



CATÓLICA
ESCOLA DAS ARTES

PORTO

DIGITAL TECHNOLOGY AS MEDIATION IN EUROPEAN FINE ART MUSEUMS

Dissertation presented to Universidade Católica Portuguesa
to obtain the master's degree in Management for the Creative Industries

Catarina dos Reis

Porto, September 2019



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Work done under the supervision of

Professor Doutor Luís Teixeira
Professora Doutora Eduarda Vieira

Porto, September 2019

I. Dedication

I dedicate this work to all future Creatives and Museum professionals, to never give up on your dreams.

II. Acknowledgments

First, I would like to thank my advisor and co-advisor, Professor Luís Teixeira and Professor Eduarda Vieira, for the guidance and support through this work.

I would like to thank my parents and sister, that with their efforts made the completion of this work possible.

Finally, I would like to thank Tomás for all the help and patience during these last months.

III. Abstract

In order to fully understand museums in their current state and the changes that are undergoing, it is crucial to observe their evolution through history. First museums appeared many years ago and nowadays these institutions are present all around the world in different typologies. Museums have been founded to promote civic pride, identity and feelings of belonging, as recreational facilities, educational resources, means to improve quality of life, and to attract tourism. Nowadays, museums are facing some challenges, and the overall trend is to democratize the access. From two decades until now, a change is undergoing, due to social changes that made museums re-evaluate their relationship with the audience.

Today, the visitors are seen as individuals, instead of socio-demographic groups. In the last years, museum mediation has been evolving because of the digital technologies. Digital technology was invented in the 20th century, marking what was named as the third technological revolution (Greenwood, 1997). Chappuis et als (2011) report that “Consumer behaviour is shifting rapidly as more people use digital devices and platforms intensively.” (Chappuis, Gaffey and Parvizi, 2011).

New technologies started to be seen as solutions to reach visitors in an effective way, independently of their backgrounds. In terms of digital technology as mediation in European fine art museums, the most common are smartphone apps and multimedia guides, but there are also projects using gamming, storytelling, artificial intelligence, augmented/virtual reality and 3D reproductions (Examples of these technologies range from smartphone apps and multimedia guides, to projects using gamming, storytelling, artificial intelligence, augmented/virtual reality and 3D reproductions).

To understand the trends, we identified, characterize and studied projects in European Fine Art museums. This information was analysed and allowed to portray the present panorama in European fine art museums towards their visitors through digital means.

New policies, strategies and missions are being re-thought. Questions such as how museums must be responsive to the audience needs, open to share knowledge, to create new collaborations and to have an interdisciplinary character, so the cultural experience can be global and diversified are now being discussed. The present work raises questions for the future of museums.

Keywords: Museum; Fine Art; Mediation; Digital Technology; Europe

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Introduction

Digital Technologies as Mediation in European Fine Art Museums is an important topic. Mediation *in-situ* using digital tools allows to create a better connection between the content of the museum and the perception of its visitors.

This is a very present topic in the sense that digital technologies are tremendously influencing all tasks in our life, from work methods to basic human functions such as communication. The world is facing enormous changes and the new generation of museum visitors already have different demands. Furthermore, being a current issue that is still in an early stage of development, make it even more appealing and challenging to explore.

It is important to comprehend the museum field and its evolution, to understand why these mediation actions are so important for the current situation. There is a need to characterize the framework, to do a projects' mapping and to understand the future trends. Through the projects gathering it is possible to observe what they have in common, the advantages and the constraints, the requirements and risks carried. With this, it is easier to perceive what are the development models adopted by these institutions.

This dissertation proposes to characterize the framework, to do a projects' mapping and to understand the future trends. By following this approach, we will be able to increase our understanding of the trends, reflect about it and raise some questions about the future of museums in a more and more technological world.

For this purpose, the first part of the work was to describe the framework: understand what is a museum and how it has been reinventing itself through the years; briefly characterize museum mediation, and how its evolution has been inside the museum context; and finally, to perceive how the relation between museums and digital technology has been evolving, and what the present situation is.

A survey was created and sent to European Fine Art museums. To construct the survey, it was necessary to consult other surveys. This survey was focused on themes such as: the museum, mediation and digital technologies. This is part of the framework characterisation.

The mapping of digital mediation projects in European Fine Art museums was made through extensive research and consultation of online information available. In order to organize the information collected, three thematic tables were constructed. The tables contain summary information such as the museum project localisation (including temporary projects), the developer, the releasing year or its last update, promoter, the cost, languages available, main

features. I did not find in the literature information regarding digital mediation projects in European Fine Art museums. This study aims to fill this gap.

The work is divided in two main chapters: museums, mediation and digital technology framework, and digital technology projects inside European Fine Art museums.

Section 1.1 describes the evolution of the museum concept, the museum institution history and how its definition has been adapting. The evolution is analysed from the first curiosities cabinets up to the contemporary institutions of today, along with the social, industrial and technological evolutions. New concepts and museum typologies as well as on the museum visit evolution and the shifts on the museum visitors are introduced and discussed. Finally, a brief statistical characterization of European museum is present.

Section 1.2, mediation in museums, introduces the mediation concept and its evolution, contextualizes present situation and how the use of digital technology as mediation is being introduced. What the first attempts were, how - it has been spreading and growing, and what advantages can bring both for the museum and visitors. How and when the relation between digital technology and museum mediation started to impact the museum work. It is described the growth, from the first screens at the exhibition until the digital projects.

Section 1.3 presents a survey regarding the presence of digital technologies as mediation in European Fine Art museums. The survey aimed to gather information on the reach and number of visitors of the museum, and the use of digital technologies by the museum. Museums were asked to characterize its structure (staff members and department). The full survey is available at the end of this dissertation on Appendix D.

Chapter 2 describes digital mediation projects in European Fine Art museums. The projects were analysed in three categories: Apps (mobile applications), Multimedia Guides and Other experiences. Full information is available at the Appendixes A, B and C, in the end of this dissertation.

These projects work as a representative sample to analyse the trends of the digital mediation inside European fine art museums. In total, there are one hundred and twenty-one projects, in seventy-three European Fine Art museums. There are ninety-four apps, twelve multimedia guides and fifteen other experiences projects. By other experiences, it was decided to include projects of augmented reality, virtual reality, gaming, 3D reproductions and interactive exhibitions.

Chapter 3 presents and debates questions formulated along the work such as advantages and disadvantages, demands and challenges, or expectations from digital project of this nature. By presenting a critical perspective about the future of the museums and the changes they are

going through, this work proposes to contribute to discussion of the future of museums, and the use of digital technology as mediation in European fine art museums.

1. Museum, Mediation and Technology Framework

1.1 Museum Concept Evolution

In order to fully understand museums in their current state and the changes that are undergoing, it is crucial to observe their evolution throughout history. Defining ‘museum’ in itself is a challenging task. Museums are institutions present all around the world with different typologies, shapes and sizes, and with many functions and purposes. The definition of a museum has been evolving since the first years of existence of these places, and currently, a museum can be defined as

“...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 was established by the International Council of Museums (ICOM) on the 22nd General Assembly in Vienna, Austria, on 24 August 2007. Since 2016, however, at the ICOM General Conference in Milan, a new Standing Committee was formed to study and amend this definition. This Committee is called Committee on Museum Definition, Prospects and Potentials (MDPP, 2017-2019) and its main goal is to form a definition that includes new critical perspectives about the current situation of the museums in the international framework, considering the ambiguous tendencies of nowadays’ society and the new conditions, obligations and opportunities. The Committee formed by experts from all around the world will present the proposal at the 2019 ICOM General Conference in Kyoto. The conference happened between 1 – 7 of September but a new date will be set because it was not reached a consensual result.

There are different definitions depending on the author or institution, however, ICOM’s definition is the most internationally accepted by the museum community. ICOM is the only global organisation in the museum field. It counts with more than 40.000 professionals, working at 141 countries. It is a membership association and a non-governmental organisation which establishes professional and ethical standards for museum activities. ICOM makes recommendations on issues related to cultural heritage, promotes capacity building and advances knowledge. It works as the voice of museum professionals and raises public cultural awareness through global networks and co-operation programmes (ICOM, n.d.).

The American Alliance of Museums define museum as economic engines which serve the public, act as community anchors, and have to be trusted and for everyone (AAM, n.d.); the Brazilian legislation (law number 11.904) defines a museum as a non-profit institution with purposes of conservation, investigation, communication, interpretation and exhibition, with intents of preservation, study, research, education, contemplation and tourism. Ranging from historical, artistic, scientific, technical or any other cultural nature value. Open to the public, in service of society and its development (Presidência da República, 2009). The Portuguese law (law number 47/2004) defines a museum as a permanent institution with or without juridical personality, non- profit, with an organizational structure that guarantee a unique recipient to a set of cultural assets and value them through investigation, incorporation, inventory, documentation, conservation, interpretation, exhibition and divulgation, with scientific, educational and ludic purposes. A place that offer regular access to the public and promote the democratization of culture, promote the citizen and the development of society (Lei Quadro dos Museus, 2004). Regardless the definition, there are common points in almost all of them. A museum is more than a collection of objects, it needs to be permanent, open to the public and provide public service with educational or enjoyment purposes, to be concerned with acquisition, preservation and research, and, to work on communication and interpretation.

In recent years, the museum environment has evolved tremendously in terms of its functions and its main elements of work. For these reasons, all the existing definitions are correct on some level. A comprehensive museum definition should include many layers of understanding:

- a conceptual approach with terms such as heritage, institution, society, ethics, and many more;
- a theoretical approach like the studies of museology;
- an approach based in its functions, mostly related to collections;
- an approach focused on its activities like preservation, research, communication, education, exhibition, mediation, management, and others.
- an approach based on its stakeholders: the museum professionals, the public and the government or other private entities involved;

All these points of view must be included in the museum phenomenon. There should not exist a separation between the institution and the physical building, since both functions and museum architecture have undergone serious changes over the two last centuries.

Museums have been founded for many reasons: public access to culture and art, as recreational facilities, as educational resources, as means to improve quality of life, to attract

tourism, to promote civic pride, identity and feelings of belonging. Given this variety of purposes and contexts, museums present a big diversity, however, all of them have the same purpose: preserve and interpret aspects of society's cultural consciousness. These changes are related to the evolution of the museum itself, so it is important to understand the historical course of these places.

The word "museum" comes from the ancient Greek word *mouseion*, that means "seat of the Muses", used to designate a place of contemplation. The Latin derivation as we know it today, appeared in the Roman times to describe places of philosophical discussions. It was only in the 15th century that the word was revived to describe the collection of the Medici family, in Florence. However, the term was more a concept than a reference to a building. By the 17th century, this word was being used to describe collections of extraordinary objects around Europe – cabinets of curiosities. It was until the 18th century that the idea of an institution that preserves and displays a collection of objects to the public was well established. In 1753 The British Museum was founded, and it was the first national public museum of the world (but only opened to the public at 1759). During the late 19th and most of the 20th century, the word denoted a building housing cultural evidences to which the public had access (Latham and Simmons, 2014). Later, the emphasis started to alter from the building, the objects and the artists, to the public. Museums started to want to be "...accessible and reaches as many people as possible in order to enrich and inspire them" (Mission of the Van Gogh Museum, Amsterdam, n.d.).

It was during the second half of the 19th century that museums started to proliferate around Europe, due to civic pride and free education movements. The industrialization made people move to the cities and the scientific and technological advances were reshaping life. The governments were also changing their attitudes towards social services and education, and museums were seen as great institutions to promote education for the masses (Hein, 1998). Around the 20th century, social forces caused the number of museums to grow, especially national and regional museums. The first half of this century was a period of economic recession and major social changes due to the two world wars. Museums felt the need to readjust its practices. New approaches were developed and, with the industrialized world, among other innovations, new types of museum started to appear. The post-war period was very important for these institutions, because they had to respond to a rapidly changing and better educated society. By this time, "Museums are no longer built in the image of that nationalistic temple of

culture.” (Hooper-Greenhill, E., 1992). A new era began with the industrialization. The rhythm of life was no longer the same. The machines introduced a new speed to the modern societies and started the era of the spectacle (Jewitt, C., 2014). The completion of the Centre Pompidou in Paris and its success, in the mid-1970, marked the beginning of the museum boom in Europe. Many European cities started to construct new museums and to expand the existing ones. By this time, there was a perceptible change from serving the scholars and the specialists of the area, to providing for a ‘lay’ public as well. With these modifications, museums found a new popularity, increasing the number of visitors, evolving into public spaces where the visitor occupies a prominent place. The distance created between the museum and the audience during the earlier years of existence was slowly disappearing.

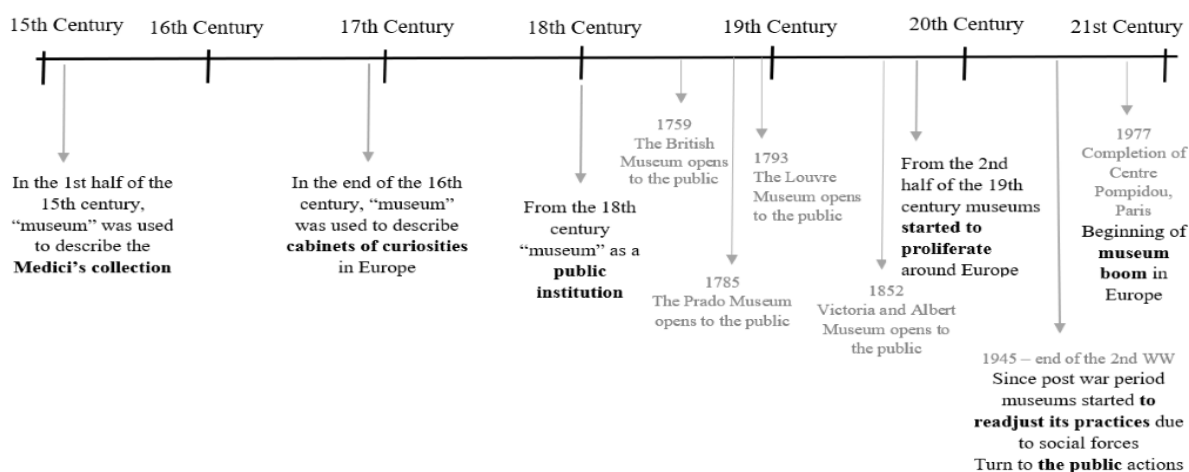


Figure 1 – Museums timeline © Catarina Reis

Since the first attempts, museums were being used as symbols, acting as signs of domain, nationalism or liberation, working as mediators for societies' values, which many times were subjects of contestation (Hein, G., 1998). This turn required changes in terms of what the museums expect to achieve now and, in the future, and for whom they exist. "(...) the basic tasks will not change dramatically, with whom, for whom, where, when, how and why museums perform particular tasks will shift." (NEMO, 2013). Nowadays, the trend is to democratize the access and fruition of these places. Museums are reshaping themselves as educational facilities, sources of leisure and mediums of communication. These adaptations required new competences inside the museum such as curators, scientists, conservators, designers, educators, information scientists, marketing managers, and others. Museums are facing a shift of values.

This increases the museums' role as social agents, encouraging social cohesion. (Sbarbati, 2014)

From two decades until now, a continuous change has been going on, museums are re-thinking their identities and ambitions. The social changes forced them re-evaluate their relationship with the audience, which, most of the times, was very traditional and unfamiliar (Jewitt, 2014). Museums will remain places that collect, study and present objects to the public, but now, they are trying to do it in different ways. Transforming art museums from intimidating and curator-driven places into welcoming and socially relevant centres where the visitor engagement is crucial has been a leading trend within the museum field for decades (Mager, 2017). This new positioning that museums are creating for themselves is not accomplished easily. Everything that requires change, requires time, requires many tries, failures, re-thinking; it is a process. Museums are in the process of finding new working strategies on how to adapt their practices to new challenges.

“In the last three years (...) institutions faced many challenges and changes including shifts in practice from its custodial role in relation to collections and conservation to becoming a social and sometimes commercial institution and part of what has been termed “the creative industries”.” (RICHEs, 2016)

Museums want to create a dialectic relation between them and the audience (Jewitt, 2014) and this new attitude of opening doors made the museum scale and scope of interaction increased (Drotner, K., 2017). The museums intention is clear in the mission of the Rijksmuseum: “...give to art and history a new meaning for a broad-based, contemporary national and international audience.” (Rijksmuseum, n.d.). Now, museums want to be more captivating and interactive, where visitors are drawn into the heart of the exhibit, where they must participate and react (Stickler, 1995).

The existence of museums only makes sense if there are visitors (even for virtual museums). The world needs museums, museums need people, and for museums to continue to have visitors, they must participate in the cultural networking, otherwise their public mission will be lost, and museums will become irrelevant and left behind (NEMO, 2013). The great challenges of museums on the modern world are related to the relation with the public, on how they will continue to attract *in-situ* visitors, especially new generations. This is a continuation of the ongoing evolution process that has characterized the museum environment for the last 150 years (NEMO, 2013). The collections are the main thing museums have to offer to their visitors. They must go back and re-think of what an exhibition is or even if the concept of

exhibition still makes sense. A collection can be defined as a set of material objects or intangible values, classified, selected and displayed to an audience. These objects must form a coherent and meaningful whole (ICOFOM, 2010). Exhibitions are mounted with objects of collections and can be defined as spatial organized expression of thoughts, things and systems of knowledge (Jewitt, 2014), Now, these narratives need to adapt to the current reality.

Since the early 1990s, many museums have been responding to the individualization of interpretation (Jewitt, 2014), and what museums are looking forward now is to be able to wide participation and at the same time, provide their visitors the opportunity to find their own language and identity inside the museum. The visitors are the true legitimizers of value, and they are essential to any value creation. The proximity to the audience is fundamental for a successful museum in the future (NEMO, 2013). Modern societies are no longer separated by national narratives. Today we live in a world of multiculturalism and this multiplicity must be the new narrative. The shift has been slowly happening for a while, and recently, there is a new element that has been causing a tremendous impact on the evolution of the world - the massive influence of digital technologies.

Nowadays, there are many different museums, usually divided into typologies according to their collections. There is no “official” nomenclatures or divisions, and it depends on the author or institution. In this work, the target are the European Fine Art museums. In the book “Museums in Motion – An Introduction to the History and Function of Museums”, these institutions are divided as: Art and Design Museums, Natural History and Anthropology Museums, Science Museums, History Museums, Historic Houses, Interpretation Sites, Sites of Conscience and Memorial Museums, Botanical Gardens and Zoos, and Children’s Museums. Museums can also be defined as: Art Museum, History Museum, Science and Technology Museum, Ethnographic Museum and Universal Museum (Alexander, Alexander and Decker, 2017). EGMUS (European Group on Museum Statistic), separate these organizations as Art, Archaeology and History Museums, Science and Technology Museums, Ethnology Museums and Other Museums. Inside each category can exist sub-categories. In art museums, there are main groups that can be easily recognize: Fine Art museums, Contemporary Art museums and Decorative Art museums. Fine Art museums, in general, present themselves as more traditional institutions and, since there is not a defined definition for “Fine Art” and for what it can include, these museums show drawings, paintings and sculptures made until the second half of the 20th century. According to EGMUS, Fine Art includes works of art created between Ancient times

and the XIX century - architecture, sculpture, painting, drawing, etching and religious art (EGMUS, n.d.).

Along with the several changes and the search for the role of museums, new fields of study and concepts have appeared. A body of theoretical studies started to emerge, known as Museology. Etymologically, museology means the study of the museum, but the term now has more than one meaning. The most accepted, applies the term to anything related to museums. The other meaning is closer to the etymological sense: museum studies, which studies its history, role in society and does research on relevant subjects as conservation, organisation and functioning. The term has been increasingly applied since the 1950s, along with the increased interest in museums. The New Museology (*la Nouvelle Muséologie*) widely influenced Museology in the 1980s. This current emphasised the social role of museums and its interdisciplinary character, its new way of expression and communication. The New Museology was interested in new types of museums, contrasting classical models in which collections were in the centre. The new museums are eco, social, scientific and cultural centres, places to promote local development. New Museology appeared as a critique on the social and political role of the museums.

Museography was another new concept, which means museum practice. Appeared in the 18th century (1727) and it refers to the techniques that have been developed by the museums to fulfil their operations, such as planning, conservation, restoration, security and exhibition. The museographical programme covers the contents of the exhibition, its requirements, and the functional links between the exhibition spaces and the other museum areas. This does not mean that Museography - museum practice - only works on parts of the museum seen by the visitor. Museographers (museum designers or exhibit designers), also work with the scientific programme and collection management, and display the objects selected by the curator. They create the exhibition environment and propose the language, considering the needs of the public. Museographers are the intermediary between the curator and the public. Formerly, museography means the description of the contents of a museum, like a bibliography. (ICOFOM, 2010). Curatorship and the museum curator appeared to designate the person whose functions are identify, control, order and display the collections (Hooper-Greenhill, 1992).

The public itself also evolved. Until the 18th century, museums were places for the artists, scholars and high levels of society, reaching only a very restricted group of people, mainly because they started as private collections in royal palaces (McClellan, 2003). Together

with the external changes happening in the world, museums started to be more open, so they wanted to turn “everyone” as its potential visitor. With the growing interest in visitors, the potential users of museums became the people, the public in general, the distant, the disabled, the audience, the visitors, the consumers, the spectators, and many more. One of the objectives of The National Gallery is to create “Access to the collection for the education and enjoyment of the widest possible public”. With the 20th century turn to the public museum action, the experience of the visit and the expectations and needs of the public started to be on top of the concerns of the museum professionals. With the gradual opening of the museums, the experience changed. When big national museums like Louvre opened to the public (August 10th, 1793), visiting these places was an act of national pride, but it continued to be a difficult experience for most of the population. Museums have been active in shaping knowledge for at least 600 years (Hooper-Greenhill, 1992) and, nowadays, they are trying to be places of non-formal educational experiences, wanting to effectively transfer information to everyone.

With the rising number of museums, a necessity of harmonization of museum data from European countries was felt. In the Berlin Conference, in 1995, the Statistic Institute of the European Union, Eurostat, set up a pilot project called Leadership Group (LEG) on «Harmonisation of Cultural Statistics in the EU», approved by SPC, Statistical Programme Committee, 13th March 1997. Its task was "developing cultural statistics capable of describing the European cultural scene and enabling inter-country comparisons to be made easily" (EGMUS, n.d.). After the completion of this report, Eurostat established a working group on cultural statistics. By the same time, the Ministries of Culture of Luxembourg and The Netherlands also started a group with the same purpose. In 2002, these two groups merged and EGMUS was created as European Group on Museum Statistic. EGMUS's members meet on a regular basis to discuss the changing aspects related to museums. Ranging from privatisation and ownership tendencies, depth of documentation for collections available, the relation between museums and their virtual presence in terms of educational offers and, target groups of museums (EGMUS, n.d.). EGMUS established a standard questionnaire for the statistical information on museums in Europe.

According to EGMUS, by 2010 there were 13.487 museums in Europe (Bulgaria, Czech Republic, Denmark, Estonia, France, Germany, Italy, Latvia, Norway, Poland, Portugal, Romania, Slovenia, Spain, Sweden, Switzerland), and 3.793 of those were “Art, Archaeology and History Museums” (the other categories are “Science and Technology Museums, Ethnology Museums” and “Other Museums”). In the same year, the total number of visitors of

all types of museums were around 300 million (including paid visits, free admissions, and temporary exhibitions). The “Number of museums making use of computers” “for visitor's information purposes (e.g. interactive gallery system)” were 975, although this is not an accurate number because Denmark, Germany, Italy, Norway, Poland, Portugal, Romania, Slovenia, Sweden and Switzerland did not have this information filled, which can mean that “... there is no data available or that the data is negligible or is equal to zero”. In the year of 2016, there were a total of 16.037 in Europe (Austria, Bulgaria, Czech Republic, Denmark, Estonia, Finland, Germany, Hungary, Latvia, Lithuania, Poland, Portugal, Romania, Serbia, Slovak Republic, Spain, Sweden, Switzerland, The Netherlands). According to EGMUS data, the number of museums in Europe increased in 2.550, however, it is important to note that Austria, Finland, Hungary, Lithuania, Serbia, Slovak Republic and Netherlands were not accounted in 2010. On other hand, France, Italy, Norway and Slovenia, were accounted in 2010, and not on 2016. The number of “Art, Archaeology and History Museums” were 4.275, more 482 museums than in 2010, even with Denmark, Finland, Hungary, Latvia and Lithuania having blank fields. In 2016, the total number of visitors were more than 400 million, once again, showing growth. The “Number of museums making use of computers” “for visitor's information purposes (e.g. interactive gallery system)” were 1.274, which represents a marked growth, because only Austria, Bulgaria, Czech Republic, Estonia, Hungary, Latvia and Spain had this field filled.

Year		2010	2016
Number of Museums	Total	13.487 *	16.037 * ₁
	Art, archaeology and history museums	3.793	4.275 * ₂
Number of Visitors		300 millions **	400 million ** ₁
Number of Museums using computers		975 ***	1.274 *** ₁

*Bulgaria, Czech Republic, Denmark, Estonia, France, Germany, Italy, Latvia, Norway, Poland, Portugal, Romania, Slovenia, Spain, Sweden, Switzerland

**approximated. Including paid visits, free admissions, and temporary exhibitions

***using computers for visitor's information purposes. Denmark, Germany, Italy, Norway, Poland, Portugal, Romania, Slovenia, Sweden, Switzerland did not have this data

*₁ Austria, Bulgaria, Czech Republic, Denmark, Estonia, Finland, Germany, Hungary, Latvia, Lithuania, Poland, Portugal, Romania, Serbia, Slovak Republic, Spain, Sweden, Switzerland, The Netherlands

*₂ Denmark, Finland, Hungary, Latvia and Lithuania with blank fields

**₁ approximated. Including paid visits, free admissions, and temporary exhibitions

***₁ using computers for visitor's information purposes. Only Austria, Bulgaria, Czech Republic, Estonia, Hungary, Latvia and Spain had this information

Table 1 – EGMUS museum data © Catarina Reis

As it is clear on the above table, the number of museums is still growing, and so is the number of visitors. This is a decisive factor on why museums should continue working on its improvement. Considering the increasingly digital technological modern societies, the relation between the museum and technology has a strong influence and it needs to be handled in order to be advantageous. The museum adaptation to digital technology happens at every level. The

organizational mission and working strategy, policies, collections managed by the museum, facilities and experiences the museum provide, capabilities and values of the museum's staff, services offered, business model and the way the museum communicates and presents itself to the world (NEMO, 2013).

