It Doesn't Compare to Being There: In-Situ vs. Remote Exploration of Museum Collections

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ABSTRACT

The digitization of museum collections has the potential not only to make them accessible remotely but also to augment their in-situ exploration at the gallery. We are interested in how mobile visual interfaces to museum collections can enhance explorations and experiences of the collection in-situ, and how these in-situ explorations compare to remote browsing of collections, e.g., through web-based interfaces. We discuss findings from a study where potential visitors explored a museum collection using a tablet-based visualization remotely, at first, and then as part of their museum visit. Our findings show that the entry points to the collection differ in the two different contexts: while overview visualizations linked with individual artifacts triggered curiosity and promoted exploration in the remote setting, it was the individual (physical) artifacts that drove explorations of the mobile visualization in-situ. While remote explorations of the visualization can be characterized as highly open-ended, in-situ, people approached the interface in a more targeted way. These findings suggest an item-centric approach to the design of mobile visualizations that bridges the physical and digital information space to assist in-situ explorations of museums collections.

Keywords

Information Visualization, Entry Points, Museum Collection, Mobile Devices

1. INTRODUCTION

Museum collections typically include vast amounts of evocative artifacts. These artifacts are often linked in a variety of ways, for example, through a shared creator, location of origin, creation time, context of use, aesthetic characteristics, or materials involved. When people visit a museum, however, they will typically see only a fraction of this collection on display. Most museums have to keep the majority of their collection in storage due to space constraints. These space constraints also limit the presentation of the large variety of links and relations between exhibits.

From this perspective, the digitization of museum collections and the availability of rich meta data has the potential not only to make these collections accessible remotely (e.g., through web visualizations, [10]) but also to enhance people's experience and insights into the collection in-situ, that is within the museum. We are interested in how mobile display technology and information visualization can be combined to highlight topics inherent in the museum collection as a whole and to provide links and relations between on-display physical artifacts as visitors explore the gallery in-situ. How do visitors use and experience such tablet-based visualizations as part of their museum visit? How do such digitally enhanced in-situ explorations differ from remote exploration approaches when the collection is presented, for example, as part of a web-based visual interface?

In this paper we present lessons learnt from studying a tablet-based visualization prototype during remote and in-gallery use. Our findings show that there are fundamental differences in how people approach a collection remotely vs. in-situ, at the museum. During remote exploration, overview visualizations can act as powerful entry points to the digital collection. In contrast, in-situ, it is the individual (physical) artifacts on display that trigger and drive the exploration of the collection, not only in physical space (by guiding visitors through the museum) but, in particular, in the digital information space offered by mobile visual interfaces. Furthermore, in the remote setting, participants explored the collection presented by the visualization in an open-ended way. In-situ, however, the tablet was used in a targeted way, as a means to find additional information about particular artifacts that participants encountered at the gallery. Open-ended exploration occurred in physical space when strolling through the galleries. We discuss these findings and their implications for the design of mobile visual interfaces for museum- and other cultural collections.

2. VISUALIZATION PROTOTYPE

Our research was conducted in collaboration with the local university museum. The museum features four galleries that focus on the history of the university, past and present student life, academic achievements, and scientific discoveries. Only approx. 0.3% of the over 100,000 artifacts the museum owns are on display. The collection is currently in the process of being digitized in order to make it available online through the museum website. The curators are keen to explore digital technology as a means to enhance people's experience of the museum collection, both as part of their visit, as well as remotely. It is in this context that we proposed to develop a tablet-based visualization that people could take with them as part of their museum visit and that

would provide additional perspectives on the collection (e.g., geographical heritage of museum artifacts, time of their creation, and more details about selected artifacts).

Design Goals & Process.

