CLASSE	0,24	0,21	0,23
211	MUSEO NATURALISTICO DIDATTICO 'PATRIZIO RIGONI'	0,20	0,26	0,23
212	MUSEO D' ARTE SCIENZA DI G. MATTHAES	0,15	0,31	0,23
213	AREE ARCHEOLOGICHE DI AQUILEIA (FORO ROMANO, PORTO FLUVIALE)	0,13	0,32	0,23
214	MUSEO ARCHEOLOGICO NAZIONALE DI AQUILEIA	0,05	0,40	0,23
215	MUSEO PROVINCIALE DI TORCELLO	0,05	0,40	0,23
216	MUSEO ARCHEOLOGICO NAZIONALE	0,25	0,20	0,23
217	COMPLESSO MUSEALE PALAZZO DUCALE DI MANTOVA	0,05	0,40	0,23
218	MUSLI-MUSEO DELLA SCUOLA E DEL LIBRO PER L'INFANZIA (FONDAZIONE TANCREDI DI BAROLO)	0,16	0,29	0,23
219	CASTEL SANT'ELMO	0,05	0,40	0,23
220	MUSEO ARCHEOLOGICO E PINACOTECA DEL PALAZZO MALATESTIANO	0,24	0,21	0,22
221	ECOMUSEO 'SOGNO DI LUCE: ALPIGNANO LA LAMPADINA DI ALESSANDRO CRUTO	0,24	0,21	0,22
222	MUSEO ARCHEOLOGICO NAZIONALE (Cagliari)	0,21	0,24	0,22
223	PALAZZO REALE DI GENOVA	0,05	0,39	0,22
224	MUSEO ARCHEOLOGICO DELLA VALLE SABBIA	0,10	0,34	0,22
225	Fondazione MUBA - museo dei bambini	0,13	0,30	0,22
226	FONDAZIONE MUSEO DEL CALCIO	0,05	0,38	0,22
227	MUSEO DELLE INDUSTRIE E DEL LAVORO DEL SARONNESE	0,10	0,33	0,22
228	MUSEO UNIVERSITARIO DELL'UNIVERSITA' G.D'ANNUNZIO (Chieti)	0,10	0,33	0,22
229	MUSEO STORICO DELLA COMUNICAZIONE	0,15	0,28	0,22
230	MUSEO D'ARTE SACRA DELLA CHIESA DI SAN MARCO	0,15	0,28	0,21
231	MUSEO DELLA CIVILTA' CONTADINA (Mombaroccio)	0,15	0,28	0,21
232	LABORATORIO-ASSOCIAZIONE (EX MUSEO DEL RICAMO)	0,15	0,28	0,21
233	LABORATORIO DI GALILEO E GUIDOBALDO	0,15	0,28	0,21
234	MUSEO A COME AMBIENTE	0,13	0,30	0,21
235	GALATA MUSEO DEL MARE	0,05	0,37	0,21
236	MUSEO NAVALE DI PEGLI	0,05	0,37	0,21
237	LANTERNA & MUSEO	0,05	0,37	0,21
238	MUSEOTEATRO DELLA COMMENDA DI PRE'	0,05	0,37	0,21
239	MUSEI CIVICI DI VARESE	0,27	0,15	0,21
240	MUSEO ARCHEOLOGICO 'LA CIVITELLA'	0,05	0,37	0,21
241	MUSEO NAZIONALE DI VILLA GUINIGI	0,11	0,31	0,21
242	PINACOTECA NAZIONALE E MUSEO DI PALAZZO MANSI	0,11	0,31	0,21
243	MUSEO ARCHEOLOGICO COMPRENSORIALE DEL MUGELLO ALTO MUGELLO E VALDISIEVE	0,05	0,36	0,21
244	COLLEZIONE GIUSEPPE CULTRERA - MUSEO DELLA CERAMICA, DELLA SOCIETA' TARQUINIENSE, D'ARTE E STORIA	0,34	0,08	0,21
245	MUSEO DELL'OSSIDIANA	0,05	0,36	0,21
246	MUSEO PROVINCIALE SIGISMONDO CASTROMEDIANO	0,24	0,18	0,21
247	MAGI'900 - MUSEO DELLE ECCELLENZE ARTISTICHE E STORICHE	0,05	0,36	0,21