EGMUS	2016
Public owned museums	6.534
Private owned museum	2.416
Free admissions	87.402.997
Foreign admissions	31.050.912
Paid permanent staff	83.377
Of which specialized staff	31.451
Volunteers	46.754
Of which specialized volunteers	2.454

Table 2 - EGMUS museum data 2016 © Catarina Reis

Most of the museums are public owned, which have its advantages and its constraints. The fact that a museum is public owned is a guarantee that some actions are mandatory, due to its responsibility to the country/society which it is serving. It needs to be permanent and accessible to the public. However, questions like the budget management are very problematic for those institutions that are dependent on public funding. For big museums that can attract external budget from investors or patrons, it is easier, but for smaller museums that have low proper profits, the state money is vital. The proper sources of income like ticket sales or merchandising, are also very important. According to the Louvre Museum 2018 Annual Report, 59 per cent of its budget comes from proper resources, and the other 41 per cent comes from the state (Louvre, 2018). Since the Louvre Museum was the most visited museum worldwide in 2018, this percentage is very different for other museums.

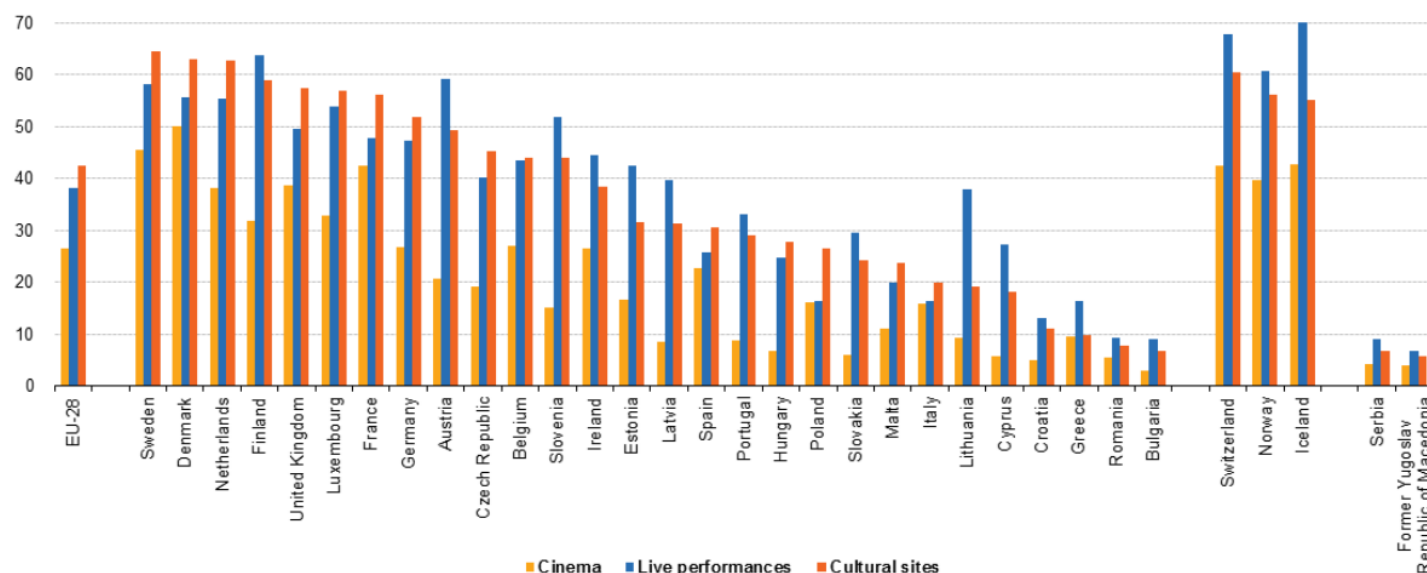
Related to the funding problems there are also problems with the museum staff. Many museums struggle with the lack of staff, including specialized staff. This is a big barrier for the museum work. In a total of around 17.000 European museums (2016), there are 83.377 paid permanent staff members (excluding freelancer staff). Within which around 32.000 are specialized staff. Concerning the requirements of the museums' actions at all its levels, from

sales to curatorship, this number is incredibly low. Giving less than five staff members per museum, and less than two specialized staff members per museum.

It is also evident on the above table the relevant number of foreign entrances. These days, the tourism is highly connected with the cultural participation. Cultural Tourism is an important movement, making millions of people to travel and search for different cultural experiences out of its city/country. According to UNWTO (World Tourism Organization), Cultural Tourism can be defined as the tourism activity in which the essential motivation is to learn, discover, experience and consume the tangible and intangible cultural attractions/products in a tourism destination (UNWTO, 2017). Museums are a key factor for this kind of tourists. In the United-Kingdom, most artforms only attract 7% of cultural tourists from overseas, and museums had 12% of their audience as non-UK residents (The Audience Agency, 2018). This phenomenon has taken much attention during the past decade. Cultural tourism is one of the most important sectors of the tourism industry and is a very powerful economic development tool. Museums have a central role within tourism and leisure. Museums cannot sit back and expect visitors to come. This kind of tourism is a solid factor in the developing countries and there is a significant growth of economy in this sector. In this context, museums facilitate a dynamic network of travel attractions and visitor services. Museum audiences have a strong link to tourism. The presence of a museum is commonly understood as the presence of something valuable (Perera, n.d.).

According to the Art Newspaper Special Report, seven out of the ten most visited museums worldwide were European Art museums, and six of them, Fine Art museums. Paris and London were leading the table. The Louvre Museum is on first place, with a significant difference from the second (almost two million more than the second place – The British Museum). (The Art Newspaper – Special Report, 2015).

Also, according to Eurostat, the attendance on cultural sites in a European level is high, and in countries like Sweden, Denmark, Netherlands, United Kingdom, Luxembourg, France, Germany, Czech Republic, Belgium, Spain, Hungary, Poland, Malta and Italy is in first place, compared to Cinema or Live Performances. (Eurostat, 2015).



Note: Cultural participation – at least once in the previous 12 months.

Data ranked on 'Cultural sites'. Estimated data for EU-28. Data of low reliability for Ireland, Poland and the United Kingdom.

Figure 2 - Eurostat Cultural Participation 2015 © Eurostat

Museum keywords for the future are sustainability, participation, accessibility, communication, digital, education, personalization, interdisciplinary and multiculturalism. It is necessary to create new museum practices where objects are able to express themselves for each visitor. Museums are questioning themselves, experimenting, building up partnerships, being challenged by different publics, and trying to make a positive impact in these lives (Bodo, Gibbs and Sani, 2009). Museums are inviting everyone to experience them, however they must guarantee that they can connect with such different visitors. These institutions need to find the right tools. To be innovative can be very challenging. Most of the museums are controlled by local authorities and have uncertain funding. Many museums work tirelessly to adjust their capacities and reinforce their personnel expertise and competences, while battling with budget restrictions, fragmented know-how, and, non-supportive governmental structure (NEMO, 2013). Even though, museums are working on creating new practices to provide stronger experiences to their public. At the same time, they need to take into account not only its funding

environment and the diversification of its audience, but also the creation of dynamic management, contribution to placemaking, delivering cultural education, developing staff with appropriate skills, creating digital capacity and innovation, and, working internationally (Mendoza, 2017). Summing up, a successful twenty-first century museum needs to re-think their purpose. Museums must rewrite their mission and be more aligned with their visitors. The museum needs to be clear about its existence and who is serving (Falk, 2016). The big challenge now is to transform the digital shift and digital technologies into good solutions to help museums becoming a living institution that looks ahead, able to stimulate the participation and the creativity of its audience on every level. To become more important for society, being an inspirational place, where the production of new meaning is stimulated (Mu.Sa, 2016).

1.2 Museum Mediation Evolution

This dialogue between the museum and the visitor happens through mediation actions. Most of the times, this communication between the artworks and the public does not happen, due to the language differences between them. In order to decrease this distance, museums started to work on education, communication and mediation techniques. Mediation was another term that started to appear on the museum field during the turnover to the public, and now it is extremely important considering what museums are trying to achieve.

Mediation is the translation of the French word *médiation* which means ‘interpretation’. According to ICOM, mediation in the context of the museum, happens between the museum public and what the museum gives its public to see. Intercession, intermediate, mediator. Etymologically, med, means ‘middle’, the idea of being in the median position, of a third element placed between two distant poles and acting as an intermediary. In the museological context, mediation is an in-between trying to reduce a space by creating a connection. The concept of mediation places the institution of culture as the transmission of common heritage which bonds the members of a community and in which they recognize themselves. It is through the mediation that individuals perceive and understand the world and their own identity. Mediation can also be used to analyse ideas and cultural products that were made for the public and the results of their circulation in the social sphere. The mediation of cultural products leads to the idea of intermediality. In Museology the term mediation has been frequently used for

more than a decade, to refer the actions carried out in order to build bridges between what is being exhibited and the meanings that these objects carry. Mediation seeks the sharing of experiences, social interactions between visitors, and the building of common references. It is an educational communication strategy to give visitors the means to understand better certain aspects and to create their appropriation. Mediation plays a fundamental role in the visitor quest for self-knowledge, a knowledge facilitated by the museum. This approach makes the museum one of the best places to contact with the world of cultural works, and where each person can find the path of a greater understanding of self and of reality as a whole (ICOM, n.d.).

Understanding the path of museums, its positioning shifts, and considering what mediation is capable to reach inside the museum, it is easy to recognize when and how it started to be an important part of the work for these institutions. By the time museums started to put the focus on the visitors, making them the centre of their work, they wanted to understand them and create deeper connections with each one. Creating compelling and memorable experiences that effectively engage the visitors. To do so, it is necessary to create a conversation. Most of the times, this is problematic due to the speeches' differences. The role of mediation is to create a language that works for both sides.

Initially, the relation between the museum and the public was to open its doors and show the artworks. Museums professionals, however, started to realize that it was not enough. From the first attempts until now, mediation assumed many forms inside the museum. Nowadays mediation is still searching for new and better formats. The act of just expose the objects was being challenged as a result of the realization that audience engagement is important, and they were completely impaired. Some museum professionals concluded that the act of stare at objects only through aestheticism was not sufficient for what museums intended. Engagement, education, full public access and democratization were becoming part of the museum vocabulary (Jewitt, 2014). The first form mediation can assume is simply the construction of an exhibition. If the artworks are exposed through some logic, that is a guideline to understand those objects. Actions that today seem basic to us, like a catalogue or support texts through the museums, brought a big difference some years ago. In the beginning of the 20th century, to implement contextual information through the collection was one of the main museums' concerns. Museums felt pressure to present accurate and truthfulness information, so the discourse turned into historical information (Jewitt, 2014).

Museums also started to include in their staff, guides. Professionals who guide and lead groups of visitors through the museum, supporting the visit, explaining and contextualizing the

objects in order to make the museum easier to understand. With the advance of technology, it started to appear alternative solutions such as audio guides, screens through the exhibition, and more recently, digital solutions like apps or multimedia devices.

When the visit experience is made easier, the enjoyment and satisfaction levels rise (Mulberg, 2015). The traditional audio-guides continue to be very common, but they have been pointed out as insufficient solutions. Those devices play recorded discourses, exactly the same for everyone, independently if it is a young visitor, an older visitor, someone with some expertise about the subject or someone dealing with that subject for the first time. To overcome flaws of this nature, digital technologies have been putted in action, in order to create better and more appropriate solutions. However, it is very important to keep in mind that if digital solutions used to stimulate visitors' interest are not used wisely, it will do anything more than the older forms of interpretation (Jewitt, 2014). It is important to note that the technology itself is far from being the solution.

When museums started to understand how the world is changing and how it affects their audience in terms of fruition, they began to improve a better communication with them. More than that, museums want to be able to serve everyone, instead of representing specific groups of people. Presently, these institutions are expected to meet the real needs of their visitors by building bridges. The audience wants to be recipient of information, and at the same time, protagonist in the process of cultural and meaning production, through interaction and new learning methodologies (Mu.Sa, 2016). Museums need to find new ways to communicate with an increasingly globalised society who will create more culturally and demographically diverse audiences. Accordingly, museums are venturing outside conventional boundaries to engage with people beyond their core demographic (ARUP, 2014). Museums are no longer just dealing with the adult visitor that wants to go to the museum, to learn, by curiosity or just to spend time, but also with children, migrants, disabled, socially excluded, and many more. And the mediation challenge is: how can the museum provide lifelong learning to all these different people? (NEMO, 2013).

More than audience development, museums are looking for audience engagement. Aiming for long-term visitors, creating loyalty and recognition amongst visitors. This will create impact and open notoriety for the museums. Increase visitor numbers is not enough, what museums aim is to be able to truly connect with the visitors, making them participate and learn. With diversified audiences, that includes children, young adults, elderly or millennials, it is not possible to have a discourse adaptable to everyone, so the guideline is personalization. To provide to the visitors a chance to find and construct their own meanings from the museum

collections. “It represents an ideological shift from “welcoming all vs welcoming each” (The Creative Museum Project, n.d.).

The idea of an exhibition where the visitors are led through a pre-determined set of meanings is starting to be questionable in terms of effectiveness. The objective is to create an experience where the visitor and the museum can co-create, turning the public in an active member of the visit experience (Rodney, 2016). Accordingly, museums are thinking creatively, in a strategic, dynamic and interactive way. “It aims at engaging individuals and communities in experiencing, enjoying, participating in and valuing the arts...” (European Union, 2012).

Public engagement assumes a culture that is participatory (PEDAALI, 2016). Museums do not want to merely provide information. Instead, they want to offer resources so the visitor can interpret the information by himself. The goal is to afford the power of choice and decision, to adapt the knowledge and the information, transforming the museum in a place of experience and action, a meeting place of pluralistic realities. Museum professionals are concerned about the experiences inside the museum, seeking to captivate interest and curiosity, build self-actualization, promote exchange of ideas, and engage people in meaningful activities (Falk and Dierking, 2016). If the museum can reach the individual needs of the visitors, the audience will be connected to it, getting satisfactory learning outcomes. An important part of the public engagement is diversifying the audience. More than half of the adult population now visits museums, a significant achievement. However, those audiences still do not represent specific groups as ethnic minorities, disabled, the very old or young, or, lower socio-economic backgrounds (Mendoza, 2017).

Modern consumers come from a society that is ageing, facing tremendous changes, social crises, connecting differently and wanting more active roles in political decision-making (NEMO, 2013). Now, museums are collecting and analysing audience data. The extensive knowledge of their public is an essential element to fulfil the demand for cultural contents that can be enjoyed through experience (Mu.Sa, 2016). Nowadays, millennials are the new generation of visitors and the hardest to engage. “It isn’t that the history, culture or art isn’t relevant to millennials, but rather museum-going experiences don’t match their lifestyles and expectations.” (RICHEs, 2016). However, it will still exist visitors that are only interested on the traditional methods, so museums need to deal with this duality too. These institutions need to personalize the content and find an adequate language, according to whom they are addressing. If museums understand the visitor experience, they will perceive better how they affect people’s lives. Factors like personal drives, group identity, meaning-making strategies, memory and leisure preferences, affect the experience at the museum (Falk, 2016). To outline

mediation actions and tools that suit better for them. Each museum must understand: its audience, their expectations and needs; their collections; what projects are appropriate for their content; and, their financial budget. The investment needs to be carefully decided and very well planned in order to be sustainable. Museums must consider their infrastructure to guarantee that its space has capacity to receive the project. Also, their organisational structure, analysing if their working practices are according to the project demands. And, evaluate their staff, which probably will need training to acquire new skills (NEMO, 2013).

In the last years, mediation has been moving forward due to the use of digital technologies. It started with the introduction of screens in the exhibition. Then these screens became touchable, and later, with the introduction of the Wi Fi connection “The visitor is allowed to go “surfing” on the information network, not only among objects and contexts in the exhibition space, but on IT-stations and computers, virtual images and games.” (Jewitt, 2014). These tools are mediation actions with the purpose of bringing together the audience and the collection. Digital technology continues to evolve, and museums must keep looking for new ways to reduce distances. Technology is transforming the ways in which museums are engaged with, understood, communicated, participated in and disseminated (RICHERS, 2016). Making possible the creation of solutions that are more dialogic, interactive, participatory and that create more democratic relations with the audience. The presence of these technologies inside the museums give the visitor the power to choose what, how and when he wants to access the information, according to their own preferences and levels of knowledge. When properly applied, digital technologies can offer huge potential to educate the public, especially those who will become the museum visitors of the future, individuals who know nothing but a digital world (NEMO, 2013). Beyond the deeply important participatory character, the inclusion character that these solutions can bring is very meaningful for the museums. Technology can enable the inclusion of hitherto marginalized groups, building stronger and more sustainable communities (European Union, 2017). Digital technology projects to mediate the relation of the public and museum objects are still on an embryonic stage. There are no long-term conclusions about its effectiveness, although some authors have been analysing these events. Though, not all the intended messages are understood by visitors, and not all the visitors come away from the museum fully satisfied with their experience (Dierking and Faulk, 2016). For the reason that technology by itself it is not a magical solution that will solve the museum flaws in this matter. It is necessary to find good ways to take advantage of the technology possibilities and use these as an improvement on the museum work towards the public.

A good example of this and a great mediation tool is applying storytelling techniques in the relation between the museum and the visitor. Storytelling is something natural for the human being almost since birth, and it is one of the most efficient communication strategies. Museum storytelling has constantly evolved since the first institutions. In the nineteenth century, storytelling was labelling and the sequential disposition of the objects (Roussou et al, 2015). Nowadays, the challenge for the museum storytelling is to find ways to turn their knowledge into meaningful, engaging, and emotional experiences. The ability to tell stories that people can empathize with will create a totally different connection between the visitor and the museum. The ‘stories’ must be presented in an intimate and authentic way. Able to affect people through thought and emotion. Since the aim is to create long-term engagement with the visitors, the mix of direct storytelling (the museum narrates itself), and indirect storytelling (visitor narrates the museum), can be a tool to construct participative storytelling (Mu.Sa, 2016).

This sort of communication is expected to combine cognitive and emotional content. Besides this, there are other (digital technology) strategies like gaming, virtual reality, augmented reality, chatbots with artificial intelligence. They all have the same purpose: stimulate people to read, to ask new questions, to make different choices, to travel in new ways, and, to generate conversation with oneself and with surroundings (NEMO, 2013).

1.3 Digital Museum Mediation

First, what exactly is digital technology? Digital technologies can be defined as all types of electronic equipment that function with numeric code. These can be calculators, personal computers, traffic light controllers, automobiles, cellular telephones, satellite communications, and many more, including computation, communication and content. This kind of technology was invented in the 20th century, marking what was named as the third technological revolution (Greenwood, 1997), when the analogue and mechanical technology were replaced by the electronical and digital technologies. However, it was only on the second half of the 20th century that digital computing and communication technology started to transform all the fields. “Did 1974 mark the beginning of a third industrial revolution? Was this the start of an era of rapid technological progress associated with the development of information technologies (IT)?“(Greenwood, 1997).

Around the 2000's, digital technologies were everywhere and had become part of the daily life, influencing everything from business strategies to human relations. This new environment changed the way people look, search and process information. For example, in the past, watching television was limited to a few channel choices and the viewer needed to adapt to the schedules. These days, there is the possibility of hundreds of channels. The viewer has the possibility to be their own scheduler, watching what he wants, when he wants (Levy, 2005). Changes like these are modifying the audience in many levels. The digital consumer is more powerful, short on attention, interested in speed of delivery (Nicholas et al., 2003). Museums need to adjust their work to a consumer behaviour that is shifting rapidly as more people use digital devices and platforms intensively (Chappuis, Gaffey and Parvizi, 2011). The element that has a constant and intense presence are the mobile devices like smartphones or tablets, even more influent than the previous computer (Chappuis, Gaffey and Parvizi, 2011). Specifically, in terms of smartphone using habits, “Three-quarters of iPhone users, for example, now pay for one or more apps each month, though most remain free.” (Chappuis, Gaffey and Parvizi, 2011). This technological environment and how it works is important for the museums' work, so they can adapt to their visitors' reality. When a revolutionary innovation such as a new technology is introduced it disrupts social relations (Knell, 2010).

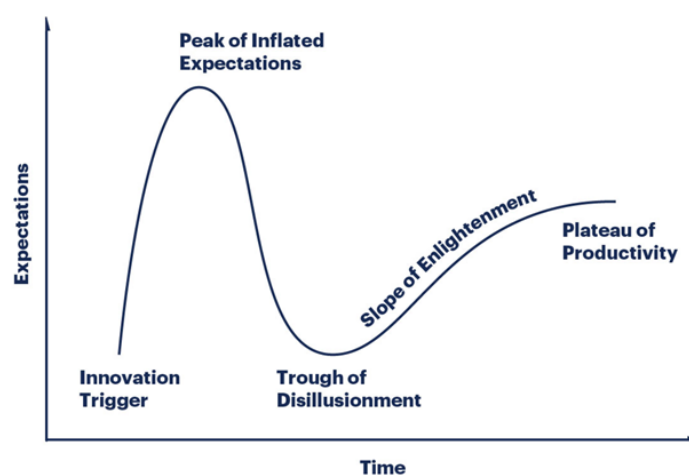
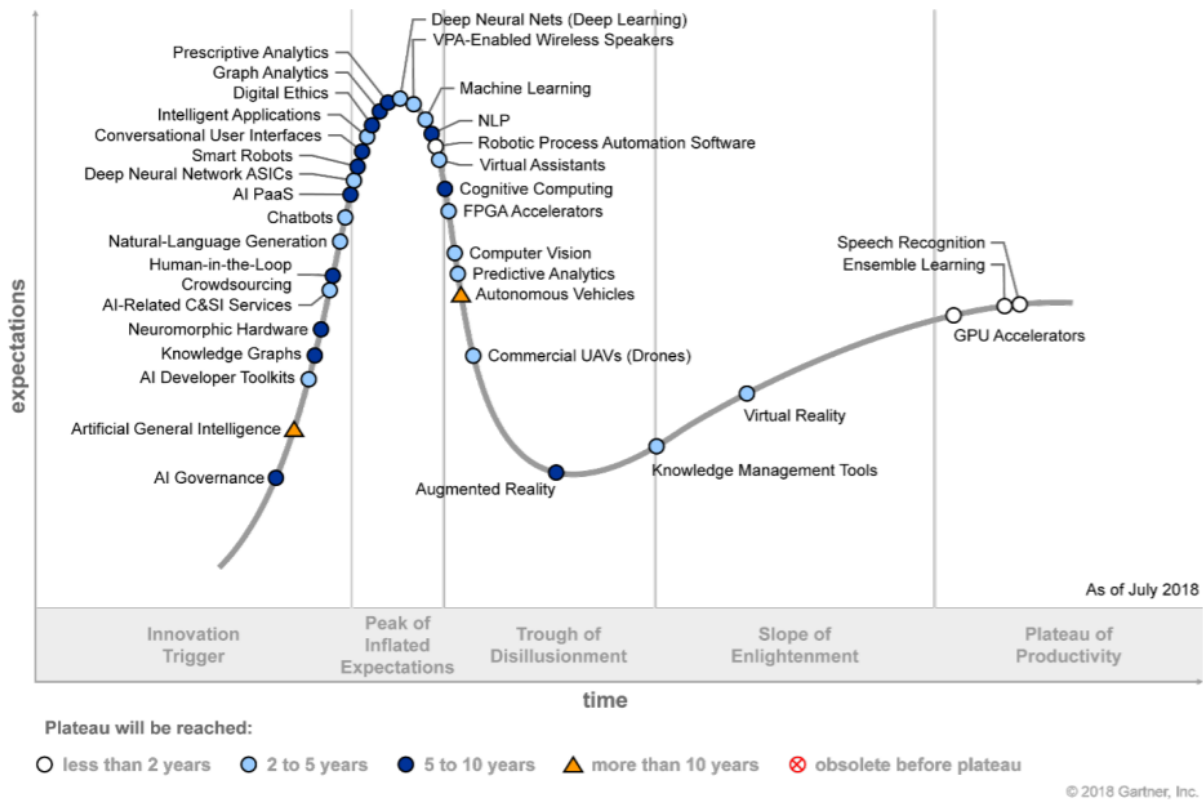


Figure 3 - Gartner Hype Cycle © Gartner

Above, there is the Gartner Hype Cycle for Technology. Gartner is the leading research and advisory company, specialized in technology (Gartner, n.d.). This company created the hype cycle as a graphical representation of the life stages of a technology, from its conception until maturity and mainstream.



Source: Gartner (July 2018)

Figure 4 – 2018 Gartner Hype Cycle © Gartner

This tool is used by companies in order to discern the hype from what is commercially viable, when a new technology is making bold promises. This helps us to understand the maturity of the technology and to estimate when is the best time to invest on the technology or its applications. If the technology is already mainstream, its value is proved, the prices are lower, there are more competition but less risk. Looking at the 2018 Hype Cycle, we can see that the more innovative technology that it is being used at European fine art museums – virtual reality – is almost reaching the plateau of productivity, and it is expected to reach it in 2 to 5 years. The other one – augmented reality – is on the previous stage, through of disillusionment. At this stage, some of the promises previously made by the technology are not being corresponded. Even though, it is expected that this technology will reach its plateau of productivity in 5 to 10 years.

As said before, digital technologies are present in almost every field of modern life, but with different levels of maturity. Digital capacity is an area where museums are a little behind compared to other arts and cultural sectors (Mendoza, 2017). In this work the focus is this crossing for mediation purposes. To understand in what stage these projects are. It is important that both museums and its professionals are open to think about “What will happen when digital technology shows its full potential?” (Mu.Sa, 2016).

