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## The assessment of the level of digital innovation in Italian museums

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## **ABSTRACT (ENGLISH VERSION)**

If on the one hand museums have always been envisaged as sacred places of culture, on the other, we can say with certainty that they have not remained the same as on the first day. Since the third millennium, their challenges have mutated. It is now important to be able to capture the attention of an ever wider and more varied audience and to offer a unique and unforgettable experience in which the visitors are protagonists.

Thanks to the increasingly innovative new technologies, that the Fourth Industrial Revolution is allowing us to discover, the visitor need no longer have a passive approach whilst looking at a work of art, but can interact and have fun, living a unique and new experience.

The final objective of this thesis is to provide an assessment of the level of digital innovation present in Italian museums, through the analysis of data collected during a survey that required the participation of Italian institutions.

The study made it possible to identify the most significant trends related to Information and Communication Technologies (ICT) and, subsequently, allowed comparisons in the level of digitalization of the museums, with that of the previous year. It was, therefore, possible to provide a critical reading of the results.

Lastly, an attempt was made to understand how the current health emergency, linked to Covid-19, has impacted cultural institutions, providing a picture of the main initiatives that have been undertaken.



## **ABSTRACT (ITALIAN VERSION)**

Se da un lato i musei sono sempre stati visti come luoghi sacri della cultura, dall'altro, però, possiamo affermare con certezza che non sono mai rimasti uguali al primo giorno. A partire dal terzo millennio, infatti, la loro sfida è cambiata. In particolare, al giorno d'oggi, è importante riuscire a catturare l'attenzione di un pubblico sempre più vasto e variegato ed offrire un'esperienza unica ed indimenticabile in cui i protagonisti sono proprio i visitatori.

Grazie alle nuove tecnologie sempre più innovative che la Quarta Rivoluzione Industriale ci sta facendo scoprire, il visitatore non deve più avere un approccio passivo di fronte ad un'opera d'arte, bensì deve interagire e divertirsi vivendo l'esperienza offerta per la sua unicità ed innovatività.

L'obiettivo finale di questa tesi è quello di fornire una mappatura del livello di innovazione digitale presente nei musei italiani, considerando una raccolta dati effettuata tramite un'indagine che ha richiesto la partecipazione delle istituzioni italiane.

L'analisi ha permesso di identificare i trend più significativi legati alle Tecnologie dell'Informazione e della Comunicazione (TIC) e, successivamente, di confrontare il livello di digitalizzazione dei musei ottenuto, con quello dello scorso anno. È stato quindi possibile fornire una lettura critica dei risultati ottenuti.

Da ultimo si è cercato di capire come l'attuale emergenza sanitaria legata al Covid-19 abbia impattato sulle istituzioni culturali, fornendo un quadro delle principali iniziative che sono state intraprese.



## EXECUTIVE SUMMARY

The museum has always been a fundamental institution for our culture since, through the exhibition of works or objects dating back to the past, it tries to transmit the treasured heritage to the outside world. From the definition of the International Council of Museums, *“The Museum is a permanent, non-profit institution at the service of society and its development, open to the public, which carries out research on the material and immaterial testimonies of man and its environment, acquires them, preserves them, and communicates them and specifically exposes them for study, education and enjoyment purposes”* (ICOM, 2007).

However, its role within the society of the third millennium has changed and continues to change, just as the definition of the museum itself as a physical place, mission and the relationship with the visitor is also changing. Thinking about the long history of museums, we can say that we have gone from Museums as temples of knowledge and intellectual advancement, Museums for the contemplation of the wonders of the world, Museums for the acculturation and literacy of the masses, Museums for the education of generations of young people, Museums for disclosure as public responsibility, to Museums as a resource for lifelong learning, Museums as personal / unique experience, Museums as places of our individual and collective identity, Museums as mediators for active citizenship, Museums as machines of democracy, Museums that belong to everyone, which are an integral part of society (M. Xanthoudaki, 2013).

From the use of the museum as an “exceptional cultural monument”, we have moved on to its use as part of an informal, personalized, lifelong learning path chosen freely, consciously and for different reasons by each of us. Today the visitor is a “researcher”, on a journey of exploration and seeking for personal meaning (M. Xanthoudaki et al., 2003).

Today, the role of the museum reflects the change in the rhythms of contemporary life, and even more the emerging model of education, linked to increasingly personalized training courses.

The exhibition, closed in rooms for decades, now needs to open up and expand into new realities. This changes the image of the museum, which now merges with the urban planning of the city, redefining unusual spaces, transforming them into “exhibition rooms” frequented no longer by a small circle of people, but by the masses. The goal is to make the museum a place of everyday life.

It is impossible to deny that the Web has profoundly changed the ways of communication between museums and the visitor. Museums have had to adapt to an ever-wider audience, which, perhaps via Internet, has been able to find some interest in this institution. The directors or representatives of the museums have changed the way of expressing themselves, since digitalization has allowed them to follow the new communication techniques to reach the set of individuals connected to the network or to transfer the treasured heritage differently.

Nowadays the possibilities have multiplied, thanks also to the technologies brought about by the Fourth Industrial Revolution. Therefore, a continuous evolution of its communication channels is necessary in order to have an increasingly intimate and personalized relationship with visitors, which makes them absolute protagonists and which broadens their experience, involving them not only during the visit, but also in the pre and in the post.

In fact, a museum's website is now perceived as a virtual extension of physical space: *“In a technological world, a visit to the museum no longer starts when a person enters the building, nor does it necessarily end when he leaves it. The physical space of the museum is only a site - however privileged - in the continuum of the visitor's imaginative universe”* (P. Samis, 2008).

Technology also gives to the visitor the opportunity to access information in the order, place, and time that it deems most appropriate. It is clear how museum communication online is going in this direction, subjecting the physical reality of the museum and collections to a coding process whose result is a complex digital object, which communicates through different platforms and devices.

If until a few years ago there was only concern about what should be displayed on a computer screen, today this theme concerns a plurality of solutions, ranging from the website to social communication, from computers to tablets, to smartphones.

The aim of this thesis is to provide a mapping of the digitalization level of Italian institutions and try to understand what improvements have been introduced compared to previous years to fully exploit the available technologies.

Considering the emergency medical situation linked to Covid-19 that we are experiencing these days, it is possible to see how the need for radical change emerged, to try to exploit the full potential offered by technologies and rethink communication in the long-term.

In fact, many Italian museums have promptly responded to this extraordinary situation, trying to promote history and culture even behind “closed doors”.

# 1. INTRODUCTION

It is appropriate to start the research by transcribing the definition of the International Council of Museums, seen as a starting point for the evolution that museums have or must have in order to open up and evolve in the new millennium:

*“The 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, 2007).

This definition has been a reference for the international community since 2007 and therefore deserves to be analysed in all its facets.

*“The Museum is a permanent institution ...”* in order to perform its functions it needs to be maintained over time. In particular, it needs physical space to live, to grow, to bind and integrate more and more with the territory in which it is born and developed, so that this allows it to function at its best.

*“... non-profit, at the service of society and its development ...”* refers to the fact that the aim is not to get rich economically but to foster the culture of the population and to always be at its disposition, as a real point of reference. It aims to be a social structure that is an expression of synthesis with respect to the culture of a people, its historical reality and the prospects for change.

*“... open to the public ...”* it means that a museum exists when there are visitors. If a museum cannot be visited, there is no reason for it to be considered as such. In fact, its purpose is not only to preserve works and collections but must transmit them to enrich the culture of the population and therefore must have as its central focus the man, the visitor himself.

*“... which conducts research on the tangible and intangible heritage of humanity...”* in the sense that research can lead to archaeological, anthropological, naturalistic, ethnographic finds, sculptures, paintings, etc. The museum is open to every kind of testimony, history or object. Since museums contain material objects that have been created, used and accumulated by a certain community throughout history, they therefore represent their memory and testimony and allow this community to be handed down from generation to generation.

*“... of its environment ...”* because the museum that stands in a particular environment provides man all the necessary tools to know it, understand it and fit in better.

*“... acquires, conserves, researches, communicates...”* referring to the three fundamental functions of a museum: acquisition, research, and communication. In order to be able to pass on the testimonies, in fact, it is obvious that in a first phase these must be acquired, for example in the form of objects, documents, reproductions, etc. Secondly, the exhibits could not be realized without proper research and conservation. Finally, communication is particularly important because it allows the visitor to receive the right information in order to interpret the works and collections.

*“... specifically exhibits them for study, education and enjoyment purposes.”* because a museum exhibits for study purposes, to know the past, to understand the present and define the future. The educational function is addressed not only to students, but to all visitors. In addition to these ethical and social values, however, the function of delight is not excluded. In particular, it is important that emotions are aroused and that the experience is fun, in order to leave a good memory and satisfy the visitor.

This definition traces the way to what is, and should be, the evolution of the museum exhibition, in a context in which everything flows at a frenetic pace and technologies evolve continuously. Therefore, it is necessary to adapt and make the most of all that new technologies can offer, without forgetting where one started, that is an institution where past, present and future stories are collected, collated and communicated.

Therefore, the museum should no longer be simply a cold place to admire works of art.

The visitor must be able to observe the works but must also be involved in various activities such as educational workshops, multimedia exhibitions, experiments that allow him to feel an integral part of that world. More specifically, we can say that before the museum it was centred on objects, nowadays it is more centred on the orientation of the visitor (CeSMAP - Center of prehistoric studies and Museum of prehistoric art, 2015).

Recently, a new definition of Museum has been proposed to be included in the ICOM Statutes, in place of the current definition analysed above:

*“Museums are democratising, inclusive and polyphonic spaces for critical dialogue about the pasts and the futures. Acknowledging and addressing the conflicts and challenges of the present, they hold artefacts and specimens in trust for society, safeguard diverse memories for future generations and guarantee equal rights and equal access to heritage for all people. Museums are not for profit. They are participatory and transparent, and work in active*

*partnership with and for diverse communities to collect, preserve, research, interpret, exhibit, and enhance understandings of the world, aiming to contribute to human dignity and social justice, global equality and planetary wellbeing” (ICOM, 2019).*

This proposal was somewhat simplified by ICOM Italia which provided amore concise definition:

*“A museum is a permanent, accessible, non-profit institution, which operates in a system of relations to serve society and its sustainable development. It researches, acquires, conserves, communicates and exhibits the heritage of humanity and its cultural landscapes. It promotes learning and responsibility, critical thinking, participation and wellbeing in the community” (ICOM Italia, 2019).* As can be seen, the concept of accessibility, the system of relationships in which the museum operates, has been added, the concept of sustainability has been put next to the word development, making implicit reference to the 17 Sustainable Development Goals. Furthermore, the object of the museum action has been extended from the testimonies of humanity (material, immaterial, natural and digital) to cultural landscapes. The five main functions have remained such since they are typical of the museum reality. The goals section has been expanded by including the themes related to *“promoting knowledge, critical thinking, participation and the well-being of the community”*, where the latter tries to replace the idea of pleasure. To conclude, it is necessary to report how an agreement has not yet been reached on this new definition and, therefore, the one referred to is the definition dating back to 2007.

## **1.1 A GENERAL OVERVIEW ABOUT THE ITALIAN CULTURAL SYSTEM**

To give the reader a solid base of knowledge, regarding the topic dealt with in the thesis, it is now necessary to provide a general overview of the Italian cultural system. In 2018, Italy boasted of 4908 museums, archaeological areas, monuments and eco-museums open to the public. In particular, the heritage is made up of 3882 museums and collections (79.1%), 630 monuments (12.8%), 327 archaeological areas (6.7%) and 69 eco-museums (1.4%). It is a heritage spread throughout the whole territory: in one out of three Italian municipalities (2311) there is at least one museum. There is one every 50 sq km and one every 6 thousand inhabitants. Most are museums, galleries or collections (3882), of which 630 monuments and monumental complexes, 327 archaeological areas and parks and 69 eco-museums.

Another very important trend regards the growing number of visitors. In fact, over 128 million people (of which 58.6 foreigners) visited the Italian cultural heritage in 2018, almost 10 million more (+ 8%) than in 2017. The greatest increase is recorded by monuments and monumental complexes (+ 11.5%) and museums (+ 9.6%). On the other hand, visitors to the archaeological areas decreased (-11.3%).

On the other hand, considering a wider time horizon, from 2006 to 2018, the public of Italian cultural heritage increased by almost a third, growing at a rate of over two and a half million visitors a year. In particular, the visits to national museums, monuments and archaeological areas has almost doubled, from 34.6 million to 54.1 million visitors and the public of non-state structures has also grown from 62.7 million to 74,5 million.

The top 10 cities in which more than half of the visitors are concentrated (55.5%) are Rome, Florence, Naples, Venice, Milan, Turin, Pisa, Pompeii, Siena and Verona. The most visited structures, however, are the Pantheon, the Flavian Amphitheatre (Colosseum), the Archaeological Area of Pompeii and the Museum and Park of Capodimonte, all national institutions that registered more than three million visitors in 2018 and which together total 21.5 million, equal to 17% of the overall public of the entire Italian cultural heritage.

Despite these promising numbers, however, the digitalization of assets is still not widespread. In particular, only 10% of the structures have a digital scientific catalogue of their assets. Of these, about a third have already completed the digitalization process, two thirds have carried out the digitalization activities but have covered about 50% of the objects and collections available.

Among those who have digitized most of their works, stand out the museums of ancient art (23%), history and natural sciences (16%).

The Italian museums' use of interactive technologies and digital tools, that guarantee to enrich the experience of the visit and the involvement of the public, is still rather limited. In particular, only half of the structures surveyed (44.7%) make available at least one device among smartphones, tablets, touch screens, visit aids such as video and / or multimedia sales, QR Code technology and augmented reality paths.

While, on one hand, communication and information on the spot have broad margins for development, on the other, online communication involves an increasing number of structures. In fact, half of the institutes have a dedicated website (51.1%) and 53.4% have an account on the main social media, such as Facebook, Twitter, Instagram, etc. In the last three years, from 2015 to 2018, the number of establishments offering the possibility to buy tickets online has



doubled (from 6.6% to 14%). The number of facilities that provide visitors with free Wi-Fi has also increased. In particular, in 2018, a percentage of 25.1% was reached.

On the other hand, 38.4% of the museum facilities publish links on the web to digital maps and / or geographical coordinates useful for the geo-location of the structure. Finally, one museum out of ten offers the opportunity to virtually visit its institute (ISTAT, 2019).

In general, in a context such as that of Italy, characterised by a cultural heritage of extraordinary richness, it is important to continue the actions launched by previous governments and give a strong acceleration to the process of digitalization of cultural heritage. Therefore, *“technologies such as artificial intelligence, augmented and virtual reality offer the possibility of exploring - thanks to special viewers - environments and places of the past, even lost, with immersive 360-degree experiences. 3D reconstruction allows new forms of fruition, also aimed at blind and visually impaired people. Diagnostic imaging provides a detailed exploration of works of art by providing extremely valuable information, invisible to the naked eye, such as the dating of a painting, its authenticity, its state of conservation, the restoration work”* (G. Vacca, 2019).

In order to try to experiment and express the potential of digital environments in the best possible way and with the aim of providing a reference framework in the adoption of digital solutions, in 2019, the General Management of Museums published the Three-Year Plan for the Digitalization and Innovation of Museums (approved in collaboration, among others, of the MiBAC, AgID, CNR, Politecnico di Milano, ICOM, etc.). Among the main objectives of the plan we find: increasing the process of protection through the available cataloguing standards and new enhancement paths; make museums spaces for sharing; offer tools on the subject of accessibility from a system perspective; activate partnerships with private companies; present the cultural heritage both thanks to the exhibition and narration of the works and in terms of services.

In particular, the focus in the digitalization process is the improvement of the services offered to the public. This will be possible through: the adoption of the Catalogue of museum services; methods for defining digitalization processes such as the creation of 3D models, augmented reality solutions and gaming experiences; integrated systems of *Analytics, Business Intelligence and Big Data* with structured data flows, in full security and in compliance with privacy; *customer satisfaction* and monitoring of the quality of services; innovative geolocation solutions with the creation of customized museum guides.

The Triennial Plan for the Digitalization and Innovation of Museums is proposed as a useful tool to support digitalization, offering solutions at different levels. It represents a point of reference that aims to connect around 5000 Italian museums to promote knowledge, enjoyment and management sustainability, based on standards of quality, such as: “Adoption of uniform minimum quality levels for museums and places of public culture and activation of the national museum System” (Ministerial Decree, 21 February 2018).

The “Cultural Heritage and Tourism” ecosystem supports the enhancement and promotion of the cultural and tourism sector through the digitalization of places and sites of historical and artistic interest, the systemization of the information available on the historical, artistic and cultural heritage as well as of all the subjects that revolve around the ecosystem and the development of new digital services for citizens, tourists and operators.

The reference model for the Digital Ecosystem of Italian Museums (described in figure 1) envisages the construction of a federation of public and private entities, which operates through an interoperability framework based on rules, standards, APIs and the circulation of open data according to shared models (Triennial Plan for the Digitalization and Innovation of Museums, 2018).

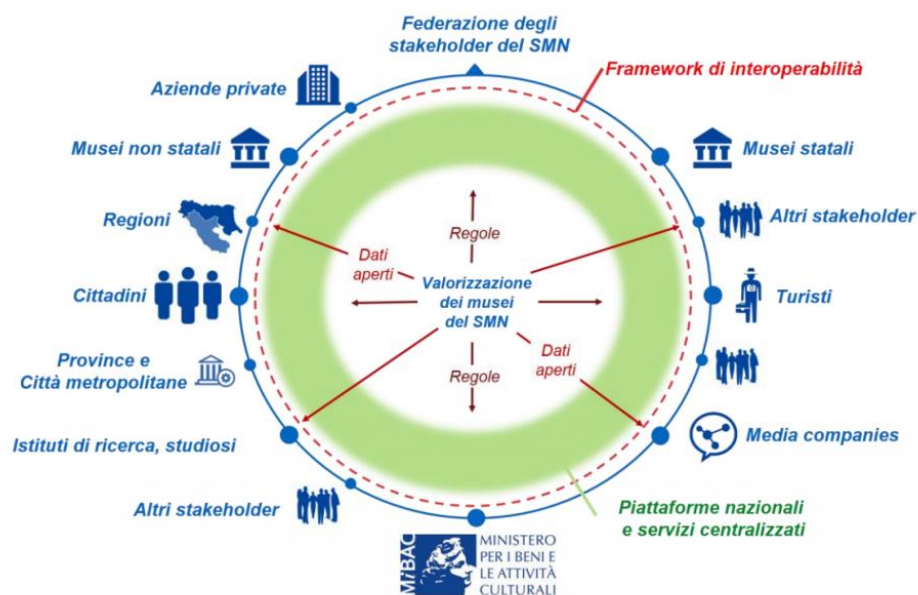


Figure 1 - Interoperability Framework

Finally, the General Directorate of Museums supports the creation of territorial networks to enhance the “diffuse museum” that characterizes the Italian cultural landscape and promotes innovative management systems, including participatory, for museums and cultural sites.

The diffuse museum, as opposed to the traditional one, creates its visiting routes within a geographical area. Places, events, ancient crafts and historical figures are united through thematic itineraries. The narration is entrusted to a signage system that, in a linear and comprehensive manner, describes the distinctive characteristics of the territory. The peculiarity of this museum is that the population also has its leading role. Through meetings, educational activities and conservation activities, the museum becomes of the people and for the people (M. Polelli, 2018).

