

Extending the GUIDE@HAND Tourist Guide Application with QR Codes for Museum Learning

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Abstract. The following paper attempts to encompass the opportunities for applying QR codes for museums and exhibits through the example of the Hungarian Museum of Environmental Protection and Water Management (Esztergom, Hungary). Besides providing interactivity in the museum for the mobile phone generation through the utilization of a device and a method that they are familiar with, it is important to explain how and why it is worthwhile to “adorn” the exhibits with these codes. In this paper we also touch upon the technical issues of how an existing mobile phone application can be incorporated into and used for the presentation of the museum.

Keywords: Mobile Applications, Tourist Guide Application, QR Code, Museum Learning, Exhibition Technologies

1 Introduction

The application called GUIDE@HAND developed by the Computer and Automation Research Institute of the Hungarian Academy of Sciences (MTA SZTAKI) under several platforms (iOS and Android). GUIDE@HAND is available on mobile devices (e.g. smartphone, tablet) with Global Positioning System (GPS) exactly determining the location of the traveller. The service provides GUIDED WALKS with various durations. During the walks, tourists may gain standalone unique knowledge about the sights and attractions of a town or region. The application will help the tourists to discover the city or region with turn-by-turn navigation, guiding them from one interesting sight to the next - they will be presented all information and stories at the right time. The aim with the walks in GUIDE@HAND is to enable the visitors to change their view on new or familiar locations, objects and motives and explore the past and present of their own neighborhood in an entertaining and exploring way. During the walks tourists merely need to put the device into pocket, which then can be used as an audio tour guide.

Through the use of QR codes the content and information available in the system can even be accessed inside buildings (where the GPS signal cannot be relied upon),

so it can be easily applied in museums, palaces, collections, etc. as a multilingual interdisciplinary guide. This year the Night of the Museums provided a good opportunity to utilize the GUIDE@HAND application in museums, realized within the co-operation with the Danube Museum in Esztergom, Hungary. With the aid of the mobile application, the users were able to access additional multimedia content about highlighted objects in the exhibitions.

In organization this paper is we first provide an overview of the museum exhibits. In the next section we introduce the events in Esztergom during the Night of the Museums, which provided an opportunity for the utilization of the mobile service. Then we present how the mobile application was further developed in order to provide visitors with additional information when they were inside the museum building. In a separate section we present the use of the service at the Danube Museum. Finally we present a review of the observations and make suggestions for further developments.

2 The Site: the Museum Exhibit

The Hungarian Museum of Environmental Protection and Water Management – more popularly and better known as the Danube Museum – welcomes visitors in the city of Esztergom, a town located on the banks of the Danube about an hour from Budapest. Its current permanent exhibition, which was opened to the public in 2001, presents the history of Hungarian water management – the coexistence of humans and water. The primary target audience of the museum is organized school groups as well as families. This is why when designing the exhibit the primary consideration was to make its topics comprehensive in a visually appealing way with interactive tools, providing guests with the best combination of entertainment and learning during their visit to the museum. When the exhibit opened, the success of its approach, which was considered new in the realm of Hungarian museums, was approved by winning the Museum of the Year award in 2001, and in 2003 it received a special commendation from the European Museum Forum. Furthermore its visitors chose this institute for the recognition of Family-Friendly Museum (2005) and Visitor-Friendly Museum (2009). The recent national research study looking for the characteristics of visitor-friendly museums in Hungary mentioned it as one of the positive examples.

While there has not been much of a chance to renovate the exhibit in the last ten years, the employees of the museum have made efforts to continuously update it with the introduction of new equipment and new content. The education activities offered to kindergarten and school groups by the museum and subjects of the exhibits are regularly expanded, providing more and newer topics related to nature conservation, environmental protection and the history of technology. The museum addresses the wider audience and individual visitors with full-day events and lively programs – it celebrates World Water Day and Night of the Museums annually, and it also regularly joins the national series of events for the Autumn Festival of Museums. Utilizing funds from grants it has been possible to develop new information points and a classroom for museum educational events that is well equipped for demonstrations. Fur-

thermore, our short term plans – in the case of a successful grant proposal – include the development of a study exhibit of the museum's collection of materials.