This is made by analysing the necessary requirements, the difficulties, the pros and constraints of the new working tools, so museums can benefit in the best way possible the opportunities that can be achieved with digital technologies. Digital technology can offer new opportunities to improve operating models, communicate with audiences, raise money, catalogue, share collections, and exhibiting in a more interactive and engaging way (Mendoza, 2017). These tools are not specific to the museum sector, but they have been used for many purposes inside the museums.

Digital technologies started to connect with art museums in a disruptive way in conservation and restoration techniques. New techniques and tools for dating and author identification were created. New artistic techniques and new artistic fields were invented, and later, it started to affect the relation between the museum and the visitors, democratizing the access and enhancing the experiences at the museum. The development of new digital technologies is changing the work of archivists and conservators, and also the work of curators (Mu.Sa, 2016). The digital revolution that museums are living brought profound changes for the artistic object itself and for the museum characterization. Digital objects are things that have no physical equivalent and are shifting what is understood as a museum object. Simultaneously, digital collections are forcing museum professionals to rethink the concept of museum in general (Young, 2012).

The digital is modernizing and helping museums facing the future. “Sharing collections and spaces, creating connections with new audiences; even those apparently distant. Sharing means opportunity for growth (...) useful to broaden the audience.” (Mu.Sa, 2016). Museums are using digital technology at many levels. Especially in marketing, audience capture, collecting data to a better understanding of their public and institution in order to create more appropriate and accurate experiences. Many museums already use sophisticated data analytics, predictive modelling, dynamic pricing and highly accurate projections for attendance. Comprehensive datasets about the audiences, their preferences and behaviours, are helping museums’ personalization on visit experiences (AAM, n.d.). The introduction of these

technologies in the relation between the museums and the public is allowing the creation of new dialogues never possible before.

Digital technology inside museums and the way it changed the fruition of the visitor and its expectations, may bring a new shift: “Museums will have to consider themselves – to a certain degree – as part of the entertainment sector and not only as part of the education sector in order to attract visitors.” (Widmann, 2017). It is because of questions like these that the debate is not unanimous between the professional. Loss of truthfulness or even legal questions make this a complex topic, “... due to unresolved legal controversies over copyrights, insufficient financial resources, a lack of technological expertise and inflexible mindsets, the practical realisation of making cultural heritage accessible through digitised representations has turned out to be a significant challenge.” (NEMO, 2013). There are many points in which the relation between museums and technology faces many challenges. Beyond the ones referred before, the physical aspects of the museum and the museum professionals’ skills, are the most challenging. “The skills needed for a museums career are changing, with greater emphasis now on flexibility and collaboration, business and digital, commercial, marketing and fundraising.” (Mendoza, 2017). More than ever before, museums need to create working teams that are transversal involving different departments.

Even though, the advantages are superior and digital technology is having a positive overall impact on museums capability to fulfil their mission (NESTA, 2017). Some studies have been made, and according to NESTA and the Arts Council of England, by 2017, “...over a two-year period, significantly more organisations say that digital has a major positive impact overall (up 7 per cent since 2015, from 37 per cent to 44 per cent²⁷), and fewer say it has a minor positive impact (down 9 per cent, from 35 per cent to 26 per cent).” The implemented technological tools need to be in line with the museum mission because it affects all aspects of the museum’s work (Mu.Sa, 2016).

Now, museums have what is called ‘digital strategy’, “The museum digital strategy depends on many factors: financial resources, open-mindedness and a leadership capable to deal with the change (Mu.Sa, 2016). It is also fundamental to create new partnerships and to extend the museum network. Partners like

“... software and hardware developers, universities or centers for technological innovation. These alliances may be useful to solve important issues for the digital museum, such as the long-term preservation of digital content and the technological obsolescence of the tools used. The clearer the definition of objectives and priorities, the more involved the departments of the organization are in the implementation of the change. In fact, no digital

product emerges if significant process innovations, new behaviours and methodologies have not been promoted before.” (Mu.Sa, 2016).

Considering that: the first museums are centenary institutions, the concept of mediation has been used for decades, and digital technologies are acquiring a notable importance; how these three concepts are relating themselves? Specifically, in European Fine Art museums.

In order to present and future visitors continue to seek museums and its knowledge, it is crucial for these institutions to follow the evolution of its visitants and societies in which they are inserted. The present challenge for the museums is “... to understand its audiences, their preferences and responses to technology mediated experiences.” (Marques, n.d.). The transition from the traditional methods to digital tools, can bring enormous advantages for the museums and the visitors, but also many challenges.

The digital shift that we are currently living turns everyone in a potential museum visitor. Due to that, museum needs to create tools that make them accessible to such a different range of people. New generation of museum goers do not know another reality beyond the digital one, and it is evident that they expect new formats in museum interpretation that includes digital technology. Incorporating digital technology within the physical gallery space is one such way to do this, providing more interactive and engaging platforms from which visitors of all ages can learn (Hillier, 2018). An evidence of this new kind of challenge for the museums is present in the mission of the Louvre museum: promote “...encounters between art collections and visitors. More than just a meeting place, it is now clearly a forum for sharing, open and generous, where the exceptional is accessible to all.” (Martinez, n.d.). Nevertheless, in an increasingly technological society, it is important that the museum continues to be the place where the direct and intimate contact with those kinds of object is possible, not comparable to any other experience. For that reason, it is necessary to find ways that decrease the gap between the museum and the visitor on *in-situ* experiences. The introduction of

“... technology into exhibits themselves and using new media in creative ways audiences can engage with art and artefact and work with their own entrance narratives to create new knowledge. Museum are working towards effective incorporation of technology in exhibits and working at ways of incorporating technologies within a changing landscape of audience participation (...)” (Jewitt, 2014).

It must be kept in mind that an experience filtered by a screen or other digital gadget is easily reproduced in any other context. However, an experience of direct contact with artworks is unique. The ideal is to find the best encounter possible between the two realities, where the technology is a facilitator and never a distraction.

The beginning of the use of multimedia terminals in the 80s or the current use of touch screens or smart devices are all part of the same logic. Those terminals were the first big attempt to introduce digital technology in the relation with the public inside the museum. Since then the evolution did not stop. This relation started with screens through the exhibition with extra content, such as images or videos. Later, the screens were replaced by touch screens, allowing the visitor to be more active. The traditional audio guides were already a mainstream technology inside the museums. The next step was to re-think them. The first digital versions appeared in the 90s decade. It started to be created devices with more than the audio function. By 2015, most of the major museums in Europe had smartphone apps to provide to its visitors a digital guide. At the moment, most of the digital technology projects created to be used inside the museum as a mediation tool are smartphone apps. The visitor needs to install it on their own device. The apps came to replace the audio guides, bringing new possibilities, more autonomy and flexibility to the user. There are different models, from very simple versions, to others with many features. This visit model allows the visitor to create its own visit. He can decide what and when, and which information he wants to hear/see. This option also allows the extension of the visit beyond the moment inside the museum. The visitor can prepare the visit after, and re-watch the content after the visit.

These new technologies started to be looked at as possible solutions to reach visitors in an effective way, allowing all kind of people, independently of the background, to visit the museum and learn through its content. “User needs and digital technologies are reformulating our understanding of museum collections and the relationships between museums and audiences.” (Cameron, 2010). The changes caused by digital factors need to be handled very carefully, otherwise they can risk the serious work that museums have been developing for years. Therefore, it is necessary to define what the museum is looking for with the implementation of the project. There are some fundamental keywords in this relation: experience, democratising, interactive, engagement, participation, interpretation, personalization, reach, expectations, sustainability, sharing, and accessibility. What professionals from the different fields need to ask themselves is:

“How can the use of digital technologies in museum/gallery can create interactive experiences for the visitor?”, “In what ways does technology afford new routes to engagement and participation with an exhibit or museum/gallery?”, “How can digital technologies impact on opportunities for visitors interpretation or understanding of exhibits and experiences?” (Bock and Pachler, 2013).

It is fundamental that the museum knows itself, its collection, its capabilities and limitations, what it can offer to its visitors and what are the necessary conditions to do it in the best way possible. As important as that, the museum needs to deeply know the technology that is introducing in its space. Keeping in mind that “... technology is not a magic wand that can alter the state of a museum’s outlook, its ideas and objects, but that it is something that needs to be carefully considered and not used for the sake of it.” (Murphy, 2015). The digital shift came to allow the creation of more extensive, inclusive and accessible experiences, offering a multitude of new ways to engage with people. Allowing a fundamental disentangling of what used to be understood as mainstream and the hard-to-reach groups. This shift has also offered tools that help to overcome physical, emotional, mental, cultural or social barriers. Providing accessible digital cultural options result in a better user experience for all (European Union, 2017).

The use of technology is changing the relation between the character of official knowledge holder of the museum and putting the visitor in the process of building new knowledge inside the museum (Jewitt, 2014). To make this possible it is necessary to think strategically to exploit the best potential from this alliance. Since what museums pretend to reach are the visitors, and technology by itself is not capable to do it, it is fundamental to “Always start with the audience and not the technology; centre any engagement strategy on the customer experience (from start to finish).” It must be the technology adapting to the public necessities and not the opposite. Technology should be a support and not the centre of the attention. Adapt the content to the audience and their needs and fully exploit the attributes of the chosen digital technology, and in last instance, the museum must be ready to assume that the best solution to engaging an audience may not necessarily be digital at all (NEMO, 2013). It is also essential to find the best tools, because an equipment that might seem easy to use for one person, can be difficult or very time consuming for another.

“... museums (...) need to consider what technology really is, before applying it in their collections. A better understanding of the essence of technology can only create a better relationship with it...” (Jewitt, 2014). technology in this environment needs to be seen as something that is “...able to involve the visitors and let them create “customized” links between the cultural heritage and their own experience, (...) as an educational tool, useful in terms of accessibility of culture and cultural heritage, (...) new media as a further instrument for self-expression and personal reinterpretation (...).” (NEMO, 2013).

The goal is to reach more visitors and new kinds of audiences, including those who

were previously disengaged or uninterested and provide new ways to experience culture in new and deeper ways (DDCMS, 2019). The point is that in the future, even with the evolution of almost perfect virtual museum tours, the physical visit continues to be irreplaceable. For that, the implemented solutions must be effective, *in-situ* digital tools need to be well-funded and well-executed (Widmann, 2017). The competition to on-site visits is much bigger these days and digital technology can be a great support but also a burden. It is important to have in mind that the use of digital technology carries risks. Equipment fails, the internet connection can be slow, the visitor's smartphones are not using the same operating system, the session is oversubscribed. Digital technology tools can also be very disappointing when it fails (The Creative Museum, n.d.). It is necessary more than new gadgets. What is necessary is to have an appropriate communication strategy that is facilitated by technology. The chosen approach should not valorise some perspectives in deterioration of others but celebrate the diversity of everyone. To be a successful case, the museum digital mediation project needs to, in an immediate and intuitive way, give to the visitors the information that will bring them closer to the museum, the artworks and artists. Tools that allow results that are not possible to achieve through the traditional means. Tools that will be used by people that are not experts, looking for a better involvement with the museum. The implemented technology cannot create a gap between technological natives and other kind of audience. Because of that, it needs to be responsive and capable to adapt to different users. The intention is to improve on-site accessibility. However, it is necessary to remember that "... a museum is not Disneyland: the user does not only look for an escape, but also for cognitive development." (Mu.Sa, 2016). The different gadgets used must provide several kinds of content, to improve the museum work, to enrich the visitor experience and to enable customized visits. The final aim is always the education and not the entertainment.

The creation, implementation and success of these projects represent big challenges. It entails several demands and changes in the museum operation, structure and even mentalities of its professionals. Legal questions as copyright or ethical management of data collecting are, emerging associated to these projects. Due to its recent character some of these questions are not legislated yet. These technologies are changing the way people access, produce and use cultural content. "What is the impact of the digital shift on audience development policies and what are the practices of cultural institutions?" (European Union, 2017). It is necessary the creation of new communication and digital strategies that should be developed within the museum (Mu.Sa, 2016).

There are still museum professionals that remain sceptical about the efficiency of digital technology associated to the museum. For some, it is a question of difficulty in dealing with innovation and getting out of the comfort zone; for others there are issues related to authenticity, authority, ownership, and truthfulness of representation (Jewit, 2014). Many museum professionals defend the traditional methods, fearing that these innovations will blur the line between education and entertainment. Interactive exhibits can be very popular and attractive to visitors, especially to younger generations, but this can only be a result of the attractive and distractive character of the technology. Projects of this nature are still very new, so more profound studies about its efficiency do not exist yet. Nonetheless, technology that is used without effectiveness testing in immediate and long-term museum experiences is a problem (Jewitt, 2014). Even so, there are already some studies and attempts to monitor these projects.

1.4 Museums' Survey

A survey about the presence of digital technologies as mediation in European Fine Art museums was elaborated. In order to construct this survey similar ones were consulted. Joining with the information that was considered as the most relevant for this work, the survey was formulated. It stayed online for approximately two months (from April to the middle of June/2019) through Google Forms, and the survey request was sent by email to the museums. The request was sent to forty-six institutions, from small/regional to big/international European Fine Art museums. The email was sent more than once, but unfortunately, only four museums answered the survey. The survey is anonymous so the name of the museums will not be presented.

The survey had 33 questions. The main topic of the survey are the digital technologies as mediation in Fine Art museums in Europe, however it also addresses to issues related to the structure and positioning of the museums. Therefore, the survey was divided in 3 sections. The first section focused on the reach and number of visitors of the museum. The second, about the museum structure (staff members and department), and the third one about the use of digital technologies by the museum.

Gathering the answers, the profiles of the four museums that answered the survey are:

Museum number 1:

It is a museum with an international reach, that had 2.165.000 visitors last year. The number of visitors increased and fulfilled the expectations. A museum that receives this number of visitors has between 201-500 full-time staff members. The museum has an educational department with twenty-two members. This museum also has a specific team dedicated to the mediation between the museum and its visitors, with six members. The museum number 1 has a team dedicated to the creation of digital content. This team has seven members and a specific budget. Effective mediation is part of the museum mission. This museum has a very strong 'outside' digital presence, using all suggested platforms, except the blog (website, newsletter, Facebook, Instagram, Twitter, YouTube, others). The 'inside' digital presence is not so strong, only using multimedia guides. This museum uses digital technologies in these areas: internal communication/organization, marketing and public relations, analyse audiences/ticket sales and customer service. This museum has a digital strategy and its main topics are: reach, engagement and holistic. The digital strategy objectives are part of the museum mission. Effective mediation is part of this strategy. This museum considers its interaction with visitors through digital technologies very mature. The museum considers digital technologies as good tools to help the museum. The main obstacles pointed by Museum number 1 in terms of the development of digital technologies inside the museum are: cost, management and expertise. For the future, this museum looks at mediation through digital technologies as something in expansion, desiring to increase the engagement and personalization.

Museum number 2:

The museum number 2 is an international museum in terms of visitors reach. Last year had 3.200.000 visitors. This number was stable, considering the last five years, and fulfilled the museum expectations. This museum has more than 501 full-time staff members, however, does not have an educational department. The museum has a small team of seven members dedicated to the mediation between the museum and visitors. Museum number 2 said to have a team dedicated to the creation of digital content, of seven members. This team is dependent on a specific budget but also on the overall budget. Effective mediation is considered a priority in the museum mission. The 'outside' presence of the museum is strong, using all the suggested options except the blog (website, newsletter, Facebook, Instagram, Twitter, YouTube, others). The 'inside' digital presence is also relevant. The museum has multimedia guides and augmented/virtual reality experiences. Regarding the areas using digital technologies the museum number 2 said to use all: internal communication/organization, marketing and public relations, audience engagement/mediation, exhibitions, analyse audiences/ticket sales and

customer service. Concerning these areas, the museum said that the most developed one is audience engagement, and, the less developed are exhibitions. The museum has a digital strategy and its main topic is enhance the visitors' experience. This strategy is part of the museum mission. Effective mediation is part of the digital strategy. This museum considers its relationship with visitors through digital technologies immature, and the major needs of the public are: information, orientation and mediation. To fulfil these, the museum considers digital tools as helpful. The major disadvantage of the use of digital technologies inside the museum pointed by the museum was the possibility of the technology comes between the visitor and masterpiece.

Museum number 3:

The museum number 3 has an international reach, counting with 9000.000 visitors last year. The number of visitors increased but the museum was expecting more. This museum has between 50-200 full-time staff members. The museum has an educational department with four members, and, a team to work on mediation between the museum and visitors with four members also. Museum number 3 also has a team to work on digital content. This team has five members and a specific budget. Effective mediation is part of the museum mission. This museum has a very strong 'outside' digital presence, using all the suggested options: website, newsletter, blog, Facebook, Instagram, Twitter and YouTube. In terms of 'inside' digital presence, this museum has also a strong presence, having a smartphone app, multimedia guides and others. Concerning the areas in which the museum uses digital technologies, this museum said to use all (internal communication/organization, marketing and public relations, audience engagement/mediation, exhibitions, analyse audiences/ticket sales and customer service). Regarding these areas, the most developed one is the digital department, and the less developed is curatorship. The museum has a digital strategy and its main topics are: improve the visitor experience, integration of IT systems, improve internal communication/efficiency, improve digital literacy of staff across the museum, and develop an analytics plan. Effective mediation is part of the digital strategy, and its main goals are: diversify the platforms and channels to better reach diverse audiences with very diverse needs, develop a content strategy and produce more and better content, deploy interactives in-gallery, and explore/experiment with VR, IoT, and other new tech. This museum considers its relationship with the visitors through digital technologies moderate. The major need of the public is the creation of interactives in-galleries. Museum number 3 considers digital technologies as good tools, because digital technologies are an effective way to complement the visit for those users wanting to go deeper, explore,

enjoy; and are very powerful to better connect with audiences (before-during-after the visit). The major obstacles are: budget, internal resistance and lack of expertise. For the future this museum expects digital technologies much more employed and central.

Museum number 4:

Museum number 4 has an international reach. Last year had 906.814 visitors. Considering the last five years this number has been stable and fulfilled the museum expectations. This museum has between 50-200 full-time staff members. Museum number four has both an educational department and a team dedicated to the mediation between the museum and the public. These teams have ten and five members, respectively. On the other hand, this museum does not have a team dedicated to creating digital content nor considers mediation as a priority of the museum mission. The ‘outside’ digital presence of this museum is very strong, using all options except the blog (website, newsletter, Facebook, Instagram, Twitter and YouTube). The ‘inside’ digital presence is also good, having multimedia guides and digital games. The areas in which the museum uses digital technologies are: internal communication/organization, marketing and public relations, analyse audiences/ticket sales and customer service. The most developed is the ticket sales, and the less developed is mediation. The museum has a digital strategy and its main topics are: increasing income, innovation and technology, efficiency and cost reduction. These objectives are not included in the museum mission statement. Museum number 4 considers its interaction with visitors through digital technologies moderate. The major visitors’ needs are: digital signage and mobile charging stations. The museum considers digital technologies as good tools, but not for all audiences; suitable for younger audiences but not for seniors. The major disadvantage of the use of digital technologies inside the museum is the attention span inside the galleries; sometimes we can get distracted by notifications at the mobile. The major obstacles in the development of digital technologies within the museum are: investment required and the evolution of technology makes it important to embark in projects with resources ensured for middle term. For the future of mediation/public engagement through digital technologies this museum says that the education department is the one more involved in developing strategies for millennials.

The number of answers was very below the intended. However, the received answers point at an interesting direction considering the subject of this work. Revealing that mediation and digital technologies are becoming an essential part of the Fine Art museums’ work, and

that these institutions have been focusing in those areas. Overall the museums answers were satisfying concerning the theme of this dissertation. Museums seem to be aware of the importance and impact of digital technologies and its impact on the relation with visitors. However, for example, Museum number 1 has a very strong ‘outside’ digital presence but only has multimedia guides as *in-situ* options, even though the museum considers its interaction with visitors through digital technologies very mature. Museum number 2, as an international reach museum does not have an educational department but considers audience engagement as the most developed area in terms of digital mediation. However, this museum considers its relationship with the public through digital tools immature. Museum number 4 does not have a team to create digital contents, but claims to have digital strategy. This museum does not consider effective mediation a priority but has multimedia guides and digital games. Looking at some contradictory answers, it looks like the museums consider that having a strong ‘outside’ digital presence is the same of successfully interact with their visitors through digital technologies in general. It seems that some of these technological areas of work are still not completely clear and defined. Even so the sample of the survey answers is so small, the fact that these varied answers related to digital technologies inside the museum showed up it can be seen as a growth indicator of the relation between digital technology and museum mediation. European fine art museums are each more familiarized with digital technologies as part of their daily lives, having some processes completely dependent on it. Also, the fact that museums have the notion that those areas are not developed enough it is an evidence of their desire to improve, so this situation is likely to change in a near future.

1.5 Methodology and Data

Regarding the methodology of this dissertation it were used mixed methods, such as indirect and direct sources of information, qualitative and quantitative data. Since the beginning of the work all the research was made in English, which it is a filter of the information found by itself. The main keywords used were: museums, fine art, Europe, mediation, digital technology, public engagement. From these, the following research continued to be built.

Concerning the qualitative data, the information gathered came from indirect sources. These sources were relevant literature such as books, articles, dissertations, reports, surveys and websites. Sources like reports and surveys have both qualitative and quantitative data. Quantitative data were also retrieved from EGMUS and Eurostat websites. The museums’

survey answers were used as direct sources of qualitative and quantitative information. Gather the information and cross the data was the base methodology to construct the first chapter of this dissertation.

The second chapter elaboration was based on intensive projects research. The information collected was later organized. The tables started to be constructed and adapted, according to the necessities (and constraints) of the work. This information is analysed and crossed with the data from the first chapter.

Accordingly, the reflexions of the last chapter are a result of this work.

2. Digital Mediation Projects in European Fine Art Museums

This chapter will present and analyse current projects in Fine Art Museums that use digital technology as mediation

Concerning the configuration that digital museum mediation has been assuming, the most commons are smartphone apps and multimedia guides. We have also encountered projects that used gaming, storytelling, artificial intelligence, augmented or virtual reality technology, and 3D reproductions.

Building upon the legacy of the traditional audio guides, museums are now opening up to the potential of the new digital solutions. To deepen the relationship with its public by providing relevant content and compelling experiences (NEMO, 2013). The apps, as said before, are the most common these days and many museums chose this alternative because of the lower budget necessity. The device is the smartphone of the visitor and the museum does not need to acquire its own devices. The apps can have all the same features as a multimedia guide. Another advantage is the use outside the museum that with other solutions is impossible. The visitor can begin a relationship before even come to the museum. With its own device the visitor can download the content and design their own experience of the exhibition (Cuno, 2016). On the other hand, the multimedia guides are devices made available by the museum, usually touch screen devices with several features to guide the museum visit. These kind of visit supporters are also advantageous for the museums in other aspects. Since these solutions do not add any physical elements (even if very small, like QR codes) and are absolutely non-invasive (Laudazi and Boccaccini, n.d.).

As said before, storytelling is a very effective mediation strategy. It transforms the museum speech into a fluid and natural dialogue, used to engage the visitors. However, the simplification of the museum discourse must happen without sacrificing scientific integrity. (Roussou et al., 2015). The intention is to transform the museum speech into a narrative story with characters, selecting specific objects within the museum to illustrate the story. Creating multimedia enhancements, and producing a digital narrative delivered through in-gallery devices (Roussou et al., 2015). The same happens with gaming strategy. The museum speech is transformed into a game with a series of challenges. The visitor can interiorize the museum's knowledge through interactive and dynamic actions. For the younger generations, gaming is part of their daily lives, something they are familiarized with. Related to the learning delivery method - gamification. This tool "... facilitates learning and encourages motivation using game elements, mechanics and game-based thinking." (Kapp, 2014).

The introduction of a virtual space within the physical one, allows the personalization of one through the other. Emerging trends such as wearable technology, smart devices, sensors or 3D printing are opening up new capabilities to create, personalise and distribute culture (NEMO, 2013). Artificial intelligence has been used by museums in mediation in a more indirect way. To analyse the collected data about its visitors, or in the creation of chatbots that talk with the visitors and answer their questions in real time.

The new trends, but still in an undeveloped phase, are the augmented and virtual reality, applied inside European Fine Art museums. According to Emspak (2018) Augmented reality is the result of using technology to superimpose information — sounds, images and text — on the world we see. Augmented reality demands a support that will show the virtual elements within the physical space. The user needs to point the device to specific points to see the information. On the other hand, virtual reality is a three-dimensional computer-generated environment. The user can explore and become part of this reality. This immersive experience allows the user to manipulate objects or performs a series of actions whilst there (Virtual Reality Society, 2017). This is the most ambitious option, that requires very specific equipment like a headset. Virtual reality technologies are changing and expanding the access to fine art. Tools of this kind can take the richness and understanding of an art object to a completely new level (RA team, 2016).

These new technologies have a great potential in terms of art education inside fine art museums. Instead of reading a catalogue, or watching pictures or videos through a screen, the visitor has a mediation that is ten time more effective. Presently the costs are very high, but the value compared to the cost, will make these experiences mainstream (RA team, 2016). New digital technologies like these ones, not only democratize the information, but also the experience. Another format of mediation in fine art museums brought by digital technology are the 3D impressions. These printings allow reconstructions or creation of replicas. Objects that can be touched and experienced by other senses beyond vision, which can be very important for people with vision disabilities.

2.1 Projects Analysis

There is a total of one hundred and twenty-one projects, including apps, multimedia guides and other experiences. The geographical distribution of the projects is represented on the map below (Figure 5). Due to superposition, not all are visible. Several museums have more than one project, so the number of projects is higher than the number of museums. The projects are

happening almost all over Europe. We did not find projects in countries in East Europe and other countries like Portugal, Ireland, Norway and Finland. We narrowed the focus of our search by selecting keywords in English language. This decision limited the identification of projects whose information is not in English.

As countries in Central Europe are economically powerful and are recognized as important cultural tourism destination this can also allow to explain our results.

