

Developing Virtual Exhibitions on Mobile Devices for the Educational Sector

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Introduction

As presented in *Handbook on Virtual Exhibitions* (Natale, Fernandez, Lopez, 2012) the evolution of new ITC solutions offers new opportunities to promote and valorise the national and international cultural heritage (Felicati, Natale, 2008). The potential offered by mobile technologies and the increased number of mobile devices that can process multimedia content, both offline and online, facilitates the feasibility of implementing virtual exhibitions on mobile devices (Filip, 1996). In (Filip, Donciulescu, Filip, 2001), a cybernetic model for computerization of cultural heritage is proposed to study the implied relationship between the organizations. Mobile devices and technologies have seen huge growth in recent years and some operating systems, such as Android,

iOS, and Windows Phone have captured the mobile market (Dumitrescu, Lepadatu, Ciurea, 2014).

There is a great variety of mobile devices available to the consumer on the market, in many different hardware and software configurations (Clark, 2012). However, from the developers' point of view, the primary interest is in the operating system installed on these devices (Ciurea, Zamfiroiu, Grosu, 2014). According to a Gartner study (<http://www.gartner.com>), the usual mobile operating systems found on mobile devices with smart capabilities are: Android OS, with a market share of 57%, Apple iOS, with 23%, Microsoft Windows Phone (11%), and others (9%). The mobile operating systems distribution is displayed in Figure 1.

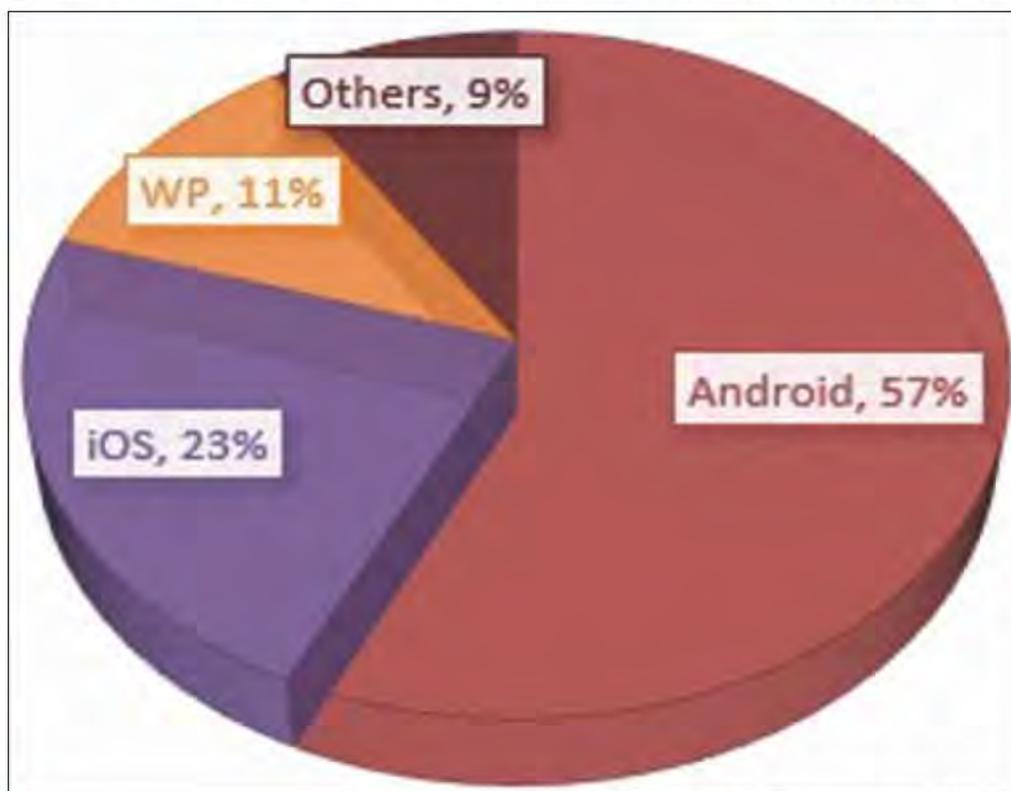


Fig. 1. Mobile operating systems market share



The most important challenge when speaking about content distribution is that today the educational infrastructure does not reflect the cultural needs of young people.

As we can see, Android is the most used operating system with more than half of the market share, which means that in the Google Play market store we can find the widest range of mobile applications.

Educational aspects of virtual exhibitions

When we want to offer educational content through virtual exhibitions, it is not enough to arouse the interest of students for an exhibition in virtual space, because it is necessary that the exhibition be presented in an attractive manner. The most important challenge when speaking about content distribution is that today the educational infrastructure does not reflect the cultural needs of young people. In this manner, a useful and well-designed learning resource will not be adequate for the teaching methodologies used in most classrooms and by most teachers. Some design theories can be applied to enrich many aspects of virtual exhibitions and this could be responsible for innovative educational materials for teachers and students. Young people visit physical exhibitions, take part in educational workshops, and learn from professionals and educators about applied creativity. The effect of using interactive elements within the virtual exhibitions serves this particular audience by catering to more contemporary ways of learning. When we want to target museums and libraries as locations for larger audiences, we have grown accustomed to migrating the physical exhibition experience to an on-line experience. We could apply Himmelsbach's (2011) statement about virtual and physical exhibitions, to museums and libraries *"Today, exhibitions are partially defined by their virtual urban spaces, which radically alter the image of the exhibition itself. The virtual exhibition as physical exhibition of the future can never replace the real, experiential world, but it can offer its inhabitants enriched and expanded potentials"*.