3 The Occasion: the Night of the Museums 2012

At this year's Night of the Museums, together with the visitors to our museum we tested new technological advances: in conjunction cooperation with colleagues from MTA SZTAKI we examined – live – the possibilities for using a smartphone application for cultural events and museums.

In connection with the national Night of the Museums program on the 16th of June 2012, for the seventh time the museums and exhibition halls of Esztergom and Štúrovo (Slovakia) stayed open into the night [5]. They welcomed visitors to exhibitions as well as to various programs and special events between 6 p.m. and midnight. In addition to the popular locations from previous years, the Balassa Bálint Museum, the Babits Memorial House, the Danube Museum, the Christian Museum, the Komárom-Esztergom County Archives, the Castle Museum of the Hungarian National Museum and the Štúrovo Municipal Museum, those who arrived with the universal entry ticket were welcomed by the Zsibogó Antique Shop, the Bánhidy Gallery, the Jami Mosque, the Culture Center and the Kaleidoszkóp House, as well as the Prímás Cellar, the Szent Adalbert Center and the Szamos Chocolate Exhibition and Display Workshop. On this night the Geoda Interactive Mineral and Fossil Exhibition could also be visited at a discounted price and the Basilica was open until 8 p.m.

Transportation between the sites was made easier by the municipal sightseeing mini-trains that even went across to Štúrovo. With the aid of GUIDE@HAND a walk was provided for the visitors on their mobile phones, which linked up with the route of the mini-train and acquainted them with all of the Night of the Museums locations in Esztergom and Štúrovo. The sightseeing walk set to begin at the Castle Museum, but it could also be started, interrupted and continued from any one of its stops. Stops could be entered individually as well, along the guided walk route or in the Exploring mode. During the guided walk and exploring, the users could record their experiences with the aid of the application, so they could make a unique travelogue of the sights and events they found, which then they could even share with others.

4 The Application: the Extended GUIDE@HAND Application

The application was extended with QR code reading in order to determine the location of the visitor in the interior spaces.

Outdoors the GUIDE@HAND smart phone application identifies the location of the user with the aid of GPS in the guided walk mode or free exploring function. Following this identification the prepared information is always provided automatically. This may be textual, pictorial, audio or even video content. In order to expand the usability of the application, developers of MTA SZTAKI integrated a QR code reader, which had previously been used for other purposes. With this innovative solution the possible range of uses was expanded with new services and opportunities.

The scientific and methodological tests of these new opportunities could be examined with the cooperation of the experts at the Danube Museum. (Fig. 1).



Fig. 1. a) The mobile application can be downloaded with the aid of a QR code at the entrance to the museum. b) Using the application with a mobile phone.

In order to support the application's new services the content development system of GUIDE@HAND also needed to allow for the use of QR codes. The system was improved to automatically generate printable QR codes for the content integrated here (sights, services, events).

5 The Service: the Use of QR Codes in the Permanent Exhibition

The museum institutes of Esztergom and Štúrovo (Slovakia) have been jointly organizing the Night of the Museums program for years. It was therefore clear that we would provide our visitors with a suggested route for a walk able to link the individual locations. Users of the application became able to access the information related to the individual locations and the schedule of events. In this case, similar to the previously compiled guided walks, we guided the users throughout the outdoor walk with the use of GPS, easily identifying their precise locations. Everyone could proceed at their own pace, and at any time they could interrupt or continue the walk while they are getting familiar with the sites and programs.



Fig. 2. a) A QR code. b) Exhibited object with a QR code

In addition to this – at the suggestion of our colleagues from MTA SZTAKI – in order to test the improved application we prepared a virtual “interior” walk as well, which brought the attention of those interested to a few highlighted points of the Danube Museum’s permanent exhibit. We placed a total of 10 QR codes in the exhibit (Fig. 2 a, b). Five of these were related to actual objects and installations in the exhibit:

- In the water activity room, the operating principle of a Norton pump is shown through a model that can be manipulated and a short film can be watched about the functioning of an actual well. (Fig. 3).
- In the diorama showing the bird life of the flood plains, the call of the night heron (*Nycticorax nycticorax*) can be heard and one can learn what the bird has to do with a well-known nursery rhyme.
- Amongst the engineering tools for river regulation projects, we marked the theodolite and introduced it through a brief text and illustrations.
- Visitors were able to listen to a short description of the model of a stamp mill boat used for river channel dredging.
- We also provided similar information for the beautiful middle-class bathroom interior in the room describing the supply of water to urban areas.