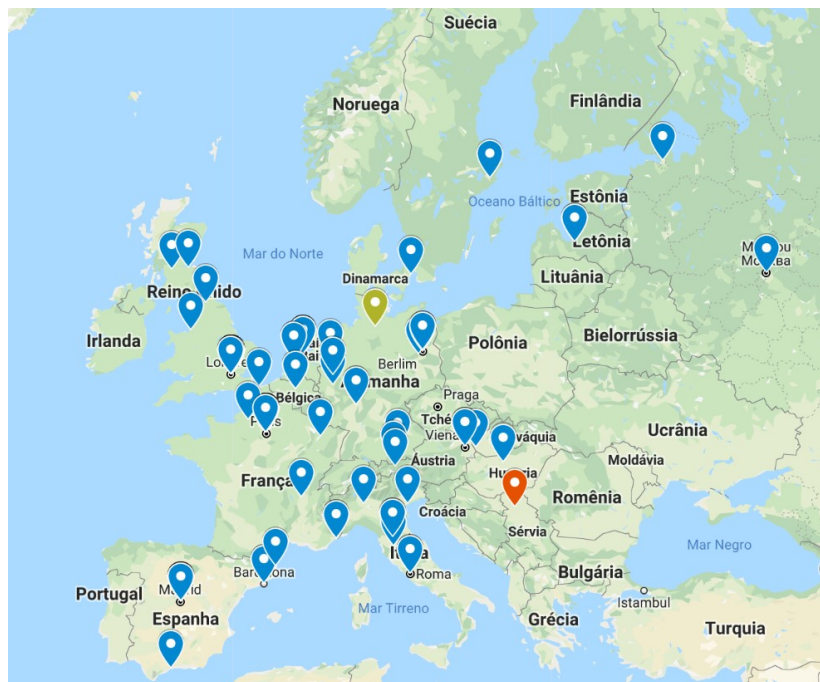


Figure 5 - Projects Map © Catarina Reis

The European cities with a bigger concentration of these projects are a reflexion of what was mentioned before. These cities are London, Paris, Amsterdam, Berlin and Madrid (Figure 6). Big European capitals, with very well-known museums, receiving millions of visitors.

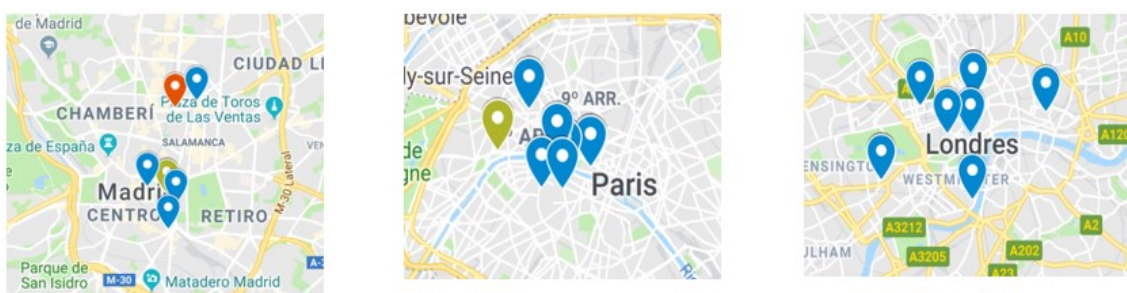


Figure 6 - European cities projects map © Catarina Reis

On a national level, France and The United Kingdom are the countries with more projects (The Louvre Museum and The British Museum were the most visited museums in 2018). However, the projects are concentrated on a small number of big museums – national / international museums.

We will present in a more detailed way one of the projects. To select this project the criteria was: one app (apps are the most popular projects), official and with the higher number of downloads. Applying these filters, two projects candidates were identified from the Louvre Museum and from the Rijksmuseum. The Rijksmuseum app has a better classification and it is free. The Louvre Museum app has a lower classification and is free with in-app purchases. However, the Louvre Museum app is more complete in terms of features.

This app is labelled with the European video game content rating system as PEGI 3 (Pan European Game Information), which means that is not offensive or violent and it can be used by all age groups. It has a classification of 2,2 out of five, by 766 users. According to the twenty comments presented at the Play Store, the unsatisfied users claim that:

- The interface is outdated
- Not intuitive
- Could not use the location tracking
- Little information about the artworks
- Blocks / slow
- All the audio guides are paid
- Museum wi-fi is weak

The satisfied costumers said that the app is:

- Good
- Excellent
- Very helpful
- Very good GPS
- Helpful planning the visit

The ‘slogan’ of this app is “The guide, it’s you”. As the main features this app offers: 60000 m2 3D modelled space, practical info about the museum and its events, 600 files about the museum spaces and artworks (on-screen information – image and text), 600 audio guide files about the museum spaces and artworks (paid option).

When the app is installed, the front page that welcomes the visitor with “Louvre: My Visit”, provides the option of creating a profile/skip this step, or buy tickets (Figure 22). This means that these app can be useful if previously installed. The visitor can plan the visit and buy the tickets.

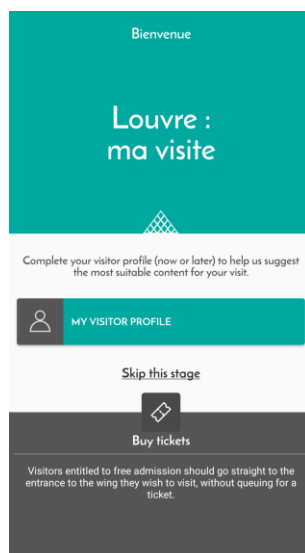


Figure 7 - The Louvre App © Louvre Museum

If the chosen option is Buy Tickets, the visitor can select the ticket he wants and its conditions (Figure 23):

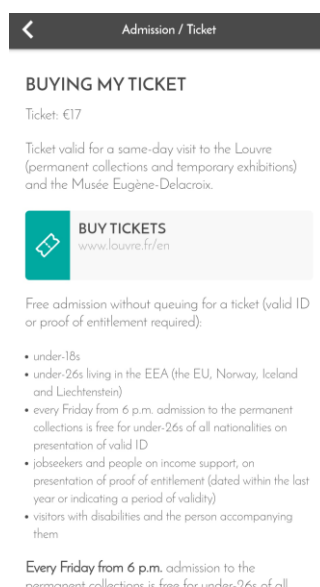


Figure 8 - Buy Tickets at The Louvre App © Louvre Museum

The visitor can skip the profile step, and go directly to the visit content of the app. However, if the visitor wants to create its profile, he needs to answer some questions. With those answers the app will give suggestions. The questions are related to the time that the visitor has to spend at the museum, the subject

with more interest in, and, if it the visit must be adapted to reduce mobility or visual impairment (Figure 24).

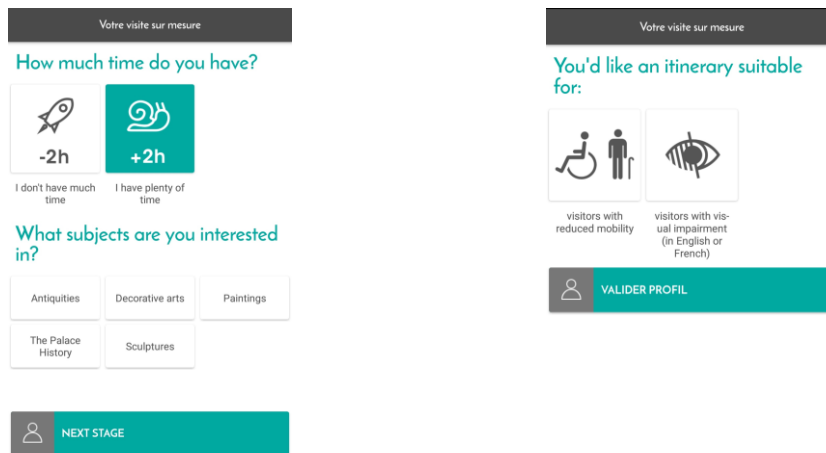


Figure 9 - User Profile The Louvre App © Louvre Museum

Next, there is the visit content. On the top, there is the personalised visit suggested according to the user profile. Below, some practical info about the museum, such as schedules, and prices of tickets and audio guides. On the bottom of the screen there are the options: Map, Explore, and, My Profile (Figure 25).

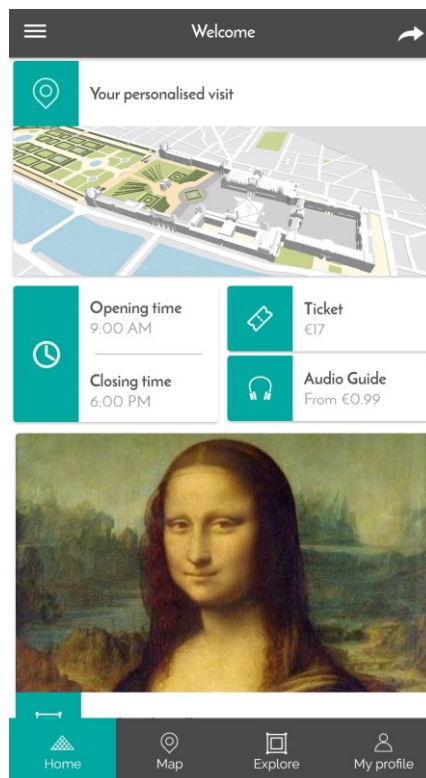


Figure 10 - Home The Louvre App © Louvre Museum

On the option Map, the visitor can see the 3D modelled map of the museum. On the option Explore, is where the artwork information is. This information is organized into permanent/temporary collection. Inside these, divided in categories like paintings or sculptures, and, chronologically also.

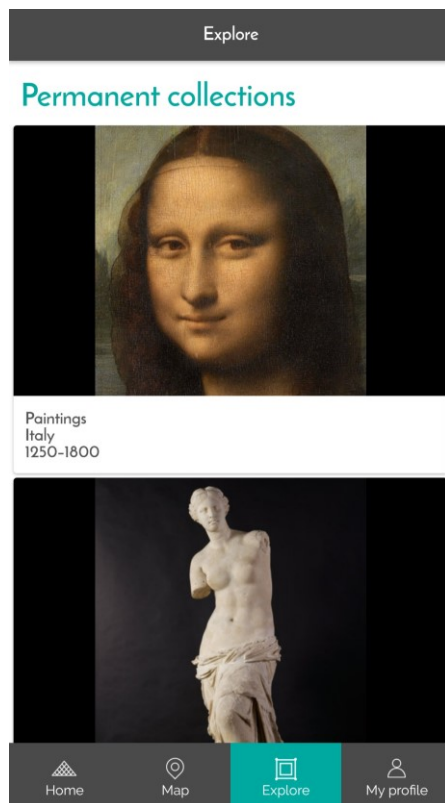


Figure 11 - Explore the Collection The Louvre App © Louvre Museum

Here the visitor can see pictures from the artworks and some basic information like author and date. More detailed information is present on the audio files that must be paid. Besides this, the visitor can also use the app very similarly to the audio guides and search the objects by its reference number.

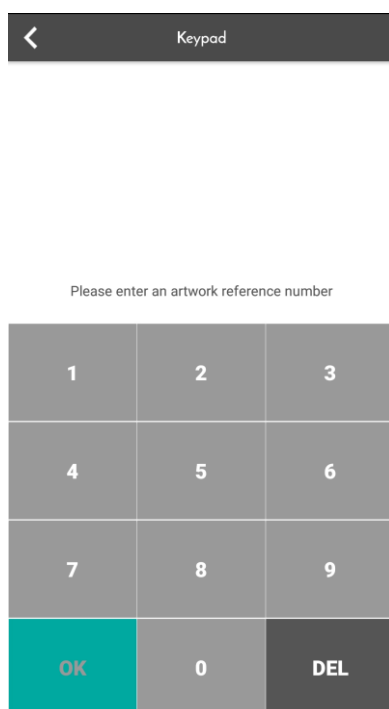


Figure 12 - Keypad The Louvre App © Louvre Museum

This app can be useful before the visit, in terms of planning and getting to know the museum in advance. However, after the visit it becomes useless, in the sense that the visitor does not have the option to download content, create its gallery to watch later, or other function that makes the app interesting even after the visit. This app does not have personalised content, only personalised choices of paths inside the museum. The content is the same for everyone. The app does not have adapted content for children, but this can make sense if we think that children do not use smartphones. The app does not allow any kind of interaction with other users through it. Some apps allow the sharing on social media, but it still do not create a network amongst the users. It could be very interesting if these apps have a place where the visitors can connect and share with each other.

2.2 Apps

Museum	Developer	Official	€	Platform	Last Update	Classification	Evaluations	Downloads	Features	Languages
Musée du Louvre, Paris	Musée du Louvre	Yes	In-app purchase (0,99 to €39)	iOS / Android	01/02/2018	2.2 / 5	693	100.000 +	Museum space modeled in 3D Helps finding artwork or collections Suggests itineraries Practical info on exhibitions, auditorium, workshops, etc Descriptions of artworks and parts of Louvre palace Audio commentaries of artworks	French / English / Spanish / German / Italian / Korean / Japanese
Musée du Louvre, Paris	Museum Guides Ltd	No	Paid (2,99)	iOS / Android	06/02/2018	n.l / 5	11	500 +	Interactive map Detailed photography and descriptions Audio guide Suggested walking tours Create personal tours	
Musée du Louvre, Paris	Toutlink	No	In-app purchase (0,99 – 5,00)	iOS / Android	26/10/2018	4.4 / 5	286	10.000 +	Offline audio-guided tours Practical info about the museum Offline chat	
Musée du Louvre, Paris	Museo88	No	Free	iOS / Android	21/09/2018	n.l / 5	4	1.000 +	Images of 2300 paintings Separation of paintings by genres and authors Download of paintings in high resolution Search for paintings Adding paintings to My favorites Download paintings	
Musée du Louvre, Paris	Smartify	No	In-app purchase (0,69 – 13,99)	iOS / Android	10/02/2018	3.1 / 5	777	100.000 +	*Hold your smartphone up towards a painting and detailed information about the work will appear on-screen Save paintings and create personal digital collections**	

Table 3 - Apps Table © Catarina Reis

In order to properly understand how mediation is used made in European Fine Art museums we mapped of digital mediation projects and gather information in summary tables. The tables contain information that characterize each project.

The projects are divided in three separate tables: Apps, Multimedia Guides and Other Experiences. Due to the extension, the complete tables are available at the of this dissertation (Appendixes A, B and C). Whenever we did not find information it is marked with colour yellow. It is important to refer that the projects were not installed or directed evaluated during this work. The information was gathered from the museums' websites, App Store or Play Store.

Table 3 contains describes the Apps whose main objective is to support the visit, since there are other museum-orientated apps with different purposes. During the research process it were identified apps with content about museums and artworks but tourism oriented. These apps were also excluded for not being relevant enough to the goal of this study. The same criteria were used with apps from temporary exhibitions, apart from some exceptional cases where the project is worth to mention.

It were identified ninety-four apps, from sixty-five museums from different parts of Europe. All the apps were created to support the on-site visit but most of them allow the visitor to extend the experience beyond the moment inside the museum. These apps offer additional features beside audio information, and it can represent a big improvement for the public and museum. The apps work in more than one level in terms of connecting with the user, providing audio information, on-screen content like text, video, HD photography, and many other. Below there is a part of the Apps table.

Each project was characterized with a set of parameters. One parameter (first column) is the main developer of the app (museum or an external company that worked or not with the museum). Apps were classified as official or non-official, and by official are considered the projects that are mentioned on the museums website or that have a clear identification that were made in collaboration with the museum. In ninety-four apps, thirty-six are official apps and the other ones were made by other companies independently from the museum.

Apps were classified according cost (second column): free, paid or free with in-app purchases. Thirteen apps are paid, and the prices are around two to six euros. Forty-six apps are completely free, and thirty-five are free with in-app purchases, with prices around one to fourteen euros.

A third parameter is the mobile software distribution platforms in which the app is available. The two biggest app stores are Google Play for Android, and App Store for iOS. For each platform there is also information such as last update, classification, evaluation and

number of downloads. About the platforms, seventeen are iOS exclusive, and the rest are available in both platforms – iOS and Android. The majority of the apps were updated recently, but the years of the last updates range from 2000 to 2019. In a total of ninety-four apps, eighty-four of them were updated in the last two years.

For each project we have identified the app’s features. All apps support “Audio Guide” and “On-screen information” features. Audio content is about the museums and its artworks, and extra information is available in text, image or video, complementary to the information available at the exhibition. There are features very common such as “Suggested itineraries” or suggested tours or artworks (present in forty-two projects). These app’s features suggest to the users thematic tours or tours adapted to the time constraints or visitor’s preferences. Thirty-two apps have the function called “Practical Info” (Figure 7), which includes schedules, prices of the tickets, temporary exhibitions information, events at the museum, and other information of this kind. Through some of the apps the visitor can even buy tickets.

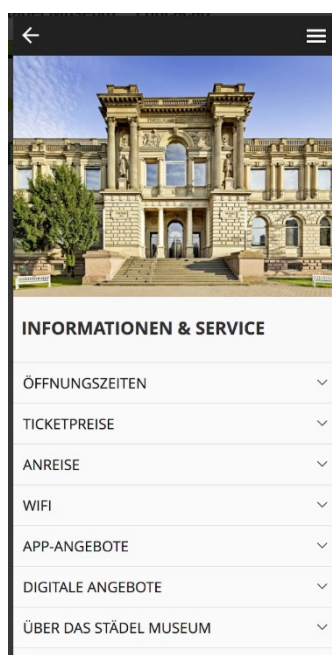


Figure 13 - Stadel App Practical Info © Stadel Museum

Thirty apps have the feature called “Map” (Figure 8). Inside this category are included orientation functions, such as maps, interactive maps, 3D modelled maps and navigation systems inside the museum.

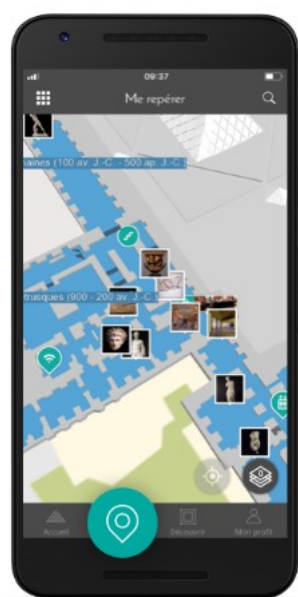


Figure 14 - Louvre App Map © Louvre Museum

The category “Photography” appears in twenty-eight apps. This category includes apps that have more than regular pictures of the museum or artworks such as High Definition images, detailed photography and pictures with high quality zoom.

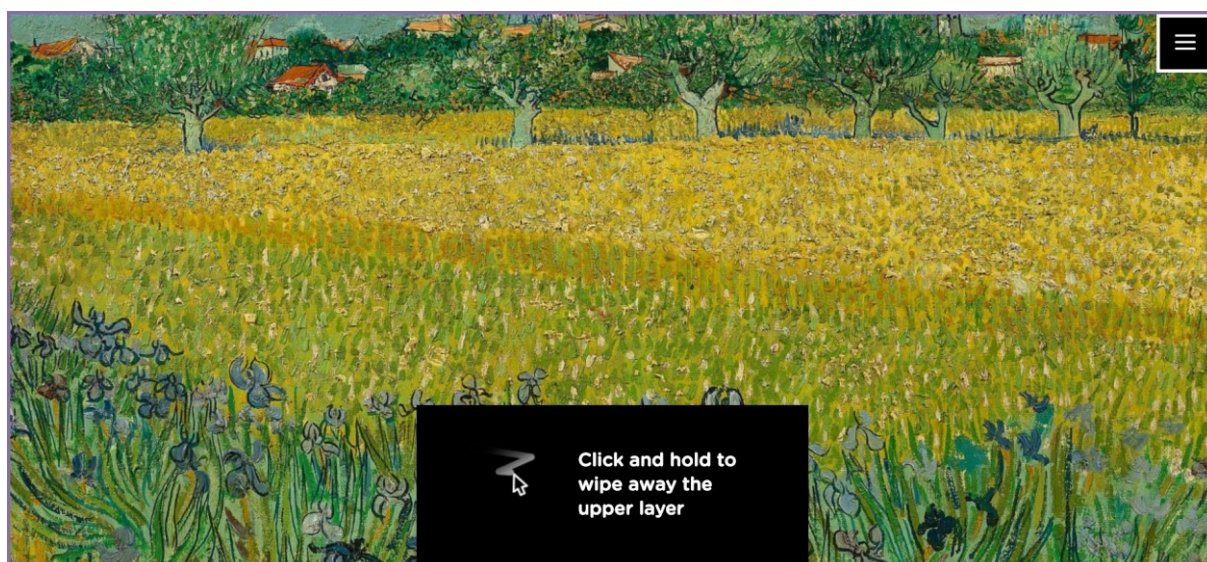


Figure 15 - Van Gogh Web App © Van Gogh Museum

Twenty-five apps have the feature nominated as “Create My Gallery”. User can select and save its favourite artworks and create a personalized gallery that remains available after the visit.

In nineteen apps have the functions “Share on social media” and “Image Recognition”. The first one is easy to understand, these apps allow the users to share pictures and images from the museum and the app post directly in their social media profiles. The “Image Recognition” function is a tool where the app can scan and recognize the artwork. The user only needs to point its smartphone to the artwork, allowing the app to use the camera.

The function “Download” is present in seventeen apps. Users can download content from the app to their devices.

In fourteen apps there is a search engine so the user can find specific artworks, collections or artist inside the museum (feature “Find Artworks”). It works like a regular search engine, where the visitor can search by keywords.

Thirteen apps have the function “Offline”, which means that the apps do not require internet connection to work. In twelve apps there is the “Create your itinerary” function. With this the visitor can plan, construct and save his own path inside the museum through the app. Nine of the apps have specific content for “Children”, like shorter tours with adapted information and discourse. Five of them have the option of “Sign Language” for people with disabilities.

In three apps there are the options: “Chat”, “Storytelling” and “Games”. Apps with a chatbot to speak with the visitors are included in this category. In “Storytelling” are the apps that give the information about the artworks through a story, instead of just presenting the facts. In the category “Games” are visit supporter apps with games as an extra activity, like quizzes.

APP FEATURES

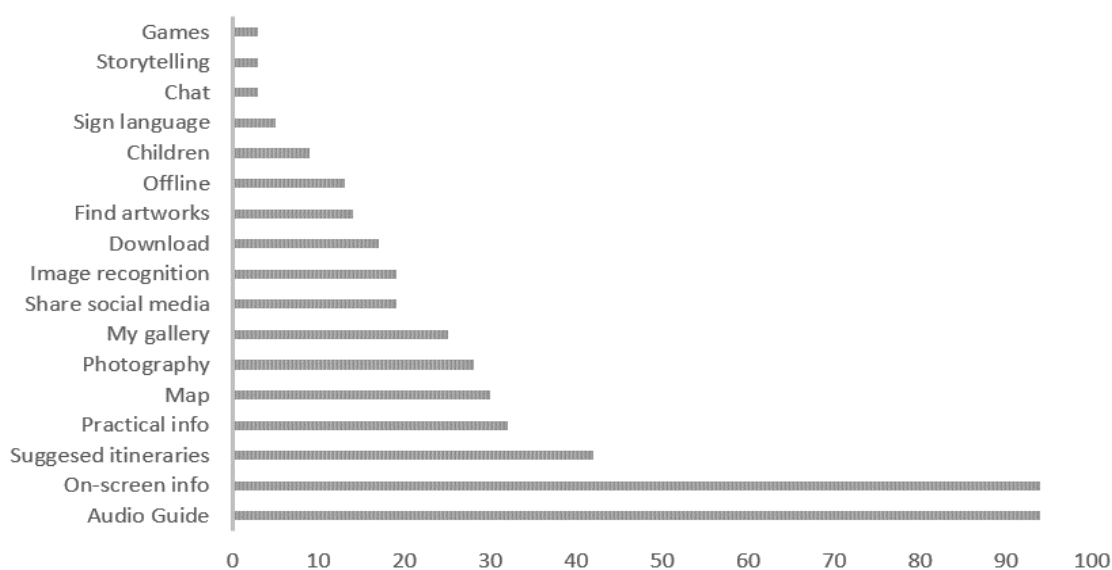


Figure 16 – Apps Features © Catarina Reis

On the map below (Figure 10) there are pinpointed the apps features working as visit supporters mediating the relation between the visitor and European Fine Art museums.

Summing up, there are ninety-four apps in sixty-five different European fine art museums, from medium to international museums. Forty-six are free and the paid ones are between around two to six euros. Thirty-six of the apps are official, and eighty-four were released or last updated in the last two years.

Its distribution is wide and varied, reaching sixty-five different museums, from sixteen countries. However, the bigger concentration is in central Europe, where the most developed and more economic powerful countries are. Other countries from east Europe or Portugal, Ireland, Norway or Finland do not present any project. Even though, the existing ones come from local to international museums.



Figure 17 – Apps Distribution Map © Catarina Reis

Its distribution is wide and varied, reaching sixty-five different museums, from sixteen countries (Figure 11). However, the bigger concentration is in Central Europe, where the most developed and more economic powerful countries are. Other countries from East Europe or Portugal, Ireland, Norway or Finland do not present any project. Even though, the existing ones come from local to international museums. From sixteen different countries:

- France – twenty apps from twelve museums
- Spain – sixteen apps from eight museums
- United Kingdom – fifteen apps from ten museums
- Germany – nine apps from eight museums
- Italy – six apps from six museums
- The Netherlands - six apps from four museums
- Austria - four apps from four museums
- Vatican – four apps from one museum
- Hungary – three apps from two museums
- Scotland – two apps from two museums
- Russia – three apps from two museum
- Latvia – two apps from two museums
- Slovakia, Denmark, Sweden, and Belgium – one app

2.3 Multimedia Guides

Museum	Developer	€	Device	Year	Languages	Features
Musée du Louvre, Paris	Musée du Louvre and Nintendo	15	Nintendo 3DS™ XL (available at the museum)		French, English, Spanish, Italian, German, Japanese, and Korean	<ul style="list-style-type: none"> Over 35 hours of audio content Lively and informal on-the-spot interviews Interactive map of the museum Over 700 descriptions of galleries and artworks Tracks position and guides in the museum 3D photos and reconstruction and high definition images
British Museum, London	British Museum, sponsored by Korea Air	£7	Touch Screen devices (available at the museum)		English, Korean, French, German, Italian, Spanish, Arabic, Russian, Japanese and Mandarin	<ul style="list-style-type: none"> Helps you make the most of your visit, adapting itineraries according to time and interests Keeps track of what is seen and creates a digital souvenir of the visit 280 expert commentaries Self-guided tours Interactive map
British Museum, London	British Museum, sponsored by Korea Air	€8	Touch Screen devices (available at the museum)		English, Korean, Spanish and Simplified Chinese	<ul style="list-style-type: none"> Family Guide Complete fun creative challenges Explore the collection through a series of special adventures Interactive game-based guide
Van Gogh Museum, Amsterdam	Van Gogh Museum and Fabrique	13-16	Touch Screen devices (available at the museum)	2015	English, Dutch, French, German, Italian, Portuguese, Spanish, Russian, Chinese (Mandarin), Japanese and Korean	<ul style="list-style-type: none"> Engaging multimedia experience Interactive audio guide Self-guided tours

Table 4 - Multimedia Guides Table © Catarina Reis

Table 4 presents the Multimedia Guides projects found in European Fine Art museums. In this list were only considered devices provided by the museums that have more functions than a traditional audio guide. These projects were created to mediate the relation between the museum and the public in more than the audio level. In many ways, they are very similar to the apps, the main difference is the devices. In just one project the device is the visitor smartphone, however, it is not an app.