248	CENTRO DI DOCUMENTAZIONE DELLE ARTI GRAFICHE 'GRIFANI-DONATI 1799'	0,19	0,22	0,21
249	PARCO ARCHEOLOGICO E ANTIQUARIUM (Castelseprio)	0,15	0,26	0,21
250	MUSEO CIVICO 'CRAVERI' DI STORIA NATURALE	0,10	0,31	0,21
251	MUSEO DEL MODELLISMO STORICO	0,27	0,14	0,20
252	MUSEI DI GIUSEPPE PELLIZZA DA VOLPEDO	0,05	0,36	0,20
253	MUSEO DEL BIJOU DI CASALMAGGIORE	0,05	0,35	0,20
254	MUSEO DELLE LANGHE	0,15	0,25	0,20
255	MUSEO ARCHEOLOGICO NAZIONALE DI FIRENZE	0,10	0,29	0,20
256	MUSEO CIVICO ALPINO 'ARNALDO TAZZETTI'	0,10	0,29	0,20
257	MUSEO DEMOLOGICO GIACOMO BERGOMI	0,05	0,34	0,19
258	MUSEO RISORGIMENTALE AGOSTINO BIANCHI	0,05	0,34	0,19
259	MUSEO LUIGI E PIERO LECHI	0,05	0,34	0,19
260	CIVICA PINACOTECA ANTONIO E LAURA PASINETTI	0,05	0,34	0,19
261	Centro Uomini e Lupi	0,05	0,34	0,19
262	PARCO ARCHEOLOGICO E ANTIQUARIUM DI S.LEUCIO	0,05	0,33	0,19
263	MUSEO TUSCOLANO - SCUDERIE ALDOBRANDINI	0,15	0,23	0,19
264	CIVICO MUSEO ARCHEOLOGICO ALLE CLARISSE (San michele)	0,05	0,33	0,19
265	MUSEO DI ARTI E MESTIERI 'P. LAZZARINI'	0,05	0,33	0,19
266	MUSEO NAZIONALE DELLA CERAMICA 'DUCA DI MARTINA'	0,00	0,38	0,19
267	Ecomuseo delle Miniere e della Val Germanasca - ScopriMiniera&ScopriAlpi	0,05	0,33	0,19
268	MuSA - Museo Virtuale della Scultura e dell'Architettura	0,15	0,22	0,19
269	MUSEI DI STRADA NUOVA	0,10	0,27	0,19
270	MUSEO NATURALISTICO ARCHEOLOGICO VICENZA	0,00	0,37	0,19
271	ROSSINI ART SITE	0,05	0,32	0,18
272	COMPLESSO MUSEALE DELL'AUGUSTISSIMA ARCICONFRATERNITA DEI PELLEGRINI	0,05	0,32	0,18
273	MUSEO NAZIONALE ROMANO - PALAZZO MASSIMO ALLE TERME	0,05	0,32	0,18
274	MUSEO NAZIONALE ROMANO - TERME DI DIOCLEZIANO	0,05	0,32	0,18
275	MUSEO CIVICO DELLA STAMPA	0,16	0,21	0,18
276	TORRE CIVICA DEL BELVEDERE	0,16	0,21	0,18
277	MUSEO DELLA CERAMICA DI MONDOVI'	0,16	0,21	0,18
278	MUSEO DI ARTI DECORATIVE ACCORSI - OMETTO	0,00	0,36	0,18
279	MUSEO PALAZZON TRADIZIONI DELLA GENTE DI LUSIANA	0,15	0,21	0,18
280	MUSEO CIVICO ARCHEOLOGICO 'ISIDORO FALCHI'	0,05	0,31	0,18
281	MUSEO NAZIONALE ATESTINO	0,10	0,26	0,18
282	BASILICA PALEOCRISTIANA DI CONCORDIA SAGITTARIA	0,10	0,26	0,18
283	MUSEO ARCHEOLOGICO NAZIONALE CONCORDIESE	0,10	0,26	0,18
284	MUSEO ARCHEOLOGICO DI QUARTO D'ALTINO	0,10	0,26	0,18
285	GALLERIA 'GIORGIO FRANCHETTI' ALLA CA' D'ORO	0,10	0,26	0,18
286	MUSEO ARCHEOLOGICO DI VENEZIA	0,10	0,26	0,18
287	MUSEO D'ARTE ORIENTALE	0,10	0,26	0,18
288	VILLA DEL BENE	0,10	0,26	0,18
289	MUSEO DI PALAZZO GRIMANI	0,10	0,26	0,18
290	MUSEO ARCHEOLOGICO NAZIONALE (BARCHESSA DI VILLA BADOER)	0,10	0,26	0,18
291	MUSEO DELLA FRUTTA 'FRANCESCO GARNIER VALLETTI'	0,06	0,30	0,18
292	MUSEO DELL'AGRICOLTURA E DEL MONDO RURALE	0,05	0,30	0,18
293	MUSEO FERROVIARIO PIEMONTESE	0,17	0,18	0,18
294	MUSEO DI ANTROPOLOGIA CRIMINALE 'CESARE LOMBROSO' DELL'UNIVERSIT └ DI TORINO	0,15	0,20	0,18
295	Archivio Storico Barilla	0,24	0,10	0,17
296	MUSEO CIVICO 'CARLO VERRI'	0,00	0,34	0,17
297	MUSEO CIVICO, ARCHEOLOGICO E DELLA COLLEGIATA	0,05	0,29	0,17
298	MUSEO DI MINERALOGIA (MUST - Museo Universitario Sapienza di Scienze della Terra)	0,10	0,23	0,17
299	MUSEO DEL GIOCATTOLO (Bra)	0,00	0,33	0,16
300	MUSEO NAZIONALE DELL'ET ├?┬? NEOCLASSICA IN ROMAGNA IN PALAZZO MILZETTI	0,05	0,28	0,16
301	PALAZZO DI TEODORICO	0,05	0,28	0,16
302	MUSEO NAZIONALE DI RAVENNA	0,05	0,28	0,16
303	VILLA ROMANA DI RUSSI	0,05	0,28	0,16
304	MUSEO ETNOGRAFICO DI MORIGERATI	0,05	0,27	0,16
305	MUSEO TERRITORIALE DEL LAGO DI BOLSENA	0,05	0,27	0,16
306	FONDAZIONE MUSEO DELL'OCCHIALE ONLUS	0,05	0,27	0,16
307	MUSEO NAZIONALE ARCHEOLOGICO DI EGNAZIA 'GIUSEPPE ANDREASSI'	0,10	0,22	0,16
308	SOCIETA' DI STUDI FIUMANI	0,10	0,22	0,16
309	MUSEO ARCHEOLOGICO NAZIONALE (cividale del friuli)	0,10	0,21	0,16

