Making history alive and interactive

Designing an iPhone App to present the Summer War of Osaka byōbu

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Abstract—**Mobile technology is becoming increasingly widespread in museums and cultural heritage sites, and many institutions have already developed applications that can be downloaded on mobile phones. Amongst these, iPhone Applications are certainly the most popular. The research briefly presented here describes the phases of the development of an iPhone application to interactively present the story of the people and places depicted on the Summer War of Osaka byōbu (traditional Japanese wooden folding screens) currently displayed at Osaka Castle Museum, Osaka City, Japan. The iPhone application will also be integrated with the Tiled Display Wall system of the Knowledge Creating Communication Research Center of NICT (Kyoto) to test various interaction functionalities.**

Keywords-component; iPhone App, Tiled Display Wall, Usability Evaluation.

I. INTRODUCTION

Digital technologies in museums and cultural heritage sites are widely used to enhance and support the visitors' experience. Mobile technology is also becoming increasingly more popular in the heritage sector, with the result that many institutions develop applications for a variety of platforms.

Mobile and smart-phone applications are rapidly increasing in number, because they offer great advantages as they:

- Allow users around the world to download content before visiting the museum and to an extent preview their experience;

- Eliminate interface issues, as everybody is accustomed to their own mobile phone;

- Free museums from maintenance costs and allowing investment in content development;

- Provide guided tours of various buildings or sites without the hassle of picking-up and returning audio-guides [1].

Amongst these, Apple's iPhone Applications (thereafter iPhone App) are certainly playing a big role: from the first one developed in 2009 by Antenna Audio Inc. for the Van Gogh Museum [2], many museums and heritage institutions have released their iPhone App. Some of them are specifically designed to be downloaded before the actual visit, so that the visitor can benefit of rich audio-tours, like the British Museum one [3]. Others are instead intended to make available to art lovers a catalogue of the most relevant masterpieces to be explored worldwide, like the iPhone App developed for the National Gallery in London [4].

The research briefly presented here describes the phases of the development of an iPhone App to interactively present the stories of the people and the places depicted on the Summer War of Osaka byōbu currently displayed at Osaka Castle Museum. This paper also illustrates the future steps to integrate the iPhone App with a Tiled Display Wall (TDW) system that acts as a 'virtual byōbu' and will allow testing various interaction functionalities. The application will also be tested and evaluated to understand its effectiveness for Osaka Castle Museum and its visitors.

II. DEVELOPMENT OF THE IPHONE APP

A. Aim and target users

The potential of iPhone App are multiple, from allowing a virtual, interactive exploration of a museum, to providing content directly on the user's device. The latest one is particularly appealing for Osaka Castle Museum, the main cultural attraction of Osaka.
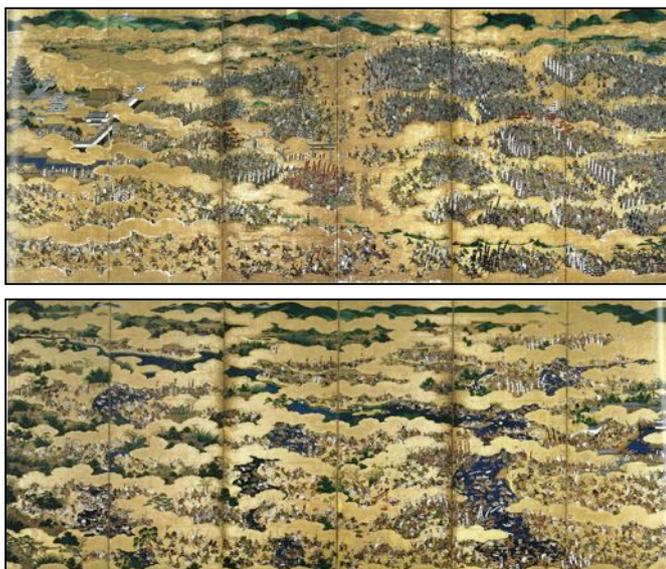
Figure 1. Summer War of Osaka byōbu: top, the battle of Osaka Castle (right screen); bottom, the escape of the refugees (left screen).

