Konrad-Zuse-Zentrum
für Informationstechnik Berlin

Takustraße 7
D-14195 Berlin-Dahlem
Germany

MARCO KLINDT, DANIEL BAUM, STEFFEN PROHASKA,
HANS-CHRISTIAN HEGE

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Takustraße 7
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Telefon: 030-84185-0
Telefax: 030-84185-125

e-mail: bibliothek@zib.de
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iCon.text – a customizable iPad app for kiosk applications in museum exhibitions

Marco Klindt, Daniel Baum, Steffen Prohaska, Hans-Christian Hege
Konrad-Zuse-Zentrum für Informationstechnik Berlin (ZIB)
Takustrasse 7, 14195 Berlin, Germany

Abstract:
We present iCon.text, a kiosk platform for the iPad centered around artefacts, whose content and layout can be tailored without programming skills for specific museum exhibitions. The central metaphor to access information is a virtual postcard with one front and a customizable number of back sides that provide details about exhibits to museum visitors in textual and image form. Back sides can link to others cards. Access to these postcards is possible through one or more navigation views that can be navigated to from a navigation bar.
The entry point to the application is designed as a multitouch interactive pile of cards in a playful manner that allows visitors of any age an easy approach to the presentation and interaction metaphor. To directly access a certain postcard, a mosaic view can be uitilized to provide an overview about all available exhibits. A category view groups postcards into themes. Locating artefacts on a zoomable map or exhibition floor plan allows for conveying information about spatial contexts between different objects and their location. Furthermore, contexts can be illustrated with a two stage view comprising an overview and corresponding detail views to provide further insights into the spatial, temporal, and thematic contexts of artefacts. The application scaffolding allows the design of bilingual presentations to support exhibitions with an international audience. The logo of the presenting institution or exhibition can be incorporated to display the the kiosk's corporate design branding and to access an imprint or further informations. Usage is logged into files to provide a basis for extracting statistical information about the usage.
The details about the exhibits are presented as images and as such impose no limit to the design choices made by the content provider or exhibition designer.
The application (enhanced with a panoramic view) has been integrated successfully into a large special exhibition about the ancient city of Pergamon 2011/2012 at the Pergamon Museum Berlin within the interdisciplinary project "Berlin Sculpture Network".

1. Introduction

The purpose of museums or related cultural heritage institutions is to collect, conserve, research, and exhibit artefacts for the purpose of education, study, and enjoyment according to the ICOM Statutes [1]. Most of the time, objects of interest are presented out of their contexts, naturally because they belong to the past with their contexts long gone or artificially to satisfy the need for a representative selection of works or to emphasize certain aspects of the respective collection. Museum exhibitions, therefore, should not only display selected artefacts to visitors but should engage them by providing digital technologies to convey additional background information and contexts. These presentation forms should be usable by the whole range of museum visitors, not only digital natives, but also children, or senior citizens. It should also enable the layman to understand the significance of the artefacts, comprehend interpretations and justifications, reconstruct reception histories, and, furthermore, draw connections between different objects, epochs, materials, styles and so on.

1.1. Motivation

One can assume a certain interest in the objects of a certain exhibition by the museum visitor. But it is less certain to assume a prior experience or expertise in the usage of interactive digital installations. Computer kiosks, where visitors can access additional information with the normal setup of screen, mouse, or keyboard requires prior knowledge about how to use graphical user interfaces and, therefore, create a barrier to use them. Touch screens are employed to overcome this by providing a more natural input interaction. But they often fail to adapt the user interface design and only exchange the mouse pointer with the touch of a finger. Special display tables with multi-touch capabilities like Microsoft's PixelSense [2] and adapted interfaces have been embedded into museum exhibitions but fall short in providing common gestures to use them. Due to the size and price of these multi-touch tables, they are also often designed to accommodate groups of visitors and, thus, provide a collective experience in contrast to a more personal comprehension of insights about artefacts. To combine the natural input modes of multi-touch screens with the affordability to provide several visitors with the possibility to explore the provided information individually at the same time, we chose the iPad 2 as the target system of the application: a setup of iPad and mounting cost less than 1000€ at the time of writing.
iCon.text is designed as a native application to provide museums with a framework that can be customized easily without programming skills in order to present their selection of artefacts and requirements for providing information and context and to adapt it to their graphical design specifications.
This paper describes the conceptual design and decisions made (in section 2), illustrates how a museum might adapt the framework to their needs, and presents the results of a user evaluation of the application in a case study (section 3), before concluding and proposing enhancement for the future (section 4).

