

# **Engaging with the environment: the role of mobile apps.**

A Qualitative case study on the role of mobile applications on museum experience.

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## **Abstract**

During the last decades, the development of museums throughout the Western World has significantly increased. However, this so-called museum boom has not translated into an increase in visitor rates; in contrast, a decline in visitor attendance has been recorded. In parallel, shifts in the leisure industry have resulted in museums competing with not only other museums but also with other leisure attractions –and what’s more, museums receive limited funding due to the stricter extension of public money in the last years. Therefore, museums, operating within a tumultuous and quickly changing environment that has also dramatically been influenced by the rise of the Web 2.0, need to reposition themselves and find innovative ways to attract the today’s sophisticated and demanding audiences. The diffusion of Web 2.0 and lastly the upsurge of mobile technologies have provided museums with a potential to attract these diverse audiences and to provide new value propositions that correspond to the needs of contemporary users. In fact, over the last few years the use of mobile devices has been an already established trend, and this momentum generates an additional opportunity for museums to exploit the capabilities of mobile technologies and to achieve their goals.

This paper attempts to investigate the capabilities that mobile applications offer to museums to attract the contemporary audiences by providing new value propositions. In order to do so, eleven mobile applications were selected to be analyzed based on geographic criteria as well as their size and the cultural context where they operate. The data collection and analysis of the cases was guided from the conceptual framework that was formulated according to the literature on the field. The significant findings confirmed most of the theory and permitted a judgement on what extent museums exploit the capabilities of mobile apps to provide public value to their audiences.

**Keywords:** value propositions, diverse audiences, mobile applications, public value, museums, business model

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## 1. Introduction

Over the last decades, museums have been going through significant changes. In this context, museums are subject to various demands to enable them to play valid roles in the new world (Hooper-Greenhill, 2000).

From the 1970s, the so called ‘museum boom’ has taken place in the Western societies as a large number of museums has been constructed to satisfy the demand for culture. However, not only has this boom not been translated into huge visitor attendance but visitor numbers actually seem to decline (Butler, 2000). In addition, this boom coincided with the evolution of the leisure industry, and thus museums have to compete both with each other and with other emerging venues and attractions for a limited market (Burton & Scott, 2003). An increasing number of museum leaders are worried about competition from the entertainment and cultural spaces in central cities, as well as from the new history and science centers which also present collections and exhibitions (Kotler & Kotler, 2000).

An equally important issue for museums is limited funding, which originates from stricter regulations with respect to the use of public money. Additionally, many museums suffer from lack of adequate expertise, insufficient management, and vague philosophies (Hooper-Greenhill, 2000). Under those circumstances, a shift to a wider range of financial sources, a focus on customer satisfaction, and the adoption of new business models are prerequisites for the longevity of museums (Camarero, Garrido & Vicente, 2011). Therefore, museums operating within a tumultuous and quickly changing environment, require new approaches from their management, new sources of funding, and new working practices (Sandell, 2003). It is noteworthy that museums, as ‘non-profit businesses’, have similar business models to those that for-profit businesses possess. On this basis, museums’ business models need to be amended so as to meet the growing expectations of the public (Falk & Sheppard, 2006). McLean (1996) states that museums should adopt a visitor-focused approach, which would in turn result in them offering a product/service able to fulfill their customers’ expectations. Therefore, the establishment of new business models can assist museums to align the needs and expectations of the public with the needs and the vision of the institution.

Lastly, museums strive to retain their integrity as distinctive institutions for collections, research, exhibitions and education, and at the same time, to become more popular, attractive and competitive (Kotler & Kotler, 2000). Indeed, museums are now struggling to function as

sociocultural hubs that provide vibrancy and meaning to people's lives in urban spaces (Bagnall, 2003).

Without a doubt, the current Web 2.0 media environment imposes the adoption of a different attitude towards their public on museums. The public demands engagement and participation in order to co-create the cultural experience delivered with the museums (Verboom & Arora, 2013). Hence, the evolution of new technologies leads museums to be more customer-oriented and these developments, in turn, require museums to re-evaluate the value propositions presented to their customers (Teece, 2010).

Today, cultural organizations such as museums strive to engage with new technologies as a means of improving their operational efficiency and expanding the range of ways in which they pursue their cultural missions (Bakhshi & Throsby, 2012). However, given their heterogeneous nature, museums do not have the same capabilities to adapt to this new landscape and depend on a number of separate factors like size, cultural policies, organizational structure and sources of funding (Camarero, Garrido & Vicente, 2011).

After the diffusion of Web 2.0 applications, the mobile upsurge has become an already established trend. A substantial number of people use mobile devices like smartphones and tablets and these devices have become an integral part of daily life since there is a need to 'always be connected' (Palumbo, Dominici & Basile, 2013). Carried by the user, handheld technologies, and especially mobile phones, facilitate the one-to-one personal relationship with the user, namely the user has absolute control over the device and the content it contains (Tallon, 2010). Therefore, these technologies have an already established relationship with users – one that museums can tap into (Tallon, 2008).

Hence, this momentum generates an opportunity for museums to incorporate visitor-oriented mobile technologies to achieve their strategic goals. In this line of reasoning, conceptualizing the way mobile technologies facilitate the visitors' exploration of the richness and diversity of a museum's collection is a crucial topic for discussion. Sophisticated computer-based applications can now completely change the way museums communicate internally as well as with external bodies. Moreover, the new 'mobile economy' provides museum marketers with the potential to implement new marketing strategies in regard to imperatives of the mobile era (Palumbo, Dominici & Basile, 2013). In this context, mobile applications become an invaluable tool in the hands of museum marketers for achieving their goals.



This research takes the perspective of the supplier, -the museums in our case-, and studies how they incorporate in their mobile applications features that allow for the provision of new value propositions to the contemporary audiences. In this context, it is necessary for an analysis of the behavior of contemporary media users to be undertaken, which would thereafter be related to the value propositions provided by museums. Hence, this paper is relevant to museums, given their struggle to maintain and increase their audiences, whilst suffering from limited funding. On this basis, museums try to adopt more visitor-focused approaches in order to attract broader audiences and generate revenue. The study is also relevant to science, since it attempts to connect business literature -specifically, the concepts of entrepreneurship and innovation- to the upper goal of museums, namely the provision of public value. Additionally, although much research has been undertaken on how digital technologies can help museums to re-assess their relationships with their audiences, only few studies have addressed the role of mobile applications for museums and the perceptions of media users with respect to museum experience.

In summary, museums today are struggling to maintain their public (Burton & Scott, 2003) and are concurrently searching for ways to align their objectives with the changing world imperatives. Simultaneously, new business models are constantly emerging and museums need to adopt a suitable business model to create value and meet the growing needs of their modern visitors.

The study is organized as follows: first, the strategic goals of museums will be elaborated on; secondly, an analysis of the new value propositions they offer will take place through an association with a detailed description of the media behavior of users. Finally, a number of representative existing applications intended to enhance the experience of a visitor in different museums will be examined.

The purpose of this paper is to find the opportunities as well as the challenges that museums face following the rise of new technologies in regard to the value provided and the goal of museums to enhance the visit experience of their audiences. To do so, the following research question and sub-questions are introduced:

1. How can museums strategically use mobile applications to generate public value for young and adult users?

### **Sub-questions**

2. How can museums strategically use mobile applications to enhance the contemporary media users' visit experience?
3. How can museums use mobile applications to create new customer relationships?

## **2. Theoretical Framework**

There is no doubt that new technologies are here to stay, and their stable and ubiquitous evolution can be congruous with modern visitors' expectations (Tallon, 2008). Due to changing attitudes, museums are led to justify their existence and to maintain or increase visitors' attendance (Burton & Scott, 2003). In particular, museums seek new ways to attract the widest and most diverse audience possible. Therefore, as institutions attempt to become more aware of their target audiences, patterns of consumption begin to be sketched out, and at the same time, patterns of participation, interpretation and meaning are also coming to light (Hooper-Greenhill, 2000).

Museums, having realized the potential of the use of new technologies, make efforts to incorporate them into their core strategy. New media has changed the capabilities museums have in order to deliver value propositions to their sophisticated audiences and their increasing demands regarding services provided by museums (Carey & Jeffrey, 2006). In this context, the 'participatory culture' of Web 2.0 (Jenkins, 2006) gives museums the capacity to create new ways to engage visitors and enhance their museum experience.

Museums are pressured to adapt to the new media environment and to reposition themselves in the field of curating, interacting with their audiences and their means of knowledge dissemination (Hooper-Greenhill, 2000). Under this pressure, the idea of 'new museology' has come into practice by emphasizing the educational side of museums and new connections between them and the public (Hooper-Greenhill, 2000). Thus, today the majority of museums have an online presence and have adopted tools and practices to facilitate the interactivity which can now be defined as a Web 2.0 interaction as such the current environment with the diffusion of new technologies, offers museums the opportunities as well as the challenges to attract diverse audiences and maintain their role as safe keepers of the art world. Furthermore, by expanding and diversifying their audience, museums can gain wider community support as well as increased income (Kotler & Kotler, 2000).

Museums are cultural icons with a goal to provide 'symbolic value' in the societal conditions where they operate (Kirchberg, 1998). The need for museums to correspond to the current social values derives from the radical changes in audience behavior, where visitors no longer want to be just 'consumers' of the information, but desire to actively participate in the experiences received and their interpretations (Barry, 2006). In accordance to this notion,

contemporary museum visitors are less audience than they are author – active contributors to meaning making and content creation (Tallon, 2008). The audience now demands that a primary goal for museums to achieve is to demonstrate information rather than objects (Anderson, 2000). Thus, the traditional role of the museum of acquiring and preserving objects, has shifted to a role of interpreting the collections. Given that today the boundaries between the real and the virtual seem to be blurring, this virtuality gives museums new potential.

In summary, the virtuality of experiences leads museums, which have traditionally been in the ‘authenticity’ business, to reposition themselves from offering authenticity through objects alone to offering information and cohesion (Burton & Scott, 2003).

Today, museums are subject to various demands to enable them to play valid roles in the new world. Museums must show their viability and discuss their value in new contexts where former values are no longer taken for granted. In order to enhance the value of the museum visiting experience and to further increase the societal return on the monetary investment into museums, museum managers, educators, and staff ought to consider the ways in which they want their museums to affect visitors (Pass, 2015). Museums are the gatekeepers of the art world, but have established high barriers for the public to participate in the shaping of art consumption (Arora & Vermeulen, 2014). They have been accused of making the art world deeply elitist. The advent of Web 2.0 raised the promise of an insurrectional change in the art field, allowing for an increase in democratization in the creation of the art object, experience and knowledge by the audiences (Arora & Vermeulen, 2014). Thus, it is significant to detect which are the expectations and the desires of visitors and their actual level of customer satisfaction/dissatisfaction and subsequently to re-design their strategies.

## **2.1. Purpose & Strategic Goals of museums**

The fundamental purpose for a museum is value creation (Porter, 2006). There is a direct correlation between the social benefits provided to audiences and the resources expended for this delivery, which corresponds to the measurement of value. For museums, there are perennially multiple social benefits, which lead to multiple strategic goals (Porter, 2006). However, museums are faced with the challenge of making the right choices of goals and strategies and allocating adequate resources for achieving their profound purpose (Kotler & Kotler, 2000).

According to Holden (2004), the goal of public value lies on “the unchanging concepts of public goods such as equity and fairness, enhancing trust in the public realm, prosperity, thereby placing goals such as social inclusion and diversity in a context that can be easily understood” (Holden, 2004, p. 60). Public value, thus, is a multi-faceted theory with several significant implications for museums (Scott, 2009). The goal of museum managers in regard to public value is “to respond to citizens and users’ preferences renewing their mandates and trust through guaranteeing quality services” (Kelly, Mulgan, & Muers, 2002, p. 10).

Scott (2006) identified three types of public value that museums offer their communities: individual, societal, and economic. Individual value refers to the value museums provide to the individuals, societal value refers to values delivered to the community as a whole, and economic value focuses on how the economy of the community is benefited by museums. Similarly, a study conducted by ACE (2008) found that there was a distinction between individual and community value; however, both of them are parts of the public value context. Figure 1 (Porter, 2006) presents the current strategic goals of museums through which museums can create public value both for individuals and society.

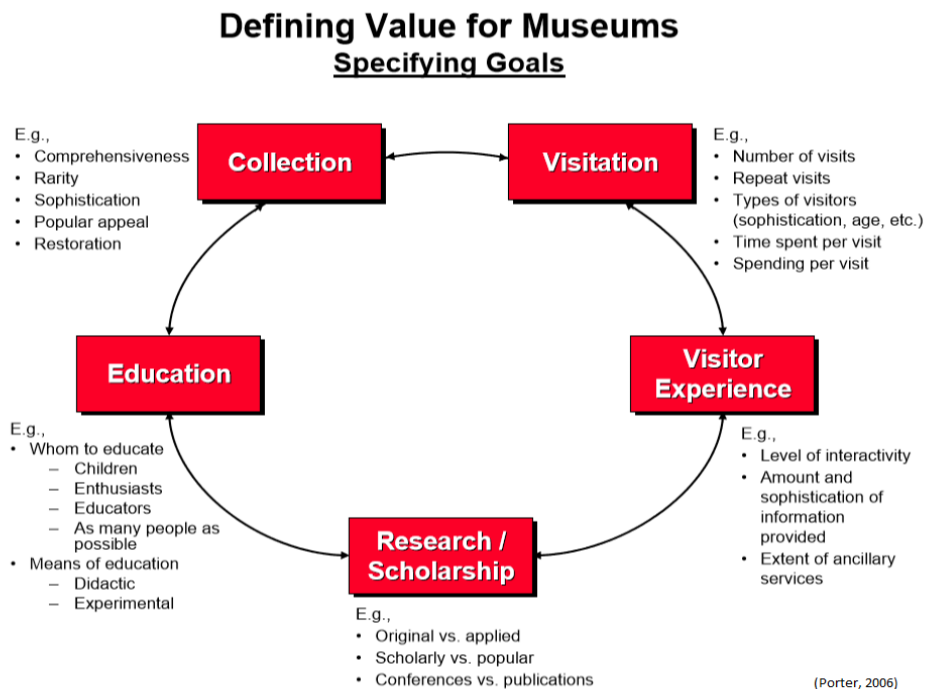


Figure 1: Defining Value for Museums. Porter, (2006) highlighted the main pillars that museums focus on providing value.

Public value charges museums with “maintaining an organization’s legitimacy in the eyes of the public” (Blaug, Horner & Lekhi, 2006, p. 6). Therefore, the public operates as an ‘authorizing agent’ for the quality of value delivered by museums (Scott, 2009). Matching citizens’ preferences and desires with the value provided is of pivotal significance. Hence, museums can achieve this, by seeking the audience’s perspective on the value delivered by the museums, and what value they want from the museums (Scott, 2009).

## **2.2. Business Model Innovation**

A business model describes the logic of a ‘business system’ for creating value (Petrovic et al., 2001). It is a conceptual tool that contains a set of elements and their relationships and allows the expression of the business logic of a specific business. In other words, a business model depicts the value an organization offers its customers, and the structure of the company and its network of partners for establishing and delivering this value and relationship capital, in order to produce profitable and sustainable revenue flows (Osterwalder & Pigneur, 2002).

Although museums are perceived as ‘non-profit organizations’, in which social objectives predominate (education, conservation, information, etc.), they can still adopt similar business models with for-profit companies. They also have commercial objectives, to offer visitors an alternative leisure activity, and pursue financial goals similarly to for-profit organizations (Camarero, Garrido & Vicente, 2011). According to social entrepreneurship theory which refers to innovative activity with a social objective either in the commercial or in the nonprofit sector (Austin, Stevenson & Wei-Skillern, 2003), it can be said that the concepts of entrepreneurship and innovation are highly suitable for museums. Indeed, innovative new media technologies can assist the growth of museums’ competitiveness in the market, since innovation is a crucial factor in gaining competitive advantage (Bakhshi & Throsby, 2012).

The business models of the past were shaped according to the imperatives of the twentieth century. During that industrial age, the logic of organizations required top-up decisions, mass-market conditions and mass-production procedures; this approach was implemented from automobiles to government, from schooling to museums (Falk & Sheppard, 2006). Although the new knowledge age is undoubtedly present, the nature of a museum experience has changed little over the previous decades, since museums have only managed very slight improvements to their business models. Therefore, it is necessary for museums to

change their way of doing business if they want to justify their existence and maintain their audiences in a changing world (Burton & Scott, 2003).

Significantly, in a period of economic insecurity for many countries, some areas of the public sector, such as museums, may face static funding at best, or a diminution in funding at worst. In addition, during the last two decades, there has been a climate of accountability and competition for very limited public resources, which means that museums have faced even greater pressure to present a persuasive case for their role and value to society (Sandell, 1998).

Within this climate, it is necessary for the museum sector to express its value from a position of strength and to defend that position (Scott, 2009). The issues with funding may also lead museums to increase investment in innovation, as a result of having to demonstrate their efficiency in order to ensure funding (McDonald & Harrison, 2002). Indeed, a definitely different innovative management principle appears in this realm nowadays – a new generation of museum’ directors which focuses on entrepreneurship (Gilmore & Rentschler, 2002). One of the most brilliant examples of this entrepreneurial logic is Thomas Krens, the former director of the Guggenheim Museum – well-known for his business-oriented strategy resulting in the museum’s expansion (Bradley, 1997). Under Krens’ directorship, the museum adopted a ‘Global Guggenheim’ strategy, from which ensued branches in different cities all over the world, including Abu-Dhabi, Bilbao and Berlin. According to Krens (1998), cultural institutions in the USA are more business-oriented compared to the ones in Europe because government support for culture is usually higher in Europe than in the US. Regardless of whether American and British museums operate like businesses or not, they depend increasingly on the market for their funding, and subsequently, are more open to obtaining a commercial orientation and adopting different innovations (Hughes & Luksetich 2004). In line with this, museums desire to attract clients and donors through a wider and more appealing range of services. The effect of this is a rise in innovations in value creation and in technology, which enhance visitor experience and make the museum’s work visible to the donor (Camarero, Garrido & Vicente, 2011).