A version 2.0 of the diffuse museum brings reality to the digital world. The Diffuse Digital Museums are an innovative and multi-channel project that allows users to visit the area from wherever they are located. A possible definition of Diffuse Digital Museums could be: *“Transposition of reality into digital. A way of living in advance to spread a digital multimedia library”* (Musei Digitali Diffusi, 2019).

A museum of this type has as its distinctive character that of being a real and virtual journey that unites places, things and contexts. It is an opportunity to promote a territory or a specific topic through the involvement of individuals, associations and institutions. To make the best use of the technologies, a strategic plan of “interfacing with social” has been prepared with the intention of preserving the whole range of self-produced content, news from other sites, to share and connect all the information in a single stream wall. In addition, another function is linked to the Rating to allow the users to report their level of satisfaction, and the possibility of using the smartphone to make their contribution. Through the app and the development of services with the integration of geolocation features, the user can participate by sharing photos of the places he visits.



Figure 2 - Examples of Musei Digitali Diffusi

## 2. LITERATURE REVIEW

In this chapter it is possible to better understand the main themes of this thesis: the museum, the digitalization and the correlation between these two terms, analysed through those technologies that are currently present in museums and that contribute allowing the visitor to live a memorable and increasingly personalized experience.

In particular, the first part relates to the evolution of the concept of “museum” through the main historical periods, up to the present day. The second part, on the other hand, refers to the impact of ICT (Information and Communication Technologies) on the *mission* of museums and aims to provide an image of the current situation and the perspectives related to new technologies.

In the third part we tried to analyse, giving adequate examples, those technologies currently implemented in museums. Finally, the last part of the chapter is dedicated to some initiatives, implemented simultaneously with the research for this thesis, to continue promoting Italian history and culture even during the current emergency medical situation due to Covid-19.

### 2.1 MUSEUM’S HISTORY

The word “museum” derives from the Greek *mouséion*, that is “place dedicated to the Muses”, the protective deities of the arts, daughters of Zeus, king of the gods, and Mnemosyne, the goddess of memory. The Muses were nine and were thoughtful protectors of the arts. It is said that they were called to the banquets of the heroes to cheer them up with music and dance and to sing of their exploits. As daughters of Mnemosyne and Zeus they were also the protectors of memory and knowledge.

In ancient times the *mouséion* was seen as the place where scholars met to discuss.

The first place in the world called a Museum was built in Alexandria in Egypt by King Ptolemy I in the third century BC, in the Hellenistic era. However, it was not a museum as we know it in modern times. The Museum of Alexandria was a place of worship, consecrated to the Muse, where a community of scholars, scientists and writers of the time, lived and carried out their activities, studying and discussing, as today's scientists do. The Museum of Alexandria contained a large library, an astronomical observatory, research tools and materials for scholars and artists.

Before the construction of the Museum of Alexandria, there were no real museums. It would be somehow possible to consider the pyramids, the ziggurats, the Etruscan tombs, where precious objects and furnishings were collected, and the temples of the Greek cities, where treasures offered to the gods flowed, as museums, but the purpose of these collections was very different from that of museums. In fact, the collected objects were destined to accompany the deceased, or to ingratiate them with the benevolence of the gods. Therefore, in the Greek world, there were no places of conservation, but there were simple displays: *“the works in the Greek world, in fact, simply became old, and therefore replaced with others, and were present in the temple with an eminently votive function”* (S Pansini, 2004).

In Roman times, objects began to be preserved to enjoy their beauty. There was an explosion of a real collection of works of art, coming from the rich war booty of the military campaigns. This is also confirmed by what was stated by Saverio Pansini (2004), *“less religious than the Greek, the Roman will not undergo the charm of the Muses, but will enjoy the values of art during the period in which he became a collector and refined sculptor”*. The word museum indicates a villa or spaces dedicated to philosophical studies, not yet places destined for art collections. The term takes on the meaning we know only with the Italian Renaissance.

During the Middle Ages, on the other hand, churches acted as a “museum”: in fact, the concentration of works of art in cathedrals and convents is remarkable. The works were thus visible and exposed to the adoration of all the faithful. *“These objects, symbol or source of wonder, absolutely exclusively devotional or of magic-thaumaturgical value, on which the veneration of medieval man was concentrated, overwhelmed by the supernatural”* (C. Grassi, 2015).

With Humanism, the passion for ancient art was reborn. In the courts of the fifteenth century there were large collections of works of art.

During the eternity of the popes, was born in Rome, by Sixtus IV, what could be considered the first museum in the modern sense. The pope, in 1471, gave the people of Rome a collection of bronze statues, which became the first nucleus of the Capitoline Museums. Only in 1734, however, the collection was opened to the public by decision of Clement XII, thus becoming the first museum in the world intended as a place where works of art were made available to the community and were available to everyone (Italian Environment Fund).

Between the sixteenth and seventeenth centuries there also spread a so-called “scientific” type of collecting that collected instruments, stuffed animals, animal and human anatomical specimens preserved in spirit. These are the first examples of museums of science and technology or natural history. Characteristic of this period are also the “rooms of wonders”: private collections of *mirabilia*, wonderful and amazing things. These rooms are widespread especially in the countries of the German area and rare and particular objects such as corals, fossils or automata, mechanical objects that move on their own. These collections were therefore composed indifferently of *artificialia* and *naturalia*, artifacts of man and things of natural origin.

The French *Chambres des merveilles*, which corresponded to the German *Wunderkammer*, were seen as travel destinations and were open to the public of the time, composed of artists, amateurs, aristocrats and writers. Over time, these collections required ever larger spaces where they could be exhibited and, therefore, especially in France, galleries were built adjacent to the buildings where the lord kept his collections and received visitors. This was the origin of the modern-day gallery.

In the eighteenth century it was customary for gentlemen and ladies to make long trips abroad for the purpose of knowledge, the so-called Grand Tours. On this occasion many visited the most famous collections. Thus, awareness of the importance of these collections for education and knowledge of the sciences and the arts grew. The first public museums were born in this period: the British Museum in London, inaugurated in 1753, and the Uffizi Gallery, donated to the people of Florence by Anna Maria Luisa de 'Medici in 1737. In Italy, in the eighteenth century, were inaugurated the Capitoline Museums, already mentioned above, and the Pio Clementino Museum in Rome.

The true modern museum, conceived as a public place in which to keep the memories of the past, was born, however, with the French Revolution and with the idea that all men, without necessary distinction, should have the right to observe the masterpieces of art. The collections of kings and nobles were then confiscated and declared property of the people. In this spirit, the Louvre Museum was born in Paris in 1793, in what was once the city residence of the King of France. Therefore, the idea spread that the works of art kept in a public museum are the patrimony of all. Thus, their conservation is important, since it is precisely the museum that makes it possible to spread culture to a large number of people.

From the mid-twentieth century, the idea became to be considered that a certain type of architecture would have played an important role in attracting more visitors. So much so that some museums, created in this period, are true works of art themselves, spectacular buildings designed by world-renowned architects, such as the Guggenheim Museum in New York or the Center Pompidou in Paris, created by Renzo Piano and Richard Rogers.

As we can see, the role of museums has changed over the centuries. For example, we have gone from an idea of collecting as a practice linked to religious rites or spiritual activities, to a cognitive function. Their task is, first of all, the conservation and care of objects and works of art. To this is added the dissemination of knowledge to as many people as possible, through the organization of exhibitions, guided tours and conferences.

As seen, in different eras, there has always been a different conception of the visitor and his relationship to the works of art: we have passed from a medieval pilgrim who visited a cathedral to understand biblical history through works of art, to having a wealthy owner who showed his collection to a visitor, who was seen as his guest. Again, during the eighteenth century, the idea in which the visit was intended as a privilege rather than a right, since it was an activity only for the most advantaged. With the opening of the Louvre, the visit to the museum was associated with the notion of citizenship, since all citizens could have access to what had become the national heritage. With public museums, the museum became fundamental to define the civic sphere, the space between private house and public workspace, and helped to build civil society.

After the First World War, museums began to be considered educational institutions. Until the end of the twentieth century, museums focused on public service through education, rather than on the collections. However, if up to thirty years ago entering a museum you could have expected a purely educational experience, nowadays the experience is much more varied and is associated with the needs of visitors, which can include a social interaction, spiritual support, emotional connection, intellectual challenge or consumer indulgence. Museums have begun to recognize that, in order to survive, they must constantly capture the attention of potential visitors and stimulate current visitors so that they can repeat the experience. To do this, first of all, it is necessary to recognize the ability of visitors to create meaning for themselves, to collaborate with them to find out what they really look for in the visit and, finally, to mobilize the museum's resources to meet these needs. The new strategies are based on a close relationship between collaborators and visitors, in which museums develop activities and events

together with the visitors. An example are the co-curation projects and the crowdsourcing exhibition contents.

Some examples of this close collaboration are: the Stedelijk Museum in Amsterdam which exhibited drawings made collaboratively by visitors while they were at the museum; the Frye Museum in Seattle which launched the hashtag #SocialMedium, an exhibition composed of works selected on the basis of the preferences expressed by visitors through social media; the Portland Art Museum which instead launched the hashtag #captureParklandia, referring to a project through which photographs, taken in city parks and appropriately tagged, are transmitted via Instagram to the museum's web page dedicated to the initiative; and finally the Museum of Fine Arts in Boston, which used a popular vote to choose the paintings to be included in an exhibition.

In general, the trend has changed and today it is going more and more in the direction of an increasingly personalized visit, which is able to be adapted to the individual needs of different visitors. This is partly determined by consumer developments and partly by a marketing revolution, which has led the visitors and the museum to plan together the meaning of the experience that will be lived during the visit. Visitors are, therefore, to all effects involved and have an increasingly important role (S. Rodney, 2016).

The latest and most recent step forward has been introduced with the concept of the virtual museum, which can also be classified in other ways, including online museum, digital museum, cyber museum, or web museum. The virtual museum, however, is not a simple substitute for the real one, but can be seen as its complement. Thanks to new technologies, for example, it is possible to have a very faithful 3D reproduction of works present in physical museums. It is possible to take a 360 ° virtual tour of an archaeological complex without being physically on site.

In conclusion, we can say that virtual museums will necessarily have to spread more and more, because we are now faced with an unstoppable evolutionary process, carried forward by the continuous evolution of technologies. This process, however, will require close collaboration between the various stakeholders to reduce costs and concentrate resources to find the right balance in order to satisfy everyone.



## **2.2 DIGITAL**

In this second part of the chapter, an attempt has been made to show how the introduction of Information and Communication Technologies (ICT) has influenced the museum's mission and how there has been an evolution in the use of technologies. Furthermore, they are no longer used exclusively in the management of collections and cataloguing systems, but also to assist museums in expressing in a completely new and more effective way, focusing on the visitor and his needs. The goal of the institution, therefore, is to expand its audience and improve the current conditions of use of exhibitions and information. Finally, an attempt has been made to provide a general overview of the current situation and the prospects linked to new technologies in the Italian context.

### **2.2.1 Museum and its Mission**

The first experiences on the use of IT tools within a museum institution were introduced in the United States in the 1960s and led to an evolution in the management of collections and cataloguing systems. Furthermore, new technologies have opened the doors to new opportunities: they have led to a significant increase in the gathering and processing of data on the collections and to an evolution of the idea of accessibility of the museum, which has led to a different relationship with its audience. Initially, the high costs and the thought that technologies could divert attention from art led to resistance against these innovations. In a second phase, starting from the 90s, technologies have been re-evaluated and have brought a new way of museums expressing themselves, to be more effective in communicating with the public, also through digital tools. They have allowed the public more involvement and created more solid relationships, which allow the visitor to stay constantly updated on the various initiatives or events of the institution. If on the one hand the Information and Communication Technologies have allowed cultural institutions to enhance their heritage, to make it more accessible and to change the way in which they relate to the public, on the other hand, however, they have not transformed the museum, which has remained the place of conservation for knowledge and heritage education.

The museum, moreover, cannot fail to have taken into account the digital transformation process and the globalization that has involved society and that has led to the provision of increasingly personalized products and services and constantly listens to the needs of

customers. Therefore, the museum also had to adapt and put users, their needs and the type of experience they would like to live at the centre of its mission.

This fact can be found in the Decree of the President of the Council of Ministers n.171 of 2014 which states that the challenge of museum activity has increasingly become that of providing “effective experiences of knowledge and public enjoyment”.

As seen, the current definition of the museum states that “*The Museum is a permanent, non-profit institution, at the service and development of society, open to the public, which conducts research on the material and immaterial testimonies of man and his environment, acquires them, preserves them, and communicates them, and specifically exposes them for the purposes of study, education and pleasure*” (ICOM, 2007). The five main functions of a museum emerge from the definition: research, acquisition, conservation, communication, and exhibition. Considering the advent of new technologies, it almost seems that these tasks have changed over time and that, nowadays, the most important ones are communication and exhibition, because these are the two functions that allow a relationship with the public, to provide unique and personalized experiences. As said, while “*the old museum was centred on objects, the new museum is centred on the orientation of the visitor*” (D. Seglie, 2015).

### **2.2.2 Audience Development**

What museums must go through is therefore an expansion and diversification of the public and an improvement in the current conditions of use of exhibitions and information. We can refer to this process with the term *audience development*. The museum has the task of retaining the regular and occasional customer and to include more and more people who are currently excluded from the experience. In a study on best practices in the field of audience development published in 2018 by Economía Creativa society, the researchers Molendowska-Ruiz and Ruiz Soria, study in depth the concept, underlining how the development of the public is more than a communication strategy. They describe it as the elaboration of activities aimed at satisfying the needs of the existing and potential public, with the aim of creating solid and lasting relationships. This process, therefore, serves to get to know the public better, to diversify it and to find strategies for expanding it, for building lasting relationships and involving various subjects in the creation of collaboration in museum projects. According to Molendowska-Ruiz and Ruiz Soria, the audience development plan is made up of four phases: *diagnostics, planning strategy, implementation and evaluation*. The first phase (*diagnostics*) is the includes the

registration and listening to the relevant public to understand the positioning of the operation and to be able to trace the following paths to reach one's goal. This phase provides a general overview of the situation. The second phase (*planning strategy*) is that provided to the strategic plan to interact with the target audience, communicate the mission and the activities to undertake. The third phase (*implementation*) is that of implementation, who will come and when, what will be offered to the public, by which method. It is therefore linked to the action plan. The last phase (*evaluation*) is summarized by the question: are we doing it correctly? Furthermore, it refers to which evaluation measures are used. The phases are summarized graphically in Figure 3.

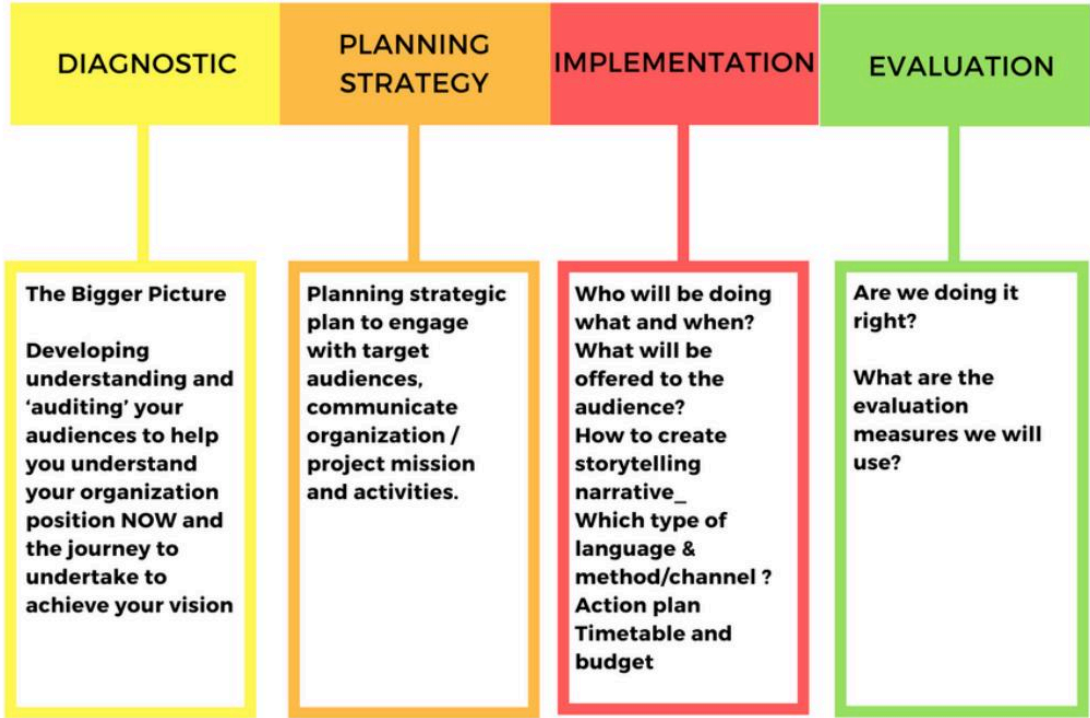


Figure 3 - The four phases of an audience development plan

The two developers also identify four fundamental approaches that can be considered by museums to promote a specific audience, real or potential. Inspired by the Ansoff Growth Matrix, they created a matrix that places selected Content / Program / Offer and Members / Audience on the two main axes x and y and which offers four possible scenarios, represented by the four quadrants. Analysing them in more detail, it is possible to see how it is possible to increase the audience by the existing offer (*market development*), or, create a new offer to

capture new visitors (*diversification*). If instead you want to follow a strategy that does not lead to having a new audience, but to improve the relationship with the existing audience, loyalty practices are suggested through membership and loyalty programs (*market penetration*), or, the creation a new offer based on cultural events or programs (*activities / program development*). This is also schematically reported in figure 4 (Audience Development Matrix).

