A Taxonomy for the Evaluation of Mobile Museum Guides

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ABSTRACT
Museums are a fertile ground for experimentations with edutainment applications conceived for mobile devices. However, the design, implementation and maintenance of mobile multimedia guides is a time and resources consuming iterative process to which ideally all involved stakeholders should participate. Evaluation therefore is of outmost importance.

Drawing from already published results and on site experience from DANAE project we define three categories of evaluation key points, under which all possible evaluation questions measuring the effectiveness of an edutainment application can be classified; we then match them with all involved stakeholders, mainly museums, their visitors and information technologies companies.

Finally, we argue that the proposed taxonomy can be used for the classification of different evaluation questions so as to constitute a comprehensive and adjustable guide for evaluation purposes of applications for different and heterogeneous museum environments.

Categories and Subject Descriptors
H.5.2 [Information interfaces and presentation]: User Interfaces - ergonomics, evaluation, methodology, theory and methods, user centred design.
J.5 [Arts and Humanities]: Fine Arts.
K.3.1 [Computer and Education]: Computers in education - collaborative learning.

General Terms
Design, Experimentation, Human Factors.

Keywords
Museum handheld devices, evaluation, experimentation, geolocalization, multimedia applications, edutainment, mobility.

1. INTRODUCTION
Museums constitute an ideal environment for experimentation with mobile, interactive applications dedicated to the interpretation of tangible and intangible cultural heritage as they are “permanent institutions in the service of society and of its development, open to the public, which acquire, conserve, research, communicate and exhibit, for purposes of study, education, enjoyment, the tangible and intangible evidence of people and their environment” (ICOM 2001 definition) and where learning has always been a “mobile” experience conducted usually not individually but with other companions. More recently, the increasing need for museums to become financially self sustained has opened up new perspectives for a long lasting relationship (before, during and after the visit) in between museums and its audiences.

The use of handheld devices in the museum setting can be examined under two perspectives. First, they make part of interpretation methods employed to convey the meaning and facilitate the contextualisation of an exposed object. Secondly, mobile guides can be considered as making part of other multimedia and information technologies applied in the museum setting for purposes that vary from cataloguing, ticketing and administration, to knowledge dissemination, publication and on site interpretation.

2. EVALUATION OF MOBILE GUIDES IN THE MUSEUM SETTING
One of the most important aspects of the introduction of mobile guides in the museum setting is that due to their character they could be used as a linking entity for the delivery of all kind of information delivered through more traditional means, such as explanatory textual labels, posters, educational programs, audio guides, guided tours, printed material or stationary multimedia applications. However, there are still issues that constitute barriers for the adoption of mobile cutting-edge technology in the museum premises[1]. The cost is sometimes prohibiting, additional personnel can be required for the distribution while museum curators sometimes fear for a heads down approach [2] in an environment where the museum display is considered to be the major form of pedagogy. These are some of the reasons why evaluation should be introduced from the beginning of a project.

Several evaluation studies have been conducted during the last years. They all share a common characteristic: measuring the effectiveness of the introduction of handheld devices in the museum setting. Evaluation questions are sometimes mentioned as well as more or less measurable aspects of this intervention. Some of the most common ones are enjoyability, usefulness, ease of use, ergonomics, user satisfaction, navigation, interface, content design, geolocalization, knowledge acquisition, fragmentation of attention and isolation, attentional balance and social interaction.
In order to better conduct our experimentations in DANAE project, we proceeded in a comparative study of numerous evaluation results conducted in the last five years and tried to classify evaluation questions with the aforementioned different evaluation aspects in order to better define which are the key evaluation points that should be taken under consideration in the process of the assessment of a mobile, location aware, multimedia museum guide. This classification yielded two conclusions. The first one is that evaluation key points can fall under three categories: technological evaluation points, information impact evaluation points and logistics/administration evaluation points. The second one is that further classification can be obtained if one matches particular key points with different stakeholders namely museums and information technology companies and museum visitors.

3. KEY EVALUATION POINTS FOR MOBILE MUSEUM GUIDES

3.1 Technological Evaluation Key Points
Technological evaluation points are related with choices made regarding the actual software and hardware used to design and implement multimedia applications for museum handheld guides. In this case, evaluation with museum stuff should include evaluation questions relevant with the content implementation, the effectiveness of the chosen way of content distribution (either wireless or locally stored), the geolocation modules, in case they exist to help with visitors’ orientation and, finally, the content delivery and adaptation to potentially different platforms and available bandwidths. Technological evaluation points must also be assessed with museum visitors. Under this category we classified issues such as the usability and ease of use of a proposed application, the overall user interface, including navigation, multimedia and interaction design, the recovery of the system after a potential crash, ergonomics (such as the use of stripes or headphones), the positioning and messaging system and the system’s accessibility. Personalization, according to language, age, different learning abilities, preferred themes, available time for the visit, falls also under this category.

3.2 Information Impact Evaluation Key Points
Information Impact evaluation points are relevant with the impact of introducing a mobile multimedia guide in the museum setting. These two can also be examined under two different perspectives, the museum’s point of view and the visitors’ point of view. This category is strongly linked with the previous one. For example the choice of specific tools for the content implementation influences the process of content creation and updating as well the process for the creation of different user groups and profiles. Information Impact evaluation points are more numerous when examining the visitors’ side. Here, one of the main evaluation points is the content quality. Content quality can be treated either as such, meaning the quality of the multimedia content included as well as its overall structure and design as well as in relation with the actual exhibition that is accompanied and interpreted with the multimedia guide.

Other important aspects that are often treated in assessment sessions have to do with the usability, enjoyability and usefulness of the application as well as with the overall user satisfaction Distraction and attentional balance as described by Aoki [3] et al. falls under this category as well as learning and knowledge acquisition and isolation in contrast with the issue of social interaction and general interaction impact.

3.3 Administration Evaluation Key Points
There is finally a third category, which groups evaluation points relevant with administration/logistics issues. Regarding the museum professionals, evaluation needs to be conducted in relation to maintainability. Maintainability covers many different aspects such as battery life and recharging, updating older versions of the multimedia applications, security not only of the devices but of the overall museum information system, as well as distribution and recovery of the terminals after the end of each session. An important issue is to examine whether the number of existing terminals is sufficient as well as the personnel charged with the distribution and recovery of the devices. Distribution and registration process needs also to be evaluated with visitors in order to see if the full process of getting and using a mobile device is smooth and not time and energy consuming.

4. CONCLUSIONS
Even though more and more museums throughout the world have started experimenting with mobile, location aware and multimedia capable devices there is still skepticism as to which extent applications conceived for portable, able to be personalized devices are effective with regards to the mission, the policies and the available funds in a museum setting. Therefore evaluation and assessment is of great importance. In this paper we argued that even though several evaluation studies regarding the effectiveness of museum handheld devices have been published, there is still no unanimity in what the term effective means. This study suggests that effectiveness can be examined using three different kinds of evaluation key points, related with the technology chosen, the information impact of the proposed application as well as with logistics/administration issues. We believe that this categorization and formalization of heterogeneous evaluation points could be further developed by matching evaluation key points with all kind of possible evaluation questions present in other studies so as to form an easily adjustable and comprehensive guide able to be used for the assessment, modification and evaluation of various aspects of mobile, location aware, multimedia guides for the museum setting.

5. REFERENCES