Always On: Museums in the Mobile Communication Era

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Abstract: The paper investigates the use of mobile tools by museums in order to provide mobile access to their permanent collections and special exhibitions. In fact, it deals with the wider topic of how museums tackle the complex issue of communicating with their present and potential audience using modern (i.e., mobile in this case) technologies. The paper presents and discusses the results of a survey that was proposed to Dutch and Flemish museums mainly dealing with modern and contemporary art or with science and technology. We tried to derive some trends and best practices in order to identify a good way to provide an engaging (mobile) experience to museum visitors. These results, although not always stirring in terms of answer percentages and of what most museums seem to be doing with new media, do show a clear interest towards mobile technologies and openness to innovation in the Dutch cultural sector.

Keywords: Mobile access to digital cultural heritage; mobile museums; mobile user experience.

Introduction

For a number of years, we have been investigating the use and the impact of social media on cultural heritage. In particular, we have been studying the use of Facebook by academic libraries (Calvi et al., 2010) and its intrinsic possibilities as a medium to attract new users, to help libraries build and maintain a well-defined and recognised role (Cassella, 2010) and to transfer efficiently their knowledge to their audience (Cassella & Calvi, forthcoming). However, librarians are not the only ones within the cultural sector to experiment with the use of the social tools of the Web 2.0 to advocate, promote, and raise awareness about their collections and services (Boost, 2009; Boost & Calvi, 2009).

This issue is indeed part of the wider concern of cultural institutions to reposition themselves in the vast digital environment and to redefine their role and expertise in a more complex informational context, where users have mostly become remote and information retrieval and discovery tools have improved the strategies adopted to promote cultural communication, to attract new users and to facilitate access to their information.

In this paper, we analyse how museums make use of the mobile user experience by performing an empirical analysis of current practices in museums in the Dutch speaking world (i.e., The Netherlands and Belgium). The museums that we have selected include science and technology museums, graphic design museums and modern and contemporary art museums, i.e., all museums that deal with contemporary art forms and that for this reason we consider more inclined to experiment with modern technology. Apart from the clear design issues that are implicit in its adoption, and which imply not just technological developments but also the (new) ways to enhance users' participation and to promote social inclusion, there is also a more strategic and communicative aspect in choosing to resort to mobile media to promote museum collections. This is why we have been mainly concerned with the question of how museums can use mobile tools to promote access to digital culture, i.e., to promote their exhibitions and permanent collections. We have also highlighted the strong and the weak points in using mobile communication for museums. In addition, we have tackled the issue of how to enhance the mobile user experience for those museums that do already use mobile tools.

Background

Driven by the Apple devices' success,[1] mobile communication is fast spreading all over the world. According to the last Pew & American Life Project Report, 47% of American adults state they access local news on their cell phones or tablet computers. The demographic characteristics of mobile information consumers show that adults using mobile information are very young, affluent, educated and live in non-rural communities. By 2020, mobile devices will be the primary connection tool to the Internet for most people in the world.

The potentiality of mobile technology is enormous. At the same time, mobile communication poses new challenges; for example, it changes people's perception of space and time and the way people look at and experience reality. Above all, as Dempsey (2009) states:

> a discussion about mobile communications, especially when seen in the context of the broader diffusion of network communications, soon touches on many fundamental issues: pedagogy and cognitive approaches; organization and structures; lifestyles and social preferences.

In times of economic crisis, cultural institutions (i.e., libraries, museums and archives) have taken advantage of the huge possibility offered by mobile technology to reposition themselves in the digital environment and to redefine their role and expertise in a more complex informational context, where users have become mainly remote users and information retrieval and discovery tools have improved the strategies adopted to promote cultural communications, to attract new users and to facilitate access to the information they need.

For many years, art museums have been offering their visitors learning experiences that extend beyond traditional exhibit labels with in-gallery kiosks and audio guides. This experience is now moving fast towards platform-specific applications in an effort to capitalize on the commonly-owned portable devices – iPods, MP3 players, Blackberries, smartphones, iPhones, iPads – that visitors already carry in their pockets.

Surveys and Case Studies

From 2005 on,[2] to enhance the users' mobile experience, museums have carried out manifold surveys among visitors to get feedback and comments on mobile technology and services they could offer. In 2008, for instance, the Whitney Museum of American Art performed a survey on visiting users to assess their use of technology to interact with the museum. Among other results, the survey highlighted the visitors' preference to download audio tours from the Whitney's website (74%). Of those who were interested in this, a majority (59%, n=90) would prefer to download the content prior to the exhibit, 25% (n=38) would prefer to download it after visiting the exhibit, and only 16% (n=24) would prefer to download it at the museum. More than half (53%) of the respondents owned an iPod, 14% owned an MP3 player, and only 7% of them owned an iPhone.