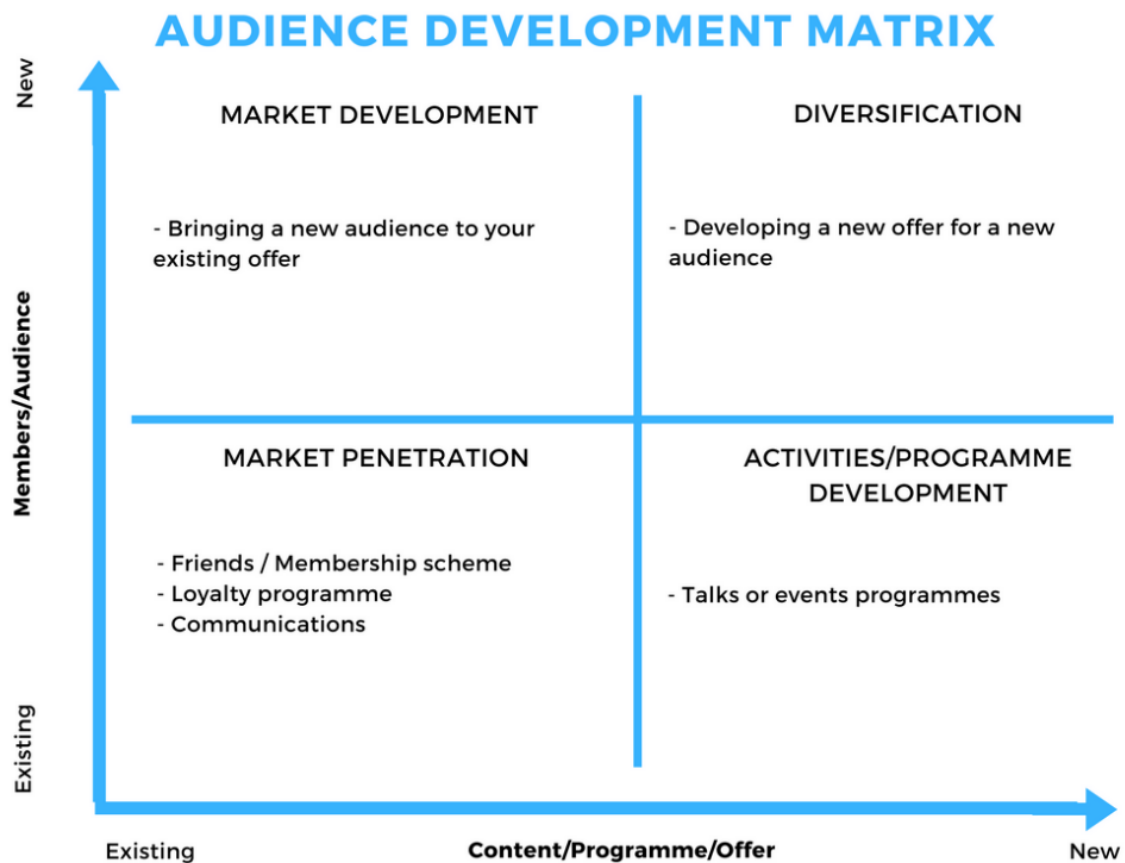


Figure 4 - Audience Development Matrix

The scenario that presents itself, is constantly evolving and can do nothing but use the technologies, also in continuous expansion, to improve the accessibility, communication and understanding of the works of art, through a relationship that is ever more intimate with the visitor.

ICT (Information and Communication Technologies), therefore, allow you to expand your audience, since they allow you to make it active and place it at the centre of the experience. Referring to the previous matrix, they guarantee to diversify the offer, reach a wider audience and make the experience as uniform as possible.

At this point it is possible to try to understand the current situation and the prospects of new technologies in museums.

### **2.2.3 Current situation and perspectives of new technologies in museums**

Referring to the book “Management for the cultural enterprise” by Ludovico Solima, cited by Christian Gamper in 2018, it is possible to illustrate the impact of new technologies on the cultural sector. Solima, in fact, explains that technology intervenes not only in the production phase of the cultural service, but more and more in the distribution phase of the same service.

A cultural institution can use culture in different ways: through exhibitions and therefore with direct fruition; through digital media and therefore through reproduction; through analogue or digital transmission; through exchange between different devices (Bluetooth or NFC).

Thanks to Information and Communication Technologies, therefore, a completely different service offered, according to the distribution methods. It is therefore evident that the development of technology has had a strong impact, also in the cultural sector. This evolution was also facilitated through the spread of broadband which has the capacity to transfer a large body of data in a short time. Using technologies, it is also possible to exploit the replication economy with important cost savings and an increase in income. Another beneficial effect given by the introduction of ICT is the permission to create new services that make communication more effective and accessible and which are complementary to the real offer. In fact, it emerged that there are three ways in which new technologies can create new opportunities: reproduction, improvement of an existing cultural service and design of a new cultural service. By reproduction is meant the possibility of allowing its use in a different space / time. The improvement means that technology is used to cope with some intrinsic limitations, for example it can be the study of certain works. With the creation of a new cultural service, reference is made to the possibility of circumventing the actual limits by using technologies, for example to access archaeological areas through three-dimensional graphics. The author, like many others, claims that new technologies help to overcome the barriers that hinder full physical accessibility to museums, also providing disabled people with access through viewers, 3D prints or interactive whiteboards. Secondly, they reduce the costs of use. And finally, permit the breaking down of cognitive barriers, allowing the customization of services to anyone's needs and making sure that the sense of inadequacy, which in some cases stops a potential visit to the museum, is reduced. Improper use of technologies, on the other hand, could lead to an

increase in the digital divide, defined as *“the lack of uniformity, between distinct social groups, as regards the access, use and impact of ICT technologies. This digital divide often translates into forms of educational, economic and career inequality”* (Inside Marketing, 2020).

But at this point it is legitimate to ask, how is the Italian cultural situation today? How widespread are technologies such as the Internet, *social media, mobile devices*, virtual reality and augmented reality, *gamification*, 3D modelling and printing, *Internet of Things, Big Data* and Artificial Intelligence in Italian cultural institutions?

Referring to what is written in the press release “Innovation in museums: who guides the digital journey in culture?” of the Digital Innovation Observatory In Cultural Heritage and Activities of the Polytechnic of Milan, on the 23<sup>rd</sup> May, 2019, affirms that 69% of museums is present on at least one social channel, especially on Facebook (currently 67%) and Instagram (currently 26%). Museums, nowadays, try to expand their offer through these social networks with which they can reach many people with minimal effort and in the shortest possible time. In addition to this, however, 76% of institutions also rely on other structures such as TripAdvisor since feedback is particularly important to improve the current offer and to increasingly meet the visitor's expectations. This is fundamental in a vision that places it at the centre. On the contrary, on the other hand, online travel agencies (OTA) or online tour operators are not widely used. As evidence of what was said, 83% of museums announced that they consult the analytics and 77% read the reviews, intervening where appropriate.

Of considerable importance is also the fact that 68% (over 2 people out of 3) consult the website to choose the places to visit on vacation, and only one out of two institutions have a website suitable for mobile browsing. In Italy, moreover, cultural activities can still be bought on the spot (73%) and in cash (66%).

As for the technologies that have started to spread, we mainly have virtual reality and augmented reality, with 16% and 12%. In addition, 17% of cultural institutions declare that they have an app and 62% plan to have one soon. Therefore, as Eleonora Lorenzini, director of the Digital Innovation in Cultural Heritage and Activities declares, *“cultural institutions are in the midst of a profound process of change, stimulated by the need to open up ever more to the outside, use new ways and languages, strongly influenced by digital. The need for transformation is a challenge but also the opportunity to bring in new audiences and to enhance the tangible and intangible assets that the institutions preserve and produce”*.

Going back to talking about numbers and statistics, we also have that before a visit, for 48% of Italian digital tourists, the main tools of inspiration are reviews and comments read online, to which one can add 19% who that draw inspiration from posts by other users on social networks. An analysis carried out on a representative sample of Italian museums shows that 85% of museums have a website but only 47% have a site related to their cultural institution.

It is also interesting to note how, only 20% of museums allow online ticket purchase and how only 8% of institutions allow entry without having to print the ticket on paper.

Regarding the digital support tools for the visit the main opinions expressed by the interviewees 39% said they found them amusing, 22% surprising and 21% relaxing. From what emerges therefore, the innovative tools managed by the various museums seem to entertain people more and make them have fun. The entertainment component, rather than the in-depth one, therefore seems to connote these tools. This concept of communicating by entertaining we find in a term that was coined in 1973 by Bob Heyman, as “edutainment”. The lemma consists of putting two nouns together and effectively represents two of the main objectives of cultural communication: education, or the learning phase, and entertainment, or the fun phase. One of the first needs of edutainment is the following: *“the branch of e-learning combines both scholastic and extracurricular notions in a playful way, through multimedia [contents] training made available through supports such as CD ROM and the Web”* (F. Cervellini & D. Rossi, 2011). Obviously, this is a dated definition, since there is still talk of CD ROM. Today, thanks to the evolution of technologies that have made available a series of virtual tools able to modify the relationship between the cultural resource and those who have it, it is possible to provide a more rigorous definition of the term. Following the principle that without fun there is no learning, *“edutainment consists of educating, informing and inducing to develop operational skills, improving relationship behaviours in work groups, study or cultural tourism through activities that also involve other forms of entertainment. These various activities, in addition to interactive cultural exhibitions, may also include television programs, video games, 3D and 5D film projections, music, websites, software and E-learning”* (Agorasophia Edutainment).

It would seem clear that the new digital tools represent an essential resource for the dissemination of cultural heritage, since they allow the integration of content complementary to the experience itself. Despite this, the data shows that digital is still not very present: only 58% of cultural institutions make Wi-Fi available to visitors and 36% the audio guides. In addition, as mentioned above, there are some first shy approaches towards virtual reality and augmented reality. A statistic that bodes well and goes in the direction of digitalization is the

fact that about 50% have declared that they are interested in inserting these two technologies. The mobile application is also not widespread in cultural institutions and is mainly used for the informational purposes and not for greater visitor involvement.

Back office activities are also still poorly digitalized. Still 32% of museums do not have any computerized support system for administrative activities, 45% have software for ticketing, 30% for the management of educational activities, 21% for services such as bookshops and restaurants and 11% for the management and rental of spaces. As regards the analysis and monitoring activities, 36% have Customer Relationship Management (CRM) and contact management software. Clearly the possibilities for making improvements to the system are many and the technologies, the digitalization, can be the starting point for better management of the activities.

As stated by Michela Arnaboldi, Scientific Manager of the Digital Innovation Observatory on Cultural Heritage and Activities, during the event “Who guides the digital journey through culture?” held on 23<sup>rd</sup> May, 2019, *“having tools that can improve and automate the management of contacts, for example, should become a priority for all those institutions that are focusing their strategic objectives on expanding their public and the engagement and loyalty of users already reached”*.

Finally, as far as cataloguing is concerned, despite the fact that 68% claim to have a computerized system for these activities, the paper catalogue still remains widespread (in 53% of museums).

Considering the Italian scenario just illustrated as a starting point for the analysis that will be presented during this thesis, it is quite clear there are still numerous gaps among visitors who live more and more *onlife* and the services made available by the various institutions. With the term *onlife* one refers to the definition of Treccani (2019) *“the vital, relational, social and communicative, work and economic dimension, seen as the result of a continuous interaction between material and analogue reality and virtual and interactive reality”*, it is possible to understand how we find ourselves and live in a situation characterized by an unclear distinction between real and virtual. Through this increasingly current trend, therefore, reference is made to all those concrete experiences lived every day while staying in contact with digital and interactive devices and environments.

Considering this starting point, it is necessary that institutions increasingly try to engage the visitor and offer a better service, to at least try to stay in step with the times and with today's society.



Since there is talk of various technologies such as augmented reality, virtual reality, audio guide, social media, etc. we will now try to see which can be if they can be implemented in museums, also thanks to some examples.

## **2.3 TECHNOLOGIES IMPLEMENTED IN MUSEUMS**

Some of the technologies already implemented in museums to improve interactive communication with the public, are described below. The task of the museum manager is to conceive a renewal of the format for the exhibition of the works, accompanied by a presentation of the contents in digital form.

### **2.3.1 QR Code**

The QR code (Quick Response) is a two-dimensional bar code, that is a matrix, composed of black modules arranged inside a white square-shaped scheme, typically used to store information generally to be read via a smartphone (Inside Marketing). It is as if it allows the creation of a bridge between the real world and the digital world. This tool allows you to create a sort of protected guide on web pages. For this reason, they are seen as an evolution of the traditional audio guide. The visitor, in the vicinity of a work of art, can decide whether to access the content for further information, or whether to go further.

The classic didactic message, therefore, can be conveyed with a different tool, the smartphone. In this way, the exhibited works no longer remain isolated or contextualized only in the visit path, but rather become the focal point of an information network.

The use of QR Code does not require special skills and, therefore, could be managed internally by the museum. The most delicate part concerns the choice of works that need particular study, the creation of the contents (texts, audio, images, videos) that you want to offer to the visitor and the creation of a web page that contains the information. The creative process, as can be seen, is not particularly complex for the museum.

Even from the visitor's point of view, the process does not involve great complexity, once they are educated on how to use this technology. Overall, therefore, this technology is a candidate to be used on a large scale in museums, thanks to its simplicity, the low investments required and the ease of use both on the consumer side and on the service provider side. Above all, the

younger generations are the ones who make the most of the opportunity to interact with the system to build personalized visits.

Figure 5 shows an example of a QR Code which refers to the website of the Digital Innovation in Cultural Heritage and Activities of the Politecnico di Milano.



*Figure 5 - Example of QR Code*

### **2.3.2 3D Technologies**

With 3D technologies it is possible to refer to two strands, one relating to audio-visual content and the other relating to the creation of three-dimensional objects. If, on the one hand, the one relating to audio-visuals has had little success and a shorter life, on the other the creation of three-dimensional objects and the 3D printer is becoming increasingly widespread. 3D printers in museums can have above all educational and accessibility purposes. As for the educational purpose, it is possible to let the boys try to print miniature works seen during the visit or touch monuments reproduced in large dimensions. Since they provide a greater perception and allow one to have a faithful copy of the exhibit, these technologies are therefore able to attract the attention and create greater public involvement.

At the accessibility level, on the other hand, they can be seen as a support for the blind. The blind, in fact, see through their hands and therefore being able to physically reproduce the objects is of great help to them.

An initiative in support of greater accessibility was carried out by a Venetian start-up (Tooteko) who decided to show the works of art to the blind. In concrete terms, a three-dimensional model

of what you want to show to the blind. Once the building has been digitized and the necessary information has been collected, the three-dimensional printing of the object is performed. Subsequently, by touching this work with a special ring capable of recognizing the NFC sensors positioned in the reconstruction, the audio information about the part in contact with the finger at that time is transmitted on smartphone or tablet. In this way, the semi-blind or blind have the opportunity to receive more explanations on the various parts of the three-dimensional work (A. Nisi, 2018).



*Figure 6 - Tooteko technology*

### **2.3.3 Gamification**

Gamification is the application of typical game mechanics (game elements, game mechanics and game design techniques) to non-gaming contexts, with the aim of improving engagement and promoting user loyalty (B. Roncaglia, 2018). The game and gamification may be envisaged as useful tools to reach new museum audiences and, in particular, new generations. Furthermore, we can stimulate a participatory and emotional process in the public, improving the current experience. As seen, in fact, today the museum is no longer seen as a passive place for the conservation of works of art but as a space for learning and interaction in which visitors are involved in actively participating. The game within the cultural world therefore allows you to live the museal experience like that of a video game, in a living way, with one difference: it is the visitor himself who moves and solves missions and puzzles. Another aspect not to be underestimated is related to the fact that the game can make sure that the visit to the museum

is no longer only occasional, but instead represents a moment of play and fun to be lived more frequently.

Let's now see some examples of museum gaming developed in recent years:

“Secret Seekers” is one of the mobile games of the Victoria and Albert Museum in London, released with the inauguration of the “Road Quarter” exhibition in June 2017. Through this game, some characters from the rich history of the V&A Museum guide visitors on a treasure-hunt to try to discover some of the museums secrets and reveal interesting historical facts and curiosities to them. Through a series of quizzes, the game helps children and families to discover particular facts and characteristics of the various works. This mobile game therefore offers the opportunity to play with the museum itself to complete challenges and collect gems that allow you to unlock special achievements.

Another example that we can offer is that of the archaeological museum MANN in Naples, the first archaeological museum to have produced a video game. “Father and Son” is a 2D side-scrolling narrative game, which explores feelings such as love, dreams, fear, through the journey of a son to discover an archaeologist father who he never knew. During the experience, the protagonist goes through different historical periods: from ancient Rome, to Egypt, passing through the Bourbon age to today's Naples. So, although starting as a personal experience, it becomes a universal and timeless story, the present and the past alternate in a series of significant choices for the player himself. The protagonist is called Michael and is a young man who is going to Naples after receiving a letter from his father, an archaeologist, in which orders are assigned to get to the National Archaeological Museum of Naples (MANN).

Exploring the streets of the city and the halls of the museum, the player meets different characters and comes across stories that span the various eras, but which have constant references to current life. The aim is obviously to find out more about the precious collections inside the museum, thus enriching the experience of the visit, both in the event that the real visitors are playing it, and in the event that the players are far from the MANN playing virtually. Among the features of the game, there is also the functionality of the check-in, which has a relationship between the digital content and the physical space of the museum. We find this relationship also in the words of Paolo Giulierini (2017), director of the MANN, who says *“This is a remarkable “beat of the wing”, which allows us to fully achieve one of the founding objectives of the Strategic Plan: the connection with the public, both those who visit the museum and the virtual ones. If you think that all over the world you can interact with the historical contents of our Institute and the city of Naples through this peculiar tool, which should now be*

*counted among the new art forms, you can only be satisfied with our cultural dissemination. If before it was the only exhibitions to talk about MANN in many foreign cities, now an extraordinary digital adventure will make us converse with thousands of potential, new visitors, art lovers, students, especially young people: and that it is the Past that takes up the arms of the Future, speaks volumes about our desire to present ourselves as a site where everything can be experienced, because of a cultural vision without prejudices or barriers”.*

#### **2.3.4 Holograms**

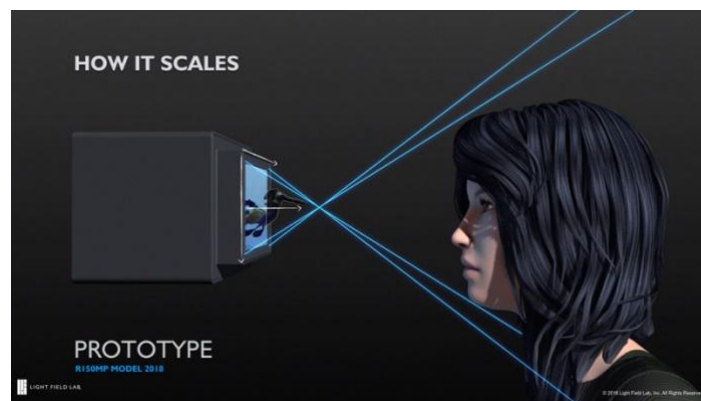
Holograms are three-dimensional reproductions of objects made using a specific optical technique, holography. The hologram allows the reproduction of a previously recorded image. During recording, a laser light beam is sent both to the object to be reproduced and to a plate of sensitive material. It is, then, thanks to a play of mirrors that the light that arrives interferes with that reflected by the object. Through this technique, therefore, a series of lines are formed on the plate, called interference fringes. Fringes contain information about three-dimensionality. Later, by illuminating the plate with another laser beam, it is possible to decode the information and reconstruct the three-dimensional image of the object in question (Focus, 2002). A strong point of this technology is the fact that the images can be observed in their entirety and from different points of view without the aid of viewers.

This technology is still scarcely used in museums as it is very expensive, although, as mentioned, it could prove useful to create three-dimensional animations of objects that are not actually available or to reproduce destroyed finds. A possible application of holograms, therefore, could be a case for science museums and archaeological museums. Through three-dimensionality, accompanied by engaging narratives, in fact, the level of interaction, learning and fun can be promoted.

The first Italian experiment took place in the Ducal Palace in the city of Gubbio in 2010 (Stark). Specifically, the historical figure of Federico da Montefeltro, played by the actor Giulio Base, is proposed in a full-size holographic three-dimensional representation. The great leader talks for fifteen minutes with an angel who asks him a series of very “penetrating” questions. The idea is to create, through this dialogue, an emotional bond between this historical figure and the public.