Research has shown that cultural organizations based in English-speaking countries have a more business-like tradition (the Anglo-American model) and are often more successful in the implementation of new technologies and strategies of user engagement than museums based in Europe (Lopez et al., 2010). Museums with a more public tradition (the European model) seem

to have fewer incentives to innovate (Frey & Meier, 2002). This can be explained by the aforementioned fact that the cultural policy followed by each country influences the degree to which museums invest in innovation (Camarero et al., 2011). Thus, it is not a surprise that American museums show have rapid responses in terms of the innovative use of new media technologies (Toepler & Dewees, 2005). On the other hand, the majority of European museums are highly dependent on public funding (Vicente et al., 2012), which implies that they are less maneuverable regarding the innovative implementation of new technologies. Nonetheless, some researchers claim that public funding may motivate cultural organizations to make a greater investment in innovation (Osborne et al. 2008). In fact, when government funding is dependent upon certain stated conditions, the organization has to show its efficiency in order to receive funding. However, public funding for museums is not necessarily devoted to innovation but in many instances given over to refurbishment, maintenance or conservation.

Finally, Camarero et al. (2011) claim that large museums will be proportionately more innovative than small ones because of the disproportion of resources. It is a broadly held view that a large size endows organizations with more advantages in relation to technology as well as the opportunity to be more competitive in the long term (Camarero et al., 2011). Thus, it can be said that the implementation of innovative new media practices by museums is influenced by their size and cultural context.

Despite the significance of cultural context and other factors, it is still crucial for all museum organizations to create an ongoing dialogue with the population and to promote new value propositions for individuals as well as society as a whole. In order to achieve this, museums need to adopt new business models in order to justify their role in the society and provide public value to their audiences. Innovation in a business model is more than a simple product, service or technology. It goes beyond tactical strategies and demands a holistic understanding of the new business environment (BCG, 2009). Innovation becomes business model innovation when the elements of a business model are restructured to deliver value in a new manner (Lindgardt et al., 2009).

### *Business Model Canvas*

According to Osterwalder and Pigneur (2010), a business model consists of nine building blocks, namely, the business model canvas. The nine blocks cover the four main pillars



through which a business operates: customers, offer, infrastructure management and financials. More specifically, the business model canvas is composed of value propositions, customer segments, customer relationship, channel, key activities, key resources, key partners, revenue streams and cost structure. Value propositions and customer segments form the value proposition canvas whose goal is to assist organizations in designing great value propositions that match their customer segments' needs and jobs-to-be-done (Osterwalder, 2012). The way an organization reaches the market and approaches its customer segments is expressed from the customer relationship and the channels. The pillar of infrastructure management is expressed from the blocks of key resources, key activities and key partners, and shows how an organization can deliver its product and establish and maintain a customer relationship (Osterwalder & Pigneur, 2002). Finally, the blocks of revenues streams and cost structure constitute the pillar of financials.

This study will focus on four of the nine blocks because of their relevance with the issue examined. More specifically, this research pursues to explore how the use of mobile applications assists museums to fulfil the increasing demands of their sophisticated audiences by providing new value propositions. Therefore, the four blocks relevant to the study are: value propositions, customer relationship, customer segments, and channels. It will be attempted to analyze how these elements of the business model are repositioned with the assistance of mobile apps to deliver value in a new manner (Lindgardt et al., 2009).

### **2.2.1. Value Propositions**

Value propositions can be perceived as the statements of benefits that are delivered by the organization to its several customer segments (Bagchi & Tulske 2000). It could be described as the way value items, like products and services, as well as supplementary value-added services, are combined and offered to accomplish customer needs (Kambil, Ginsberg & Bloch, 1997).

Value propositions are the critical 'what' of customer experience strategy and management. The customer value proposition is where the organization decides what will be delivered to the customers in terms of tangibles – products, services, offerings – and, more importantly, intangibles – what experiences the customer segments will have from the offerings,

how they will be treated treat them and what is the expected response to this (Osterwalder & Pigneur, 2003).

Value propositions consist of the product and services, the pain relievers and the gain creators an organization creates aiming at delivering value, and they have both tangible and intangible nature (Osterwalder & Pigneur, 2010). A museum that removes the barriers for public participation in the shaping of art consumption (Arora & Vermeulen, 2014) through the provision of products and services that correspond to customer needs alleviates the customer pain of the non-participation to co-creation. Correspondingly, the use of mobile applications can assist museums to create customer gains in relation to the customers' desire to co-create cultural experiences.

Today, visitors can interact with the exhibits through mobile devices during a museum visit. However, effective interaction design needs to take into account multiple dimensions, such as the customer segment in which the mobile applications are addressed, the value propositions museums pursue to deliver, and the usability of these applications (Raptis, Tselios & Avouris, 2005).

For the sake of this study, the uses and gratification theory (U&G) can be considered as one of the most appropriate perspectives for investigating the reasons why audiences choose to deal with the media channel of mobile applications (LaRose et al., 2001; Ruggiero, 2000). U&G research has typically focused on how media are used to satisfy cognitive and affective needs involving personal needs and entertainment needs (Rubin, 2002). U&G is used to recognize consequences that follow from needs, motives and behavior (Katz et al., 1974). Stafford and Gonier (2004) have identified several gratifications from Internet use that motivate users' behaviors. These include web searching, acquisition of information, ability to engage in interpersonal communication, and socialization. U&G states that audiences consciously choose the medium that could fulfill their needs and desires and are able to detect their reasons for making media choices (Katz et al., 1974).

It can be deduced, then, that museums trying to achieve their goals, should make use of the insights of U&G research, and adapt the value provided to correspond to their customers' needs, namely to design mobile applications suitable to fulfill those needs. Thus, it is clear that there is a strong association between those channels and the value provided.

In a nutshell, the connection between the capabilities of mobile applications and the experience provided can lead museum visitors to experiencing tangible value propositions such as (information) accessibility, personalization and interaction (Lovelock & Wirtz, 2007).

#### *2.2.1.1. (Information) Accessibility - Usability*

Accessibility refers to the efforts of museums to make products and services available to their customer segments who previously had deficient access (Osterwalder & Pigneur, 2010). Moreover, ISO 9241-171 and 9241-20 (2001) define accessibility in a very different way as “usability of a product, service, environment or facility by people with the widest range of capabilities”, thus introducing a strong connection with usability. Usability involves the software features that facilitate users’ activities (Preece, 2000). It is stated that software with great usability is consistent, controllable and predictable so that people can carry out their tasks simply, effectively and with pleasure (Preece, 2000). Shneiderman (2000) suggests “universal usability” as a term to enclose both accessibility and usability, but supports that access is not sufficient for guaranteeing successful usage. This way, Shneiderman (2003) defines a different ranking of accessibility in comparison with usability: accessibility is a first but not sufficient prerequisite to achieving universal usability. According to these principles, Accessible Design is defined as a design that concentrates on principles of expanding regular design to people with some type of performance limitation to maximize the number of potential users who can readily use a product, building or service (ISO/IEC Guide, 2006).

Handheld devices, particularly mobile phones, are technologies that users already have an intuitive relationship with since these technologies are in the hands of the wide public, readily available anywhere and anytime. Mobile technologies are able to mediate personally rewarding experiences that no other medium can replicate (Tallon, 2008). As an aspect of mobile technologies, mobile applications have become widely available to mobile users of almost every operating system (iOS, Android), and are often free to access and download (Tallon, 2008). In line with this, museums can be facilitators of accessibility by launching mobile applications that are available for users with the widest range of capabilities, compatible with every operating system, free to download and offered in multiple languages. In addition, mobile applications are accessible when they ensure user access to all content, allow users to

control time limits on their reading or interaction and secure that content is clear and simple (Billi, Burzagli, Catarci, Santucci, Bertini, Gabbanini, & Palchetti, 2010).

Antona, Mourouzis and Stephanidis (2007) support that usability is achieved when the app includes a simulation of the users' reasoned action process in order to ensure that users will be in favor of accessing, exploring, tapping and, eventually, adopting the system, and it addresses the diverse needs of all users, rather than just of the average user, thus embodying accessibility for all target users as an intrinsic measurement. In short, it has been supported that accessibility is a subtheme of usability, denoting that accessibility problems are specific types of usability problems (Thatcher et al., 2003).

Information accessibility means the degree of ease of finding information and the degree of availability of information about an organization (Siu, Zhang, Dong & Kwan, 2013). Appropriate use of information provides a fundamental ability for organizations to best serve the customer (Rogers, Dawe & Guerra, 1991). Museums use websites and applications to communicate information with their visitors but also with their virtual visitors who can become real visitors in the future. The accessibility of information on museum mobile applications is translated in their settings which enable visitors to browse information regarding their needs (i.e. events, visiting hours, location, artworks, etc.). Therefore, information accessibility can function as a way for museums to cement the relationship with their customer segments (Herbig & Shao, 1993).

In terms of media behavior analysis, uses and gratification research on traditional and new media has revealed two typical motives for media consumption, namely, information seeking and entertainment (Graber, 1993; Katz et al., 1974). Information seeking is motivated by the need of users to increase their knowledge about several subjects. For example, a virtual visitor of a museum website who seeks information on the mobile application regarding a specific collection, fulfils the need for consuming information. The need for achieving entertainment through the use of new media, derives from the behavior of modern consumers who have 'limited' time and want to consume 'snack' content (Idato, 2006). Accordingly, users want to consume content based on their increasing needs for high-speed entertainment with increased frequency (Miller, 2007). As such, it becomes clear that the proposition of information accessibility can be readily appreciated by museum visitors.

### *2.2.1.2. Participation and Interaction*

The current age has been called the ‘age of engagement’ (Morgan Stanley, 2005), the ‘age of participation’ (Schwartz, 2005) and an ‘authorship society’ (Rushkoff, 2005). These titles all refer to the shift Web 2.0 brought, emphasizing online collaboration and sharing among users. Web 2.0 allows an online ‘participatory culture’ (Jeckins, 2006) where users are increasingly involved in creating web content as well as consuming it, and they generate value and show independence (Schwartz, 2005). It is worth noting that individuals use new technologies like user-generated sites and mobile applications to fulfil three needs: to consume, to participate, and to produce (Shao, 2009). Heeter (1989) described interactivity as a multidimensional concept: the amount of choices offered to users, the level of effort a user must expend to access information, how actively responsive a medium is to users, the degree to which users can add information to the system, and the level to which a media system facilitates interpersonal communication between certain users. User-to-content interaction happens when people like a specific content, share it with others, post comments, etc. User-to-user interaction occurs when people interact with others through e-mail, chat room, etc. (Shao, 2009).

Web 2.0 technologies have extensively found their way into the museum field, establishing new ways to engage with visitors and enhance their museum experience. Important investments have been made in the development of these new technologies, resulting in distinctive and surprising applications (Arora & Verboom, 2012). Using these, audiences are able to access and interpret museum information in their own pace and on their own terms and add their personal experiences and memories to this body of knowledge (Verboom & Arora, 2013).

Mobile devices, such as smartphones and tablets, have become necessary to everyday life, connecting users in a powerful network through services accessible via mobile applications (Oh & Wang, 2011). Therefore, mobile applications are used to enable audience participation not only in terms of convenience, but also because they tend to urge engaging and interactive social experience (Oh & Wang, 2011). It has been found that a museum application can provide the opportunity for visitors to directly connect to their social media accounts, rate the content contained in the app and then to share the rate with other users. In that way, mobile applications contribute to the formation and maintenance of virtual communities in the context of the museum experience. Therefore, users can fulfil their need to form webs of personal

relationships and can also achieve a sense of belonging and a shared faith that users' needs will be met through their commitment to be together (Rheingold, 2000). A virtual museum community can be easily created since visitors are people who share a similar interest in the arts, and are able to voice opinions and concerns in a supportive environment (Korenman & Wyatt, 1996).

Another way that users employ new media to interact is by producing their own content (i.e. images, videos, etc.). A noteworthy example of a mobile application that allowed users to create their own on-line museum content is that of Voices: FAMSF, an application launched from the Fine Arts Museums of San Francisco through which users can co-create content and engage in what becomes an ongoing community conversation about art (Girardeau et al., 2013).

A factor that motivates people to produce content on new media platforms is the need for self-expression. Self-expression is defined as the expression of one's own identity and especially one's individuality. People have the need to present their 'true' self in the outside world and the desire to control the impressions others have of them (Dominick, 1999). The need for self-actualization derives from an unconscious motive that causes specific behavioral objectives of online production such as seeking recognition, fame, or personal efficacy (Kollock, 1999; Rheingold 1993).

Museums must exploit the opportunities that mobile technologies and mobile applications offer and subsequently find new ways to get the attention of a demanding audience, becoming 'Museum 2.0' (Palumbo, Dominici & Basile, 2013). The new 'mobile economy' imposes a mobile marketing strategy which allows museums to follow the user/visitor along the whole relationship cycle. As expectations for interactivity increase, museums must generate new ways to understand visitors and engage them. For this reason, museums have adopted mobile technologies to a significant extent in recent years. Social media for self-publication, image sharing, mobile apps for creating own masterpiece, or online videos, are some of the ways used to provide solutions for museums to retain their audiences and interact with them (Watkins & Russo, n.d.). Mobile applications with direct links to social media facilitate user participation and thus content is being co-created (Arora & Verboom, 2012).

In a nutshell, interactive mobile applications can enhance the current and the potential visitors' experiences allowing them to get involved in the creation of their museum tour according to their interests (Vom, Lehn & Heath, 2005).

### *2.2.1.3. Personalization*

Consumers have become more demanding which results in them having highly increased expectations and desires. Specifically in the case of museums, visitors deem the museum experience as satisfying if there is a good match between the visitor's needs and the museum affordances (Kuflik, Kay & Kummerfeld, 2010). If a system is to enhance the visitor's experience, it should be able to do this better if it takes into consideration the visitor type, their personal context (prior knowledge, experience and interests), social context and the museum's physical context (Kuflik, Kay, & Kummerfeld, 2010). Thus, all these parameters are taken into account through customization, resulting in tailored offerings to actual customers' characteristics, functioning as a way to provide value (Osterwalder & Pigneur, 2010). In line with this, because of their growing needs, customers show a distinct willingness to provide invaluable information with an aim to receive personalized products that meet their needs and desires (Dominici & Palumbo, 2013).

The visitors' demand for personalized products can be supported by the use of new mobile technologies functioning as facilitators of personalization (Kuflik, Kay, & Kummerfeld, 2010). Mobile applications have the ability to personalize a user's museum visit according to his or her interests, thus assisting the user to experience a tour on the pace desired.

Whatever reason brings a visitor to the museum, they have a limited amount of time (Kuflik, Kay, & Kummerfeld, 2010). This is defined by several restraints, including the opening hours of the museum, the time the visitor has available, their own attention span and that of their companions (Kuflik, Kay, & Kummerfeld, 2010). For example, visitors with very limited time can be benefited by the use of mobile museum applications by experiencing personalized tours to explore the exhibits preferred in a quick way. Besides, especially in museums with different types of exhibits (i.e. archeological, fine art, contemporary art, etc.), mobile applications can function as the best companion to provide a visit experience tailored to the visitor's preferences, especially in museums with different types of exhibits (i.e. archeological, fine art, contemporary art, etc.). The main incentive is to assist visitors in dealing with increasing 'information overload' by helping them find their way around the exhibition, offering the right information at the right time, increasing their awareness of art history themes, and enticing them to visit the museum more frequently (Aroyo et al. 2007). Furthermore, different needs derive from different types of visitors, such as, one-time visitors and regular art lovers. For the former, a good personalized

experience may mean a tour across all the museum highlights, but for the latter a personalized experience can be meaningful in terms of expanding their knowledge about the art themes according to their specific interests and the objects they have already seen (Aroyo et al. 2007). Through personalization, museums can achieve, in the long run, long-lasting and engaging experiences for a broader audience. Thus, this will also allow museums to accomplish one of their core objectives which is to establish and maintain close relationships with their audience.

#### *2.2.1.4. Value Propositions for Society as a Whole*

Museums use instrumental, institutional and intrinsic dimensions for the museum value in communities and society (Scott, 2007). Instrumental value consists of the community capacity, social cohesion and economy. Community capacity shows the educative role of museums as an educational resource for schools, as a source of learning for the whole society, and for knowledge building (Scott 2007, 2008). Whilst much of the current focus on education is on formal resources like schools, informal settings such as museums offer untapped capabilities for communicating social, cultural and scientific information, rectifying misconceptions and improving attitudes and cognitive skills (Screven, 1993). In a dissimilar way to the typical classroom however, the museum has the unique opportunity and resources to make the learning experience one of delight and joyous discovery (Pass, 2015). Learning is voluntary and self-directed in informal settings; it is led by inquisitiveness, discovery, free exploration and the sharing of experiences with companions (Screven, 1993). Learning in museums, in its widest meaning, is a by-product of the free interaction of leisure-oriented visitors with artworks and their environment (Screven, 1993).

In a similar manner, the notion of ‘the new museology’ involved a paradigm shift from object-oriented to customer-oriented museums in which the knowledge about the exhibitions should not only derive from the museum’s staff of experts, but should compose various narratives from different perspectives, highlighting the educational side of the museum (Hooper-Greenhill, 2000). This value can be better declared through the effect the museum objects have on their audiences as different generations of visitors assign meaning, understanding, and context to them (Pass, 2015). This idea is supported by the establishment of new media technologies, and currently the diffusion of mobile applications, which changed the way of communication, enabling new connections between the museum and the public



(Verboom & Arora, 2013).. Museums have the unique chance and resources to make the learning experience one of exhilaration and gleeful discovery. Indeed, this experience is what museum educators ought to strive toward building and sharing with their visitors as they face declining attendance rates in the 21st century (Pass, 2015).