2. Conceptual Design

The design of the interface satisfies three main goals: it is **intuitive** to use and requires neither prior knowledge nor a help system; it is **responsive** to input by providing instant feedback of functional touches to users; 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.
The user interface is split into two modes: the content mode, where users are provided with selected textual and graphical information concerning a particular artefact, and the navigation mode, where users can explore the provided information through different arrangements and context. The user can switch between these modes as depicted in figure 1, and it is not possible to switch to another navigation view while viewing content and vice versa.
The usage frequency and duration of postcards and navigation views are logged into files on the device and can be used to generate a report. This report presents insights about what information is accessed the most and for how long, and how often which navigation views were used to access the postcards.

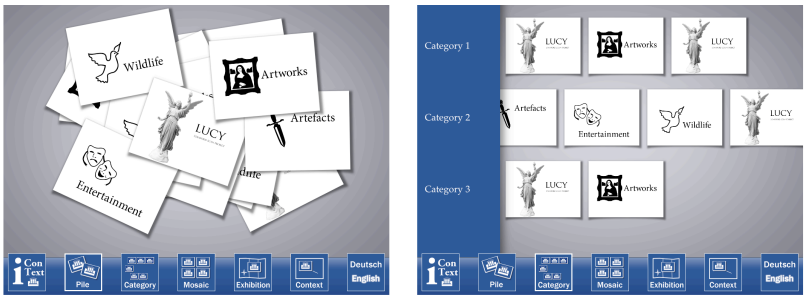


Figure 1: Default design of pile and categories view

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 with information about the object in various formats such as text, tables, figures, maps, illustrations, facsimiles of documents and more.
The pages can be changed by either swiping on the touch screen or by touching arrow buttons to move left or right. The framework does not limit the amount of backside pages, although we found a minimum of four and a maximum of 12 pages as a reasonable number of backside pages. A close button on the upper right corner of all pages leaves the content mode and flips the card back to the front side and their location in the navigation view. The touchable areas around these UI elements are enlarged to maximize the chance of hitting 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. The linking depth is limited to one, that is if a backside page links to another page 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. The interaction modes are shown in figure 2.

