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# Edutainment technologies in museums: aligning social impact and financial sustainability

## The Case Study of the Museum of Art, Architecture and Technology and the Central Tejo of Lisbon

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# Abstract

In light of the recent transformations of the society which threatened the financial sustainability of museums, identifying new managerial approaches for these institutions is urgent. Specifically, museums need to find new strategies to attract visitors and enhance their return intent. In recent years, the concept of edutainment has emerged, defined as the inclusion of gaming elements in educational contexts. This strategy, often implemented by means of interactive technologies, results effective in enhancing the learning and entertainment experience of the users. The aim of this dissertation is to examine the impact of edutainment technologies in museums. The research examines how edutainment technologies can help museums to achieve both their social and financial objectives. The research was based on the Case Study of MAAT and the Central Tejo, the two museum sites of EDP Campus in Lisbon. The development of the Case Study was supported by secondary data received from the museum personnel, by semi-structured interviews with visitors of the two museums and by participant-observation methods. As a result of the analysis, edutainment technologies were proven to effectively increase the visitors' perceived learning, perceived entertainment, satisfaction and return intent. Thus, the conclusions confirm that edutainment technologies help MAAT and the Central Tejo towards the achievement of both their mission purposes and a strengthened financial situation. Through the Case Study, this dissertation contributes to suggest new strategic solutions for the financial sustainability of museums and holds important practical implications for museum managers and professionals in the cultural sector in general.



# Resumo

Devido às recentes transformações ocorridas na sociedade e que ameaçaram a sustentabilidade financeira dos museus, tornou-se imperativo identificar novas maneiras de gerir estas organizações. Precisamente, os museus necessitam de encontrar novas estratégias de atração de clientes e aumentar as suas intenções de retorno. No passado recente, o conceito de "edutainment" emergiu, como o uso de atividades lúdicas em contextos de aprendizagem. Estratégias como esta, muitas vezes suportadas por tecnologias interactivas, ajudam a melhorar a experiência de aprendizagem e divertimento. O objetivo desta dissertação é analisar o impacto destas tecnologias quanto ao seu uso em museus, mais precisamente como ajudam os mesmos a atingir as suas metas socias e financeiras. A análise baseou-se no estudo de dois museus, o MAAT e o Central Tejo, ambos pertencentes ao EDP campus em Lisboa. O seu desenvolvimento foi feito através da recolha de dados secundários junto de funcionários e colaboradores, e dados primários, como entrevistas específicas junto de usuários do museu e ainda métodos de observação participativa. Os resultados demonstram claramente que o recurso às novas tecnologias permite enaltecer a aprendizagem dos visitantes, assim como a sua satisfação e intenção de retorno. Por outras palavras, ajudam ao MAAT e ao Central Tejo atingir os seus objetivos socias e financeiros. Concluindo, o estudo oferece novas soluções estratégicas que podem vir a ser utilizadas pelos museus em geral de forma a desenvolver a sua sustentabilidade organizacional, e contribuí ainda com importantes implicações práticas para gerentes de museus e profissionais do setor cultural em geral.

# Acknowledgments

During my academic career, I had the chance to broaden my knowledge in different areas, which included Literature, Philosophy and Arts, Economics and, eventually, Management and Entrepreneurship. This dissertation gave me the possibility to use the knowledge acquired throughout these years to explore a topic that involved my main interests and passions: Art, culture, technology and innovation.

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# Chapter 1: Introduction

## 1.1 Context and topic overview

Museums are nowadays facing several challenges related to their long-term sustainability, defined as their ability to maintain existence and fulfil the mission objectives (Weerawardena & Mort, 2006). Although the value of these organizations is widely recognized in our society (Scott, 2006), the economic crisis, the digital transformation and the increasing competition coming from the leisure and entertainment industries have threatened the traditional role of museums (Kotler & Kotler, 2000; Burton & Scott, 2003; Lindqvist, 2012; Pop & Borza, 2016). These factors translated into cuts to public expenditure on culture, decreased funds and donations from private stakeholders and, above all, a decrease in the number of visitors and in their return intent (Eurostat, 2015; NEA, 2015; Loach, Rowley, & Griffiths, 2016).

By analysing the current literature on the topic of museum management, it is clear that a shift in the managerial approach is needed in order to ensure the financial sustainability of these institutions. The new management paradigm needs to include strategies and practices that can attract a broader audience and convert visitors into loyal customers (Alcaraz, Hume, & Mort, 2009; Hume, 2011; Di Pietro, Mugion, Renzi, & Toni, 2014). Adopting an audience-centric approach can increase the direct revenues, fulfil the educational purposes and prove the value of museums to all the stakeholders involved.

Among the strategies suggested in literature to expand the visitor base of museums, *edutainment* has emerged in the recent years (Addis, 2005). This concept, which suggests a combination of the words *education* and *entertainment*, represents the strategy of including gaming elements in a learning environment (Yan Wang, Zuo, & Li, 2007; Corona, Cozzarelli, Palumbo, & Sibilio, 2013). Edutainment practices are mostly implemented by means of interactive technologies, because these latter provide users with the ability of receiving educational messages in a recreational way (Pallud, 2016). Therefore, when efficiently managed, edutaining technologies can increase both the learning outcomes and the pleasure of visitors.

## 1.2 Problem statement and research objectives

Museums fulfil a public service through the preservation of cultural heritage for the purposes of public education and enjoyment. Besides these goals, these institutions rely on their ability

to attract and retain visitors to increase their financial stability. These two objectives need to be aligned to ensure the growth and sustainability of these organizations in the future.

This dissertation strives to explore how *edutainment* and its applications through interactive technologies in museums can enhance the visitor's experience and the return intent, with the purpose of expanding the customer base. The study is meant to advance in the existing research, to prove that edutainment can be a successful strategy for ensuring the long-term organizational sustainability of museums, thanks to its contribution in achieving both social impact and financial objectives.

In order to analyse the problem presented, the research was based on the case of the Museum of Art, Architecture and Technology and the Central Tejo in Lisbon. The Case Study seeks to explore how edutaining technologies can enhance the organizational sustainability of the two museums. Therefore, by adapting the problem statement to the case presented, the dissertation was led by the following research question:

*RQ: How can edutainment technologies help museums to achieve their social and financial objectives?*

The case was developed thanks to different research methods, meant to provide a triangulation approach of cross-validation of the data (Mertens & Hesse-Biber, 2012). The research was based on secondary data received from the EDP Foundation team, on primary data collected through 15 in-depth interviews and on primary observational data (Annex 4; Annex 5). The details of the methodology will be further explained in Chapter 4.

## 1.3 Thesis structure

After the presentation of the problem and the research objectives in this chapter, the dissertation will follow in Chapter 2 with the review of the literature concerning the topics involved in the research. The mission and value of museums, the organizational nature, the sustainability and the concept of edutainment and interactive technologies will be presented. In Chapter 3 and 4, the conceptual model and research methodology will be described in detail. Furthermore, Chapter 4 will deal with the case of the MAAT and the Central Tejo, with an overview of the mission, the organizational structure and the museum services of these institutions. Chapter 5 will exhibit the teaching notes related to the Case Study, to provide students and professors with guidelines for the discussion of the case. Finally, Chapter 6 will present the conclusions of the research, the limitations and the opportunities for future research.

# Chapter 2: Literature review

## 2.1 Museums: definition, mission, value

### 2.1.1 Definition of museum

Regardless of their focus and content, all museums can be included in a common definition that highlights their mission and their value for the society. The current definition of a museum is given by the International Council of Museums (ICOM) and it is used as a reference at an international level. According to the ICOM:

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

Although this statement holds valid for all types of museums, the elements contained in it are subject to debates, mainly associated to the different museums' managerial approach and vision.

### 2.1.2 The multiple missions of museums

As described in the definition given by ICOM, museums cover different functions that are meant to serve the public by creating and delivering value to the community. These functions include the acquisition, conservation, research, communication and exhibition of the tangible (objects and creations) and intangible (knowledge and messages) heritage of humanity. All these activities are pursued with the social goal of enabling the citizens to learn, study and enjoy this heritage. Indeed, the access to and enjoyment of cultural heritage is not only the mission of these institutions, but also a human right recognized by international agreements (UN General Assembly, 1948).

Although there is a common agreement on the functions that a museum should fulfil, the need of increased financial resources has led to a debate around which weight each of these should assume (Gilmore & Rentschler, 2002; Camarero, Garrido, & Vicente, 2015; Alcaraz et al., 2009; Balloffet, Courvoisier, & Lagier, 2014). Moreover, also the purposes of education, study and enjoyment of the cultural heritage are matter of discussion and assume different importance, mostly according to the management orientation and beliefs of each museum directory board

(Alcaraz et al., 2009; Jacobsen, 2014). These debates find their origin in the seek for sustainability of museums and will be further discussed in the section dedicated to it.

### 2.1.3 Value creation and social impact

Achieving the goals that are embedded in the mission of museums creates a remarkable value for the society, which goes beyond the direct benefits of accessibility and enjoyment of the cultural heritage (Jacobsen, 2014). This positive impact, defined as "*…the consequences to human populations of any public or private actions that alter the ways in which people live, work, play, relate to one another, organize to meet their needs and generally cope as members of society*" (Yang Wang, Han, De Vries, & Zuo, 2016) is widely recognized by many stakeholders, both public and private and both customers and non-customers (Scott, 2003).

Scott (2009) identifies different sources of value delivered by museums to both individuals and communities. At a social level, this value includes a remarkable economic impact (Jacobsen, 2014) through tourism (Browning, 1993), employment and infrastructures, but also a social development (Tobelem, 1997) through educational services, cohesion in a public space, preservation of cultural heritage and historical identity (Armbrecht, 2014). Indeed, museums contribute to the sustainable development of the communities in cultural terms, by making them places in which people want to live (Di Pietro et al., 2014). On the other hand, at an individual level, the value of a museum lies in the "*self-directed learning in a free choice environment"* and in the experience of discovery and pleasure that the visit often provides to customers (Scott, 2006). Finally, museums provide a return to donors and financial stakeholders in terms of reputation and social recognition (Alcaraz et al., 2009).

Indeed, cultural sustainability has drawn growing attention within the sustainable development agendas of municipalities and governments, and is nowadays often considered as a fourth pillar, equal to social, economic, and environmental subjects (Loach et al., 2016). However, the public budgetary constraints, together with the difficulties in measuring the value created for the communities in accountable terms, impose a certain pressure for museums to remain competitive and prove their positive impact (Scott, 2003).

## 2.2 Organizational and financial structure of museums

Museums can be either private or public institutions, and might be furthermore divided into for-profit or non-profit within the private sector (Lindqvist, 2012). However, as the ICOM definition presented above suggests, almost the totality of museums are non-profit

organizations, either private or public. Non-profits are characterized by being subject to the non-distribution constraint, inhibiting them to distribute residual earnings to individuals who exercise control over the firm (Hansmann, 1980). Therefore, any revenue surplus created is reinvested within the organization to support the pursued social objectives.

As any other non-profit institutions, museums rely on a variety of income flows to support their activities (Lindqvist, 2012). These include earned income, government support, returns on investment, donations from individuals, foundations and corporate grants or funds from other sources (Wilsker & Young, 2010). The presence of external and public funding is justified by the fact that museums are fulfilling a service to the society (Johnson & Thomas, 1998). The distribution of revenues is heavily on favour of these external funds: Incomes coming from visitors are on average only 15% of the total income flows (AADM, 2015; Alcaraz et al., 2009). Because of this failure in covering the costs with direct revenues, the financial stability of museums is strictly related to the volatility of the external funds, which represent a considerable source of uncertainty (Lindqvist, 2012).

Given their organizational and revenue structure and their goals, museums can be compared to hybrid organizations. Indeed, these institutions are facing the challenge of achieving both the socio-cultural goals related to their mission and the economic goals of self-sustainability and growth (Camarero et al., 2015) (Annex 1).

## 2.3 Sustainability of museums: threats and opportunities

### 2.3.1 Definition of sustainability and the context of museums

In a business and organizational context, sustainability is used with the meaning of an organization having sufficient resources to maintain existence, and fulfil its objectives, into the future (Weerawardena & Mort, 2006). The concept of sustainability is therefore strictly related, on the organizational side, to the ability to generate revenues to support the operations and, on the social side, to the ability to meet the mission purposes. Sustainability can be achieved through the design and implementation of an appropriate business model (Santos, Pache, & Birkholz, 2015), which can be defined as the combination of resources and activities that allow an organization to create, deliver, and capture value (Zott, Amit, & Massa, 2011).

In the context of museums, the sustainability of these organizations mainly depends on their relevance for the community and its individuals (Nielsen, 2015) and is closely related to

ensuring a certain flow of visitors (Di Pietro et al., 2014). Indeed, museums need to prove their value and their competitive advantage in order to increase both the direct incomes coming from the attendants and the indirect incomes coming from investors. However, cultural institutions are facing several challenges, coming from both the recent transformations of the society and their nature of non-profit organizations, that question their sustainability in the long run.