Among visitors who participated in the survey, half (50%, n=103) would want to use their personal device for video or information about the museum or the exhibit; 27% (n=56) would not want to, and 23% (n=48) were not sure. Fifty-nine percent (n=115) of them would prefer a combination of video and audio content. Audio and video tours were among the first kind of mobile applications offered to visitors by museums.[3] Initially, mobile applications were mainly supported by traditional players rented at the entrance of the museum.

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[1] According to the Burson-Marsteller blog (September 2010), the initial three-year growth rate of Apple's iPhone/iPod Touch, launched in June 2007, is ten times faster than the initial three-year growth rate of the online service American Online (AOL).

[2] In 2005, one of the first surveys on the use of technology in museums was the study conducted on a hand-held device developed for the Rembrandt's late religious portraits exhibition held by the J. Paul Getty Museum in Los Angeles.

[3] According to a 2010 Reach Advisors' survey on the use of technology in exhibitions, audio tours, videos and movies are mainly preferred by older visitors. Reach Advisor is an American research firm performing surveys on consumers (http://reachadvisors.com/).

In 2011, mobile technology in museums is moving on and visitors access mobile services from their personal smartphones, tablets, etc., i.e., from any kind of mobile personal device. Sometimes, they need to download a specific application that enables them to access only the information that is relevant to their profile (and interests) as specified, generally online (see below for a short discussion on what the Dordrechts Museum has started to do in 2011 in this respect), prior to the physical visit to the museum.

As a matter of fact, museums are now investigating whether it is still worth renting mobile devices to visitors: in June 2010, a short survey on visitors' mobile preferences was performed by the Indianapolis Museum of Art (IMA). The results indicated that the majority of the people surveyed prefer to access mobile content from their own devices, followed by a fewer number of respondents who would rather rent a mobile device from the museum and by a smaller portion of respondents who prefer to sit and watch a museum video at home.

As for the content visitors prefer to access, 90% answered that they prefer to hear an explanation of the work exhibited from the concerned artist, 83% want to have explanations behind the scenes, 54% prefer to hear comments from the experts, 51% want to access high resolution images, 27% state their interest is in games.[4]

Other surveys have focused on museums to assess their experience when going mobile. A survey on museums conducted in 2009 by the Center for History and New Media (CHNM) at the George Mason University, for example, found that 67% of respondents had implemented or were in the process of implementing a mobile content delivery project. Sixty-one percent of the respondents that implemented a mobile project offered podcasts, 54.5% offered cell phone tours, 36.4% offered an iPhone/iPod touch application.[5]

In January 2011, the second Museums and Mobile annual survey containing data about 738 museums was published. The survey – performed from September 2010 to November 2010 – tried to assess the objectives of museums going mobile, the main challenges in delivering mobile applications and the future perspectives of mobile technology in museums. Thirty percent of the museums surveyed offered mobile interpretation tools to visitors, 23% were planning to do so. This survey highlighted a correlation between the museum annual attendance and the use of mobile technology. Half of the institutions with over 250,000 annual visitors currently use mobile tools compared to less than 20% for those institutions with fewer than 50,000 visitors. Another correlation was among the number of staff working on mobile projects and the offer of mobile tools to visitors. Over two-thirds of the institutions with between one and five members of staff working on digital technologies used or were planning to use mobile tools.

Four most important objectives were identified by museums offering mobile experience:
- To provide supplementary information to visitors;
- To diversify the museum's offering to visitors;
- To engage visitors As part of the museum's experimentation; and
- To create a more interactive experience.

The most important challenges were identified as costs, keeping the content up-to-date and the technical development of the mobile tool.

Methodology

We developed a survey consisting of 27 questions[6] and published it online in March 2011. The link to this survey was sent to about 75 Dutch and 15 Flemish museums, most of which were applied art and modern or contemporary art museums and some science and technology museums. From the survey logs, we identified the profile of the museums that filled out the questionnaire as being graphic

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[4] Short results of the IMA survey can be found at the URL: http://www.imamuseum.org/blog/2010/06/22/have-it-your-way-results-from-our-2-minute-mobile-survey/

[5] Museums and Mobile Adoption Survey, Center for History and New Media, open from January, 31st till April, 1st 2009. Survey results are available from Survey Monkey: http://www.surveymonkey.com/sr.aspx?sm=mpcrjZYeT32X_2fVFtptvGGdO3OZb4eP9azwlmPd8uDew_3d

[6] http://pws5.parantion.nl/index.php

design museums, museums of contemporary or modern art and history or architecture museums with an attendance ranging between 20.000 and 270.000 visitors per year.