A step forward regarding the development of this technology is being carried out by the Light Field Lab, based in San Jose, California, which is making holographic displays that can be

assembled from small modules into huge screens to obtain 3D images. These holographic displays, created in collaboration with Otoy's 3D content, show that they have the potential to be the turning point that everyone expects. Looking at figure 7, we understand how this technology works. It is possible to see objects in a real environment, thanks to rays of light that bounce in the space of our visual field of view. This technology, as seen, is being perfected and therefore it is necessary to wait to see if, in the near future, it could be made more accessible for possible applications in many areas (Altervista, 2019).



*Figure 7 - 3D reconstruction of the holographic panels by Light Field Lab*

### **2.3.5 Augmented Reality and Virtual Reality**

Another particularly important trend that is developing within the various museums is that related to the use of augmented reality and virtual reality. Often reference is made indifferently to one or the other, however the two terms do not express the same type of technology. Virtual reality refers to a three-dimensional digital environment generated by the computer which can be explored and interact with a person. It is therefore an interactive world in which objects have their own position, independent from the person observing and in which it is difficult to distinguish what is real from what is not.

The term augmented reality, on the other hand, expresses the union between virtual reality and real life. The person can interact with virtual content in the real world and remains able to distinguish between the two worlds.

These technologies are those mainly desired by museums as they allow for particularly high levels of involvement and sensory immersion. They are used because they offer the public the

opportunity to enjoy monuments which are at risk of damage, to reconstruct objects and realities that no longer exist, to create moments without space-time limits.

Virtual reality is implemented through specific tools such as helmets and visors, which transport the user into a completely digital world. Most of these devices use the exploitation of virtual reality applications for smartphones. Specifically, a smartphone is inserted on which an augmented reality software is installed inside the viewer itself. Furthermore, if there are motion detectors and interactive buttons, the user also has the possibility to interact with the surrounding environment, just as if he were in real life. Virtual reality, therefore, is immersive, isolates the user by transporting him into a parallel world so realistic as to seem true. It allows one to relive places or situations from the past that assist in contextualising the collections, stimulating the processes of memory and the preservation of historical and cultural identity, as well as enriching and making learning more dynamic. Unlike virtual reality, augmented reality does not take one to a parallel universe but enriches the experience, provides an enrichment of contents. In fact, it allows the reconstruction of objects that have disappeared or are no longer usable. This type of technology also allows one to reconstruct the reality of the past through a device, with the aim of involving the visitor more. Other applications can be: providing insights into works of art, reconstructing in 3D statues or other elements that are currently in a state of decay and reconstructing archaeological sites. Through these technologies it is possible to reconfigure the museum space and bring it to a substantial transformation in the communication processes and to a progressive fusion between real and virtual.

These technologies, have been able and can integrate the museum visit, opening up new opportunities. The communication process is less and less linked to the physical and geographic space of the institution and tends to emerge as a space of direct and remote interactions, mediated by networks and complexes that go beyond the traditional limits of the museum.

An example of application of these technologies can be found in the Museo del 900 (M9) in Mestre, Venice. In this case there is a collective path that puts interactivity and multimedia at the service of historical narration. The Museum is configured as a small smart city, thanks to new technologies, it offers innovative services to improve the quality of life of citizens. Inside the building there are the classrooms and the auditorium / cinema 4K and VR on the ground floor, the multimedia museum on the first and second floors, and the space for temporary exhibitions on the third. The visit is made unique thanks to the presence of three different levels: an emotional level capable of surprising, enhancing the evocative aspects of the story; a narrative level that interactively enhances the dimension of the story; an information level that

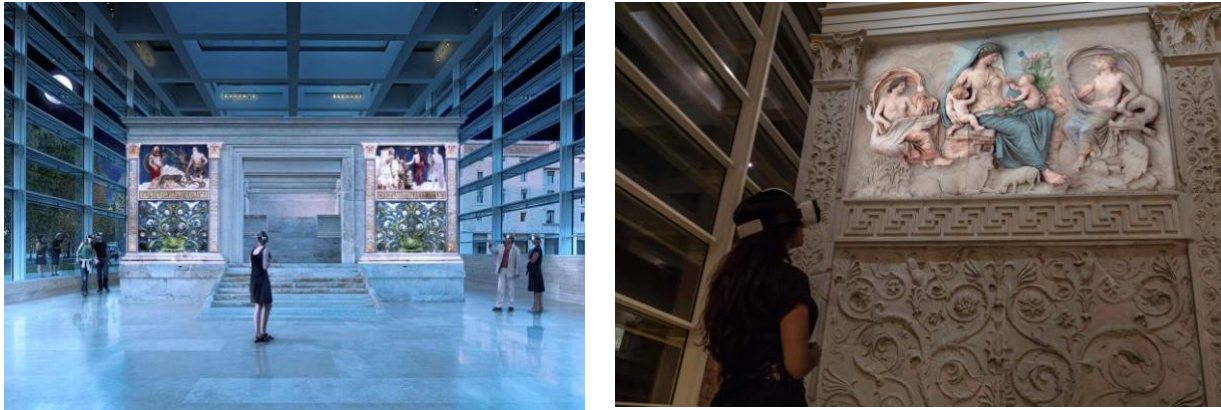
allows you to deepen the topics covered. The visit is made even more interesting thanks to the use of technologies such as viewers, multi-touch devices, holograms, sound focusing systems and immersive environments (M9 Museum).



*Figure 8 - Examples of technologies exploited in M9*

Another interesting example is that of the Ara Pacis Museum, whose project “The ara as it was” ended on 30<sup>th</sup> December 2019. It is an interactive story that revives the Ara Pacis monument thanks to the use of augmented reality and virtual reality tools. Using different technologies, the project leads to the creation of virtual worlds in which both real and reconstructed characters are connected. Using visors (Samsung Gear VR) and the camera of the devices inserted in them, real and virtual elements merge into the visual field of visitors. The route consists of 9 POIs (points of interest) that can be used with the viewers. In particular, in the first two the visitor sees the Ara Pacis complex discovering the original colours of the ancient monument, after being catapulted into the past in the days of Augustus, who is virtually represented by a real actor. Subsequently, the user witnesses the virtual reconstruction of a Roman sacrifice and, through a 3D reconstruction, admires the Campo Marzio from above, the area including the Pantheon, the Saepta Julia, the Mausoleum of Augustus and the Aqueduct. In this phase, therefore, the visitor manages to contextualize the ancient use of the Ara Pacis by the Romans, immersing themselves in the reality of those times. In the following 7 POIs, the public can look deeper into the symbolism of the bas-reliefs that characterise the monument. The surfaces of the Ara Pacis are recognized and traced by the viewer thanks to 3D tracking technologies, which allow the digital images to adapt to the shape of the reliefs, making the experience as real as possible (Ara Pacis Museum, 2019).





*Figure 9 - Ara Pacis with AR*

### **2.3.6 App**

The term App, from the English application, is a computer neologism. In fact, the software registered and created for mobile devices such as smartphones and tablets are thus indicated. Compared to software intended for a computer, apps are characterized by a greater simplification of operation and content, to be more intuitive and immediate. Also, you can have a distinction within the category app. Two types of apps can be distinguished, native and web. The native app provides for the installation and use entirely on the smartphone (or tablet) and are therefore created for the operating system of the device. The Web app, on the other hand, does not provide for an installation but a connection to a remote application. In contrast to the first, they require a constant internet connection, even if they allow a saving on the memory of the device used.

Through the app, visitors can consult the guide and information at any time, both first to get to know the museum, and after with the idea of deepening the museum themes and to stay constantly updated with the initiatives and events promoted by the institution. In addition to this, of course, the app can also be useful during the visit itself because, through information, video, audio, or games, it can encourage interaction between the visitor and the museum. The main advantages that can be obtained with an application can be summarized in: pre and post visit information; preparation of itineraries dedicated to different target visitors; greater involvement (for example through gamification); geolocation; visitor data collection. As for the first advantage, you can easily see as a user, that by downloading the app before the visit, one may already be informed about the collections and the experience that will be expected.

In the same way, the visitor can access shared information to review contents or deepen topics covered during the visit, with the aim of better learning what there is to know about the museum's collections. As for the preparation of routes dedicated to different target visitors, the important aspect offered by the app is personalization. Through the app it is possible to examine different routes for children, adults, expert users, also considering the different themes and the time that the visitor can dedicate to the visit. It is possible to set up an app in such a way that it is the user who manually clicks what interests him most or use geolocation so that the device itself automatically offers the content to be seen.

The third benefit is related to greater involvement, for example through gamification. As mentioned, one of the main objectives of a museum is to keep the visitor's level of attention high and involve him more and more. As already seen, the term gamification refers to the use of game dynamics within external activities (not purely related to the game) with the aim of retaining the visitor and stimulating participation. Through the game, therefore, the visitor can actively participate and, above all, be emotionally involved. To obtain satisfactory results it is necessary to take into consideration two different aspects: the mechanics and the game dynamics. While the mechanics refer to the tools to create the play infrastructure, the dynamics refer to the human needs that must be satisfied through the former.

Therefore, each mechanic satisfies a dynamic: the collection of points satisfies the need to receive a reward and allows people to be more motivated; the levels allow the creation of a system to introduce goals to be achieved; challenges or missions give the user a reason to continue trying to achieve results; the ranking stimulates competition and participation, since users aspire to become the best within their circle of friends and acquaintances (Gamification, 2010).

While gamification, in the cultural sector, is aimed primarily at a younger audience, in other sectors it is also designed for those who were born from 1980 onwards and who therefore grew up in the digital age. Therefore, it would be appropriate that cultural institutions also begin to expand the age group involved.

The fourth advantage is related to geolocation or identification of the geographical position of a device, such as a smartphone, tablet, or computer, thanks to systems including GPS, cellular network cells, Wi-Fi network, etc. This tool can be useful from the moment in which the visitors' position is known and therefore can provide them with information on the objects displayed in the place where they are at that moment. It is basically a simplification and greatly

increases the practicality. It is also easy to implement since GPS is integrated into every modern smartphone.

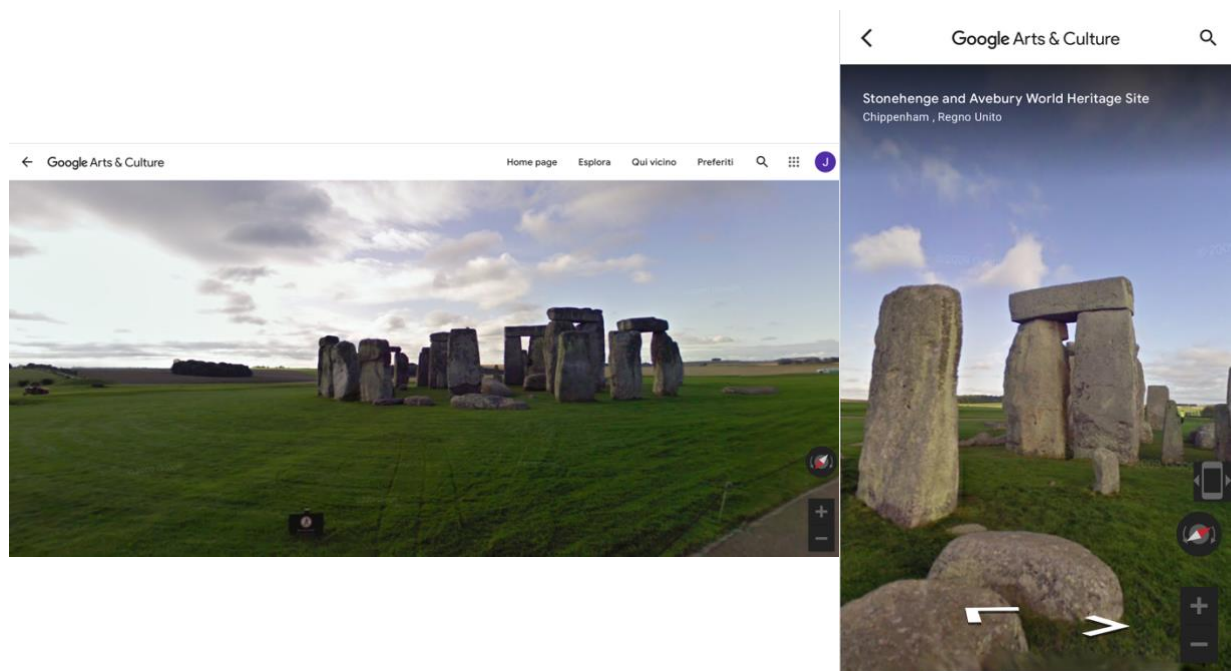
Finally, an advantage that can always be obtained using GPS is linked to the collection of data by the museum. Through the app it is possible to collect data related to the movements of visitors within the various halls, the time dedicated to each work, the information and in-depth material seen by visitors, areas where there is a greater flow of people. Once these data have been recorded, it is possible for the cultural organization to analyse them to improve the experience, for example by creating appropriate paths for visitors, providing specific insights for the most viewed collections, etc.

One of the most interesting apps or projects in this regard is that of Google Arts & Culture which allows you to appreciate numerous works of art directly from your smartphone, take a virtual tour of museums and much more. Google Arts & Culture has, in fact, partnered with more than 1200 museums, galleries and institutes from 70 countries to make online exhibits available to everyone. With this app you can enlarge the works of art, discover many stories, photos, videos, and manuscripts, travel the world thanks to the proposed tours, on screen and in virtual reality. Thanks to the help of a Google Art Camera, in fact, it was possible to take very high-resolution photos that allow one to see even the smallest details of the various works of art. Since museums can also upload their images to the platform, Google Art & Culture has become much more than a mere reproducer of art collections and is now purchased as a producer of cultural content, with enormous visibility on social media, app and website.

The birth of this project is also curious. In fact, there has always been this “20% time” philosophy within Google in which employees dedicate 20% of their working time to conceiving new projects, other than ordinary ones. So it was that Amit Sood, who worked as an engineer, who suggested this idea to some colleagues. Sood claimed that he wanted to see Van Gogh's *Starry Night* (kept at MoMA) from home, drinking a glass of wine, not in poor quality and in the size of a stamp. Quoting his words, *“I want a beautiful, magnificent version and I want your curator to tell me the story. I want an experience, and when I have time to come to New York, I we will go and see the original.”* (A. Sood, 2011).

Overall, Google Arts & Culture, represents a model to be followed regarding the process of digitalization of works of art. It is a constantly updated, easy to use and very well-organized platform. In addition to the website, there is also the app, both for the iOS and Android operating system, through which it is possible to share every aspect on the main social networks.

In figure 10 it is possible to see the archaeological site of Stonehenge, both through the website and the mobile application of this platform.



*Figure 10 - The archaeological site of Stonehenge seen by Google Arts & Culture (Web and App)*

### **2.3.7 Social Network**

Nowadays, social networks are the primary source of information and content sharing for users. Therefore, they have a great potential because they manage to connect millions of people in a few moments. Their expansion has been global and has affected most sectors, including the cultural one. In fact, social networks have become a virtual space in which museums have tried to build a link with the public, through less formal relationships. These tools have also allowed the user himself to assume the role of content creator, in addition to that of user. From the museal point of view, the advantage is that in this way users have become instruments of promotion and communication of the various cultural activities. In fact, more and more often, visitors publish photographs and news made during the visit, with the aim of sharing with friends or, more generally, with their followers. Through this sharing, therefore, the experience of the visit is offered to new users who may be stimulated to put their attention on that museum. Social networks have made it possible to establish a dialogue between museum and visitor, in which there can be questions and answers, in which there is a sort of collaboration.

The three main objectives can be summarized in these three words: marketing, inclusiveness and collaboration. If you think of social network marketing, defined as *“a branch of online marketing applied to social networks, which exploits the ability of social media and web-social applications (apps) to generate interaction (involvement) and sharing (social sharing) in order to increase the visibility and notoriety of a firm, a brand, a product or service”* (Digital Coach), it’s possible to understand the importance of this tool in promoting information campaigns that involve a very broad user-base, in a very short time and with very low costs. As for inclusiveness, social networks require you to create real communities in which you can interact with other users, share opinions, photos, videos and much more. They therefore allow you to create new relationships, strengthen existing ones and share content with a much wider and more varied audience. Finally, allow a collaboration in that, as mentioned, visitors take an active role and are themselves content creators.

Social networks allow one to start the experience at an earlier stage than the actual visit because, often, it is through some reviews on Facebook or Instagram that a person is encouraged to visit a particular institution. In addition to this, however, it allows them to remain in contact with visitors even after the visit and to communicate any events or initiatives planned by them.

An example of a positive use of social networks (in particular Instagram) is that of the Uffizi Galleries in Florence. This museum has been defined as the most social museum in Italy in that it has reached and exceeded 400,000 followers, ranking 21st among the most popular museums in the world, just behind the Getty Museum in Los Angeles. The growth of followers in 2019 was 74.8% and this is mainly due to the communication style of the account, which allows the public to continuously make new discoveries. In fact, as stated by the director of the Gallery Eike Schmidt at the beginning of 2020 *“every day we publish an image, accompanied by a historical, philosophical, poetic or amusing writing proposed in Italian and English, a formula that is conquering thousands of new fans every week, in every corner of the world”*.



Figure 11 - Uffizi Galleries official Instagram account

## 2.4 THE RESPONSE OF MUSEUMS, ARCHAEOLOGICAL SITES AND ART GALLERIES TO LOCKDOWN DURING COVID-19

At this point, given the emergency situation in which the country finds itself, due to the Covid-19 pandemic that spread during the time this thesis was drafted, it was decided to insert this study to highlight some of the initiatives that have been undertaken by cultural institutions who have tried to promote history and culture even behind “closed doors”.

### 2.4.1 The spread of Covid-19 in Italy

The first two cases of Covid-19, in Italy, were identified on the 31<sup>st</sup> January 2020, in Rome and led to an immediate decree, on the 31<sup>st</sup> January 2020, of a National State of Emergency, in consequence to the health risk connected with the virus. After days of apparent calm, a nucleus of 16 infections occurred in Codogno, in the region of Lodi, on the 21<sup>st</sup> February 2020: the day after, this had grown to 60 cases, with the first deaths. During the coming days, the appearance of other nuclei of infections, in the Lodi-Cremona area, led to the quarantining, on the 23<sup>rd</sup> February, of 11 communes (Ministerial decree). Due to the spread of infections of Covid-19 to

other areas of northern Italy, on 8<sup>th</sup> of March, Prime Minister Giuseppe Conte extended the quarantine lockdown to cover the entire region of Lombardy and 14 other northern provinces. Two days later, on the 10<sup>th</sup> March 2020, the quarantine lockdown was extended to cover the whole of Italy (Ministerial decree). Throughout Italy, provision was made for: the suspension of fairs, events and shows of any nature, including cinema and theatrical performances, held in every place, both public and private; the suspension of the opening to the public of museums and other institutes and places of culture referred to in the Code of Cultural and Landscape Heritage art. 101, pursuant to the Legislative Decree of the 22<sup>nd</sup> January 2004, n. 42 (therefore museums, archives, libraries, archaeological areas and parks are included). At the time of writing, some museums and galleries have started to re-open (from the 18<sup>th</sup> May), with limitations on the use of touchscreens and other multimedia devices, and other places of public gatherings, indicate 1<sup>st</sup> June 2020 for re-opening, subject to the success in the slowing of the Covid-19 spread.