Museums also contribute to the achievement of social cohesion by providing opportunities for engagement, such as volunteering programs, or chances for social interaction. Within the current rise of social and mobile media, visitors can use museums' technologies to connect with each other, to be engaged, and to share their opinion.

Furthermore, museums "can contribute towards social inclusion at individual, community and societal levels" (Sandell, 2003, p.45). At a community level, museums can dramatically affect social regeneration, can help communities to increase their self-determination and evolve the confidence and skills to obtain greater control over their lives. In addition, according to Sandell (2003) "museums, through the representation of inclusive communities within collections and displays, have the potential to promote tolerance, inter-community respect and to challenge stereotypes" (p. 45). Moreover, the instrumental value of museums lies on their contribution to the local economy. The economic value of museums describes the degree in which the museums generate benefits for society; it involves both the financial and commercial benefits and the non-market benefits (Peacock, 1998). Direct impacts on the economy can be detected in employment, the purchase of services and the launch of new commercial products. Besides, museums attract tourists, add value to the local economy, assist in urban regeneration plans, attract creative people to communities, conduce to civic branding, promote subject expertise and inspire new product development. For museums, new product development is of pivotal importance for achieving long-term performance both financially and non-financially (Griffin & Page, 1996). Museums, by designing and launching mobile applications that have the potential to personalize the users' museum experience whenever and wherever they like, integrating displays and exhibitions according to users' expectations and wishes, attempt to implement a successful service development (Palumbo, Dominici & Basile, 2013).

According to Scott's typology of museum value (2007), museums provide institutional value to the society and this value is based on four aspects. The first one addresses the access of the public to the exhibitions and the contribution of museums to democracy by encouraging

public debate. The second contribution refers to the supply of high quality information to the audience and the third aspect relates to the achievement of the public's trust and loyalty based on the provision of excellent services. Finally, the fourth contribution of museums is the establishment of partnerships with local and international entities.

Last, the intrinsic value of museums constitutes their historical, social and symbolic value and expresses the sense of belonging, the experience of the past, the community identity, and generates sentiments of wonder and awe.

### **2.2.2. Customer Relationship**

The customer relationship element refers to the way a business reaches the market and approaches its customers. Customer relationship consists of the feel and serve element, which involves the channels used from businesses to reach the customers, the information strategy for the collection and use of customer information, and the trust and loyalty element, which is essential especially today, in the 'virtual' business world (Osterwalder & Pigneur, 2002). All the elements combined, aim to improve relationships and adapt the business's response to customer needs (Winer, 2001). Museums, together with other places of heritage and tourism industries, are highly related to consumer welfare, especially to consumers' need for high-quality tourist services. Hence, research into customer relationship management in museums is timely and crucial (Siu, Zhang, Dong & Kwan, 2013).

Businesses, today, seek to achieve long-term profitable relationships with customers, since the strong competition, the plethora of available choices for consumers, and the new consumer behavior, create new pressures on marketing decision-makers (Hennig-Thurau & Klee, 1997). Organizations invest in customer relationship management as part of their efforts to optimize the customer experience, increase customer satisfaction and customer loyalty, and provide better customer service (Winch, 2011). Customer relationships, like any relationship, can only thrive if there is input from both parties. Thus, customers' contribution to this 'dialogue' is a prerequisite for a long-last relationship. Today, many organizations attempt to foster a dialogue with their customers by providing customer satisfaction surveys, or other options such as forms for providing feedback to organizations (Winch, 2011). In line with this, the advent of new technologies and in recent years, the new 'mobile economy' enables museums to establish a dialogue with the audience, paramount for relationship building.

Customer relationship management (CRM) requires organizations to tailor their products and services and interact with their customers based on actual consumer preferences and desires, rather than some presumptive general characteristics (Peppers & Rogers, 1997). Therefore, CRM implies a customer-oriented approach to strategy, organizational structure and culture, processes and measures. Museums, based on the rationale of change, must build long-term relationships with their audiences through the implementation of customer relationship strategies to satisfy their visitors' expectations (Falk & Sheppard, 2006).

The successful implementation of CRM strategy can be of great benefit to the organizations, since organizations like museums can achieve growing revenues through better market segmentation, customizing services, and above all, securing long-lasting customer-retention, commitment and loyalty (Stockdale, 2007). Museums can further cultivate the relationships with their public by exploiting the capabilities of mobile applications to link in other resources such as e-mail newsletters and retail options (ticket sales, online shops, membership cards, personalized discounts) (Rentschler & Hede, 2009). On top of that, the aim of customer satisfaction can be achieved, resulting to the maintenance of the customer relationship.

Following the notion of customer satisfaction, it is unavoidable to refer to Kotler's statement (1972) which declared that achieving 'customer satisfaction' required the channeling of all efforts of the business into identifying and fulfilling customer desires in specific places and at specific times. Moreover, Kotler states: "The key to customer retention is customer satisfaction" (Kotler, 1994, p. 20). Additionally, the customer relationship element is significantly influential for the overall customer experience and focuses on three different goals: customer acquisition, customer retention or boosting sales (Osterwalder & Pigneur, 2010).

Finally, customer loyalty can be perceived as the outcome of the customer's trust and satisfaction. Customers can show their loyalty, when their perception about the level to which a museum dedicates resources, effort, and attention to developing, maintaining and strengthening relationships with them is perceived positively (Wulf et al., 2001). Perceived relationship investment is influenced by the relationship-marketing strategy that promotes commitment (Wulf et al., 2001).

### 2.2.3. Customer Segment

Organizations create value for specific segments of customers (Osterwalder & Pigneur, 2010). Each customer segment presents similar customer jobs, customer pains, and customer gains. An organization, by sketching out these three elements, aims to obtain a deep understanding of specific customer needs for which it will attempt to provide corresponding value propositions (Osterwalder, 2012).

Museums today need to attract increased audiences due to the fact that limited public funding has led their revenue to decline. However, museum visitors can no longer be perceived as ‘the general public’, but must be treated as individuals, who have distinctive characteristics and desires to be fulfilled (Hooper-Greenhill, 2000). In some cases, visitors repeatedly visit the same museum whilst in other cases, especially in the case of tourists, there may only ever be a single visit that museum. Conceptualizing the reasons that people visit museums, different types of visitors are arisen, namely the Explorers, Facilitators, Experience seekers, Professionals/Hobbyists, and Rechargers (Falk, 2009). People come to a museum with children, for recreation, or due to the reputation of the museum or a current exhibition, out of interest (in the collection/museum/ museology) (Durbin, 1996). The understanding of differentiated audiences and the reasons that bring them to a museum leads museums to think more analytically about the experience provided to them (Bicknell & Farmelo, 1993). The ‘general public’ can be broken down to smaller groups according to age, traits, place of origin, and their purpose for coming (Hooper-Greenhill, 2000). Thus, museums have taken into account the diversity of their audiences, and are now beginning to plan their displays according to different interests and experience.

Contemporary media users are less audience than they are active contributors to meaning making and content creation (Tallon, 2008). They seek to explore higher levels of interaction with content and are highly familiar with social media. There is no denying that new technologies are an established trend and museums need to attract the generations of digital natives (Prensky, 2001).

The common audiences of museums such as children, students, family groups, tourists, and regular art lovers can be served distinctively through the use of mobile applications. User behaviors that seek high levels of interaction may provide a means for museums to co-create new cultural experiences (Watkins & Russo, n.d.). It is worth noting that mobile apps ask for

access to personal data, aiming to a better segmentation of the customers (Dipl-Kfm, 2014). Data generated through users' use of mobile apps is of special analytic value because it not only offers insights into users' 'digital' lives (e.g. internet browsing preferences), but also into their 'real' lives (e.g. location data, interests) (Dipl-Kfm, 2014). While the data generated by a single app contains only a very small fraction of information about the user, the variety of data that can be created is stunning (Dipl-Kfm, 2014). The particular architecture embedded into apps allows for a combination and aggregation of these fragmented pieces of data. This link to the individual identity creates a deep and holistic picture of the consumer (Dipl-Kfm, 2014). This detailed analysis of users' profiles that mobile apps permit, enables museums to launch applications that contain ad hoc features for each customer segment, accounting for their distinct needs (family tours, highlight tours, audio guides for visitors with disabilities, etc.), achieving in that way the desirable experience expected by the audience.

#### **2.2.4. Channels**

Channels show how organizations 'go to market' and how they actually 'reach' their customers (Hamel, 2000). Therefore, value propositions are delivered to customer segments through the channels used from organizations (Osterwalder & Pigneur, 2010). Since the terrain of communication channels is expanding quickly, today's media environment becomes more complex. The establishment of new media and especially mobile technologies changed the world of entertainment, communication and information, mainly because of their self-sustaining characteristics and their growing use from an ever-increasing audience (Shao, 2009). With the introduction of the iPhone in 2007, the whole industry and the way people use and integrate mobile devices in their everyday life have changed overwhelmingly (Dipl-Kfm, 2014). Smartphones have replaced standard mobile phones in last years and tablets are on their way to taking the place of notebooks and desktop PCs (Dipl-Kfm, 2014). A recent study by Meeker and Lu (2013) indicated that global mobile traffic was estimated at around 15% of the total internet traffic in 2013 and anticipated, at that time, that by 2015 more people would access the internet via a mobile device than from a desktop (Dipl-Kfm, 2014). Furthermore, research conducted by Flurry (2014) has shown that users today are spending around three hours per day on their mobile devices, which validates the claim that the mobile upsurge is a phenomenon of the current era.

Mobile devices offer new opportunities and challenges in the field of information technology and in society in general, such as omnipresent access, portability, personalization, and democratization of information access, opportunistic interaction, lower intricacy, flexibility, and efficiency of use (Billi et al., 2013). On the other hand, mobile devices innately display several limitations, namely: small screen, limited input capabilities, limited power (batteries), and broad heterogeneity. Some additional issues such as interruptions, privacy and security, and availability arise from context and interaction.

Along with the changes in mobile device manufacturing a whole new sector has evolved, providing innovative software and mobile applications. This rise of mobile devices fast-forwarded the use of mobile applications based on the logic that native mobile apps perform better than mobile web browsers and thus offer better user experience (Charland & Leroux, 2011). In line with this, current research has shown that users are turning away from the use of browsers and increasingly rely on applications (Spence, 2014). Indeed, they ask for continuously improved mobile applications that match their digitized lifestyle and personal needs (Dipl-Kfm, 2014). Native apps, i.e. mobile apps that require downloading from an app store, are a better option than responsive mobile web, namely web designs that are able to self-adapt to a mobile device in order to be seen (Murillo, 2015). Native apps are basically more expensive because the development team has to create a unique design and codebase for each operating system (Murillo, 2015). However, the results regarding quality, speed and opportunity to use several capabilities of the smartphone and other systems are generally superior (Murillo, 2015). Moreover, with native apps, users do not necessarily need an Internet connection in order to use the app. Once the app has been downloaded, it is stored directly on their device, so they are able to access it in every context (Murillo, 2015). Last but not least, in terms of performance, native apps also solve the problem of loading times, as native elements are designed specifically with mobile performance in mind. They are much lighter, much faster, and tend to provide a much better user experience.

New possibilities arise for museums to exploit these tools for communicating in new ways and promoting their collections and programs (Economou & Meintani, 2011). The use of mobile apps opens up new channels of communication between the museum and the user, which go beyond the boundaries of the museum's walls (Economou & Meintani, 2011). In addition, mobile apps allow mobile users to personalize repeated actions, as well as to set the

system dynamically in line with contextual needs. These mobile apps increasingly offer comprehensive features that exploit the devices' technical capabilities to a big extent, triggering, in turn, the need for constant technological innovation (Dipl-Kfm, 2014).

However, for the sake of this study, it is also interesting to investigate how mobile applications are related to the other new media channels that are used by museums. More specifically, how mobile applications are used along with other new media platforms (offering direct links, providing common or distinct content, serving different purposes etc.). Research has shown that corporate websites typically serve as the primary point of contact and information. However, in the 'age of engagement' (Morgan Stanley, 2005), where users no longer seek passive information but active participation, a website that provides basic information about the museum can barely attract broader audiences. Therefore, museums need to engage their audiences through new media technologies and, further, to strategically design their online communication in order to be seen on the Web (Russo, 2011).

In the case of museums, the most obvious use of new technologies has been in the development of websites as a means of providing information for consumers and, where appropriate, online booking and ticket handling facilities (Bakhshi & Throsby, 2012). In addition, given that it has been supported that a museum without a website can hardly be perceived as professional (Bearman & Geber, 2008), it can be claimed that museums need to invest on all the new media platforms such as websites, newsletters and social media platforms. Research has shown that museums benefit from the implementation of various new media technologies, concluding that all together can function in conjunction towards the achievement of audience engagement (Russo, Watkins & Groundwater-Smith, 2009).

Nevertheless, the arguments above show that museum websites (desk or mobile) can be used as a source of information before the visit, however, during and after the visit, mobile applications seem to be the most popular tool in terms of a better user experience (Charland & Leroux, 2011). Consequently, museums with a goal to provide better visit and user experience to their audiences, to actively engage with audiences and to co-create new cultural experiences, need to exploit all the capabilities of mobile applications which allow technological convergence, and in that way audiences can access cultural experiences at any time, in any place and in any form (Bakhshi & Throsby, 2012). Hence, what a mobile application can achieve is to facilitate the concept of the 'museum without walls' (Hooper-Greenhill, 2000, pp. 152–153)

where indeed the idea of an entirely virtual museum takes shape and visitors can attend only in cyberspace (Styliani et al., 2009).

To conclude, an essential line of innovation for museums to increase audience reach is the launch of mobile apps which permits users to access the museum’s collections on their hand-held devices incorporating all the Web 2.0 tools such as direct links to social media platforms, emails and museums’ websites.

### 2.3. Conceptual Model

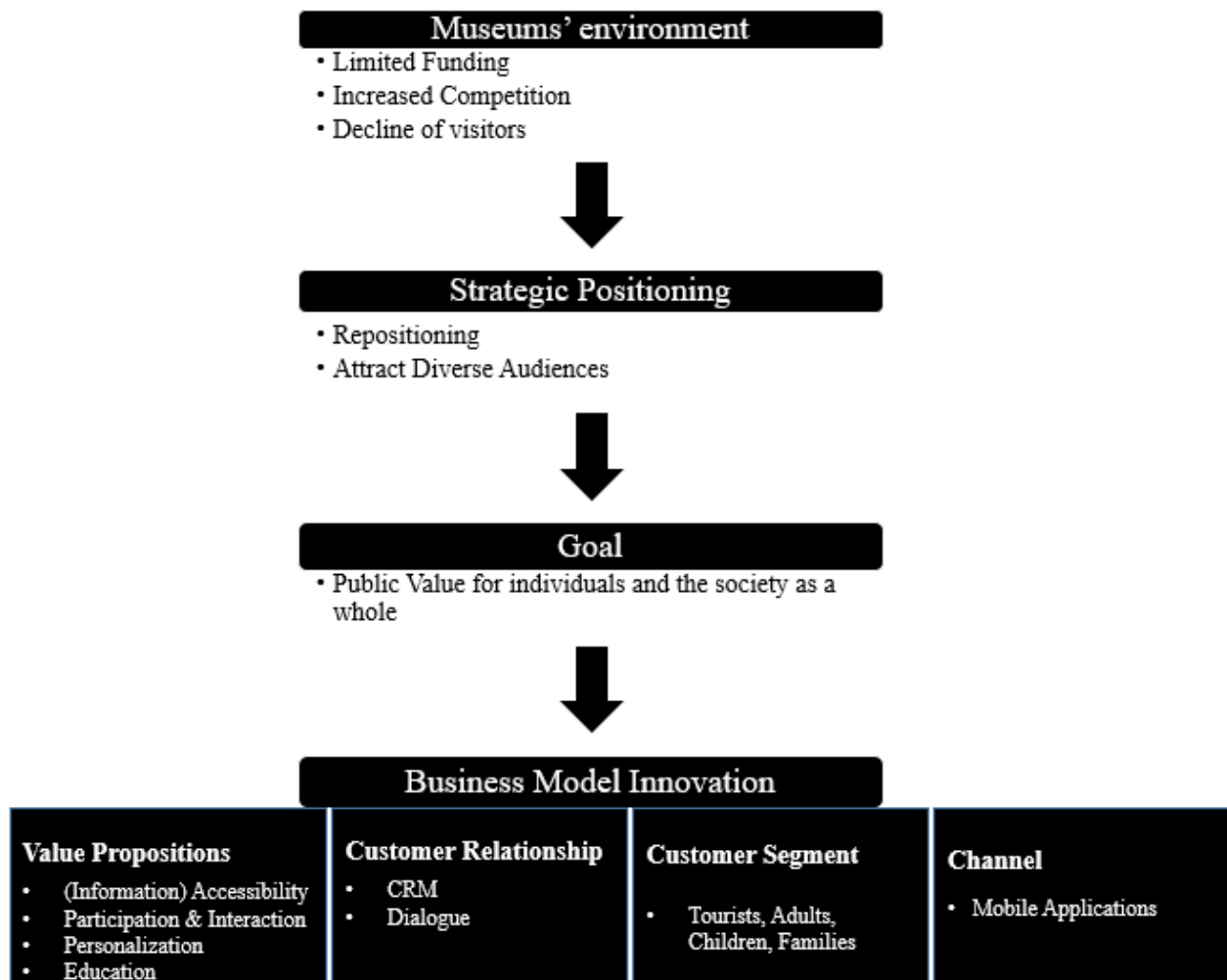


Figure 2: Conceptual Framework of the study. This conceptual model guided the data collection and analysis.



### 3. Method

For the purposes of this study, an analysis of a number of existing mobile applications used in museum environments was carried out, in order to examine the degree to which mobile applications fulfill the strategic objectives of museums, and at the same time, the degree to which the visitors' experience improved museum visits or not. In order to systematically address the topic, this study made use of case studies with a view to produce a deep understanding about a real-world situation (Yin, 2011). In fact, the strength of the case study method—compared to other methods, is its ability to examine, in-depth, a 'case' within its 'real-life' context (Yin, 2014).

