# Information and communication in museum visits supported by user participation through mobile technologies: the mesh-t app

Pedro Beça[a], Rui Raposo[a], Cátia Figueiredo[a] and Filipa Martins[a]

[a] Dep. Comunicação e Arte, University of Aveiro, Portugal

pedrobeca@ua.pt, raposo@ua.pt, cat@ua.pt, filipa.mso@gmail.com

## Abstract

The theoretical framework used to describe the integration between ICT and tourism, such as e-Tourism and m-Tourism, are debatable as to if they are suitable for including and describing, at a detailed level, the influential role played by social media and participatory culture in technological mediated scenarios. Work presented in this paper explores and aims to contribute to the development of additional research in m-Tourism (2.0) by contributing to the definition of contexts of use, services and intrinsic advantages related with adoption of mobile technologies in these contexts; contribute to research in areas related with mobile and travel experiences in tourism contexts; and approach underlying challenges of personalized access to information ("just in time, just enough, just for me"). Within this effort a prototype has been developed as a proof of concept regarding issues linked to m-Tourism 2.0 backed up by: transdisciplinary participative design, data collected with the aid of a questionnaire answered by both visitors at the Museum of Aveiro in Portugal and museum professionals, and exploratory interviews involving tourism researchers and professionals. Museum of Aveiro visitors tested the prototype and the data collected shows that visitors are interested in using these kinds of apps in order to communicate, access and share information related with their experience.

**Keywords:** m-Tourism 2.0; e-Tourism; m-Tourism; WEB 2.0; participatory culture; museum visits

## 1 Introduction

Web 2.0 has led to the spawning of users who are active, rather than passive, and who are no longer just consumers but also producers of content. The term prosumer (Hao, Wei, & Wenjing, 2008) has been widely used to define this type of user. In the tourism context, the Tourism 2.0 concept is already widely used when defining these online prosumer related activities, which have, for instance, led to profound changes in the way people plan their trips. However, this participatory behaviour may still be considered scarce in the m-tourism context due to the fact that the majority of services and content are still completely closed or limited in terms of external contributions.

An overview of recent published work regarding m-Tourism suggests that, up until now, the core issues researched were related with interaction design (and it's intrinsic concerns such as usability, accessibility) and the search for a flawless ubiquitous system (Bortenschlager, Häusler, Schwaiger, Egger, & Jooss, 2010). What is

suggested in this work is that, according to what is known from Web 2.0 related activities, participatory culture should also become a core research issue thus granting the possibility to explore beyond what is suggested by the tourism industry. The concept of m-Tourism 2.0 (Fig. 1) establishes as one of its cornerstones the possibility of tourists to communicate their perspective of what they are feeling and experiencing at any given moment and, at the same time, being able to share that information with someone who, may or may not, use that information for their own benefit (Beça & Raposo, 2011). When trying to access multimedia content about a Point of Interest (POI) tourists, either through the use of their laptops, mobile phones or tablets, will be presented with K, which represents the content provided by, for instance, a local DMO, in addition to C, which is the content provided by other tourists which have also contributed with information.

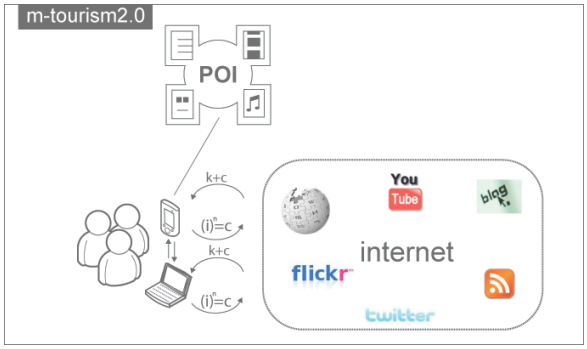



**Fig. 1** m-Tourism 2.0

## 2 m-Tourism 2.0 prototype

In order experiment with some of the concepts dealt with within the m-Tourism 2.0 concept (Beça & Raposo, 2011), a museum application prototype has been developed according to specific design, implementation and evaluation stages. The design of the prototype took into account the opinions of visitors to the Museum of Aveiro, tourism and Portuguese museum professionals, as well as the analysis of existing tourism related mobile guides and apps. The development of the prototype was based on a User-Centred Design (UCD) methodology, which at its essence allows the development of products that will further meet the needs and expectations of the users (Sharp, Rogers, & Preece, 2007). Visitors of the Museum of Aveiro tested the prototype during their visit. Through the analysis of the data collected, the team proceeded to the outlining of improvements in the application.

