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How to create new services between Library Resources, Museum Exhibitions and Virtual Collections

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Abstract:

Internet Technologies allow us to connect virtual objects between them, by using their unique descriptors and identifiers. Mobile Technologies offer new opportunities for connecting the Reader/Visitor with Library Resources, Museum Materials and other Virtual Collections. We present an ongoing project in which we are connecting these materials in new services and open ways. We outline two paradigms for using Mobile technologies as information tools and we discuss the main opportunities and challenges related to the introduction of mobile technologies in the library as well as the usage scenarios we foresee to experiment.

Keywords: *Library - Resources - Museum - Services - Mobile*

2 Overview of BSI and CSI: what are their relations and what are their links

The Bibliothèque des sciences et de l'industrie library (BSI) is part of France biggest Science Museum, the *Cité des sciences et de l'industrie* (CSI, part of universcience). The creation of documents and bibliographies related to CSI's Exhibitions and Collections is among its everyday activities. For example, CSI exhibitions link to BSI bibliographies and some BSI documents are arranged in order to provoke the reader's curiosity about ongoing exhibitions. Furthermore, the Library and the Museum have links to third-party resources. Among them, BSI links to the Open Science Resources portal (www.osrportal.eu) the portal of an ongoing eContentplus project of which BSI is partner that aims at creating an Open repository of scientific digital objects available in European science museums and science centres. A different kind of resources can be found in LUTIN Userlab (www.lutin-userlab.fr) a Cognitive Science laboratory and technological platform dedicated to the studying the usage of new technologies hosted by CSI. Thanks to the collaboration between BSI and LUTIN, BSI visitors are often invited to participate to experiences in the lab that contribute to their scientific knowledge. On the web, Museum and Library materials and external resources are connected by web links, but there is no direct relation between their physical elements. Thus, experiencing the Museum “Spectacular Collections” and accessing the Library Resources are today two separate, self-containing experiences.

As Mobile technologies progress well in the connectivity field, we decided to use this technology to make a link between Library's collections, Museum's objects and virtual objects. The approach we choose is a progressive one; we proceed by a technical validation (proof of concept) before widening the solution on all the data. In this paper we discuss the main opportunities and challenges related to the introduction of Mobile technologies in the library as well as the usage scenarios we foresee to experiment at BSI.

3 Mobile devices: opportunities and challenges

Today, BSI's purpose is to create new services around the library resources (on-site and remote) and the visitors of the Cité. We believe that Mobile devices can offer interesting opportunities for bridging the gaps of access and augmenting the interactions between the variegated resources described before. Mobile devices can track the visitor's path and make the connection between the Exhibitions, the Library and the web Materials and can thus be used to create a footbridge for accessing these different objects. In Museums, nomadic devices (Mobiles, PDAs, etc.) are more and more used for guiding the user and giving him information on the objects he sees. For the libraries in general, Mobiles and PDAs can offer different services such as: catalog

search, provide practical informations (hours, contacts, etc.), content delivery (e-books, full- text content), reference services and links to external content providers. Many existing technologies can be used for this purpose. Among them: Near Field Communication (NFC) and Radio Frequency Identifier (RFID) to identify and track objects, QR codes to trigger remote content, Bluetooth for exchanging data over short distances, GPS and indoor sensors to track the user position outside or inside a building. However, the potential impact of these technologies on the visitor experience is far from being understood and clearly assessed.