We identified twelve projects, from eight different European Fine Art museums. For each project running in a Museum (first column), we identified developer. All the projects are official, produced by or with the museum participation.

Regarding the cost (third column), almost all multimedia guides (except one) have an additional cost, between three to six euros. Most of the devices (column 4), ten, are touch screen devices provided by the museum. In one case the device is a Nintendo 3DS XL. It was a collaboration developed between The Louvre Museum and Nintendo. The other one case, it's the visitor smartphone.

We have also gathered information about the year of the release or last update, and support Languages.

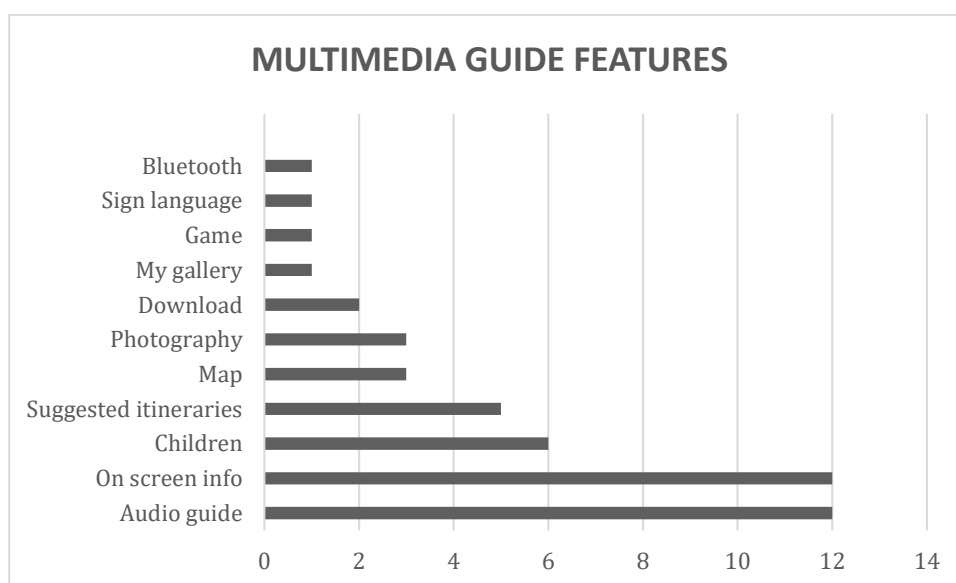


Figure 18 - Multimedia Guide Features © Catarina Reis

About the Features, they were divided like the Apps' features. All the Multimedia Guides have Audio Guide content and extra on-screen information such as images, text, video or animations. Seven of them have specific content for younger visitors and / or families. Three

of the Multimedia Guides have “Maps” of the museum, interactive maps and / or navigation system that tracks the position of the visitor inside the museum (Figure 13).

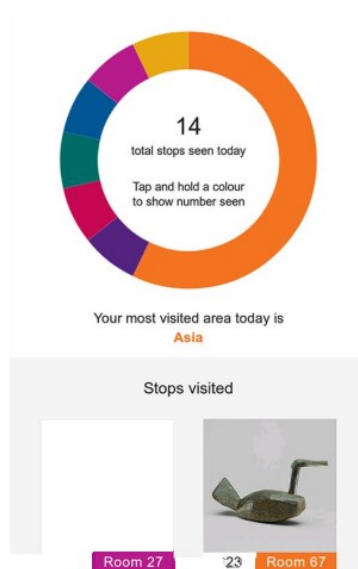


Figure 19 - British Museum Guide Tracks Visitor Path © British Museum

Three of them have the function of suggesting itineraries through the collections inside the museum, according to the time and interests of the user. Less frequently, some projects have other extra features like on-spot interviews, 3D and high definition images, the possibility of the visitor make its own itinerary and to create a personal gallery saving favourite artworks, and as some of the apps, games.

One of the Multimedia Guides works as an interactive game-based guide, with creative challenges through the collection (British Museum). Only one of these multimedia guides is adapted to people with disabilities, having sign language (Royal Museum of Fine Arts, Belgium).

The Palais de Tokyo (Paris) project works on the users' smartphones by using Bluetooth technology. When the device is in an active area it delivers messages to the smartphone. The visitor just needs to activate the Bluetooth and accept or refuse the messages that will pop-up in their device. In this project, the content, such as audio and on-screen information, can be downloaded.

Figure 14 shows the location of the multimedia guides projects. Comparing to the apps, the difference in terms of quantity and distribution is very accentuated. It is limited to eight

museums, from six countries. The countries are: France, United Kingdom, The Netherlands, Germany, Belgium and Spain. These countries are amongst the most developed and economic powerful European countries. These countries also have a very strong artistic and historical identity. Cultural Tourism is very strong in these countries, which can also justify the investment in these kinds of projects. The cultural tourism represents a significative number of museum entrances (Table 2).

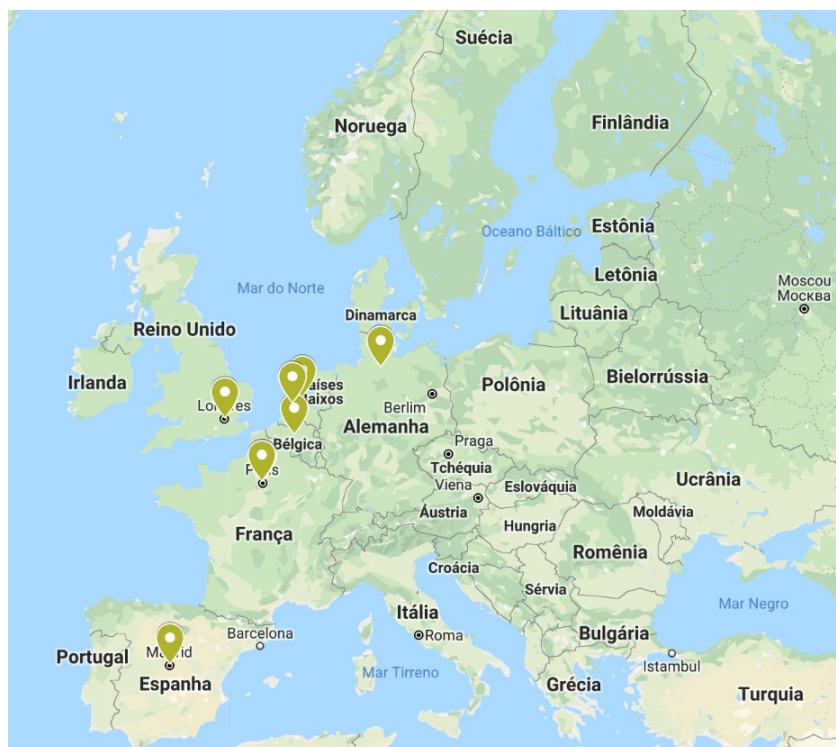


Figure 20 – Multimedia Guides Distribution Map © Catarina Reis

Summing up, there are twelve Multimedia Guides in eight different European fine art museums. From national to international museums, and from six different countries:

- France – two multimedia guides from two museums
- United Kingdom – two multimedia guides from one museum
- The Netherlands – three multimedia guides from two museums
- Germany – two multimedia guides from one museum
- Belgium – one multimedia guide
- Spain – two multimedia guides from one museum

2.4 Other Experiences

Museum	Experience	Developer	\$	Device	Languages	Year	Features
Philharmonie, Amsterdam	Multimedia Family Game		€2,500/device	Touch screen device (available at the museum)	Dutch, English, German and French		Group game, 2 to 4 persons, each using 1 device Solve 8 puzzles about the museum (about 1 hour) For families with children with more than 7 years
Soledad Museum, Madrid	Augmented Reality	EDL Lab	Free	Smartphone app	Spanish and English	Last update 2018	Unofficial app Augmented Reality app Paintings explained by the painter Take a selfie with the painter Share on social media
Stadel Museum, Frankfurt	Children Multimedia Game	Stadel Museum	Free	Smartphone app		Last update 2018	"Imagoras" Official app 4.9 / 5 - 68 evaluations 5,000 + downloads For kids from 6 to 12 years Explore the museum through a game Solve mysteries
Stadel Museum, Frankfurt	Virtual Reality	Stadel Museum	Free	Touchpad app	German and English	Released on 2016	Official app See how the museum was in the 19th century Reconstructions The collection in 1878 2 tours available

Table 5 - Other Experiences Table © Catarina Reis

Our last set of projects, “Other Experiences”, are outside the scope of Apps or Multimedia Guides.

It refers to projects that employ digital technology such as virtual reality, augmented reality, multimedia games and 3D reproductions, to support interactions with the visitor inside the museum.

Table 5 presents fifteen projects, from twelve different European Fine Art museums. For each project it identifies the museum (first column).

Projects use different type of digital technology (column 2): augmented reality (six), virtual reality (three), interactive games (three), 3D reproductions (one), and interactive exhibition (one) (Figure 15). Only one of these projects is not official (Sorolla Museum augmented reality app). Most of the projects work in devices delivered by the museums.

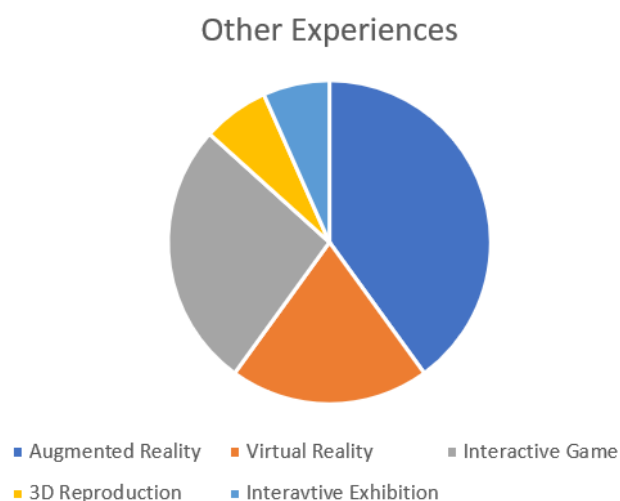


Figure 21 - Other Experiences Digital Technology © Catarina Reis

The third column is related to the costs. At least, eight are free, which means that beyond the entrance ticket (paid or not), the museum does not charge any extra for these devices or experiences. The two that are paid, the prices range from two to seven euros, approximately.

Six of the projects require the visitor to download an app to its smartphone. Five of the projects work in touch-screen devices given by the museum (fourth column). Two project work with headsets. The Musée d'Orsay Tactile Experience uses 3D reproductions and thus it does not need a device. The experience itself is the medium.

About the year of release or last update, at least one was a temporary project (from April/2019 until the end of June/2019), and nine were released or updated in the last two years, which shows how recent these initiatives are. The Musée d'Orsay Tactile Experience (3D reproductions of one painting) was also a temporary exhibition also. In this experience the

museum visitor can explore the painting beyond the visual, by touching, perceiving textures and layers in a completely different way (Figure 16). This project also had complementary information as text and audio, with the option of French sign language and subtitles.



Samples of canvas
© Musée d'Orsay / Sophie Crépy

Figure 22 - Musée d'Orsay Tactile Experience © Orsay Museum

The games are more focused on children or families, creating a way of engaging the younger visitors. Games are a way of stimulating interaction between kids and the artworks that with the traditional means would be difficult (Figure 17). Through mysteries that need to be solved the kids can see the museum in a different and more appropriate way. One of the games is a web app (Victoria and Albert Museum Game - Figure 17) and the other one has augmented reality content (Sorolla Museum Augmented Reality Experience – Figure 18).

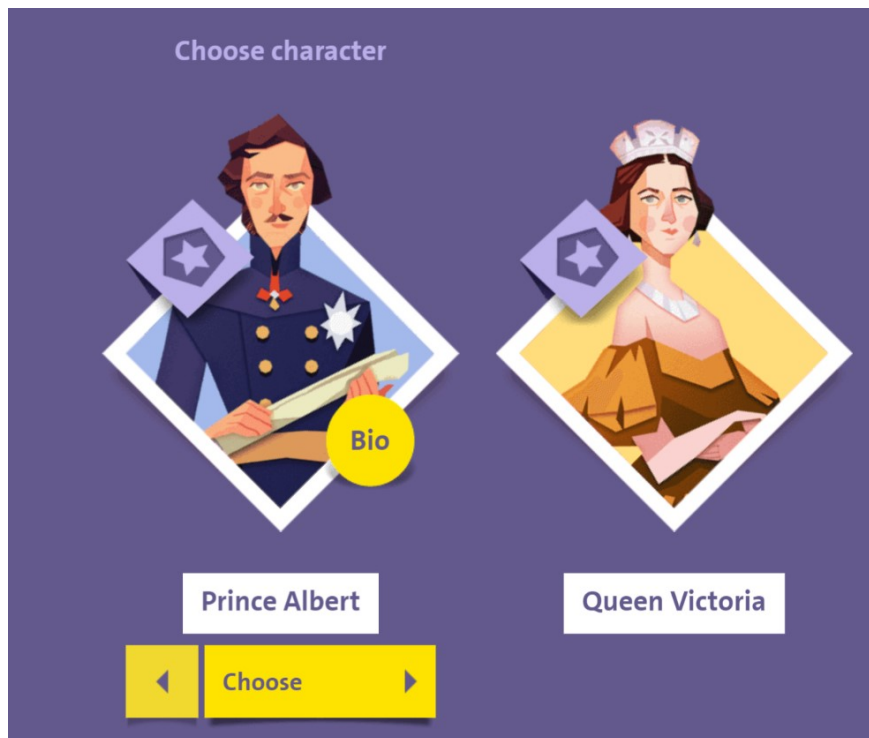


Figure 23 - Victoria and Albert Museum Game © Victoria and Albert Museum

The augmented reality projects offer experiences by pointing the device to an artwork (Figure 18). The artist is next to the painting explaining it, for example.

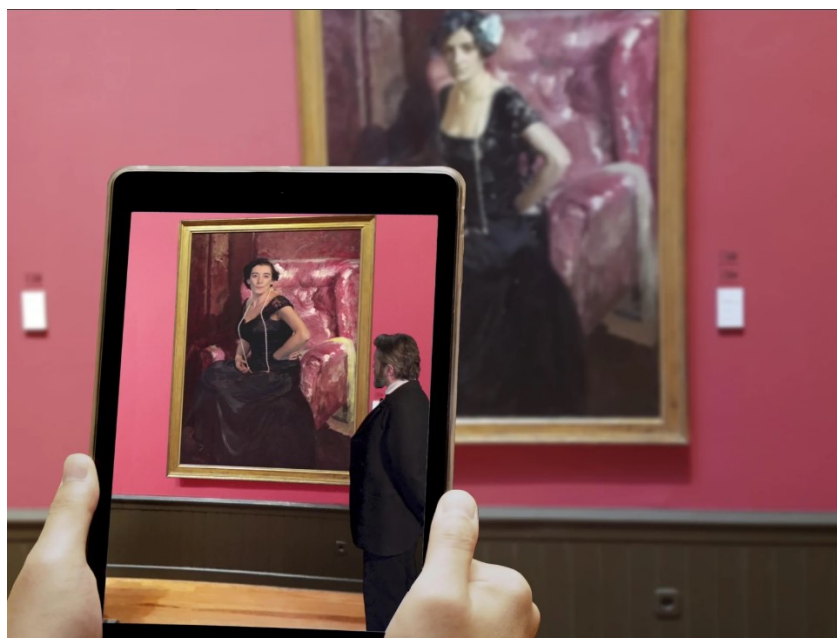


Figure 24 - Sorolla Museum Augmented Reality Experience © Sorolla Museum

In the virtual reality experiences the visitor can enter in immersive scenarios and see things that no longer exist or enter inside a painting (Figure 19).



Figure 25 - Old National Gallery Berlin VR Experience © Old National Gallery

In terms of cost, at least nine of them are free. Six of the projects need a touch screen device provided by the museum, six work as smartphone apps, and the others, work with special equipment, given by the museum, as headsets.

Nine of these projects were released or updated in the last two years.

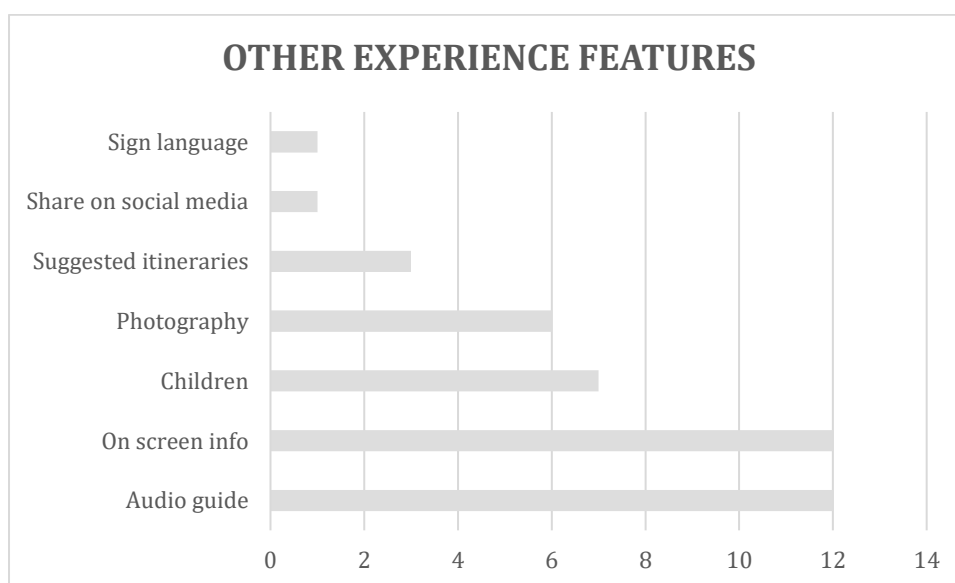


Figure 26 - Other Experiences Features © Catarina Reis

In terms of features, these projects present features such as audio content, on-screen information, adapted content for children, the possibility to share on social media, suggested itineraries, high quality photos, and sign language. Just like the apps and the multimedia guides, audio and on-screen info are present in almost all the projects, followed by Photography and adapted content for children.

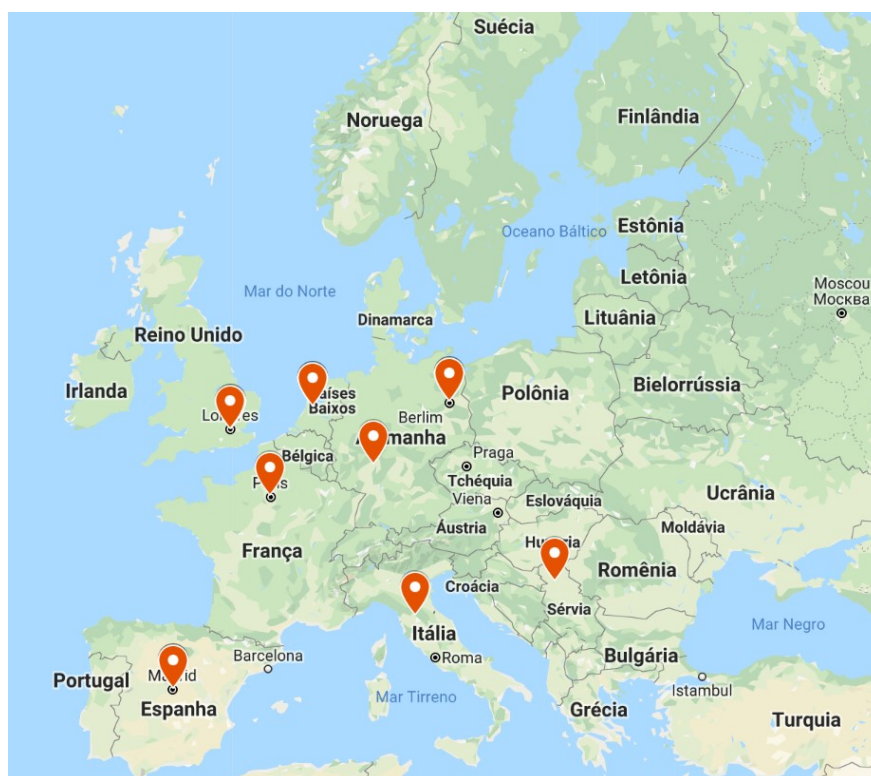


Figure 27 – Other Experiences Distribution Map © Catarina Reis

Figure 21 pinpoints the other experiences used to mediate the relation between the visitor and European Fine Art museums.

The number of projects is much smaller compared to the apps, however its distribution is more spread than the multimedia guides. These projects happen(ed) in twelve museums from seven countries. With exception from Serbia, which is a smaller, less developed and less touristic, the rest of the countries are: The Netherlands, Spain, Germany, France, Italy, United Kingdom and Serbia. Once again are relevant countries at European level, with a strong artistic and historical presence, a dynamic ICT (Information and Communications Technology) sector, welcoming millions of cultural tourists. These factors can help understand better these investments.

- The Netherlands – two projects (Multimedia Family Game / Interactive exhibition) from two museums
- Spain – two projects (Augmented reality experiences) from two museums
- Germany – four projects (Children Multimedia Game / two Virtual Reality experience / Augmented Reality experience) from three museums
- France – two projects (Augmented Reality experience / 3D reproductions) from one museum

- Italy – one project (Augmented reality experience) from one museum
- United Kingdom – three projects (Children Multimedia Game / Virtual Reality experience / Multimedia Game) from two museums
- Serbia – one project (Augmented Reality experience) from one museum

2.5 Museums with Projects

In terms of museums, there a total of seventy-three European Fine Art museums containing digital mediation projects.

Almost all the museums listed below have at least an app. There are only seven museum that do not have an app, official or not. However, all the seven have other option to offer to their visitors; multimedia guides or other digital mediation tool. There are some museums that stand out: The museum with the biggest concentration of projects is The Louvre Museum, with a total of eight projects. However, seven of them are apps and only one is official. The other project is a Multimedia Guide, created in partnership with Nintendo. In second place, there is the British Museum, with seven projects. Three apps, two multimedia guides, and, two other experiences. None of the apps is official. The multimedia guides were created with the support of Korean Air. The device is the same, but the features and the target public are different. One is specially made to families with children. In terms of the other experiences, the British Museum, has an interactive game for children working on a touch screen device provided by the museum, and had a virtual reality experience. This experience was temporary (2015) and it was made with the collaboration of Samsung. The Musée d'Orsay has five projects, three apps and two other experiences. All the apps are unofficial, and the other experiences were temporary exhibitions. The augmented reality experience and the 3D reproductions belonged to the same exhibition - The artist's Studio, A Real Allegory Summing up Seven Years of my Artistic and Moral Life. This museum does not have multimedia guides. The Stadel Museum has four projects, two apps and two other experiences. One of the apps is official, however, it is very limited in terms of features. In terms of other experiences, this museum has an interactive game for children, working as an app that need to be downloaded in the user smartphone, and, a virtual experience. The virtual experience works in a device provided by the museum and allows the visitor to see the museum in 1878 and some reconstructions. Other museums like

The Van Gogh Museum, The Mauritshuis, and, The Thyssen-Bornemisza Museum, present three projects, ranging between apps, multimedia guides and other experiences.