### 2.3.2 Threats to the sustainability of museums

The first event that threatened the sustainability of museums was the economic crisis experienced almost a decade ago, that did not spare the cultural sector (Lindqvist, 2012; Scott, 2009; Alcaraz et al., 2009). The financial distress that involved all stakeholders was reflected in terms of cuts to public funding (Eurostat, 2015; Loach et al., 2016), cuts to private sponsorship and donations (Lindqvist, 2012) and decrease in the number of visitors (NEA, 2015). Indeed, the difference in budget allocations for culture among countries after the crisis confirmed the museums' dependence on political decisions (Moen, 1997; Lindqvist, 2012). Moreover, together with the decrease of incomes, the crisis put museums under increased pressure to prove their value in accountable terms (Scott, 2009) and to justify their existence (Loach et al., 2016).

Besides the economic crisis, the digital transformation has also brought up new challenges for museums, both in terms of threats and opportunities (Freedman, 2000). The democratization of the access to information and cultural heritage, that contributed to the collapse of the importance of the physical space, had a negative impact on visitors' attendance to museums (Burton & Scott, 2003; Balloffet et al., 2014). In this context, the traditional competitive advantage of museums, based on the value of the objects they possessed, has been substituted by a competition based on information and services (Balloffet et al., 2014). As a consequence, museums also experienced an increasing competition in the leisure market, coming from restaurants, cinemas, shopping malls and sports arenas (Pop & Borza, 2016; Kotler & Kotler, 2000). In this regard, several authors suggest the need of a managerial shift in the museums' focus, from a conservation function to an audience-centric offering. In particular, they highlight how adopting a more visitor-centric approach could meet the market expectations (Pietro, Mugion, Renzi, & Toni, 2014; Alcaraz et al., 2009; Freedman, 2000; Gilmore & Rentschler, 2002; Camarero et al., 2015).

Finally, as explained in previous paragraphs, museums are by nature more exposed to financial and managerial risks. The reliance on multiple income sources makes these institutions more

vulnerable and raises the level of uncertainty towards the future (Lindqvist, 2012). In addition to it, museums are always asked to adapt to the requirements and preferences of important resource providers (Froelich, 1999). Moreover, the *"market vs. culture"* debate increases the difficulties of managing the opposing goals of financial returns and cultural impact (Camarero & Garrido, 2012) and creates conflicts within the organization (Annex 1). Indeed, a rational economic approach to museum management often dilutes the effectiveness of the social mission (Gilmore & Rentschler, 2002). Nonetheless, on the other hand, the resistance towards innovation and market orientation is affecting the competitiveness of these institutions and threatening their ability to deliver social value (Balloffet et al., 2014).

Because of all the factors mentioned above, financial sustainability has become an urgent issue for museums and cultural institutions. It is clear that these organizations need to decrease the uncertainty coming from external and internal variables by reinforcing their competitive advantage and their financial independence. In order to work towards these transformations, museums can take inspirations from hybrid organizations (Annex 1) and recognize the need of aligning the activities that generate profit (in this case revenues) with the activities that generate impact (Santos et al., 2015).

### 2.3.3 Aligning revenues and impact: audience development

From the analysis of museums' resources and threats to sustainability carried out so far, it is evident that the most urgent need for these institutions is to attract new visitors and, above all, retain the existing ones (Hume, 2011; Di Pietro et al., 2014). These two elements represent the key factors to achieve both the mission objectives and the financial sustainability (Kotler & Kotler, 2000). In terms of mission, the audience development meets and expands the museum's goals of providing the citizens with access to education, study and enjoyment of the cultural heritage. Also, at a community level, attracting more visitors means increasing the economic and social returns discussed above, which involve tourism and cultural development. On the other side, considering the financial returns, an expanded and loyal audience base translates in greater direct revenues coming from the entrance fees, the sales of related goods (e.g. products of the museum shop) and the consumption of related services (e.g. museum restaurants and cafés).

Despite the clear link between customers, revenue and value creation (Alcaraz et al., 2009), critics of museum management often argue that they lack customer orientation and they tend to

focus on the custodial function rather than in the presentation of the artefacts in an exciting and market-oriented way (Freedman, 2000; Gilmore & Rentschler, 2002; Balloffet et al., 2014).

In this research, the practice of edutainment and its application in museums through interactive technologies are considered as a possible solution for the alignment of the educational and market purposes of the museums. This thesis is supported by recent findings in literature that prove the positive effect of these new strategies on the visitors' satisfaction and learning (Addis, 2005; Jarrier & Bourgeon-Renault, 2012; Balloffet et al., 2014; Hume, 2015; De Blas, Bourgeon-Renault, & Jarrier, 2015; Pallud, 2016). In the following sections, a broader explanation of the concept of edutainment is presented, with a focus on interactive technologies as tools to implement successful service innovation strategies in museums.

## 2.4 Edutainment: definition, risks and opportunities and applications

### 2.4.1 Definition of edutainment and the context of museums

Even though applications of edutainment practices can be found in several sectors since many years, the clear definition of this concept is quite recent. As the noun itself suggests, *edutainment* is the blend of the words *education* and *entertainment*. It is commonly agreed that the first person to use this term was Robert Heymann, a documentarian of the National Geographic Society, to refer to the use of gaming elements for educational purposes (Yan Wang et al., 2007; Corona et al., 2013; Aksakal, 2015). Nowadays, the Cambridge English Business Dictionary defines edutainment as *"the process of entertaining people at the same time as you are teaching them something, and the products, such as television programmes or software, that do this"* ("Edutainment [Def.1]," 2017).

By applying this definition in the context of museums, edutainment can include all the strategies, tools and services implemented by the organization to deliver the information embedded in the exhibitions in an entertaining way, to make the learning experience more exciting and enjoyable (Wiberg & Jegers, 2003; Lepouras & Vassilakis, 2004; Addis, 2005; Hertzman, Anderson, & Rowley, 2008).

### 2.4.2 Opportunities and risks of edutainment in museums

Many museums have already recognized the potential of edutainment practices for increasing the visitor's satisfaction and the perception of learning (Balloffet et al., 2014) and the boundaries between these institutions and other recreational or educational organizations are blurring (Kotler & Kotler, 2000). Indeed, museums are understanding the need of a shift from

*"being about something to being for somebody"* (Weil, 1999) to create an appealing experience (Freedman, 2000; Kotler & Kotler, 2000).

However, many managers still see in edutainment a risk of '*disneyfication*' of culture (Balloffet et al., 2014) and are sceptical about borrowing practices from the leisure and entertainment sector (Camarero & Garrido, 2012; Mencarelli & Pulh, 2012). Camarero and Garrido (2009) also found out that a too considerable focus on customers' preferences has a negative impact on the economic performance of museums, diluting their overall brand image. The reason for this result is that comparing museums to other entertainment venues raises the issue of the opposition between high culture and popular culture (Balloffet et al., 2014).

Nonetheless, it is a fact that visitors are decreasing in number and, to ensure the sustainability of museums, a radical change in managerial approaches is required (Di Pietro et al., 2014). Many researches prove that museumgoers are unsatisfied with the passive role that they often assume in museums and have expectations of a co-produced experience, that is user-friendly and interactive and in which they play an active role (Balloffet et al., 2014; Di Pietro, Mugion, Mattia, & Renzi, 2015). In times of unlimited leisure opportunities, visitors are looking for a museum experience that provides them with effective education, but also with excitement and enjoyment (Di Pietro et al., 2014). In this context, the choice of visiting a museum is not only based on the acquisition of knowledge, but also on the generation of creative and memorable experiences.

According to Addis (2005), consumption is *"the experience derived from the interaction between a subject (the consumer), and an object (i.e. a product, an event, an idea, a person) within a given context"*. For this reason, edutainment can be seen under an innovative perspective as the act of cultural consumption, as the visitor is enjoying and learning at the same time (Annex 2). However, in this particular case, the object of consumption shifts from the artefact to the message embedded in the exhibition (Freedman, 2000; Addis, 2005) (Annex 2).

The inclusion of gaming elements as tools for the delivery of educational messages is proven to be effective not only for making education 'funny', but also to enhance the level of learning (Pallud, 2016). For this reason, edutainment can help museums to achieve both their educational purposes. On the other hand, edutainment is effective in enhancing the visitors' overall engagement and satisfaction (Hume, 2015), because they are able to meet both their educational and leisure expectations (Pallud, 2016). Nonetheless, it is important to outline the limitations of edutainment, and consider that these practices should not completely substitute the traditional

experience in museums. In particular, not all demographic groups respond positively to gaming elements and some visitors remain loyal to the usual forms of mediation with the exhibitions (Jarrier & Bourgeon-Renault, 2012). These groups should also be taken into consideration when implementing innovations in the service offer of a museum.

### 2.4.3 Interactive technologies for edutainment

Edutainment practices are often provided by means of technologic tools and devices (Addis, 2005; Hume, 2015; Corona et al., 2013; Pallud, 2016). Technology greatly increases the potential of convergence between education and entertainment (Balloffet et al., 2014), mainly because it allows users to interact with the content and the messages and co-create the value of the experience (Addis, 2005). According to De Blas, Bourgeon-Renault and Jarrier (2015), in the context of museums, *"the experience of using an interactive mediation tool has two dimensions: a functional dimension corresponding to the useful, clear, relevant, exhaustive and efficient use of the tool; and a dimension that rests on the pleasant, soothing, stimulating, surprising, convivial, fun or aesthetic character of the too"*.

Interactivity generally corresponds to "*the degree to which two or more communication parties can act on each other, on the communication medium, and on the messages, and the degree to which such influences are synchronized"* (Liu & Shrum, 2002). Interactive or mediation technologies might include several different devices that can be categorized according to different dimensions. Jarrier and Burgeon-Renault (2012) indicate some categories such as the nature (static or mobile), the objective, the level of interactivity (high or low), the type of museum served, the capacity to enhance the *in situ* or off-site experience and the main orientation (learning or entertaining), among others (Annex 3).

Concerning the functional and educational dimension, the existing research has proven that interactive technologies mostly increase the absorption of knowledge (Falk, Scott, Dierking, Rennie, & Jones, 2004; Pallud, 2016). As a matter of fact, education and learning result greater when linked to emotions, feelings of authenticity, and enjoyment (Pallud, 2016). Moreover, the practice of '*learning-by-doing'* actively involves the visitor and gives her the feeling of a re-discovery (Falk et al., 2004). Indeed, mediation devices provide users with these dimensions while delivering the educational content. Plus, these technologies often enable visitors to choose what to learn, instead of receiving all the information related to the exhibitions. The customization of the educational content allows the user to discover synergies between different disciplines connected to the museum offer (Addis, 2005). Finally, through the involvement of

all senses, interactives influence and enhance the long-term memory of the experience and the related knowledge (Addis, 2005; Corona et al., 2013; Pallud, 2016).

In terms of entertainment, mediation tools enrich the cultural message embedded in the museum offer but at the same time make more understandable, personalized and therefore enjoyable (Addis, 2005). This makes museums more attractive to a broader audience and to non-customers, by contrasting the common belief that an expertise on the exhibited subjects is required to enjoy the visit. Moreover, interactives can provide a variety of different experiences around the same exhibition, providing museumgoers with a feeling of novelty even in repeated visits and increasing their return intent (Jarrier & Bourgeon-Renault, 2012). Finally, the playful dimension of interactives represents itself a source of enjoyment, even when considered separately from the learning experience, and an intrinsic motive for the visit for many customers (Jarrier & Bourgeon-Renault, 2012).

Considering the two dimensions together, it is clear that mediation devices have the great potential to make museums more attractive both for loyal visitors and new ones (Adams, Luke, & Moussouri, 2004). Indeed, interactives have been proven to affect positively both the visitor's satisfaction and the return intent (Hume, 2015; Alcaraz et al., 2009). Other authors (De Blas et al., 2015) support this thesis by arguing that the use of mediation tools could reduce the identity gap between the visitors and the museum, by improving the sense of proximity and belonging with the exhibitions. However, it is important to take into consideration that the users' reaction to these devices is strictly related to their technologic acceptance, to the perceived ease-of-use and to their individual preferences (Hume, 2015). Likewise, the degree of learning associated to the use of mediation tools depends on the visitor's orientation, and sometimes the playful dimension overshadows the educational intent (Adams et al., 2004). Nonetheless, whenever both the traditional and the interactive museum experience are offered, interactive technologies can remarkably improve the visitor experience in museums.

# Chapter 3: Conceptual framework

Based on the literature review of mission and value of museums, sustainability, audience development, edutainment and interactive technologies in the context of museums, this chapter presents the conceptual model and the hypothesis that will be tested.