Mobile devices in museums are typically designed to provide additional information about particular artifacts on display, often in form of text or audio. While medium-size mobile displays such as tablets have the potential of showing more contextual information about the museum collection and enable sharing among visitors, in-depth case studies in this area are still rare and, to our knowledge, design recommendations do not exist. The design of our prototype was therefore informed by general recommendations from previous work on designing interfaces that support open-ended exploration approaches to information collections. In particular, we aimed at providing different types of visual overviews that provide a first glimpse of the collection and promote further exploration (e.g., [2, 7, 8, 9, 10]). Following up on works such as [1, 5, 9] we aimed at linking these overview visualizations to facilitate an exploration of the collection along different dimensions. The overviews also act as filters to promote drilling down into particular areas of interest [1, 8]. At the same time, we aimed at giving individual artifacts a visual presence in the interface to balance the abstract character of the visualizations with actual samples of the collection [7, 10].

The visualization prototype was developed in an iterative process in close collaboration with museum curators, starting with sketches and paper prototypes and leading into a fully functional interactive visualization. It was implemented using web-based technologies[1] to make it easily accessible on different types of devices and operating systems. In this way, visitors can potentially use their own tablet device and, the museum can easily integrate a (potentially modified) version of the visualization on their website.

Interlinked Visualizations.

The resulting visualization consists of three interlinked visual panels (see Fig. 1.A,B,C). The interface is dominated by a Choropleth map that provides an overview of the geographic origin of museum artifacts (see Fig. 1.A). The more artifacts originate from a country, the darker it appears in the map. The map is zoomable and panable. Below the map panel, a bar graph shows an overview of the creation time of artifacts (see Fig. 1.B). Discussions with the curators revealed that a rough overview based on centuries would provide enough details for the general museum audience. To the right, the list of museum artifacts is shown in form of thumbnail images (if available) and their title (see Fig. 1.C). The images above this list represent the seven different collections that artifacts are associated with (see Fig. 1.D).

When first opened in the browser, the visualization shows an overview of the entire museum collection (featuring approx. 2,400 artifacts that have been digitized and tagged with metadata to date) along geographic and temporal dimensions. The map and the timeline visualizations act as filters to the collection: selecting a country via mouse-click or touch updates the timeline to only represent artifacts originating from the selected country and filters the list of artifacts accordingly. Similarly, selecting a century of interest

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[1]http://d3js.org/; http://jquery.com/
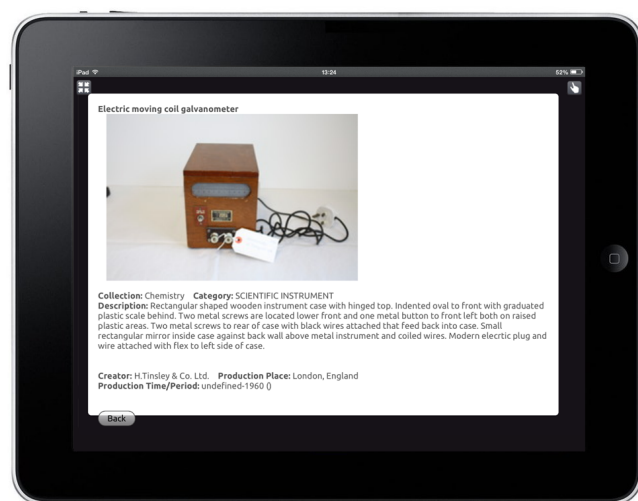

Figure 1: Visualization prototype on an iPad.

Figure 2: Selecting an artifact from the artifact list, brings up some details about this particular artifact.

updates the map and list of artifacts associated with the selected time period. Selecting one of the seven collection thumbnails changes the other panels accordingly. A "keyword search" field on the top right of the screen (see Fig. 1.E) enables a targeted search for particular artifacts or topics of interest. Selecting an artifact from the list view, reveals background details alongside related artifacts in form of an overlay element (see Fig. 2).

Again, this approach to visualizing digital collections is not uncommon; many similar examples exist (e.g., [1, 5, 9, 10]). However, we were interested in how museum visitors would use and experience this type of visualization not only remotely, outside of the museum, but during their stroll through the museum galleries.

3. STUDY

The study was conducted over the course of seven days at the local university museum. Ten groups of two people each took part in the study (11 female participants in total). We decided to recruit dyads to simulate a more realistic museum experience (people typically visit museums together

with family and/or friends [4]) and to promote a more vivid discussion about the prototype. Participants' age ranged from 22 to 51 with half of them in the 22–25 age group. All but three participants were students in a variety of subject areas such as computer science, natural sciences, and the humanities. The remaining participants worked in academic and administrative positions.