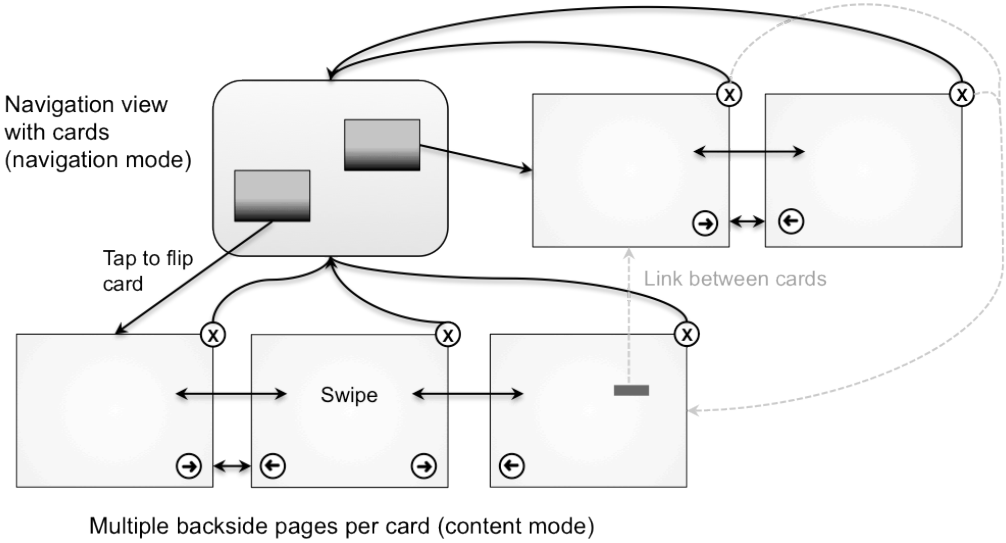


Figure 2: Interaction modes

2.2. Navigation mode: Views

The content mode is accessible through five 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 latter two provide access via contextual arrangement (see figure 3).

- **Pile view**: The starting point of the application consists of a pile of postcards, where the visitors can drag around cards playfully as if they were interacting with a pile of physical photographs. The view is animated in the idle state to encourage users to touch the interface.
- **Mosaic view:** 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:** The categories view lays out the postcards horizontally in categories, which can be scrolled up and down with swipe gestures. Every artefact in the application can be assigned exactly to one category.
- **Context view:** This view is split into an overview image that displays touchable areas with optional text labels that lead to detail images where the postcards can be laid out. The overview image can for example represent a timeline, areas of interest, or themed image buttons. The detail images can show the postcards, for example, in a more detailed range of the timeline, in a graphical impression of the area of interest, or in an arrangement to signifies connections between objects.
- **Map view:** This view arranges the postcards on a large image that can be scrolled around and zoomed in and out much like map applications on touch devices. The image can be a map, which shows locations of artefacts or a floor plan to locate objects in an exhibition. The image does not have to be a map but can be any large image, for example, a diagram showing connections between postcards.

Furthermore an **imprint view**, a single image without postcards, can be used to provide credits, or information or explanations about the institution or collection.
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.

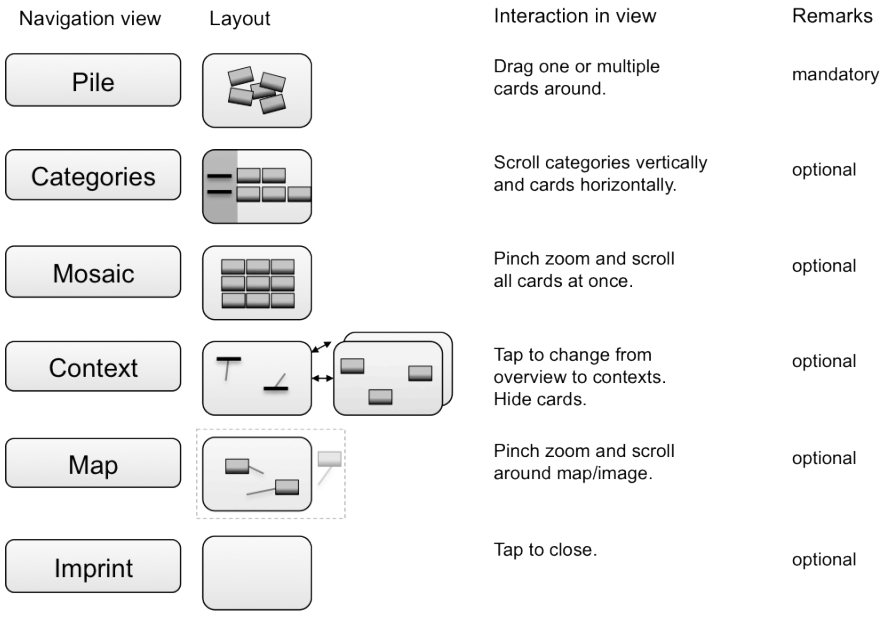


Figure 3: Navigation mode views

An example navigation flow is shown in figure 4.