The other five QR codes were placed in one room – located below the protective glass on the floor of the map room depicting Hungary from space. The visitors are able to walk on this map while wearing protective slippers and can investigate it using magnifying glasses. Here, on the basis of the publication entitled 111 Water Management Monuments, with the aid of the codes we presented 5 different monuments related to the history of water management and technology. After scanning the proper codes, the Szeged water tower, the Tiszabercel pump station, the Somlóvásárhely treadwheel well, the housing of the water gauge at the Chain Bridge in Budapest and the Karapancsa pump house appear with brief texts and beautiful photographs on the smart phones of the visitors.



Fig. 3. a) A QR code on a mobile phone. b) The information related to the exhibited object on the mobile phone. c) Playing of a short film related to the exhibited object on a mobile phone.

For this, an important consideration in the selection of the sites was that they should be located relatively far from one another, so that at the same time more people would be able to get to their location on the map and scan their codes. Utilizing this technology, the exhibit was expanded with new elements of content – since previously information on these water management monuments was not available in this form – and at the same time the existing exhibit installation also was given a new function.

6 Observations and Possibilities for Further Development

On the basis of the observations from the development of content and from the visitor comments, both forms of utilization are able to function and can be employed in the provision of information at museums. The QR codes make it possible to gain a deeper understanding of the exhibited objects while not burdening the exhibition space with long explanatory texts. Furthermore, it is up to the visitor how much they “consume” from the provided menu, or which of the objects they would like to get more information about. The provision of supplemental information, films and audio becomes simpler in this way, making it easier to keep information fresh and up to date when compared to installing printed texts. In addition, it does not necessarily require an investment in equipment by the museum, since the visitors get the information through their own devices, smartphones and tablets. This makes their use more cost efficient for the museum and more convenient for the visitors (since they do not need to bring along or learn how to use an extra device when viewing the exhibition). We are planning on providing only minimal printed textual information at the study exhibit that is to be

developed in the museum. Instead, the visitors will be able to obtain the information related to the objects by scanning the QR codes linked to the digital catalogue.

The virtual expansion of the exhibits, which in the case of the Night of the Museums was temporarily realized in the map room, also contains many possibilities. Either permanently or temporarily we can mark certain points on the map with QR codes that are related to individual events on particular topics or museum education activities, so that we can show information, pictures or even films about the sites, monuments and natural phenomena found there. We can also link questions to these exercises, so we can make the museum visit and educational opportunities at the museum more exciting for the generation that is growing up using the computer. Further steps towards integrating and utilizing AR (augmented reality) can provide the opportunity to make the exhibit more visually appealing and even to create virtual 3D models. In this case, however, to make sure that the experience of the exhibit is open to all visitors and that the information is available to all the students during the museum educational activities, we will need to provide them with devices that are able to read the codes. We trust that we will have the opportunity to provide these through grant resources.

The placement of the QR codes and the compilation of the content are of course only the first steps on a long journey. On the basis of the opinions of the visitors, their ideas for utilization and their needs, the content and its uses will be able to be constantly transformed and improved during the course of continuous updating and development. As with every innovative development, it is their dynamic nature that genuinely excites people about the new museum services accessed through the utilization of devices that are becoming more and more common.

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6. Múzeumok éjszakája Esztergomban 2012. június 16 (Night of the Museums in Esztergom, 16 June 2012) <http://www.youtube.com/watch?v=huVkj1Z7GKQ>

Appendix

1. The introductory material compiled about the application in Hungarian can be found at the following web page:
http://test.guideathand.com/Esztergom/GAtH_Esztergom.mp4
2. The introductory demonstration video introduces, enhanced by audio explanations, the most relevant functions of the GUIDE@HAND application:
<http://guideathand.com/demoen.html>