The first part of the study took place outside of the galleries in a meeting room at the museum. Study participants were given a brief introduction to the visualization prototype and were then invited to explore the presented collection using a single iPad to share. Participants were seated with the iPad between them. While the groups were asked to explore all components of the visualization, they were not guided in any particular directions. This first exploration phase ended with a brief interview where we asked groups about their discoveries and how they experienced the different features of the visualization. After this we invited each group to take the iPad on a stroll through the museum. Groups were specifically prompted that they could spend as much or little time in the galleries, and use the iPad for as much or little as they wished. After the groups' visit to the museum galleries, we interviewed them about their experience with the iPad visualization as part of their museum visit.

During both parts of the study we video-recorded and took notes of groups' interactions with the iPad and with each other. Furthermore, we audio-recorded all interviews. In the following, we provide a preliminary overview of the findings of this study, focusing in particular on how participants explored the museum collection remotely using the iPad prototype in contrast to in-situ, using the visualization as part of their museum visit.

4. EXPLORATION APPROACHES

We found that groups took different approaches to exploring the museum collection remotely using the iPad visualization, compared to when they strolled through the museum galleries with the iPad at hand (see Fig 3).

Remote Exploration of the Collection.

When exploring the museum collection remotely, outside of the museum galleries, we found that participants typically focused on the map visualization first, trying to make sense of the color coding and then concentrating on a particular country of interest. The choice of country was often influenced by participants' own nationality. However, groups were also drawn toward countries that were associated with many artifacts: *"I would suggest that we explore that one* [Peru]. *That looks very green."* [G10-A]. The selection of a country in the map visualizsation was typically followed by browsing the resulting list of artifact. Here, artifacts that came with a thumbnail image received more attention. However, the visible titles of artifacts also triggered curiosity (*"Finger piano? What's that?"* [G10-A]), and led participants to take a look at the detail view (see Fig. 2). With the timeline visualization, groups typically selected a century of interest, inspected how this selection changed the map visualization, sometimes selected another country based on these changes, and then turned to the artifact list to browse for exhibits that seemed interesting. When browsing the artifact list, they frequently explored the collection filters.

On average, groups spent approx 9 min. (6–17 min) with the visualizations. Our observations and interviews with

Figure 3: Group exploring the visualization within the galleries.

participants show that, even in this relative short amount of time, groups made several discoveries. For example, they reported on general patterns visible in the collection data (e.g., the prominence of certain countries or time periods: *"I was surprised that there was nothing else in South America. Just from Peru."* [G10-B]), or they described curious artifacts that they encountered as part of their exploration.

Participants experienced the overview visualizations as quite valuable for exploring the museum collection from different perspectives: *"I like the fact that there is both the map and that I can see everything simultaneously"* [G9-A]; *"I like the linked views. I think the fact that the three things* [the map, the timeline, and the artifact list] *are connected to each other... I think that is very powerful"* [G10-A].

To summarize, the groups' impression of the general idea of the visualization prototype was quite positive. One participant even expressed excitement to take the iPad down to the galleries: *"I would love to go around with this* [in the museum]*."* [G4-A]. However, one group expressed scepticism about the value of the iPad visualization at the museum: *"So there's no natural path around the museum that this is going to take you?"* [G3-B]. As we describe in the following section, participants felt less enthusiastic about the visualization when strolling through the museum galleries.

In-Gallery Exploration of the Collection.

Groups' exploration of the museum galleries was driven by the artifacts on display; participants followed the layout of the galleries looking at exhibits one-by-one. If an artifact caught their attention, groups tried to find more details about it using the iPad. Our interviews confirmed that the main motivation of groups to use the iPad was to get more background information about an artifact on display: *"We tried to get a little bit more information about Ben Franklin and his medal."* [G1-A]. Within the galleries, the keyword search functionality in the interface was most frequently used; interactions with the map or timeline visualizations were the exception: *"We used the centuries at the beginning to see what was around. Most of the time we were using the keyword search."* [G10-A]. Occasionally, groups would search for a specific artifact, and, in this process find out about similar artifacts in the collection through the artifact list: *"We were looking for information about the Chained Bible in the first room and ended up finding information about the other bibles around."* [G1-A].