310	ROCCA ROVERESCA	0,05	0,26	0,16
311	MUSEO ETNOGRAFICO 'SU MAGASINU 'E SU BINU'	0,10	0,21	0,15
312	MUSEO DI SAN MARTINO	0,05	0,25	0,15
313	MUSEO ETNOGRAFICO C'ERA UNA VOLTA	0,10	0,20	0,15
314	PINACOTECA NAZIONALE DI CAGLIARI	0,00	0,30	0,15
315	MUSEO ARCHEOLOGICO NAZIONALE DI ADRIA	0,05	0,25	0,15
316	RACCOLTA PRIVATA GEOLOGICA, MINERALOGICA E MALACOLOGICA P.D'AGOSTINO	0,05	0,25	0,15
317	GALLERIA DI STORIA NATURALE DELL'UNIVERSITA' DEGLI STUDI DI PERUGIA	0,05	0,24	0,15
318	MUSEO STORICO DELL'ARMA DI CAVALLERIA	0,00	0,29	0,15
319	MUSEO DELLE ORIGINI	0,05	0,24	0,14
320	CIVICO MUSEO ARCHEOLOGICO (Angera)	0,05	0,24	0,14
321	MUSEO ARCHEOLOGICO COMUNALE (Frosinone)	0,00	0,28	0,14
322	MUSEO CARNICO DELLE ARTI POPOLARI 'MICHELE GORTANI'	0,00	0,28	0,14
323	SINAGOGA E MUSEO DI ARTE E STORIA EBRAICA DI FIRENZE	0,05	0,23	0,14
324	ANTIQUARIUM E ZONA ARCHEOLOGICA DI CANNE DELLA BATTAGLIA	0,16	0,13	0,14
325	FONDAZIONE MUSEO ETTORE GUATELLI	0,11	0,17	0,14
326	MUSEO DELLE TRADIZIONI POPOLARI DI CANEPINA	0,00	0,28	0,14
327	ABBAZIA DI STAFFARDA	0,00	0,28	0,14
328	MUSEO ANATOMICO 'G.TUMIATI'	0,19	0,09	0,14
329	Museo Archeologico del Chianti senese	0,05	0,22	0,14
330	MUSEO STORICO DELLO SBARCO IN SICILIA - 1943	0,00	0,27	0,14
331	MUSEO DEL CARBONE	0,00	0,27	0,14
332	MUSEO CIVICO DI SCIENZE NATURALI MARIO REALINI	0,05	0,22	0,13
333	SISTEMA MUSEALE DI ATENEO (Università Pavia)	0,05	0,21	0,13
334	MUSEO CIVICO ARCHEOLOGICO DI BISACCIA	0,08	0,18	0,13
335	CASA MUSEO BOSCHI - DI STEFANO	0,05	0,21	0,13
336	MUSEO DELLA CIVILTA' CONTADINA VALLE DELL'ANIENE	0,05	0,21	0,13
337	MUSEO CIVICO ARCHEOLOGICO DELLE ACQUE	0,05	0,21	0,13
338	MUSEI DI PALAZZO DUCALE - MUSEO CIVICO, PINACOTECA, COLLEZIONE DI GRAFICA -	0,05	0,21	0,13
339	MUSEO ARCHEOLOGICO NAZIONALE DI FERRARA	0,10	0,16	0,13
340	MUSEO BIOLOGIA MARINA E PALEONTOLOGIA	0,16	0,09	0,13
341	ANTIQUARIUM DI POGGIO CIVITATE (Museo etrusco Murlo)	0,05	0,20	0,13
342	MUSEO ARCHEOLOGICO REGIONALE 'PIETRO GRIFFO' DI AGRIGENTO	0,00	0,25	0,13
343	AREA ARCHEOLOGICA DI ANTAS (TEMPIO PUNICO ROMANO)	0,05	0,20	0,13
344	MUCA - Museo della Cantieristica di Monfalcone	0,00	0,25	0,13
345	MAM - MUSEO ARCHIVIO DELLA MEMORIA	0,10	0,15	0,13
346	MUSEO ARCHEOLOGICO LOMELLINO	0,05	0,20	0,12
347	MUSEO PALEONTOLOGICO 'GIULIO MAINI'	0,00	0,25	0,12
348	PARCO ARCHEOLOGICO DI HIMERA	0,00	0,24	0,12
349	MUSEO DELLE ANFORE	0,05	0,19	0,12
350	MUSEO ITTICO 'A. CAPRIOTTI	0,05	0,19	0,12
351	MAM - MUSEO D'ARTE SUL MARE	0,05	0,19	0,12
352	MUSEO DELLA CIVILTA' MARINARA DELLE MARCHE	0,05	0,19	0,12
353	PINACOTECA DEL MARE	0,05	0,19	0,12
354	ANTIQUARIUM TRUENTINUM	0,05	0,19	0,12
355	MUSEO ARCHEOLOGICO E AREE ARCHEOLOGICHE DI MONTELUPO FIORENTINO	0,00	0,24	0,12
356	MUSEO DEL FALEGNAME TINO SANA	0,10	0,14	0,12
357	MUSEO ARCHIVIO LABORATORIO PER LE ARTI CONTEMPORANEE HERMANN NITSCH	0,05	0,19	0,12
358	MUSEO ARCHEOLOGICO NAZIONALE DI PONTECAGNANO'GLI ETRUSCHI DI FRONTIERA'	0,05	0,19	0,12
359	SANTUARIO ITALICO	0,05	0,19	0,12
360	MUSEO ETNOLOGICO MISSIONARIO (Bernardi Semeria)	0,05	0,19	0,12
361	MUSEO ARCHEOLOGICO DI CALATIA	0,11	0,13	0,12
362	Associazione per gli studi di storia e architettura militare	0,00	0,23	0,12
363	MUSEO ARCHEOLOGICO PROVINCIALE DI POTENZA (M. Lacava)	0,05	0,18	0,12
364	MUSEO NAZIONALE ARCHEOLOGICO - ETNOGRAFICO 'GIOVANNI ANTONIO SANNA'	0,05	0,18	0,11
365	Giardino Botanico Rea	0,00	0,23	0,11
366	MUSEO DI ETNOPREISTORIA 'ALFONSO PICIOCCHI'	0,00	0,23	0,11
367	MUSEO ETNOGRAFICO DELL'ATTREZZO AGRICOLO 'L ÃIVEL'	0,11	0,12	0,11
368	MUSEO DELL'ABBAZIA DI SAN DALMAZZO DI PEDONA	0,05	0,17	0,11
369	MUSEO ARCHEOLOGICO NAZIONALE DELLA VALLE DEL SARNO	0,05	0,17	0,11
370	MUSEO NAZIONALE DI VILLA PISANI	0,05	0,17	0,11
371	AREA ARCHEOLOGICA 'SU MULINU'	0,05	0,17	0,11

