

# Conveying Archaeological Contexts to Museum Visitors: Case Study Pergamon Exhibition

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## Abstract

*Reconnecting the audience of an exhibition to the archaeological context of ancient artefacts and explaining their reception histories is a great challenge. Employing digital devices to support the understanding of connections between exhibits and their past, creates the additional challenge of developing a system that not only achieves comprehension but is also accessible to all museum visitors.*

*We have devised a concept and an implementation of a kiosk application for conveying these contexts and evaluated the effectiveness in a special exhibition about the ancient city of Pergamon. We found that using postcards that are accessible through different navigation views as the central metaphor is an effective way for museum visitors to interact with and to spent time exploring contexts about exhibits.*

Categories and Subject Descriptors (according to ACM CCS): H.5.1 [HCI]: Information interfaces and presentation—Multimedia Information Systems, H.5.2 [HCI]: User Interfaces—Evaluation/methodology

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## 1. Introduction

The purpose of museums is, according to ICOM, to collect, conserve, study, and make publicly available the cultural heritage of humanity. The display of objects in exhibitions is the main pillar of museums to educate the public about their subjects. It is therefore crucial for the understanding of the theme of an exhibition to not only display selected artefacts but also to provide information and context about these exhibits. This is done more and more with information technologies such as kiosks or touch tables (see e.g. [JD12]), tangible interactions (e.g. [PMPW06]), or applications for mobile devices and augmented reality (e.g. [DCB\*08]).

A special exhibition about the ancient city of Pergamon has taken place at the Pergamon Museum on the Museum Island in Berlin, Germany, from autumn 2011 until end of September 2012. This special exhibition displayed numerous finds of campaigns from the first excavations in the late 19th century until the most recent finds. Many of them were presented to the public for the first time. Supplementary, a huge circular panorama painting gives an artistic impression of Pergamon in the year 129AD.

We created iCon.text, an application for the iPad. It was installed on 10 kiosks and combines and provides context to

these two parts of the exhibition: the physical objects exhibited out of context and the immersive panorama display.

## 2. Conceptual design

The design of the interface satisfies three main goals: it is *intuitive to use* and requires neither prior knowledge nor help system, it is *responsive* to inputs by providing instant feedback of functional touches to users, and it provides a *clear way of navigation* to prevent visitors from getting lost and not finding their way through the content.

To provide a usable experience for all museum visitors, we chose to deviate from the stock interface elements provided by Apple for the development of iPad applications because they require the user to be somewhat familiar with a set of gestures and behaviours of the user interface framework. The design of the user interface was done in an iterative way described by [Nie93]. The application has no help system or tutorial and solely relies on the curiosity of the user to explore the interaction modes.

The user interface is split into two modes (figure 1): the *content mode*, where users are provided with selected textual and graphical information concerning a particular artefact and the *navigation mode*. It lets users explore the provided information through different arrangements and con-

texts. The user can switch between these modes, and it is not possible to switch to another navigation view while viewing content and vice versa.



**Figure 1:** Kiosk application in navigation mode (left) and content mode (right).

### 2.1. Content mode: Postcards

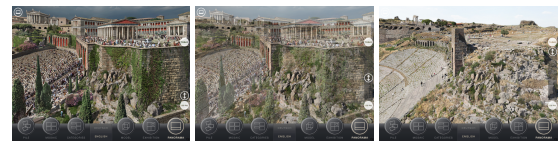
The artefacts are presented as *postcards* as the central interface metaphor. Postcards with a front side and a backside should be familiar to all museum visitors. The front side depicts the artefact or a detail of the artefact and may also display the name of the object. Tapping on a postcard flips it to reveal the backside. The backside consists of *multiple* backside pages (see figure 2) with information about the object in various formats such as text, figures, maps, illustrations, and facsimiles of documents. The pages can be changed by either swiping on the touch screen or by touching arrow buttons to move left or right. A button on the upper right corner closes the content mode and flips the card back to the front side and their location in a navigation view. The touchable areas around these UI elements are enlarged to minimize the chance of missing the buttons. The display of the back pages does not cover the whole screen of the device and leaves a small, darkened area of the current navigation view visible such that the user is made aware of a context switch.

Links to other postcard backsides can be defined. Linking depth is limited to one, i.e. if a backside page links to another page with links, these links will be disabled and not shown to the user. This prevents users from getting lost in the content mode navigation and prevents circular links.