The dissertation follows this conceptual framework:

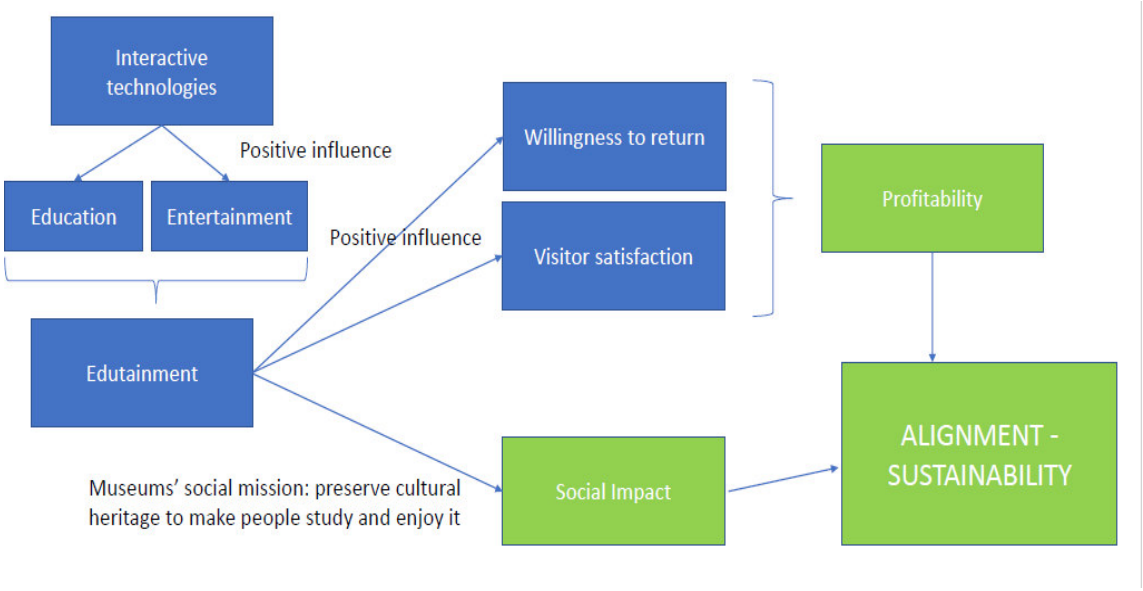



*Figure 1: Conceptual framework of the dissertation.*

The existing research on interactive technologies described in the previous chapter confirms the positive influence of these devices on the learning and entertaining outcomes of visitors (Pallud, 2016; Jarrier & Bourgeon-Renault, 2012; Falk et al., 2004; Addis, 2005). These outcomes are in line with the social purposes of museums ("Museum Definition- ICOM," 2017). Therefore, by adapting these findings to the Case Study presented, this dissertation suggests the following hypothesis:

*Hp1: Edutainment technologies help MAAT and the Central to maximize their social impact.*

Likewise, several authors prove the positive relationship between the implementation of interactive technologies and edutainment practices in museums and the satisfaction and return intent of visitors (Hume, 2015; De Blas et al., 2015). In general, the research presented in the literature review supported the thesis that an audience-centric approach in museums is needed to ensure the financial sustainability of these institutions (Alcaraz, Hume, & Mort, 2009; Lindqvist, 2012; Di Pietro, Mugion, Renzi, & Toni, 2014). Indeed, expanding the audience base

leads to an increase in the direct revenues of museums. Accordingly, in the context of MAAT and the Central Tejo, the following hypothesis is formulated:

*Hp2: Edutainment technologies help MAAT and the Central to increase their direct revenues.*

# Chapter 4: Methodology

To carry out the research presented, the author developed a Case Study to investigate the topic in depth. As edutainment in museum is a relatively recent practice, a Case Study is considered appropriate because it allows to investigate a particularly contemporary phenomenon using multiple sources of evidence. The case has been furthermore supported by three investigation methods in order to cross-validate the results and ensure the quality and reliability of the research (Mertens & Hesse-Biber, 2012).

## 4.1 Case Study

As stated in the introduction, this research focused on the case of the museum of Art, Architecture and Technology and the Central Tejo of Lisbon. MAAT and the Central Tejo are particularly relevant for the purposes of this research for several reasons. First, MAAT and Central Tejo are multi-focus museums which exhibit contemporary art, electricity and technology, and architecture. This variety of disciplines makes these museums an interesting research location to test the validity of edutainment in a broad range of fields. Moreover, MAAT and Central Tejo have already installed edutaining technologies and gaming tools, specifically in the Electricity exhibition area. Studying the visitors' reaction to these technologies results useful for the purposes of this research. Finally, MAAT is a quite young museum, which opened to the public only in October 2016. Therefore, this case study represents a great opportunity to explore the potential of future strategic implementations involving technology.

The collaboration with MAAT started in March 2017 in the form of a curricular internship throughout the thesis semester. The internship is meant to give to the author the ability to access the information needed to complete the research and to study the visitors' experience at the museum closely. During the internship, the author worked with the Visitor Services Department to analyse the impact of edutainment in the offering and to spot opportunities of improvement.

## 4.2 Secondary data: MAAT available data

For the completion of the case study, the author has access to several reports concerning MAAT and Fundaçao EDP, which is the private foundation controlling the museum. This information was used to provide an overview of the organization, to study the financial structure of the museum and to extrapolate useful facts concerning MAAT's current situation. Moreover, the

author had access to secondary data from a visitors' survey conducted during the month of March 2017, with 462 respondents (Exhibit 13).

## 4.3 Primary qualitative data: semi-structured interviews

The author used semi-structured interviews to collect visitors' feedback on the museum offering and on the interactive technologies implemented. The results of these interviews were used to enrich the information presented in the Case Study and to answer to the related Teaching Questions.

The objective of these in-depth interviews was to gain valuable insights on the perceived learning, perceived entertainment, satisfaction and return intent of the visitors, both generally and in relation to their use of interactive technologies (Annex 4). The sample included 15 visitors, interviewed during the month of April 2017. The sample characteristics are presented in Annex 4. The Portuguese nationality was the largest one represented (33%), but this figure is in line with the visitor statistics of the museum, which show that Portuguese attendants represent the largest number (Exhibit 10).

The interview was structured as a set of open-ended questions, that could be enriched by further questions in order to clarify and deepen the answers. The questions were pre-determined together with the topics that needed to be studied (Annex 4).

## 4.4 Primary qualitative data: participant observation

As a further support to the Case Study, the author used a participant observation method (Annex 5). This latter was used to collect meaningful insights about the visitors' behaviour in relation to interactive devices at MAAT and the Central Tejo.

At the first day of the internship, the author made an individual visit in order to identify the aspects that were most interesting to investigate. Moreover, during the month of April 2017, the researcher followed the tour of each of the 15 visitors that were then interviewed, to note additional aspects of their behavior (Annex 4). Finally, the author participated in two guided visits of the museum as a hidden observer. These tours were divided according to the focus of the tour and the age of the participants (Annex 5). The participant observation method resulted particularly useful to outline some of the peculiar behaviours of visitors in relation to the technologic devices that are present in the museum. The data collected supported and enriched the findings that resulted from the other investigation methods.

# Chapter 5: Case Study

## 5.1 EDP campus: history and current situation

Even before opening the doors to the public, in October 2016, the Museum of Art, Architecture and Technology of Lisbon was already known internationally through the press. Hosted in a new magnificent building by the river Tejo, designed by Amanda Levete (Exhibit 1), and directed by Pedro Gadanho, previous curator in the MoMa of New York, the MAAT has been the biggest novelty of 2016 for the city of Lisbon. By completing the EDP campus with the Central Tejo (previously called Electricity Museum) (Exhibit 2), this museum gave a new life to the riverside of Lisbon and created a new cultural hub for the community. The success of this new cultural attraction was confirmed by the 365 thousand visitors that entered the Central and the MAAT in 2016[1] and by the award of biggest cultural development in Lisbon by the readers of Time Out Magazine[2].

The opening of the Museum of Art, Architecture and Technology represented a new beginning for EDP campus, by also giving international exposure to the recently renovated Central Tejo, one of the best examples of industrial architecture in Portugal. The two exhibitive spaces (Exhibit 3; Exhibit 4) present a continuous programme focused on contemporary art and the history of electricity. This year, the 38 thousand square metres of the campus will also be completed with a landscape project for the outdoor areas, designed by the architect Vladimir Djurovic.

The MAAT certainly represented a turning point in the history of the EDP Foundation, bringing new opportunities and a considerable exposure for the organization. Considering the remarkable investment, however, the MAAT also raised new challenges in terms of stakeholders' management, audience development and, in general, sustainability of the project. At this early stage, the Visitors Services Department is working to improve, adapt and finalize the offer through complementary services and activities meant to respond to the audience's needs and preferences.

[1] Interview with Miguel Coutinho, CEO of EDP Foundation. EDP Foundation Magazine, Vol.3, 2017.
[2] TimeOut Website: https://www.timeout.pt/lisboa/pt/blogue/a-time-out-desta-semana-012517

## 5.2 Mission, positioning and value for the community

### 5.2.1 Mission of MAAT and the Central Tejo

The Museum of Art, Architecture and Technology represents, together with the Central Tejo, the ambitious purpose of bringing together three different cultural fields in an innovative and unique context. The mission of this new cultural institution is to create *'a space for debate, critical thinking and international dialogue, which offers an intense and diverse programme conceived for all audiences and ages'* [3], with the ultimate vision of bringing *'new energy to the city of Lisbon's culture and landscape'* [4].

The mission of MAAT and the Central Tejo is in line with the common goals of museums and highlights the general educational purposes of these institutions. In particular, the two museums focus on offering to the visitors a space to foster cultural exchange and discussions on current trends. A big importance is given to attracting a broad audience, to comply with *"the function of art and the public service that the EDP foundation aims to provide"*, as the CEO Miguel Coutinho affirms[5].

### 5.2.2 Positioning and competitive advantage

The name of the new museum, together with its mission statement, also embed the willingness of MAAT and the Central Tejo to position as "*innovative, provocative"* spaces with a focus on *"the central problems of our society"*[6], rather than on past artefacts. This positioning statement is partly met through the peculiar and futuristic exhibitions such as "Utopia/Dystopia"[7], the original events such as "a Night in the Museum"[8] and the debates on contemporary issues organized at the sites[9]. Moreover, the innovative combination of three fields in one space is the core of MAAT and Central Tejo's competitive advantage, and one of the reasons for their local and international attractivity.

### 5.2.3 Vision and value to the community

The vision of MAAT and Central Tejo, presented above, highlights the most important goal of this organization, which is to bring added value to the community. The EDP Campus is indeed

[3] EDP Foundation - Financial Report 2016. Available at: http://www.fundacaoedp.pt/.
[4] MAAT Website: https://www.maat.pt/en/about
[5] Interview with Miguel Coutinho, CEO of EDP Foundation. EDP Foundation Magazine, Vol.3, 2017.
[6] Interview with Miguel Coutinho, CEO of EDP Foundation. EDP Foundation Magazine, Vol.3, 2017.
[7] MAAT Website: https://www.maat.pt/pt/exposicoes/utopiadistopia
[8] MAAT Website: https://www.maat.pt/pt/exposicoes/apqhome-maat
[9] MAAT Website: https://www.maat.pt/pt/programas-eventos

a remarkable step towards the cultural, social and economic development of Lisbon. In cultural terms, the three-dimensional approach that involves art, architecture and technology is a unique educational offer for the visitors. In social terms, with the renovation of 38 thousand square meters, the EDP Campus offers not only the two museums, but also a new public space, in an area that was before underexploited. Finally, in economic terms, MAAT certainly contributed in raising Lisbon's reputation as touristic destination. Indeed, the museum is always mentioned as one of the top reasons to visit the city, according to several recognized newspapers and magazines[10].

## 5.3 Organization, revenue and cost structure

### 5.3.1 Organization

The EDP campus, which hosts MAAT and the Central Tejo (Exhibit 2), is part of the EDP Foundation, a private Foundation with charitable status, established in 2004. The foundation was set up by Energias de Portugal (EDP) S.A., the private largest generator, distributor and supplier of electricity in Portugal and the third largest electricity generation company in the Iberian Peninsula[11].

As defined by the annual report 2016, the purpose of the EDP foundation is:

*"[…] to promote, develop and support initiatives of a social, cultural, scientific, technological, educational, environmental and sports nature, as well as to defend EDP's heritage. The Foundation's special purpose is to promote the study, preservation and dissemination of the cultural, scientific and technological heritage in Portugal associated with electric energy."*

Besides the MAAT and the Central Tejo, the EDP foundation supports activities in social innovation, scientific research, music, art and dance[12]. The staff of the foundation is mainly divided into the museum area and the social innovation area, with all the other departments (communication, finance, etc.) working transversally on all projects (Exhibit 5). As for the two museum buildings of the EDP campus, the staff is divided into directory, executive production and partnerships, curatorship, collection and publications management, educational services

[10] Financial Times: https://www.ft.com/content/2d203494-8fd6-11e6-a72e-b428cb934b78
Huffington Post:http://www.huffingtonpost.com/entry/portugal-travel_us_585c1ab6e4b0d9a594577b5c
[11] EDP Website: https://www.edpannualreport.edp.pt/en/edp-in-a-glance
[12] EDP Foundation Website: http://www.fundacaoedp.pt/

and visitor services[13]. The museum is directed by Pedro Gadanho, previous curator of the Museum of Modern Art of New York.