As Pervasive Information Technologies, Mobiles modify the relation between the visitor and his habitual Information Ecosystem (De Rosnay, 2000) and can affect the way visitors *explore* the Library and the Museum and the way they *learn* from their objects (Tselios et al., 2008; Wang et al., 2009 Bartneck et al. 2006; Al-khamayseh et al. 2007; Corbeil, Valdes-Corbeil, 2007). What separates nomadic devices from more classic desktop devices (desktop computers, multimedia stations, interactive kiosks, etc.) is the nature of User Interaction: while desktop devices create a *dyadic, one-to-one (user-system) interaction,* Mobile devices entail a *triadic interaction* between the user, the system and the context of use (Tselios et al., 2008; Christopoulou, 2008). When introducing Mobile devices in a Library or in a Museum one possible scenario is that the Mobile will act as a "cognitive tubular tool" (Tijus, 2009) that will guide the visitor and help him focusing his attention on the Library objects, improving the continuity of his experience (continuity between pre/during/post visit and continuity between different documents) and enriching his learning experience. Another possible scenario is that the nomadic device will withdraw the attention of the visitor from the Library objects, overloading his cognitive system and thus giving place to disordered attentional strategies (erratic movements between the objects and the device) and a poorer, less organized form of learning (too many sources with no clear relation among them).

4 Screen or Storage: two paradigms for using Mobile Devices as information tools

Conceived as oral communication tools, Mobile devices are today massively used as information and multimedia tools. Their usage is spreading: Mobile data is expected to outstrip voice traffic by 2011[1]. As multimedia tools, Mobiles can be mainly used as a screens for providing augmented information or as tool for storing and carrying information on the user. These usages arise out of two paradigms that differ in terms of the kind of data they convey and the interaction they propose to the user. We propose to define the first one the *Mobile as a screen* paradigm and the second one the *Mobile as storage and identifier* paradigm. In the *Mobile as screen* paradigm the

[1] http://www.nokiasiemensnetworks.com/news-events/press-room/press-releases/mobile-data-to-outstrip-voice-traffic-by-2011

device is used as an extension of the visitor's eye (a magnifying prosthesis, Eco 1976). In the *Mobile as storage* paradigm the device is used as an extension of the visitor's memory (a cognitive prosthesis, Clark, 2003) and, as a consequence, as an *identifier* of the user's preferences and pathways. The applications resulting from the two paradigms are quite different, even if they are not incompatible. Following the first paradigm you would find “augmented reality” application that are used to provide the user with additional information on what he is seeing, through the addition of a second layer of visual information. Following the second paradigm you would find “internet of things” application that make use of sensors, Near Field Communication technologies and all sorts of identifiers to localize the user and connect him with near objects.

We are persuaded that the “perfect” application should combine some elements from both paradigms and should be able to guide the visitor by sensing the user's context, interpreting his needs and providing him with augmented, non invasive information that he could access on-site or save for a later retrieval. In our case, the paradigm we decided to explore and experiment is the “Mobile as storage and identifier” one. The main reason for not adopting the “Mobile as screen” paradigm is that we are concerned with the fact that invasive, augmented reality applications involving the parallel use of multiple information sources demand too much cognitive resources on the user side and could deteriorate his experience. When using an augmented reality Mobile application the user has to choose how to allocate his attention between the objects of interest, contextual information in the environment, and the additional information to get from the mobile. The device modifies the user's Information Ecosystem and can therefore have an effect on his Attention Strategies. The risk is that the nomadic device will withdraw the attention of the visitor from the real objects (books, documents, museum objects), overloading his cognitive system and thus giving place to disordered attention strategies (erratic movements between the objects and the device) and a poorer, less organized exploration (too many sources with no clear relation among them). On the contrary, we believe that the right solution for a Library wishing to facilitate the access to diversified collections and otherwise disconnected resources is a Mobile tool that accompanies the visitor and assists him by connecting these resources. In the following sessions we outline a set of usage scenarios that stem from the Mobile as storage and identifier paradigm.