The introduction of content presented by designers and artists into an on-line space can be pleasant for the younger audience, and can be a very satisfying experience. Many virtual exhibition designers have been exploring the idea of the physical and the virtual within their own work. The designers and the design managers have illustrated in different ways how the economic and social aspects of online information can be integrally connected to the design and consumption of virtual spaces. This is especially the case for the target audiences of virtual exhibitions (Kaye, Poletto, 2004).

To begin the observation and generation of new virtual exhibitions we need to follow five steps:

- 1) observe the sight movement of the visitors;
- 2) classify the routes of visitors;
- 3) analyse the routes for experience content retrieval;
- 4) generate experience content descriptors as scenarios;
- 5) use the scenarios for establishing new virtual exhibitions with similar content.

If a virtual exhibition can deliver a variety of different experiences for a visitor at the same time, then it can even classify the type of users and it can identify who should be the subject of this experience. One of the goals of a virtual exhibition is to reach a larger audience, to achieve a better number of visitors. In order to achieve this goal, the virtual exhibition must suggest a type of experience with well-defined content and title. Besides, the virtual exhibition can serve as a kind of management information, because the technical environment in which this framework runs also provides a lot of statistics and information about the virtual exhibition's impact on the visitors (Respício et al. 2010).



For achieving virtual exhibitions, a prior project is not required, because virtual reality offers remarkable possibilities and ideas. In this kind of activity, we need to have the most specialized expertise, to provide a structured environment and to develop ideas in order to build the best virtual exhibitions.

While asking people to create their own virtual designs, more work and expertise is demanded, in order to allow them to clearly articulate their designs and to engage themselves on a more professional, specific level about the exhibits. When you create something, it is imperative to have a good starting point for discussion about what is missing and what the virtues of the exhibit are. It is easier to talk about interactivity by asking questions like "What can I do here?" than to determine exactly what is needed. If we post a poem or create a workshop, we wouldn't criticize participants' *ideas* for their poems or creations. We would talk about the work itself. The same thing is true for the exhibits, but we need tools to facilitate the accessibility to exhibitions in a much easier way than to large-scale manufactured objects. Using virtual exhibitions in education has become more popular these days, due to the fact that they have been acting as a solution to the challenges of e-learning.

Displaying larger amounts of information about exhibits using digital media tools in an attractive manner within a virtual space can be advantageous in reaching a wider and younger audience. In this way, we can also acquire valuable information regarding the relationship between physical and virtual representation of exhibits and ideas on how we can reach museum and library visitors on-line.

New approaches to virtual exhibitions on mobile devices

The problem with virtual exhibitions on mobile devices is the business model that can be applied in order to enable commercialization. The following question arises when we want to make the business model reliable: who will pay for the mobile application development and implementation? The following answers can be offered to this question:

- the use of some marketing freemium strategies, so that mobile application users will pay for access to the virtual exhibition as a special access to dedicated resources for a specific category of people;
- the development of virtual exhibitions for mobile applications by external software companies, other than museums and libraries; in this situation, other two questions will arise:
 - who will do the marketing (and how) for the mobile applications?
 - who will pay for access to virtual exhibitions?

In the second case, if the virtual exhibition implemented on mobile technologies has an educational character, different schools and universities can pay for their students to access the collections presented in the virtual exhibition.

The distinction between fee or free must be very well analysed before applying a specific business model, because UNESCO promotes open and free access to cultural resources as a human right. Some compensations can be realized through voluntary micropayments realized by end users of the mobile application. Therefore, when speaking about payments, some connections occur with the field of virtual tourism and e-commerce with art albums in digital format.

Virtual exhibitions implemented on mobile devices allow expanded multimedia access to cultural heritage from libraries, museums and art galleries, increasing public interest for collections, while libraries and museums exploit their resources in order to enrich and maintain them, becoming true documentation centres that promote culture.

We have developed a virtual exhibition for mobile devices with the Android operating system, which has the objective of valorising rare manuscripts found at the Romanian Academy Library. The mobile application was created as support for real exhibitions organized with different events at the Romanian Academy Library, with the main purpose of informing potential visitors interested in these rare manuscripts (Figure 2).

Fig. 2. Historical document in a mobile virtual exhibition



Virtual exhibitions for mobile devices include GLAM (Galleries, Libraries, Archives and Museums) content, which means that multimedia components, promoted in the application, are digital representations of the real objects that can be found in galleries, libraries, archives and museums (Figure 3).



