

One object many stories: Introducing ICT in museums and collections through digital storytelling

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Abstract—This paper discusses issues related to digital storytelling and its use in Cultural Heritage institutions. It will demonstrate the usefulness and advantages of digital storytelling by providing concrete examples of adoption and suggest how digital storytelling may be used in different cultural heritage environments. We will identify issues and challenges and also focus on lessons learnt, all of them being important aspects for the further deployment of ICT in museums and collections.

Keywords— *digital storytelling; Cultural Heritage institutions; mobile applications; enhancement of visitors experience; personalization*

I. INTRODUCTION

Telling stories is wedded to the human nature, since the beginning of our civilization. The basic elements remain the same until today: the story, the plot, the oral communication, the triggering of the imagination; it requires and creates at the same time engaging with the audience. What changes is the way of telling a story.

In traditional storytelling the main objective is to create an interesting plot with attractive characters that create emotional engagement through dramaturgy, empathy, and plot climax in a fluent manner.

Digital storytelling allows many of the elements of traditional storytelling to be integrated and to address different learning styles [1]. This is especially true in the case of Interactive Digital Storytelling, which combines participation, as occurs in computer games, with automatic story generation and narration, and has evolved in two main directions: plot-based and character-based approaches. Plot-based approaches are primarily concerned with the narrative structure, much as it is in more traditional storytelling media [2]. In character-based approaches [3], the storyline usually results from the real-time interaction between virtual autonomous agents and the user [4].

Museums are in fact storytellers, as they have been the natural setting for experimenting with storytelling approaches [5][6][7]. Until the first half of the 20th century however, storytelling was implicit, mainly related to the objects' historical context, and therefore only accessible to experts. The transformation of the museological practices during the second half of the 20th century (the so called New Museology) has transformed exhibitions, which now present different points of view (mainly related to the social and

cultural context); are based on other arrangements (e.g. thematic); and include different tools for different audience sectors to build their own interpretations or even share authorship with the museum [8].

During the early efforts to introduce ICT, the narrative has been linked with digital content (sound, video, images) to produce for the museum visitors a multimedia experience [1]. In the late 2000 digital storytelling evolved by acquiring interactive components and allowing the active participation of the museum visitor. Efforts today focus on making storytelling more personal and more mobile.

II. STORYTELLING, THE WINNING CHOICE

Nowadays museums find themselves competing with the large offer coming from the entertainment industry. They therefore need to make their "product" more appealing and attractive to a variety of audiences, while attaching additional attributes to it that combine educational and entertainment aspects. Digital storytelling is one of the "vehicles" they have on hand for enriching their offer.

A. Edutainment

The term "edutainment" was formed by combining the two words "education" and "entertainment". Edutainment implies an approach that should be both, entertaining and instructive. It has been defined as a hybrid genre that relies heavily on visual material, on narrative or game-like formats, and on more informal, less didactic styles of address [9].

Nowadays, museums face a crisis of attendance: visitors have more competitive choices for their leisure activities than before and also expect to combine learning with entertaining experience [10]. Digital storytelling can successfully establish the link between the two notions, as it is genuinely educational, while balancing entertainment and factual soundness. An effective storytelling does not only relate the events, but is also per se a memorable performance and gives visitors a chance to experience a variety of emotions [6], combined with a genuine interest in the objects on show [7]. In this context, researchers argue that viewing, listening, and reading stories with the use of ICT solutions could change users' attitudes towards museums in a positive way and, as a result, motivate them to visit memory institutions for leisure purposes [11].

B. Enhancing visitors' experience

In recent years, museums have realized that the static traditional way of exhibits presentation needs to be significantly transformed by adding creativity elements and ideas, in order to encourage interactivity and improve visitors' engagement. The use of digital storytelling can fulfill those requirements, especially when it is constructed in a similar way to a fully scripted, theatrical production. Authors are able to create a multi-dimensional narrative with the use of digital tools such as hyperlinks, text, images, videos, motions and sounds. Therefore, the storyteller enhances the creation of an immersive and enjoyable environment, consolidates a direct communication with the visitor and allows him/her to actively participate in the story [7]. If digital storytelling uses the right combination of interest to focus attention, empathy to make visitors feel they are part of the story world and imagination to let them fantasize alternative realities, then it could constitute a successful entertainment experience [12]. Moreover, digital storytelling can provide the advantage of personalization, adaptation and contextualization of the information delivered, in order to accommodate different visitor profiles [10] and make collections more accessible and engaging for different kinds of audiences [7].

III. CHALLENGES AND ISSUES

In this section we categorize the main challenges and issues that are related to the adoption of digital storytelling in museums.

