Museum Experience Design: A Modern Storytelling Methodology

Federica Dal Falco & Stavros Vassos

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Federica Dal Falco[a*], Stavros Vassos[b*]

[a]Department PDTA Sapienza University of Rome
[b]Helvia.io
*Corresponding author e-mail: federica.dalfalco@uniroma1.it; vassos@dis.uniroma1.it;

Abstract: In this paper we propose a new direction for design, in the context of the theme "Next Digital Technologies in Arts and Culture", by employing modern methods based on Interaction Design, Interactive Storytelling and Artificial Intelligence. Focusing on Cultural Heritage, we propose a new paradigm for Museum Experience Design, facilitating on the one hand traditional visual and multimedia communication and, on the other, a new type of interaction with artefacts, in the form of a Storytelling Experience. Museums are increasingly being transformed into hybrid spaces, where virtual (digital) information coexists with tangible artefacts. In this context, "Next Digital Technologies" play a new role, providing methods to increase cultural accessibility and enhance experience. Not only is the goal to convey stories hidden inside artefacts, as well as items or objects connected to them, but it is also to pave the way for the creation of new ones through an interactive museum experience that continues after the museum visit ends. Social sharing, in particular, can greatly increase the value of dissemination.

Keywords: Storytelling, Interaction Design, Cultural Heritage, Museum Studies

1. Introduction

With this paper we wish to initiate an industry-wide discussion in the field of Design related to Cultural Heritage, notably focusing on how the use of modern technology - such as Interaction Design, Interactive Storytelling and Artificial Intelligence – may fundamentally change visual and multimedia communication in museums. The aim is to achieve higher integration between the artefacts and the information they carry and the visitor experience, based on new forms of technology-backed narrative experiences. We have experimented by using technological approaches - such as Augmented/Virtual Reality, Internet of Things, Interactive Storytelling, Smart Assistants, etc. -throughout the whole design process, i.e. covering i) the branding identity of the museum in the digital age, ii) an immersive storytelling experience for visitors inside the museum, and iii) a social communication follow-up action after the visit, thus promoting the visitor experience by using meaningful items, memories and products, in addition to social media.

In Section 2, we present a brief overview of some major methods and trends related to the notion of cultural heritage and the design of museum experiences. In Section 3, we turn our attention to how

the latter are transformed, examining how modern computing technologies can be used as a medium to integrate storytelling experiences within a larger lifecycle. Finally, in Section 4, we offer insights derived from our collaboration with small-sized museums in the city of Rome, and present some conclusions.

2 Cultural Heritage and Museum Experiences

2.1 The potentially increasing evolution of cultural heritage

Our discussion draws from the concept of Cultural Heritage as referred to in the English-speaking world, i.e. inherently connected to the idea of conservation through active use (Irace, 2014). Cultural Heritage in this sense is considered an evolving organism that can be 'incremented' with the production of new goods, both tangible and intangible. This may include, among others, architectural and environmental restoration aiming at the enhancement and transmission of heritage, but also artistic interventions and performance design; the latter also comprises an intangible component, in its capacity to identify social change and subsequently propose new forms of use.

In Italian history, the foundational principles underlying the concept and the evolution of Cultural Heritage were established with the 'Franceschini Commission Report' dating back to 1967, which formally introduced this concept. The document specified for the first time that all objects and products relating to the history of civilization, regardless of their artistic value, were to be considered Cultural Heritage: any 'tangible evidence having the force of civilization' (*Atti Commissione Franceschini*- ACF, 1967 Statement I). This included tangible and intangible products, movable and immovable objects, but also applied arts, traditions, the history of science and technology (ACF, 1967 D. XXXII) and contemporary art (ACF, 1967 D. XXXIII). In addition, any adjacent properties of a building, as well as its furniture, would be part of its cultural assets (ACF, 1967 D. XXXIV).

In the following decades, the concept of Cultural Assets was further enlarged and acquired new meanings, through the contributions, for instance, of UNESCO (World Conference on Cultural Policies, 1982), the Paris Convention for the Safeguarding of Intangible Cultural Heritage in 2003, and the European Community (European Commission, 2007b). Cultural Heritage was therefore encapsulating the shared social values to be preserved and transmitted (Stille, 2002). This interpretation has evolved towards the Anglo-American definition of Cultural Heritage, aimed at creating 'synergies between past Cultural Heritage and contemporary creations; live arts and crafts should be promoted in order to encourage dialogue between generations and the integration of cultural heritage in local daily life'. In this context, modern technology has offered new opportunities to explore synergies between Cultural Heritage and end-users, leveraging the economy, community identity and local territories.