### 2.2. Navigation mode: Views

The content mode is accessible through six different navigation views, which present the postcards to the user. The first three enable the user to directly access the postcards through different layouts, and the second three provide access via contextual arrangement:

- **Pile view 3(a):** The starting point of the application consists of a pile of postcards, where the visitors can drag around cards playfully as if they are interacting with a pile of physical photographs. The view is animated in the idle state to encourage users to touch the interface.
- **Mosaic view 3(b):** In the mosaic view, all available cards are arranged in a grid layout that can be scrolled around and zoomed in and out by pinching gestures.
- **Categories view 3(c):** The categories view lays out the postcards horizontally in categories, which can be scrolled up and down with swipe gestures. Every artefact in the exhibition is assigned to a building complex of the Pergamene acropolis.
- **Reconstruction model view 3(d):** This view presents the postcards in static zoomable renderings of a hypothetical but archaeologically sound reconstruction model of the acropolis. The overview image with touchable areas of interest and text labels lets users access detail impressions of building complexes where the postcards point to their assumed positions.
- **Floor plan view 3(e):** To rediscover the objects from the exhibition in the application, a pinch zoomable floor plan is provided, where the postcards signify their current physical locations.
- **Panorama view 3(f):** While the physical panorama painting gives an holistic impression of Pergamon, it does not provide links to the artefacts of the exhibition. The panorama view lets users locate exhibits in the panoramic image mapped onto a virtual cylinder that can be rotated by 360 degrees. To illustrate the work of archaeologists, the painting can be blended seamlessly into the photographic panorama of the situation of today (see figure 4). The postcards in this view can be hidden and the panorama can be zoomed in and out a little.



**Figure 4:** Blending in the panorama view

The museum visitor can switch between these navigation views by touching buttons on a navigation bar on the bottom of the screen. While in content mode, the navigation bar is overlaid with the backside pages and is not accessible.

### 3. Usage evaluation

To evaluate the effectiveness of the user interface and the design choices made for the navigation views, we implemented a logging mechanism into the application, which logs interface events including switching navigation views, page views, the use of interface elements and non-functional taps on backsides. We also conducted a user survey asking museum visitors about their opinions regarding the application and its usability and usefulness. Approximately 40% of users explored the application alone, 46% in a group of two, and 14% in a group of three or more people.

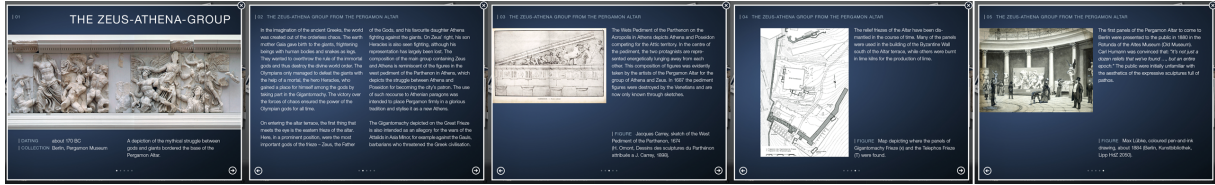


Figure 2: Content mode: Backside pages of the postcard about the Zeus-Athena-Group