*Figure 12 - Closure of cultural institutions due to Covid-19*

There was no time to organize completely new online services for the public, but since many of the larger museums had already digital archives, dedicated websites, Facebook pages, Instagram accounts, YouTube videos, etc., they were able to offer the general public a certain number of facilities to be able to make “virtual” visits to their collections and archaeological sites.

## 2.4.2 Some initiatives

### **MIBACT – THE CULTURAL HERITAGE MINISTRY FOR ITALY**

One of the most important, and complete, resources was put online by the Ministry of Cultural Heritage and Activities and Tourism.

At the start of the lockdown they added a new page to their website, called “*The digital initiatives of museums, archaeological sites, archives, theatres, cinemas and music*” with the hashtag #iorestoacasa.



Figure 13 - MIBACT Virtual Initiative

### **Culture never stops! Virtual visits to Museums**

“Culture never stops!” is the new page of the MIBACT website that allows one to aggregate through six sections - Museums, Books, Cinema, Music, Education and Theatre - the initiatives organized virtually by the institutes of national culture, the world of entertainment, music and audio-visual. It is a cultural offer that allows Italians to continue to experience art and culture, despite this anomalous and difficult situation. MIBACT, together with all the other cultural realities that wish to participate, has decided to make this page to allow accessibility to various contents including videos, web pages and social initiatives. The page is very intuitive and to explore it, it is sufficient to click on one of the various categories - for example Museums - and choose what to see among the various 3D models, virtual tours, games offered by the individual institutes, suitably divided by regional area.

By browsing the site, therefore, users can find what interests them most and express their participation through the hashtag #iorestoacasa and #ioleggoacasa or by tagging profiles @mibact and all places of culture.

They also included a link to their YouTube page ([www.youtube.com/MiBACT](http://www.youtube.com/MiBACT)).



## Art competitions

Several museums, including the Pavia Art Museum made an initiative called “*Museum in pills*”, with a series of works of art on their Instagram page ([www.instagram.com/museicivicipavia/](http://www.instagram.com/museicivicipavia/)). They started the “*Art Challenge*” by participating in the challenge (originally launched by the @gettymuseum and the @rijksmuseum), which consisted in creatively re-proposing the works of art using the objects available while #stiamoacasa. They asked people to choose one of their works from their album. As inspiration they offered a selection from their collection that you could find in the Instagram album. People had to publish the photo of their creation, together with the image of the original and tag the museum on their Facebook and Instagram pages, adding the hashtag #museicivicipvchallenge, or by writing to museicivici@comune.pv.it. The shot that got the highest number of likes would receive a catalogue of their collection as a prize. The hashtags used were: #artcontest #artchallenge #gettymuseum #gettymuseumchallenge #tussenkunstenquarantaine #accademiataadiniartcontest #tableaudeconfinement #unjouruntableau #paintingcreation #BetweenArtandQuarantine #ArtTwinning #lartetisomiglia #artedasilagil #artannellay.

## For children – Cremona Natural History Museum

One of the institutions which forms part of the Cremona museums group, the Cremona Natural History Museum, with the hashtags #iorestoacasa #lartenonsichiude #laculturanonsiferma, put online this amusing historical curiosity about one of the most famous encrypted codes dating to the Roman period. Precisely it was Julius Caesar who used this technique to protect his secret messages. In the ciphered code of the Roman Emperor, each letter is replaced by another letter which is located after three places in the alphabet.

The quiz asked youngsters to look at the pattern and try to translate, through this technique, the secret following messages:

- RK YXJYFKL ZEB IBDDB PXOX RK XARIQL ZEB MBKPX
- IBDDBOB LCCOB I ‘ LMMLOQRKFQX AF SFSBOB JLIQB SFQB

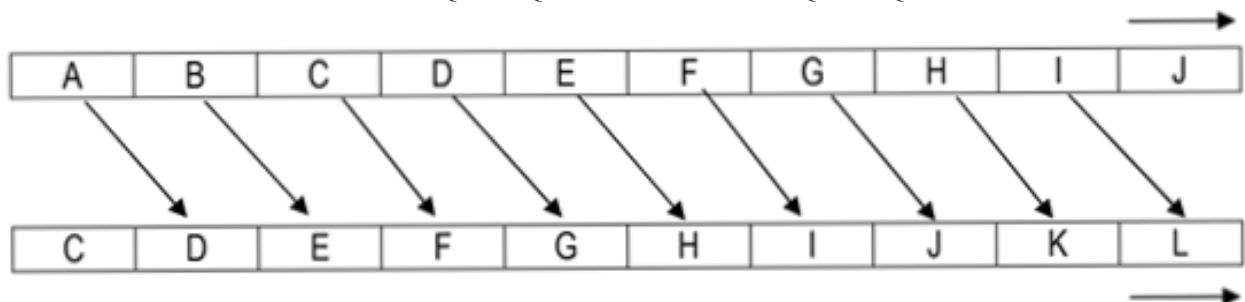


Figure 14 - The code-breaking sequence

## Culture, Go Digital!

During the health emergency, museums and institutions reacted quickly and creatively. An interesting project in this regard is CultureGoDigital.org, developed by Dotdotdot with the contribution of the Digital Innovation in Cultural Heritage and Activities of the Politecnico di Milano. In particular, a handbook was created to suggest and guide Italian cultural institutions through an intuitive path that led towards digitalization starting from existing resources. This project wants to underline the need to build a strategy of fruition of culture using free digital tools available to everyone.

Through tutorials and digital tools divided by categories of users, it is possible to create content, share it and encourage interaction with the public. As stated by Alessandro Masserdotti (CTO and co-founder of Dotdotdot, 2020), it is clear *“how it has become fundamental to rethink and diversify the organization of culture with a new vision, extremely attentive to new needs, opportunities and questions arising from this important moment of transformation”*.



Figure 15 - Culture, Go Digital! Initiative

### **3. METHODOLOGY**

This chapter aims to explain how the whole process that led to the evaluation of the level of digital innovation in Italian museums took place. In particular, the following are described: the logic with which the literature review was developed, how the survey shared with the Italian institutions was structured and conducted and finally how the results were analysed with the aim of obtaining aggregate data, to be used linked the previous year, 2019.

#### **3.1 LITERATURE REVIEW APPROACH**

Starting from the literature review and following what has so far been described and expressed within this thesis, it can be said that in an initial phase, after providing an overview of the current Italian cultural situation, thanks to the data obtained from the ISTAT website, an attempt was made to start from the origins, that is, from looking at the evolution of museums in the various eras. As seen, the function of a museum has changed a lot through the years and historical periods. In fact, it went from the idea of collecting as a practice linked to religious rites to a cognitive function, from a medieval pilgrim who visited a cathedral to understand the biblical history to having a rich owner who showed off his collection to a visitor seen as his guest, from the visit understood as a privilege rather than a right to the idea of a public museum open to all citizens, to the idea of museum as an educational structure and, again, to the idea of a museum as an institution that provides increasingly renewed and customized experiences for its visitors.

Subsequently, since the new museum is centred on visitor orientation, various articles have been analysed regarding the concept of audience development. This is because, as reported, nowadays, it is vitally important to try to widen one's audience more and more and try to look for good strategies that allow one to build loyalty and establish lasting relationships.

At this point, an attempt is made to give the reader a starting point, which allows one to understand the analysis that will be developed in the following chapters of this thesis. In particular, the situation of the Italian cultural institutions of 2019 is analysed, providing some interesting ideas on what would then be found at a later stage, for example in the questionnaire. In this phase, some data and numbers have been added on the various technologies and on the practices of the visitors in the various phases of a visit: the pre, during and post.

Subsequently, through research on articles and case studies, are described some of the technologies already implemented in some museums with the aim of intensifying interactive communication towards the public.

All of this, as mentioned, has laid the foundations for a better understanding of the type of analysis that will be presented later.

### **3.2 SURVEY**

In parallel with the literature review, the questionnaire on the level of digitalization of Italian cultural institutions was conducted by the Digital Innovation in Cultural Heritage and Activities of the Politecnico di Milano.

The questionnaire was structured with closed-ended questions and was created by making improvements to the questionnaire conducted the previous year, with the same purpose in mind. Obviously, it was decided to opt for closed-ended questions as the ultimate goal was to obtain quantifiable and easily analysed data to get to have aggregate data. The questionnaire was created and launched through the Opinio software.

In mid-December the first massive mailing was made to 1593 cultural institutions while, in two successive moments, at the end of January and at the end of March, two reminders were sent to try to obtain a greater number of responses in order to have an even more significant sample. In particular, in the third massive submission, not only the initial institutions, but also 400 other institutions were invited to fill in the questionnaire. This is because, during the phase of telephone contact with the various institutions and in surfing the web, new e-mail addresses were found or, in any case, e-mail addresses that replaced the previous ones, which are no longer in use.

The questionnaire was administered to the various institutions in Italian and required an online compilation, typically provided by the museum director, the collection curator or the communication manager.

The final version of the questionnaire was made up of the following ten sections (which correspond to 41 questions):

- A first section dedicated to the registry where it was requested, for example, the name of the institution, the body on behalf of which one replies, the overall estimated number of visitors. In this phase, if the respondent is a network, the system or the museum network is required to specify the activity managed by all the museums that refer to it

and to indicate some references to the individual institutions. This was done to ensure that they were contacted individually, and answers were received from the individual museums belonging to that network.

- - A second section, focused on the digital approach, which asks if they have a formalized strategic plan for digital innovation, the latest investments in digital and what they consider investing as a priority (always with regards to digital technologies).
- The third section, on the other hand, was centred on communication & customer care and refers to the presence of a website, app, social networks, visitor monitoring activities, type of data collected.
- The fourth section is called ticketing, booking management & access control and deals with the following topics: presence of a ticketing system in the institution, amount of ticket revenue, type of ticket, percentage distribution of ticket sales, visitor access control mode, presence of services that generate additional revenue compared to the ticket office.
- The fifth section is related to management support to administrative activities and it was requested to specify in support of which activity there is a computerized management system.
- The sixth section called fruition of on-site content focuses on the following contents: the presence or absence of Wi-Fi available to the visitor and the presence or absence of technologies analysed in the literature review, such as augmented reality, virtual reality, QR Code, Video Games, 3D displays / interactive touch screens, etc.
- The seventh and eighth sections were dedicated to cataloguing and digitizing the collection and refer to the percentage of the catalogued and digitized collection, and the presence or absence of the digitized collection on a website.
- The ninth section is called digital skills and places the focus of institutions on the presence of staff dedicated to digital innovation and on the roles of digital professionals used by the institution itself.
- The tenth and final section refers instead to the location and type of institution and, therefore, more generally, it goes to collect that information related to the region and province where the institution is based, to the type of cultural institution (museum, area or archaeological park, monument or monumental complex) and to the titular subject (MiBACT, Municipality, Ecclesiastical or religious body, Foundation, Company museum, Other public or private body).

The questionnaire was created by making a series of improvements to the one relating to the year 2018-2019, which consisted of 31 questions.

During this first phase it was appropriate to try to have the greatest number of answers to get a significant sample that would allow one to develop an analysis with a solid foundation. Therefore, especially at this stage, telephone contact with the institutions was extremely useful because it led them to better understand the advantage they would have by taking part in this survey. In fact, it was explained to them that the data would be used exclusively in aggregate and anonymous form for statistical purposes and that by participating they would then receive the results relating to the Italian panorama, with which they could compare their situation.

It is appropriate to see now how the sample size was established, necessary to have a significant investigation. The number of starting cultural institutions is the one already mentioned at the beginning of this thesis, or 4908. This number was obtained from the statistics published by Istat on 23<sup>rd</sup> December 2019 and refers to the cultural institutions present in the year 2018. Starting from this data and analysing the tables published by Istat, it was decided to exclude from the overall population the number of museums open only for special events (e.g. patron's day, culture week), equal to 4.4% of the total. On the contrary, however, museums open only in some months of the year (seasonal opening) were taken into consideration. By subtracting 4.4% from the total, the total population was 4692.

Before showing how the actual sample size was calculated, it is good to define some terms:

- The confidence interval expresses the statistical margin of error (e). For example, if in a sample 47% answered “yes” to a certain question, with a confidence interval of 4%, the percentage of people who would answer “yes” if the question was asked to the whole population would be included between 43% (47% - 4%) and 51% (47% + 4%).
- The level of confidence, on the other hand, expresses the degree of certainty of the result. To better understand the concept, it is good to report once again the example already considered previously. If the confidence level were 95%, this would mean that with 95% probability the percentage of people who would answer “yes” (always if the question is asked to the whole population), would be between 43 % and 51%. At the end of this example it is therefore possible to affirm that it is 95% sure that the real percentage of the population that would answer “yes” is between 43% and 51%.
- The size of the sample (n) indicates that the larger our sample, the higher the degree of reliability of the answers. So, in other words, for a given level of confidence, the higher the sample, the lower the confidence interval.

- The percentage (p) is another term to be taken into consideration as the accuracy also depends on the percentage distribution of the responses. For example, if 99% of the answers correspond to a “yes” and only 1% to a “no”, then there is little chance of error. On the contrary, considering the case in which the answers are 50% “yes” and 50% “no”, there is a greater possibility of error. It is recommended to use the worst-case percentage (50%) in case one wants to determine the sample size for a certain confidence level and also when you want to determine a general confidence level for a sample already available (Survey System).
- The size of the population (N) indicates the total number of people (in this case institutions) who are part of the group that is being studied.
- Z-score is the number of standard deviations a given proportion is away from the mean and is calculated from the desired confidence level. For example, referring to figure 16, if we wanted to consider a 95% confidence level, the z-score would be 1.96.

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

*Figure 16 - Z-score for desired confidence level*

At this point, once the quantities have been defined, it is possible to proceed to the phase of calculating the sample size. Using the following formula:

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

Where:  $z = 1.96$ ,  $e = 0.05$ ,  $p = 0.5$ ,  $N = 4692$ , a sample size of 355 institutions is obtained.

This has been achieved and exceeded, since 465 responses have been recorded.

Subsequently, once the survey was completed in the second week of April 2020, the results were analysed.

### 3.3 ANALYSIS

Before starting this phase of analysis of the results, approximately one week after the closure of the survey, the representativeness was calculated by type of cultural institution (Museum, gallery and / or collection, Area or archaeological park, Monument or monumental complex) and for titular subject (MiBACT, Municipality, Ecclesiastical or religious body, Foundation, Company museum). This was done to identify whether, within the individual Italian regions, we had an adequate percentage of responses compared to the percentage ratio between the number of institutions of that type present in each region and the total of those belonging to that type (obtained from the Istat tables).

To better understand the concept, it is possible to refer to figure 17, in which the two percentages are compared in relation to the “Museum, gallery and / or collection” typology.

|                                | Museum, gallery and/or collection by Region ISTAT |                                     | Museum, gallery and/or collection by Region Survey Respondents |   | Assessment Representativeness |
|--------------------------------|---|-------------------------------------|--|---|-------------------------------|
|                                | Museum, gallery and/or collection                 | Museum, gallery and/or collection % | Absolute Value Survey Respondents                              | % of the total museums responding to the survey | Δ Percentage Points           |
| Abruzzo                        | 87  | 2%                                  | 10   | 3%  | 1%                            |
| Basilicata                     | 37  | 1%                                  | 21   | 6%  | 5%                            |
| Calabria                       | 139   | 4%                                  | 14   | 4%  | 0%                            |
| Campania                       | 157   | 4%                                  | 28   | 8%  | 4%                            |
| Emilia-Romagna                 | 381   | 10%                                 | 25   | 7%  | 3%                            |
| Friuli-Venezia Giulia          | 155   | 4%                                  | 11   | 3%  | 1%                            |
| Lazio                          | 269   | 7%                                  | 34   | 10%   | 3%                            |
| Liguria                        | 169   | 4%                                  | 13   | 4%  | 0%                            |
| Lombardia                      | 363   | 9%                                  | 53   | 15%   | 6%                            |
| Marche                         | 242   | 6%                                  | 7  | 2%  | 4%                            |
| Molise                         | 32  | 1%                                  | 9  | 3%  | 2%                            |
| Piemonte                       | 326   | 8%                                  | 22   | 6%  | 2%                            |
| Puglia                         | 133   | 3%                                  | 11   | 3%  | 0%                            |
| Sardegna                       | 187   | 5%                                  | 14   | 4%  | 1%                            |
| Sicilia                        | 183   | 5%                                  | 7  | 2%  | 3%                            |
| Toscana                        | 421   | 11%                                 | 39   | 11%   | 0%                            |
| Trentino-Alto Adige            | 172   | 4%                                  | 9  | 3%  | 1%                            |
| Umbria                         | 122   | 3%                                  | 3  | 1%  | 2%                            |
| Valle d'Aosta - Vallée d'Aoste | 39  | 1%                                  | 1  | 0%  | 1%                            |
| Veneto                         | 268   | 7%                                  | 25   | 7%  | 0%                            |

Figure 17 - Evaluation of representativeness for Museum, gallery and/or collection



At this point, as shown in the figure, an attempt was made to solicit institutions in those regions where the percentage of responses to the survey was lower than the ISTAT percentage (indicated in yellow). Always referring to this example, in fact, it is possible to see how in Piedmont and Umbria there is a difference of two percentage points, in Emilia-Romagna and Sicily of three percentage points and finally in the Marche there is a deviation of four percentage points. It is possible to conclude by saying that at the end of this phase the main differences had been found for the MiBACT institutions of Tuscany, the archaeological areas of Sardinia and the ecclesiastical bodies of Campania. While for the institutions of Tuscany it was possible to obtain some answers, in the last period in which the questionnaire was still open for compilation, for the other two clusters, however, the final value obtained remained slightly lower than the Istat percentage.

At this point, the actual analysis of the data began. At the start, the cleaning up the database was done, which had been developed and constantly updated on Microsoft Excel. After removing the partial responses and the duplicates, the analysis was carried out with the help of the pivot tables, a useful tool to better organize the results obtained through an appropriate choice of fields and elements that must compose them. Subsequently, the graph was created for each of these tables, to have a clear representation of the results. Once this was done, a PowerPoint presentation was created to improve the graphs from an aesthetic point of view and to insert the graphs relating to the previous analysis, conducted in 2019.

In this way, the possibility of comparing the two surveys was created, always considering the fact that this year the number of questions had increased and that some of them had been revised to make them clearer and more effective. Therefore, as you can easily imagine, it was not possible to compare every single question.

In the next chapter of this thesis, the results obtained and the comparison with the analysis on the level of digitalization of the Italian museums of the previous year are expressed.

## **4. ANALYSIS OF RESULTS AND COMPARISON WITH 2019**

After presenting the sample numerically and how the questionnaire was structured, this chapter analyses the results obtained from the survey on the digitalization level of Italian museums conducted by the Digital Innovation Observatory for Cultural Heritage and Activities of the Politecnico di Milano. Data obtained by analysing the responses of the various institutions obtained during the 2020 edition are presented, also through a comparison with 2019. Seven sections have been created to facilitate understanding and aggregate data by topic.