Moreover, according to the European Commission's recent Work Programme within Horizon 2020, boosting research on Europe's digital Cultural Heritage is of fundamental importance and provides long-term benefits. The integration of knowledge related to Cultural Heritage will lead to more innovative partnerships between public authorities, local communities and creative industries, as well as to education and the transfer of knowledge to other socio-cultural areas. Design for Cultural Heritage therefore also includes methods and techniques that need to consider the system of Cultural Heritage in a multi-dimensional way - i.e. cognitive, social, symbolic, as well as digital – in a given territory or community.

2.2 Museum interactions

State of the art museum experience includes a long list of studies on the use of digital technology, pointing out strengths and weaknesses in terms of both methods and applications, by evaluating major museums around the world. The various features tested include the use of online applications and mobile devices, to create a dialogue between the visitor and the museum, beyond traditional

audio guides. Museum collections can thus be explored using additional channels, such as virtual reconstructions, on-site gaming scenarios, but also regular media displaying information on exhibitions and their backstage scenarios. In this way, they enjoy extended exposure on social media through shared images, audio and video files (Regione del Veneto, Adria Muse, Venetian Civic Museums Foundation, Fitzcarraldo Foundation, 2014).

Studies show increased visitor interest in interacting with the artefacts in an original and participatory manner (Solima, 2012),notably by exploiting the functions offered by new digital media. In such a dynamic setting, marketing and communication objectives converge, and the educational role of museums can benefit audience development (Stamp, 2014). Many recent studies also question the future of museums, particularly in the case of modern art museums. It is known that museums have encountered growing difficulties, due to the recent economic crisis - which has greatly affected prices on the art market-,but also to the changes in cultural practices and to the ever-increasing challenge of globalization. These phenomena have undermined the way museums operate and their identity, raising numerous thorny issues and leading to a rethinking of their traditional model.

In this scenario, museums have lately appeared to be evolving into dynamic places where different cultural events are offered to diverse and wide audiences. Visitors are often intrigued by special shows offered at museums, for which they may even travel a long way, similar to a big international event or a concert (Costanzo, 2012). Indeed, since the mid-20th century, the role of the museum has begun to move away from being a passive conservation mechanism and has also started to offer a way to understand the present (Quintavalle, 1982, pp. 11- 34), acting as a laboratory to experiment with events from the field of theatre, film and advertising. This is the approach found in Giulio Carlo Argan's visionary work (1982), partly inspired by the museum innovation represented by the 1977 opening of the Centre Pompidou in Paris.

Another interesting aspect is discussed in the work by Nicholas Serota (Serota, 1996), where the new perspective on the contemporary museum is based on a study of the transformed relationship between contemporary society and the artwork : in line with the entertaining and performative features of contemporary art, visitors are emotionally stimulated by the artefacts, moving away from the traditional analytical and interpretative experience, based on rational involvement. In this sense, Serota considers visitors and artistic communication to be processes at the core of the transformation of museums, rather than the work of art. In fact, the role of visitors has changed in the last few decades, as they have become themselves, to a certain extent, artworks: they are invited to interact with artefacts and artists through physical relationships, by participating first-hand and integrating themselves with performances and events.

The historian Granier (2013) bases her analysis on the example of the French museum, whose humanistic role dates back to the Enlightenment, and compares it with several international contexts and with the current cultural transformation. Granier suggests 'le musée polymorphe', an innovative model that embraces new ways to transfer knowledge and stands as a living organism, adjusting to the evolution of social needs. This new model goes beyond the traditional distinction between the different types of museums - art, science, technology, etc. - offering a view of the museum as a place of public knowledge, with potential socio-political implications.

This view is related to the famous book by André Malraux, *Le Musée Imaginaire* (*Museums Without Walls*), written in 1947. This work quite accurately predicted the evolution of the art system from the 1960s to the contemporary era, in particular with respect to its transformation from a closed system to one integrating influences from several social aspects. The theory of the Imaginary Museum justifies the presence - in the same place - of works that are diverse, and possibly in contrast or in opposition, in terms of function and quality, as they share the wide notion of art. Malraux identifies a continuous transformation of the 'language of forms', whereby the museum becomes the meeting place and the works 'speak' the language of the constantly changing content. Through new means of re-interpretation and re-experiencing, offered by the digital culture and modern technology for

interaction, the Imaginary Museum becomes a mental place where all artworks can talk to each other, while respecting each other's differences.