Museums	Apps	Multimedia Guides	Other experiences	Total
Alte Nationalgalerie	1	0	1	2
Alte Pinakothek	1	0	0	1
Applied Arts, Budapest	2	0	0	2
Barberini	1	0	0	1
Beaux-arts, Calais	1	0	0	1
Beaux-arts, Lyon	1	0	0	1
Beaux-arts, Nancy	1	0	0	1
Beaux-arts, Rouen	1	0	0	1
Borghese	1	0	0	1
Bowes	1	0	0	1
Brera Academy	1	0	0	1
British Museum	3	2	2	7
Carmen Thyssen	2	0	0	2
Correr	1	0	0	1
Dom Wien	1	0	0	1
Ferdinandum	1	0	0	1
Fine Arts, Brussels	1	1	0	2
Folkwang	1	0	0	1
Franz Marc	1	0	0	1
Gallerie dell'accademia	0	0	1	1
Gallery of Matia	0	0	1	1
Gemaldegalerie	1	0	0	1
Guildhal	1	0	0	1
Hamburger Kunsthale	0	2	0	2
Himself Museum	1	0	0	1
Hungarian National Gallery	1	0	0	1
Jacquemart Andre	1	0	0	1
Kelvingrove	1	0	0	1
Kunsthistorisches	1	0	0	1
Latvian Museum of Art	1	0	0	1
Lazaro Galdiano	2	0	0	2
Leopold	1	0	0	1
Louvre	7	1	0	8
Maillol	1	0	0	1
Marc Chagall	1	0	0	1

Museums	Apps	Multimedia Guides	Other experiences	Total
Matisse Museum	1	0	0	1
Mauritshuis	2	1	0	3
Morsbroich	1	0	0	1
Museo de L'Emporda	1	0	0	1
Museu Nacional, Catalunya	2	0	0	2
National Gallery	3	0	0	3
National Museum, Scotland	1	0	0	1
National Museum, Sweden	1	0	0	1
Orangerie	1	0	0	1
Orsay	3	0	2	5
Palais de Tokyo	0	1	0	1
Picasso Museum	1	0	0	1
Portrait Gallery	2	0	0	2
Prado	5	0	0	5
Pushkin	1	0	0	1
Real Academia San Fernando	2	0	0	2
Reina Sofia	1	0	0	1
Rijksmuseum	2	0	1	3
Rijksmuseum Twenthe	1	0	0	1
Rodin Museum	1	0	0	1
Rodolfo Siviero	1	0	0	1
Royal Academy of Arts	1	0	0	1
San Donato	1	0	0	1
Slovak Gallery	1	0	0	1
Sorolla	0	0	1	1
Staatliche	0	0	1	1
Stadel	2	0	2	4
Stadsarchief	0	0	1	1
State Hermitage	2	0	0	2
Statens for Kunst	1	0	0	1

Museums	Apps	Multimedia Guides	Other experiences	Total
Tate Britain	1	0	0	1
Thyssen-Bornemisza	0	2	1	3
Uffizi Gallery	1	0	0	1
Van Gogh Museum	1	2	0	3
Vatican Museum	4	0	0	4
Victoria and Albert Museum	1	0	1	2
Victoria Gallery	1	0	0	1
Wallace Collection	1	0	0	1
Total	94	12	15	121

Table 6 – Museums and its Projects © Catarina Reis

When fine art museums visitors search for engaging experiences containing learning content, it is understandable that the audio and on-screen extra information are part of almost every digital mediation tool that museums provide. The visitor can access the information whenever he wants, without having the need to wait to read the museum boards. Avoiding long texts that are not easy to read on the museum boards, crowded areas, or little information about a subject that the visitor may want to know more. The same happens with features such as interactive maps. The visitor can easily walk through the museum. He already knows what to expect from the museum in terms of its exhibitions, its building and distribution. This way the visitor is able to define what he wants to see, and in what order, avoiding content that he does not have interest in it. Other features that exist for the user to find specific artworks or artists, and the option to define its own path along the museum, are also amongst the most common ones, due to the same logic.

Analysing the projects that were mapped, it is safe to say that the apps are the most common solution. This option is valid from smaller museums up to big ones because it is the easiest and simplified way to have an efficient digital guide without major costs. The cost factor is related to the device and accessibility to the technology. With an app the museum avoids acquiring devices and support its maintenance.

The accessibility factor is related to the development, spread, success and acceptance of the technology. Along with the development of technology, the prices decrease, and its

accessibility is easier. Also, the possibility of the use outside the museum, extending the connection of the visitor with the museum, is a big advantage of this solution.

When the device is the user smartphone, it is expected that the visitor will feel more comfortable using it. This way, the visitor can also avoid an extra line inside the museum, risking finding sold out equipment. At this moment, apps are a mainstream technology. The apps prices are relatively low for the visitor, including several free options. The use of smart devices had a great diffusion as the first choice for every direct interaction between visitors and artistic, cultural or historical heritage. A mobile app can be considered as an excellent opportunity to bring artistic contents into the life of a wider range of users (Laudazi and Boccacini, n.d.).

The informal learning process inside the museum through mobile digital technologies can provide links between the museum experience and post-visit to support continuous learning and reflection (Jewitt, 2014). However, the ‘banalization’ of this digital technology brings disadvantages. There are many apps for making your own tours, maps, QR codes, games, but none of them are great (Simon, 2016). Too much offer can also be problematic. The visitor can be overwhelmed, and the selection becomes more difficult. For this reason, there are many unused apps, result of a culture that is not investing in serious visitor research before developing interpretative devices (Jewitt, 2014).

Fifty-eight apps are not official, and many times exposing not very trustable content. Regarding the visitor utilisation of the app, despite the advantages said before, there are some barriers on this topic. When is it said to the visitor that there is an available app to work as a visit support? When buying the tickets, at the entrance of the museum? The communication of this matter is still weak. Most of the times the museum (website) does not make clear that they can provide this tool. There are other questions that need to be taken into account: If the user will use his smartphone the Wi-Fi connection of the museum needs to be good enough, the smartphone needs to have enough space and battery to follow the visit, the operational system needs to be compatible, and, the use of headphones is recommended. All of these factors can define the success of the project. Even though, for medium-small museums looking for digital solutions, this is the best option.

Concerning the multimedia guides, they support the visit through very similar features to the apps. This solution can avoid some of the apps’ problems, but it also brings some constraints. In most of the cases, eleven, this option is paid. Besides the price of the ticket (which can be paid or not), the visitor needs to pay an extra to access the guide devices. Beyond the extra expense, the visitor may need to go another desk / line. Beyond that, there is the

possibility that devices are not available at that moment. Most of the times, the devices used are touchscreen devices. Even though these devices are very common these days, it can be easy to use for ones and a challenge for others. Trying to find the best solution possible will continue to be a challenge. Since the devices belong to the museum, they need to be picked up at the beginning of the visit and delivered back at the exit. This automatically defines and restricts the experience. In opposite of the apps, there is not a continuation of the experience outside the museum. However, this solution brings its advantages. Since the devices belong to the museum the content is always trustable. The device capabilities are in line with the expected functions. Even so, this solution continues to only be available for medium to big museums. The extra cost that is necessary for the museums to acquire the devices, to maintain and repair the devices are the main reason for this. In most of the cases, the museums have digital multimedia guides in partnership with a company. For example. The Louvre and Nintendo, and once again this is easier to achieve for big/international museums with more projection. Notoriety is a key-factor when it comes to get sponsors.

Projects involving virtual or augmented reality represent a completely new level of experience inside fine art museums. Creating more immersive and intense experiences that stimulate the senses in more than one level. Well-planned and executed projects can bring enormous advantages in terms of informal learning and understanding of art works, never reached before. The technology itself, but specially, applied in fine art museums is still low developed. Projects of this kind require very specific equipment, specially, virtual reality. It requires adapted software, proper devices to work with it, that can range from a smartphone to a headset. Including specialized personnel and following monitoring. Since these technologies are still far from reaching the mainstream point, the prices are high. Due to that, these technologies are almost exclusive to big museums, and most of the times, as temporary events. The same happens with 3D reproductions, that are a little more common but still reserved for medium to big museums. Mainly because of the costs involved with the 3D printers, that are expensive items. Projects involving immersive environments or gaming technologies need to take into account that museums are places where the visitors look both for evasion and cognitive development with active participation. Creating interaction between them and loyalty before the visit (Mu.Sa, 2016). However, it is necessary to be very careful introducing these projects. Wasting resources in “trendy” digital technologies that are not in line with the museum overall strategy will become a barrier for the museum work. “Moreover, using too many digital products can have a misleading effect, compromising the users’ understanding of the museum’s mission.” (Mu.Sa, 2016).

Conclusions

It is safe to say that the museum environment was never stable, and it is always changing and adapting due to the straight connection with the ever-changing world around it. Societies are always reshaping themselves through evolution and new discoveries. The concept of museum itself has been changing through the years, along with other concepts of the field. Every aspect, from the physical shape of the museum and the construction of an exhibition, until the museum objectives, have been updating changing along with the ones who visit them.

Presently, museums are going through a new shift. This process has been happening for some years now. Museums are trying to learn how to adjust their practices in order to effectively achieve offer their visitors, to give them the best possible experience possible. With a wider range of museum visitors, the objective is to engage each one of them. Museums are evaluating the need to adapt the concept of the museum visit, into a personalized informal learning unique and rich experience. We live in a globalized world, and museum professionals started to realize that everyone sees, learns and enjoys the museum in different ways. The goal is to find tools capable to welcome such different views.

Looking to the statistical data, it is possible to realize that the number of Art museums in Europe and its visitors continues to grow. This happens because new generations are more educated, with an easy access to information and culture. Overall, the general scenario looks positive. However, for museums to continue to have in-situ visitors aiming for a pedagogic experience, they need to keep up in line with the younger public and future generations. Despite this, it is important to keep the balance between innovation and the present younger and older generations. Due to the enormous influence of digital technology, this museum turn into the public is mainly happening through these tools. Digital mediation projects demand some requirements such as investment and skilled staff, which can be problematic issues for some museums. However, it is important to note that the objective is not to replace the existent knowledge of the staff, but to develop new digital skills. This staff training and other preparing actions are essential because the digital technology by itself is not a solution, it requires a lot more in order to be effective.

Presently, many European Fine Art museums have an educational department, a communication strategy and even, a digital team and strategy for digital field. The most recent mediation actions are related to the use of digital technology due to the digital boom. With the use of digital technology inside the museum, these institutions are looking forward to provide to their public more efficient, interesting, dynamic, active and autonomous experiences, in order

to engage, grow and diversify their audience. New generations have already been born in a digital world and for them the presence of digital technology in almost every scenario of life is normal, and even expected. This digital revolution changed the world in many ways, including the way people communicate, work, think, see, interact and many more. Younger generations are used to fast and easy information, making them a more demanding audience. A static touchscreen with dry information about certain paintings and collections, perhaps accompanied by a couple of images, is hardly inspiring for individuals who belong to the millennial and Z generations, for whom technology has become the very centre of their daily lives (Hillier, 2018). Currently, the use of digital technologies is part of the daily life of many museums in diverse areas as internal organization, ticket sales or marketing.

Before any digital project, museums need to think carefully about this new kind of relationship. It can bring new opportunities and great advantages for both the museum and the public, but it can also represent problems and difficulties that can compromise the work of the museum and the experience of the visitor. For this reason, the debate is still divided between the professionals of the area. The ones more apprehensive about the implementation of digital technology inside the museum claim that museums are risking their seriousness, risking becoming an entertainment show, risking their status of official knowledge holders. Other subjects like copyrights or ethical data collection, are also being discussed. Due to the recent status of this field, the legislation is still scarce and less developed. Some consider it a threat, while others see new opportunities (NEMO, 2013). Despite these fears, it is undeniable that along with technological advance, also do the behaviour of audiences, especially younger generations, is changing drastically (Zhang, 2012). This new public expect instant access to digital content, to interact and give feedback. Audiences want to create, adapt, and manipulate, as part of the appreciating of art and culture (DDCMS, 2019). Up until now, digital mediation inside traditional museums such as fine art museums has been kept to a minimum (Jewitt, 2014). Although digital tools are becoming an undeniable ally, but they should never prevent the perception of the artwork and the uniqueness that only its materiality can generate (Mu.Sa, 2016).

To make these projects work successfully, it is necessary to create a strategic planning, so the transition from the traditional methods to the digital ones can be a smoothly upgrade for everyone.

The projects studied in this work aim, its objective is to value the in-situ experience, decreasing the gap between the museum and the visitor. To do this properly, the museum administration board needs to understand in depth the possibilities digital technology has to

offer. The museum must have in consideration some important question beyond staff capabilities and investment. Topics such as infrastructure capabilities and maintenance management are very important to guarantee that it is a viable and sustain project.

The museum must start by analysing itself and its audience. It cannot be the public adapting to the technology, but the opposite. The technology must be suitable for the museum and audience characteristics. Besides these, the museum needs to be prepared to deal with the limitations of the technology. These tools are a supplementary support, never the centre of the visitor attention.

Digital technology as mediation in European fine art museums is happening, growing and finding its ways, and it will be part of the museums' future. Technology is not yet at the centre of the museum activities on site (Jewitt, 2014), and many museums are finding it hard to reach the younger, digitally oriented generations. (Hillier, 2018). Technology needs to be seen as driver of change, a shift to the future and to the new audiences. Based on the European support and funding initiatives, the implementation of digital technologies will continue to grow, and this will bring further changes to institutions. However, it demands taking risks, investing time and effort to experiment, being entrepreneurial and allowing the visitor to participate and co-create. (Digital meets Heritage, 2012). In order to do this, new policies, strategies, and museums' missions are being developed.

At the moment, the cultural developing model is very straightening connected to the digital technologies. These institutions already have a very strong presence on the virtual world reaching their publics in a faster and effective way. Museums want to provide more embracing and democratic experiences through digital tools. Regarding the *in-situ* mediation, the bigger innovations are connected to the digital and experience personalization. For the future, it is expected a cultural model that will turn culture, people and digital inseparable. Even though these innovative projects can bring several new possibilities to the museums and its visitors, it is necessary to do a critical reflexion about it. The advantages can be numerous, but it is important to also see beyond that.

First of all, it is necessary to think if this option makes sense for the museum. For example, contemporary art museums are more prepared to have a very direct connection to digital technologies. In terms of its artworks, but also the building itself. These museums are more recent institutions with infrastructures ready to deal with these new elements. On the other hand, other museums like fine art museums can be not so ready. This might be problematic because the digital technology adaptation can never be so extended that compromise the

museum or the artworks. In cases where this is not possible, is it still worth it to follow this path? It is necessary to think very prudently and do not blindly follow trends.

The digital mediation projects -presented and discussed on this dissertation, work as visit supporters but also as museum visit incentives. The objective is to fight the disinterest and the possible lack of visitors in the future, reaching more people and specially the younger generations. However, to what extent this is the best for the museums?

Nowadays the virtual tours are more and more perfect. This alternative is more comfortable and is reachable by everyone in any part of the world with internet connection. For museums, the costs reduction would be enormous by removing the daily functioning logistics. From staff reduction to less expenses on items such as water and energy. Even for the artworks this option could be advantageous, due to the conservative secondary effects of the constant exposure. Without physical visits the artworks could always be in very controlled environments. Public museums have a public mission concerning the artworks and the society that can be problematic. These museums have to deal with their obligation of conserve the objects in the best way they possibly can versus their obligation of educate all.

Nevertheless, there is nothing like the real contact with those objects. More than this, museums are not only places where it is possible to contemplate valuable goods. Museums are centres of learning, of sharing knowledges and ideas, museums are meeting points. And that cannot be replaced by a virtual visit.

On the other side, until where is it advantageous to attract more and more people to the museum? Visiting an overcrowded museum is never a good experience, no matter how good the mediation is. Being at a museum where everyone is pointing a device to the artworks may not be the ideal scenario. Because of that, one very important thing that should be discussed is the real motivations behind these initiatives. The ideal is that the motivations are honest and transparent, in the name of art and culture, and those wanting to enjoy it. However, it could exist different motivations. Nowadays, tourism is one of the biggest economic engines of the world, including the cultural tourism. This kind of tourism includes the museums directly. So, the more attractive and efficient these places are the better will be its contribution for the tourism economy. These motivations very connected to economic interests and targeting the masses are probably not the most ethic way for museums to follow.

Other questions like the personalization of the visit, giving the visitor the power to construct its own path inside the museum, can be very discussable. This option goes in direct conflict with the curator work of constructing a logic and meaning through the exhibition. So, until where is it valuable to “ignore” the artistic process of the curator? Beyond this, it is

important to reflect on how a person that knows nothing or very little about that museum and its artworks has the capacity to define what he wants to see and in what order? More than this, even for the visitors that already have knowledge about that subject, the probability that they will see and interpret the exhibitions according to what they already know is very high. The museums have interest in start new discussions amongst their visitors providing new perspectives.

It is also necessary to think if this model so closely connected to the digital is reversible. As observed in this work, museums and societies are never stagnant and it is not guaranteed that in a few decades these options are still valid. Once again, the technology must be a support element and not a basilar structure that could compromise the future of these institutions.

Concluding, the digital factor is undeniably important for the museum work. Even for some museum that want to remain more traditional, it may not be the best option on this present time. However, there is still a long way to go. There are many important and interesting questions being discussed right now that will alter the future of the museums. For now, I hope the debate continues to happen in order to find the best options for the future.

References

- AAM. (n.d.). *Museum Facts & Data*. <https://www.aam-us.org/programs/about-museums/museum-facts-data/>
- AAM. (n.d.). *Museums and New Intelligences*. <http://ww2.aam-us.org/events/museums-and-new-intelligences/>
- Alexander, E., & Alexander, M. (2008). *Museums in Motion: An Introduction to the History and Functions of Museums*. Plymouth, United Kingdom: AltaMira Press.
- Alexander, E., Alexander, M., & Decker, J. (2017). *Museums in Motion: An Introduction to the History and Functions of Museums*. London, United Kingdom: Rowman&Littlefield.
- ARUP. (2014). *Museums in the Digital Age*. London: ARUP.
http://file:///C:/Users/pavao/Downloads/FRI_Museums_in_the_Digital_Age.pdf
- Bock, M., & Pachler, N. (2013). *Multimodality and Social Semiosis*. New York, United States of America: Routledge.
- Bodo, S., Gibbs, K., & Sani, M. (2009). *Museums as places for intercultural dialogue: selected practices from Europe*. https://www.nemo.org/fileadmin/Dateien/public/service/Handbook_MAPforID_EN.pdf
- Cameron, F. (2010). *Digital Futures I: Museum Collections, Digital Technologies, and the Cultural Construction of Knowledge*.
<https://onlinelibrary.wiley.com/doi/abs/10.1111/j.2151-6952.2003.tb00098.x>
- Chappuis, B., Gaffey, B., & Parvizi, P. (2011). *Are your customers becoming digital junkies?*.
<http://www.loooker.com/wp-content/uploads/2013/05/Are-your-customers-becoming-digital-junkies.pdf>
- Cuno, J. (2016). *Exploring the Digital Future of Museums*. <https://museumhack.com/james-cuno/>
- DDCMS. (2019). *Culture Is Digital*. <https://www.gov.uk/government/publications/culture-is-digital/culture-is-digital#audiences---using-digital-technology-to-engage-audiences-1>

- DGPC. (2004). *Lei Quadro dos Museus Portugueses*.
http://www.patrimoniocultural.gov.pt/static/data/museus_e_monumentos/credenciacao_d_e_museus/lei_dos_museus.pdf
- Digital meets Heritage. (2012). *DIGITAL MEETS HERITAGE*.
<https://www.digitalmeetsculture.net/article/digital-meets-heritage/>
- Dortner, k. (2017). *Studying museum communication for citizen engagement*.
http://voresmuseum.dk/wp-content/uploads/2018/01/Drotner_NordiskMuseologi.pdf
- EGMUS. (n.d.). *About EGMUS*. https://www.egmus.eu/en/about_egmus/
- Empak, J. (2018). *What is Augmented Reality?* <https://www.livescience.com/34843-augmented-reality.html>
- European Union. (2017). *Promoting access to culture via digital means: policies and strategies for audience development*. http://kultur.creative-europe-desk.de/fileadmin/2_Publikationen/Final_Draft_digitalisation.pdf
- European Union. (2012). *European audiences : 2020 and beyond*.
<https://publications.europa.eu/en/publication-detail/-/publication/9f59889c-c071-4e52-875a-21a007fdbf09>
- European Union. (2017). *Promoting access to culture via digital means : policies and strategies for audience development : work plan for culture 2015-2018*.
<https://publications.europa.eu/en/publication-detail/-/publication/7839cb98-651d-11e7-b2f2-01aa75ed71a1>
- Falk, J. (2016). *Identity and the Museum Visitor Experience*.
<https://www.taylorfrancis.com/books/9781315427058>
- Falk, J., & Dierking, L. (2016). *The Museum Experience Revisited*. California, United States of America: Left Coast Press, Inc.
- Greenwood, J. (1997). *The Third Industrial Revolution: Technology, Productivity, and Income Inequality*. Washington, D. C., United States of America: The AEI Press.
- Hein, G. (1998). *Learning in the Museum*.
<https://www.taylorfrancis.com/books/9780203028322>

- Hillier, L. (2018). *How museums are using immersive digital experiences*.
<https://econsultancy.com/how-museums-are-using-immersive-digital-experiences/>
- Hooper-Greenhill, E. (1992). *Museums and the Shaping of Knowledge*.
<https://www.questia.com/library/103442277/museums-and-the-shaping-of-knowledge>
- ICOFOM. (2010). *Key Concepts of Museology*.
<https://icom.museum/en/resources/publications/?q=key+concepts&y=&type=>
- ICOM. (2007). *Museum Definition - ICOM*. <https://icom.museum/en/activities/standards-guidelines/museum-definition/>
- ICOM. *Missions and objectives - ICOM*. (n.d.). <https://icom.museum/en/about-us/missions-and-objectives/>
- Jewitt, C. (2014). *Digital technologies in museums: New routes to engagement and participation*. London: University College London.
http://file:///C:/Users/pavao/Downloads/DFL_1-2_2012_korr_2_ssr.pdf
- Kapp, K. (2014). *GAMIFICATION: Separating Fact From Fiction*. [http://ww.w.cedma-europe.org/newsletter%20articles/Clomedia/Gamification%20-%20Separating%20Fact%20from%20Fiction%20\(Mar%2014\).pdf](http://ww.w.cedma-europe.org/newsletter%20articles/Clomedia/Gamification%20-%20Separating%20Fact%20from%20Fiction%20(Mar%2014).pdf)
- Knell, M. (2010). Nanotechnology and the Sixth Technological Revolution.
https://link.springer.com/chapter/10.1007/978-90-481-9615-9_8
- Latham, K., Simmons, J. (2014). *Foundations of Museum Studies – Evolving Systems of Knowledge*. California, United States of America: Libraries Unlimited.
- Laudazi, A., & Boccaccini, R. *Augmented Museums Through Mobile Apps*. <http://ceur-ws.org/Vol-1336/paper3.pdf>
- Levy, D. (2005). *Europe's Digital Revolution: Broadcasting Regulation, the EU and the Nation State*. London, United Kingdom: Routledge.
- Mager, D. (2017). *Review: Creating the Visitor-Centered Museum by Peter Samis and Mimi Michaelson*. Retrieved from: <http://articles.themuseumscholar.org/vol1no1mager>

- Marques, D. *THE VISITOR EXPERIENCE USING AUGMENTED REALITY ON MOBILE DEVICES IN MUSEUM EXHIBITIONS*.
<https://www.dianamarques.com/Downloads/DMarques-PhDThesis.pdf>
- Martinez, J. (n.d.). *Missions & Projects | Louvre Museum | Paris*.
<https://www.louvre.fr/en/missions-projects>
- McClellan, A. (2003). *Art and Its Publics: Museum Studies at the Millennium*. Malden, United States of America: Blackwell Publishing Ltd.
- Mendoza, N. (2017). *The Mendoza Review: an independent review of museums in England*.
<https://www.gov.uk/government/publications/the-mendoza-review-an-independent-review-of-museums-in-england>
- Mu.Sa. (2016). *Museum of the Future - Insights and reflections from 10 international museums*. <http://www.project-musa.eu/wp-content/uploads/2017/03/MuSA-Museum-of-the-future.pdf>
- Mulberg, C. (2015). *Visitor experience is key to museum and heritage resilience*.
<https://advisor.museumsandheritage.com/features/insight-visitor-experience-is-key-to-museum-and-heritage-resilience/>
- Murphy, A. (2015). *Technology in Museums: making the latest advances work for our cultural institutions*. <https://advisor.museumsandheritage.com/features/technology-in-museums-making-the-latest-advances-work-for-our-cultural-institutions/>
- NEMO. (2013). *Museums in the Digital Age - Museums and the Development of Active Citizenship*. https://www.nemo.org/fileadmin/Dateien/public/statements_and_news/NEMO_21st_Annual_Conference_Documentation.pdf
- NESTA. (2017). *Digital Culture 2017*.
https://media.nesta.org.uk/documents/digital_culture_2017.pdf
- Nicholas et al. (2003). *Digital information consumers, players and purchasers: information seeking behaviour in the new digital interactive environment*.
[https://www.emerald.com/insight/content/doi/10.1108/00012530310462689\)/full/html](https://www.emerald.com/insight/content/doi/10.1108/00012530310462689)/full/html)

- PEDAALI. (2016). *New Approaches NOW – From Museum Education to Audience Engagement*.
https://pedaali.fi/sites/default/files/julkaisut/New%20Approaches%20NOW%20Pedaali%202016_verkkoon.pdf
- Perera, K. *The Role of Museums in Cultural and Heritage Tourism for Sustainable Economy in Developing Countries*. https://www.nemo.org/fileadmin/Dateien/public/statements_and_news/Reading_Corner/Cultural_and_Heritage_Tourism.pdf
- Presidência da República. (2009). *L11904*. http://www.planalto.gov.br/ccivil_03/_Ato2007-2010/2009/Lei/L11904.htm
- RA team. (2016). *What virtual reality means for art*.
<https://www.royalacademy.org.uk/article/what-virtual-reality-means-for-art>
- RICHEs. (2016). *Access, Participation, Learning: Digital strategies for audience engagement with cultural heritage in museums and libraries*. https://resources.riches-project.eu/wp-content/uploads/2016/06/RICHES-D6.1-Access-Participation-Learning-Digital-strategies-for-audience-engagement-with-cultural-heritage-in-museums-and-libraries_public.pdf
- Rijksmuseum. (n.d.). *Vision and mission of the Rijksmuseum - Organisation - Rijksmuseum*.
<https://www.rijksmuseum.nl/en/organisation/vision-and-mission>
- Rodney, S. (2016). *The Evolution of the Museum Visit, from Privilege to Personalized Experience*. <https://hyperallergic.com/267096/the-evolution-of-the-museum-visit-from-privilege-to-personalized-experience/>
- Roussou, M., Pujol, L., Katifori, A., Chrysanthi, A., Perry, S., & Vayanou, M. (2015). *The museum as digital storyteller: Collaborative participatory creation of interactive digital experiences | MW2015: Museums and the Web 2015*.
<https://mw2015.museumsandtheweb.com/paper/the-museum-as-digital-storyteller-collaborative-participatory-creation-of-interactive-digital-experiences/>
- Sbarbati, S. (2014). *Creative Cooperation in Cultural Heritage*. <http://www.creative-heritage.eu/creative->

heritage.eu/48120ac0.html?&tx_ttnews%5Btt_news%5D=8182&cHash=6e1ce90d1bf4143726903ab26b725ea0

Simon, N. (2017). *What Does a Great Distributed Digital Museum Experience Look Like?*.
<http://museumtwo.blogspot.com/2016/10/what-does-great-distributed-mobile.html>

Stickler, J. (1995). *Total immersion: new technology creates new experiences*.
<https://www.tandfonline.com/doi/abs/10.1111/j.1468-0033.1995.tb01222.x>