### 5.3.2 Revenue structure

All the activities of the EDP foundation are made possible by the endowment and financial support of the shareholders of the EDP Group. In fact, these latter provide the foundation with grants and contributions which represent 96,7% of the revenues (Exhibit 6). The remaining 3,3% includes all the direct revenues coming from the activities (Exhibit 7).

As described in Exhibit 7, the revenues coming from the EDP campus sites, which include the museum shop, the ticket fees and the events at the sites, accounted for approximately 66% of the total "Other Revenues" in 2016. Indeed, the museums represent the largest source of direct revenues for the foundation, and this percentage is likely to increase in 2017. This assumption is supported by the fact that, first, before June 2016 the entrance to the Central Tejo was free and, second, the MAAT building only opened fully to the public in October 2016. The positive impact of the opening of MAAT on the campus revenues is also demonstrated by the increase in museum shop revenues (+ 75 %) from 2015 to 2016.

The decision of applying an entrance fee to the MAAT and Central Tejo was made to compensate, at least partially, the investment for the new building. As the CEO of the Foundation stated, *"if we want to be more ambitious in our programming, we have to find new forms of revenue"*[14]. The ticket revenues are completely reinvested in the running of the two museums, as *"the MAAT obviously requires an increased investment for programming and maintenance"* and the museums are still only a part of the social projects that the foundation offers.

### 5.3.3 Cost structure

Considering the costs of the EDP Campus for the EDP Foundation, the expenses accounted for approximately 42% of the total costs of the foundation in 2016[15] (Exhibit 8). The expenditure itself did not vary significantly between 2015 and 2016, but it registered a remarkable increase in communication and personnel costs due to the opening of the new building (Exhibit 8).

[13] MAAAT Website: https://www.maat.pt/pt/equipa
[14] Interview with Miguel Coutinho, CEO of EDP Foundation. EDP Foundation Magazine, Vol.3, 2017.
[15] The calculation took into consideration the Personnel costs, the ME/MAAT and Campus operational costs and the Communication costs associated to the campus, according to the directions received by the Finance Department of the EDP foundation.

The costs associated to the museum sites represent a remarkable invoice for the foundation, highlighting the commitment to this new investment in culture. However, this considerable allocation of resources has also raised issues related to its justification for the stakeholders. The EDP Group competes in an open market in the Iberian Peninsula and the reputation of the company is strictly linked to the one of the Foundation and its museums. Moreover, Portugal is one of the European countries which experienced the highest increase in prices of electricity and gas[16] in recent years and some customers of EDP observed that *"the EDP Group should have reduced electricity rates instead of building a museum"*[17]. The context therefore imposes a certain pressure for the Foundation to prove the value of MAAT and the Central and to fulfil the purposes of positive impact on the community.

## 5.4 The museum services to the audience

### 5.4.1 Visitors' overview

Although the new MAAT building opened only in October 2016, the EDP campus experienced a remarkable increase in the number of visitors to the museum site from 2015 to 2016 (+ 51 %)[18] as well as increased revenues by passing from free to paid entrance (Exhibit 7). Currently, visitors can opt for visiting one or both the museum sites. The entrance to either MAAT or the Central is 5 Euros, in line with the price of the other major museums in Lisbon[19] (Exhibit 9). Differently, visitors can choose a bundling price of 9 Euros to visit both areas. Discounts or free entrance are offered to specific groups, such as students, that benefit from a 50% discount, or people up to 18 years old, for whom the entrance is free. Also, to increase the loyalty of visitors, annual membership cards are offered for the symbolic price of 20 Euros, giving unlimited access for the two buildings and special invitations to events.

Given the recent opening, the visitors' statistics are only partially informative about the demographic trends of the attendants. However, the recent figures show that, despite the innovative positioning and the international exposure, the Museum of Art, Architecture and Technology is still struggling to attract specific groups that should form part of the target

[16] Jornal Economico: http://www.jornaleconomico.sapo.pt/noticias/portugal-dos-paises-maior-aumento-dos-precos-da-eletricidade-gas-120023
[17] Interview with Miguel Coutinho, CEO of EDP Foundation. EDP Foundation Magazine, Vol.3, 2017.
[18] Visitors to the Electricity Museum (now Central Tejo), 2015: 241.000. Visitors to the Central and the MAAT buildings, 2016: 365.000. EDP Foundation, Financial Reports 2015 and 2016: http://www.fundacaoedp.pt/fundacao-edp/impactos-e-resultados/como-nos-financiamos/26
[19] Museu Berardo: http://www.museuberardo.pt/
Museu Gulbenkian: https://gulbenkian.pt/museu/
Museu do Oriente: http://www.museudooriente.pt/

audience (Exhibit 10). In particular, although the tourism in Lisbon is booming, foreigners are still only 11% of the total visitors, showing that there is space for improvement in terms of international attractivity. Also, teenagers and students, who could be particularly attracted by the futuristic features of MAAT, represent the minority of the visitors. Therefore, the mission goal of attracting *"all audiences of all ages"* has not been fully met yet. Finally, there is a remarkable number of visitors that decides to attend only the exhibitions at the new MAAT building (Exhibit 10). This figure is in line with the fact that the building is the biggest novelty of the EDP campus, but also points out the potential improvements in terms of audience development for the older Central Tejo.

The exhibitions presented at MAAT and the Central are only partly the reason for the visitors' attendance. Indeed, the cultural heritage exhibited needs to be closely supported by the complementary educational and visitors' services. The first ones refer to all activities programmed with educational purposes that are offered separately from the standard visit. Several of these educational services can be included in the definition of edutainment practices, because they focus on the combination of educational and entertaining aspects, to form the public on artistic and scientific topics (Exhibit 11). However, these services still attract only a small part of the total visitors (Exhibit 10) and the standard visit remains the preferred choice of the museumgoers. The visitor services, instead, include all the tools and features that complete and enrich the visitor experience during the standard tour. These services have the biggest impact on the visitors' perception of the museum.

### 5.4.2 Visitor Services

Differently from the rich educational programme (Exhibit 11), the two young museums still offer only very basic services included in the traditional individual visit. However, as suggested by the number of visitors that opts for a standard tour (Exhibit 10), the quality and variety of this services is crucial for the museums' efficiency in attracting a broader audience and satisfying customers.

In order to collect the visitors' feedback, the Services Department installed an interactive totem at the exit of the Central Tejo, which presents simple questions regarding the visit (Exhibit 12). The results for the month of March 2017 are showed in Exhibit 13. The figures give few additional insights on the audience of the museum. First, although 71% of the 472 participants stated that they would like to come back to the museum, only 39% of them had already been there before, with 61% participants being first-time attendants. These numbers are coherent

with the museum recent re-opening, but also highlight space for improvement in terms of loyal customers. Also, 45% of attendants knew about the museum through another visitor, outlining both the importance of referrals and word-of-mouth, and the potential improvement in terms of social media and web exposure. Finally, the feedback in terms of satisfaction, information available and visitor services has been overall positive, with high rates in the categories "Excellent" and "Good", but it has also presented non-neglectable percentages in the "Bad" category (17-19%) (Exhibit 13).

The in-depth interviews conducted on 15 visitors in the month of April 2017 also provided interesting insights on the expectations of visitors (Annex 4). In particular, 80% of the respondents mentioned learning and education as their expected outcome. Other emerging codes included immersion (47%), discovery (40%), entertainment (40%). These figures offer an overview of the visitor needs and desires and help to understand the reaction to the visitor services presented below.

#### *5.4.3.1 Informative panels*

The two buildings mainly provide information on the exhibitions through text panels. In the Central Tejo building, in the area where the power station is hosted (Exhibit 3), these panels are either placed on the external walls of the building or are pending from the ceilings, to comply with the constraints concerning the preservation of the historical machineries. This allocation makes it sometimes difficult for the visitor to identify the panels, as well as to understand the intended narrative path of the visit[20]. A similar problem occurs in the MAAT building, where the non-linear architectural structure of the exhibitive areas does not allow a clear and immediate identification of the panels, nor the association between these latter and the artworks described (Exhibit 4).

As a result of the in-depth interviews conducted (Annex 4), some participants claimed that the information presented is not sufficient to provide a comprehensive explanation of the exhibition, especially for the areas presenting contemporary art. In terms of learning, thus, the respondents expressed a negative reaction towards the panels. One participant observed that *"it is nice to try to interpret the message of the artist, but it is also frustrating to not to find enough clarifications after the trial"*[21]. This statement was also supported by the results of the survey shown in Exhibit 13, in which 19% of respondents rated the information available as not

[20] Assumption made from the participant observation data collected (Annex 5) and from the in-depth interviews with visitors (Annex 4).
[21] Participant "IC" (Annex 4).

sufficient. Finally, trends in the answers of the in-depth interviews show that especially Millennials think that the explanatory panels are *"rather boring and not really informative"*[22] or *"too general and passive as a form of giving information"*[23]. The observational insights also confirm that visitors aged below 35 spend generally less time reading the text presented and prefer other forms of communication (Annex 5).

#### *5.4.3.2 Interactive technologies*

Although the text panels represent the main form of transmission of information, during the visit the attendants can also find few interactive technologic devices. These latter are mainly continuously present at the Central Tejo building in the power station area, and include touchscreens and interactive games (Exhibit 14). As for the art exhibitions at both Central and MAAT buildings, the technologic devices are very limited and vary according to the exhibition, including tools with a broad range of interactivity. Visitors can find from simple headphones to Virtual Reality Glasses (Exhibit 15). However, the technologies related to the art exhibitions are, so far, part of the artists' work, and are not tools implemented by the Visitor Services Department. Therefore, the only interactive technologies to be considered part of the visitor services are the ones presented at Central Tejo.

The interactive games placed at the end of the visit of Central Tejo are the best example of edutainment technologies that are present at the museum. These devices provide a coherent mix of learning and gaming elements. The target audience for these interactive stations is mainly kids and teens, as the games are simple and intuitive. However, some touchscreen stations with quizzes are also placed in the area, offering questions and riddles to a more adult public.

The visitors' feedback resulted from the in-depth interviews described in Annex 4 showed a remarkable positive attitude towards these technologies. Participants highlighted the positive influence of these interactive devices on their learning and entertaining outcomes. The totality of visitors interviewed affirmed that they enjoyed using these technologies and further comments on the topic included concepts like curiosity (73%), fun and pleasure (66%), and learning (53%). Considering the latter, 66% of participants confirmed that the interactive technologies positively influenced their learning related to the visit. Respondents used words such as *"learning by doing"*, *"learning experience"* and one participant observed that: *"they* [interactive technologies] e*ngage me more easily in the act of learning"*[24]. In terms of

[22] Participant "AD" (Annex 4).
[23] Participant "JL" (Annex 4).
[24] Participant "AD" (Annex 4).

entertainment, 73% of participants highlighted the positive correlation between their pleasure and fun and the interactive devices. One of them stated: *"I loved them! They were one of the best parts"*[25]. The observations conducted on the visitors also highlighted a positive reaction to these tools, with 90% of the observed individuals using the technologies available (Annex 5).

Nonetheless, the feedback on the interactive devices, when positive at a general level, also included criticism in terms of visitor services. Some participants (47%) observed that interactive technologies are still very limited at the museum and almost neglectable. In this regard, some respondents (40%) highlighted the mismatch between the expectations before the visit and their real outcomes. One participant observed: *"Both me and my kids were a bit frustrated. The games were very simple both at a learning and entertaining level. We all expected something better!"*[26]. Respondents also mentioned the discrepancy between the positioning and the brand communication of the museum and the visit: *"If you don't include technology in a museum that is called like that, what should you include?"*[27] . Plus, all foreign participants to the interviews pointed out that most of the interactive games, even when being very simple and intuitive, do not have an English version (Annex 4).

Despite the criticism, however, 66% of participants confirmed that interactive devices had a positive impact on their overall satisfaction and 87% of them expressed a positive attitude towards implementing interactive technologies in museums in general. Plus, out of 66% of participants stating that they would return to the museums, 93% affirmed that they would return if new interactive devices were available (Annex 4).

## 5.5 Future development

As stated in the introduction of this Case Study, the renovation of the EDP Campus with the opening of MAAT building represented a turning point in the history of the foundation. Nonetheless, given the recent opening, the management team dedicated to the museum offering is just at the initial stage of implementation of the museum services. The first feedback coming from the visitors might result particularly helpful for shaping the future offer and for adapting the new services to the needs expressed by the attendants.