In everything we have discussed so far, there has been an underlying aspect of communication between visitors and museums. In our proposal below, we make this communication more apparent using modern methods of interaction.

3. Modern Methods of Storytelling for Museum Experience Design

Considering the different perspectives on the current role and concept of museums, our work follows the European Commission guidelines on culture and creativity, as expressed by 'Creative Europe'(2014-2020). This Programme aims at encouraging innovative projects able to counter the limitations and obstacles currently faced by cultural sectors; and, in particular, at supporting such projects transnationally, by promoting their circulation, seizing the opportunities arising from the new digital culture, and expanding their reach by experimenting with new forms of involvement (Stamp, 2014).

It is evident that digital technology is transforming museums into hybrid and complex spaces, where the virtual lives of characters and stories are blended with the physical form of artefacts (Irace, 2014). Digital culture in museums has grown along with the transformation of the notion of cultural accessibility, to the point that a virtual museum experience may be a highly inclusive alternative to a more traditional visit. The communication process of the museum is also becoming a key tool, similar to a cultural product carrying a message from the museum and the artefacts to visitors, and whose value increases thanks to interaction with the audience, both in the museum space and through digital dissemination channels and social sharing. One of the main roles of museum communication is to convey a brand identity; yet in this setting it becomes crucial to experiment with tools that offer experiential and emotional ways to create a relationship between visitors and artefacts.

In this sense, our paper suggests that Cultural Heritage and museum artefacts may represent a live storytelling experience, benefitting from the fact that technology-driven design can open up innovative opportunities to pass on knowledge and information through experience. This interpretation also allows the value of Cultural Heritage to be highlighted as 'conservation through use', incorporating the anthropological and social components of the communities that participate in such 'use' (Irace, 2014).

3.1 Branding identity for museums in the digital age

The core role of every cultural institution - and museums in particular - is the transmission of knowledge, as well as the study, conservation, and exhibition of its works. Nowadays this mission takes on a new meaning, connecting the facilities where knowledge and artefacts are kept with the theories of experience economics (Vannini, 2012).

According to this view, museum branding is critical to strengthen identity and adopt appropriate strategies aimed at highlighting the unique characteristics of the artefacts and their stories. A combined approach is required, integrating museum experts with a wide range of design experts, from the fields of multimedia/graphic and communication design, industrial/fashion design for merchandising related to the artefacts, as well as design for innovative models of interaction between visitors, the environment and artefacts.

A brand identity for a museum is perceived through all of its expressions, in the form of graphic design and multimedia products, and the ways the experience is offered inside the museum. This essentially serves as an interface between the museum space, artefacts and visitors. Visual communication plays a crucial role, not only by providing a trademark or a logo for the Cultural Heritage content and container, but also as a visual signature and a consistent story of the values of

artefact collections. Information design (based on typography, graphic design, linguistics, psychology, ergonomics) transforms complex historical data into easily understandable information.

Going beyond traditional use, a museum's visual information strategy takes part in a complete and concise narrative representation, which is much more than a mere description of museum artefacts based on images and texts.

3.2 Immersive storytelling museum experiences

There is a lot of discussion on promoting museum communication, as expressed by visitors who often criticize museums for offering strict rules of behaviour, essentially limited to artefact observation and lacking any interactivity. To that end, the museum experience is perceived by visitors as not being as entertaining and as pleasant as it could be, and by museum experts as lacking the learning potential that it could offer to visitors, e.g. by creating customized itineraries to convey the Cultural Heritage they preserve.

Museums have placed increasing emphasis on resolving these issues. In particular, in relation to digital technology, most of their effort relies on the common use of smartphones and mobile devices. A study by Tallon (2013) has shown that mobile applications are offered by 35% of museums, while 34% of them plan to offer such a service. These applications open up a more active conversation between visitors and the museum space. The next step would be to integrate the various aspects of the museum experience in an ongoing narrative experience creating a personalized story through interactions inside the museum, but also before and after the visit. To this end, new technology offers possibilities for artefacts, historical people, buildings and events to become the characters of a storytelling experience that unfolds in the form of a dialogue between visitors and the museum.