5 Usage scenarios

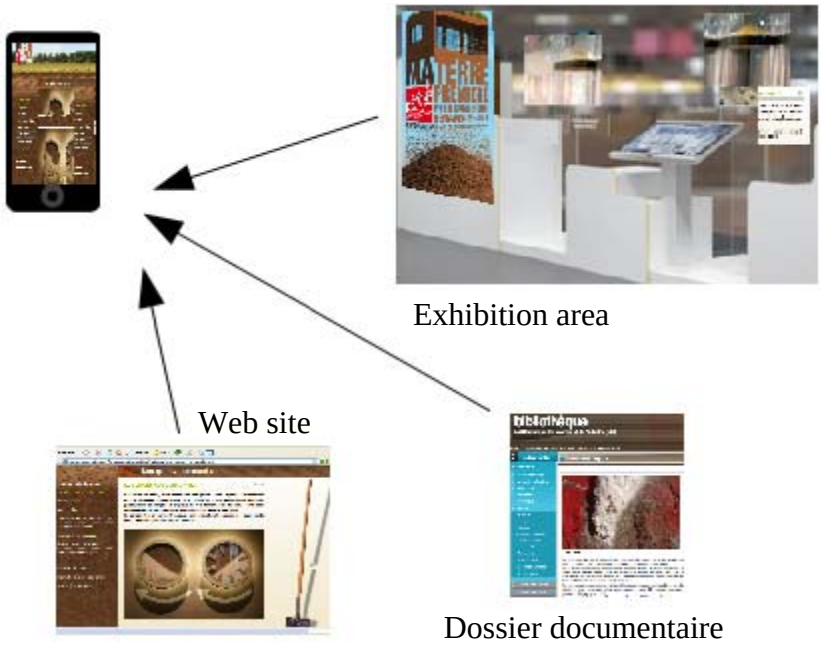
The scenarios we present have been conceived as part of the Open Science Resources project (OSR), some of them will be implemented and tested during the next phases of the project.

5.1 Scenario 1: Prepare at home and go deeper on site

Context: Families / classrooms want to visit an exhibit. They want to prepare for that so that once on site they can focus on what they prefer. They search for documents on the subject (videos, images, documents and bibliography) to have a general introduction on the theme.

Mobile use case: Each document they access is associated with a unique identifier that can be stored on a Mobile. When they are on site, visitors can be guided by the mobile device to documents related to those they have stored. When they reach a document they can identify it through the Mobile and explore its relations with what they have stored. Eventually, they can use a computer on-site, download all the objects they have collected (remotely and on-site) and explore them.

Result: When they visit the library and/or an exhibit visitors are guided through the documents that are of particular interest for them. This will focus their attention and filter out non-relevant content. A positive impact on learning is expected.



5.2 Scenario 2: Discover on site and go deeper at home

Context: Families and classrooms visit the library or an exhibit. When they are on site they can find something that:

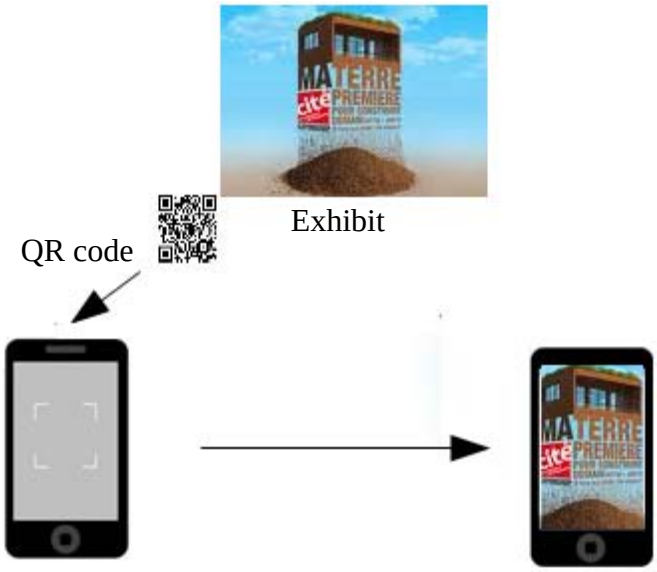
i) Interest them but can't be fully experienced (e.g. lack of time, too many visitors, document is absent);

ii) Is very interesting for them and they would like to study it in more detail at home;

Mobile use case: documents and objects that are also accessible on-line (for example on the OSR portal) could be identified by a symbol (e.g. an icon) and associated with an identifier (a QR code, a

RFID tag, a keyword, etc.). Every item is connected to a unique URL allowing the direct access to the resource. In this way, the teacher could later retrieve and use the objects in the classroom. The family can retrieve the object to continue the visit at home (e.g. viewing a related movie at home). By using the unique identifier the visitor can find the object and other related contents. During the visit, linked objects could be browsed on a mobile device and « saved for later ».