372	MUSEO ARCHIVIO GIOSUE CARDUCCI	0,11	0,11	0,11
373	MUSEO DI BIOLOGIA MARINA 'PIETRO PARENZAN'	0,05	0,16	0,11
374	CENTRO DI INTERPRETAZIONE DEL PAESAGGIO DEL PO	0,05	0,16	0,10
375	MUSEO CIVICO ARCHEOLOGICO DI NEPI	0,05	0,16	0,10
376	MUSEO DI ARTE CONTEMPORANEA (G. e T. dal verme)	0,06	0,15	0,10
377	MUSEO E ORTO BOTANICO DELL' UNIVERSITA' DI GENOVA	0,00	0,21	0,10
378	PALAZZO PISTILLI	0,00	0,20	0,10
379	MUSEO SANNITICO DI CAMPOBASSO (polo museale molise)	0,00	0,20	0,10
380	MUSEO NAZIONALE DI CASTELLO PANDONE	0,00	0,20	0,10
381	ABBAZIA DI POMPOSA E MUSEO POMPOSIANO	0,05	0,14	0,09
382	CASTELLO DI MORSASCO	0,05	0,14	0,09
383	MUSEO ARCHEOLOGICO DI SANTA MARIA DELLE MONACHE	0,00	0,19	0,09
384	PALAZZINA DI CACCIA DI STUPINIGI (FONDAZIONE MAURIZIANO)	0,00	0,19	0,09
385	MUSEO CIVICO DI STORIA NATURALE 'LA TERRA E L'UOMO'	0,00	0,19	0,09
386	MUSEO DEL COSTUME E DELLA MODA SICILIANA	0,00	0,19	0,09
387	FONDAZIONE CAMILLO CAVOUR-CASTELLO CAVOUR	0,00	0,18	0,09
388	MUSEO ARCHEOLOGICO DI VENAFRO	0,00	0,18	0,09
389	MUSEO CIVICO 'GIOVAN BATTISTA ADRIANI'	0,05	0,13	0,09
390	CERTOSA DI SAN GIACOMO	0,00	0,18	0,09
391	COMPLESSO MONUMENTALE DI SAN VINCENZO AL VOLTURNO	0,00	0,18	0,09
392	MUSEO CIVICO ANTONIO PARAZZI	0,05	0,13	0,09
393	MUSEO DEL SANNIO	0,00	0,18	0,09
394	PALAZZO VERTEMATE FRANCHI	0,05	0,13	0,09
395	Museo dell'Emigrazione Santa Ninfa	0,00	0,17	0,09
396	ACQUARIO E MUSEO ETNOGRAFICO DEL PO	0,05	0,12	0,09
397	MUSEO ARCHEOLOGICO NAZIONALE PALAZZO ROCCA (Chiavari)	0,05	0,12	0,08
398	MUSEO ARCHEOLOGICO DI TEANUM SIDICINUM	0,05	0,11	0,08
399	MUSEO ARCHEOLOGICO NAZIONALE DELL'ANTICA ALLIFAE	0,05	0,11	0,08
400	ORTO BOTANICO (Torino)	0,00	0,16	0,08
401	MUSEO STATALE CIVICO BRANCALEONI	0,05	0,11	0,08
402	MUSEO CIVICO A. OLMO E GIPSOTECA D.CALANDRA	0,00	0,16	0,08
403	MUSEO CIVICO DI SCIENZE NATURALI 'ANGELO PRIOLO'	0,00	0,16	0,08
404	MUSEO 'V.F. PIERSANTI'	0,00	0,16	0,08
405	MUSEO DI MERCEOLOGIA (RACCOLTA DELL'ISTITUTO DI MERCEOLOGIA)	0,05	0,11	0,08
406	MUSEO DELLA GINESTRA 'EUGENIO CELESTINO' - MOSTRA PERMANENTE DI ARTE TESSILE	0,05	0,11	0,08
407	ANTIQUARIUM ARCHEOLOGICO (Milazzo)	0,05	0,10	0,08
408	MUSEO ARCHEOLOGICO NAZIONALE DELLE MARCHE	0,05	0,10	0,08
409	CASTELLO DI CAPUA A GAMBATESA	0,00	0,15	0,07
410	MUSEO ARCHEOLOGICO STATALE (ascoli piceno)	0,05	0,10	0,07
411	MOLINO DI MENICONE	0,00	0,15	0,07
412	MUSEO UGO GUIDI	0,00	0,14	0,07
413	ABBAZIA DI CASAMARI	0,05	0,09	0,07
414	MUSEO DELL'ABBAZIA DI CASAMARI	0,05	0,09	0,07
415	MUSEO ARCHEOLOGICO DI SEPINO- ALTILIA	0,00	0,14	0,07
416	MUSEO ARCHEOLOGICO DI EBOLI E DELLA MEDIA VALLE DEL SELE	0,00	0,13	0,07
417	MUSEO CIVICO DI LENTATE SUL SEVESO	0,00	0,13	0,06
418	MUSEO DELLA CIVILTA' CONTADINA DELLA VALLARSA	0,00	0,13	0,06
419	MUSEO ARCHEOLOGICO NAZIONALE G. ASPRONI	0,05	0,07	0,06
420	MUSEO STORICO GIUSEPPE BECCARI	0,05	0,07	0,06
421	PARCO ARCHEOLOGICO VALLATA DEL SAN PASQUALE ARCHEODERI	0,05	0,07	0,06
422	MUSEO ETNOLOGICO DELLE APUANE 'Luigi Bonacoscia'	0,05	0,05	0,05
423	ANFITEATRO ROMANO	0,00	0,10	0,05
424	TOMBA DI VIRGILIO	0,00	0,09	0,05
425	CASTELLO DI CIVITACAMPOMARANO	0,00	0,09	0,05
426	MUSEO E PARCO ARCHEOLOGICO NAZIONALE (Locri)	0,05	0,03	0,04
427	ECOMUSEO DELLE GUIDE ALPINE ANTONIO CASTAGNERI	0,00	0,04	0,02
428	Collegio San Francesco	0,00	0,03	0,02
429	MUSEO REGIONALE DI KAMARINA	0,00	0,03	0,02
430	PINACOTECA CIVICA DI PALAZZO VOLPI	0,00	0,03	0,01
431	MUSEO MULTIMEDIALE DEL BUFù	0,00	0,01	0,01