It is an exciting time to apply modern computing and interaction technology to enhance communication between people, physical spaces and digital information. Below, we will highlight some directions to take that are in line with the storytelling experience we have just described.

Interaction Design. Technology offers endless possibilities and activities for new ways to experience and interact with the physical world, including being immersed in a virtual world. Augmented Reality, Virtual Reality, Embedded Computing, Gesture Control, are some of the approaches that enable rich interactions between a visitor within the hybrid physical space of a museum and the digital space of information on the artefacts, their related characters, lives and stories. These approaches may constitute the first step toward a wider integration of digital means in the experience of Cultural Heritage across a new generation of museum spaces. In the next paragraphs, we are going to provide a brief overview of some cutting-edge technological approaches that, combined together, can lead to a deeper storytelling experience with a wider lifecycle.

Interactive storytelling. The landscape of Interactive Narrative research (Riedl 2013) is based on three axes that characterize each approach, with respect to the generation of the story, the autonomy of its characters and the modelling of players. A relevant trade-off is produced between a plot-based authoring system that controls the story tightly and a character-driven system that unfolds the story based on the autonomy of the characters. Several points along this spectrum have been studied, both in the past - e.g. the ABL language (Mateas 2004) -and more recently - e.g. based on the STRIPS Planning (Porteus 2010). The foundational component for specifying and managing the story is an implicit graph of story-points over which a story trajectory is traced step-by-step, often also adapting to the player's responses. This type of drama management is studied in the context of personalized stories and adventures in videogames (Sharma 2010, Yu 2012). In a similar manner, these methods and techniques can be applied to create an interactive narrative in the context of the historical background of artefacts, characters, and their stories, but also of a wider storytelling experience, starting before the visit to a museum and continuing after it ends.

Conversational Interfaces. Messaging apps such as Facebook Messenger, Skype, WhatsApp, etc., have already outgrown social networks with the largest of them having hundreds of millions of

monthly active users. In these apps, people communicate mostly by chatting, i.e. talking to each other by typing words either directly on their smartphone or on a web-based version of the messaging app. Yet messaging apps are becoming more than just talking to other people: in the last few months, most messaging apps have opened up their platform and their developers have started to build chatbots, i.e., automated programmes that chat with people either for fun and leisure or to satisfy a specific need, such as finding information, or even buying desired goods. The existing platforms for building chat-robots or chatbots -e.g. Wit.ai, Api.ai, Motion.ai, Converse.ai - are inspired mostly by recent work in Natural Language Processing (NLP). Their main focus is to provide Machine Learning tools to identify a specific intent, e.g. 'I want to know more about the owner of this building'; extract the relevant information, e.g. the name of the building and the owner; and provide a text response based on a back-end process that provides one-shot responses, e.g. a knowledge base in this case, or an existing online service. The conversation is therefore structured as a linear or branching story of such intents and responses.

Natural Language Conversation. Beyond a 'static' authoring of stories, there are two main categories for generating responses in a conversational manner: retrieval-based models and generative models (Britz 2016). Retrieval-based models use a repository of predefined responses and a heuristic to choose an appropriate response based on the input and on the context. The heuristic could be as simple as a rule-based expression match, or as complex as a combination of Machine Learning components from Artificial Intelligence that learn to classify inputs as belonging to specific response categories. Such systems (Vinyals 2015,Shang 2015) do not generate new text, they just pick a response from a fixed set. Generative models, instead, generate new responses from scratch. These are typically based on Machine Translation techniques, but instead of translating from one language into another, they 'translate' from an input into an output response (Sutskever 2014, Serban 2016). Existing combinations of both approaches, such as the Google Smart Reply project (Kannan 2016), are showing promising results.

Finally, there is also the unique opportunity for smaller museums to present Cultural Heritage information and artefacts in their collections as an exciting live experience similar to a movie, and, in so doing, to expand and attract diverse audiences.

3.3 Methods for theme-based storytelling in the museum experience

This type of storytelling experience suits small to medium museums with a holistic approach to an artist or a theme. For instance, a museum that features a collection dedicated to one artist or a small group of artists, or a museum that conserves the work of an artist, but also has collections of objects, furniture, and items to do with the life story of the artists and the historical and environmental context in which they lived. In such cases, consistent storytelling can be achieved that is more closely connected to the brand identity of the museum and the emotions the museum would like to trigger in audiences.