Case study research has one starting point: the desire to deeply understand a single or a small number of 'cases' set in their real-world contexts (Bromley, 1986, p. 1). To define it, "case study is an empirical inquiry about a contemporary phenomenon, set within a real-world context - especially when the boundaries between phenomenon and context are not clearly evident" (Yin, 2009a, p.18). For the purposes of this study, a number of existing cases were examined to test if previous literature and empirical reality are associated.

In contrast to surveys, regularly the number of units in a case study is significantly lower than in a survey, but the extent of detail available for each case is larger. In comparison with an experiment, the case study researcher has less control over the variables than when an experiment is used to research a phenomenon (Rowley, 2002). In a survey, data may be collected from a number of organizations in order to permit generalizations for all other similar organizations. In contrast, a comparative case study across a number of different organizations aims to compare the organizations studied in a systematic way with a view to investigate distinct research issues (Rowley, 2002).

The case study is a research strategy which concentrates on understanding the dynamics present within single settings (Eisenhardt, 1989). This makes it a suitable method to approach this rather new topic area in an effort to understand how mobile applications enhance the visit experience and the value delivered by museums (Eisenhardt, 1989).

Additionally, the use of case studies is pertinent to unfolding a complex phenomenon like the subject of this study, and adds strength to the findings of prior research. This type of research aims at frame-breaking insights, testing good theory and convincing grounding in the

evidence (Eisenhardt, 1989). Therefore, it can be evaluated as novel, testable and empirically valid.

A second reason that the case study method has been chosen as research method is because case studies are appropriate when a research addresses an explanatory question (questions beginning with ‘how’ or ‘why’). Yin (2014) argues that this method has a distinct advantage when the research addresses explanatory questions and also when the research pursues to illuminate a particular situation; in contrast, a well-designed experiment is used to infer causal relationships, and a survey is more appropriate for looking at the frequency of occurrence of a phenomenon.

Finally, the case study method is suitable for this research since the inquiry simultaneously relies on multiple sources and many variables of interest, and also because theoretical propositions are used to guide the collection and analysis of data (Yin, 2014). For these reasons, it was deemed able to adequately address the research questions posed.

### **3.1. Research Design**

In regard to the research design of this study, a theory driven thematic approach has been followed, with a view to reveal the importance of questions and propositions in advance of data collection (Yin, 2014). This is contradictory to the alternatives like the grounded theory or the inductive approach, in which questions, insights, propositions, and pictures come out from the data collection (Rowley, 2002). This approach has been claimed to provide a solid foundation for understanding and managing issues such as validity and reliability, and for structuring data collection and analysis, and as such has been deemed appropriate for the purposes of this study (Rowley, 2002).

A research design is the rationale that connects the data to be collected and the conclusions to be exported to the initial questions of a study so that coherence can be secured. This involves defining the basic pillars of the research, such as the research questions and propositions, appreciating how validity and reliability can be achieved, and selecting a case study design (Rowley, 2002). The process to translate research questions into propositions permits the researcher to make a speculation, on the basis of the literature and any other earlier evidence as to what they expect the findings of the research to be. The data collection and analysis can then be formed in order to ensure or disprove the research propositions.

According to Eckhardt (2013), the business model concept is an invaluable tool for practitioners to generate and test theories about how a business delivers value to its customer segments. Thus, this study uses the four elements of the business model canvas which were described in section two, with an aim to test value practices implemented by museums.

Additionally, research design includes the analysis of multiple sources in order for valid results to be exported. It is common for case study research to use sources such as documents, artifacts, interviews, and observation, and this facilitates the triangulation of evidence, namely the collection of evidence from different sources to corroborate the same fact or finding (Rowley, 2002). Thus, when a pattern from one data source is verified by the evidence from another, the finding is stronger and more confident.

If two or more cases are shown to support the same theory, replication can be claimed. The greater the number of case studies that demonstrate replication the greater the rigor with which a theory has been built (Rowley, 2002). Replication logic can vary between direct replication and theoretical replication. Direct replication lies on the finding of similar patterns across the cases whilst theoretical replication produces contrasting results (Yin, 2011).

A first step for designing the case study research is to define the case which may be an organization, a behavior or a phenomenon, and is considered to be the main unit of analysis in a case study (Yin, 2011).

### **3.2. Case Selection**

Selecting the unit of analysis, or the case is crucial. Case selection must be led by the research purpose, questions, propositions and theoretical context, but it can be constrained by several factors such as accessibility, resources and time available (Rowley, 2002).

During the design phase of case study research, the researcher decides what approaches to use in choosing single or multiple real-life cases. Whether single or multiple, the researcher can also select to keep a holistic case or to have embedded subcases within an overall holistic case (Yin, 2011). According to Small (2009), the question of the ideal number of cases to be included in a multiple-case study is a topic of much debate in the field. For the current study, a multiple-case study involving eleven case studies has been selected, guided by the argument that the higher the number of cases the greater the confidence or certainty in the study's findings (Yin, 2011). The sampling of the cases has not been selected randomly or statistically, but based

on theoretical reasons (Glaser & Strauss, 1967). The objective of theoretical sampling is to select cases which are likely to replicate or extend the emergent theory (Eisenhardt, 1989). In other words, the cases selected to test if the findings predict similar results (direct replications) or contrasting results (theoretical replications) (Yin, 2011). In addition, several studies have illustrated theoretical sampling. Many researchers have used theoretical sampling aiming at extending the existing theory in order to build a business model applicable to various organization types (Eisenhardt, 1989). For the purposes of this research, the cases chosen (Table 1) represent a variety of geographic regions as well as size parameters; the selection of cases ranges from the largest museums (i.e. Hermitage, Metropolitan) to quite small ones (i.e. Mauritshuis, Dali Museum). This selection derived from the notion that size and cultural context of museums influence the implementation of innovative new media technologies (Camarero et al., 2011). Thus, museums that represent either the European Model or the Anglo-American Model were chosen in order to verify the afore-mentioned evidence regarding the cultural policy and its relation to the degree to which museums invest in innovation (Camarero et al., 2011).

The following table outlines the cases that were analyzed:

Table 1: Case selection

<b>Mobile Application</b>	<b>Museum</b>
The Rijksmuseum app	Rijksmuseum, Netherlands
Guggenheim Bilbao app	Guggenheim, Spain
Guggenheim app	Guggenheim, USA
Tate Britain Mobile Guide app	Tate Britain, UK
Mauritshuis Tour	Mauritshuis, Netherlands
Centre Pompidou	Centre Pompidou, France
Dali Museum Virtual Tour	The Dali Museum, USA
The State Hermitage Museum App	Hermitage Museum, Russia
Met app	The Metropolitan Museum of Art, USA
KHM Stories app	Kunsthistorisches Museum, Austria

Istanbul Modern app	Istanbul Museum of Modern Art, Turkey
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### 3.3. Operationalization

These eleven mobile applications of various museums have all been researched employing the four main blocks of the business model canvas outlined by Osterwalder and Pigneur (2010), i.e. the value proposition, customer relationships, customer segment, and channels, which were described in the section two. All of the mobile applications were observed in Android version except for Tate app that was observed in iOS version. The Tate app, whilst launched both for iOS and for Android, was not functioning in its Android version for the period of this research; thus its performance was observed through the iOS version. The elements of the business model canvas were researched using mobile app observation (Yin, 1994).

However, for the purposes of this research, it was deemed appropriate to additionally use other qualitative research methods combined with observation as a means of triangulation—‘the combination of methodologies in the study of the same phenomenon’ (Denzin, 1970, p. 291). Moreover, documents such as annual reports, websites, and external sources have been used. Document analysis is defined as the systematic procedure for reviewing or evaluating documents, in both printed and electronic versions. Document analysis, like any other analytical method in qualitative research, demands data to be analyzed and interpreted in order to reveal meaning, gain understanding and develop empirical knowledge (Corbin & Strauss, 2008).

Documents can contain text and images that have been recorded without a researcher’s intervention (Bowen, 2009). These can be institutional and industry reports, survey data, websites, archival artifacts, etc. The analytic procedure requires finding, selecting, evaluating and synthesizing data included in documents (Bowen, 2009). Document analysis provides data that are then organized into major themes, categories and case examples especially through thematic analysis. Thematic analysis thus seems to be the most suitable method to identify themes that have arisen from the documents examined and to address how a particular social object (public value) is portrayed in a particular context (museums).

The qualitative researcher is expected to be based on multiple (at least two) sources of evidence; that is, to seek convergence and confirmation through the use of different data sources

and methods. Therefore, multiple sources have been used in this study to attain the goal mentioned.

It is noteworthy that unlike most other methods, in case studies the researcher usually needs to do data collection and data analysis together. Yin supports that “a key demand of the case study method is the investigator’s skill and expertise at pursuing an entire (and sometimes subtle) line of inquiry at the same time as (and not after) data are being collected” (2014, p. 4). In order to address the objectives of this study, the following data were perused. Annual reports, websites and observation were used for the analysis of the element of value proposition. Documents and in-depth observation were researched for the blocks of channel and customer segment. Finally, for the customer relationship, in-depth observation was used.

The following table (Table 2) includes the documents that were used in conjunction with the observation of the eleven mobile apps (cases) in order for a triangulation of the data to be achieved.

Table 2: Documents selected for analysis in order for a triangulation of the data to be achieved.

<b>Case</b>	<b>Theme</b>	<b>Document Type</b>	<b>Citation</b>
Met app	Channel	Article	Porges, S. (2014). The Met's New App Is Modest, But Could Foreshadow Big Things. Retrieved from <a href="http://www.forbes.com/sites/sethporges/2014/09/03/the-mets-new-app-is-modest-but-could-foreshadow-big-things/">http://www.forbes.com/sites/sethporges/2014/09/03/the-mets-new-app-is-modest-but-could-foreshadow-big-things/</a>
Met app	Value Proposition	Article	Dzikiy, P. (2014). Apps of the Week: The Met, Iconic, Infinity Blade 1.4 more. Retrieved June 11, 2016, from <a href="http://www.ilounge.com/index.php/news/comments/apps-of-the-week-the-met-iconic-infinity-blade-1.4-more">http://www.ilounge.com/index.php/news/comments/apps-of-the-week-the-met-iconic-infinity-blade-1.4-more</a>
Met App	Value Proposition	Article	Wood, M. (2014). Tour a Museum From Anywhere. Retrieved June 11, 2016, from <a href="http://www.nytimes.com/2014/10/26/business/apps-offer-virtual-tours-of-museums-and-more.html">http://www.nytimes.com/2014/10/26/business/apps-offer-virtual-tours-of-museums-and-more.html</a>
Guggenheim Bilbao App	Value Proposition /Customer Segment	Article	Wood, M. (2014). Tour a Museum From Anywhere. Retrieved June 11, 2016, from <a href="http://www.nytimes.com/2014/10/26/business/apps-offer-virtual-tours-of-museums-and-more.html">http://www.nytimes.com/2014/10/26/business/apps-offer-virtual-tours-of-museums-and-more.html</a>

Rijksmuseum App	Value Proposition /Customer Segment	Article	Wood, M. (2014). Tour a Museum From Anywhere. Retrieved June 11, 2016, from <a href="http://www.nytimes.com/2014/10/26/business/apps-offer-virtual-tours-of-museums-and-more.html">http://www.nytimes.com/2014/10/26/business/apps-offer-virtual-tours-of-museums-and-more.html</a>
Rijksmuseum App	Channel	Journal	P. Gorgels, Rijksstudio: Make Your Own Masterpiece!. In <i>Museums and the Web 2013</i> , N. Proctor & R. Cherry (eds). Silver Spring, MD: Museums and the Web. Published January 28, 2013. Consulted June 18, 2016 . <a href="http://mw2013.museumsandtheweb.com/paper/rijksstudio-make-your-own-masterpiece/">http://mw2013.museumsandtheweb.com/paper/rijksstudio-make-your-own-masterpiece/</a>
Istanbul Modern App	Value Proposition	Article	Wood, M. (2014). Tour a Museum From Anywhere. Retrieved June 11, 2016, from <a href="http://www.nytimes.com/2014/10/26/business/apps-offer-virtual-tours-of-museums-and-more.html">http://www.nytimes.com/2014/10/26/business/apps-offer-virtual-tours-of-museums-and-more.html</a>
Istanbul Modern App	Value Proposition	Article	Turkcell develops app for Istanbul Modern visitors. (2016). Retrieved June 11, 2016, from <a href="http://www.hurriyetdailynews.com/turkcell-develops-app-for-istanbul-modern-visitors.aspx?pageID=238">http://www.hurriyetdailynews.com/turkcell-develops-app-for-istanbul-modern-visitors.aspx?pageID=238</a>
Centre Pompidou App	Value Proposition	Article	4 Great & Free Museum Apps to Teach your Students or to simply enjoy. (2012). Retrieved June 11, 2016, from <a href="http://www.edukwest.com/4-great-free-museum-apps-to-teach-your-students-or-to-simply-enjoy/">http://www.edukwest.com/4-great-free-museum-apps-to-teach-your-students-or-to-simply-enjoy/</a>
Centre Pompidou App	Value Proposition	Article	Le Centre Pompidou lance sa nouvelle application gratuite en mettant l'accent sur la personnalisation et l'après visite. (2015). Retrieved June 11, 2016, from <a href="http://www.club-innovation-culture.fr/le-centre-pompidou-lance-sa-nouvelle-application-gratuite-en-mettant-laccent-sur-la-personnalisation-et-lapres-visite/">http://www.club-innovation-culture.fr/le-centre-pompidou-lance-sa-nouvelle-application-gratuite-en-mettant-laccent-sur-la-personnalisation-et-lapres-visite/</a>
The State Hermitage Museum App	Value Proposition	Article	Shilovskaya, T. (2014). Hermitage apps show the way for Russian museums. Retrieved from <a href="http://rbth.com/science_and_tech/2014/06/20/hermitage_apps_show_the_way_for_russian_museums_37611.html">http://rbth.com/science_and_tech/2014/06/20/hermitage_apps_show_the_way_for_russian_museums_37611.html</a>
Mauritshuis Tour	Channel	Article	Trend, N. (2014). The Mauritshuis visitor guide. Retrieved from <a href="http://www.telegraph.co.uk/travel/destinations/europe/netherlands/the-hague/articles/The-Mauritshuis-visitor-guide/">http://www.telegraph.co.uk/travel/destinations/europe/netherlands/the-hague/articles/The-Mauritshuis-visitor-guide/</a>

Mauritshuis Tour	Channel	Article	A Local's Guide to the Hague [Web log post]. (2015). Retrieved from <a href="http://www.huffingtonpost.com/college-tourist/a-locals-guide-to-the-hag_b_8126064.html">http://www.huffingtonpost.com/college-tourist/a-locals-guide-to-the-hag_b_8126064.html</a>
Centre Pompidou App	Value Proposition /Channel	Annual Report	Centre Pompidou, (2016). <i>2014 annual report of the Centre Pompidou</i> . Retrieved from <a href="http://mediation.centrepompidou.fr/documentation/bilandactivite2014/">http://mediation.centrepompidou.fr/documentation/bilandactivite2014/</a>
Tate Britain App	Channel	Annual Report	Tate, (2016). <i>2014/2015 annual report of the Centre Pompidou</i> . Retrieved from <a href="http://www.tate.org.uk/download/file/fid/56701">http://www.tate.org.uk/download/file/fid/56701</a>
KHM Stories	Channel	Annual Report	Kunsthistorisches Museum, (2016). <i>2015 annual report of the KHM</i> . Retrieved from <a href="http://press.khm.at/fileadmin/content/KHM/Ausstellungen/2016/Jahresberichte_2016/Jahr_15_KHM_Druck.pdf">http://press.khm.at/fileadmin/content/KHM/Ausstellungen/2016/Jahresberichte_2016/Jahr_15_KHM_Druck.pdf</a>
Rijksmuseum app	Channel	Official Website	<a href="https://www.rijksmuseum.nl/">https://www.rijksmuseum.nl/</a>
Guggenheim Bilbao app	Channel	Official Website	<a href="http://www.guggenheim-bilbao.es/en/">http://www.guggenheim-bilbao.es/en/</a>
Guggenheim app	Channel	Official Website	<a href="https://www.guggenheim.org/">https://www.guggenheim.org/</a>
Tate Britain Mobile Guide	Channel	Official Website	<a href="http://www.tate.org.uk/">http://www.tate.org.uk/</a>
Mauritshuis Tour	Channel	Official Website	<a href="https://www.mauritshuis.nl/en/">https://www.mauritshuis.nl/en/</a>
Centre Pompidou	Channel	Official Website	<a href="https://www.centrepompidou.fr/">https://www.centrepompidou.fr/</a>
Dali Museum Virtual Tour	Channel	Official Website	<a href="http://thedali.org/">http://thedali.org/</a>
The State Hermitage Museum App	Channel	Official Website	<a href="https://www.hermitagemuseum.org/">https://www.hermitagemuseum.org/</a>
Met app	Channel	Official Website	<a href="http://www.metmuseum.org/">http://www.metmuseum.org/</a>



KHM Stories	Channel	Official Website	<a href="https://www.khm.at/">https://www.khm.at/</a>
Istanbul Modern app	Channel	Official Website	<a href="http://www.istanbulmodern.org/en">www.istanbulmodern.org/en</a>
All the mobile apps	Customer Segment	Website	<a href="https://play.google.com/store/apps/">https://play.google.com/store/apps/</a>

The collection of these data started at the beginning of April 2016 and finished at the end of May. The case study template below (Table 3) presents the manner in which each component of the business model was analyzed. This template can be perceived as the blueprint of the research; within this, each case has been systematically researched based on the elements sketched out in the theoretical framework.