F. FULL R CODE (CLUSTERING)

PRE - PROCESSING

```
library(readxl)
library(factoextra)
library(cluster)
library(fpc)
library(NbClust)
library("openxlsx")
#load the Excel dataset file on RStudio
DATASET_R <- read_excel("Desktop/analisi survey/R/analisi 3/DATASET_R.xlsx")
View(DATASET_R)
mydata  = DATASET_R

#analyze the data to find if categorical variables are there and if so transform them
mydata = as.data.frame(unclass(mydata))
summary(mydata)
 INDICE.STRUTTURA INDICE.ATTIVITÀ
 Min.   :0.0000       Min.   :0.02143
 1st Qu.:0.0500       1st Qu.:0.20931
 Median :0.1278       Median :0.29083
 Mean   :0.1881       Mean   :0.31811
 3rd Qu.:0.3167       3rd Qu.:0.41220
 Max.   :0.8333       Max.   :0.77264
dim(mydata)
[1] 431   2
#remove any records that have NA values
myDataClean = na.omit(mydata)
dim(myDataClean)
[1] 431   2
scaled_data = as.matrix(scale(myDataClean))
```

30 INDEXES

```
# compute the number of clusters
nb <- NbClust(scaled_data, distance = "euclidean", min.nc = 2, max.nc = 10, method =
"complete", index ="all")
# visualize the result
fviz_nbclust(nb) + theme_minimal()
## Among all indices:
## ==================
## * 6 proposed 2 as the best number of clusters
## * 4 proposed 3 as the best number of clusters
## * 8 proposed 4 as the best number of clusters
## * 3 proposed 7 as the best number of clusters
## * 3 proposed 9 as the best number of clusters
##
## Conclusion
```

```
## =========================
## * According to the majority rule, the best number of clusters is 4.
```

ELBOW METHOD

```
#Elbow method for finding the optimal number of clusters
# compute and plot wss for k = 2 to k = 15
k.max <- 15
data <- scaled_data
wss <- sapply(1:k.max,function(k){kmeans(data, k, nstart=50,iter.max = 15 )$tot.withinss})
wss
[1] 860.00000 436.41631 293.50040 210.19455 158.77310 131.92640 113.06076
[8] 98.51422 89.26547 78.81426 69.66239 66.53129 57.80333 49.70665
[15] 47.85237
plot(1:k.max, wss, type="b", pch = 19, frame = FALSE, xlab="Number of clusters K",
ylab="Total within-clusters sum of squares")
```

4 CLUSTERS ANALYSIS

```
#apply kmeans for k=4 clusters
km.res <- eclust(scaled_data, "kmeans", k = 4, nstart = 25, graph = FALSE)
#k-means group number of each observation
km.res$cluster
## [1] 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
## [44] 3 1 2 1 2 2 2 3 3 3 2 3 1 1 2 2 2 3 3 3 1 2 3 3 3 1 3 3
## [70] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [98] 3 3 3 3 3 3 3 3 1 1 3 3 1 1 3 3 1 3 3 1 1 3 3 1 3 1 3 3 3 3 3 1 1 3 3 3 3 3 1 3 3 3 3
## [141] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
## [162] 3 3 1 3 3 3 3 1 1 3 3 3 3 3 1 3 1 1 3 3 3 3 3 3 1 1 3 3 1 3 1 1 1 3 3 1 3 3 1 1 3 1 3
3 1 4 4 3 1 4 4 4 3 3 1 3 4 3 1 1 4 3 3 4 3 4 4 4 4 4 4 4 4 3 3 3 3 1 3 4 4 3 1 3 1 3 4 4 4 1 3
3 4 4 4 4 4 4 4 4 4 4 4 4 3
## [271] 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4

#visualize k-means clusters
fviz_cluster(km.res, geom = "point", frame.type = "norm")
#Silhouette coefficient of observations
sil <- silhouette(km.res$cluster, dist(scaled_data))
head(sil[, 1:3], 10)
##       cluster neighbor sil_width
## [1,]      2        3 0.4382999
## [2,]      2        1 0.2652248
## [3,]      2        3 0.5589494
## [4,]      2        3 0.5658781
## [5,]      2        1 0.2999690
## [6,]      2        3 0.3663575
## [7,]      2        1 0.2690851
## [8,]      2        3 0.5398354
## [9,]      2        1 0.5978379
## [10,]     2        1 0.5453334
```

```
#Silhouette plot
plot(sil, main ="Silhouette plot - K-means")
fviz_silhouette(km.res)
## cluster size ave.sil.width
## 1       1   90         0.37
## 2       2   51         0.47
## 3       3   94         0.39
## 4       4   196        0.53
#export the new dataset with the cluster column
mydata <- cbind(mydata, km.res$cluster)
write.xlsx(mydata, file="Museums_cluster.xlsx")
```