The basic ingredients for design methods that can deliver this kind of experience are derived from a variety of fields, as follows.

- Cultural Heritage information on the historical figures that lived in the sites hosting the artist or theme, and on the historical sites and buildings where the artists lived and worked and where their artwork was displayed. This will most probably come from *museum experts*.
- Authored stories based on familiarity with the previous bullet point. The short stories are specifically tailored to be turned into short movies or interactive experiences. This requires the involvement of *experienced authors* who know how to generate the narrative for short stories as well as robust communication material.
- Specifications for interactive experiences such as games within a physical, digital or hybrid space – essentially, visualization and execution of these stories. This requires

the involvement of *game designers* and *interaction design specialists*, as well as *application developers* and *engineers* for scenario implementation.

- A branding identity and a marketing strategy in order to offer storytelling experiences as described, addressing a target audience and specifying how to bring the museum experience to their attention.

4. Experiments and Conclusions

Our initial intent was to show that Cultural Heritage is 'a privileged asset for sustainable development and the country's innovation system' (Wolf, 2011) and to demonstrate that cultural assets multiply the possibilities for widening the reach of goods and services, by 'colouring and texturing' them with the hidden identities and values of the cultural DNA of local territories.

As an experiment, we have focused on museums in Italy, notably in Rome - a city with a particularly rich cultural background - and observed that although museums have mostly kept their traditional role of exhibiting artefacts, there are significant opportunities to apply a wider storytelling experience that may continue on the streets of Rome and in digital communication with visitors. This can be explored by asking creative people to experiment with the specific museums and potential approaches we have presented. To that end, we set up a new Design Course at M.Sc. level combining features from diverse academic fields - Design, Cultural Heritage and Computer Science - involving small-sized museums in the city of Rome as case studies. During the course, students were introduced to these new methods and asked to produce the project 'Museum Experience Design' for specific museums, and at the end, representatives of the creative and managerial teams from the museums were invited to evaluate the projects. We supervised more than 20 student projects; the outcomes were diverse and exciting, ranging from interactive projections to mini videogames and to chatbots, serving as artefacts and allowing visitors to engage in a conversation with the artwork. Feedback from the museums was also positive and led to an exhibition held in H.C. Andersen Museum of selected projects with the intention of implementing some of the ideas that were particularly promising. We believe that with this exhibition we reached one of our goals of 'Museum Experience Design', creating new forms of relation between visitors and Museums engaging young high school students for this occasion. Particularly, indicative results are the outcomes of "Multimedia & Interactive Experience for Praz Museum" (Bomben, St.g. Carlotti, St.g. Di Maggio, 2016); "Multimedia & Interactive Experience for Andersen Museum" (St.g. D'Antonio, 2016) and the thesis project "Interactive & Multimedia Experience in Tucci Museum" (Arabmashaee, 2017).

In our work, we initiated a discussion for a 'Museum Experience Design' based on wider storytelling, incorporating modern technologies for interaction. This project propose a concept of enhancement of Cultural Heritage as a live experience because the interdisciplinarity between Design, Interaction Design, Interactive Storytelling and Artificial Intelligence, can offer innovative opportunities in gaining knowledge. This approach is best suited to theme-based, medium-sized museums that are able to shape the visitor experience into an 'interactive movie' or an 'interactive game'. Our experiments with selected museums in Rome show promising results.

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About the Authors:

Federica Dal Falco, Ph.D. in architecture technologies, is an Associate Professor of Design at the "Sapienza" University of Rome - Department PDTA, Fellowship of CNR, scientific researcher CIEBA (FBAUL), digital media artist. From 2010 to 2014 she was the Head of the educational area of Design (PDTA). Her current works focus on Design for cultural heritage. She is author of several books (two with awards), essays and articles published in international journals (Class A). She exhibited her artworks (video, installation) also in foreign cultural institutes (AAR, Egyptian and Hungarian Academy).

Stavros Vassos is passionate about AI as an interface to the modern computing world. He holds a MSc and PhD from the University of Toronto (Canada), and in 2012-2016 worked as an Assistant Professor in the Sapienza University of Rome (Italy). He teaches and works in a variety of scenarios related to Interaction Design, Internet of Things, Videogames, and Chatbots. He is a co-founder of Helvia.io that develops custom AI business solutions.