In the current version of the iPad visualization finding specific artifacts is difficult. Groups had to look for the artifact's name or an appropriate keyword, and then type this into the search field—a slow process that was experienced as frustrating and somewhat distracting from the actual museum experience: *"I was looking down at it* [the iPad] *and I was paying attention to it and possibly moving a bit, and then as I was strolling along, I was walking past information.* [physical exhibits] *that I would have otherwise read."* [G10-A]. The tediousness of using the iPad as part of the museum visit is reflected in groups' overall usage of the device. On average, groups spent approx. 28 min. at the galleries (5–47 min.). While they frequently consulted the iPad at the beginning of their visit, the usage decreased toward the end.

In general, groups were keen on having a mobile device that would provide more details about museum artifacts and links within the collection. The possibility to retrieve in-depth information in-situ, while standing in front of an exhibit of interest was experienced as more compelling than exploring a separate large-display exhibit that would be located somewhere in the museum and provide an overview of the collection alongside more detailed information about individual artifacts: *"I want the information when I am looking at the artifact."* [G10-B]. However, the interlinked visualizations that proved to be quite successful in promoting an open-ended exploration of the collection outside of the museum galleries, fell short behind these expectations, as these do not provide easy access to individual artifacts on demand. We discuss these preliminary findings considering how the *exploration context* influences the type of *entry points* that invite people to explore a museum collection.

5. CONTEXT & ENTRY POINTS

Entry points have been discussed in the context of workplaces as *"a structure or cue that represents an invitation to do something—to enter into a new venue or information space"* [6, p.311]. Our findings indicate that the exploration context affects the entry points to the museum collection: In the remote context, overview visualizations alongside views that allow the quick scanning and browsing through a series of individual artifacts seem to be effective entry points to the collection. The overview visualizations tell a story about the character of the collection and guide interest toward individual artifacts; unique characteristics of the collection are highlighted and juxtaposed to promote exploration paths based on the different interests of visitors and, potentially, lead to serendipitous discoveries.

In contrast, within the museum, the physical exhibits on display triggered an urge for more detailed information. Hence, the open-ended approach to the iPad visualization that we observed during groups' remote exploration was replaced by a more targeted search behaviour during in-gallery use of the iPad. The open-ended exploration took place in physical space: by walking through the museum and taking in the physical exhibits on display. That is, in-situ, visitors' interest in the collection is driven through the lens of individual artifacts which form the most prominent entry points to the collection. Drawing from recent approaches to designing interfaces for digital collections [3], we will revise our mobile interface to grant a prominent role to individual artifacts. Finding the digital counterpart of a physical exhibit in the mobile interface could be facilitated through common technologies such as RFID tags or QR codes. Highlighting links to related exhibits (on display and in storage) may help visitors explore the galleries in a more meaningful way and help the museum to find out what artifacts that are currently in storage may be of interest to visitors. Here, visualization can help to illustrate the character and variety of links that can be diverse in a museum collection. We will also explore the use of overview visualizations to convey background information about artifacts in focus. On a higher level, we will further explore how this approach of introducing mobile visualizations into the gallery space influences visitors' experience of physical artifacts on display (e.g., achieving a balance between explorations in physical and digital space whiles avoiding meaningless distractions from physical exhibits) as well as shared experiences between visitors.

6. CONCLUSION

We believe that the combination of information visualization and medium-sized mobile displays has the potential to enhance the in-situ exploration of museum collections beyond what is already possible with audio guides and augmented reality applications that visitors can engage in using their mobile phones. From this perspective, the digitization of cultural collections not only raises questions of how to make these accessible and explorable in digital space. It also poses questions on how we can make creative and effective use of collections' digital meta-data and context information to enhance individual and shared experiences with their physical counterparts in physical space. Considering how different exploration contexts (e.g., in-situ and remote contexts) call for different entry points to a cultural collection and how the navigation of one space may be enhanced through the other can be a helpful starting point in this endeavour.

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