G. CRITERIA AND SCORE ASSIGNMENT

STRUCTURE INDICATORS		QUESTIONS	POSSIBLE ANSWERS	CRITERIA	QUESTION WEIGHT	SINGLE ANSWER SCORE
1	Strategy	Do you have a formalized strategic digital innovation plan?	No	Not acceptable	0,33	0
			Yes, within another document	Minimum criteria		0,75
			Yes, there is a dedicated document	Improvement criteria		1
2	Investments	Considering the total amount of annual investments, indicate the average percentage of investment destined for digital (digital tools, internal staff, purchase of external services) in the last two years:	No digital investment	Not acceptable	0,33	0
			1% - 10%	Minimum criteria		0,2
			11% - 25%	Improvement criteria		0,4
			26% - 50%			0,6
			51% - 75%			0,8
			76% - 100%			1
3	Competence	Do you have a social media & communication manager?	No, not available	7 answers as "No, not available" represent the not acceptable criteria At least one answer as "Yes, external consultant" represents the minimum criteria More than one answer as "Yes, shared with other institutions" or "Yes, internal staff" represents the improvement criteria	0,071	0
			Yes, external consultants			0,5
			Yes, shared with other sectors / institutions			1
			Yes, internal staff			
		Do you have a digital curator?	No, not available		0,071	0
			Yes, external consultants			0,5
			Yes, shared with other sectors / institutions			1
			Yes, internal staff			
		Do you have a digital marketing manager?	No, not available		0,071	0
			Yes, external consultants			0,5
			Yes, shared with other sectors / institutions			1
			Yes, internal staff			
		Do you have a digital user experience developer?	No, not available		0,071	0
			Yes, external consultants			0,5
			Yes, shared with other sectors / institutions			1
			Yes, internal staff			
		Do you have a designer / game designer?	No, not available		0,071	0
			Yes, external consultants			0,5
			Yes, shared with other sectors / institutions			1
			Yes, internal staff			
		Do you have a data protection officer?	No, not available		0,071	0
			Yes, external consultants			0,5
			Yes, shared with other sectors / institutions			1
			Yes, internal staff			
		Do you have a digital officer?	No, not available		0,071	0
			Yes, external consultants			0,5
			Yes, shared with other sectors / institutions			1
			Yes, internal staff			

ACTIVITY INDICATORS		QUESTIONS	POSSIBLE ANSWERS	CRITERIA	TOTAL WEIGHT	SINGLE ANSWER SCORE
1	Back Office	Do you have a computerized management system (not excel sheets) for accounting?	No, not available	13 answers as "No, not available" or "No, we don't manage this activity" represent the not acceptable criteria At least one answer as "Yes, shared with other institutions" or "Yes, dedicated" represents the minimum criteria More than one answer as "Yes, shared with other institutions" or "Yes, dedicated" represents the improvement criteria	0,038	0
			No, we don't manage this activity			
			Yes, shared with other institutions			1
			Yes, dedicated			
		Do you have a computerized management system (not excel sheets) for purchases?	No, not available		0,038	0
			No, we don't manage this activity			
			Yes, shared with other institutions			1
			Yes, dedicated			
		Do you have a computerized management system (not excel sheets) for personnel management?	No, not available		0,038	0
			No, we don't manage this activity			
			Yes, shared with other institutions			1
			Yes, dedicated			
		Do you have a computerized management system (not Excel sheets) for the cataloging, storage and ordinary maintenance of collections?	No, not available		0,038	0
			No, we don't manage this activity			
			Yes, shared with other institutions			1
			Yes, dedicated			
		Do you have a computerized management system (not Excel sheets) for loans and works handling?	No, not available		0,038	0