Amongst its vast collection, the Summer War of Osaka byōbu are the most relevant objects (Fig. 1). These painted wooden folding screens, which are listed as Important Cultural Properties, portray the events of summer 1615, when Ieyasu Tokugawa defeated Hideyori Toyotomi and became the shogun of whole Japan.

Over five thousand people are portrayed on the two screens: the right one presents the conquest of Osaka Castle by the army of Ieyasu Tokugawa, whilst the left screen depicts the fleeing of refugees toward Kyoto and Hokusetsu [5].

The events, people and places portrayed on the two folding screens are extremely relevant in the history of Osaka and in particular of its Castle. The iPhone App being developed for seeks to interactively communicate such heritage.

The visitors of the Museum can already learn more about the events of summer 1615 thanks to the Panorama Vision (Fig. 2), a multi-display presentation that briefly explains the role of the samurai and some of the scenes portrayed. However, non-Japanese speaking visitors have the hard task of reading the subtitles on small lateral screens whilst watching the images on the big screens. Hence, the iPhone App seeks to provide the visitors with an interactive tool, entirely designed in English and, at the same time, the Museum with an application that can be regularly updated and extended without the need to maintain hardware. The target users are therefore the visitors of Osaka Castle Museum, with a particular attention to the foreign ones.

B. Concept, design and development

The first stage of the development concerned the collection of data regarding the byōbus, the events, the people and places portrayed. Simultaneously, the needs and expectations of Osaka Castle Museum were investigated by interviewing its Chief Curator, Mr Makoto Atobe. It emerged that the museum has been introducing technology for public presentation from the late 1990s and the offer is now quite diversified, ranging from audio-guides to a theatre for the vision of short videos, from holography to tiled display system (the Panorama Vision). However, with the exception of audio-guides, which provide very brief explanations of the collection and the museum's sections, the ICT deployed is entirely non-interactive. This is mainly due to the large number of visitors per year – around one million – which would translate in high maintenance costs if there were interactive devices lent to the public.

Mr Atobe also underlined the museum's effort in providing multilingual tools for foreign visitors, from the audio-guides' commentaries to the subtitles in Chinese, Korean and English on lateral screens in the Panorama Vision and the theatre on the first floor. However, he also pointed out the desire to introduce interactive experiences for the visitors: the idea of a mobile phone application was positively considered, as it would eliminate the costs for the maintenance of the devices.

The selection of the iPhone as platform was mainly motivated by the constant growing number of Apps being released by museums and heritage sites, and the worldwide distribution of these phones, which has been steadily raising from its first launch in 2007 [6].

The design of the iPhone App aimed at providing the visitors of Osaka Castle Museum with an interactive tool to explore the Summer War of Osaka byōbu and learn more about the events, people and places portrayed.

The design of the interface was firstly realized using Balsamiq Mockups [7] to define the assets and the general look-and-feel of the application (Fig. 3).

The layout and the navigation structure are intuitive to facilitate the exploration of the application and its content without the need to *memorize* too many functions.

Once assets – the various components, from pictures to text to video – and type of functionalities were defined, the iPhone App was developed using Apple's SDK [8]. This software allows integrating the content within the desired navigation structure and testing the application on an iPhone Simulator, but also to perfect the design with the Interface Builder (Fig. 4).

Figure 2. Panorama Vision at Osaka Castle Museum.
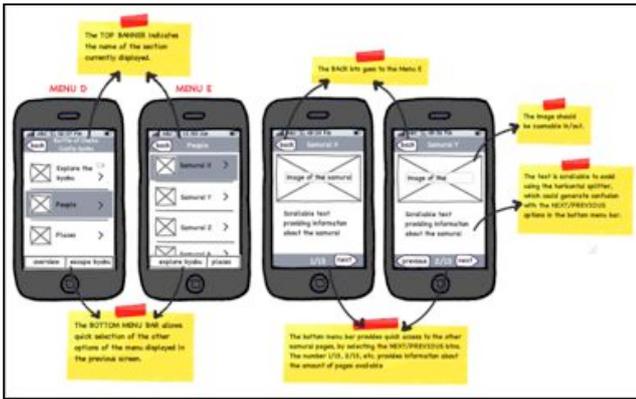
Figure 3.   Design of the graphical user interface of the iPhone App.