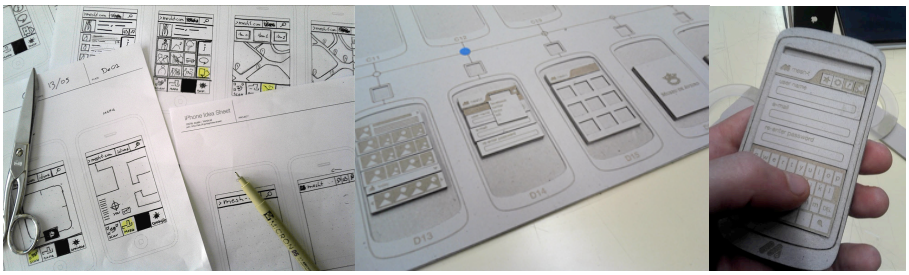
### 2.1 Exploratory questionnaires and interviews

A structured questionnaire and exploratory interviews were used to gather information from museums visitors, museum professionals and professionals and researchers in the tourism area. The aim of the questionnaire was to identify the use,

by the museum visitors and museum professionals, of mobile phones and the Internet; measure the degree of knowledge and use of Web 2.0 services; identify and describe m-Tourism services already used; and, assess their willingness to use their personal mobile devices during a museum visit. The questionnaire samples consisted of 115 Museum of Aveiro[1] visitors and 126 responders from the 137 museums integrated in the Rede Portuguesa de Museus[2], Portugal's network of national museums. For the interviews, researchers from University of Aveiro and University of Algarve were selected as representative elements of the academic community in the field of Tourism. The tourism coordinator for the Aveiro city tourism office was also interviewed due to his knowledge and responsibilities in managing and coordinating a tourism destination and, finally, the director of the Museum of Aveiro at the time and the person responsible for the Facebook Museum page [3] were selected as representative elements of the museum field and due to their link to museum in which the app would be used. The interviews were conducted with an exploratory nature and enabled the understanding, from the tourism professionals' point of view, of the relationships established between the institutions and the tourists, the Internet and Web 2.0 related issues and, also, their view on use of mobile phones in visits to museums.

## 2.2 Design process

The design process of the prototype started with a brainstorming session aiming for "outside of the box" thinking, with a large quantity of sketches, from simple doodles to highly detailed interaction and layout drafts. The next phase involved the communication and discussion of some of the ideas and their inherent possibilities through low fidelity, co-operative and evolutive prototyping tools suited for participatory design sessions. It was decided that we would focus on two main aspects intrinsic to common web design: the definition of grid based modular components (Curtis, 2010) and the construction of navigation maps. We also decided to prototype on a real-scale low-fidelity solution by using thick cardboard and the laser printing of symbols and frames more adequate for intense use in the work sessions. The resulting cardboard mock-ups and navigation structure diagram led to a page layout with a low number of navigation levels, improved and correlated features, a clear navigation view and an overall graphical coherence. Figure 2 compiles some images regarding work done in this phase with the low fidelity prototyping tool.



1 http://www.ipmuseus.pt/pt-PT/museus_palacios/ContentDetail.aspx?id=1103

2 http://www.imc-ip.pt/pt-PT/rpm/ContentDetail.aspx

3 http://www.facebook.com/museuaveiro

**Fig. 2.** Mobile application low-fidelity prototyping

Soon after the implementation of the low fidelity prototype version the team went on to the development of the high fidelity prototype for Android smartphones. During the iterative design and development of the prototype, usability challenges were tackled, in order to ensure the efficiency and effectiveness of the application and also ensure user experience satisfaction. Based on the results obtained in the low level prototyping experience, it became possible to define a grid basis, the general modules and functional components (Santos, Beça, Figueiredo, & Raposo, 2011). Several high fidelity versions of the application interface were then developed and fine-tuned by the team members based on the grid produced and the positioning defined for each feature (Fig. 3).


**Fig. 3** High fidelity prototype

### 2.3 Validation phase

For a product or service to be usable, it must be useful, efficient, effective, fair, learnable, and accessible (Sharp, et al., 2007). Although usability issues were always taken into account throughout the development cycle of the prototype, there were two moments exclusively dedicated to the usability evaluation of the prototype in which a field trial was combined with a heuristic evaluation. The first evaluation moment took place after the completion of the first version of the high fidelity prototype and the second moment was performed on an improved version of the application, reviewed according to the errors and problems found during the first evaluation. The mobile application was tested at the Museum of Aveiro in an organized field trial moment. During the evaluation, visitors could use the application, available on smartphones provided by the museum, in order to access information shared by the museum about its collections and, in return, they were able to share their own content in the form of comments and lists of favourite artefacts. After the visit, they were asked to answer a questionnaire in order to evaluate certain aspects of the application and their experience. The results of the questionnaires showed some positive feedback in comments such as: “We can obtain the desired information whenever we want”; “The availability of multimedia content and other extras can make a guided visit more complete”; “Allows a greater involvement between the Museum and the visitor“; ”When the tour is not guided, there is a lot of useful and interesting information that is

lost". Despite the positive opinions, some less positive aspects related with the use of this kind of applications were also identified: "Too much use of the application will serve as distracting element"; "I prefer the contact with the museum tour guide"; "Not during the visit, maybe after".

## 3 Final considerations

The results obtained show that Internet access and the use of Web 2.0 services on smart phones are still limited and that the experience of using mobile devices in museum activities at a national level in Portugal is still relatively scarce. However, there seems to be a will to use smartphones during a visit to a museum, despite the existing constraints. It is firmly believed that the role played by participatory culture must be placed in a foreground position by understanding the importance of the tourists as a prosumer, both in proactive and reactive activities related with the services and products provided. However, it is also believed that this will only be possible if technological mediated scenarios are understood as useful, not only from a tourist point of view, but also from a institutional point-of-view. By analyzing, evaluating and redesigning services currently provided, museums may provide their visitors with innovative and creative services and products thus promoting themselves as an active asset in the tourism area.

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