			No, we don't manage this activity			
			Yes, shared with other institutions			1
			Yes, dedicated			
		Do you have a computerized management system (not excel sheets) for space management?	No, not available		0,038	0
			No, we don't manage this activity			
			Yes, shared with other institutions			1
			Yes, dedicated			
		Do you have a computerized management system (not Excel sheets) for public services?	No, not available		0,038	0
			No, we don't manage this activity			
			Yes, shared with other institutions			1
			Yes, dedicated			
		Do you have a computerized management system (not Excel sheets) for educational activities?	No, not available		0,038	0
			No, we don't manage this activity			
			Yes, shared with other institutions			1
			Yes, dedicated			
		Do you have a computerized management system (not excel sheets) for ticketing?	No, not available		0,038	0
			No, we don't manage this activity			
			Yes, shared with other institutions			1
			Yes, dedicated			
		Do you have a computerized management system	No, not available		0,038	0
			No, we don't manage this activity			

		(not excel sheets) for e-commerce?	Yes, shared with other institutions			1
			Yes, dedicated			
		Do you have a computerized management system (not excel sheets) for fundraising?	No, not available		0,038	0
			No, we don't manage this activity			
			Yes, shared with other institutions			1
			Yes, dedicated			
		Do you have a computerized management system (not excel sheets) for crm and contact management?	No, not available		0,038	0
			No, we don't manage this activity			
			Yes, shared with other institutions			1
			Yes, dedicated			
		Do you have a computerized management system (not excel sheets) for reporting?	No, not available		0,038	0
			No, we don't manage this activity			
			Yes, shared with other institutions			1
			Yes, dedicated			
2	Cataloguing	Indicate what percentage of the collection has been cataloged through the paper catalogue	0%	All the answers related to the paper catalogue and the "0%" answers represent the not acceptable criteria The answer "1% - 25%" related to the database catalogue represent the minimum criteria All the remaining answers represent the improvement criteria	0	0
			1% - 25%			
			26% - 50%			
			51% - 75%			
			76% - 100%			
		Indicate what percentage of the collection was cataloged through the database catalog	0%		0,055	0
			1% - 25%			0,25
			26% - 50%			0,5
			51% - 75%			0,75
			76% - 100%			1
		Indicate what percentage of the collection was cataloged through an open-source, proprietary or tailor-made software catalog	0%		0,11	0
			1% - 25%			0,25
			26% - 50%			0,5
			51% - 75%			0,75
			76% - 100%			1
3	Conservation	Have you digitized the collection?	No	Not having digitized the collection represents the not acceptable criteria Having digitized the collection at least for the 25% is the minimum criteria All the other answers represent the improvement criteria	0,055	0
			Yes, < 25%			0,25
			Yes, 25% - 50%			0,5
			Yes, 51% - 75%			0,75
			Yes, > 75%			1
		Do you have published the collection digitized on a website?	No		0,055	0
			Yes, other websites			0,5
			Yes, on a website shared with other institutions			1
			Yes, on the institution website			
		What is the percentage of the collection published online compared to the digitized collection?	0%		0,055	0
			1% - 25%			0,25
			26% - 50%			0,5
			51% - 75%			0,75
			76% - 100%			1
4	Security	What methods do you use to control visitor access?	No method	Not acceptable	0,166	0
			Entry of admission ticket			
			Paper sheet			
			Card for frequent visitors			
			Turnstiles or gates count people	Minimum criteria		0,25
			Spreadsheet (for example Excel)	Improvement criteria		0,5