Fig. 3. Mobile view of an element in a virtual exhibition

The virtual exhibition for mobile devices addressed visitors of real exhibitions organized by the library, in order to offer them a preview of the manuscripts displayed and a full description of these documents. The application



was available for testing to any interested user of a smartphone or tablet with the Android operating system.

In such a virtual exhibition for mobile devices, the mobile application provider becomes implicitly an intermediary in a transaction with digital content. The question arises of the commercial and legal relationship with the owner of the rights to the collections, who may or may not be the owner of intellectual property rights. In addition, a clear distinction must be drawn between the permanent collections of museums and unique exhibitions organized on special occasions (Figure 4).

The access through mobile solutions to art collections from museums and libraries can influence the transactions with art works and the financial sustainability of museums, because mobile contents may become surrogates for the original collections.

Conclusions

The idea of developing virtual exhibitions on mobile devices has an interdisciplinary character, because it integrates components from ICT and cultural fields. An example can be the development of a mobile application that presents historical documents in a virtual exhibition. One of the specific objectives for the development of mobile applications in the field of virtual exhibitions can be considered achieved, namely the promotion of culture and art collections to young people and beyond. The implementation of virtual exhibitions for mobile devices involves a collaboration between ICT and the social sciences, by creating mobile applications that promote cultural heritage elements. Learning to be effective is a huge benefit, and virtual exhibitions have become an articulation of a blended learning system, as a virtual space can be part of a larger virtual community, using other learning tools, evaluations and prospective opportunities, all contributing to a new learning approach.

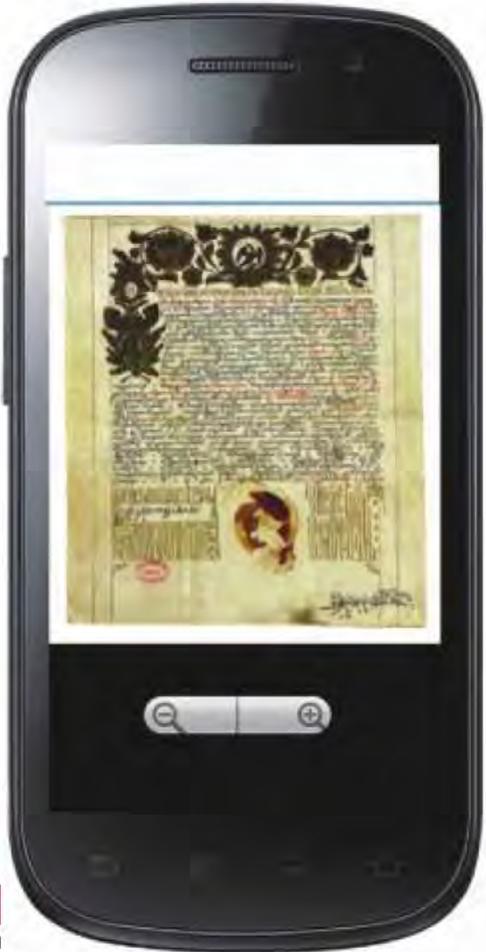


Fig. 4. Mobile application for virtual exhibition presentation

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References

1. Cristian Ciurea, Alin Zamfiroiu, Alin Grosu, "Implementing Mobile Virtual Exhibitions to Increase Cultural Heritage Visibility," *Informatica Economică*, Vol. 18, No. 2, 2014, pp. 24-31.
2. Jason A. Clark, *Building Mobile Library Applications*, American Library Association, Chicago, 2012, 130 pg.
3. Gabriela Dumitrescu, Cornel Lepadatu, Cristian Ciurea, "Creating Virtual Exhibitions for Educational and Cultural Development," *Informatica Economică*, Vol. 18, No. 1, 2014, pp. 102-110.
4. Pierluigi Feliciati, Maria Teresa Natale (eds.), *Handbook of cultural web user interaction, First edition (September 2008)*, MINERVA EC Project, 2008.
5. Florin Gheorghe Filip, D. A. Donciulescu, C. I. Filip, "A cybernetic model of computerization of cultural heritage," *Computer Science Journal of Moldova*, vol. 9, no. 2(26), 2001, pp. 101-112.
6. Florin Gheorghe Filip, "Information Technologies in Cultural Institutions," *Studies in Informatics and Control*, vol. 6, no. 4, 1996, pp. 385-400.
7. Sabine Himmelsbach, ed. *Produced@: 10 Jahre Stipendium für Medienkunst*, Berlin: Revolver Publishing, 2011.
8. Anne Kaye, Paola Poletto, 2004. *Virtual vs. Physical: Creating On-Line Educational Experiences through Design, Museums and the Web*, <http://www.museumsandtheweb.com/mw2004/papers/kaye/kaye.html>
9. Maria Teresa Natale, Sergi Fernandez, Merce Lopez (editors), *Handbook on Virtual Exhibitions and Virtual Performances, version 1.0*, Italy, August 2012
10. Ana Respício, Frédéric Adam, Gloria Phillips-Wren, Carlos Teixeira, João Telhada, *Bridging the Socio-technical Gap in Decision Support Systems: Challenges for the Next Decade*, IOS Press, 2010, pp. 600.