The Creative Museum Project. (n.d.). *Analysis of selected best practices from Europe*.
<http://creative-museum.net/wp-content/uploads/2016/06/analysis-of-best-practices.pdf>

The Louvre Museum. (2019). *RAPPORT D'ACTIVITÉ 2018*.
https://www.louvre.fr/sites/default/files/medias/medias_fichiers/fichiers/pdf/louvre-rapport-d-activites-2018.pdf

Van Gogh Museum. (n.d.). *Mission and Strategy - Van Gogh Museum*.
<https://www.vangoghmuseum.nl/en/organisation/mission-and-strategy>

Virtual Reality Society. (2017). *What is Virtual Reality?*. <https://www.vrs.org.uk/virtual-reality/what-is-virtual-reality.html>

Widmann, S. (2017). *Influence of New Media Technologies on the Success of Museum Exhibitions*. <http://www.annamonteverdi.it/digital/influence-of-new-media-technologies-on-the-success-of-museum-exhibitions-by-sofia-widmann/>

Young, H. (2012). *How can museums preserve our digital heritage?*.
<https://www.wired.co.uk/article/how-can-museums-preserve-our-digital-heritage>

Zhang, S. (2012). *The Convergence of Conventional Media and New Technology in the Cases of The New York Times and National Broadcasting Company (NBC)*.
<https://pdfs.semanticscholar.org/0741/9675cea89e9d2234494e9c4e58a58adc7834.pdf>

Appendix A – Apps table

Museum	Developer	Official	\$	Platform	Last Update	Classification	Evaluations	Downloads	Features	Languages	Link
Musée du Louvre, Paris	Musée du Louvre	Yes	In-app purchase (€0.99 to €4.99)	iOS / Android	01/02/2019	2,3 / 5	583	100.000+	Museum space modeled in 3D Helps finding artwork or collections Suggests itineraries Practical info on exhibitions, auditorium, workshops, etc Descriptions of artworks and parts of Louvre palace Audio commentaries of artworks	French / English / Spanish / German / Italian / Korean / Japanese	https://www.louvre.fr/en/louvre-app
Musée du Louvre, Paris	Museum Guides Ltd	No	Paid (2.99 €)	iOS / Android	06/02/2019	n.i. / 5	11	500+	Interactive map Detailed photography and descriptions Audio guide Suggested walking tours Create personal tours		https://play.google.com/store/apps/details?id=com.lvr.paris.voisem.falgaik
Musée du Louvre, Paris	Tourblink	No	In-app purchase (0.59 € – 5.00 €)	iOS / Android	26/10/2018	4,4 / 5	286	10.000+	Offline audio guided tours Practical info about the museum Online chat		https://play.google.com/store/apps/details?id=com.tourblink.louvre
Musée du Louvre, Paris	Mascotex	No	Free	iOS / Android	21/09/2018	n.i. / 5	4	1.000+	Images of 2300 paintings Separation of paintings by genres and authors Download of paintings in high resolution Search for paintings Adding paintings to My favorites Download paintings		https://play.google.com/store/apps/details?id=com.mascotex.louvrefree
Musée du Louvre, Paris	Smartify	No	In-app purchase (€0.69 – €13.99)	iOS / Android	10/02/2018	3,1 / 5	777	100.000+	" hold your smartphone up towards a painting and detailed information about the work will appear on-screen" Save paintings and create personal digital collections"		https://play.google.com/store/apps/details?id=com.mobgen.smartify&hl=en_GB
Musée du Louvre, Paris	Emoji Guide	No	In-app purchase (4.89 €)	iOS / Android	11/01/2019	n.i. / 5	97	5.000+	Chatbot app Discover artworks through entertaining stories Chatbot about 6 artworks		https://play.google.com/store/apps/details?id=com.waememine.louvre
Musée du Louvre, Paris	eTips	No	In-app purchase (\$1.99 – \$2.99)	iOS	08/12/2017	3,5 / 5	53	n.i.	Offline functions History of the museum Points of interest Maps of the museum Themes tours Practical info about the museum Info about the city	English, French, German, Italian, Portuguese, Spanish	https://itunes.apple.com/us/app/louvre-museum-visitor-guide/id58619009
British Museum, London	Museum Guides Ltd	No	In-app purchase (3.99 €)	iOS / Android	09/03/2016	3,4 / 5	319	50.000+	Interactive map Virtual itineraries High resolution images of artworks Detailed history of artworks Practical info on cultural events and activities		https://play.google.com/store/apps/details?id=com.bm.london.voisem&hl=en_GB
British Museum, London	Tourblink	No	In-app purchase (0.99 € – 1.99 €)	iOS / Android	07/12/2018	n.i. / 5	9	1.000+	Offline audio guides tours Practical info about the museum		https://play.google.com/store/apps/details?id=com.tourblink.britishmuseum
British Museum, London	Gonzalo Martin	No	In-app purchase (\$1.99 – \$2.99)	iOS	17/07/2018	3,9 / 5	43	n.i.	History of the museum Themed tours Maps of the museum Practical info about the museum Info about the city	English, French, German, Italian, Spanish	https://itunes.apple.com/us/app/british-museum-visitor-guide/id539150239?mt=8
State Hermitage Museum, San Petersburg	Hermitage Museum	Yes	In-app purchase (1.09€ - 4.49€)	iOS	08/09/2017	n.i. / 5	n.i.	n.i.	Audio excursions – general and thematic Adaptable according to the visitor interests Detailed floor plans Enlarged views Calculation of the shortest route to the object of interest Catalogue of the artworks Practical info about the museum and tickets	Mandarin, English, Russian	http://www.hermitagemuseum.com/en/visit-guide/
State Hermitage Museum, San Petersburg	Smartify	No	In-app purchase (€0.69 – €13.99)	iOS / Android	10/02/2018	3,1 / 5	777	100.000+	" hold your smartphone up towards a painting and detailed information about the work will appear on-screen" Save paintings and create personal digital collections"		https://play.google.com/store/apps/details?id=com.mobgen.smartify&hl=en_GB
Uffizi Gallery, Florence	Uffizi Gallery	Yes	Paid app (2.29 €)	iOS	07/04/2015	n.i. / 5	n.i.	n.i.	The artworks can be selected according to key words Super-high resolution images Visual Tour – gives suggestions of other artworks with same theme	English	http://www.uffiziouth.it/en/app/
Rijksmuseum, Amsterdam	Rijksmuseum	Yes	Free	iOS / Android	01/02/2019	3,7 / 5	883	100.000+	Adaptable itineraries Themed tours Multiple layers of info: audio clips, animations with details, extra information given by inspiring experts Practical information and tips	Dutch, English, French, German, Spanish, Italian, Japanese, Russian and Mandarin	https://www.rijksmuseum.nl/en/multimedia@about
Rijksmuseum, Amsterdam	Smartify	No	In-app purchase (€0.69 – €13.99)	iOS / Android	10/02/2019	3,1 / 5	777	100.000+	" hold your smartphone up towards a painting and detailed information about the work will appear on-screen" Save paintings and create personal digital collections"		https://play.google.com/store/apps/details?id=com.mobgen.smartify&hl=en_GB
Rijksmuseum Twenthe, Enschede	Smartify	No	In-app purchase (€0.69 – €13.99)	iOS / Android	10/02/2019	3,1 / 5	777	100.000+	" hold your smartphone up towards a painting and detailed information about the work will appear on-screen" Save paintings and create personal digital collections"		https://play.google.com/store/apps/details?id=com.mobgen.smartify&hl=en_GB
Musée d'Orsay, Paris	Museum Guides Ltd	No	In-app purchase (2.99 €)	iOS / Android	11/01/2019	n.i. / 5	54	10.000+	Easily searchable collection Detailed descriptions and insights about artworks and artists Interactive maps Customized information Themed tours		https://www.museumguides.com/ios/museumguides/musee-orsay-app-guide/
Musée d'Orsay, Paris	Tourblink	No	In-app purchase (0.99€ – 4.99€)	iOS / Android	19/01/2019	4,5 / 5	104	5.000+	Suggested itineraries Image based itineraries Professional information about the paintings Offline guide		https://play.google.com/store/apps/details?id=com.tourblink.museeorsay
Musée d'Orsay, Paris	eTips	No	In-app purchase (\$1.99 – \$2.99)	iOS	20/12/2017	n.i. / 5	n.i.	n.i.	Offline functions Detailed info about the museum, artworks and artists Thematic tours Practical info about the museum Info about the city	English, French, German, Italian, Spanish	https://itunes.apple.com/us/app/orsay-museum-visitor-guide/id593702630?platform=apple-watch

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Musée de L'Orangerie, Paris	Museum Guides Ltd	No	Paid (€1.99)	iOS	06/02/2019	n.i. / 5	n.i.	n.i.	Inightful descriptions with audio High definition images Themed tours	English, French	https://itunes.apple.com/gh/app/orangerie-guide-full-edition/id1093148477?mt=8
Museo del Prado, Madrid	MUSMon.com	No	Paid (€2.95)	iOS / Android	19/06/2014	n.i. / 5	31	1.000+	For children for 9 from 12 years Interactive images and maps Professional audio support Suggested and flexible itineraries Practical info about the museum		https://play.google.com/store/apps/details?id=com.museumon.prado
Museo del Prado, Madrid	Audiomuseums	No	In-app purchase (1,02 € – 10,16 €)	iOS / Android	21/02/2017	n.i. / 5	89	10.000+	Audio guide about the museum, artworks and its authors Find specific works inside the museum		https://play.google.com/store/apps/details?id=es.landa.museoand
Museo del Prado, Madrid	Tourblink	No	In-app purchase (0,99 € – 1,99 €)	iOS / Android	05/12/2018	n.i. / 5	18	1.000+	Offline audio guided tours Practical info about the museum Suggested itineraries		https://play.google.com/store/apps/details?id=com.tourblink.museoelprado
Museo del Prado, Madrid	SEO NACIONAL DEL PRADO DIFUSION, S	Yes	Paid (€4,09)	iOS / Android	09/05/2017	n.i. / 5	4	100+	Second Canvas Prado – Masterpieces 14 masterpieces in Ultra HD Extra info about the artworks and artists 60 related artworks and respective info Audio guides and sign language guide Super zoom, X ray and Ultraviolet to see the paintings Share on social media or email		https://play.google.com/store/apps/details?id=com.museodelsegundocanvas.museoelprado.es&as
Museo del Prado, Madrid	SEO NACIONAL DEL PRADO DIFUSION, S	Yes	Paid (€2,09)	iOS / Android	10/05/2017	n.i. / 5	5	100+	Second Canvas Prado – Bosch Explore Bosch's masterpieces Ultra HD images Extra info about the artworks Audio guides and sign language guide Super zoom, X ray and Ultraviolet to see the paintings Share on social media or email		https://play.google.com/store/apps/details?id=com.museodelsegundocanvas.museoelprado.es&as
Vatican Museums, Vatican	Tourblink	No	In-app purchase (0,59€ – 4,99€)	iOS / Android	03/12/2018	4.7 / 5	65	5.000+	Offline guide Adaptable walks inside museums Professional guide Suggested itineraries Practical info		https://play.google.com/store/apps/details?id=com.tourblink.vaticanmuseums
Vatican Museums, Vatican	Ticketbar	No	Free	iOS / Android	16/01/2019	n.i. / 5	4	1.000+	Image Recognition for artworks Points of interest with GPS coordinates (Apple Maps only) 120 minutes of storytelling Background audio playback No internet required for audio playback and image recognition Search engine for artwork or artists. Suggested route video	English, Italian, French and Portuguese	https://play.google.com/store/apps/details?id=com.comparticketbar.vaticanmuseums
Vatican Museums, Vatican	eTips	No	In-app purchase (\$1.99 - \$3.99)	iOS	08/12/2017	1.7 / 5	7	n.i.	Offline use Themed tours Maps Info about the city	English, French, German, Italian, Portuguese, Spanish	https://itunes.apple.com/us/app/vatican-museums-etips-guide/id991375145?mt=8
Vatican Museums, Vatican	ComPart Multimedia	No	Paid (\$5.99)	iOS	19/01/2019	3.3 / 5	7	n.i.	Scan image recognition Points of interest with GPS coordinates 120 minutes of storytelling Offline functions Search artworks or artists Suggested route video Save Favorites Before, during and after the visit Buy tickets Audio tours for adults and kids Save personal favorites and see it later Map and navigation system inside the museum Practical info 360p panoramas with multimedia content	English, Italian, French and Portuguese	https://itunes.apple.com/us/app/vatican-museums-audio/id104810068?mt=8
Museum Barberini, Berlin	Museum Barberini	Yes	Free	iOS / Android	30/01/2019	4.7 / 5	1164	10.000+	Audio guide Practical info about the museum Extra info about the collections On-site or remote Save Favorites and see later		https://play.google.com/store/apps/details?id=com.barberini.museum.barberini&hl=de
National Museum, Sweden	NationalMuseum	Yes	Free	iOS / Android	14/01/2019	n.i. / 5	14	5.000+	Audio guide Practical info about the museum Extra info about the collections On-site or remote Save Favorites and see later		https://play.google.com/store/apps/details?id=se.nationalmuseum.nmapp
Museum Morsbroich, Leverkusen	VIAVIG	Yes	Free	iOS / Android	29/01/2019	n.i. / 5	3	100+	Audio Guide Extra info about the artworks and artists		https://play.google.com/store/apps/details?id=com.freshmuseum.morsbroich
Latvian National Museum of Art, Riga	CUBE Mobile	Yes	Free	iOS / Android	09/11/2017	n.i. / 5	58	5.000+	Details about the museum buildings Audio guide Extra interactive info about the artworks Practical info about the museum Plan my path inside the museum	Latvian, English and Russian	https://play.google.com/store/apps/details?id=lv.cube.bim
Himself Museum, Riga	The Mad Pixel Factory	No	Free	iOS / Android	23/11/2018	n.i. / 5	n.i.	10+	6 paintings in HD Super zoom Detailed audio guide, text and video Share on social media	English and Latvian	https://play.google.com/store/apps/details?id=com.secondartwork.himselfmuseum
Rodin Museum, Paris	Museum Guides Ltd	No	In-app purchase (€2.99)	iOS	22/11/2017	n.i. / 5	n.i.	n.i.	Audio guide for the most important works Search the collection 2 suggested itineraries (2 or 4 hours) HD images	English	https://play.google.com/store/apps/details?id=com.moggen.smart&hl=en_US&as
Museo Reina Sofia, Madrid	MUSMon.com	No	Paid (€0,59)	iOS / Android	07/10/2013	3.3 / 5	35	500+	Interactive images and maps Audio guide Search for artworks through the map of the museum or by keywords Suggested itineraries Practical info about the museum Buy tickets		https://play.google.com/store/apps/details?id=com.museumon.es&as
National Gallery, London	Smartify	No	In-app purchase (€0.69 – €13.99)	iOS / Android	10/02/2019	3.1 / 5	779	100.000+	"hold your smartphone up towards a painting and detailed information about the work will appear on-screen" Save paintings and create personal digital collections"		https://play.google.com/store/apps/details?id=com.moggen.smart&hl=en_GB
National Gallery, London	Museum Guides Ltd	No	Paid (\$2.99)	iOS	08/10/2018	n.i. / 5	n.i.	n.i.	Explore hundreds of paintings Zoom in to high-resolution images Descriptions Interactive floor maps for navigation Info about current events Themed tours - Renaissance, Romanticism, Dutch landscapes etc.	English	https://itunes.apple.com/us/app/national-gallery-full-edition/id864251175&as
National Gallery, London	Macsoftex	No	Free	iOS / Android	27/09/2018	n.i. / 5	2	1.000+	1600 paintings: Organized by genres and authors Save paintings at your device Share on social media/email Search for paintings Zoom		https://play.google.com/store/apps/details?id=com.macosoftex.ng

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Guildhall Art Gallery, London	Smartify	No	In-app purchase (€0.69 – €13.99)	iOS / Android	10/02/2019	3.1 / 5	779	100.000 +	"hold your smartphone up towards a painting and detailed information about the work will appear on-screen" Save paintings and create personal digital collections"		https://play.google.com/store/apps/details?id=com.mobgen.smartify&hl=en_GB
National Portrait Gallery, London	Smartify	No	In-app purchase (€0.69 – €13.99)	iOS / Android	10/02/2019	3.1 / 5	779	100.000 +	"hold your smartphone up towards a painting and detailed information about the work will appear on-screen" Save paintings and create personal digital collections"		https://play.google.com/store/apps/details?id=com.mobgen.smartify&hl=en_GB
National Portrait Gallery, London	Locatify	No	Free	iOS / Android	28/09/2015	n.i. / 5	2	100 +	Five displays exploring the development, character and meanings of British portraiture Portraits will be displayed by theme and not chronologically Themes: Power, Love, Fame, People and Self Info automatically delivered according to the location		https://play.google.com/store/apps/details?id=com.locatify.museum.gpg&hl=en
Tate Britain, UK	Smartify	No	In-app purchase (€0.69 – €13.99)	iOS / Android	10/02/2019	3.1 / 5	779	100.000 +	"hold your smartphone up towards a painting and detailed information about the work will appear on-screen" Save paintings and create personal digital collections"		https://play.google.com/store/apps/details?id=com.mobgen.smartify&hl=en_GB
Royal Academy of Arts, London	Smartify	No	In-app purchase (€0.69 – €13.99)	iOS / Android	10/02/2019	3.1 / 5	779	100.000 +	"hold your smartphone up towards a painting and detailed information about the work will appear on-screen" Save paintings and create personal digital collections"		https://play.google.com/store/apps/details?id=com.mobgen.smartify&hl=en_GB
The Wallace Collection, London	Smartify	No	In-app purchase (€0.69 – €13.99)	iOS / Android	10/02/2019	3.1 / 5	779	100.000 +	"hold your smartphone up towards a painting and detailed information about the work will appear on-screen" Save paintings and create personal digital collections"		https://play.google.com/store/apps/details?id=com.mobgen.smartify&hl=en_GB
Bowes Museum, Barnard Castle	Smartify	No	In-app purchase (€0.69 – €13.99)	iOS / Android	10/02/2019	3.1 / 5	779	100.000 +	"hold your smartphone up towards a painting and detailed information about the work will appear on-screen" Save paintings and create personal digital collections"		https://play.google.com/store/apps/details?id=com.mobgen.smartify&hl=en_GB
Kelvingrove Art Gallery and Museum, Glasgow	Smartify	No	In-app purchase (€0.69 – €13.99)	iOS / Android	10/02/2019	3.1 / 5	779	100.000 +	"hold your smartphone up towards a painting and detailed information about the work will appear on-screen" Save paintings and create personal digital collections"		https://play.google.com/store/apps/details?id=com.mobgen.smartify&hl=en_GB
Museo Correr, Venice	Smartify	No	In-app purchase (€0.69 – €13.99)	iOS / Android	10/02/2019	3.1 / 5	779	100.000 +	"hold your smartphone up towards a painting and detailed information about the work will appear on-screen" Save paintings and create personal digital collections"		https://play.google.com/store/apps/details?id=com.mobgen.smartify&hl=en_GB
Museo San Donato, Siena	Smartify	No	In-app purchase (€0.69 – €13.99)	iOS / Android	10/02/2019	3.1 / 5	779	100.000 +	"hold your smartphone up towards a painting and detailed information about the work will appear on-screen" Save paintings and create personal digital collections"		https://play.google.com/store/apps/details?id=com.mobgen.smartify&hl=en_GB
The Pushkin Museum of Fine Arts, Moscow	Smartify	No	In-app purchase (€0.69 – €13.99)	iOS / Android	10/02/2019	3.1 / 5	779	100.000 +	"hold your smartphone up towards a painting and detailed information about the work will appear on-screen" Save paintings and create personal digital collections"		https://play.google.com/store/apps/details?id=com.mobgen.smartify&hl=en_GB
Kunsthistorisches Museum, Vienna	Kunsthistorisches Museum	Yes	Free	iOS / Android	15/11/2018	4.6 / 5	221	10.000 +	9 thematic tours (3 for kids) Interactive elements for extra info about the collection 4 languages available Navigation inside the museum		https://www.khm.at/en/learn/kunsthistorischesmuseum/apps-store/
Van Gogh Museum, Amsterdam	Van Gogh Museum	Yes	Free	iOS / Android	10/07/2005	n.i. / 5	n.i.	n.i.	"Unravel Van Gogh" Discover stories hidden in and underneath the paintings Navigate from point to point in HD images Web app		https://unravel.vangogh.com/en/story/26/#intro-mirror-on-the-wall
Leopold Museum, Vienna	Hearonymus Audioguide	Yes	Paid (€3.99)	iOS / Android	07/02/2019	n.i. / 5	104	10.000 +	92 audio explanations about the artworks		https://www.hearonymus.com/index.php?page=guides&id=2826
Alte Pinakothek, Munich		Yes	In-app purchase	iOS		n.i. / 5			Visit the 3D virtual museum 3Dx zoom Audio guide about the artworks	Germany and English	http://art-venture.eu/news-tabletapp/
Gemäldegalerie Alte Meister, Dresden	Acoustiguide GmbH	No	Paid (€0.79)	iOS / Android	10/01/2019	4.5 / 5	4	100 +	Suggested tours (with special for kids) Images with zoom Audio explanations about the artworks		https://play.google.com/store/apps/details?id=com.acoustiguide.gemaldegalerie_alte_meister&hl=en_GB
Musée des Beaux-Arts, Lyon	MyLuckyDay	Yes	Free	iOS / Android	15/07/2016	n.i. / 5	48	10.000 +	Complete audio guide 5 thematic suggested itineraries HD images with zoom Detailed information about the artworks Videos with subtitles Practical info about the museum 360 degrees virtual tours		https://play.google.com/store/apps/details?id=com.mid.mba&hl=fr
Musée des Beaux-Arts, Nancy	Nancy Museums	Yes	Free	iOS / Android	07/12/2018	n.i. / 5	5	100 +	Make your own path inside the museum Thematic tours Games about the artworks Adapted for adults, kids and handicaps (LSF language and audio descriptions)		https://play.google.com/store/apps/details?id=com.nancy.musees.mba&hl=fr
Musée Maillol, Paris	Culturespases	Yes	Free	iOS / Android	28/09/2018	n.i. / 5	n.i.	n.i.	40 minutes guided tour through the interest points More than 40 HD zoomable images Interactive map of the museum Practical info about the museum	French and English	https://itunes.apple.com/fr/app/musee-maillol/id1479280818?ls=1&mt=8
Musée Matisse, Nice	Métropole Nice Côte d'Azur	Yes	Free	iOS / Android	01/10/2018	n.i. / 5	4	1.000 +	Guide for numerous artworks		https://play.google.com/store/apps/details?id=org.nicoledotazur.matisse&hl=en_US