### 3.3.1. Case study template

Table 3: Operationalization of the research process

<b>Value Proposition</b>	<b>Operationalization</b>
(Information) Accessibility – Usability	<p><b>Mobile app observation and document were used.</b></p> <p>The analysis of this theme was twofold.</p> <p>First, accessibility was measured using the criteria of ease of access and ease of usage of mobile applications (Siu, Zhang, Dong &amp; Kwan, 2013). Specifically, observations were made on the features of mobile applications regarding their availability for users of all the capabilities (e.g. version for deaf users etc.), their compatibility to every operating system, the option to download them for free or not, and their edition in multiple languages.</p> <p>Moreover, there was a measurement of the levels that a user has to go down to in order find information relevant to them as well as whether the user has access to all content, or can enjoy the whole material by upgrading it to a full edition at an additional cost.</p>
Participation &	<b>Use of document analysis &amp; mobile app observation.</b>

Interaction	<p>There was an observation of the features of mobile applications regarding the potential given to users to share, rate, and review the artworks via social media platforms, or to produce their own content.</p> <p>Official annual reports, websites, and external sources were used to present claims regarding the contribution of mobile applications to the engagement of the audiences.</p>
Personalization	<p><b>Mobile app observation was used to evaluate the value proposition of personalization.</b></p> <p>Whether the users can customize the information they desire (choose specific tours, create ‘favorite’ lists, etc.) was measured.</p>
Education	<p><b>Use of document analysis &amp; mobile app observation.</b></p> <p>The educational role of museums has a connection with joy so the content to be provided has to be interactive and to facilitate the free exploration and the sharing of experiences with companions (Screven, 1993).</p> <p>Hence, the extent to which the specific mobile apps provide educational content and to whom was measured; in addition, there was an examination of whether pluralism of information (videos, audio, photographic documents, infographics) and interactive settings provided to users and visitors facilitate the informal learning experience at the museums.</p>

<b>Customer Relationship</b>	<b>Operationalization</b>
CRM	<p><b>Use of mobile app observation</b></p> <p>There was an analysis of whether mobile applications provide CRM settings such as membership cards, capabilities to sign up for e-news, discounts, resulting in boost of sales and customer retention (Osterwalder &amp; Pigneur, 2010).</p>
Dialogue	<p><b>Use of mobile app observation</b></p> <p>An observation was carried out on whether users can add information to the app resulting to dialogue being facilitated between the user and the organization (Heeter, 1989), which is paramount for relationship building.</p>

	More specifically, features that enable users to leave their feedback about the museum via forms, email, etc. were examined.
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<b>Customer Segment</b>	<b>Operationalization</b>
Contemporary media users – Diverse audiences	<p><b>Use of mobile app observation and document analysis</b></p> <p>The ‘general public’ of the past has been broken down to smaller diverse groups with distinct interests and needs (Hooper-Greenhill, 2000).</p> <p>The extent to which the features of the mobile apps provide different content to different types of visitors were measured, namely whether there is content tailored to the needs of children, families, tourists, museum lovers.</p> <p>In addition, an analysis of the terms of use was carried out in order to examine whether customer data are used to facilitate the segmentation of the audience.</p> <p>Finally, a users’ review analysis was conducted to investigate what the feedback of users and visitors is on the applications. More specifically, 152 users’ reviews were found on Google Play store among all the mobile apps’ Google Play.</p>

<b>Channel</b>	<b>Operationalization</b>
Mobile applications	<p><b>Mobile app observation and museums’ websites were used.</b></p> <p>Research has shown that museums benefit from the implementation of various new media technologies, concluding that they can function in conjunction for the achievement of the audience engagement (Russo et. al., 2009). Thus, an analysis of how mobile applications are used along with other new media platforms (e.g., direct links, common content, different purposes, etc.), to achieve user engagement, was conducted. Also, an analysis of the official museum websites was carried out with the intent to find their differences as compared to the respective apps.</p>

### **3.4. Data Analysis**

The study examined raw data using many interpretations in order to find connections between the research object and the outcomes related to the research questions posed. More specifically, two types of units of analysis were examined, namely documents from external sources and museums' websites as well as screenshots of the settings of the eleven mobile applications. The case study method, which involves the use of multiple data collection methods and analytic techniques, offers great opportunities to triangulate data in order to strengthen the research findings and conclusions (Soy, 1997). Triangulation works when multiple sources provide similar events, facts, or interpretations (Yin, 2011).

The strategy followed for analysis was to use the propositions that enclose the goals of the study, and which have formulated the data collection (Rowley, 2002). Hence, this study sought to corroborate the evidence found, based on the initial propositions included in the conceptual framework of this project.

Thereafter, a cross case search for patterns was used based on the replication logic. At this stage of the analysis, a comparison of the data in pairs was carried out, and then the similarities and differences between each pair were recorded. Both of them were identified through the use of thematic analysis. Guest, MacQueen and Namey (2012) state that through the use of thematic analysis, the researcher can examine themes across groups and look for similarities and differences. Employing the technique mentioned, fruitful insights from different data collection evidence were exported. In the current study the use of direct replication was used to identify common patterns among the selected museums applications.

Finally, after patterns were drawn from the cross case analysis and replication, they were linked to the propositions shaped in the conceptual framework in order to check whether pattern matching could be achieved (Yin, 2009). According to Yin (2013), pattern matching is deemed as the most popular technique for case studies. The logic behind pattern matching, which is highly similar to that of thematic analysis, is to test the existing theory, and, for the purposes of this study, to realize if the observed patterns correspond to the theory used (Yin, 2013).

In summary, the data analysis process followed the techniques of cross case analysis and replication to identify patterns; subsequently, there was an attempt to connect these patterns to the theoretical propositions that guided the data collection. In this way, it was possible to make a judgement on whether the propositions have been substantiated (Rowley, 2002).

## **4. Results**

Overall, this research aims to establish a deeper understanding of how museums can utilize mobile apps' features to achieve their strategic goals; with the selection of the specific mobile apps, an attempt was made to identify patterns that can validate the theoretical propositions.

This research was built upon two stages of analysis: firstly, an in-depth observation of the selected mobile apps was carried out in order to find out if the theoretical propositions are validated or not. Secondly, documents such as official annual reports, museum websites and external sources were analyzed through thematic analysis to check if there is convergence or divergence with the findings from the in-depth observation.

More analytically, after introducing an overview of the mobile applications' features based on the theoretical propositions, it was attempted to compare them in pairs in order to present some emerging themes that can help the reader further understand the role of mobile applications in the museum experience. Furthermore, through these comparisons, some unique points emerged, shedding more light to the nature of these differences based on the different cultural context these museums operate in. Hence, it was possible to provide adequate answers to the main research question and the two sub-questions.

The analysis was based on the components of the business model canvas, namely the value proposition, customer relationship, customer segment, and channel as outlined by Osterwalder & Pigneur (2010). Accordingly, the following section is divided in these four parts.

### **4.1. Value Propositions**

#### *4.1.1. (Information) Accessibility*

Osterwalder and Pigneur (2010) define accessibility as the endeavor of organizations to launch products and services available to their customer segments who previously had deficient access. Generally speaking, accessibility is described as “usability of a product, service, environment or facility by people with the widest range of capabilities”, thus introducing a strong connection with usability (ISO 9241- 171; 9241-20, 2001). Led by those definitions, this study focuses on discovering if the selected mobile applications facilitate the activities of users of all capabilities (Preece, 2000). The data analysis showed that five out of eleven applications did not include any features for users with disabilities such as text enlargement, closed

captioning, videos in ASL and verbal transcripts. More specifically, the Hermitage app, the Rijksmuseum app, the Mauritshuis tour, Centre Pompidou, and the Tate Mobile Guide did not feature any settings to address the needs of those who have limited capabilities. Five out of eleven mobile apps (Guggenheim Bilbao and Guggenheim US, Istanbul Modern, Dali Tour, and the Met app) enclosed a text enlargement setting for partially sighted users. The KHM stories app features a pathfinding setting which visitors with wheelchairs can activate and take a tour throughout the museum. In addition to the text enlargement setting, the Met app also included VoiceOver technology for iOS holders thus addressing the needs of blind users. Finally, only the Guggenheim US app provided the widest range of features to address the needs of those with disabilities containing a text enlargement setting, VoiceOver technology for iOS holders and for both Android and iOS, closed captioning, verbal transcripts of the artworks as well as videos in ASL language for deaf users as it is shown in Figure 3. The above findings show that that in terms of accessibility, most of the mobile apps did not cater for users with the widest range of capabilities. The limitations regarding the accessibility features for people with disabilities can be explained in terms of cost and time, since to build an app which is accessible to everyone is highly expensive and requires longer time (Charland & Leroux, 2011).

Moreover, other parameters were also taken into account in order to evaluate the accessibility of the apps, namely whether the app was free to download, if there was an edition in multiple languages, and their compatibility with all operating systems and version updates. From the analysis, it was concluded that all the applications were free to download, and that supplementary content required additional costs upon the free download of the basic version for only two of them (the Hermitage app, KHM stories). More specifically, the Hermitage app enclosed an 'additions store' where users can purchase most of the tours and educational courses and only two collections were free to download. However, the app provided a catalogue of exhibits and other features that were free for the users. On the other hand, the KHM stories app provided two free tours that visitors can use for their walkthroughs but it includes a third one that requires payment.

Regarding the compatibility of the app with the operating systems, all of the apps were available both in iOS and Android – the two operating systems that are most used globally. However, in the case of the Tate app, its Android version did not function, excluding in that way a significant part of mobile users. None of the applications were compatible with other operating

systems such as Windows or Blackberry, something that is easily explained by the extremely high cost to building a different app for each platform if it is written in each native language (Charland & Leroux, 2011). Finally, in regard to accessibility features, most of the applications had adequate provisions in more than one languages. Only the Tate and Met app were available in English. The Dutch mobile apps (Rijksmuseum app and Mauritshuis Tour) have been launched in many languages, namely nine and ten correspondingly. Four of the apps (Guggenheim USA, Guggenheim Bilbao, Dali Tour, Centre Pompidou) were available in more than one and less than five languages (usually in English, Spanish, French, German, Italian). KHM Stories has been launched in German, English, Turkish, and Bosnian/Serbo-Croatian while Istanbul Modern and Hermitage were both available in English and Turkish and Russian respectively.

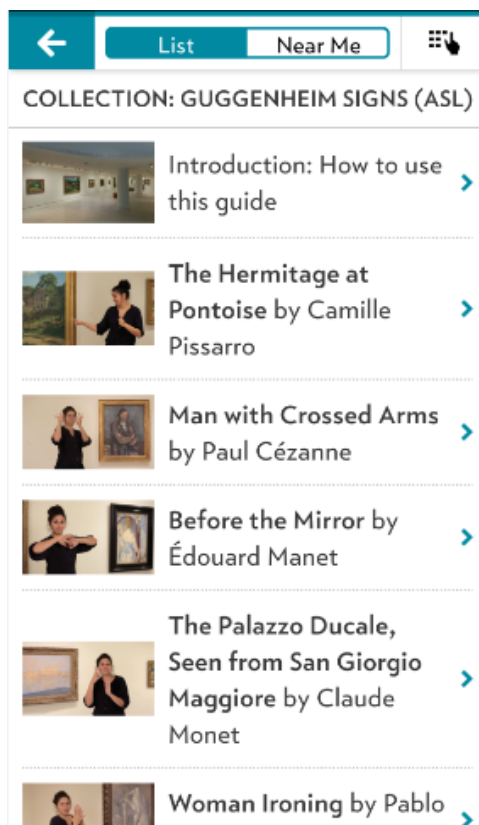


Figure 3: (Guggenheim US app) Guggenheim Collection presented in videos in ASL Language that address the needs of deaf users.

The second aspect of accessibility, i.e., information accessibility, means the degree of ease of finding information and the degree of availability of information about an organization

(Siu, Zhang, Dong & Kwan, 2013). The apps were also examined in terms of how the information is provided and more specifically how many levels users have to go down to in order find the relevant to them information.

From the analysis conducted, it was found that three out of eleven mobile apps enabled users to find information from the first level and then enable them to go down to further levels depending on the depth of the information they desired. More specifically, the Hermitage and Met apps provided information regarding exhibitions, current events, but also details about their masterpieces just one level after the front page and then users who desired to receive more information could go down to a second level. In the case of Istanbul Modern, users were able to find relevant information to them by going down one level for the ancillary services of restaurant and store, but had to go down to even five levels in order to get information about the educational programs curated by the museum. KHM stories required two levels of going down to start the tours or to see the map; similarly, in the Guggenheim Bilbao app, users could reach the information they desired from the second level till the fourth. More than three levels were required in the rest of the apps with the Guggenheim US app usually requiring five levels for users to find the desired information. Finally, the Guggenheim USA app as well as Dali Tour (Figure 4) also required additional downloads upon the initial installation making the app even more complex to use.

Taking into account that the apps are used by visitors during their visit in the museum to enhance their experience, an app that requires users to go down many levels to receive the desired information or to download additional content upon the initial installation leads to visitors getting distracted from the context. Moreover, home users that use the app as a tool to learn more about the museums and to navigate virtually are also not getting a great service since an accessible experience is characterized not only by the degree of availability of information about an organization but also by the ease of finding information (Siu, Zhang, Dong & Kwan, 2013). In line with this, appropriate use of information provides a fundamental ability for organizations to best serve the customer (Rogers, Dawe & Guerra, 1991) which means that the wealth of information offered in the apps as well as the way this information is structured enable users to gain an accessible experience.



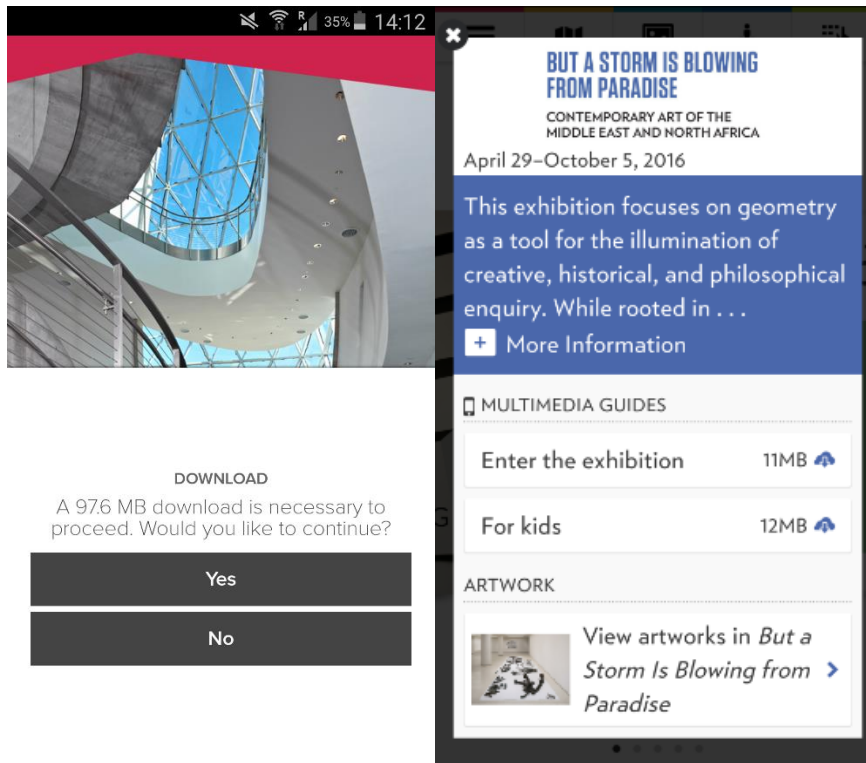


Figure 4: Apps that is required an additional download upon the initial install for user to access the information (Screenshot 1: Dali Virtual Tour app, Screenshot 2: Guggenheim US app). In the first case, the download is required when the user opens the app, so in order to use it this extra download is needed, whilst in the second case, if users want to use the multimedia guides provided, are required to download them.

#### 4.1.2. Participation & Interaction

The current age has been called the ‘age of engagement’ (Morgan Stanley, 2005), or the ‘age of participation’ (Schwartz, 2005) which emphasizes the aspects of online collaboration and sharing among users. Web 2.0 technologies have extensively found their way into the museum field, and now mobile applications are used to enable audience participation not only in terms of convenience, but also because of their tendency to urge engaging and interactive social experience (Oh & Wang, 2011). Led by the notion of engagement and participation, the mobile applications selected were analyzed in terms of the capabilities they offered to users and visitors to interact both with the content as well as with others (Shao, 2009).

The outcome of the analysis revealed that almost all the mobile applications provide to some extent the opportunity for users to interact and participate. Only one out of eleven applications, namely the Mauritshuis Tour did not enclose any features that facilitated the users’ participation and interaction. Most of the apps enabled users to share the content they desired via

their personal social media profiles; in addition, direct links to the museums' social media accounts were also provided, thus facilitating user participation and the co-creation of content (Arora & Verboom, 2012). Two of the eleven applications, namely Guggenheim Bilbao and Guggenheim US which belong to the same museum network, followed a similar logic in terms of user participation and provided great room for users to participate and interact; specifically, Guggenheim US enabled users to take photographs and to share them via their personal social media accounts, websites, and emails, translating in this feature an aspect of interactivity where users can share images through social media (Watkins & Russo, n.d). Similarly, Guggenheim Bilbao enabled users to like the artworks they desired contributing to the creation of a list of what users like the most as it is depicted in Figure 5. In this case, users and visitors interact not only with the content but also with the other users through their participation in the ranking of favorites (Shao, 2009). Hence, the Guggenheim Bilbao app facilitated the formation and maintenance of virtual communities which can be easily created since visitors are people who share a similar interest for arts, and are able to voice opinions and concerns in a supportive environment (Korenman & Wyatt, 1996).

It is worth mentioning that the Rijksmuseum app did not provide any native features where users were able to share content via their social media accounts, however, the app enabled users to save their favorites in their Rijkstudio profile which belonged to the museum's website and thus to produce their own content in that space. However, the capability for users to produce their own content, namely to create their own masterpieces as a native feature of the apps, was not served in any of the selected mobile applications. Thus, these mobile applications can fulfil two of the three needs that individuals pursue to fulfil through their use, namely to consume and to participate but not to produce (Shao, 2009).