A. Cost of resources

In order to be engaging, digital storytelling needs a certain level of produced content, including appropriate acting of the narrating character(s), sound effects, audio-visual material (videos, animations, interactive presentations), even in some cases games. This requirement considerably increases cost for new content creation and requires effort by museum staff and possibly external professionals.

B. Technologically challenging

Technology in general doesn't constitute anymore a major challenge, as it used to be in the early '90s. In terms of technological requirements, the needs and open issues related to hardware and software can vary depending on the specific application.

C. Interdisciplinarity

Digital Storytelling seems to be a hard decision making problem with many objectives and constraints as the museum setting requires a fine balance between many parameters:

- *Focus on exhibition vs. focus on the media.* Storytelling in the museum setting should carefully design the story and content in order to offer an experience that compliments and highlights the exhibition space and exhibits, without monopolizing the visitor attention on the screen. In the triangular relationship between the media, space and the visitor the question is how to deepen the experience for the

user, without conflicting between presentation space and the visitors' freedom of choices [13].

- *Rich information space vs. "economy".* Another decision to take is how to present rich information about an object while telling the story in an effective way. J. Lambert [14] considers economy as one of the seven elements of successful storytelling. Richness and complexity of information, in combination with the availability of a variety of media (audio, visual, haptic) should not take the focus away of the initial goal which is to tell a story from a specific point of view that gains the visitor's interest.
- *Immersive plot vs. Interactivity.* While giving visitors the choice of interaction with the characters and influencing the plot at several stages it is necessary to create engagement and motivation; cutting-up the story into units may be in contradiction to deepening the visitor's experience through a plot climax, dramaturgy and pacing [14].
- *Fluency vs. Mobility.* In the case of mobile applications, location awareness challenges the fluency of the plot. The topology of the museum imposes complex temporal and spatial constraints and raises the question of how to integrate descriptions of physical objects with fictional places and characters. In fact, museum topology, museum objects and the story concepts and events constitute three separate ontologies that need to be related to each other in a harmonious way [15]. In addition, mobility is a technical challenge on its own. Localization technologies are still not mature enough to offer accuracy of less than 2-3 meters, which is not sufficient for exhibition spaces with the objects closely situated to one another.
- *Informative role vs. attractiveness of the story.* Another challenging balance is the one between preserving authenticity, credibility and authoritative knowledge of the museum about objects and related events while building an attractive and entertaining story for different individuals and groups [7]. It is worth mentioning that credibility is not to be confused with believability of the story: the first is connected to soundness of information while the latter is a desired trait for the environment and characters of the story, and is not necessarily linked with perfect realism [12].

IV. USING DIGITAL STORYTELLING

In this section we will provide two different examples of using digital storytelling in museums that constitute different ways of deploying it in environments that diverge very much the one from the other. The first use case we will present is a new museum that integrated ICT right from the beginning in all its activities and exhibitions. The second is a traditional museum, with a strong legacy and prominent exhibits. Still it decided to explore new mobile and personalized technologies to enhance the visitors' experience.

A. Foundation of the Hellenic World

The objective of the Foundation of the Hellenic World is to use ICT to create a cultural area that would allow visitors to experience history in a unique and personalized way. In this light, digital storytelling is used to provide an enormous array of entertainment experiences [16] but it is also used in the frame of educational activities, or as a combination of both. In all cases, the main elements remain the same: interactive and dynamic exhibits, personalized approach, virtual and augmented reality tools.

The exhibition *Your Planet Needs You!* is an example of edutainment. It was built in 2008 at the Science Museum in London and has already travelled to a number of countries. The exhibition wants to convey an ecological message and bring to the front all the factors that influence our future lifestyle. For doing this it adopts a purely Virtual Environment (VE) approach and invites visitors to suggest and create solutions for their city for the year 2050. At the same time, the VE is accompanied with the exhibit of selected artefacts, the emphasis is put however on the multimedia and technological aspect. The exhibition is using the “character-based” approach of storytelling. Through the use of interactive and immersive technologies, each visitor creates at the end of the exhibition his/her very own, personalized neighborhood.

The battle of Thermopylae [12] is an example of interactive virtual reality application, also developed by the Foundation of Hellenic World for the museum of Thermopylae. In this case, storytelling techniques were combined with video gaming principles within a VE, dealing with the challenge of presenting a historical event and exploiting the key aspects of gaming culture to achieve clear educative goals. The fact that the VE was used on-site within the museum had two major advantages: 1) High quality hardware created an immersive experience through the “Place Illusion” effect, and 2) the social aspect of the visit to the museum empowered the learning experience. The application was designed to cover all three components (representation, experience and interactivity) for creating engagement within a VE entertaining experience. In addition, the whole experience was supported by a human educator whose guidance allowed the visitors to focus more easily not only on the technology but also on the content, through interpersonal interaction. The successfulness of storytelling was assessed, among others, through a visitor survey conducted to visitors of age nine to twelve. The questions were related to the realism of the graphical representation, the usability of the game and the immersion i.e., focus attention, empathy and the feeling that the visitors “were part of the story”. It is worth to mention that almost all children answered correctly the questions of measuring the historical knowledge acquired, and all of them said that they absolutely prefer this presentation from the traditional history lesson or museums presentation.