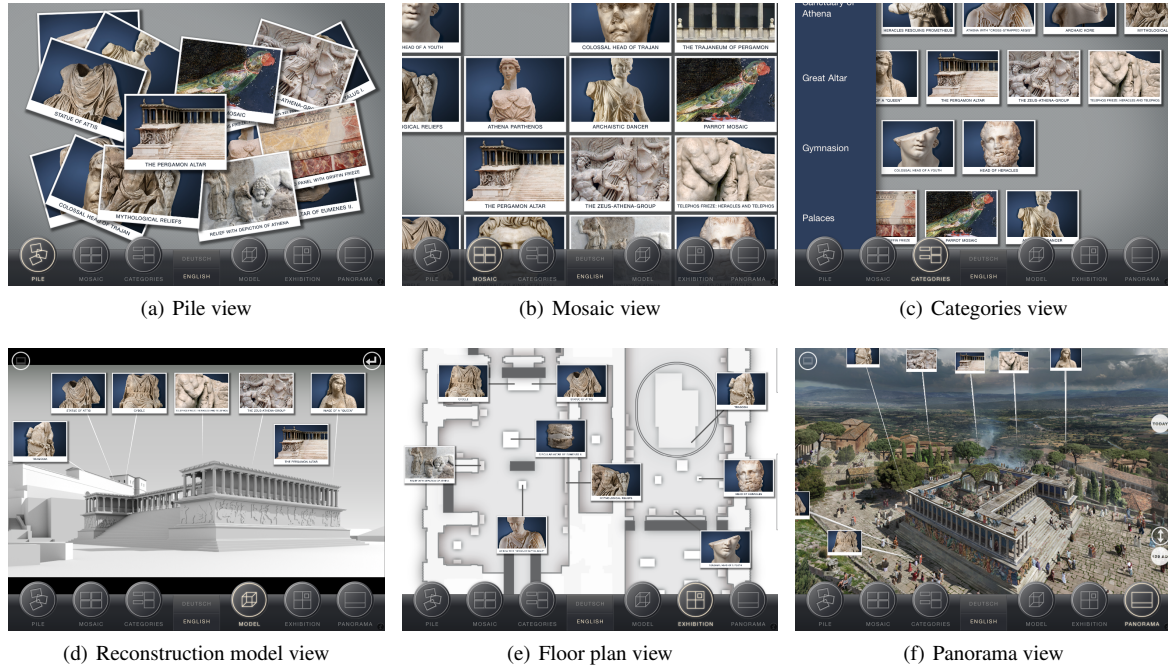


Figure 3: Navigation mode views

3.1. Logging results

Analyzing the logging data identified 57,451 sessions, which represent 11% of the total number of visitors to the exhibition. A session is defined as the time frame between the first touch of a visitor until the application is reset to the idle mode after inactivity. For the analysis, the time of inactivity for 60 seconds is subtracted from the session time. The average session time was approximately 7 minutes with a standard deviation of 10 minutes and a median of 3.85 minutes. 40% of the time was spent in content mode, i.e. on the backside pages. The distribution of time spent in the different navigation views is shown in figure 5.

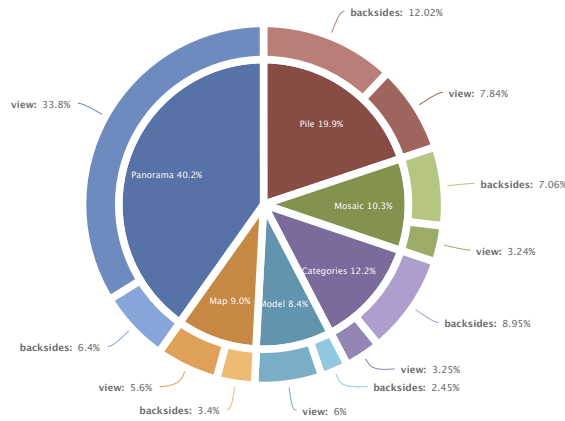
The panorama view with the possibility to compare the artistic painting with the situation today and locate the exhibits was the feature used most. The postcard viewed most was the “Pergamon Altar”, which is the main attraction of the museum. The second most viewed postcard was the “Par-

rot Mosaic”, which is the only image with colour as opposed to the grey-toned sculpture and architecture images.

3.2. User survey results

A small user survey ( $n = 121$ ) was conducted to gain qualitative insights. The age of the visitors asked ranged from 13 to 83 years. 90% of the visitors asked found the application to be a useful addition to the exhibition, 55% wanted to use the application outside of the museum, and more than 80% of these would pay a small amount of money for it (1-5 Euros). The interface design was considered to be very easy to understand and use by the majority of visitors (see table 1).

Although 38% of the visitors that were asked in the survey were not familiar with the iPad at all, users had no difficulty in navigating the views and viewing the content. When we left out the buttons to switch between the backside pages and provided only the swiping gesture, the time spent in content mode dropped to 30% compared to 40% above. It could be



**Figure 5:** Distribution of time spent in navigation views and on backsides (content mode)

that people unfamiliar with touch gestures got stuck on the first page.

very easy	easy	hard	very hard
73%	26%	1%	0%

**Table 1:** "Interacting with the application was ...?"

#### 4. Discussion

Employing postcards as the central interaction metaphor proved to be a successful approach in reaching visitors of all ages and prior experiences.

We think, to provide visitors with seating space that accommodated groups of up to four persons comfortably per iPad, was crucial for users taking their time using and exploring the iPad installations. The majority of the users used the application in groups.

Furthermore, tap maps, that is heat maps showing the positions of non-functional taps on the backsides, revealed that more interaction modes were obviously expected by the users, for example enlarging images and illustrative maps, and that changing the text colour of captions was a bad design choice as the users could not differentiate these from functional links.

#### 5. Conclusion

We demonstrated that the use of postcards as the central metaphor provided the museum visitors with an easy to understand interaction modality without the need of a help system or tutorial even for individuals not familiar with digital tablets. The postcards are easily recognizable as representing the same artefacts in the different navigation views and,



**Figure 6:** Example tap maps

thus, allow the users to explore and comprehend their significance in the past by putting them into context.

#### 5.1. Customisable application

As our approach to convey context for archaeological exhibits through the navigation views chosen and the postcard metaphor was very well received, we decided to develop a customisable framework (without the panorama view), which can be adapted with configuration files and images to other museum exhibitions (graphical design and other content) without the need for programming skills. We are planning to adapt the application and evaluate the universality of our approach in adapting it to fine art exhibitions in the future. The generic version is available in the [App Store](#).

#### 6. Acknowledgments

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