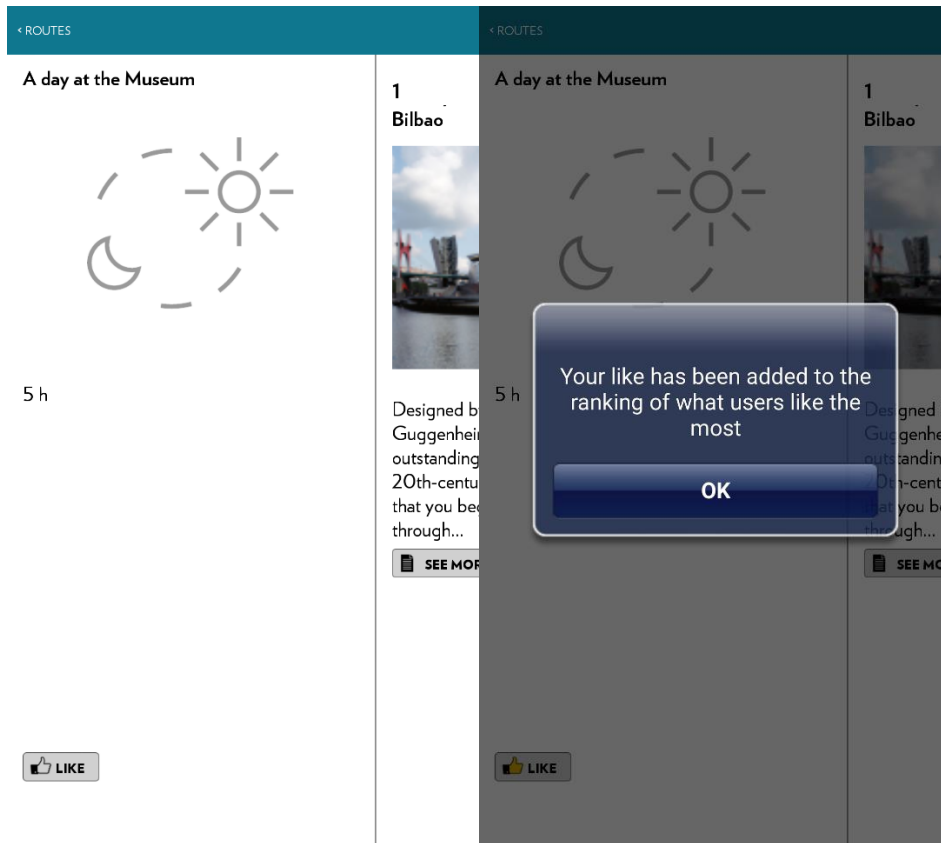


Figure 5: (Guggenheim Bilbao app) Setting that enables users to like the artworks desired and contribute to the creation of a list of what users like the most.

#### 4.1.3. Personalization

The demand of contemporary museum visitors for personalized offerings is implemented by the customization of products and services according to the visitor type and their personal context (Kuflik, Kay & Kummerfeld, 2010). Thus, based on the different types of visitors (i.e. one-time visitors and regular art lovers), and their personal context (interests, experience, prior knowledge), personalization can assist visitors in dealing with growing 'information overload' by helping them to find their way in the exhibition, offering the right information at the right time, increasing their awareness of art history themes, and enticing them to visit the museum more frequently (Aroyo et al. 2007). A good personalized experience for one-time visitors may mean a tour across all the museum's highlights but for the regular art lovers a personalized experience can be meaningful in terms of expanding their knowledge about the art themes according to their specific interests and the objects they have already seen (Aroyo et al. 2007). Besides, based on the fact that visitors have a limited amount of time, which is defined by several restraints,

including the opening hours of the museum, the time the visitor has available, their own attention span (Kuflik, Kay, & Kummerfeld, 2010) can be benefited by the use of mobile museum applications by experiencing personalized tours to explore the exhibits preferred in a quick way.

The outcome of analysis showed that most of the apps enclosed features that enable users to customize the content provided to some degree and in that way to deal with the information overload in conjunction with time restrains (Kuflik, Kay, & Kummerfeld, 2010).

More specifically, eight out of eleven mobile apps included some features that enabled visitors to customize the material provided and subsequently to tour around the museum based on this personalized creation, and also enabled users from home that tour virtually to tailor their virtual experience. In particular, five out of these eight apps (Guggenheim US, Guggenheim Bilbao, Dali Tour, Met, and the Hermitage app) enabled users and visitors to create their favorite lists, namely to add their favorite artworks in one list, and then to get the information desired more easily and quickly by browsing their own list.

It is worth noting that the Guggenheim US app also provided other features that allowed users and visitors to personalize their experience. Except for the creation of a favorite list, users were able to edit their guides by adding and deleting content in the 'my guides' section. Besides, the app included a setting called 'Near Me' which particularly exploited location modeling (Kuflik, Kay & Kummerfeld, 2010) and provided content based on the artworks that were closest to the visitors. It, therefore, becomes clear that the Guggenheim museum has invested on powerful mobile capabilities that enable visitors that carry a mobile device capable of sensing aspects of the context, such as the user's location and activity, to gain a personalized museum experience (Kuflik, Kay & Kummerfeld, 2010). Centre Pompidou went a step further in regard to personalization by enabling users to create their own profiles on the app and then to create their own circuits as it is shown in Figure 6. The app also enabled users to synchronize the events they want to attend with their Google calendar and thus to receive notifications, a feature that was also provided in the Istanbul Modern app and can be perceived as a personalized service.

On the other hand, three mobile apps did not include any feature for personalization, namely the Tate Mobile Guide, KHM stories, and Mauritshuis Tour; it seems that the apps that have been mainly designed to serve as mobile guides that facilitate the exploration throughout the museum. Lastly, the Rijksmuseum app whilst enabling users to save their artworks to their

Rijkstudio profile through a redirection to the website, it did not include its own native settings to allow users to personalize their experiences.

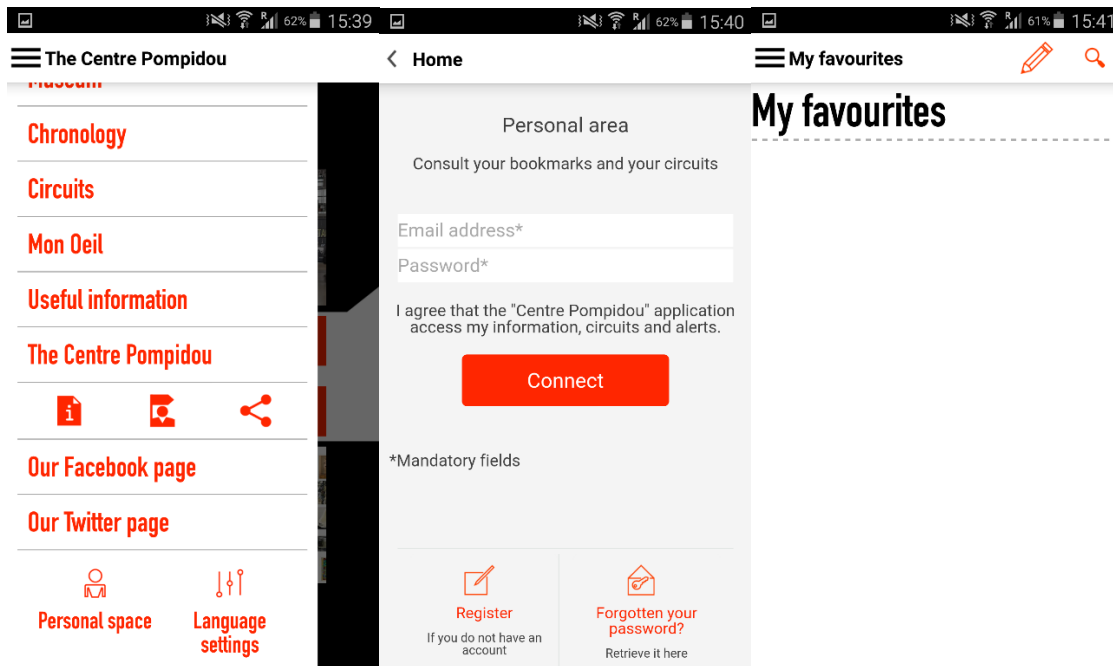


Figure 6: (Centre Pompidou app) The personal space setting that enables users to create their own area and to plan their circuits and add their favorites.

#### 4.1.4. Education

Museums are, ultimately, educational institutions (Pass, 2015). In a dissimilar way to the typical classroom however, the museum has the unique opportunity and resources to make the learning experience one of delight and joyous discovery (Pass, 2015). Museum educators therefore ought to conceptualize how to design the highest quality, most fulfilling educational experiences possible for museum visitors, especially school students. Thus, the educative role of museums both as an educational resource for schools and as a learning source for the whole society, and for knowledge building (Scott 2007, 2008) can be supported via the use of mobile applications as a tool not only in order to enhance the visit experience but also to provide an interactive learning experience beyond the museum walls (Hooper–Greenhill, 2000). Consequently, since the educational role of museums is getting connected with joy, the content to be provided has to be interactive and to facilitate the free exploration and the sharing of experiences with companions (Screven, 1993).

Through the observation of the mobile applications it was found that almost all the mobile apps included some features of interactive content such as videos, films, 3D images,

quizzes, images, or panoramas, which function as facilitators for joyous museum exploration or a virtual tour from home. However, five out of eleven applications provided particular educational content dedicated to a specific audience, namely children and families. More specifically, the KHM stories app provides two interactive tours: one tailor made to the needs of children and families, and one for those of adults, aiming to engage each audience not only with the wealth of material (radiographs, audios, images) but also with quizzes that are intertwined inside the tour, and aim to enhance their understanding about the works of art in an engaging way. Following along similar lines, Istanbul Modern also provides two interactive tours (one for families and one for individuals) that are available only inside the museum. Beacon technology has been integrated into the app, and by activating the beacon icon, visitors start their tour throughout the museum, while each of the tours provides material based on the distinct needs of the audiences addressed; fun games, child-friendly narratives and educational videos for families on the one hand, and images and videos for individuals on the other. In that way, the museum tries to make the learning experience of visitors one of exhilaration through the app (Pass, 2015). Similarly, Dali Tour includes two audio guides that address the needs of families and those of adults respectively, and after those tours have been taken, the app provides challenges consisting of tricky questions that the whole family can answer, gaining in that engaging way, and a great understanding of the exhibits that they toured (Figure 7). Likewise, the Rijksmuseum app has launched a family game called 'Family Quest' through which family members can play each on their own smartphone and by completing different tasks either individually or collaboratively they can unravel the game's secrets and decode a final message. In that way, the learning experience gets connected with joy, and the sharing of experiences with companions is facilitated (Screven, 1993). The last app that addresses the needs of children is the Guggenheim US app which includes audio guides with child-friendly narratives, dialogues between children and the artists, thus making their exploration throughout the museum an engaging learning experience. Centre Pompidou, on the other hand, promotes an educational program called 'Mon Oeil' created by the museum specifically for children, although this program is not embedded as a native feature in the app but takes the users to the website through a direct link. The rest of the apps provide a wealth of interactive material and information not only about the museums' exhibitions but also about their history, their building, their multidisciplinary programs (Guggenheim Bilbao, Centre Pompidou and Istanbul Modern) or their connection with the city (Guggenheim Bilbao).

Finally, the Met app contains a ‘Staff Picks’ section where curated image collections make users smile, think, and learn (Wood, 2014).

Thus, it can be said that informal settings such as museums offer capabilities for communicating social, cultural and scientific information, rectifying misconceptions and improving attitudes and cognitive skills through the launch of those mobile apps (Screven, 1993).

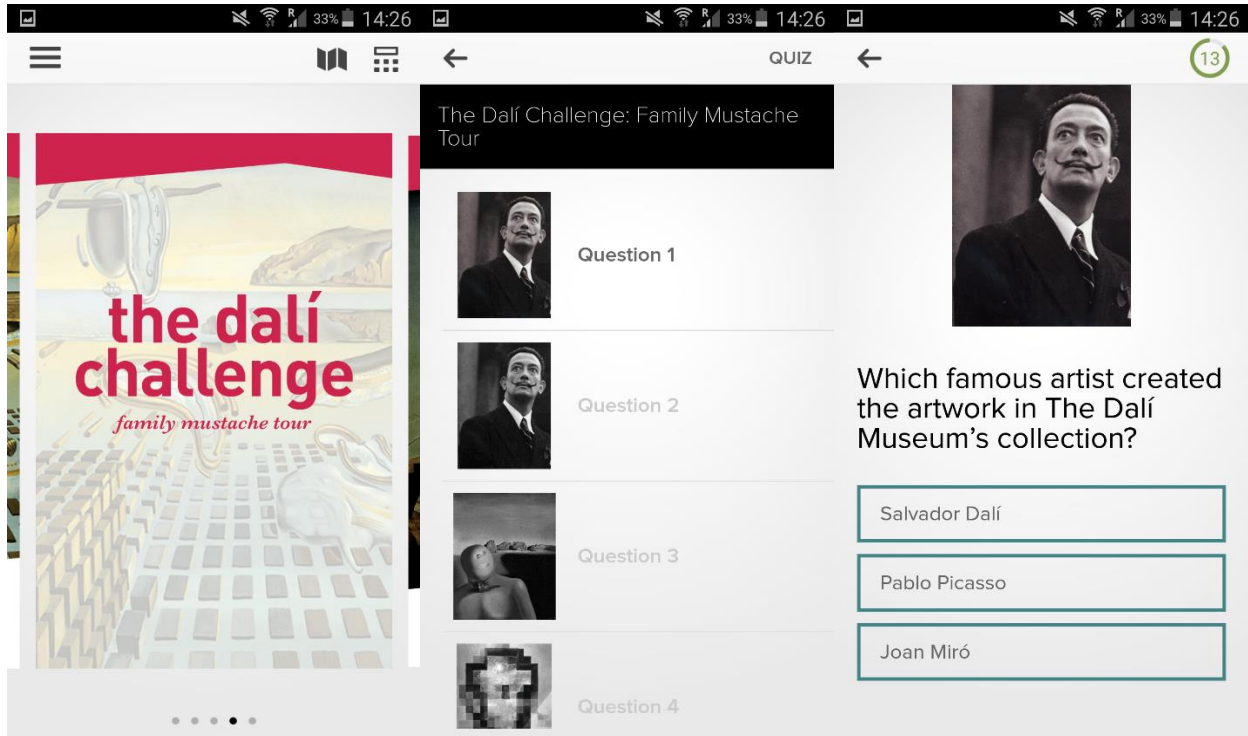


Figure 7: (Dali Virtual Tour app) A Quiz for the whole Family that enables users to gain a deeper understanding about Dalí's Collection in an engaging way. (Dali Tour provides a tour that addresses the needs of families and after this tour has been taken, the family can answer the ‘Dali challenge’).

## 4.2. Customer Relationship

### 4.2.1 CRM services

The successful implementation of CRM actions can be of great benefit to the organizations, since organizations like museums can achieve growing revenues through better market segmentation, customizing services, and above all, securing long-lasting customer-retention, commitment, and loyalty (Stockdale, 2007). Museums can further cultivate the relationships with their public by exploiting the capabilities of mobile applications to link in

other resources such as e-mail newsletters and retail options (ticket sales, online shops, membership cards, personalized discounts) (Rentschler & Hede, 2009).

From the observation of the mobile applications it was found that only two out of the eleven mobile apps include native CRM settings such as signing up for e-news or becoming members as it depicted in Figure 8. More specifically, the Guggenheim US app enables users to sign up for e-news and in that way to receive information regarding special offers, discounts and events. Moreover, the app encloses a setting called 'My membership card' which permits members to enter the museum without carrying their membership cards with them. The existence of the CRM setting in the Guggenheim app verifies Thomas Krens' notion (1998), who had supported that cultural institutions in the USA are more business-oriented compared to the ones in Europe because they depend increasingly on the market for their funding, and subsequently, are more open to obtain a commercial orientation and adopt different innovations (Hughes & Luksetich, 2004). The second app that encloses native CRM settings is this of Istanbul Modern which allows users to apply via the app and become members as it is shown in Figure 9. Moreover, the app encloses a setting that promotes the ancillary service of its restaurant in which setting users can make reservations through an email dedicated to that purpose. Since the Istanbul Modern Museum is the first private museum in Turkey, the Krens' notion (1998) that museums that depend on the market are more business-oriented is again verified. On the other hand, two museum apps, namely Mauritshuis Tour and the Rijksmuseum app do not provide any native CRM settings such as tickets services, memberships, etc., corroborating the notion that the European Model functions less commercially (Krens, 1998). However, Dali app, which operates in the USA, does also not include native CRM settings functioning a bit contradictory to the notion of Krens about the commercial orientation of American museums (Krens, 1998).

The remaining six mobile apps enclose CRM settings, however, none of them is native to the app but users are taken to the museums' website via direct links that are provided within the apps. In particular, the Met app provided links for museum admission, membership, and event tickets to the corresponding website pages, functioning as a tool that facilitated these services but not fulfilled them. Similar to this, the Tate app has embodied the museum's website and users can log on to the online ticketing services. Likewise, Centre Pompidou, Guggenheim Bilbao, the Hermitage app, and KHM stories provide direct links either to their museums' online stores, or to their online ticketing services.