The survey was also published on an online Dutch museum forum[7] and the post was read by 148 of its members. The survey was accessed by a total of 53 respondents over a period of 10 days. Of them, 14 did not fill it out completely while 9 completed it fully. However, because of the former group of respondents who filled out some parts of it, we have been able to collect more answers for the questions in the first part of the survey. Finally, a couple of respondents sent their reply by email as they could not fill out the survey online completely.

The questions covered rather heterogeneous issues ranging from the reason(s) why the museum had decided to adopt mobile technology (for example, to promote the museum collections and exhibitions; to attract new visitors and increase the number of visitors; to provide better access for visitors; to pilot innovative services; to generate new revenues, etc.), to the kind of services and plug-ins offered via the mobile platform adopted (like a mobile website of the museum; mobile video tours of the museum; mobile video tours of the special exhibitions; e-books and catalogues on permanent and special collections, for instance); from the technicalities involved in the service offered (i.e., does this mobile service rely on visitor's personal device or is the device provided by the museum itself?), to the business models underlying this choice (i.e., do visitors need to pay a fee to be able to use this service or not?). Nevertheless, the core of the questions concerned the museums' general approach to mobile technology, identifying strong and weak points related to this adoption, and the overall positioning of the museum with respect to this adoption.

In the next sections, we will discuss in more detail some of the figures drawn from this survey by clustering them into three categories: services provided, technicalities and underlying business models and museums' general approach to mobile technology.

Mobile Service Provided

Of the 20 respondents who answered the questions on the use of mobile technology by their museums, 55% (11 museums) replied that their museum had not adopted so far any mobile technology whatsoever (and 5% or 1 museum replied that this happens seldom), although a total of 77% indicated that there were plans to develop this service in the future. The services that will most likely be implemented include: iPod Touch/iPhone application (57%), cell phone tour (36%), Podcast (21%), PDA or hand-held self-guides (29%), Android OS (Google) application (14%), mobile style sheet (CSS) making the current website more readable on mobile devices (14%).

However, of the remaining 40% (9 museums) that did use mobile technology, 56% (n=5) claim they did it to promote the museum collections and exhibitions; 44% (n=4) to attract new visitors and increase the number of visitors; 33% (n= 3) to reach potential visitors and provide better access to them; 22% (n=2) to generate new revenues; and 11% (n=1) to pilot innovative services;. Additional replies included: to attract the attention of media and of policy makers (22%, n=2), and to keep up with current trends (22%, n=2). See Table 1 for services and plug-ins provided by museums.

Table 1. Services and plug-ins provided by the museums

4. What kind of services, plug-ins, etc. are you offering via mobile platform? $(N_{Total} = 20)$, $(N_{Valid} = 12)$	
A mobile website of the museum	33%
Mobile video tours of the museum	25%
Mobile video tours of the special exhibitions	17%
Mobile audio tours (podcasts)	33%
E-books and catalogues on permanent and special collections	8%
Multimedia guides and instructions	42%

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[7] http://www.museumserver.nl/

Technicalities and Business Models

Fifty-eight percent (n=7) of the respondents indicate their museum provides mobile devices to the visitors who want to take advantage of this service and 83% (n=10) offer it without asking for a fee. For 75% of the respondents (n=6), the underlying business model therefore relies on free use of the mobile service. No respondents indicated use of a mixed model (i.e., with some free services and some requiring a payment), not the so-called "freemium" (DaPonte, 2010) whereby visitors get free access and the possibility to download the applications they require for free so they are inclined to buy more if they have a good and valuable user experience.

Although the mobile application was not developed by the museum staff (67%, n=8), the museum staff is aware of the resources or tools that were consulted to develop it (as listed in Table 2).

Table 2. Resources used to design the mobile application

13. How was it designed? Please indicate what tools and resources were consulted to design the mobile application ($N_{Total} = 20$), ($N_{Valid} = 12$)	
Audience research and evaluation	8%
Content creation	58%
Programming and technical development	25%
User interface design	25%
Don't know: it was developed externally	33%

As indicated in Table 2, museum staff was mainly involved in the creation of the content for the mobile application (58%, n=7), whereas the technical development, here including also users' need analysis, interface design and evaluation have only partially been performed by the museum staff itself (25%, n= 3). Implementing a mobile service has not been a smooth process for 57% of the respondents (n=4), who encountered mainly technical problems (40%, n=2).