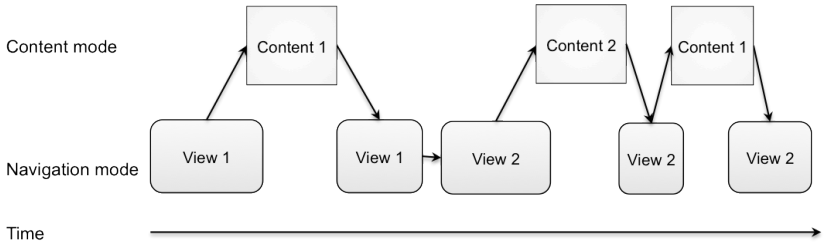


Figure 4: Navigation flow example

3.Customize and Adapt

The content and the navigation elements are configurable through XML description files. All content is provided as images to allow a large degree of freedom in creating the graphical design of both content and navigation views. To customize the framework, the designer simply has to copy the configuration files and all of the image files to the iPad and start the application.
For further details and an explanation about the structure refer to the “Customization manual” available for download via the support website [3]. The manual gives step-by-step instructions on how to tailor the framework to their needs.

3.1. Case study Pergamon

We evaluated the effectiveness and usability of the interaction design with an iCon.text application for a Pergamon special exhibition at the Pergamon Museum in Berlin. The application was installed on 10 iPad kiosks with seating opportunities in one exhibition hall. The graphical design and the navigation views are shown in figure 5.

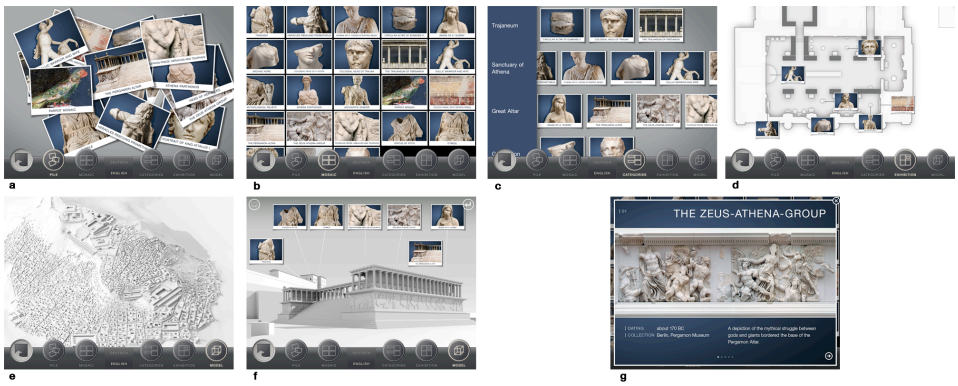


Figure 5: Case study Pergamon exhibition, (a) pile view, (b) mosaic view, (c) categories view, (d) map view, (e) context view (overview), (f) context view (detail), (g) content mode

The analysis of a small user survey revealed that almost all visitors (99%), who were asked about the usability of iCon.text, described the interface as easy or very easy to understand and use, although 38% had never used or tried the iPad interface before. A more thorough description of the results is given in [4]. We found that most visitors used the application in groups of two or more. It is, therefore, recommended to reserve seating space for groups of at least two people.

4. Conclusion

We developed a kiosk iPad application that can be customized to support conveying information about artefacts to a whole range of different museum exhibition or collection displays. Postcards, the central interaction metaphor, and the navigation views proved to be an easy to understand concept of interacting with digital representations of objects. We think that the framework is flexible enough to enable a whole range of different presentation contexts and stories. The application is production stable as we demonstrated during the Pergamon exhibition with approximately 100,000 users.
Future work should adapt the conceptual framework to support not only the iPad but also other digital tablets or mobile devices. It should also be helpful to develop a web-based application, which will guide the creation of configuration files, do error checking, and provide automatic previews.

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