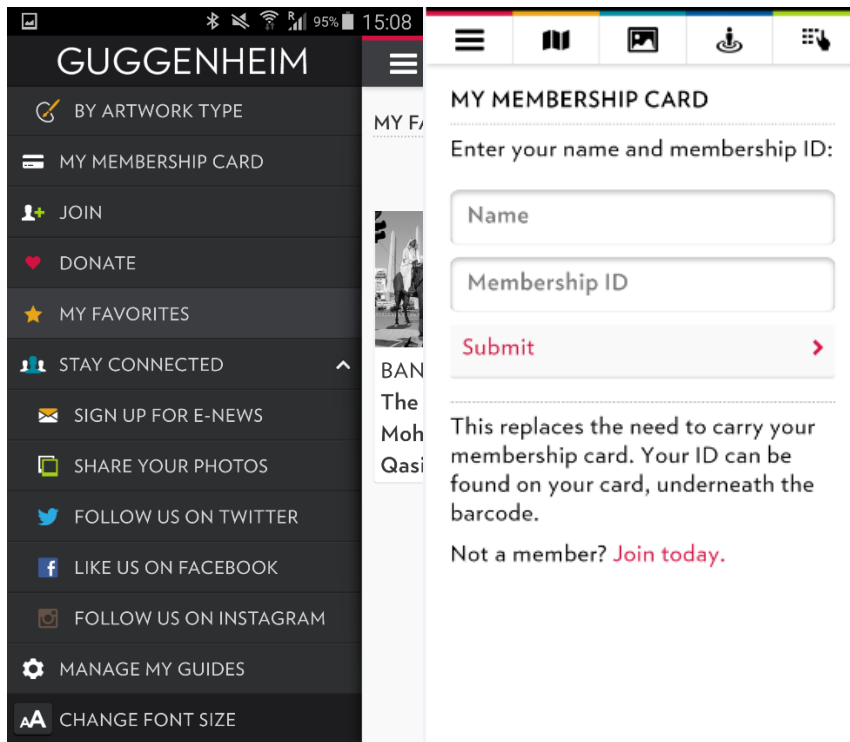


Figure 8: (Guggenheim USA app) CRM features (as native settings) of signing up for newsletters and subscribing for a membership card.

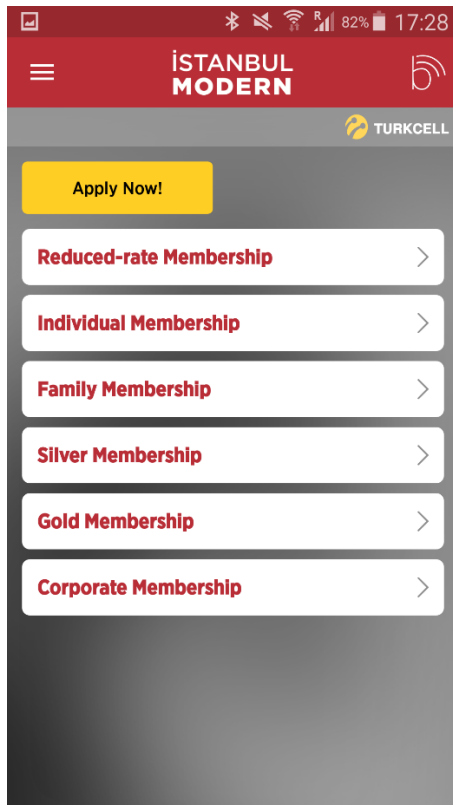


Figure 9: (Istanbul Modern app) Setting that enables users to apply for the available membership categories. For each membership category there is available a description of the benefits that members experience.

#### 4.2.2. *Establishing a Dialogue*

Customer relationships, like any relationship, can only thrive if there is input from both parties. Thus, customers' contribution to this 'dialogue' is a prerequisite for a long-lasting relationship (Winch, 2011). Today, many organizations attempt to foster a dialogue with their customers by providing customer satisfaction surveys, or other options such as forms for providing feedback to organizations (Winch, 2011). In line with this, the advent of new technologies and, in recent years, the new 'mobile economy' enables museums to establish a dialogue with the audience which is paramount for relationship building.

From the analysis conducted, it was found that four out of eleven mobile apps did not include any settings that enable users to interact with the institution, namely to leave their comments, to rate the apps, or at least to get redirected to the museums' social media accounts via direct links to them and then to leave their feedback. The apps that did not provide any feature that facilitate the dialogue between the two parties are the Rijksmuseum app, Mauritshuis Tour, Hermitage app, and KHM stories. On the other hand, only one out of eleven museum apps,

namely the Istanbul Modern app, included a native setting that facilitated the dialogue between the customers and the institution. In particular, the Istanbul Modern app enclosed a form where users can fill out their contact details and their suggestions or their comments making the users' voices heard (Figure 10), contributing in that way to the achievement of customer satisfaction. Besides, the app also included several email addresses dedicated to different services and programs that users can click on and get redirected to their emails in order to ask for more information regarding each service, activity or event. A similar logic is followed by the Tate and the Met apps which provided not a form, but customer satisfaction surveys regarding the experience of users with the app. Users can provide invaluable feedback by filling out a questionnaire and open space questions so museums can improve the experience they provide and to achieve the greatest possible customer satisfaction. Likewise, Dali Tour also enclosed a survey section, however because the app had just been launched at the time that this research was conducted, the survey was not yet operational. The Guggenheim Bilbao app provided great room for dialogue between the museum and its audience since it included several ways that users can get connected with the museum as it is shown in Figure 11. More specifically, the app featured settings through which users can leave their views and recommend the app via their emails, as well as direct links to the museum's social media accounts where users can also leave their comments.

The Guggenheim US app and Centre Pompidou included direct links to the museums' social media profiles enabling in that way users to follow the social media presence of the museums and to leave their comments there. However, this is an indirect way for the dialogue between the two parties since the museums' social media accounts are used for promoting their actions and for engaging the audiences and not as a primary contact point where users can leave their suggestions.

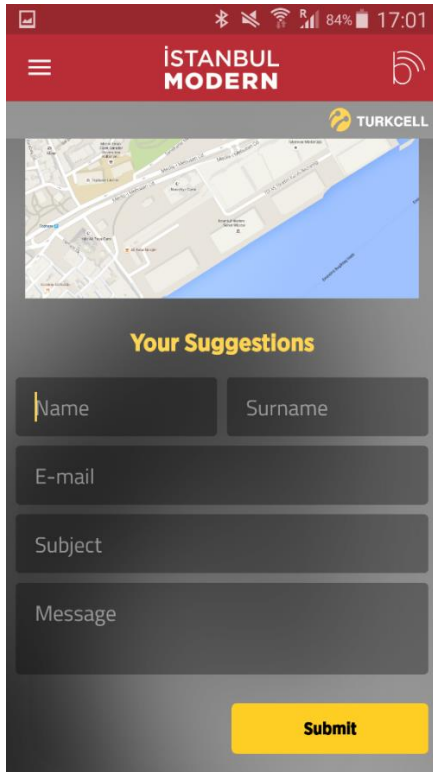


Figure 10: (Istanbul Modern app) Form (as a native feature of the app) that users can leave their views, feedback, suggestions.

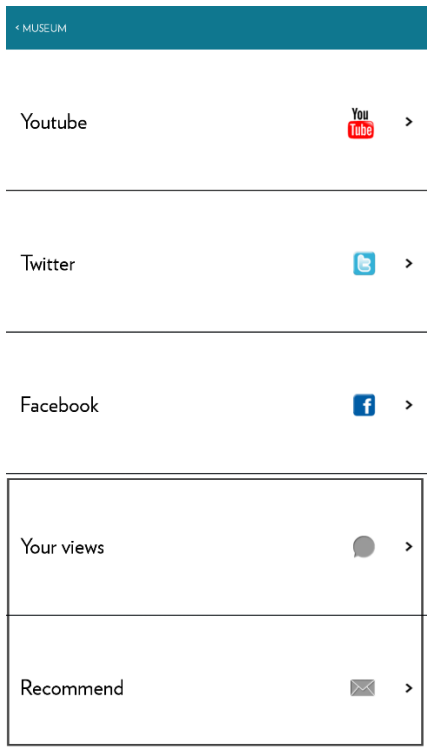


Figure 11: (Guggenheim Bilbao app) Settings that enable users to interact with the institution by providing their views via email or recommending the app through their social media accounts or via their emails to their contacts.

### 4.3. Customer Segment

Based on the reasons why people visit museums, different types of visitors are identified, namely Explorers, Facilitators, Experience seekers, Professionals/Hobbyists, and Rechargers (Falk, 2009). These types apply to all the usual audiences of museums such as children, students, family groups, tourists, and regular museum goers. The goals that these audiences have can be served distinctively through the use of mobile applications. Museum mobile applications that contain features for each customer segment and their distinct needs (family tours, highlight tours, etc.) and facilitate high levels of interaction can result in the co-creation of new cultural experiences (Watkins & Russo, n.d.).

The outcome of the analysis showed that three out of eleven mobile apps provided only general content that is available to every type of visitor or customer segment. More specifically, the Hermitage app provided a wealth of material regarding its exhibits, however no special care has been given to design content such as routes, audio guides, and tours that apply to distinct customer needs. Tate Guide and Mauritshuis Tour also did not include different content for different customer segments, however both museums have launched other applications that apply to specific customer needs. For example, Mauritshuis has launched a special tour for young visitors which is provided in the museum, and Tate has launched several other mobile apps that address children's needs, like the app called 'Tate Kids Draw & Play' which is a creative drawing app for children. Nevertheless, when the Mauritshuis and Tate mobile guides were examined, it was evident that their design has been created for the general public.

On the other hand, the rest of the applications provided content that specifically addresses the needs of a customer segment to varying extents. Given the attention museums show to children and families (Figure 12), seven applications included several types of content especially for kids and/or families. More specifically, Dali Virtual Tour, Istanbul Modern, and KHM Stories have designed interactive tours tailor made to children's needs by enclosing child-friendly narratives, fun quizzes or animations. Rijksmuseum has launched the 'Family Quest' Game and the Met app provides a multimedia guide only for children. In addition, Centre Pompidou promotes a web series designed for kids, though this feature is not native to the app. Finally, the Guggenheim Bilbao app encloses a pre-designed route called Family Tour including exhibits that apply to the needs of a family walkthrough.

However, in addition to the customer segments of children and families, the Rijksmuseum and Guggenheim Bilbao apps provided content that addresses the needs of different visitor types. In particular, the Rijksmuseum app offered eighteen guided tours based on distinct themes (i.e. Middle Ages, 19<sup>th</sup> century, etc.) which were provided both in long and short versions (90min and 45min respectively). Thus, the short tours can address the needs of regular visitors or visitors who have very limited time and want to consume ‘snack’ content (Idato, 2006), whereas the long tours can address the needs of tourists which may only ever have a single visit in that museum. Likewise, the Guggenheim Bilbao app includes an express visit for the afore-mentioned needs and also a route ‘A day at the museum’ which can apply to the single visits of tourists.

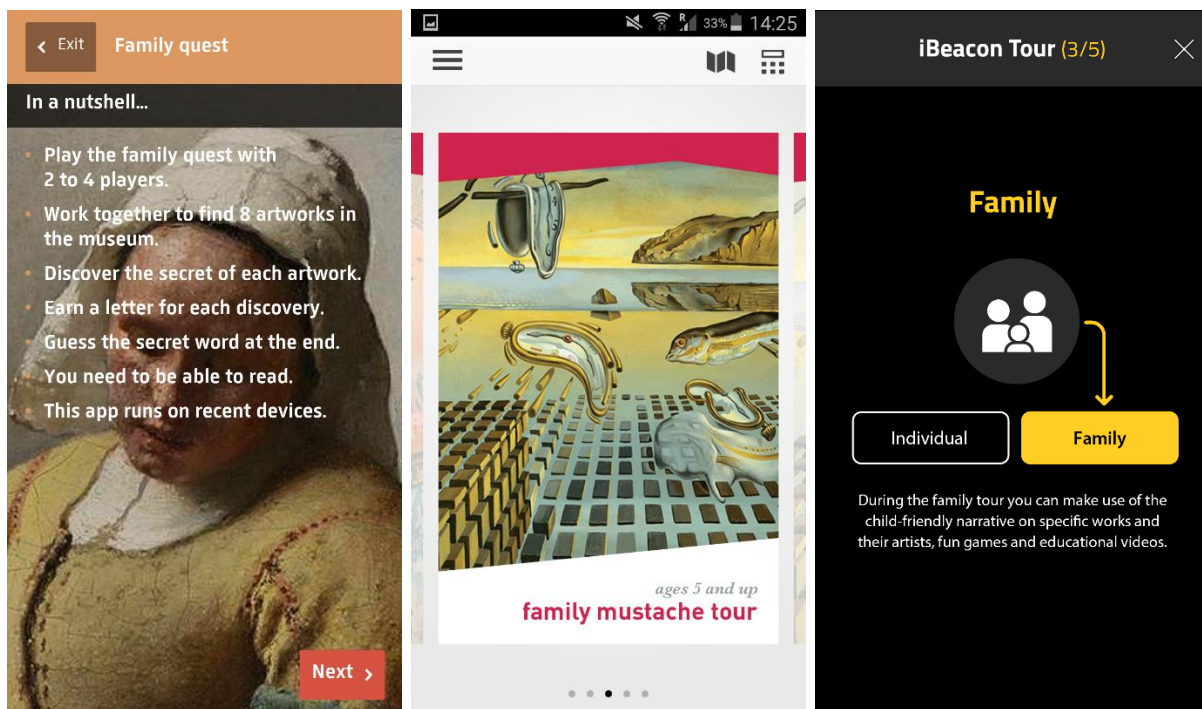


Figure 12: Features that address the needs of families (Screenshot 1: Rijksmuseum app: Family Quest Game, Screenshot 2: Dali Virtual Tour app: Family Mustache Tour, Screenshot 3: Istanbul Modern app: Family Tour).

The access of the mobile apps to personal data creates a deep and holistic picture of the consumer (Dipl-Kfm, 2014). In order to solidify this notion, an analysis of the terms of use of the apps was undertaken, which, indeed, proved that all the apps collect personal information. More specifically, it was observed that all mobile applications ask for access to personal data such as location, photos/files, the camera, identity (i.e. account on the device, profile data), calendar, device ID & call information as well as Bluetooth & Wi-Fi connection information. Thus, the

sentiment that mobile apps offer insights not only into users' 'digital' lives (e.g. internet browsing preferences) but also into their 'real' lives (e.g. location data, interests), is validated (Dipl-Kfm, 2014). Generally, from the perusal of the terms of use, it has been revealed that some apps request access to a great variety of information, while others draw close to a narrower scope of information. In particular, Guggenheim US, Hermitage, Dali, Rijksmuseum, and Istanbul Modern asked for access to a great variety of personal data (identity, location, device & app history, photos /files/ media, camera, Bluetooth & Wi-Fi connection, in-app purchases, calendar), whereas Guggenheim Bilbao and Mauritshuis requested access to few information – the former to photos/ media/ files and the latter to photos and Wi-Fi connection data. Met app also asks for access to limited information, namely the calendar –feature that is included in the app, and photos / media / files. A similar approach was realized in the Centre Pompidou app, which also asked for access to the calendar (this feature is incorporated into the app), identity, and photos / media / files. It should be underlined that two museums that belong to the same organization network, Guggenheim Bilbao and Guggenheim US, presented a very different logic for data aggregation. Overall, Guggenheim Bilbao was the app that asked for the fewest information, namely only access to photos, whilst Guggenheim US needed access to the most of the information (identity, calendar, location, photos/ media/ files, camera, Wi-Fi & Bluetooth connection information). Last, Tate Britain Guide (which was analyzed in its iOS version) did not ask for access in specific types of files like the Android apps upon the install of the app, however, in order to download it from the App store the user must enter his/her Apple ID and password. Each user that has an Apple account has already provided to Apple the access for his/her profile data. However, while all the apps access personal data of the users, not all the apps -as it was described in the findings in the beginning of this subchapter- provide content tailored to specific customer segments or types of visitors.

### *Users' Reviews*

With a view to gain a deeper understanding of what the users of these mobile apps have to say about the content provided, users' reviews on Google Play store were also analyzed and some interesting themes emerged. However, few reviews were available for many of the apps, either because the apps were quite new at the time, or because of the nature of the apps which do not usually attract a plethora of reviews, as happens in the case of gamers for example.

The outcome of this analysis showed that users do not focus only on the content provided but their comments majorly refer to functionality issues like frequent crashes, or additional downloads upon the initial installation making the apps heavy, or the non-compatibility of the apps with several models of mobile phones. These findings verify current research that has shown that users are turning away from the browser and relying on applications (Spence, 2014) because native mobile apps perform better than mobile web browsers and thus offer better user experience (Charland & Leroux, 2011). Thus, since mobile users have high expectations for a great user experience provided via native mobile apps, possible functionality problems that get them distracted either during their visit in the museum or during their virtual tour from home, create customer dissatisfaction which is articulated in their reviews. Apart from the comments regarding technical issues, users also referred to several apps as ‘tools to gain in-depth information’; ‘easy to use’; ‘very informative’; other apps ‘accompanied the visitors through their exploration enriching their experience’; ‘great to explore the world of art’; or comments were made on specific features of the apps such as the Disney audio guide included in the Dali Tour app which was characterized as a ‘special treat’; and positive reviews were given regarding the map that was embodied as a new feature in the Met app (‘map addition is nice’; ‘a good map’).

#### **4.4. Channel**

The use of mobile apps opens up new channels of communication between the museum and the user, which go beyond the boundaries of the museum’s walls (Economou & Meintani, 2011). Through the exploitation of these tools, museums can communicate in new manners and promote their collections and programs (Economou & Meintani, 2011). In line with this, museums which have a goal to provide a better visit and user experience to their audiences, to actively engage with audiences and co-create new cultural experiences, using all the capabilities of mobile applications which allow technological convergence, can facilitate their audiences’ access to cultural experiences any time, any place and in any form (Bakhshi & Throsby, 2012). However, since research has shown that museums benefit from the implementation of various new media technologies, concluding that they can all function in conjunction for the achievement of audience engagement (Russo, Watkins, & Groundwater-Smith, 2009), the way that mobile



applications related to the other new media channels that were used by the museums was also investigated.