			Barcode reader			0,75
			QR-code reader			1
5	Communication	Do you have a dedicated website?	No	Minimum criteria is represented by the presence of a websites within other websites and the presence of at least one social network account Improvement criteria is represented by the presence of other type of websites, an app, more than one social network account and the review management and the visitor data collection activities through digital tools All the other answers represent the not acceptable criteria	0,032	0
			Yes, within other websites			0,25
			Yes, in common with other cultural institutions			0,5
			Yes, in common with other institutions of our museum network			0,75
			Yes, related only to our institution			1
		Do you have an App?	No and we don't care		0,032	0
			No, but we plan to insert it			0,5
			Yes			1
		How many social accounts do you have? Facebook, Twitter, Instagram…	No one		0,032	0
			At least 1			0,25
			At least 2			0,5
			At least 3			0,75
			At least 4			1
		Do you carry out monitoring and review management tasks? (eg Tripadvisor reviews)	No		0,032	0
			Yes, reading the reviews and answering where necessary			0,5
			Yes, with ad hoc analytical tools			1
		Do you collect data on visitors?	No		0,032	0
			Yes, through paper collection			0,5
			Yes, digitally			1
6	On Site Friution	Do you have the wifi?	No and we don't care	At least one answer as “Yes” represents the minimum criteria More than one answer as “Yes” represents the improvement criteria All the other answers represent the not acceptable criteria	0,015	0
			No, we had it but we took it off			0,008
			No, but we expect to include it			0,015
			Yes			
		Do you have the audio-guide?	No and we don't care		0,015	0
			No, we had it but we took it off			0,008
			No, but we expect to include it			0,015
			Yes			
		Do you have the augmented reality?	No and we don't care		0,015	0
			No, we had it but we took it off			0,008
			No, but we expect to include it			0,015
			Yes			
		Do you have the virtual reality?	No and we don't care		0,015	0
			No, we had it but we took it off			0,008
			No, but we expect to include it			0,015
			Yes			
		Do you have the QR-code?	No and we don't care		0,015	0
			No, we had it but we took it off			0,008
			No, but we expect to include it			0,015
			Yes			
		Do you have the beacon?	No and we don't care		0,015	0
			No, we had it but we took it off			

			No, but we expect to include it			0,008
			Yes			0,015
		Do you have the NFC?	No and we don't care		0,015	0
			No, we had it but we took it off			
			No, but we expect to include it			0,008
			Yes			0,015
		Do you have the chatbot?	No and we don't care		0,015	0
			No, we had it but we took it off			
			No, but we expect to include it			0,008
			Yes			0,015
		Do you have the videogame?	No and we don't care		0,015	0
			No, we had it but we took it off			
			No, but we expect to include it			0,008
			Yes			0,015
		Do you have the LIS video?	No and we don't care		0,015	0
			No, we had it but we took it off			
			No, but we expect to include it			0,008
			Yes			0,015
		Do you have the blockchain?	No and we don't care		0,015	0
			No, we had it but we took it off			
			No, but we expect to include it			0,008
			Yes			0,015
7	Ticketing	What type of ticketing is present in the institution?	Ticket with block paper detachment accounting	Not acceptable	0,055	0
			Posting ticket with electronic system accounting	Minimum criteria		0,25
			Ticket printed at the time with database	Improvement criteria		0,5
			Ticket available online and printed at home			0,75
			Ticket available online and not printed at home			1
		Through which channel is possible to book?	Phone	Not acceptable	0,055	0
			Email	Minimum criteria		0,5
			Website related to the institution	Improvement criteria		1
			Third-party booking website			
			Social network			
			App			
		Are you part of a network that offers cards for cumulative access to several cultural institutions?	No	Not acceptable	0,055	0
			Yes, paper cards			
			Yes, electronic cards	Minimum criteria		0,5
			Yes, with virtual cards	Improvement criteria		1

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