The iPhone App features short video clips, images and text and is divided into four main sections:

- The *Introduction* explains briefly to the users the function of byōbu in Japanese culture, the type of material used and the styles of the decoration.

- The *Osaka Castle Museum* section provides general information, such as opening times and tickets, but also a map to help locate the museum and access it using public transport. The user can also find more information about the parks surrounding the castle, very popular especially during the blossoming seasons of cherry and plum trees.

- The section *Summer War of Osaka byōbu* is entirely dedicated to the two folding screens and is divided into three sub-sections: an *Overview* gives information regarding the history of the byōbu and their conservation. Then two sub-sections are dedicated to each screen (the *Battle of Osaka Castle byōbu* and the *Escape of the Refugees byōbu*), illustrating in great detail the events portrayed, the people – indeed it is possible to recognize the samurai leading the armies on each side of the battlefield – and the places, such as Osaka Castle.

- Finally, the *Interact with TDW* section will allow the user to interact with a Tiled Display Wall (TDW) system to visualize the byōbu and their content, as explained thereafter.

III.   FUTURE WORK

A.   Integration of the iPhone App with Tiled Display Wall system

The Knowledge Creating Communication Research Center at NICT (Japan) and the Cultural Informatics Research Group at the University of Brighton (UK) have been experimenting with Tiled Display Wall (TDW) systems to display cultural heritage applications and interactively navigate virtual reality environments [9] [10].

The integration of the iPhone App with the TDW system will allow experimenting with various functionalities, such as zooming in/out to view details of the byōbus, but also testing

the gigabit worldwide network for high-definition images and data sharing between the two institutions.

The iPhone will act as interaction device with the TDW by using a set of pre-defined actions, such as tapping on the upper/lower part of the screen, double tapping, etc. The options currently discussed to integrate the iPhone App with the TDW include using the phone to select details of the byōbu from a menu and then visualize them on the screens with brief descriptions. Another option is to have the descriptions displayed on the iPhone whilst the high-resolution images will be visualized on the screens (Fig. 5).

B.   Usability evaluation

The development of the iPhone App is part of a wider research that investigates the effectiveness of digital technologies for cultural heritage in various cultural contexts, by using a novel Comprehensive Evaluation Framework. This framework seeks to investigate perspectives, expectations, approach and use of different cultural heritage stakeholders – namely managers, curators and visitors – to define a series of metrics and tools to evaluate how effective is a piece of technology for them. It is clear that, since the perspectives and use of technology is different depending on the stakeholders, the aim of this evaluation framework is not to definitively label an application as effective or not. It rather seeks to present and discuss the multiple – and sometime conflicting – elements combining in making it effective.

Therefore, the iPhone App will be tested to improve its interface and general usability, through an expert review and a series of usability tests with potential users. This iterative process – during which the feedback of each test immediately feed into the implementation – will facilitate the development of a prototype that will be evaluated in the museum environment, to assess its effectiveness for Osaka Castle Museum, but also the approach, behavior and use of Japanese and foreign visitors.

Figure 4.   Development of the iPhone App from the sketch of the interface to its implementation

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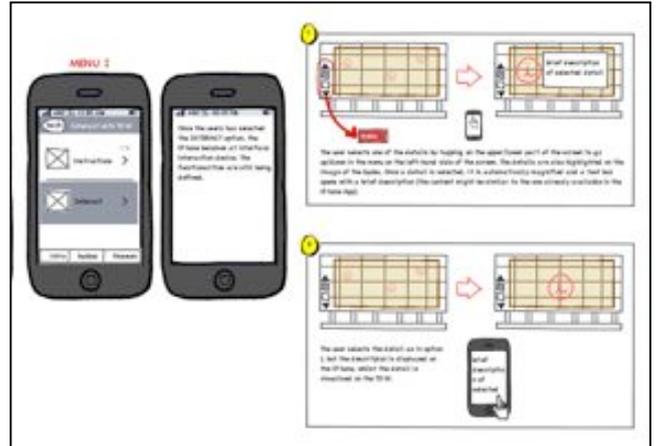
Figure 5. Options for integration of the iPhone App with TDW.