To enrich the visit with a storytelling content, the Services Department is considering the implementation of audioguides at Central Tejo and, later, at MAAT. Given the constraints in

[25] Participant "YM" (Annex 4).
[26] Participant "GC" (Annex 4).
[27] Participant "FF" (Annex 4).

terms of preservation of cultural heritage and the peculiar architecture of the buildings, the audioguides will be likely to be based on geo-localization through infrared technology. In other words, visitors will just need to get closer to the designated locations within the museum halls to let the content of the guide begin. These audioguides will be the next step for visitors' engagement, education and entertainment during the visit of the museum.

During this year, the EDP Campus will also be completed with the garden that connects the two buildings. This final element will add charm and value to the area and will hopefully fulfil the vision of creating a hub for *"culture and leisure to meet in a very satisfying way"*[28], as the CEO of EDP Foundation stated.

Overall, the investment in MAAT and in the renovation of the Central Tejo brought several advantages to the EDP Foundation and the two museums registered positive results in terms of audience and impact. Nonetheless, the figures and the visitors' opinions presented above highlighted the importance of focusing on the creation of services that can meet the expectations of the audience and that are coherent with the positioning of this new cultural institution. Indeed, the Services Department needs to work on the implementation of new appealing features, to demonstrate the value of the museums not only to the visitors, but to all the stakeholders involved, and to ensure consequently the long-term sustainability of MAAT and the Central.

[28] Interview with Miguel Coutinho, CEO of EDP Foundation. EDP Foundation Magazine, Vol.3, 2017.

# Chapter 6: Teaching notes

## 6.1 Learning objectives

The case study was developed for students interested in the fields of social and cultural innovation, technology and development and museum management. The case could be a valid material for courses in strategic management, especially focused on social and cultural organizations, or on technology. The case provides students with the opportunity to learn meaningful managerial lessons in terms of customer services, and to study their application in the specific context of museums. The learning objectives can be divided into two categories:

### *6.1.1 Strategic management of social and cultural organizations*

- To increase the students' awareness of the current challenges that museums face in terms of management of multiple missions, stakeholders' management and financial sustainability;
- To identify the social value of museums for the community, with the specific example of MAAT and the Central Tejo for the city of Lisbon, to understand the importance of ensuring the long-term sustainability of these institutions;
- To highlight the managerial challenge of aligning social purposes with financial goals and to train students to identify solutions to face the complexity of these organizations;
- To demonstrate how museums can both scale their social impact and reduce their financial dependency on donors by adopting successful audience development strategies;
- Through the example of MAAT and the Central Tejo, to train students to spot inefficiencies and opportunities in the customer (visitor) service strategies and to suggest improvements.

### *6.1.2 Innovation and technology management*

- To consider edutainment as a strategy for social enterprises, meant to combine educational purposes with customer satisfaction, and to prove its efficiency in the context of museums;
- To demonstrate how interactive technologies can serve as efficient tools in the context of edutainment because of their ability to convey educational messages in an entertaining way;
- To explore the potential of technology as a tool to enrich the customer experience, both in general and in the specific case of cultural organizations;
- At a general level, to develop the students' awareness of technology as a potential solution to managerial challenges, and to train students to identify new applications of these tools for social and cultural purposes.

## 6.2 Teaching questions and suggested teaching methods

In order to carry out a discussion on the case study presented, it is useful to provide students with a set of questions that can facilitate the identification of meaningful insights and learning outcomes.

The professor could divide the students into groups to facilitate the exchange of ideas and discussions around the topic and assign to each group these questions. The discussion could then be brought to a collective level during the lecture and students could compare and enrich their ideas and findings with the inputs of the other participants. The teaching questions are presented in the next paragraph, together with the analysis and discussion guidelines.

## 6.3 Analysis and discussion

The aim of the discussion of the teaching questions is to provide guidelines for the answers. Nonetheless, as the questions are open and deal with a managerial and strategic topic, these guidelines do not intend to represent the only possible answers. Students should be encouraged to explore alternative solutions and other perspectives and the answers can vary significantly according to their interpretation.

*TQ1: What is the current financial sustainability situation of MAAT and the Central and what are the main challenges related to it?*

In order to analyse the financial sustainability of MAAT and the Central Tejo, it is necessary to consider what are the current resources that EDP Campus disposes of in order to run the two museum sites.

Students need to take into consideration the Exhibits 7 and 8, which present the revenues and the costs associated to the museum sites. As described in Exhibit 7 and in the Case Study, the direct revenues coming from the activities of MAAT and the Central are ones generated from the ticket office, the museum shop and the events. These activities accounted for a total of 308.452 Euros in 2016. Considering the costs associated to the two museums, these include the Personnel costs, the ME/MAAT and Campus operational costs and the Communication costs, as presented in Exhibit 8. These costs in 2016 were 5.644.668 Euros and represented 42% of the total costs of EDP Foundation. By using these figures, it is possible to calculate the percentage of costs that are covered by the direct revenues. In 2016, only 5,4% of the total costs of the MAAT and the Central were covered by the income generated from their activities. This

percentage suggests that the museum sites depend by 94,6% on external funds, mainly the grants and donations coming from the EDP Group.

As explained in the literature review, these figures highlight a critical financial sustainability situation. Although the reliance on external funding is justified by the fact that museums fulfil with a public service (Johnson & Thomas, 1998), this high dependence on third-parties funds poses some issues in terms of volatility of the resources and uncertainty (Lindqvist, 2012). Although the EDP Group is not likely to withdraw from the commitment taken in supporting the museum sites in the next years because of the considerable investment decision in the two museums, the current financial situation imposes a certain pressure in delivering concrete value to the community (Nielsen, 2015) and in attracting more visitors (Di Pietro et al., 2014), in order to prove the efficiency of the investment.

*TQ2: How are audience development strategies able to balance the needs of the main stakeholders and beneficiaries of MAAT and the Central Tejo?*

In order to address the second teaching question, students should start by identifying the main stakeholders related to the EDP Campus, with the MAAT and the Central Tejo.

At an external level, the stakeholders of the two museums include the visitors, either national or international, and the community of Lisbon in its whole. As stated in the literature review, the community around a museum benefits not only from the services offered during the visit, but also from the positive impact in terms of value delivered to the city, which is cultural, social and economic (Scott, 2009; Jacobsen, 2014; Browning, 1993).

On the other side, at an internal level, the stakeholders' group includes the donors, which in this case are the shareholders and the companies within the EDP Group, and the employees of EDP Foundation. More indirectly, the customers of EDP Group are also stakeholders, as the investment decisions of the company influence and affect the overall offer provided.

Students should then make use of the literature review to understand the link between the stakeholders and the expansion of the audience base. As stated in the literature review, museums are facing the challenge of aligning the social impact with the market goals (Santos et al., 2015), which can also be seen as the different expectations of the stakeholders. The solution to overcome this trade-off is the adoption of a managerial approach based on developing and retaining a large visitor base (Kotler & Kotler, 2000; Hume, 2011; Di Pietro et al., 2014; Alcaraz et al., 2009), in order to increase the direct revenues and to achieve the mission objectives of education and entertainment of the public ("Museum Definition- ICOM," 2017).

This general solution also applies to the case of MAAT and the Central Tejo. Concerning the external stakeholders, the implementation of services meant to attract and satisfy the visitors is exactly the way in which the managers can meet the needs of this group of stakeholders. As a result of the in-depth interviews conducted on 15 participants and partially described in the Case Study (Annex 4), museumgoers look for an experience that provides them with learning (80% of respondents), immersion (47%), discovery (40%), entertainment (40%). These expectations can only be addressed by proper Visitor Services meant to attract and retain the audience. As of the community of Lisbon itself, a broader audience attending the museum sites translates in more tourism, more economic return to the businesses of the city and an improved cultural impact.

Considering the internal stakeholders, an increased customer base which translates in increased direct revenues represents a minor financial weight for the EDP Foundation, for which the costs associated to the museum amount at 42% of the total expenditure (Exhibit 8). On the other side, it also consists of an accountable return on investment for the EDP Group, which has the responsibility to justify the investment decisions to the shareholders and which might seek outcomes such as a strengthened company's reputation. This latter is strictly related to the opinion of the consumers of EDP, who have already complained about the decision of the company of investing in the new museum. Therefore, proving the positive social impact on the community by convincing more citizens to participate in the cultural offer, as well as decreasing the costs associated to the museum sites, could result beneficial for the EDP Group and enhance the opinion of its customers.

As a result of this analysis, it is clear that audience development could align the needs and expectations of all the stakeholders, by meeting the social expectations of the museum beneficiaries and the financial expectations of the internal stakeholders.

### *TQ3: How do edutainment technologies contribute to achieve the mission and financial goals of MAAT and the Central?*

As explained in the literature review, interactive technologies can contemporarily deliver learning and entertainment experiences (Addis, 2005; Balloffet et al., 2014), because of their ability to convey the educational message in an entertaining way. Therefore, students should here be able to link these dimensions with the mission and financial goals of the institution.

According to the information stated in the Case Study, MAAT and Central Tejo aim at creating *"a space for debate, critical thinking and international dialogue, which offers an intense and*

*diverse programme conceived for all audiences and ages".* Moreover, in general, museums serve the public through education and enjoyment of the cultural heritage preserved in the institutions ("Museum Definition- ICOM," 2017). The results of the in-depth interviews presented in Annex 4 showed that 66% of respondents confirmed the enriched learning outcome and the fun and pleasure coming from the use of interactive devices. Thus, the interactive technologies present at MAAT (Exhibit 13), by entertaining and educating both young and adult visitors, help the Visitor Services Department in achieving the mission purposes.

As for the financial goals, students might have understood from the previous question that these latter are strictly dependent on the ability of the museum to attract visitors. Indeed, the presence of interactive technologies is a source of satisfaction for the visitors, as confirmed by 66% of the participants of the in-depth interviews conducted (Annex 4). Moreover, 93% of respondents confirmed that the installation of new interactive devices would lead them to return to the MAAT and the Central (Annex 4). Therefore, interactive technologies contribute significantly in enriching the visitor experience and, consequently, expanding the customer base.

*TQ4: Based on the information provided in terms of edutainment practices and visitors of MAAT and the Central, discuss some potential strategies that the Services Department of the two museums could implement to expand the customer base.*

This question is particularly open, to leave space for the students' subjective opinions and creativity. However, there are some elements of the analysis that hold valid regardless of the chosen strategies. Here below, a version of the answer is provided, to include these fundamental elements and give an example of conceptual development.

The first part of the answer should include a brief analysis of the positive outcomes of the edutaining technologies, in order to spot the potential implementations of new services. The strategies proposed should aim at enriching the visitor experience mainly through the following features, presented in the literature review:

- Attracting the curiosity of visitors through learning-by-doing techniques that are meant to highlight and deepen different messages embedded in the cultural heritage (Falk et al., 2004);
- Allowing the customization of the message according to the visitors' needs and preferences, and enabling them to discover synergies among the different disciplines involved in the exhibition (Addis, 2005);

- Creating different experiences around the same exhibition, providing a feeling of novelty and discovery even in repeated visits, consequently enhancing the return intent (Jarrier & Bourgeon-Renault, 2012).

These features should then be linked with the visitor figures presented in the case study. As an example, 19% of the respondents to the survey described in Exhibit 13 stated that the information available at the Central Tejo is not sufficient, and these assumptions were supported by the comments of the participants to the in-depth interviews (Annex 4). In this regard, the Visitor Services Department team should consider the implementation of more interactive devices that could deliver the information embedded in the exhibitions in an efficient and appealing way. Given that they should definitely install the audioguides' service discussed as a future plan in the Case Study, they should also consider moving a step further and adopting devices that could provide visitors with an in-depth specific knowledge.

As a second example, the results of the in-depth interviews (Annex 4) demonstrated that visitors, even when attending the same exhibition, are attracted by very different information and knowledge. When asked to state which themes they would like to explore more at MAAT and the Central, the answers included *"renewable energy"*, *"working conditions in that historical period"* and *"painting techniques"* among other. Indeed, the Visitors Services Department should consider the implementation of audioguides which are highly customizable, in terms of language, thematic path, length of the tour and so on. This high customization level cold be obtained by means of a Mobile Application, designed to offer different possibilities of personalization of the visit, that would be downloaded at the beginning of the tour.

Finally, besides the learning outcomes, visitors have expectations of immersion (47%), discovery (40%) and entertainment (40%) (Annex 4). These expectations could be met through the provision of mediation devices meant to involve all senses of the visitors. Augmented reality tools and Virtual Reality technologies should form part of the offer of interactive technologies and should enable an immersive experience in different historical periods, different natural environments and different architectural stages.

These examples are just a small part of the possible strategies that the museums could adopt. In general, the suggestions can vary and involve any technologic tools available in the market. However, students should always consider the positioning of the museum when proposing ideas and bear in mind the innovative, provocative, futuristic and multi-disciplinary image that the two museums intend to transmit to their visitors.

