Towards Engagement Beyond Museum Walls

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ABSTRACT
Information gathered in museums and similar knowledge spaces (e.g., heritage sites or monuments) is frequently disconnected from daily life in these spaces, creating an “information bubble”. Visitors enter these spaces, see the exhibits (sometimes interact with them) and leave having learned something (hopefully) but not necessarily being able to connect it to their day to day realities. Engaging visitors is not always an easy task. Modern audiences seem to have a short attention span: younger visitors are easily distracted by calls from life outside museum walls delivered by smartphones and other modern gadgets. We believe that connecting information into daily life settings might increase the interest of the public in the exhibits, and promote better engagement. Connecting this information, however, is not a easy task. We discuss some of the challenges involved and present some proposals to address them.

Author Keywords
Human computer interaction; museums; knowledge management; awareness

ACM Classification Keywords
H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous; See http://acm.org/about/class/1998 for the full list of ACM classifiers. This section is required.

INTRODUCTION
Museums and similar heritage-oriented organizations are frequently seen as "keepers of the past", institutions dedicated to preserving history (or established facts), as opposed to schools, which are geared towards learning and the preparation for the future. Digital technologies are starting to bridge this gap, and transforming museums into institutions for learning. As informal learning environments, these institutions facilitate access to information in different ways and enable an adaptive approach that is currently not possible in schools or universities, given the strict curricula and current teaching practices [12].

These "knowledge spaces" are routinely visited by a diverse public: museums, galleries, historic places, zoos and parks usually have a very diverse range of visitors. Visitor interaction in these spaces is normally standardized, through information panels presenting static text and images, which present themselves the same way for every participant, every time. Visitor diversity may lead to different interpretations of the same contents, or to thinking of different things, depending on personal experiences. These differences also mean they may desire to obtain more information on different aspects of what they're seeing. Conversely, the content could also be enriched by this same diversity, by allowing visitors to provide information that could be added to the museum's body of knowledge.

Computer technologies have the potential to better engage these visitors. Interactive experiences can create a two way street between visitors and organizations, not only providing more information upon request and enabling visitors to add their impressions or associate new information to the information displayed. In this fashion, interaction with information becomes tailored to the individual and has the potential to improve the learning experience.

Given recent government incentives, a few new museums have recently opened in the city of Rio de Janeiro, and a number of heritage sites are currently being restored and have become very popular with locals. This opens up space for experimentation and creates new opportunities for projects involving museums and other informal learning environments. However current interactive technologies are insufficient or poorly used at these places.

Computational technology can enhance a user's experience, by bringing the museum to him/her at different moments. We are working on extending the museum experience beyond the visit in two ways:

(a) provision of museum content after a visit
(b) incorporation of content generated by past visitors

In both cases, one of the main issues is the integration of information "in the museum" with information "in the wild". We explore both of these possibilities in the next sections.
INTERACTION BEYOND MUSEUM WALLS

We are looking for new ways to engage visitors with museum and heritage sites' content. We propose to allow a visitor to bring the museum with him after the visit, by finding ways to relate the museum experience to everyday activities. To illustrate the possibilities envisioned, we discuss two scenarios, one for each of the aforementioned situations.

Scenario 1: Providing Content after a Visit

Visitor 1 visits a history museum. While walking around town, he/she stops to take a picture of a building on his/her phone. The phone recognizes the building (a la Google Goggles) and retrieves information related to the exhibits seen earlier. The point in this case is not to provide all of the content available at the museum (in an encyclopedic fashion), but only that which was actively visited. This links the content to what was actually seen at the museum, as a reminder. This leaves the space open for repeat visits, where new content can be gathered.

This is a simple example of extending the visit beyond the museum. While a visitor may read many of the panels in exhibits, much of this information is later forgotten if not properly contextualized and correlated to everyday activities. Correlating between museum content and elements outside the museum space helps visitors perceive their relevance.

This type of correlation becomes more interesting when multiple heritage institutions are involved. For instance, during a visit to a museum, information could be provided based on a prior visit to a heritage site. As an added functionality, a "guide" could suggest the best paths to explore the collection, depending on previously visited sites. This could potentially improve the learning experience, by creating an active link between content present at multiple sites.

Naturally, a large number of situations could be included (e.g., when shopping, information could be provided on the style of a pattern or on the development of a technology), and the challenge becomes knowing when and what to provide. Mobile and context-aware systems research can provide some insight in this situation.