### **4.1 THE SEVEN SECTIONS OF ANALYSIS**

As said in the brief introduction of this chapter, to facilitate understanding and analysis, the following seven sections have been introduced:

- Section 1: Strategy, skills and investments for digital innovation
- Section 2: Tools and technologies to support the user's journey
- Section 3: Ticketing, booking management and access control
- Section 4: Management systems to support the back office and the user's journey
- Section 5: Cataloguing and digitizing the collection
- Section 6: The sample of respondents
- Section 7: Brief survey on Regional Directorates of Museums, Systems and Museum Networks

Each section is now presented in detail showing: the results obtained in 2020 for the uncommon questions between the two surveys and the comparison between the current data and those relating to the survey carried out in 2019 for the questions that it was decided to propose again this year.

Before starting, it is necessary to formulate a premise relating to the type of respondent institution. Since 57% replied on behalf of a single cultural institution (e.g. a museum), 34% on behalf of a single cultural institution (e.g. a museum) belonging to a Pole, or museum system, and 9% on behalf of a pole, system or museum network, it must be specified that in the first six sections the analysis includes only the responses of the individual cultural institutions and of

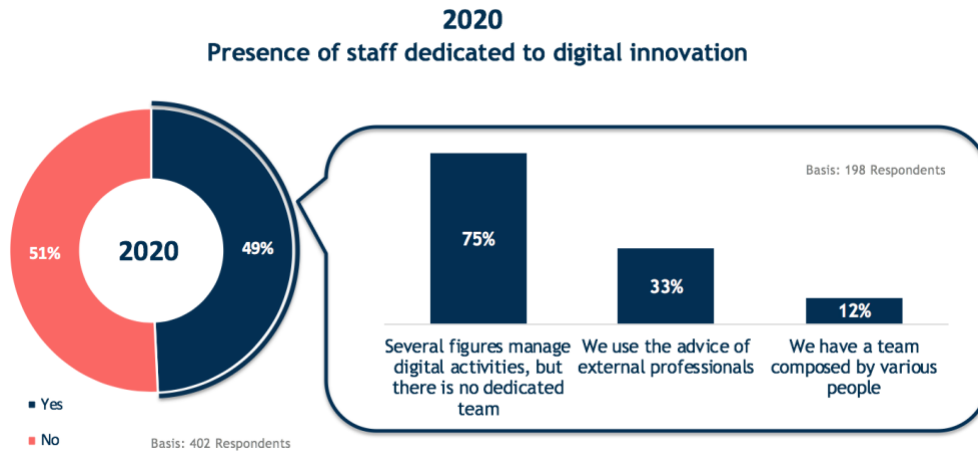
the individual cultural institutions belonging to a Pole. The analysis relating to the Pole, the system or the museum network are however reported in the seventh section.

#### **4.1.1 Strategy, skills and investments for digital innovation**

In this first section it is possible to see how much digitalization is present and what has been done in terms of investments destined for digital within cultural institutions.

If we consider the presence of a formalized digital innovation strategic plan, we can see how it is not yet a central element in the strategies of cultural institutions and how, compared to 2019, there has not been an increase in the number of institutions that have it. In fact, 76% (both for 2019 and 2020) said they did not have a formalized strategic plan for digital investment. The remaining 24%, however, is divided differently between the two years. In particular, while in 2019, 21% claimed to have included it in another document and 3% to have a dedicated document, in 2020 the percentage of institutions that claim to have a dedicated document has grown and consequently that of those who have included it in another document (e.g. strategic plan) has decreased.

It is interesting to see how the presence of staff dedicated to digital innovation is not widespread. In fact, over 50% of institutions, precisely 51%, say they have no dedicated staff. As can be seen from figure 18, however, among those who responded positively, there are: 75% who have several figures who manage digital activities without having a dedicated team, 33% who use the advice of external professionals and 12% with a team made up of various people. These percentages, however, considering the total number of respondents to the question asked in the survey (402), drop to 37%, 16% and finally 6% for those with a dedicated team. From these results it emerges how difficult it is difficult to make innovation if you do not have a culture of innovation and skills.



*Figure 18 - Staff dedicated to digital innovation*

Considering the question posed in the survey “Specify which digital professionals the cultural institution uses”, it is possible to see how three out of five museums use a social media & digital marketing manager, by far the most figure most present among the internal staff. Then 45% of the museums have a curator of the digital cultural heritage and 40% a digital manager, always with regards to internal staff. The external consultant most requested by museums is the developer / Digital user experience developer / Game designer, especially useful for creating the App, the website or for developing gamification techniques or other techniques with the aim of improving the experience of the visitor. An important note is needed to point out that the data protection officer (DPO), an emerging figure in recent years, as reported in the 2019 survey in which 39% had internal staff dedicated to observing, evaluating and organizing the management of and processing of personal data and their protection, on the contrary, in 2020, it is found in 24% among the internal staff of the institutions.

Overall, however, many figures are not available within the institutions or, at least, only one of them is present. This figure is in line with the average percentage of investment (compared to total investments) destined for digital in the last two years: the two main values in this case relate to the fact that 23% did not make any investment in digital while the 52% invested less than 10%. Furthermore, as can be seen from figure 19, the situation has somewhat “worsened” in the sense that while in 2019 the institutions that had not invested in digital were 15%, in 2020 this percentage reached 23%. The percentage, however, of institutions that have invested less than 10% in digital has remained practically unchanged.

What we can clearly say is that one museum out of four does not invest in digital.

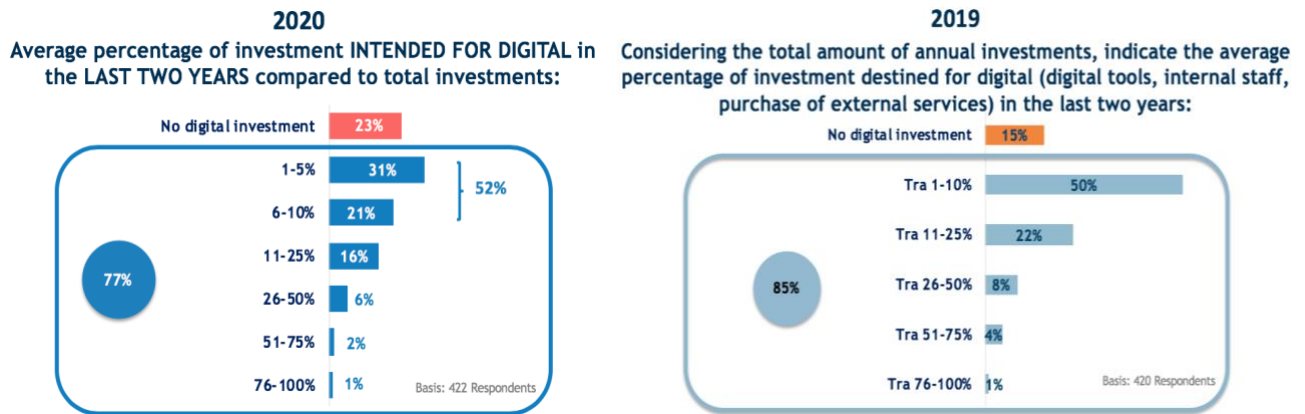


Figure 19 - Percentage of investment destined to digital in the last two years (2020 vs 2019)

Considering the activities in which investment was made in digital technologies in the last two years, it emerges how the institutions consider it a priority to invest in those activities related to the support services for the on-site visit, communication, cataloguing and digitization of the collection. It is therefore seen as increasingly important to invest in those activities that can improve communication with the visitor and increase the interactivity of the experience during the visit itself. Despite this, however, the activity considered to be a priority and to which future investments should be dedicated is that related to cataloguing and digitizing the collection of works to make them more accessible.

To conclude, it is possible to affirm that, unfortunately, the percentage destined for no investment in digital (23%) is still too high, 31% invests between 1-5% in digital and that still too few museums have a formalized plan for digital investment.

#### 4.1.2 Tools and technologies to support customer's journey

At this point, we try to see which support tools aim to improve the visitors' experience. In particular, how popular the App is within institutions, what purpose does it have, if a website is present and what are the most popular social networks. What emerged from the survey is: while the website is widespread within the institutions (97%), the App, however, is present only in 23% of cases.

The priority is given to the website, which allows one to have an overview of the best institutions. By analysing closer the 97% of those who have a website, it is possible to see how, however, only three museums out of five have one related only to the single institution. The

remaining part, on the other hand, is made up of 27% who have a website in common with other institutions of the same museum system / network and 9% who have it within other websites. This, for example, is the case with many civic museums that share the website with the municipality.

The App deserves a separate discussion because from the 2019 survey it was found that 62% of the institutions had planned to insert it. Considering the results obtained in 2020, it is possible to affirm how it is still too little diffused and the main function is the informative one.

The Apps are mainly used both to provide general information to the visitor during the phase prior to the visit such as, for example, the opening hours, the address or possible events, temporary exhibitions, and, above all, to provide information to support the visit such as visit itineraries with explanations or other features that make the visit more interactive.

Together with the website, the other tool widely used to communicate with the public is the social network. It turns out, in fact, that 91% of institutions have at least one social network. Among them, Facebook and Instagram and, to a lesser extent, Twitter and Youtube are widespread. In this regard, refer to figure 20.

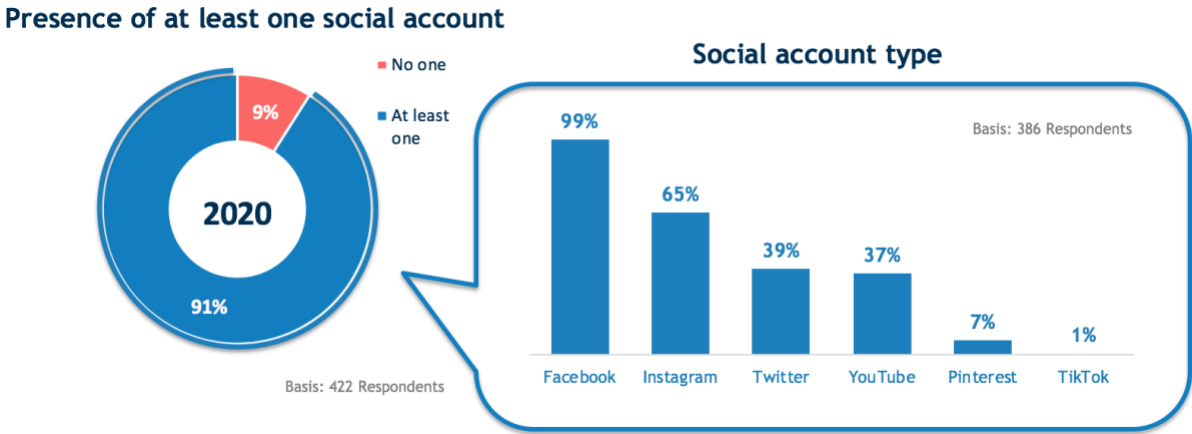


Figure 20 - Museums' social media account

Social networks are a highly effective tool for communication, also because through them visitors themselves can share their experience with friends or acquaintances. Especially during the visit and in the following phase, in fact, users tend to publish Facebook or Instagram Stories, or images of what they have just visited. Being present on these social networks is therefore the best way for a museum to reach as many people as possible and offers the opportunity to make itself known internationally.

As seen in paragraph 2.3.7 relating to social networks, a good example in this regard is that of the Uffizi Galleries in Florence, which are currently in the twenty-first place among the most popular museums in the world. What is important, however, as evidenced by this example, is a constant updating of their profiles to always keep the interest of their followers alive. Another benefit offered by social channels is related to the fact that monitoring activities can be carried out. The analysis shows that as many as four out of five museums perform social monitoring activities. This activity is carried out mainly through analytical tools provided by the social network itself (in 78% of cases). Referring to the question “What sites / review platforms are you on?” it emerges that Google Maps and TripAdvisor are the most popular platforms, with 77% and 70% respectively. Overall, it is possible to say that 86% of institutions use this type of service that allows you to read and respond to reviews if necessary. Specifically, 76% of institutions say they read reviews and respond where necessary, while 23% say they are not interested in this activity. As can be seen from figure 21, the monitoring and management of reviews has maintained the same percentages over the past year.

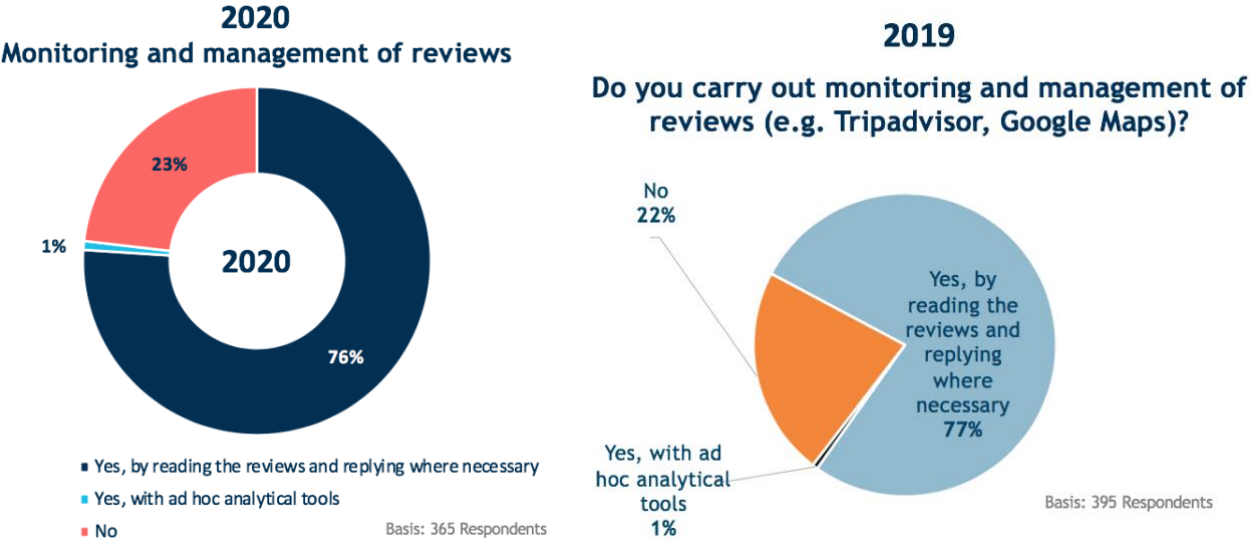


Figure 21 - Monitoring and management of reviews

As regards the collection of data on visitors, it is important to observe how the collection takes place, mainly in paper format (in 67% of cases) and how the digital format is used only by 26% of the institutions. Making a quick comparison with the histogram of 2019, we note how paradoxically the percentage of digital collection has decreased (from 33% to 26%) and how paper has returned to be increasingly prevalent (from 58% to 67%). What emerges is that not

everyone is ready for this radical change that allows us to abandon paper and make everything more accessible via digital.

As for the type of data collected, the main ones are on the degree of satisfaction of the visitor, on the motivation of the visit and those of a personal nature including age, gender, geographical origin, education etc. Obviously, this phase of data collection is particularly important because it allows museums to approach one of their main objectives: to expand their audience. In fact, knowing the visitors better, museums can create clusters and go to see which types of users are less involved than others.

Once this is done, they can create ad hoc experiences to involve new groups of people. Furthermore, through a data collection phase, interesting observations can emerge regarding: the expectations that visitors had and if they were met, any suggestions to improve the offer, what information they would have liked or would like to receive, what they appreciated most during the visit, which works they would have liked to know more about, etc.

In addition, it is possible to say that more than one museum out of two carries out newsletter and online advertising activities and / or on social networks. It is possible to notice how museums use tools such as social networks for marketing and communication activities, which allow them to reach an exceptionally large audience with a cost, also understood as effort, very contained. Newsletters, on the other hand, were a very popular tool as early as 2019 and as many as 62% of institutions sent visitors standard update emails on activities and events, to which is added a 14% of personalized emails based on the type of customer.

As a result of the present analysis, it emerges that there is still not a large presence of agreements / conventions / partnerships with tourism operators. Specifically, only 43% declare that they have agreements with tourist information centers, 28% with hoteliers and Bed & Breakfast managers while 44% declare that they have no type of agreement. Even this data does not bode well, as it would be appropriate to create a network of collaboration with those who operate in the area.

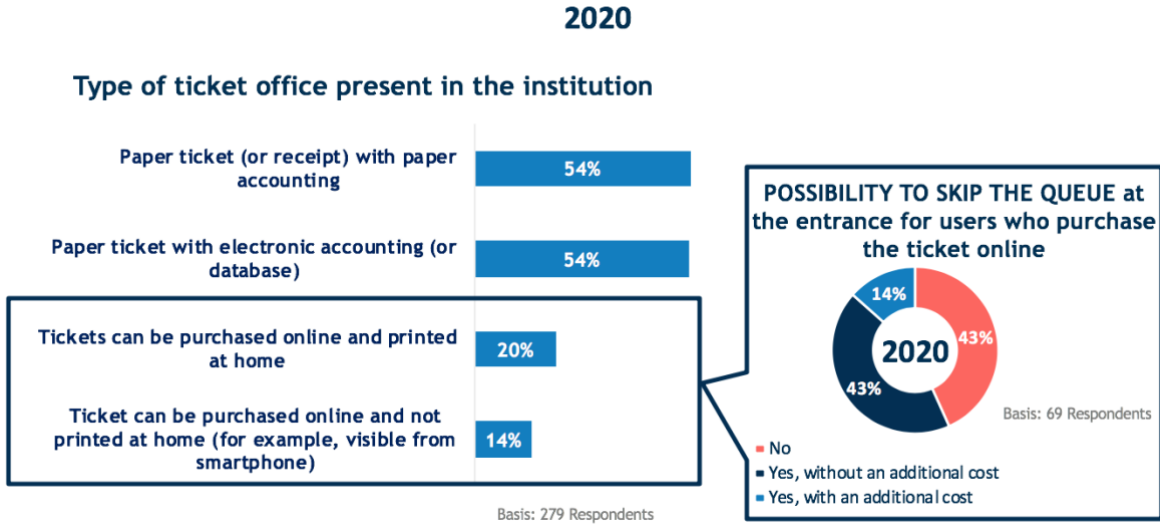
#### **4.1.3 Ticketing, management of reservations and access control**

Analysing whether or not there is a ticketing system (online and / or physical) in the various institutions, it emerges that over two museums out of three have them. Furthermore, as regards ticket revenue (online and / or physical), it emerges that 25% of institutions have no revenue from ticket sales. The most relevant percentages, considering the respondents, refer instead to



the institutions that collected less than 50,000 euros or from 100,001 to 500,000 and that had, during the year, a number of total visitors, paying and non-paying, of less than 5000 people (31%) or between 10,001 and 50,000 (28%).

Considering instead the type of ticket, it is possible to notice how, more than one museum out of two uses paper tickets with electronic accounting. This percentage, equal to 54%, reached the most widespread type in 2019: that of having the ticket which is detached from a block with paper accounting. In this case it seems it was possible to make the best use of the technologies and go more and more in the direction of electronic accounting, destined to take over the paper. Still too few museums, however, claim to give visitors the opportunity to buy the ticket online and print it at home (20%) or to buy it online and not print it but simply show it through their device (14%). Also linked to this topic is the following question “Are users who buy tickets online given the opportunity to skip the queue at the entrance?”, which answer is shown in figure 22.