The outcome of the analysis showed that two of the eleven mobile apps examined are hybrid apps, namely partly web app and partly native apps. More specifically, the Tate Mobile Guide has embodied the museum's mobile website into the app so users can use native settings like the audio guides, but are also able to browse the website as it is shown in Figure 13. The Met app tends to punt most of the deep-dive information to its mobile website and only a few settings such as the favorite lists are native to the app (Porges, 2014). It is worth mentioning that most of the apps include direct links to their museum's website, however, these links are inside the content and not distinct settings that take the user to the website.

From the mobile applications observed it was found that most of the apps do not function only as multimedia guides or but also include a great wealth of material and information regarding the museums' history, latest news, upcoming events, practical information about everything a visitor needs to plan their visit, CRM settings, direct links to museums' social media accounts, interactive tours, quizzes, and the opportunity for users to share via their personal social media profiles the content they desire. However, apps such as Mauritshuis Tour, the Rijksmuseum app, KHM Stories, and Dali Tour have been designed to accompany their visitors' exploration aiming at enriching their museum or virtual visit (Figure 14). Thus, these apps provide either no or very little information as the afore-mentioned, or details that users and visitors can find in the corresponding museum websites typically which serve as the primary point of contact and information. These websites provide extensive information regarding the museums, their activities, their annual reports, their contribution to research and education, practical information and CRM services, activities for distinct audiences and upcoming exhibitions and events. Thus, it can be said that mobile apps function in conjunction with the websites, and are used by museums for different purposes; museum websites (desk or mobile) can be used as a source of information before the visit, and during and after the visit, mobile applications can be used as a tool for better user experience (Charland & Leroux, 2011).

On the other hand, Istanbul Modern has launched an app that provides exactly the same information as its website and additionally provides two interactive tours with the integrated Beacon technology, enabling the visitors to be guided through the museum. Hence, it can be said that the Istanbul Modern app functions as a complete tool at the hands of visitors, since they can

find not only the same information as on the website with better performance than web browsers (Charland & Leroux, 2011) but also to take a walkthrough the museum in an entertaining way via the interactive tours.

The rest of the apps provide more information compared to the apps that serve mainly as multimedia guides and fewer information compared to these of their websites. The Guggenheim US, Guggenheim Bilbao, Centre Pompidou, and the Hermitage apps provided tours and guides to enhance visitors' visit experience and users' virtual tours but also included plenty of information such as the impact of Guggenheim Bilbao Museum to the city of Bilbao, the multidisciplinary program of Centre Pompidou as a center of art and culture, the history of the Hermitage Museum, or the latest events and news of the Metropolitan Museum. Thus, in the cases of these museums, websites can function as means of providing information for users and online booking and ticket handling facilities (Bakhshi & Throsby, 2012) and mobile applications as a tool for a better user experience (Charland & Leroux, 2011).

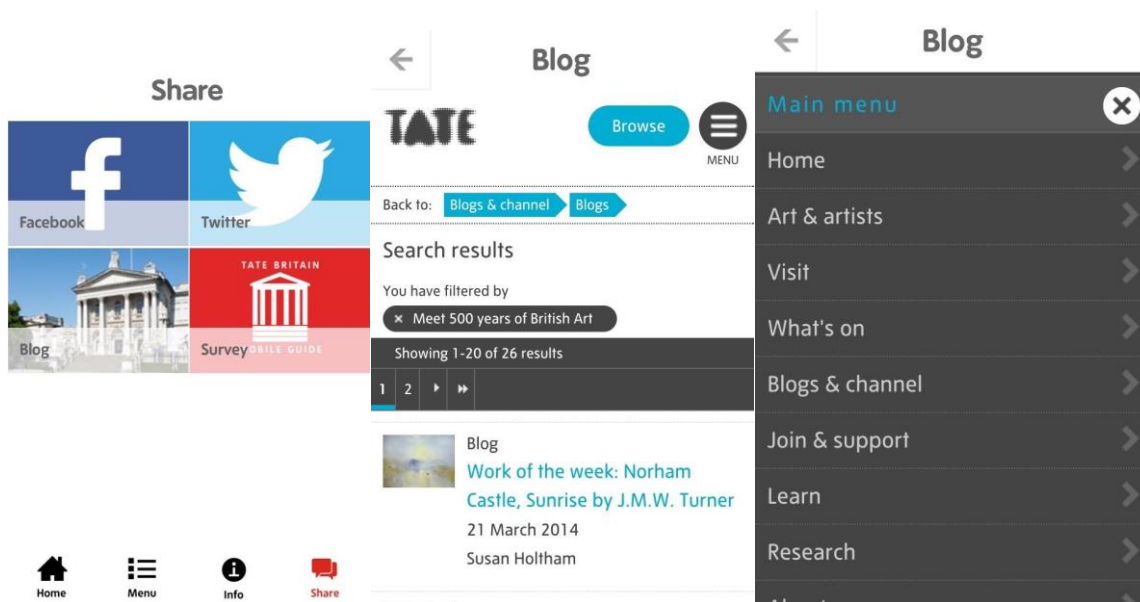


Figure 13: The hybrid app of Tate Britain where users by clicking on the 'blog' feature are taken to the mobile website of the Museum that has been integrated into the app.

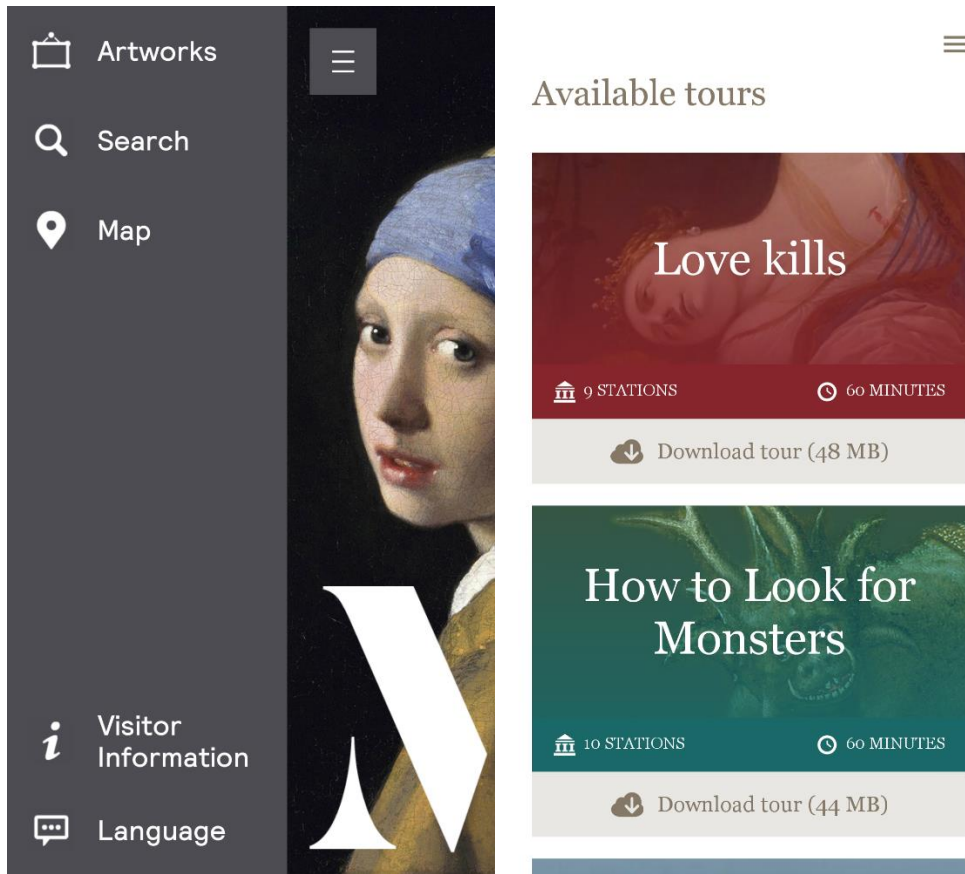


Figure 14: Apps that function mainly as multimedia guides (Screenshot 1: Mauritshuis Tour; via the 'artworks' setting users are taking a guide from the available tours. Screenshot 2: KHM Stories; The available tours that users can walk through the museum. These tours address the needs of kids/families, and of individuals)

## 5. Conclusion

The starting point of this study resulted from the understanding that the rise of new media technologies combined with the increasing demands of today's sophisticated audiences drives museums to reposition themselves and align their objectives with the changing world requirements. Moreover, the issues currently faced by museums, namely the decline of visitors (Butler, 2000), the increasing competition with other cultural spaces (Burton & Scott, 2003), and the limited public funding, lead museums to pursue new business models in order to provide new value propositions and meet the growing needs of their modern visitors.

New media has facilitated the idea of 'new museology', which emphasizes the educational side of museums and new connections with the public (Hooper-Greenhill, 2000). Furthermore, the 'participatory culture' of Web 2.0 (Jenkins, 2006) allowed museums to attract wide and diverse audiences, to engage them, and enhance their museum-experience – currently, the mobile upsurge offers museums even more capabilities to cultivate new relationships with relevant audiences (Tallon, 2008). The theoretical framework of this thesis suggests that visitor-oriented mobile applications can assist museums to achieve their strategic goals, namely to provide new value propositions to their diverse audiences. However, given that today the boundaries between the real and the virtual seem blurred, this virtuality provides museums with new potential; therefore, this study did not only focus on actual visitors of museums but also on virtual visitors. Hence, adoption of the general term "users" was preferred. In fact, this thesis posed the following research question: *"How can museums strategically use mobile applications to generate public value for young and adult users?"* – additionally, the following two research sub-questions have been posed: (i) *"How can museums strategically use mobile applications to enhance the contemporary media users' visit experience?"* and (ii) *"How can museums use mobile applications to create new customer relationships?"*

The analyses of the cases revealed interesting findings regarding the potential that mobile applications provide to museums with regard to achieving their strategic goals and, consequently, the evidence revealed an answer to the main research question of the study.

Since public value constitutes from the value that museums provide both for individuals and the society as a whole (Porter, 2006) and is defined as "a response to citizens and users' preferences by renewing their mandates and trust through guaranteeing quality services" (Kelly, Mulgan, & Muers, 2002, p. 10), it was found that museum mobile applications offer similar

value propositions such as participation, information accessibility, personalization, but at the same time facilitate the educational role of museum as an informal setting that provides joyous learning experiences. Through the comparison of the cases it has also been evidenced that museum apps follow a common logic even if implementation of their features presents some differences. Hence, it was revealed that all of them provide some of the afore-mentioned value propositions. Some apps offer all the value propositions mentioned, namely, capabilities for users to access the information provided without restraints, to interact, to customize the content they desire, and to explore the museum either physically or virtually and gain deeper knowledge in an engaging way. Other apps were found to only enclose settings that enable users to participate and interact with the content, verifying the notion that users are no longer just ‘consumers’ of the information, but actively participate in the experiences received and their interpretations (Barry, 2006), or to interact with other users, contributing thus to the formation and maintenance of virtual communities of people who share common interests (Korenman & Wyatt, 1996).

Some others were found to offer more than one value proposition but not all of them, for example, opportunity for users to customize the content offered and then access and interpret it at their own pace and on their own terms (Verboom & Arora, 2013) and also the capability to share this content via personal social media accounts or via email. It is noteworthy that all of the apps provide content that facilitates a joyous learning experience (Pass, 2015) either through the provision of a wealth of material, such as films, videos, 3D images, panoramas, or by interactive content like fun games, quizzes, interactive maps, and tours that enable users to walk through the museum (even virtually) and gain a deeper understanding of the artworks and the museums’ context.

It should be noted, however, that few mobile apps were found to provide settings regarding all the value propositions mentioned and to satisfy the needs of individuals for quality services and their mandates for personalization, information accessibility, and participation at the same time (Kelly, Mulgan, & Muers, 2002) as well as the societal mandate for a museum that functions as an informal setting, which provides an enjoyable learning experience (Pass, 2015). This can be explained from the different cultural context that museums operate, the resources they have to spend on the creation of a mobile application, and the distinct purposes they aim to achieve (Camarero et al., 2011).

Regarding the customer relationship approach, it was found that a few mobile apps provide native CRM settings. These features are mainly provided by the Istanbul Modern and Guggenheim US app. This finding validates essentially the notion of Krens (1998) – the former director of Guggenheim Museum, who had argued that cultural institutions in the USA are more business-oriented compared to the ones in Europe and depend increasingly on the market for their funding, and subsequently, are more open to obtaining a commercial orientation and adopting different innovations (Hughes & Luksetich 2004). In case of Istanbul Modern, --the first private museum in Turkey, its more commercial orientation is justified since it obviously depends on the market for its funding. The apps (Mauritshuis Tour, Rijksmuseum app) that do not enclose any CRM settings are following the European Model, which functions less commercially (Krens, 1998).

However, the customer relationships are not cultivated only by the implementation of loyalty programs; they lie in the establishment of a dialogue between the institutions and the customers. It has been found that fostering a dialogue with the audience is paramount for relationship building. From the analysis of the cases it was extracted that seven out of the eleven apps foster a dialogue between the institution and the audiences either by providing customer satisfaction surveys (Met, Tate, Dali) or by other options such as forms for providing feedback (Istanbul Modern) or even by offering direct links to the museums' social media accounts. (Winch, 2011). Thus, it can be said that these apps, (Met, Tate, Dali) which represent the Anglo-American Model and the Istanbul Modern, which is a private museum that depends on the market for its funding, present a similar logic regarding the cultivation of the relationships with customers by facilitating a dialogue with them. This finding confirmed to a significant extent that the influence of cultural context -the European or the Anglo-American model- (Camarero et al., 2011) that museums represent is essentially strong in that element. Some museums seek to cultivate the customer relationship by relying on commercial practices, (Krens, 1998) others rely on the dialogue, while there are also institutions seeking to cultivate the relationships through other means.

Finally, in terms of the museum visit experience and how it can be enhanced through the use of mobile apps, the evidence also showed interesting findings. Although the boundaries between the virtual and the real seem to be blurring and museums aim to attract also virtual visitors and provide value also to them, the findings showed that museums launch apps that

enclose settings tailored to function as a good companion for visitors to explore the museum in a new way. It was found that most of the apps provide interactive content such as interactive maps, quizzes, tours, and games that help visitors gain an experience, while having fun, and share it with their companions (Screven, 1993). It was also found that technologies such as Bluetooth and Beacon (Istanbul Modern, Guggenheim US) provide some opportunities that are available only inside the museum and aim to enhance visitors' exploration throughout the museum.

Moreover, taking into account several user reviews on Google Play that focused on functionality and usability problems, it can be said that a visit experience provided via native mobile app can be deemed enhanced when the navigation corresponds to the high expectations of visitors, given that mobile apps perform better than web and thus offer a better user experience (Charland & Leroux, 2011). Visitors that face functionality problems using the app or having to go down many levels to find relevant information are ultimately distracted during their visit in the museum. In such cases, the apps achieve the opposite result, namely to create customer dissatisfaction.

From the findings of this study it can be said that museums can utilize mobile applications' settings and, thus, provide value tailored to the expectations and needs of the contemporary users; expectations that lie in the mobile capabilities for omnipresent access, portability, personalization, and democratization of information access, opportunistic interaction, lower intricacy, flexibility, and efficiency of use (Billi et al., 2013). Museums, given that mobile apps perform better than mobile web browsers and usually offer better user experience (Charland & Leroux, 2011), can tap into these capabilities to achieve their strategic goals. Thus, a mobile app that facilitates users' desire for a highly interactive, accessible, - personalized and joyous learning experience can function as the best companion during a museum visit or even a virtual tour from home.

The afore-mentioned findings highly correspond to the theoretical framework of this research, and have revealed that museums launch apps in an effort to provide new value propositions. It is noteworthy that, to a significant extent, the analysis confirmed the theory supporting that the cultural context plays an essential role in how museums try to provide public value. Thus, while all of the museums seem to be justifying their role as informal settings (Screven, 1993) independent from the context they function, approaches regarding the customer relationship, the customer segment, and the design of the app are varying.

## 5.1. Limitations & Further Research

This study aimed to investigate the capabilities that mobile applications offer to museums to attract the contemporary audiences by providing new value propositions. However, during this research process there were several limitations that could even function as an incentive for future research.

First, the case selection was based on size and geographical criteria, i.e. museums that represent either the European or the Anglo-American Model. Thus, a limitation is observed, given the possibility for also Asian museums to be investigated (e.g. Japan, China, and Vietnam), in order for the variety to be increased and to further solidify the existing literature in the field.

Secondly, this study tried to find out how mobile applications are used along with the official museums' websites and social media accounts (e.g., direct links, common content, different purposes, etc.) to achieve user engagement. Apart from the analysis of the features that are incorporated into the apps and provide links to the other new media platforms, an analysis of the museums' websites was also undertaken to discover the differences in the content provided and the purposes they serve. However, due to time restrictions, a detailed break-down of all the social media platforms used by museums was not viable. Such a break-down could allow for an even more accurate presentation of the specific goals that museums are chasing through the use of each new media channel and of when mobile apps function as overall tools in the hands of users to be engaged with the museum. Hence, this limitation can be perceived as grounds for future research; specifically, an in-depth investigation of the new media channels could give great insights in how museums use new media platforms to engage their audiences.

A third limitation pertains to the fact that this research took mainly the perspective of the supplier -the museums in our case- and investigated how they embody in their mobile applications features that allow for the provision of new value propositions to the contemporary audiences. While an analysis of the behavior of contemporary media users based on the U&G study was undertaken, while an analysis of the users' reviews on Google Play was also carried out, an audience research itself is missing. This limitation can become a great opportunity for future research in that visitors and users can be asked for their experiences and opinions regarding the use of mobile apps and their role on the museum experience. Techniques such as participant observation, in-depth interviews, and customer surveys would be proper to shed light



on the users' perspective regarding the museum experience; essentially, today, where all the organizations seek to adopt customer-focused approaches -translating into visitor/user-oriented approaches in the museum field-, this scope can add great findings to the literature on the field.

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