Scenario 2: Allowing Visitors to Provide Information

Visitor 2 has just visited a museum. While walking out in the street, something (an object or an event) reminds him/her of something he/she saw during the visit. Through an interface, he/she is able to send in to the museum a photo, video or textual description of the element that reminded him/her of an exhibit, and link it with the appropriate museum elements. In this situation, visitors are the ones making the connections between information elements, and sending them back to the heritage institutions.

Elements sent in can be incorporated to the collection, with notes and explanations. Naturally, not everything sent in will be incorporated into the collection. Curators will have a new task: sifting through these public additions to the displays and deciding what should/should not be added to the collection, and how they should be presented to the next visitors.

This scenario could also happen during a visit. A visitor might be struck with a question, be reminded of something or make a mental correlation while visiting an exhibit. He/she should be able to attach this question or comment to the display. He/she should also be able to interactively search for answers, either through the installations or through his/her own devices, and attach these answers to the exhibit at hand.

CHALLENGES AND OPEN QUESTIONS

Both scenarios present technological challenges and opportunities. Some existing initiatives to organize and create open repositories of museum knowledge could be used as a basis for this type of system [2]. Major challenges in the two scenarios presented are:

a) Information management, especially as related to its organization, correlation and editing, and
b) Human computer interaction, particularly tailoring the experience to the user and the settings, enabling simple access to the museum’s body of knowledge and the presentation of information outside the museum spaces.

The first issue is information management and especially, integration. Structures that organize information must be clearly defined and known, so that new information can be incorporated and properly linked to existing information. When multiple organizations are involved, they might each have its own underlying structures, and the same concepts might appear more than once. Finding points of connection to interlink these structures is one challenge. Navigating both of them together is another one.

One technology that has potential to help in this solution space is Linked Data [4]. There has been growing adoption of Linked Open Data strategies in libraries, archives and museums (LODLAM1), as evidenced by a number of workshops and conferences available (for instance, see the MW2016 conference2 and LODLAM-based tutorials). The British Museum is one institutions that has released its collection using semantic technologies [3]. Semantic tags, descriptors and ontologies could help interlink information from the museum's collection to information found "in the wild", or between institutions (e.g., [2]).

Making this information available, however, is an issue of scope: when "taking the museum with you", what part of the information should be made available to a visitor after his/her visit? The point is this case is not only to provide the

1 http://lodlam.net/
2 http://mw2016.museumsandtheweb.com/
information virtually, but to connect it to its physical embodiment, which is experienced in a visit to the site. Thus, a partial visit to a site would allow the user to collect some information, but not all. Its correlation to the external world would, hopefully, entice the user to come back for another visit.

On the other end of the spectrum, users could be encouraged to contribute photos, videos or comments based on their daily experience. This turns them into more active participants in the construction of a museum's body of knowledge. These visitors should be allowed to reference elements from the outside world, add questions (which could then be answered by other visitors, creating a conversation related to an element) and further their exploration of the content after their visit. Naturally, this also means curators' jobs would change: from handling museum content, they would have to look through visitor-generated content to decide what should and should not be incorporated to the exhibits (if anything). This generates additional work that would have to be dealt with.

Were a user to visit two different sites, where both had their collections semantically enhanced, it would be easy to create links between them using linked data technology. Thus, when visiting a heritage site (e.g., a castle), objects from the museum (e.g., tapestries) could be inserted (virtually) into the experience, providing additional information and contextualizing the objects in its original space. Some initiatives on outdoor activities are already being undertaken [5], and we believe these have potential to add to the museum experience.

Another issue that presents itself is how to tailor this experience to different users. The interests and visit dynamics may be different depending on the visitor's age, interests or previous knowledge. User profiling and modeling techniques can be used to elicit preferences and interests of a user. Beyond that, any integration with the world outside museum walls would need to understand not only the location but the context in which the information is to be presented. Just as there are many opportunities for presenting information, there is also the risk of doing so at an inappropriate moment.

**DISCUSSION**

A number of proposals have been made to create new forms of engagement with heritage and museums. However, we feel there are many possibilities still open. Previously defined avenues for research [6] provide guidelines for future engagement. Issues of context and information filtering become very important in this case: how could information overload be avoided when providing museum information?

In Brazil, most students have very little interested in visiting museums and heritage sites, and interactive technology could help increase interest by making their visit more dynamic and relating the information they see with their everyday lives.

Thus, we'd like to explore how museum could become more integrated to day to day reality, and become more of an educational experience than an “archival” space. This involves defining useful technological platforms (cellphone usage is very high in the country, so it would be interesting to take advantage of that), finding new forms of interacting with the audience, leading them to question their knowledge and assumptions. Most importantly, correlating the information seen in a museum with the real world would help visitor understand the relevance of exhibits they see.

**REFERENCES**