*Figure 22 - Ticketing systems in cultural institutions*

The analysis of the data shows that 43% of those already in possession of a ticket can skip the queue at no additional cost and 14% with an additional cost. To these, however, is added 43% of institutions that do not offer this possibility, thus reducing the benefits of a possible online purchase.

Overall, it can be said that almost 90% of ticket sales are made locally and that online channels (own or third party) are still under-valued. In particular, the percentage of ticket sales in other

physical channels such as travel agencies, tour operators, tourist offices is 8%, while that linked to sales channels such as a website or proprietary app is only 3%.

The ticket office and consequently the sale of tickets is not the only way in which museums generate revenue. Three museums out of four offer services that generate additional revenue compared to the ticket office. In particular, 47% through the rental of spaces, 43% through laboratory activities and / or lecture cycles, 32% through the sale of images for research, reproduction or commercial purposes and 17% through the loan of works. Only to a lesser extent, on the other hand, does it influence online merchandising activities and the 3D models of the works already carried out or to be printed.

Considering belonging to a network that offers cards for cumulative access to multiple cultural institutions, it emerges that participation in tourist and cultural cards is not widespread. Considering as a reference the value of 2019 in which tourist and cultural cards, especially electronic (31%), were quite widespread (55%), to date, it appears that only 44% offer the possibility of having cards, especially paper (66 %), to visit the city and several cultural institutions. From this point of view, therefore, it seems that museums have taken a different direction from what has emerged in recent years.

Another aspect that is not irrelevant and linked to poor digitalization, is expressed by the fact that just under three museums out of four (71%) use ticket detachment as a type of access control. Digital systems such as the spreadsheet (for example Excel), the bar code reader with reading on the display or the QR Code reader, are still scarcely propagated despite the fact that the control of visitor access is a widespread activity. From the survey it can be seen that 93% of institutions have at least one control method. This figure is perfectly in line with that of 2019, in which it differed only by 1%. The aggregate data obtained from the 2020 analysis are represented in figure 23.

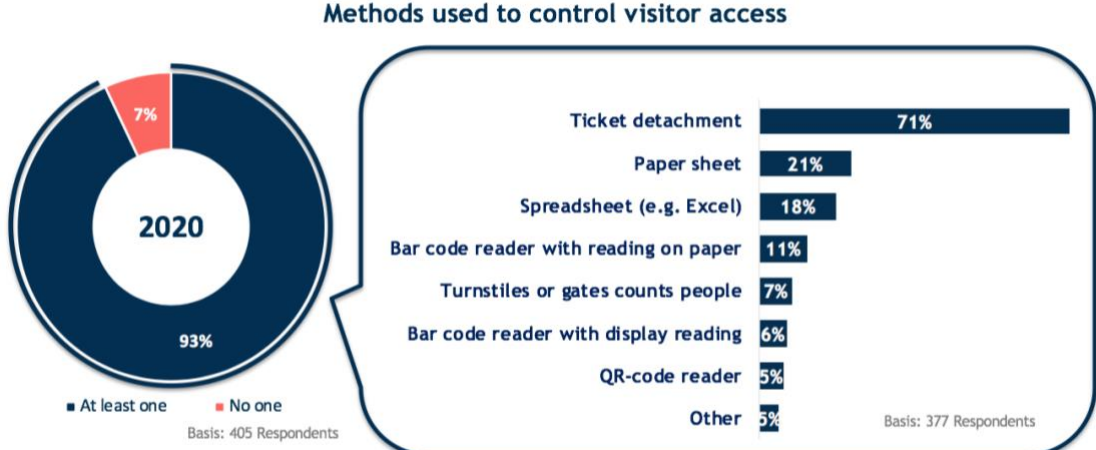


Figure 23 - Main methods to control visitors' access

In conclusion, it emerges that in the activity of booking and purchasing services for cultural activities, online channels are less used than physical ones. This is evidenced by the fact that the assets are mainly purchased on the spot. Furthermore, even though 70% of museums claim to have a ticket system (in museums with free access, a ticket and access control system is often missing), only a part allows the online purchase of the ticket itself. As seen, only 14% of institutions allow entry without having to print the ticket on paper.

This can be a problem, or in any case, it can create inconvenience for those tourists who have not bought and printed tickets before departure. Lastly, it is possible to report that almost 90% of ticket sales take place locally and the online channels (own or third parties) are still undervalued: on average only 6% of the ticket sales comes from the website or proprietary app and not.

#### **4.1.4 Management systems to support the back office and the user's journey**

Italian museums are still poorly digitalized for back office activities, 25% do not have any computerized support system for administrative and back office activities, such as purchasing or personnel management. However, although the figure is not rosy, the situation has improved compared to 2019 in which the percentage was as high as 32%. As for the management of commercial services, 29% have software for ticketing, 15% for services such as bookshops and restaurants and 14% for the management and rental of spaces.

As for analysis and monitoring activities, 12% have customer relationship management (CRM) and contact management software (managed independently or in common with other institutions) and 17% have reporting software (reservations, visitor profiles, etc.). Only 8% have fundraising software while 48% have a computerized management system to support accounting. Of this 48%, 31% say they have dedicated software, while 19% in common with other institutions.

Since, as reported several times during this thesis, the institutions are trying to expand their audience, the engagement and loyalty of visitors, it would be useful to have tools that allow them to improve and automate the management of contacts. Therefore, an improvement from this point of view seems to be essential.

As for the cataloguing and conservation of collections, 48% of museums claim to have a computerized system for this activity. Despite this, the paper catalogue still remains widespread (61% of museums have more than half of the collection so catalogued).

Observing the behavior of museums compared to the adoption of digital tools to support on-site use, the data shows that digital is still not very present: less than one museum out of two (49%) has a Wi-Fi network which the visitors can use. In addition, the other visit support technologies are not yet widespread. Virtual reality and augmented reality are beginning to spread, which are the technologies that meet the most interest from institutions. Respectively 50% and 54% plan to concentrate their investments on these two technologies.

The most popular visit support technologies, in the wake of 2019, remain the audio guide with 32%, the QR Code with 31% and interactive installations with 28%. On the contrary, the activities in which museums find less interest are video games and chatbots. For a complete picture of all the technologies, refer to figure 24.

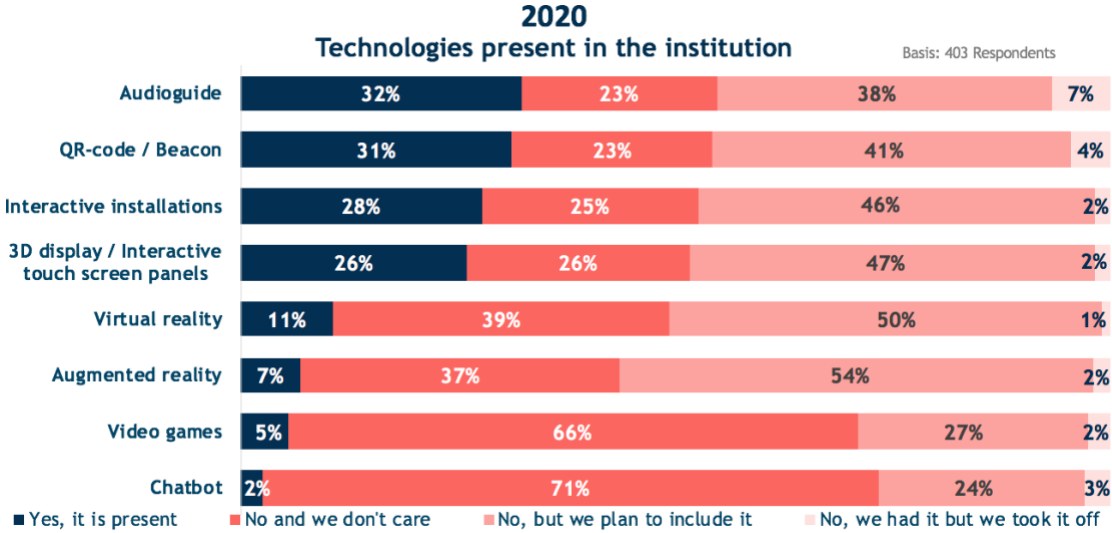


Figure 24 - Digital technologies in cultural institutions

In conclusion, what emerges from the analysis is that it still seems difficult to clearly understand how much the digital tools supporting the site visit are used and appreciated by visitors. Often, visitors are not even aware of the digital media present. Therefore, it is appropriate to try to promote them through simple and clear communication.

**4.1.5 Cataloguing and digitization of the collection**

This section analyses what has been obtained from the questions regarding the cataloguing and digitization of the collections. What emerges is that the paper catalogue remains widespread (80%). In particular, 61% of museums have more than half of the collection catalogued in this

way. In addition to the paper catalog, however, the database catalog (e.g. Excel, Access) is widespread, with a percentage of 75%; in fact, 62% of these institutions have half of the collection catalogued in this way. Automated software is much less used: 24% have proprietary or tailor-made software, that is created specifically on the functional specifications required by the institution, while only 8% have open source software, i.e. a system in which you can independently edit the source codes. Finally, with a percentage equal to 46%, we find the information system made available by ICCD, Region, etc. As for last year, it can again be said for this year that the paper catalog remains prevalent, even if other tools are starting to spread. In addition, four out of five museums claim to have digitalized part of their collection as well. Specifically, 81% say they have converted the physical assets of the collection into digital form. Of this percentage, then, 26% converted more than 75% of the collection. In this regard, it may be more interesting to analyze the percentage of those who have converted at least half of their collection or archive. This percentage, which in 2019 was 40%, has undergone a very slight variation as it is now 41%. This activity, seen as an opportunity that would allow users to see quality digital content, is still underutilized. Indeed, it is also necessary to take into consideration how part of the digitized collections is not actually shown to the public. From the question “Did you publish the digitized collection on a website?” it emerges that two out of five museums published the digitized collection on a website. Comparing this figure, equal to 40%, with that of last year (39%), it is possible to see how almost the same number of museums have decided to publish their collection on a website. Analyzing this 40% in more detail, it is possible to see how 22% of museums decided to publish on the proprietary website, 12% on a website shared with other institutions and 13% through other sites. These percentages mirror those seen in a previous section regarding the presence and type of website. In fact, it had already emerged that most institutions had a proprietary website and that the website in common with other institutions of the museum system / network was quite widespread (27%). The data just discussed relating to the publication of the digitized collection on a website, both for 2019 and 2020, are represented in figure 25.

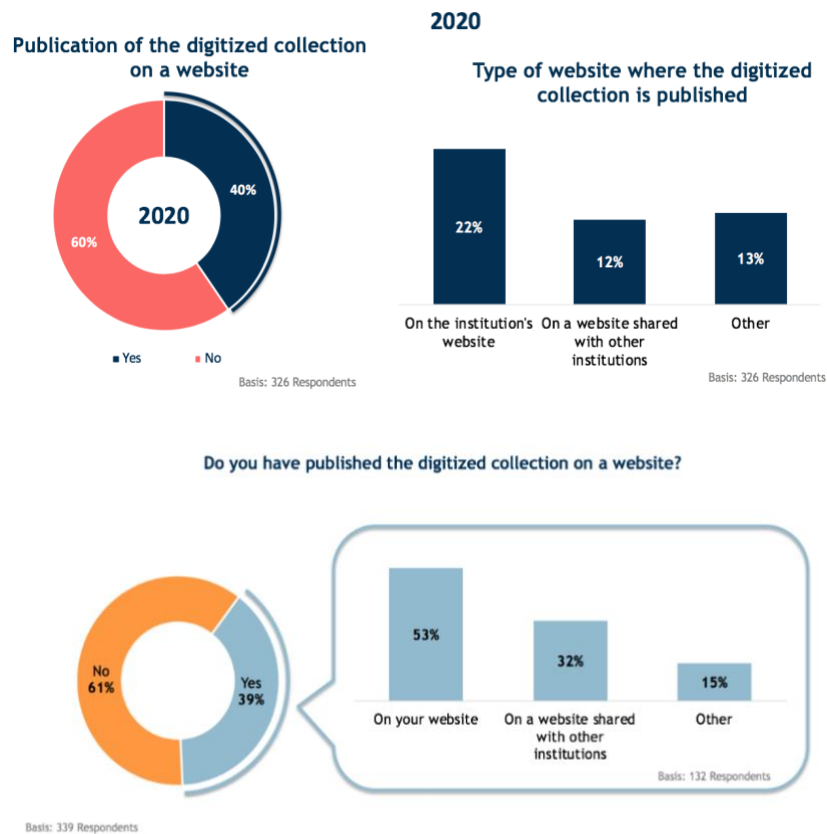


Figure 25 - Digitized collection on a website (2020 vs 2019)

#### 4.1.6 The sample of respondents

In this section we tried to better understand the composition of the sample of respondents. In particular, the region of the structure, the type and the owner of the cultural institutions that took part in this analysis.

Starting from the geographical distribution of the respondents, it is necessary to specify how the assignment of a region to a geographical area (North, Central, South and Islands) was made considering the classification of ISTAT. Therefore, the regions are distributed as follows:

- North: Piemonte, Valle d'Aosta, Liguria, Lombardia, Trentino-Alto Adige, Veneto, Friuli-Venezia Giulia, Emilia-Romagna
- Center: Toscana, Umbria, Marche, Lazio
- South and Islands: Abruzzo, Molise, Campania, Puglia, Basilicata, Calabria, Sicilia, Sardegna

The total of responses is divided as follows: 45.6% of respondents have the institution's home region in an area of Northern Italy, 22.5% come from Central Italy and 31.9% from the South

and Islands. The most significant contributions were provided by Lombardy (14.1%) for the North, Tuscany (10.6%) and Lazio (8.8%) for the Center and Campania (9.8%) for the South and Islands. The data just mentioned are shown in figure 26.

As for the provinces, those that have contributed most are: Rome with 24 answers, Naples with 21, Turin with 19, Florence with 17, Milan with 16, Genoa with 15 and Vicenza with 12.

The sample, however, is representative by geographical distribution of the total population of Italian museums (ISTAT).

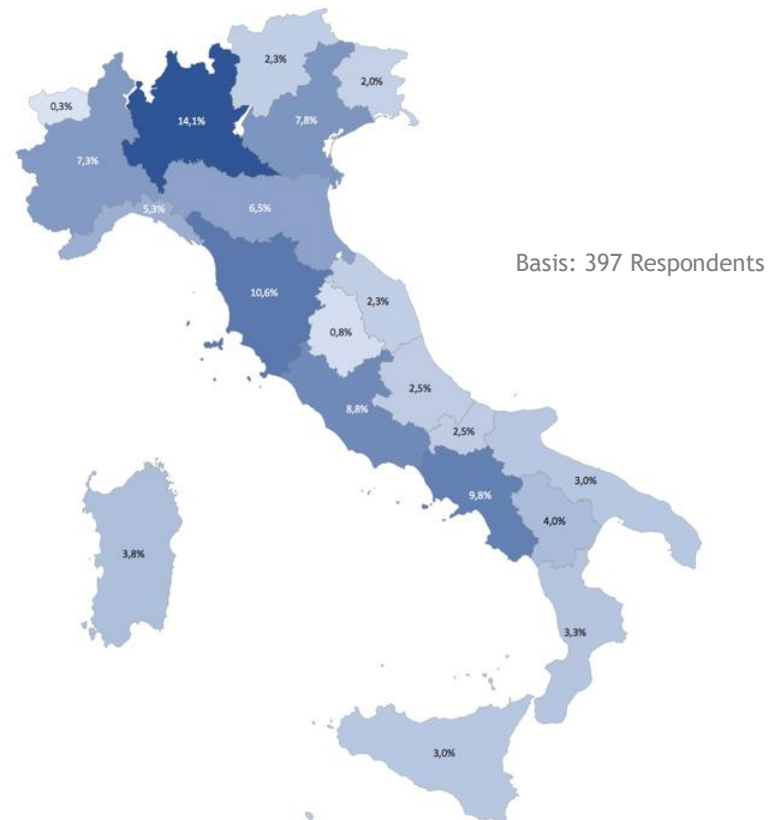
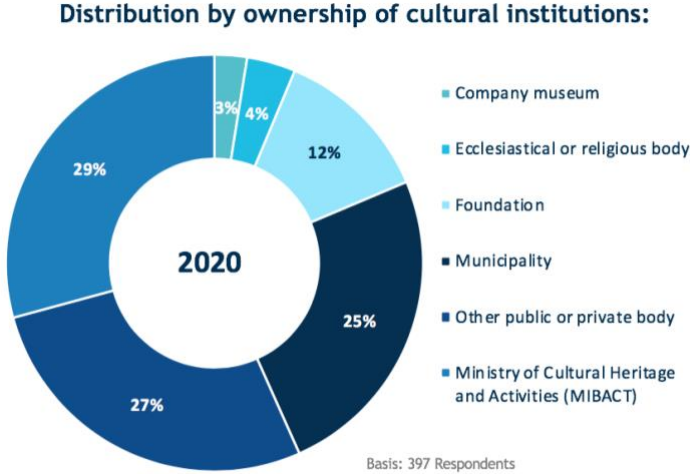


Figure 26 - Distribution of respondent institutions by region

At this point, analyzing the typology of the cultural institution, it is possible to report how 77% of the respondents filled in the Museum, gallery and / or collection category, 7% by Monument or monumental complex, 7% by Archaeological area or park and the remaining 9% for other types.

Finally, as regards the titular subject, the sample is composed of: Ministry of Cultural Heritage and Activities (MIBACT) for 29%, Other public or private body for 27%, Municipality for 25%, Foundation for 12 %, Ecclesiastical or religious body for 4% and Company museum for 3%. Among the various percentages, the one relating to municipal management stands out.

However, this percentage is also high in the Italian cultural panorama, since, considering the values of the ISTAT tables, it has a value of 41%. The local municipalities have, in fact, a fundamental role in the transmission of cultural heritage in the Italian territory.



*Figure 27 - Distribution by ownership of cultural institutions*

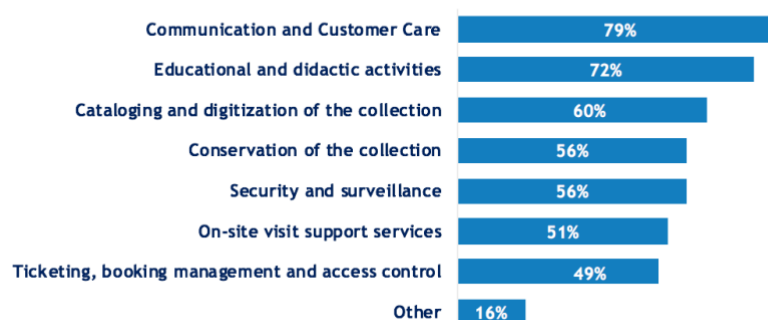
**4.1.7 Brief survey on Regional Directorates of Museums, Systems and Museum Networks**

In this last section are reported the results obtained from a short analysis on Regional Museums Directorates, systems and museum networks. Only two questions have been reserved for this typology. Starting from the common question with the analysis conducted on the individual institutions, referring to the number of total visitors (paying and non-paying) during the year, it emerges that most of the respondents have a number of visitors ranging from 10,001 to 50,000 people ( 23%) or between 100,001 and 500,000 people (23%).