Expected result: once the visitors know that they will have access to this object on-line they can go deeper in the learning activity. They are prompted to discover linked contents and objects (e.g. a bibliography, similar objects in other EU museums/libraries). This is also expected to improve the continuity between before – during and after the visit to the library.



5.3 Scenario 3: From the Library to the Museum and back

Context: A visitor is consulting the OSR portal in the BSI Library.

Mobile use case: the visitor discovers many objects. Some related objects are on display in the Museum. He takes the reference with him on a Mobile and goes visiting the Museum. Through different kind of technologies (Near Field Communication, Bluetooth, RFID, QR codes) the Mobile helps him matching the content he accessed on-line with real content. The other way round is also working: someone explores an exhibit, he founds OSR objects linking to bibliographic references that he can access in the library or through the OSR website.

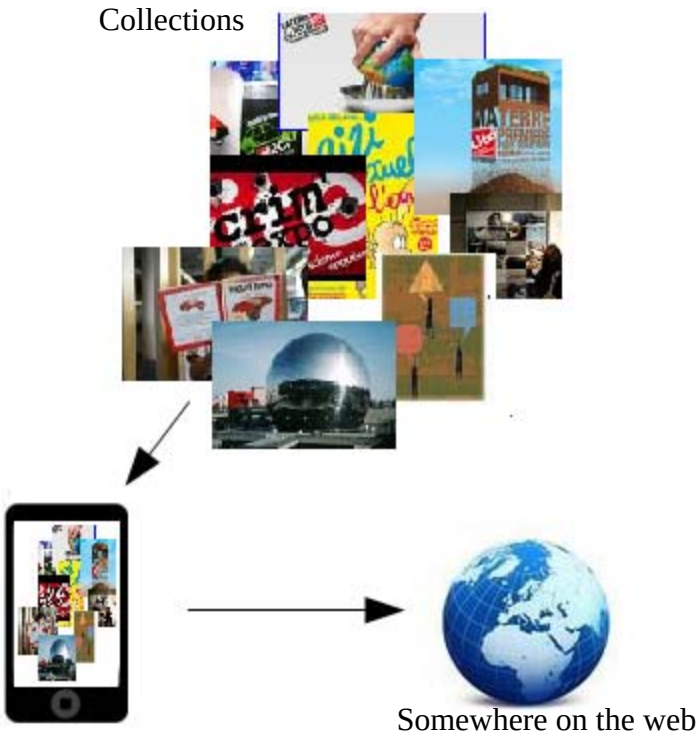
Results: improve the continuity between the Library and the Museum, between bibliographic researches and on site experience.

5.4 Scenario 4: Bring it home

Context: A family is visiting an exhibit. The little Paul falls in love with the image of Saturn's rings and ask his mother if they can bring it home. Usually the answer would be « no ».

Mobile use Case: If the object is stored somewhere on the web, its identifier can be retrieved through a Mobile and it can be made available to be accessed online.

Result: Provoke curiosity, bring science in everyday life and enhance continuity between museum and home.



In all these scenarios the Mobile can be used to connect objects that are not physically associated or near. The advantage of connecting objects in this way is that the Mobile allows us to do that in an easy way by simply retrieving and storing the object's identifier. You don't need to remember the object's name and search for it later. The object is already stored in your (external) memory and ready to interact with associated objects in its environment. In these scenarios, Mobiles act both as memories for storing objects and as compasses for finding new content. We believe there are a lot of opportunities to explore in the Mobile as storage paradigm. This paradigm can be used to turn any passive document into an interactive object and to provide the user with enriched documents and Collections. The next step consists in beginning to experiment these services and test how visitors interact with them. In this case too we will adopt an Open approach by favouring the development of new usages and services starting from what the users produce in their everyday practice.

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