The remaining 40% (n=8) who do not offer a mobile service to their visitors indicate as reasons for this choice the ones listed in Table 3.

Table 3. Reasons for not providing a mobile service

11. If you do not provide mobile content, what are the main reason(s) your museum has not? Check all that apply. ($N_{Total} = 20$), ($N_{Valid} = 13$)	
Cost	62%
Technical expertise	15%
Staff time	23%
No interest	15%
Lack of institutional support	8%

Museums' General Approach to Mobile Technology

When it comes to identifying the strong points in using mobile museum applications, 33% of the respondents (n=3) indicated that it enables them to communicate better, faster and continuously with users, especially with teenagers; 33% (n=3) that it offers the possibility to reach out to new potential visitors; 33% (n=3) that it offers the possibility to pilot and develop innovative services; 33% (n=3) that it helps users find information and maps of the museum "on the fly" and can increase museum visitors; 22% (n=2) that it is an alternative channel to promote collections.

The most important weak points that were identified by the respondents in the adoption of mobile applications in museums are that mobile technology projects can be costly to implement (11%, n=1); that senior users may be put off and intimidated by mobile technology (22%, n=2); that museum staff has often limited technical knowledge and is not keen on collaborating for mobile projects (11%, n=1); that museum staff has no time to dedicate to mobile technology projects (22%, n=2).

The respondents indicated several ways of tracking or monitoring user behaviour. Some monitor visitors' use of the museum website using Google Analytics; some track user behaviour through the iPhone store and Android market; still others use written surveys that are handed out to visitors after they have used the mobile application (i.e., a PDA in this case) provided by the museum; finally, the majority of the respondents (57%, n=4) indicated that they are not yet monitoring user behaviour nor developing any procedure to do so. Because of the lack of a systematic monitoring protocol, the respondents could not indicate either the users' reactions to the introduction or adoption of a mobile platform by the museum. Only one respondent (i.e., the one using written evaluation questionnaires after usage) replied that users are rather satisfied with the mobile application provided by the museum although some technical problems related to orientation[8] and due to the GPS's not reacting fast enough arose with the use of the PDA. In this case, the user group that was targeted mainly consisted of young users (about 15 years of age). In order to reach out to them appropriately, the content for the mobile application had also been created by young users.

The few museums that are already using mobile applications feel that they had achieved the goals they set up and are already working on an improvement of the application currently under use (more specifically, a second version of the PDA based upon users' evaluation, or the development of new routes inside the museum to be followed with the mobile application).

Discussion of the Results

We started this analysis with the goal of identifying the practices and attitude towards the use of mobile technologies in museums. We decided to focus on the Dutch speaking world, approaching mainly museums in The Netherlands and a few in Flanders, since most information already available concerns the English speaking cultural sector and does not cover cross-border realities.

We were surprised by the limited number of reactions we received, despite the positive attitude most respondents showed and the trust and faith they seem to have in the use of mobile technologies and in the necessity for museums to move in that direction if they want to survive the current changes and evolve together with their audience. One of the most advanced examples of this approach is represented by the Dordrechts Museum.[9] They apply the idea of making the museum visit personal by asking visitors to build their own profile online before starting the actual visit to the museum itself. Once in, via an iPod or their own smartphones, visitors can retrieve information that is adapted to the profile they had created.[10] The Dordrechts Museum combines personalisation and information mobility to enhance the visitor's experience and, in fact, to provide visitors with an experience, *tout court*. This is a reflection of the notion of "experience economy" introduced at the end of the 1990s by Pine and Gilmore (1999) whereby what the visitor (or customer) remembers after a certain event has taken place, i.e., the experience, is what is most valuable to the visitor and what gives importance to the event itself. As Jason DaPonte puts it, "make institutions *addictive*" (2010). This is why many design companies are focusing more and more on experience design[11] and cultural institutions try to exploit this trend as well in order to reach out to new visitors and strengthen the bond with their existing ones. This notion of the experience, borrowed from the experience economy principle and reflected in experience design, can somehow be linked as well to the "four R's" model developed by Prensky (2001a; 2001b)[12], if we assume that every experience, although not explicitly a learning one, does in fact tacitly create and affect learning.

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[8] This is an open air museum located in a park.