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Picasso Museum, Barcelona	Audioguante Servicios Culturales S.L.	Yes	Free	iOS	07/07/2016	n.i. / 5	n.i.	n.i.	Practical info about the museum Buy tickets at the app 3 languages Organize your visit and schedule extra activities Info about the museum and the collection Images, audio and video	Spanish	https://itunes.apple.com/us/app/museu-picasso-barcelona/id105176754?mt=8
Museum Folkwang, Essen	VIAVIG	Yes	Free	iOS / Android	29/01/2019	n.i. / 5	10	1.000+	Use before, during and after the visit Depth view of 44 masterpieces Full tour audio guide Short visits: 10 highlights of the collection Interactive map Practical info about the museum		https://www.museum-folkwang.de/en/news/app.html
Real Academia de Bellas Artes de san Fernando, Madrid	Mobile 72	Yes	Free	iOS / Android	19/12/2016	4.0 / 5	6	500+	Complete audio guide about the most important artworks Suggested itineraries Make your own tour Children's adapted tour Interactive map of the museum Navigation system inside the museum Share on social media		https://play.google.com/store/apps/details?id=es.ihd.es.ihd.rcaibae/experiencia810-es
Real Academia de Bellas Artes de san Fernando, Madrid	The Mad Pixel Factory	Yes	Free	iOS / Android	21/01/2019	n.i. / 5	n.i.	50+	Second Canvas Explore 8 masterpieces Ultra HD images Super zoom Complete audio guide information Share on social media Download to see later or offline		https://play.google.com/store/apps/details?id=com.secondcanvas.rcaibae
Museo Carmen Thyssen, Málaga	The Mad Pixel Factory	No	Free	iOS / Android	17/12/2018	n.i. / 5	n.i.	10+	Images in Ultra HD Super zoom Detailed info Share on social media Download to watch later or offline	Spanish and English	https://play.google.com/store/apps/details?id=com.secondcanvas.thyssenmalaga
Museo Carmen Thyssen, Málaga	GVAM Guías Interactivas	Yes	Free	iOS / Android	27/02/2015	n.i. / 5	13	1.000+	Download content to use it offline Images, videos with subtitles, Spanish sign language and audio descriptions		https://play.google.com/store/apps/details?id=com.thyssen.gvam
Stadel Museum, Frankfurt	Stadel Museum	Yes	Free	iOS / Android	27/09/2018	n.i. / 5	11	1.000+	Lotte Lavrenstein Illustrations of 19 paintings 60 minutes audio guide	German and English	https://play.google.com/store/apps/details?id=com.lms.tophia.stadelandroid&hl=de&referrer=utm_source=stadel
Stadel Museum, Frankfurt	Stadel Museum	No	In-app purchase (0,99€)	iOS / Android	06/03/2017	n.i. / 5	112	10.000+	Text, audio and video Info about more than 100 artworks Intelligent scanner for paintings Save favorites Share and print Suggestions	German and English	https://play.google.com/store/apps/details?id=com.stadelmuseum.stadelapp
Galleria Borghese, Rome	Marketing Power	No	Free	iOS	24/10/2018	n.i. / 5	n.i.	n.i.	30 guides When you buy the ticket you receive your app login info	Italian and English	https://itunes.apple.com/it/app/galleria-borghese-audio-guide/id128803051?mt=8
Hungarian National Gallery, Budapest	XPNIA	No	Free	iOS / Android	04/01/2018	n.i. / 5	7	100+	Practical info about the museum Thematic tours Detailed info about the artworks Additional images Save favorites Map of the museum		https://play.google.com/store/apps/details?id=com.xponia.mng&hl=en
Museum of Applied Arts, Budapest	xponia AG	No	Free	iOS	02/01/2018	n.i. / 5	n.i.	n.i.	Multimedia info about the museum and artworks Guided tours Practical info about the museum Share on social media Save Favorites Map of the museum	German, Hungarian, English and Italian	https://itunes.apple.com/hr/app/mma-museum/id101158370?mt=8
Museum of Applied Arts, Budapest	The Mad Pixel Factory	No	Free	iOS / Android	23/11/2018	n.i. / 5	n.i.	n.i.	Second Canvas Images in Ultra HD Super zoom Detailed audio content Share on social media Download content to see later or offline	Hungarian and English	https://play.google.com/store/apps/details?id=com.secondcanvas.apoeliedartibudapest
Brera Academy, Milan	Inera srl	No	Free	iOS / Android	09/04/2018	n.i. / 5	53	1.000+	Audio guide info about the artworks Point your phone to the paintings Practical info about the museum Download the content and use the app offline		https://play.google.com/store/apps/details?id=it.vivatoangels.mmg.brera
Museo Casa Rodolfo Siviero, Florence	Inera srl	No	Free	iOS / Android	08/01/2019	n.i. / 5	1	5+	Audio guide info about the artworks Point your phone to the museum Practical info about the museum Download the content and use the app offline		https://play.google.com/store/apps/details?id=com.mmg.casa_siviero
National Museum of Scotland, Edinburgh	National Museum of Scotland	Yes	Free	iOS / Android	27/01/2017	2.0 / 5	45	5.000+	Interactive maps of the museum Info about the collections Practical info about the museum	English, French, German and Spanish	https://play.google.com/store/apps/details?id=com.design.amos&hl=en
Statens Museum for Kunst, Copenhagen	The Mad Pixel Factory	No	Free	iOS / Android	23/11/2018	n.i. / 5	2	100+	Second Canvas 11 paintings in Ultra HD Super zoom Detailed audio info about the artworks Share on social media X-Ray vision in 1 painting Download content to watch later or offline		https://play.google.com/store/apps/details?id=com.madpixel.secondcanvas.smbk.useful
Museu Nacional d'Art de Catalunya, Barcelona	The Mad Pixel Factory	No	Free	iOS / Android	10/12/2018	n.i. / 5	n.i.	100+	Second Canvas Images in Ultra HD Super zoom Detailed audio guide Share on social media Download content to see later or offline	English, Catalan and Spanish	https://play.google.com/store/apps/details?id=com.secondcanvas.mnac
Museu Nacional d'Art de Catalunya, Barcelona	Museu Nacional d'Art de Catalunya	Yes	Free	iOS / Android	16/03/2016	n.i. / 5	4	500+	Audio, text, images and video Divided in 5 areas Save favorites Share on social media Add personal comments		https://play.google.com/store/apps/details?id=com.mnac.mnac
Mauritshuis, Den Haag	The Mad Pixel Factory	No	Paid (€1,30)	iOS / Android	23/11/2018	n.i. / 5	n.i.	10+	Second Canvas 10 paintings in Ultra HD Super zoom Share on social media Detailed audio guide Download content to watch later or offline		https://play.google.com/store/apps/details?id=com.madpixel.secondcanvas.mauritshuis&hl=en
Mauritshuis, Den Haag	Mauritshuis	Yes	Free	iOS / Android	27/11/2018	3.7 / 5	235	50.000+	Audio, video and images Suggested tours Special tour for younger visitors	Dutch, English, German, French, Spanish, Italian and Japanese	https://play.google.com/store/apps/details?id=com.nl.koninkhofmuseumhuismaurits

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Slovak National Gallery, Zvolen	The Mad Pixel Factory	No	Free	iOS / Android	23/11/2018	n.i. / 5	3	100+	Second Canvas 14 artworks in HD Detailed audio guide Super zoom Share on social media Download content to watch later or see offline	Slovak and English	https://play.google.com/store/apps/details?id=com.secondcanvas.zvolenska
Museo Lázaro Galdiano, Madrid	The Mad Pixel Factory	No	Free	iOS / Android	23/11/2018	n.i. / 5	2	100+	Second Canvas Artworks in HD Detailed audio guide Super zoom Share on social media Download content to watch later or see offline	Spanish	https://play.google.com/store/apps/details?id=com.secondcanvas.lazarogaldiano
Museo Lázaro Galdiano, Madrid	GVAM Guías Interactivas	Yes	In-app purchase (2,02 €-3,04 €)	iOS / Android	02/10/2015	3.8 / 5	19	1.000+	Selection of the most famous artworks of the museum Audio and images Search for artworks Sign language Tablet technology Themed tours		https://play.google.com/store/apps/details?id=es.gram.lazarogaldiano
Museu de l'Empordà, Figueres	The Mad Pixel Factory	No	Free	iOS / Android	05/12/2018	n.i. / 5	2	10+	Second Canvas 10 paintings in super HD Suggested tour Detailed audio guide Share on social media Super zoom Download content to watch later or offline	Catalan, Spanish and English	https://play.google.com/store/apps/details?id=com.secondcanvas.museuemporda
Musée National Marc Chagall, Nice	Réunion des Musées Nationaux	Yes	Free	iOS	27/08/2010	n.i. / 5	n.i.	n.i.	Audio guide Extra content like images and info about the artist Super zoom Practical info about the museum	French	https://itunes.apple.com/fr/app/musee-national-marc-chagall-de-nice-france/id335187937?mt=8
Victoria Gallery & Museum, Liverpool	The University of Liverpool	Yes	Free	iOS / Android	01/06/2016	n.i. / 5	2	100+	Clever location-based technology Suggest points of interest as you move Interactive maps Photographs, video and audio		https://play.google.com/store/apps/details?id=uk.ac.liv.vgm.beacon
Victoria and Albert Museum, London	eTips LTD	No	In-app purchase (\$1.99- \$2.99)	iOS	19/12/2017	1.0 / 5	5	n.i.	Offline use Map of the museum Themed tours Extra info about London	English	https://itunes.apple.com/us/app/victoria-and-alex-museum/id1029570890?mt=8
Alte Nationalgalerie, Berlin	Museum Guides Ltd	No	Paid (\$2.99)	iOS	27/07/2016	n.i. / 5	n.i.	n.i.	Insightful descriptions HD images Interactive maps Artists bio Virtual tour Search for artworks Highlights tour	German and English	https://itunes.apple.com/us/app/alte-nationalgalerie-berlin-museum-guides/id106487111
Musée des Beaux Arts, Calais	Musée des Beaux Arts de Calais	Yes	Free	iOS / Android	22/08/2017	n.i. / 5	2	100+	5 suggested itineraries 4 extra itineraries outside of the museum, that connect the artworks and the museum to the city For families (children more than 7) Quizzes and games Practical info		https://play.google.com/store/apps/details?id=com.went.mba.calais
Musée des Beaux-Arts, Rouen	Comediant	No	Free	iOS / Android	23/12/2014	n.i. / 5	5	500+	Info about more than 60 artworks Build your own itinerary Select favourites Interactive map Practical info about the museum		https://play.google.com/store/apps/details?id=com.comediant.mba.rouen
Royal Museum of Fine Arts, Brussels	The Mad Pixel Factory	Yes	Free	iOS / Android	23/11/2018	n.i. / 5	2	50+	Second Canvas 5 paintings in Ultra HD Super zoom Info about the artworks Share on social media Download content to watch offline	English, French and Dutch	https://play.google.com/store/apps/details?id=com.secondcanvas.fineartsbelgium
Musée Jacquemart-André, Paris	Culturespaces	Yes	Free	iOS / Android	03/10/2018	n.i. / 5	n.i.	100+	1h15 guided visit 18 points of interest Almost 100 images in HD with zoom 2 interactive maps Practical info about the museum		https://play.google.com/store/apps/details?id=com.culturespaces.MIA&hl=fr
Franz Marc Museum, Kunst	Linon Medien	Yes	Free	iOS / Android	21/01/2019	n.i. / 5	3	1.000+	Practical info about the museum Thematic audio tour Video and images		https://play.google.com/store/apps/details?id=de.linon.sophia.sophiaandroid.fmm&hl=de
Ferdinandum Museum, Innsbruck	Fluguide	Yes	Free	iOS / Android	15/05/2017	4.4 / 5	7	100+	Detailed info about the collection Practical info about the museum Select favorites and make your own tour 3D models Audio guide	German, English and Italian	https://play.google.com/store/apps/details?id=com.fluguide.ferdinandum&hl=de
Dom Wien Museum, Viena	Fluguide	Yes	Free	iOS / Android	09/11/2018	n.i. / 5	5	100+	Real time navigation system Audio guides tours Photos and videos Quiz game for kids Download content	German, English, French, Italian and Spanish	https://play.google.com/store/apps/details?id=com.fluguide.domwien

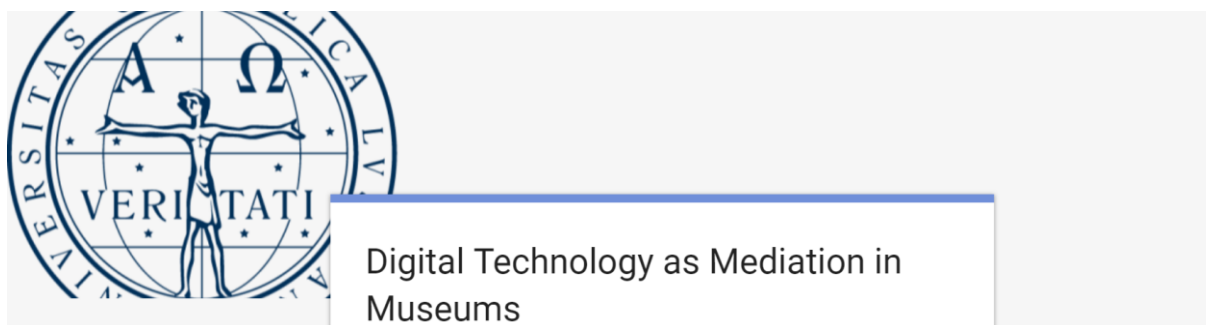
Appendix B – Multimedia Guide table

Museum	Developer	€	Device	Year	Languages	Features	Reference
Musée du Louvre, Paris	Musée du Louvre and Nintendo	€ 5	Nintendo 3DS™ XL (available at the museum)		French, English, Spanish, Italian, German, Japanese, and Korean	Over 35 hours of audio content Lively and informal on-the-spot interviews Interactive map of the museum Over 700 descriptions of galleries and artworks Tracks position and guides in the museum 3D photos and reconstruction and high definition images	https://www.louvre.fr/en/louvre-audio-guide
British Museum, London	British Museum, sponsored by Koren Air	£7	Touch Screen devices (available at the museum)		English, Korean, French, German, Italian, Spanish, Arabic, Russian, Japanese and Mandarin	Helps you make the most of your visit, adapting itineraries according to time and interests Keeps track of what is seen and creates a digital souvenir of the visit 260 expert commentaries Self-guided tours Interactive map	https://www.britishmuseum.org/visiting/starting-your-visit/audio-guides.aspx
British Museum, London	British Museum, sponsored by Koren Air	£6	Touch Screen devices (available at the museum)		English, Korean, Spanish and Simplified Chinese	Family Guide Complete fun, creative challenges Explore the collection through a series of special adventures Interactive game-based guide	https://www.britishmuseum.org/visiting/starting-your-visit/audio-guides.aspx
Van Gogh Museum, Amsterdam	Van Gogh Museum and Fabrique	€3 - €5	Touch Screen devices (available at the museum)	2015	English, Dutch, French, German, Italian, Portuguese, Spanish, Russian, Chinese (Mandarin), Japanese and Korean	Engaging multimedia experience Interactive audio guide Suitable tours	https://www.vangoghmuseum.nl/en/plan-your-visit/multimedia-guide
Van Gogh Museum, Amsterdam	Van Gogh Museum and Fabrique	€3 - €6	Touch Screen devices (available at the museum)	2015	English and Dutch	Family guide Children's adapted Tailored to each person's age Designed for families with children aged between 6 and 12	https://www.vangoghmuseum.nl/en/plan-your-visit/multimedia-guide
Hamburger Kunsthalle, Hamburg		€ 4	Touch screen devices (available at the museum)		English and German	Detailed information about the artworks Comparative illustrations, historical documents, photos and animations 2 tours (1 or 2 hours) and 1 tour for kids until 8 (45 min.)	https://www.hamburger-kunsthalle.de/en/programmformat/multimediaguide
Hamburger Kunsthalle, Hamburg		€ 4	Touch screen devices (available at the museum)		English and German	For children more than 8 years old In-depth information on individual artworks Comparative images, historical documents or photographs and animations 60-minute «highlights» tours two-hour tour 20-minute tour	https://www.hamburger-kunsthalle.de/en/programmformat/verleih-und-kommunikation-multimedia-guide
Royal Museum of Fine Arts, Belgium		€ 4	Touch screen device (available at the museum)		Belgian-French sign language (LSFB), Flemish sign language (VGT) and international sign language (IS)	For the deaf and hearing impaired public Touch screen device Present 21 artworks	http://www.musee-magritte-museum.be/en/your-visit/special-needs
Palais de Tokyo, Paris	MyArtCell	Free	Smartphone			Bluetooth technology Activate the Bluetooth and receive content through the exhibition Videos, Audios, Information You can download the content to the smartphone to watch it later Messages are delivered when the device is in an active area, the visitor do not need to do anything Messages can be accepted or refused	http://archives.palaisdetokyo.com/fr/3/low/programme/index.php?page=infospratiques/myartcell.php
Thyssen-Bornemisza Museum, Madrid		€ 5	Touch screen tablets (available at the museum)		Spanish and English	39 works of art Interactive museum map plans Multimedia content (videos, music, related works of art and other exciting secrets) Approx. 3 hours Hire at the Audio guide desk in the Hall	https://www.museothyssen.org/en/visit/resources-visit/audioguides
Thyssen-Bornemisza Museum, Madrid	With the collaboration of the Education Area and Telefonía	€ 5	Touch screen tablets (available at the museum)		Spanish and English	For children between 6 and 12 years old Animated recreations of 14 works of art Approx. 40 minutes Hire at the Audio guide desk in the Hall Magnetic induction loop available free of charge	https://www.museothyssen.org/en/visit/resources-visit/audioguides
Mauritshuis, Den Haag		€ 4	Touch screen device (available at the museum)		German, French, Spanish, Italian, Japanese, Mandarin, Russian and Brazilian Portuguese	Audio, video and images Suggested tours Special tour for younger visitors (Same content as the app as alternative for those who do not have smartphones)	https://www.mauritshuis.nl/en/visit/plan-your-visit/mauritshuis-tour/

Appendix C – Other Experiences table

Museum	Experience	Developer	€	Device	Languages	Year	Features	Reference
Rijksmuseum, Amsterdam	Multimedia Family Game		€2,50/device	Touch screen device (available at the museum)	Dutch, English, German and French		Group game, 2 to 4 persons, each using a device Solve 8 mysteries about the museum (about 1 hour) For families with children with more than 7 years	https://www.rijksmuseum.nl/en/family-game
Sorolla Museum, Madrid	Augmented Reality	60Lab	Free	Smartphone app	Spanish and English	Last update 2018	Unofficial app Augmented Reality app Paintings explained by the painter Take a selfie with the painter Share on social media	https://play.google.com/store/apps/details?id=com.vividmuseos.sorolla.MuseoSorolla
Stadel Museum, Frankfurt	Children Multimedia Game	Stadel Museum	Free	Smartphone app		Last update 2018	"Imagoras" Official app 4.5 / 5 - 68 evaluations 5.000+ downloads For kids from 6 to 12 years Explore the museum through a game Solve mysteries	https://play.google.com/store/apps/details?id=com.Deck13.imagoras
Stadel Museum, Frankfurt	Virtual Reality	Stadel Museum	Free	Touchpad app	German and English	Released on 2016	Official app See how the museum was in the 19th century Reconstructions The collection in 1876 2 hours available	https://www.ooculux.com/experiences/gear-ur/796067500495103/
Old National Gallery, Berlin	Virtual Reality			VR Headset (available at the museum)		05.04.2019 a 30.06.2019	Temporary exhibition Painting At the beach with the monk, by Caspar David Friedrich Immersive experience Be at the beach next to the monk See every detail of the painting	https://www.smb.museum/en/museums-institutions/alt-nationale-galerie/exhibitions/detail/mit-dem-monch-am-meer.html
Musée d'Orsay, Paris	Augmented Reality	Orange		Touch screen tablets (available at the museum)	French, English and Italian		Temporary exhibition Painting The Artist's Studio, A Real Allegory Summing up Seven Years of my Artistic and Moral Life Immersive experience Discover the characters, secrets about the paintings and its restoration Visitors are free to discover the painting in their own way	https://www.musee-orsay.fr/en/collections/restorations/step-into-courbet-studio.html
Musée d'Orsay, Paris	3D Reproductions	Musée d'Orsay and Fondation du Patrimoine			French, English and Italian		Temporary exhibition Painting The Artist's Studio in 3D Explore the painting by touch Complementary info (text and audio) Feel the surface material of the painting and its several layers Video in French Sign Language and subtitles	https://www.musee-orsay.fr/en/collections/restorations/step-into-courbet-studio.html
Gallerie dell'Accademia, Florence	Augmented Reality	Samsung	Free	Smartphone app		Last update 2015	Unica app 1.000+ downloads Adaptable to kids, teens or adults Audio guide Extra info about the artworks Games for kids Themed itineraries Augmented reality in some objects https://www.smb.museum/en/medien	https://play.google.com/store/apps/details?id=it.gallerieaccademia.smartphone.gallerieaccademia&hl=it
The British Museum, London	Multimedia children's Game	British Museum and Samsung	Free	Touch screen tablets (available at the museum)			Interactive game for kids School digital session 1 hour Booking required Augmented reality game	https://www.britishmuseum.org/learning/schools-and-teachers/sessions/3_gif_for_athena.aspx
The British Museum, London	Virtual Reality	Samsung Digital Discovery Centre and Soluis		Samsung VR headset (available at the museum)		2015	Virtual Reality Weekend Temporary With Samsung Digital Discovery Centre and Soluis Explore a virtual reality Bronze Age site 3D scans of objects in original site Immersive Dome	https://www.2016.museumsandtheweb.com/paper/virtual-reality-at-the-british-museum-what-is-the-value-of-virtual-reality-environments-for-learning-by-children-and-young-people-schools-and-families/
Stadsarchief, Amsterdam	Interactive Exhibition	Fieldlab Virtual Worlds	€ = €=	Ipads (available at the museum)		2018 - 2019	"Rembrandt Privé" Temporary exhibition Augmented reality brings documents to life Images, audio and artwork from other museums	https://www.amsterdam.nl/stadsarchief/agenda/rembrandt-privé/
Victoria and Albert Museum, London	Interactive Game	Preloaded	Free	Digital device with wi fi connection	English	Released on 2018	Secret Seekers Family game Web app game Get to know the museum through characters Challenges across multiple locations	https://www.vam.ac.uk/blog/digital/va-secret-seekers-designing-a-new-mobile-game-for-family-visitors
Staatliche Museen, Berlin	Augmented Reality	Refrakt	Free	Smartphone app	English	Released on 2015, last update 2018	8D painting: Point or smartphone at the artworks iOS only See 3D installations Perceptive and interactive artworks Unofficial app Only at App Store	https://www.smb.museum/nachrichten/detail/augmented-reality-app-refrakt-mit-bildern-der-gemaldegalerie-der-staatlichen-museen-zu-berlin.html
Gallery of Matica, Budapest	Augmented Reality	Zumoko	Free	Smartphone app		Last update 2017	Official app 100+ downloads Augmented reality in forest of paintings and sculptures 3 themed tours, 1 is a hunt treasure 3D virtual guides	https://play.google.com/store/apps/details?id=com.zumoko.gmgar
Museo Thyssen-Bornemisza, Madrid	Augmented Reality	Museo Thyssen-Bornemisza	Free	Smartphone app		Last update 2017	"Croononauts" 1.000+ downloads Reality-fiction adventure 3D augmented reality Official app	https://play.google.com/store/apps/details?id=io.eduardthyssen.croononauts&hl=en

Appendix D – Survey



Museum professionals are invited to participate in this survey on the presence/use of digital technology in European Fine Art museums to mediate the relation between the institution and the visitors.

The information provided in the surveys will be presented anonymously, and it will not be shared by any mean. At the end of the survey, there is an optional field where you can leave an email address, so I can share the final results of this study.

This survey was created throughout the research I am currently developing within my Master dissertation on the topic of "Digital Technologies as mediation in European Fine Art Museums", in the Management for the Creative Industries Master Degree of the School of Arts of the Portuguese Catholic University (Porto, Portugal).

My name is Catarina Reis (pavaodosreis@hotmail.com), I am 25 years old and my dissertation is being supervised by:

Luis Teixeira, Assistant Professor at Escola das Artes and Investigator at CITAR - Centro de Investigação em Ciência e Tecnologia das Artes (Centre of Investigation in Science and Arts' Technology), as Supervisor; lteixeira@porto.ucp.pt

Eduarda Viera, Assistant Professor at Escola das Artes and Investigator at CITAR - Centro de Investigação em Ciência e Tecnologia das Artes (Centre of Investigation in Science and Arts' Technology), Co-supervisor; evieira@porto.ucp.pt

The survey has 33 questions, within which 19 are multiple choice questions, 8 are long answer questions and 6 are short answer questions. Not all the questions are applicable, so only in those questions, leave it with no answer. When this is not the case, please, answer/choose or choose at least one option, so my analysis can be as accurate as possible.

The main topic of this survey are the digital technologies as mediation in Fine Art museums in Europe, however it also addresses to issues related to the structure and positioning of the museum. Therefore, the survey is divided in 3 sections. The first part is focused on the reach and number of visitors of the museum. The second, is about the museum structure (staff members and department), and the third one is about the use of digital technologies by the museum.

This survey takes about 30 minutes to be fully answered.

Please, submit the survey until the 20th of May of 2019.

By clicking on the button below, you agree with the above information and consent to participate in this study

I agree

SEGUINTE

Who is answering the survey

What is your position inside the museum?

A sua resposta

ANTERIOR

SEGUINTE

This first section has 5 questions about the public of the museum

1. What do you consider to be the reach of your institution in terms of physical visitors, at the moment ?

- Local
- Regional
- Nacional
- Internacional

2. In a near future, does your museum pretend to extend its reach ?

- Yes
- No

3. What was the estimated number of visitors last year?

A sua resposta _____

4. Considering the last five years, the number of visitors...

... decreased.

... increased.

... was stable.

5. According to the objectives defined by the museum, did these numbers fulfilled the museum's expectations ?

Yes.

No, we were expecting more visitors.

This second section has 9 questions about the structure of the museum in terms of staff members, work departments and the positioning of the institution in relation to the main subject of the survey

1. What is the total number of full-time staff members working at the museum, at the moment?

Less than 50

50 - 200

201 - 500

More than 501

2. Does the museum have an educational department?

No

Yes

3. If you answered yes to the previous question, how many members does the educational department have?

A sua resposta _____

4. Does the museum have a specific team dedicated to the mediation between the museum and the public?

No

Yes

5. If you answered yes to the previous question, how many members does the team have?

A sua resposta _____

6. Does the museum have an internal digital team / department to create digital content?

Yes

No

7. If you answered yes to the previous question, how many members does the team have?

A sua resposta _____

8. If the museum has a digital team, how is the budget managed ?

Specific budget for the team / department

It relies on the overall budget

Both

9. According to the objectives defined by the museum, is effective mediation between the museum and the visitors a priority of the museum strategy / mission / action plan?

Yes

No

This third section has 19 questions about the presence and the use of digital technologies by the museum

1. Identify the "outside" digital presence of the museum (tick all that apply):

Website

Blog

Newsletter

Facebook

Instagram

Twitter

Youtube

Others

2. Identify the "inside" digital presence of the museum (tick all that apply):

- Smartphone app
- Multimedia guides
- Interactive expositors
- Augmented / Virtual reality experiences
- Digital games
- Others

3. At the moment, the museum uses digital technologies in these areas (tick all that apply):

- Internal Communication / Organization
- Marketing and Public Relations
- Audience Engagement / Mediation
- Exhibitions
- Analyze audiences / ticket sales
- Customer Service
- Others

4. Identify the area that is more developed in terms of digital use:

A sua resposta _____

5. Identify the area that is less developed in terms of digital use:

A sua resposta _____

6. Does the museum have a digital strategy?

- Yes
- No

7. If you answered yes to the previous question, can you underline the main topics of the strategy?

A sua resposta _____

8. Are the digital strategy objectives included in the museums mission statement?

- Yes
- No

9. (If applicable) Is mediation between the museum and the visitors part of the digital strategy?

- Yes
- No

10. If you answered yes to the previous question, what are the main guidelines to reach this outcome?

A sua resposta

11. What do you consider to be the maturity level of the interaction between the museum and its visitors through digital technologies?

- Very immature
- Immature
- Moderate
- Mature
- Very mature

12. Can you identify 3 major needs of your audience, inside the museum, that are not being fulfilled or that need to be improved?

A sua resposta

13. Regarding your answer on the previous question, do you agree that digital technologies can be good tools to help the museum?

- Yes
- No

14. Regarding your answer on the previous question, please justify:

A sua resposta

15. (If applicable) From 1 to 10, how do you evaluate the impact of the digital initiatives in terms of mediation between the museum and the public?

- 1 2 3 4 5 6 7 8 9 10
- Irrelevant Very relevant

16. (If applicable) How does the museum control its digital projects and its development / success

A sua resposta

17. (If applicable) Identify a major disadvantage due to the use of digital technologies inside the museum:

A sua resposta

18. What have been the major obstacles in the development of digital technologies within the museum?

A sua resposta

19. How does your institution face the mediation/public engagement through digital technologies in the future?

A sua resposta

The final results

When the work is complete, I compromise myself to share the final results of this study.

(Optional) Please, leave an email address:

A sua resposta

Digital Technology as Mediation in Museums

Thank you for your collaboration

Catarina Reis