# 7. Conclusion

This dissertation explored how edutainment technologies help museums to achieve both social and financial objectives. The following research question: *"RQ: How can edutainment technologies help museums to achieve their social and financial objectives?"* was addressed through the development of the Case Study of MAAT and the Central Tejo. The findings, partially presented in the discussion and analysis of the Teaching Questions, support the two hypotheses that were presented in the Conceptual Framework of this dissertation.

*Hp1: Edutainment technologies help MAAT and the Central to maximize their social impact.*

This hypothesis was supported by the existent literature and the findings extracted from the in-depth interviews and the observational data presented in Annex 4 and Annex 5. The results were mentioned in the Case Study as well as in the analysis of the second Teaching Question. As the social impact goals of MAAT and the Central are the ones of providing public access to cultural heritage with the purposes of education and enjoyment, the maximization of this impact is related to the efficiency of the museum services in providing a learning and entertaining experience for the visitors. In this regard, edutaining technologies were proven to be positively related to the perceived learning and perceived entertainment of visitors (Annex 4). These results were in line with the research previously conducted in literature, which proves the positive correlation between interactive technologies and learning and pleasure outcomes in the museum visit (Pallud, 2016; Jarrier & Bourgeon-Renault, 2012; Falk et al., 2004; Addis, 2005). However, further findings highlighted the need for MAAT and the Central Tejo to improve the offer of interactive devices, to comply with the desired positioning of the two museums and to allow visitors to customize the experience, in order to respond to the different needs and preferences of the several demographic groups.

*Hp2: Edutainment technologies help MAAT and the Central to increase their direct revenues.*

As presented in the Case Study and the Teaching Notes, the results of the methods conducted (Annex 4) showed that interactive devices have a positive influence on the visitors' satisfaction and willingness to return. These findings were coherent with the existent research on the topic (Hume, 2015; De Blas et al., 2015). Given that the main advertising channel of the two museums is the word-of-mouth (Exhibit 13), the visitors' satisfaction is positively related to the expansion of the audience. Likewise, the return intent of visitors, that was higher in the case in which new interactive devices would be available (Annex 4), translates in increased attendance.

Both these factors positively influence the direct revenues of the two museum sites, through the ticket fee, the possible purchases at the museum shop and the attendance to events.

By these results of the specific case of MAAT and the Central, it is possible to answer to the research question that led the dissertation. The organizational sustainability of museums depends on the ability of having sufficient resources to maintain existence and fulfil the mission purposes in the future (Weerawardena & Mort, 2006). Thanks to the support in maximizing the social impact and in increasing the direct revenues, edutaining technologies help museums towards the achievement of organizational sustainability.

## 7.1 Implications

The research on sustainability of museums and cultural organizations is still limited and, according to the author's knowledge, it is often related to subjects such as Arts and Museum Management, rather than Social and Cultural Entrepreneurship. This dissertation contributes to the prior literature by explicitly analysing museums through the same tools used to assess social enterprises and hybrid organizations (Annex 1). This choice was justified by the fact that museums, like hybrid organizations, face the challenge of aligning the social impact pursued with the financial goals and the market requirements (Santos et al., 2015). Moreover, through the Case Study of MAAT and the Central, this dissertation contributes to extend the research on the topic of edutainment strategies, given that this concept is relatively recent (Addis, 2005) and only partially explored by the prior research.

This dissertation also provides useful practical insights for museum managers, cultural and social organizations and enterprises offering interactive technologies, on the efficiency of edutainment strategies. The implications of this Case Study can be used as a source of inspiration by other museums. Just recently, Google launched the possibility to explore some museums online through Google Maps and Street View[29]. These applications confirm once again the need to shift from a competition based on the value of the artefacts to a competition based on services, through an audience-centric approach (Freedman, 2000; Kotler & Kotler, 2000; Di Pietro et al., 2014). Museum managers need to consider the implementation of edutainment technologies to provide a new appealing experience, compete in the leisure market, and consequently attract a broader audience and increase their direct revenues. Possible

[29] TechCrunch: https://techcrunch.com/2017/05/31/google-rolls-out-enhanced-art-search-results-including-digital-museum-guides-on-street-view/k

strategies were presented in the Teaching Question 4. However, the managers should remain attentive to the risks of a "*disneyfication"* of culture (Balloffet et al., 2014) and consider the congruence of the interactive devices implemented with the positioning, the mission and the targeted audience of the museum.

# 8. Limitations and future research

Although this dissertation contributes to a more profound understanding how edutainment technologies can positively impact the organizational sustainability of museums, some limitations are associated to the research content and methods.

First, the dissertation focused on the Case Study of MAAT and the Central Tejo of Lisbon. Although these museums represent a good subject of study for the research question proposed, their peculiarities might influence the results. Indeed, the two museums have an innovative and futuristic positioning, consequently attracting a specific group of visitors who might have higher technology acceptance and a more positive attitude towards interactivity (Hume, 2015). The same results might not be obtained if the research was conducted in a more traditional museum. Likewise, given the recent opening, the visitors' statistics are only little informative about the attendance to the two museum sites (Exhibit 10). Finally, the semi-structured interviews which helped to collect information about the visitor experience were conducted on 15 attendants to the two museum sites and, although the results were useful for a deep understanding of the participants' perceptions, the results might vary if the research was conducted in other museum sites or with a larger sample.

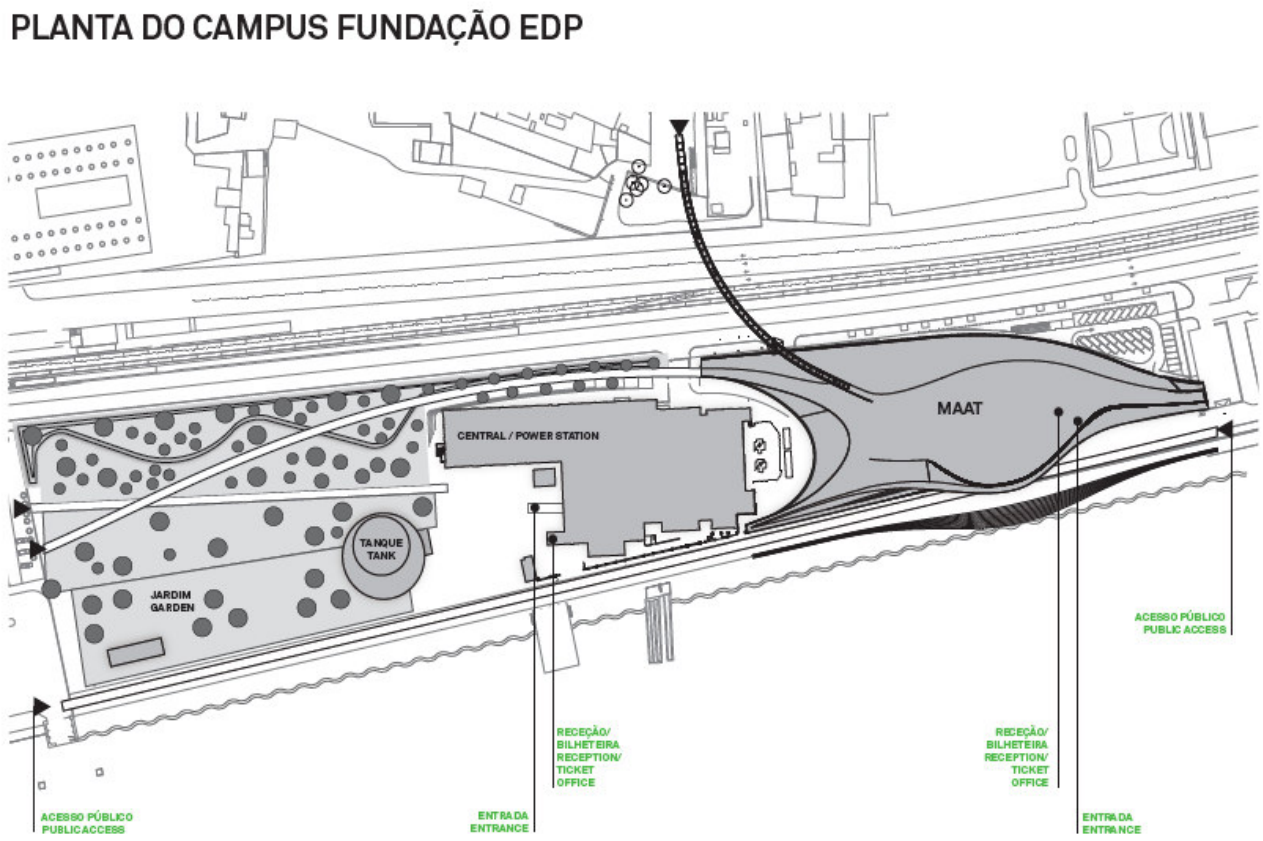
As edutainment in museums is a recent concept and topic, there are only few examples of non-scientific museums which implemented interactive technologies. Therefore, this dissertation was based on a single museum for reasons of accessibility to relevant information. As future research, it would be interesting to carry out a benchmark analysis with more museums, to understand how the visitors' reaction to the introduction of edutainment technologies change accordingly. Likewise, if more museum sites become available as subject of the research, a survey based on quantitative methods could be conducted and the results of this dissertation could be tested on a larger and more heterogeneous sample. Finally, it would be interesting to conduct an applied research to test the introduction of different types of edutainment technologies in a specific museum and explore the fit between these latter and the visitors' preferences.

# Exhibits

## Exhibit 1: MAAT Building by Amanda Levete

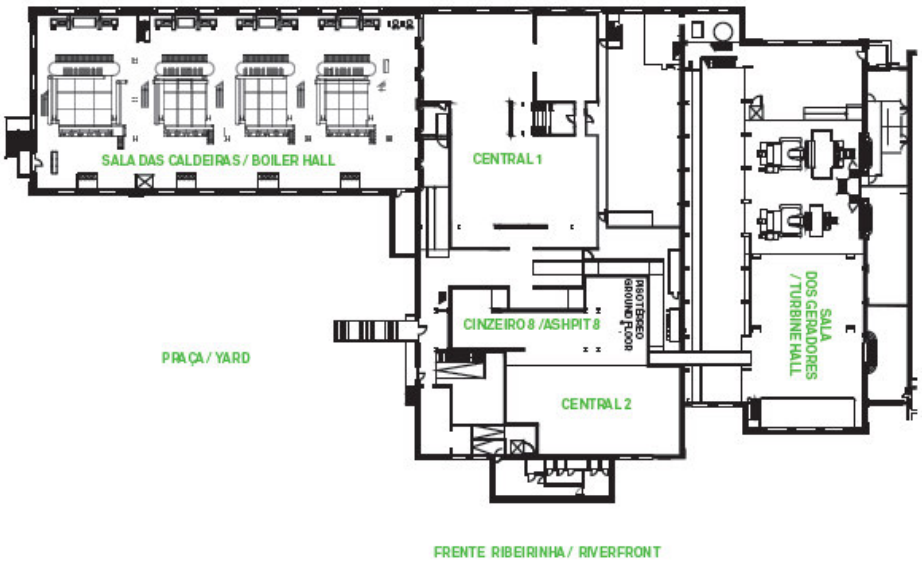
Source: MAAT Website. https://www.maat.pt/pt/sobre

## Exhibit 2: Map of EDP Campus



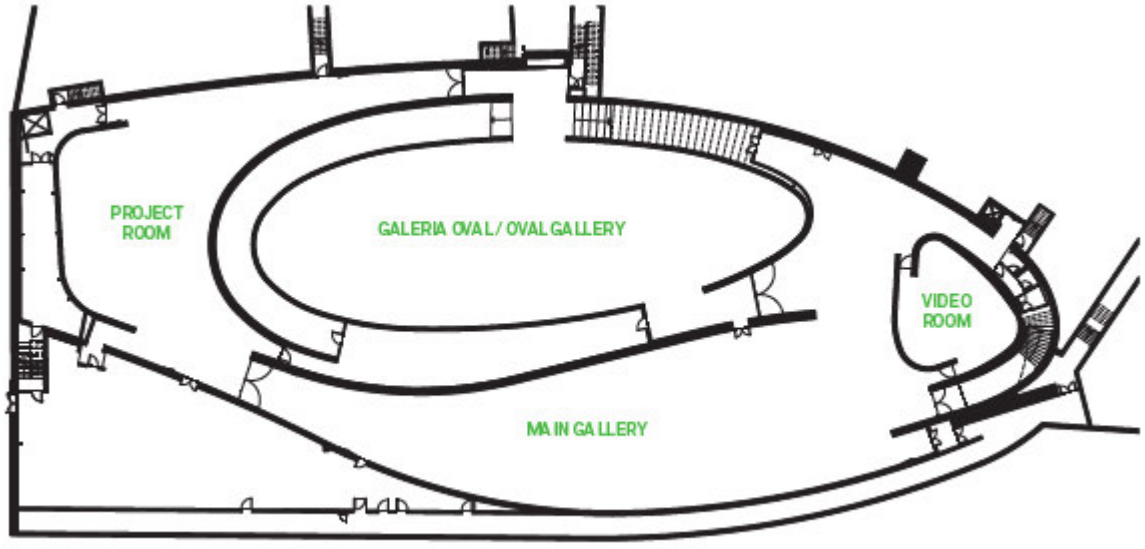

Source: Printed version of the MAAT Agenda, May-August 2017 (PDF format from internal sources).