[9] http://www.dordrechtsmuseum.nl/

[10] http://www.dordrechtsmuseum.nl/over-mijn-dordrechts-museum#

[11] For example, http://www.northernlight.nl/

[12] Namely, Record, Recall, Relate and Reinterpret, where learners collect information; recall data and other resources available; relate them to their social and information network; and process it to build new knowledge.

Conclusion and Future Work

For museums, the mobile experience is a relevant challenge. According to our survey, 70% of respondents who had not so far adopted any mobile technology are going to plan and develop mobile applications soon. However, in projecting mobile platforms and tools for visitors, museums have to tackle manifold issues, namely:

- Design and usability issues;
- Context of use;
- Plethora of mobile CMS platforms;
- Content and tools (iPod/iPhone apps, Android apps, podcasts, video tours, etc.); and
- Business models and sustainability.

Design and Usability Issues

Due to their non-stationary nature, and because of their normal use in dynamic environments, mobile applications do indeed raise specific questions when dealing with the definition of their usability and user-friendliness and require the adoption of specific usability principles when designing their interface (Brewster, 2002), namely:

- The interface has to be designed for a small screen so as to reduce dramatically the amount of information that is visible at a time. More time has to be spent on scrolling and navigating as a result of this;
- The screen resolution has to be lower, which results in a poorer performance in information retrieval tasks;
- The input mechanisms should be limited and may not always be easy to use; and
- Mobile devices do not have fast Internet connections although new generations of technology are currently starting to spread. Networks provide limited coverage and switching seamlessly between different networks is an additional problem. Computational resources like memory size and processor speed are limited as is the autonomy of the devices.

Context of Use

As Raptis, Tselios & Avouris (2005) highlight, museums are a representative example in which the context influences interaction. During a museum visit, visitors interact with the exhibits through mobile devices. They argue that effective interaction design therefore needs to take into consideration multiple dimensions of the context. Mobile projects in museums should take into account these multiple dimensions by continuously integrating the visitor's real world experience and their mobile experience. This can be a rather easy task to tackle when audio tours are used, but it becomes a more difficult task in the case of video tours and games, for example.

Moreover, the context of use of mobile technology is continuously changing. People tend to interact in small and focused chunks of activities, with a reduced attention because of what is happening around them or simply because of being on the move. This may become a critical issue for museums and should be taken into account when designing mobile applications. For example, focus groups findings at the San Francisco MOMA have highlighted that visitors love a short stop in the narration (or video tour) followed by a "Go deeper" option (Samis, 2010).

Plethora of Mobile CMS Platforms

Designing user interfaces and tools for mobile devices in museums is a huge challenge considering the wide heterogeneity of operating systems, technologies, devices and applications potentially available. Samis (2010) argues that device and distribution infrastructures should be conceived in order to ensure equal access to information for all visitors, tech-savvy persons or not. Museums should also adopt a single mobile CMS that publishes to multiple customized interfaces: in-house multimedia, iPhone, iPad apps, Android apps, or any other platforms.

Content and Tools

The content to be mobilized should be very carefully selected in order both to enhance visitors' experience and to keep costs under control. A selection of the tools to adopt to mobilize museum collections and exhibitions is another relevant issue to consider. Visitors' demographic characteristics should be carefully investigated. Games, for example, are traditionally more effective in educational

projects for a strong interaction with young children and families, but they are becoming increasingly valuable also for young people as the distinction between games and utilities, private spaces and public spaces is blurring, while video/audio tours and movies can be particularly appreciated by senior visitors.

Business Models and Sustainability

According to our survey, costs are a wide concern and may hinder or prevent a wider adoption of mobile technology in museums. Therefore, business models should be carefully planned in order to guarantee sustainability to museum mobile projects. Start-up costs are a big issue but also content update and software maintenance can be costly. Sustaining the whole system is a challenge. Apps do not usually generate income for developers and an iPhone app may cost up to 35,000 dollars to develop (Proctor, 2010).

Although in our survey we found no evidence of mixed business models, we suggest that in order both to support mobile technology costs and to accomplish the museums' mission to offer broad access to collections, mixed business models should be adopted. For example, mobile tools for enhancing access to permanent collections could be offered to visitors free of charge while mobile tools for special exhibitions could be charged or vice versa. The freemium approach mentioned earlier (DaPonte, 2010) is also a possible solution to this.

All these concerns have an impact on the decision to provide mobile access to museum collections and to support a mobile experience to museum visitors. However, if they want to be always on, museums have to experiment with mobile applications and social tools. As future work, we would like to make a comparative study and investigate the adoption of mobile applications in museums in two European countries, like The Netherlands and the United Kingdom.

Acknowledgements

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