As regards the question “What activities are managed jointly by the pole, system or museum network for all the museums that refer to it?”, We have that four out of five poles (80%) manage for all the reference museums Communication and Customer Care activities. Always considering as a basis the number of respondents on behalf of a museum network, the other significant percentages concern the following activities: educational and teaching activities, cataloguing and digitization of the collection, collection conservation, security and surveillance. The percentages relating to the proposed activities are shown in figure 28.



**2020**  
**Activities COMMONLY MANAGED BY THE POLE, SYSTEM OR MUSEUM NETWORK for all the museums that refer to it:**



Basis: 43 Respondents

*Figure 28 - Activities managed by the pole, system or museum network*

## 4.2 STRENGTHS, WEAKNESSES AND FUTURE ACTIONS

To summarize, we can see the situation that emerges from the current analysis. The figure illustrates the level of digitalization of the Italian context, showing the more important strengths and weaknesses, from which it is possible to start in order to improve the current panorama.

|  |                 |   |
|--|-----------------|---|
| Presence on at least one social network  | Very high (91%) | ✓ |
| Digitization of the collection or archive  | High (81%)      | ✓ |
| Visitor data collection  | High (78%)      | ✓ |
| Percentage of institutions that have invested in digital in the last two years               | High (77%)      | ✓ |
| Offer of services that generate additional revenue compared to the ticket office             | High (74%)      | ✓ |
| Presence of staff dedicated to digital innovation  | Low (49%)       | ✗ |
| Participation in tourist and cultural cards  | Low (44%)       | ✗ |
| Publication of the digitized collection  | Low (40%)       | ✗ |
| Presence of visit support technologies   | Low (29%)       | ✗ |
| Presence of a formalized digital innovation strategic plan                                   | Very low (24%)  | ✗ |
| Presence of online ticketing system  | Very low (23%)  | ✗ |
| Presence of an App   | Very low (23%)  | ✗ |
| Priority to invest in ticketing, booking management and access control in the next two years | Very low (6%)   | ✗ |

*Figure 29 - Current strengths and weaknesses*

If on one side the current digitalization level of museums is supported by a quite high percentage of institutions that have invested in digital in the last two years, on the other side many areas can be improved. Starting from the current strengths and weaknesses, it is possible to identify which are the most immediate actions that should be taken to improve the current digital level of museums.

|                                |  |
|--------------------------------|--|
| <b>STRATEGY</b>                | Having a strategic plan that also includes digital innovation is very important. It is necessary to take a cue from the many initiatives put in place and rationalize efforts with a long-term logic   |
|                                | Investing in people dedicated to digital innovation  |
| <b>USE OF DATA</b>             | Improvement in the analysis and strategic use of data in order to get to know the visitors better, their habits, needs and the level of satisfaction of the experience   |
| <b>PARTNERSHIPS</b>            | Take advantage of partnerships and participation in tourist and cultural cards   |
| <b>TECHNOLOGICAL RESOURCES</b> | Use digital to stimulate personalized and on demand use. Take advantage of digital to reach a wider audience and to ensure that there is continuous interaction between the user and the museum throughout the year  |
|                                | Flexibility and ability to exploit the potential of technologies to meet the continuously changing needs of the public   |
|                                | Investing in technological systems that allow, for example, online booking   |
| <b>ONLINE CHANNELS</b>         | Use of online channels and websites as tools for real content delivery and not only for gathering information on timetables, tickets, activities and visits  |
|                                | Take advantage of the fact that users who follow the pages of museums have grown in order to reach a greater audience  |
| <b>SERVICES</b>                | Make better use of the services offered by museums in order to generate revenues other than through the ticket office  |
| <b>TICKETING SYSTEM</b>        | Develop subscription or ticket forms, different from the current ones, which allow access to personalized itineraries and in which there is a clear integration between online and onsite so that the visitor is stimulated to live the experience several times |

Figure 30 - Future actions to improve the current situation

## 5. CONCLUSION

The purpose of this last chapter is to show how widespread digitalization is within the Italian panorama and some possible improvements or tweaking that can be implemented by institutions to involve an ever-wider audience and thereby increase the number of interactions.

Despite the progressive diffusion and application of digital technologies in the museum world, in Italy there are still too few museums that have a formalized plan for investment in digital and that dedicate a significant part of their investments to it. As seen, in fact, one museum out of four does not invest in digital while 31% of the representative sample invests between 1% and 5%.

In addition, the use by Italian museums of interactive technologies and digital tools that enrich the visitor experience and the engagement of the public still appears limited. Many institutions declare that they are inclined to insert technologies such as augmented reality and virtual reality, even if, to date, there is a poor implementation of the same. Sometimes, even when digital media are implemented, it appears that the visitor is not even aware of it. To improve this aspect, it would be good to promote them effectively on the institution's website or via social networks. It is still difficult for institutions to understand which are the most appreciated and most used digital tools during the visit. Once again, the key to everything is to have a clear communication between visitor and institution. Gathering information and understanding the interaction between digital tools and the people involved would be extremely useful for museums as they can thus outline a strategy to pursue and understand where to concentrate their investments.

If onsite communication and information have wide margins for development, online communication involves an increasingly large number of structures: 61% of institutions have a dedicated website and 91% at least a social account such as Facebook, Instagram, Twitter. These social networks are mainly used for marketing and communication activities because they allow to reach an exceptionally large audience with limited effort. More than one museum out of two carries out newsletter and online advertising activities and / or on social networks.

As for the digitization of the collections, however, there has been a slight improvement: if last year just over one in four museums had published the digitized collection on a website, this year two out of five museums did so. If, however, it is considered that, since the 1960s, the IT tools introduced in museum institutions have had as their first experience of use the evolution

in the management of collections and cataloguing systems, this is still insufficient. It emerges that, also from this point of view, considerable improvements can be made.

Even in the booking and purchase of services for cultural activities, online channels are less used than physical ones. This is somewhat in contrast with what is happening today for other more digital experiential services. In an increasingly technological world where many people even tend to use smartphones instead of credit cards, it is absurd to note that only 14% of institutions allow entry without having to print the ticket on paper. The main problem associated with this low percentage is the loss of potential customers. Some of the tourists, who have already left their country, may find it uncomfortable to find the right place to print the ticket and, consequently, be refused entry to the museum.

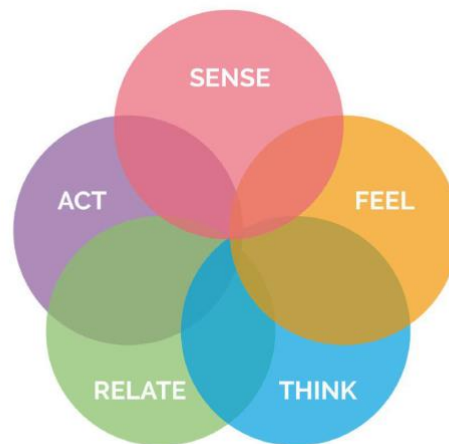
Lastly, it is necessary to report that almost 90% of the ticket sales take place locally and the online channels (own or third parties) are still under-valued: only 3% of the ticket collection comes from the website or proprietary app.

From this panorama it emerges how wide is the gap between user needs and the services made available by museums. Museums can and must intrigue and involve the consumer directly, appealing to his sensorial experience and emotional sphere. Through events, games and diving in augmented reality, museums can improve the experience to the point of making it unique. The goal remains to motivate, provoke, inspire and put the consumer back at the centre, finding what is truly useful, exciting and fun for him. On the other hand, the consumer is looking for engaging, pleasant and increasingly personalized experiences.

Through the creation of an ever-better customer experience, one-to-one connections are created between the institution and the visitor and engagement is enhanced thanks to the personalization of the offer and the stimulated reactions on an emotional and sensorial level.

As stated by Bernd H. Schmitt, one of the leading customer experience experts, in the book “Experiential Marketing: How to Get Customers to SENSE, FEEL, ACT, and RELATE to Your Company and Brands” (1999), the experience is obtained stimulating the customer with events that target sensory and emotional categories. In particular, it is necessary to stimulate and satisfy sensory perception (Sense), feelings and emotions (Feel), the cognitive and creative sphere (Think), action in real life (Act) and the connection with the philosophy of the institution (Relate). The experiences that are most successful are those that stimulate reactions on different levels. A method for managing relations with visitors in order to act on Sense, Feel, Think, Act and Relate factors to improve the customer experience is based on monitoring and analyzing

the experience itself. Through monitoring, it is also possible to collect data with the aim of improving the offer and events organized subsequently. These events or offers must be promptly promoted on the web and on social media, as through these platforms it is possible to make advertising campaigns or simple initiatives go viral and make them come into contact with an ever-wider audience.



*Figure 31 - Sense, Feel, Think, Act and Relate factors*

It has seen how some institutions have been able to seize the opportunities related to digital and to realize valuable initiatives, even if the number of these institutions is still too low in order to be able to valorize the Italian heritage in all its aspects. Today's priority, to seize the opportunities related to digital, is to collaborate online with the aim of developing common practices and guidelines that are available to all those institutions without skills.

Having skills related to the world of information and communication technologies (ICT) is the basis for the creation of quality projects. As seen, however, excluding the role of social media & digital marketing manager, the other figures with skills dedicated to digital are still not very widespread. If the lack of adequate skills adds to the lack of financial resources and the cultural resistances of some institutions, the result can only be having a system that is not very dynamic and anchored to traditional mechanisms. In this way, however, it is not possible to exploit the great benefits that technologies could bring within cultural institutions. These benefits range from improving conservation and restoration practices, facilitated by tools such as augmented reality and 3D printing, in order to better valorization and communication online and onsite.

As seen in the previous model related to customer experience and as reported several times in this thesis, one of the main objectives of the institutions is to make the visitor an active part of

the experience and involve him both emotionally and cognitively in the three phases: pre, during and post.

For this to happen, it is necessary to consider the fundamental role that communication plays in making the museum reality more accessible and in allowing to include a wider and difficult to reach public.

Technology must be integrated into museum trails in a coherent, non-invasive way and must help to create quality content and experiences based on the needs of the public and the enhancement of heritage. Digital tools must therefore be seen as a means by which to spread culture in an innovative way. Obviously, one should not think about creating virtual museums that replace the onsite visit, but must improve the visit, and therefore the experience that will be lived, taking advantage of the opportunity offered by digital.

A step forward towards digitalization was made in 2019 with the approval of the Triennial Plan for the Digitalization and Innovation of Museums. Through this plan, the General Directorate of Museums undertakes to develop “*guidelines for carrying out the enhancement activity of the Ministry, in accordance with the highest international standards, in management and communication, in didactic and technological innovation, promoting the active participation of users and ensuring effective experiences of knowledge and public enjoyment*” (Ag Cult, 2019).

The objectives of the plan are: present the cultural heritage both through the exhibition and narration of the works and in terms of marketing services, improve the protection processes with the available cataloguing standards and new enhancement paths, make museums spaces for sharing with the various actors involved, activate new forms of access and use of the data relating to the assets from a system perspective, and activate partnerships with private companies. The digitalization process has the main objective of improving the services offered to the public by adopting the Catalog of museum services, methods such as the creation of 3D models, augmented reality solutions and gaming experiences, the adoption of integrated systems of Analytics, Business Intelligence and Big Data that allow for structured data flows and in compliance with confidentiality regimes, customer satisfaction actions and service quality monitoring, and innovative geolocation solutions with the creation of customized museum guides.

From the context just described, it appears indispensable that the institutions open a collaboration with the various stakeholders with whom they live and collaborate. Although it

has emerged that digitalization is still scarcely exploited, the direction taken seems to be the right one. Certainly, the extremely varied panorama like that which characterizes the Italian museum system, has not simplified things. To support the digitalization process it is essential to have a set of rules and standards that allow the ecosystem to grow in a coherent way, provide all museums with the tools that will allow them to function more effectively and efficiently, to enhance their use and cooperate better and, lastly, offer services designed to coordinate and accelerate visitor engagement processes.

The situation in which Italy finds itself today may, in a certain sense, represent the turning point. In the last few months in which museums have been closed due to Covid-19, the perspective has changed, since digital has become the only tool to continue to spread culture and interact with the public. As reported also during the thesis, there have been many initiatives and hashtags that have populated the web and social networks in these difficult weeks. There is no doubt that the number of followers on the various social channels has increased, as has the number of posts published by the institutions themselves. In figure 32 it is possible to see that the level of online activity has significantly increased and, in particular, the number of posts has almost or more than doubled on all social media during the lockdown weeks of March 2020, remaining high also in April (Digital Innovation Observatory for Cultural Heritage and Activities).

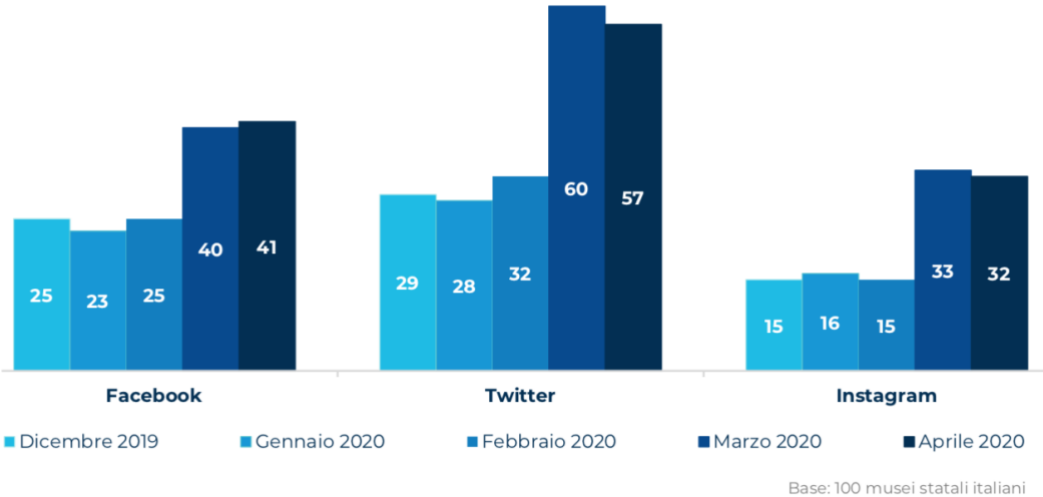


Figure 32 - Average number of monthly posts on social network accounts of Italian state museums

In this lockdown period, many people, having more free time, certainly were able to discover the beauty of art and increase their interest in this sector. Digital, therefore, has played a fundamental role in that it has allowed and still allows institutions to interact with an increasingly wider audience. If we consider that this audience can be that of tomorrow, it is particularly important to make oneself known and appreciated in the right way.

Obviously, there is the consideration that the current business model is not sustainable in the long term. To cope with this emergency health situation, that could prove longer than expected, institutions must equip themselves and begin to consider a long-term sustainable business model and the presence of a formalized strategic plan for digital innovation. For long-term sustainability, one could refer to the business model of platforms such as Netflix, a service that offers streaming content to subscribers. Of this particular case study, widely discussed during the Master of Science course at the Politecnico di Milano, it is useful to observe how effective their communication strategy, strongly marked by engagement and their content strategy, through which they create hype before a new release and maintain high levels of involvement during and after the same. In other cases, such as Spotify, a freemium business model was adopted in which a completely free basic version and a premium version, customized and with more paid features, are offered.

It is clear that these are only examples and concern exclusively the digital world. In a museum perspective, it may be possible to offer a part of the free content in order to attract as many users as possible and a paid part for those who want to deepen the basic contents, have the possibility of greater interaction and customize the content. Since the onsite visit cannot be replaced with only access to digital content, it may be appropriate to stimulate the interest of users through appropriate technologies and / or games that can be started online and continued only once they have physically reached the museum. In this way it is possible to increase customer retention, so that the public is encouraged to return to the museum to hear and see some new stories, to live new and different experiences.

It has emerged that figures such as the social media and digital marketing manager, the digital manager and the developer / digital user experience developer / game designer are increasingly useful and indispensable. These, unfortunately still not very present, are fundamental for the creation of ever new and updated digital content, for the development of user-friendly websites and increasingly engaging games.



The possible and imaginable scenarios are many, as well as the opportunities that can be seized. We must try to take a collective step forward, starting from seeing this period as an opportunity to make ourselves known more and more, and then to have an ever-growing audience to satisfy. The simple creation of websites or posts on social networks, however, is no longer enough. The site must be accompanied with the creation and care of the contents, with shared narratives that integrate experiences designed on the visitor's needs. Digital technologies, as seen, are not limited to this, but also accompany the onsite experience, making it enriching and personalized. By recalling an example presented within this master thesis, that of Google Arts & Culture, it is possible to affirm that it is a good example from which to start and from which to take inspiration. Numbers in hand you can see how there are over 500 million art-related searches, there are over 2000 institutions with more than 6 million exhibits, photos, videos, 400 thousand works of art and over 5000 images of paintings at very high resolution. The example of Google Arts & Culture can be replicated collectively by Italian institutions, allowing each of them to take advantage of the benefits offered by such a platform.

To conclude, it is good to reflect on how social networks, now channels and contemporary communication tools, are platforms of absolute value only if there is an audience interested in the topic. It is good to consider, therefore, an interaction between the two worlds, physical and online. They will be able to find the right balance and be complementary in respect of each other's dynamics and peculiarities only by traveling in parallel. The online is to be considered a real media and as such it must be understood and treated because it constantly communicates with the public, more so than happens with traditional communication channels.

The various initiatives carried out during this period must not be developed superficially, otherwise there is even the risk of having harmful and counterproductive effects for the image of the museum or institution. Some of the most significant examples in this regard are: the virtual walks between the rooms of the Egyptian Museum of Turin made in the company of the Director Christian Greco, the *Decameron project: streaming* stories of the Triennale di Milano through which all the stories are told (once a day) on the Instagram channel, the 2 minute video format of MAMbo (Museum of Modern Art of Bologna) which launched this initiative which involves the implementation of new video content shot with the smartphone inside the museum or remotely, accompanied by the hashtag #smartMAMbo and published on the YouTube channel of the Bologna museum, the *In Contact* project in which the blog of Palazzo Strozzi Foundation site in Florence ([palazzostrozzi.org](http://palazzostrozzi.org)) is transformed into a platform of texts, images,

videos, stories and insights, available to everyone to create contact with the public and stimulate reflection through art, and again the Bergamo GAMeC who created a live radio broadcasting palimpsest for a city that has been hit hard.

Having used and using social media as additional exhibition space has been and continues to be important. However, it is imperative that these initiatives evolve into more structured and ongoing projects. Obviously, there will be problems of an economic and managerial nature to solve, but at least one is aware of being able to count on an online audience that has appreciated and recognized the commitment of the cultural sector in continuing to spread culture and in keeping the level of involvement high.

Since culture is a common good and is linked to school education, it is also important to train the professionals of the future in the best possible way: *“the goal is to co-create a system of knowledge and digital know-how capable of ensuring conservation , wide, interactive, participatory and aware, sustainability, enhancement and promotion of the digital cultural heritage”* (DiCultHer, 2017).

In conclusion, during this thesis many opportunities related to digital and its implementation in the cultural field have emerged. Now, all that remains is to take the right direction and exploit the benefits that these technologies offer, adding to them human values to further enhance it. All that remains is to create a sustainable model in which the physical part is no longer fragmented. Indeed, it is necessary to reflect on experiences that go beyond the visit, which are short but recurrent during the year.

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