## Exhibit 3: Map of Central Tejo building



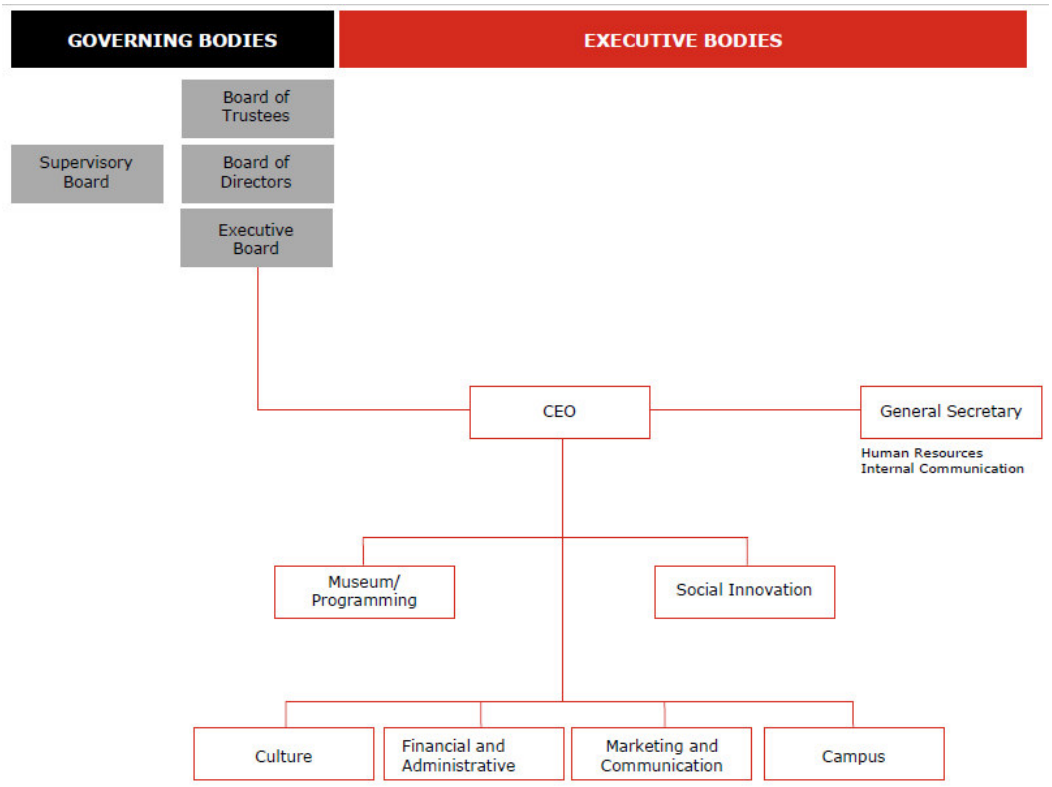

Source: Printed version of the MAAT Agenda, May-August 2017 (PDF format from internal sources).

## Exhibit 4: Map of MAAT building




Source: Printed version of the MAAT Agenda, May-August 2017 (PDF format from internal sources).

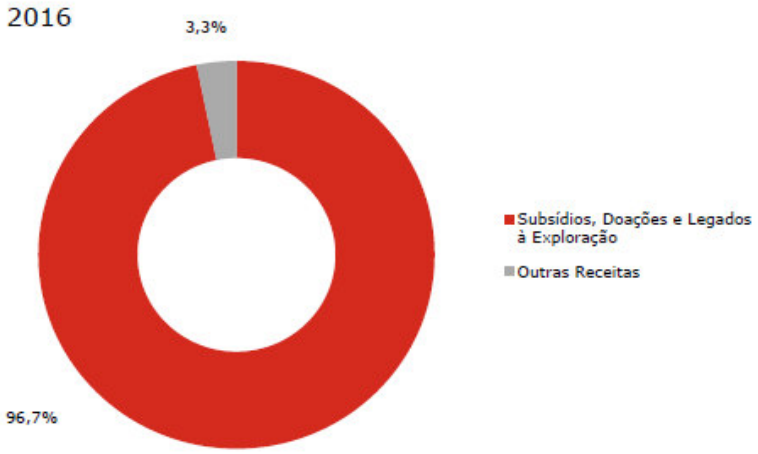
## Exhibit 5: organizational structure of EDP Foundation




Source: EDP Foundation financial report 2016. Available at: http://www.fundacaoedp.pt/fundacao-edp/impactos-e-resultados/como-nos-financiamos/26

## Exhibit 6: Revenues of the EDP Foundation

| Revenue | 2016 | 2015 | Δ % |
|---|---|---|---|
| Grants, Gifts & Operational Bequests | 13.700.000 | 13.700.000 | 0,0% |
| Other Revenue | 470.098 | 573.315 | -18,0% |
| Total | 14.170.098 | 14.273.315 | -0,7% |




Source: EDP Foundation financial report 2016. Available at: http://www.fundacaoedp.pt/fundacao-edp/impactos-e-resultados/como-nos-financiamos/26

## Exhibit 7: Details of Other Revenue of the EDP Foundation

| Other Revenue | 2016 | 2015 | Δ % |
|---|---|---|---|
| Museum shop | 31.879 | 18.209 | 75,1% |
| Ticket office | 216.754 | 61.297 | 253,6% |
| Events | 59.819 | 8.498 | 603,9% |
| EDP Group Social Investment Analysis | 0 | 50.000 | -100,0% |
| A2E favourable exchange differences | 84.047 | 321.838 | -73,9% |
| Other | 77.599 | 113.473 | -31,6% |
| Total | 470.098 | 573.315 | -18,0% |

Source: EDP Foundation financial report 2016. Available at: http://www.fundacaoedp.pt/fundacao-edp/impactos-e-resultados/como-nos-financiamos/26

## Exhibit 8: Costs of the EDP Foundation and details for MAAT and Central Tejo

| Expenses | 2016 | 2015 | Δ % |
|---|---|---|---|
| Structural | 4.181.198 | 3.420.960 | 22,2% |
| Personnel Costs | 3.117.977 | 2.685.261 | 16,1% |
| Overheads | 1.063.222 | 735.699 | 44,5% |
| Activities by Area | 9.211.417 | 9.389.319 | -1,9% |
| Social Innovation | 2.711.712 | 3.390.718 | -20,0% |
| Culture – Public., Conferences & Patronage | 1.334.328 | 1.404.610 | -5,0% |
| ME/MAAT | 2.243.580 | 2.631.128 | -14,7% |
| Campus | 1.121.585 | 948.173 | 18,3% |
| Communication | 1.717.111 | 978.290 | 75,5% |
| CEO's Office | 77.601 | 12.500 | 520,8% |
| Institutional Office/CA | 5.500 | 23.900 | -77,0% |
| Total | 13.392.615 | 12.810.279 | 4,5% |

| Details of Personnel Costs | 2016 | 2015 |
|---|---|---|
| Central Tejo and MAAT | 1.390.081 | 900.567 |
| Other | 1.727.896 | 1.784.694 |

| Details of Communication Costs | 2016 | 2015 |
|---|---|---|
| Central Tejo and MAAT | 889.422 | 203.062 |
| Other | 827.689 | 775.228 |

Source: EDP Foundation financial report 2016. Available at: http://www.fundacaoedp.pt/fundacao-edp/impactos-e-resultados/como-nos-financiamos/26

## Exhibit 9: Ticket fees for MAAT and Central Tejo, 2017.

# ADMISSION

**ENTRANCE:**

- 5 € Central
- 5 € MAAT
- 9€ Central + MAAT

(the entrance in each building allows you to visit all the exhibitions.)

**ENTRANCE: 50% DISCOUNT*:**

- students (+ 18 years);
- + 64 years
- groups (minimum 10 people).

**ENTRANCE: FREE*:**

- MAAT members (more info)
- for all visitors on the first Sunday of every month;
- kids and teens up to 18 years;
- unemployed;
- teachers and journalists;
- visitors with special needs;
- EDP Group employees;
- members of APOM/ICOM, Academia de Belas Artes, Academia Portuguesa de História, Academia Internacional de Cultura Portuguesa, Academia das Ciências.

* discounts cannot be combined; discounts are granted upon presentation of proof.

Source: MAAT Website . https://www.maat.pt/en/tickets

## Exhibit 10: Visitors' statistics at MAAT and the Central Tejo, January-April 2017.

| **Total visitors (Jan-Apr 2017)** | **139.711** |
|---|---|
| Standard | 114.677 |
| Guided tours | 17.884 |
| Inaugurations | 3.612 |
| Events | 3.538 |

| **Detail of total entrance** | **139.711** |
|---|---|
| Central Tejo | 41.726 |
| MAAT | 97.985 |

| **Details of visitors** | **139.711** |
|---|---|
| Adults | 85.211 |
| 0-11 | 4.073 |
| 11-18 | 7.480 |
| Students > 18 | 5.356 |
| Seniors > 64 | 3.836 |
| Other | 16.053 |
| Guided groups | 17.680 |
| Ateliers | 22 |

| **Workshops/activities** | **468** |
|---|---|

| **Nationality** | **139.711** |
|---|---|
| Portuguese | 125.622 |
| Foreigners | 14.089 |

Source: Non-published internal report (EDP Foundation, May 2017).

## Exhibit 11: Educational services of MAAT and the Central Tejo

The educational services are a fundamental part of the offering of MAAT and the Central, and the concrete translation of the mission purposes of public education around the cultural heritage which is preserved in the organization. Appealing and enjoyable educational activities represent a remarkable competitive advantage for museums because they are able to provide customized experiences to customers with different needs. In this context, the Services

Department of the EDP Campus has implemented four different categories of educational activities, which include the events, the guided tours, workshops and courses and creative workshops for kids. These activities are all meant to *'encourage creative thinking as well as new ways of acquiring and developing knowledge'* and to *'make access to culture more democratic'*[30] and are described as follows:

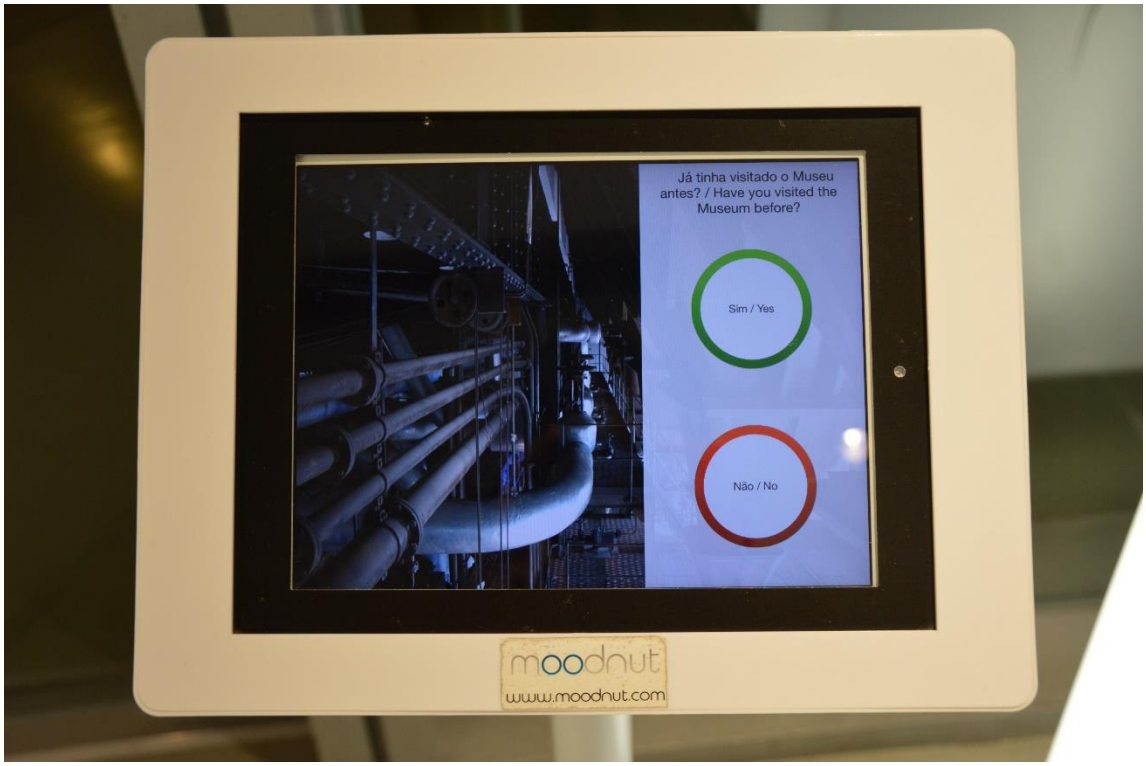
1. Events: Talks, conferences and performances with artists, curators, architects and thinkers from different fields. These events are meant to provide spaces for reflection, dialogue and debate, either concerning the exhibitions presented at the MAAT, or about trends and issues of the contemporaneity. Prices vary significantly according to the type of event and the number of participants and can range from free entrance to a fee of 30 Euros approximately[31].
2. Guided tours: Different tours are offered according to the age and the interests of the participants. The most common tours are the ones that involve groups and schools. Kids below 14 years old are normally accompanied by a guide that is prepared to work with this peculiar age group and the activities involve practical moments such as experiments, games and interaction, as well as storytelling techniques (Annex 4). Differently, groups can be composed of corporate employers. In this case, the tours are designed in a more traditional manner, being based on frontal explanations and specialized information (Annex 4). Finally, guided tours can include special areas of the museum that are normally closed to the public, or they can be focused on only one of the three fields – art, architecture or technology. Prices vary according to the frequency, the duration and the focus of the tours and are generally around 5 Euros for the standard visitor[32].
3. Workshops and courses: These activities are focused mainly on artistic themes and disciplines and involve theoretical and practical visual arts lectures. The workshops and courses take place in the evenings and weekends, to allow all types of audiences to participate, but with the age limitation of being 15 or above years old. Given the specialized content and the limited number of participants, the prices of these activities are generally higher than the ones of the other services, with a range between 20 and 50 euros[33].
4. Creative workshops: Differently from the ones presented before, these workshops are address kids and teens and are meant to develop creativity, personal expression and artistic