B. Acropolis Museum

The Athens Acropolis Museum¹, is a relatively new institution, and as such it is still in the process of examining existing practices concerning digital technologies, without

¹ <http://www.theacropolismuseum.gr>

having implemented yet any mobile technologies. However, the museum also has an active participation in research projects related to digital technologies in the museum space, including the on-going EU-funded research project CHES (Cultural Heritage Experiences through Socio-personal interactions and Storytelling)² [7]. CHES is a project that aims to enrich museum visits through personalized interactive storytelling with mobile devices. Personalization is explored at different levels and in different ways. The visitor profile is used to determine the information content provided, the audiovisual assets, the length of the story, the exhibits presented as well as the story plot itself. It is interesting to observe, how the different content that has been prepared on the basis of the information that the visitor has provided, results in different approaches to the same exhibit.

To achieve this, CHES integrates interdisciplinary research in personalization and adaptivity, digital storytelling, interaction methodologies, and narrative-oriented mobile and mixed reality technologies, with a sound theoretical basis in the museological, cognitive, learning, and leisure sciences.

Preliminary evaluation sessions showed that visitors are ready to enthusiastically embrace new technologies in museums. Interesting issues were recorded, in relation to content design, navigation in the physical space and the relation between physical and digital space.

Although the project is not yet complete, its interaction with current museum practices and structures has provided very useful insight as what the adoption of such technologies would mean both for the visiting experience and museum practices. Storytelling is a highly creative process with appeal to all parties involved in it. The project concept was generally received by the museum very positively and with insightful feedback. The promise of new technologies in the museum bring the possibility for new ways of interpretation and reaching out to diverse audiences and bring the concept of edutainment in an institution with objects of very high esthetic and historical value. Digital storytelling, mobile devices, Augmented Reality (AR), personalization, are all perceived as new ways to create a more meaningful visitor experience.

However, there are certain limitations on the directions this creative and innovative process could take, as storytelling should be based on sound archaeological findings and take into account the museum objectives and priorities. For example, the use of headphones is required for a mobile application as not to disturb the other visitors, and, most importantly, in a setting where taking photos is prohibited, using the mobile device for AR may be an issue. Thus, the notion of respectful interaction is all the more meaningful in



² <http://www.chessexperience.eu>

the particular museum, as its history and exhibits require a certain way of visitor conduct.

V. CONCLUSIONS

Undoubtedly the use of ICT in museums and collections gains momentum. Implementation of technology is today an affordable solution not only for large or pioneering museums, but also even for smaller ones. The usage of technologies as described above is, however, not yet mainstream. It is fairly safe to say that this is partially due to the fact that the knowledge about solutions on how to increase the attractiveness of cultural collections and broaden the access to them is not always easy to reach the potential users. Even museums that are potentially interested in them often do not know where to find them, not to speak about how to acquire, apply or adapt them.

In particular, when a museum takes the decision to introduce digital storytelling it would be important to consider, among others, the following aspects:

- *Seeking the balance* between providing rich information about an object and telling the story in an effective way. A key to this balance is personalizing the stories, according to the needs and profiles of specific individuals or groups to avoid feeding the visitors with more than they can digest.
- *Creating engagement and motivation of the visitors.* A solution to this is the creation of adaptive scripts which may be represented as non-linear graphs, with autonomous parts of the story as units. Of course, such models require a very close collaboration of authors and developers through-out the stages of pre-authoring, scripting, staging, producing and editing the digital story.
- *Answering the question "Satisfy all visitors or deeply satisfy some?".* Museum and CH institutions in general, need to serve a wide variety of visitors in terms of age, language, cultures, backgrounds, interests, abilities etc. User-centered approaches are highly recommended to enhance visitor's experience. Personalization is not an easy task as it is highly connected to the open issue of visitor's profiling.

Cultural collections can be valorized through different ways of using technologies, starting from mobile applications to raise awareness about artefacts to more sophisticated tools such as personalized experiences through storytelling described above. What is important: the stakeholders involved in the cultural value chain, working on the implementation of ICT (technologists or museums) must always consider the users/visitors as the corner stone of their work and cater for their personalized needs.

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