[30]MAAT Website: https://www.maat.pt/en/education-service
[31] MAAT Website: https://www.maat.pt/en/programmes-events
[32]MAAT Website: https://www.maat.pt/en/guided-tours
[33] MAAT Website: https://www.maat.pt/en/workshops-courses

knowledge. These activities are furthermore divided into four categories, including family activities, children-focused workshops, birthday parties and holiday courses, which last for more than one day. Prices vary from 5 to 40 euros according to the duration and the core of the activities[34].

[34] MAAT Website: https://www.maat.pt/en/creative-workshops

## Exhibit 12: Interactive touchscreen for questionnaire at Central Tejo




Source: Picture taken by the author, April 2017.

## Exhibit 13: Survey of visitors of the Central Tejo

| **Number of participants (March 2017)** | 462 |
|---|---|
| **Gender** | |
| Female | 38% |
| Male | 24% |
| N.D. | 38% |
| **Age group** | |
| 0-18 | 21% |
| >65 | 11% |
| Other | 68% |
| **Answers** | |
| **1) Would you like to come back to the museum?** | |
| Yes | 71% |
| No | 29% |
| **2) How do you rate the visit?** | |
| Excellent | 42% |
| Good | 26% |
| Sufficient | 9% |
| Insufficient | 6% |

| | |
|---|---|
| Bad | 17% |
| **3) Have you already been to the museum before?** | |
| Yes | 39% |
| No | 61% |
| **4)How did you know about the museum?** | |
| Press | 29% |
| Website | 8% |
| Social network | 19% |
| Other visitors | 45% |
| **5)How would you rate the information available in the museum?** | |
| Clear and exhaustive | 58% |
| Accessible to an informed public | 23% |
| Not sufficient | 19% |
| **6)Which areas did you visit?** | |
| All the areas | 65% |
| Art exhibition | 7% |
| Power station Central exhibition | 28% |
| **7)How do you rate our visitor services?** | |
| Excellent | 46% |
| Good | 23% |
| Sufficient | 9% |
| Not Sufficient | 5% |
| Bad | 18% |
| **8)Do you know the activities planned in the museum?** | |
| Yes | 50% |
| No | 50% |

Source: Non-published internal report (EDP Foundation, May 2017).

## Exhibit 14: Examples of interactive games and touchscreens



QUANTO MAIS LÂMPADAS
SE ACENDEREM, MAIOR SERÁ A QUANTIDADE
DE ENERGIA NECESSÁRIA
maat


HOW IT WORKS?
COMO FUNCIONA?
A CALDEIRA DE ALTA PRESSÃO
THE HIGH PRESSURE BOILERS'
O TRATAMENTO DA ÁGUA
THE WATER TREATMENT
O TURBOALTERNADOR
THE TURBO GENERATOR
OS CONDENSADORES
THE CONDENSERS
A SUBESTAÇÃO TEJO
THE TAGUS SUBSTATION
SAMSUNG


museu da electricidade
SAMSUNG
VIRTUAL TOUR
VISITA VIRTUAL


Operation Safety
Touch a flag
SAMSUNG

Source: Pictures taken by the author, April 2017.

## Exhibit 15: Virtual Reality Glasses

Source: Picture taken by the author, April 2017.

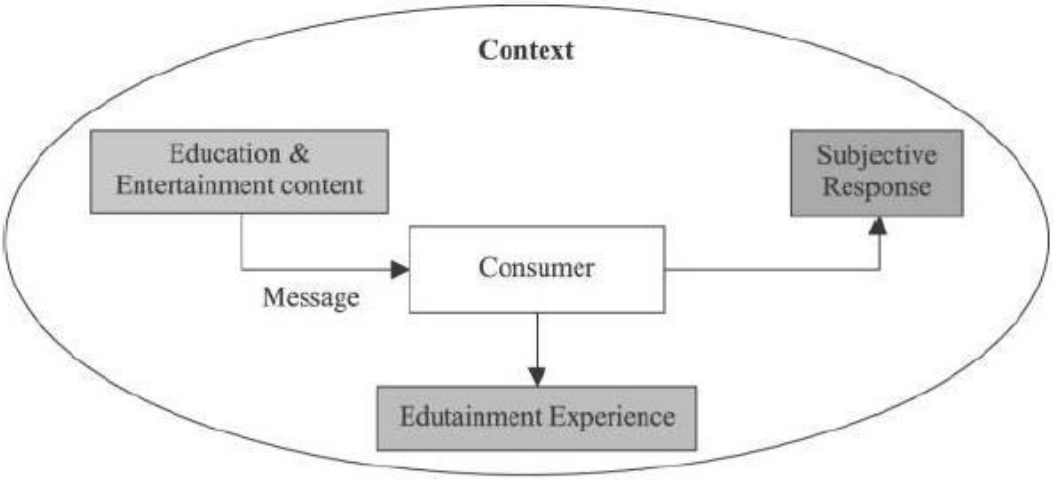
# Annexes

## Annex 1: The common features of museums and hybrid organizations

The complexity of museums as organizations results from their aims of achieving both socio-cultural goals related to their mission and economic goals of sustainability and growth (Camarero et al., 2015). To assure that they can achieve both simultaneously, some museums have become more active in commercial aspects, being managed similarly to privately-owned companies (Pop & Borza, 2016). The reason for this transformation lies in the fact that the funds they attract, either public or private, depend directly on the value that the museums offer to the public (Gilmore & Rentschler, 2002).

Despite the variety of definitions suggested in literature for the concept of hybrid organizations and social enterprises (Weerawardena & Mort, 2006), this latter can broadly include *'[...]all organizations that combine aspects of non-profits and for-profits by primarily pursuing a social mission while relying substantially on commercial revenue to sustain operations'* (Battilana and Lee, 2012). Museums find some commonalities with this definition because they are organizations pursuing a social mission while competing in the market through the sales of services (and only in part goods) (Rius-Ulldemolins, 2016). These commercial operations are meant to support the goal of addressing a societal need (Santos et al., 2015) , namely the access to and enjoyment of cultural heritage. However, museums do not rely substantially on commercial revenues because, as described above, the incomes coming from visitors represent only a small part of the incoming flows. Nonetheless, considering museums as social enterprises results useful for the purposes of this research, because it provides a framework to assess the sustainability of these organizations. In particular, it will help in defining what are the issues and the threats that hybrid organizations face in terms of financial stability (Porter, Hills, Pfitzer, Patscheke, & Hawkins, 2011). These involve the uncertainty coming from the reliance on donations and public support (Weerawardena & Mort, 2006) and the difficulties in matching the competing goals of market attractivity and social impact (Santos et al., 2015).

## Annex 2: The Edutainment Experience




Source: Addis (2005).

## Annex 3: Examples of interactive devices

Non-exhaustive examples of mediation devices can be audio-guides (designed with different degrees of interactivity), mobile applications (Raptis, Tselios, & Avouris, 2005) that can based on geo-localization (Tesoriero, Gallud, Lozano, & Penichet, 2008), Augmented and Virtual Reality devices (Wojciechowski, Walczak, White, & Cellary, 2004), and touchscreens and touching technologies (Brewster, 2001).

## Annex 4: Sample and interview structure of the in-depth interviews (April 2017)

### 1. Sample

| N. | Code* | Gender | Age | Nationality | Type of visitor** |
|---|---|---|---|---|---|
| 1 | **EP** | F | 25 | Italian | SV |
| 2 | **YM** | M | 32 | Danish | NV |
| 3 | **FF** | M | 43 | Brazilian | LV |
| 4 | **IC** | F | 23 | Portuguese | LV |
| 5 | **JL** | M | 24 | German | NV |
| 6 | **GC** | M | 42 | Portuguese | SV |
| 7 | **AD** | M | 29 | Portuguese | LV |
| 8 | **TF** | M | 57 | Portuguese | NV |

| | | | | | |
|---|---|---|---|---|---|
| 9 | **FT** | M | 34 | French | SV |
| 10 | **MW** | F | 51 | Dutch | SV |
| 11 | **SJ** | F | 39 | Portuguese | SV |
| 12 | **CS** | F | 62 | German | SV |
| 13 | **BB** | M | 24 | Austrian | LV |
| 14 | **LE** | F | 46 | Spanish | SV |
| 15 | **GB** | F | 36 | Italian | NV |

*Code: Initial letter of name and surname of the participant.
**Type of visitor:
(NV) Non-visitor: never in a museum in the last year.
(SV) Standard visitor: 1-3 times in a museum in the last year.
(LV) Loyal visitor: more than 3 times in a museum in the last year.

## 2. Interview structure and guidelines.

### Demographics

1. Gender
2. Nationality
3. Age
4. Museum visits: never in last year – 1-3 times last year – more than 3 times last year
5. Buildings visited

### Museum expectations (before the visit)

1. What comes to your mind when you think about a museum?
2. What are your expectations for this visit?

### Overall visit feedback

1. What is your opinion of the visit?
2. What is your opinion in terms of learning related to this visit?
3. What is your opinion in terms of entertainment related to this visit?
4. How do you think that your interest towards electricity/art changed? Are there new aspects you were not aware of?
5. Are you generally satisfied with this visit?
6. Would you like to come back to the museum?
7. Which features/services/offers could motivate you to come back to the museum?

### Interactive technologies

8. Did you use interactive technologies during the visit?
9. How would you describe your experience with the interactive technologies?
10. How do you think that the interactive technologies affected your learning related to the visit?
11. How do you think that the interactive technologies affected your pleasure during the visit?
12. How did you enjoy using the interactive devices during the visit?
13. How do you think that the interactive devices influenced your overall satisfaction?
14. How do you think that new interactive technologies (audioguides, AR, VR, etc.) could influence the visit?
15. How do you think that interactive technologies influence your willingness to return to these museums?
16. Would you like to come back to the museum if there are new technologic devices?
17. What is your opinion about interactive technologies in museums?
18. How do you think that interactive technologies can change your museum experiences?
19. Examples of museums that use technologies

**Topics guidelines:**

1. Perceived learning:
    a. Expectations of learning
    b. Overall learning perception
    c. Learning perception through interactive technologies
    d. Interest and new awareness
2. Perceived entertainment:
    a. Overall pleasure
    b. Entertainment through interactive technologies
3. Visitor satisfaction
    a. Overall satisfaction
    b. Satisfaction related to interactive technologies
    c. Perception of the relationship between interactive technologies and satisfaction
4. Visitor return intent
    a. Overall return intent
    b. Motivations for return
    c. Return intent related to interactive technologies

## Annex 5: Participant observation to guided tours and individual visits (April 2017)

| | Area of the tour | Focus of the tour | Duration | N° of participants | Age of participants |
|---|---|---|---|---|---|
| 1 | Central Tejo | Electricity; Science | 1.5 hours | 15 | 6-8 |
| 2 | MAAT | Modern, Contemporary Art | 1 hour | 17 | 45-65 |
| | Both museums | Both: individual tours | N/A | N/A | 20-65 |

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