Taming the urge to click

Adapting the User Interface of a mobile museum guide

Andreas Butz, Eyeled GmbH[1], Saarbrücken, Germany
butz@eyeled.de, www.eyeled.de

Abstract

We describe the development of a user interface for a mobile museum guide based on handheld devices. The system provides audio, video, graphics and text content to visitors of a world cultural heritage site, the "Weltkulturerbe Völklinger Hütte"[2]. The focus of this paper is on the design process and how the user interface was adapted step by step in order to meet the needs of visitors and account for their observed behaviour. We found that principles generally thought of as good, such as overview and free access to information at different levels, turned out to be of less use than expected for a general audience, and even contraproductive to the task of conveying focused information.

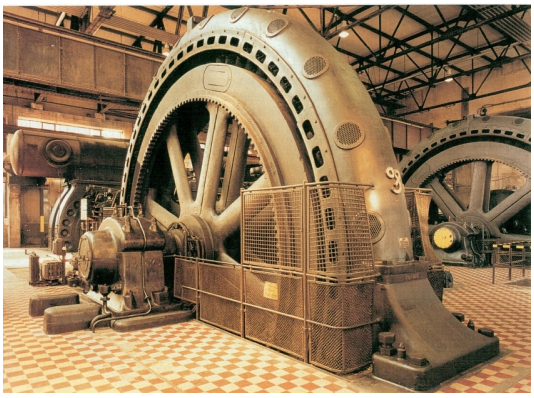
Keywords

Mobile Computing, User Interfaces, Evaluation,Target Groups

Introduction

The museum

The Weltkulturerbe Völklinger Hütte[2] is a former iron mill which was founded in 1873, shut down in 1986, and turned into a UNESCO world heritage site in 1994. It covers an area of 0.6 Km^2 with its group of blast furnaces, supply infrastructure and a large engine shed equipped with gas driven blasting engines.



In addition to the mobile museum guide visitors are guided either in guided tours, partially held by former workers of the site, or by an audio guide based on portable cassette players. In addition there are signs with short text explanations at many points across the site, as well as a multimedia wall where informative films and historic video footage is shown.

The museum guide system

The mobile museum guide system is based on Handheld devices. We used HP Jornada devices with the PocketPC 2002 operating system and additional CF storage cards with a capacity of 128MB. These devices contain all the multimedia content for the guided tour. The screen resolution is 240x320 Pixels at 16 bit color, visitors are wearing headphones for personal audio.

In the museum we installed small battery driven Infrared beacons which broadcast a 16 Bit ID twice every second. This ID is received by the Handheld´s Infrared port. A software on the Handheld then selects the corresponding content for the visitor´s current location and presents it on the screen.

In contrast to the earlier audio guide system, this content is not structured linearly, but contains sections of common interest as well as detailed explanations about different topics, such as the history or social circumstaces or technical aspects of the exhibits. Visitors are free to choose among these topics and listen to information according to their interests. The audio is supplemented by video, static images, tables and fact sheets.

Related work

While handheld museum information systems have been proposed before[3,4], they have mostly been prototypical studies using radio networks and a web browser as their infrastructure. This combination, based solely on available standard software, allows for certain UI design variations, but precludes others. While most of the UI elements known from web pages can be used in the handheld browser (buttons, menus, hyperlinks, clickable maps), others such as sliders, zooming techniques or arbitrary interface animations are very hard to implement.

Initial user interface design

The initial UI design was proposed by Eyeled to the museum after some discussion of what was needed. Both parties agreed on this design that seemed like a viable solution. The first version of the system was implemented very close to the initial sketch (see figure below).

Goals of the initial design

One goal both sides agreed on was to make access to all available information as easy as possible. The visitor should have an overview and maximum freedom of choice across the presented material in order to freely browse and explore all available information for a given location. On the other hand, visitors not wishing to interact with the system should be able to just hold the device, listen to the presented audio and concentrate on the exhibits in their surroundings. In order to satisfy both of these user groups, a user interface on the screen would give a free choice among the material, but if no interaction occurred, all of the available audio content would be played back in a given sequence, so that at least the visitor would not miss any of the acoustic explanations.

Another goal was to make transparent to the visitor the different levels at which choices could be made. The content about any given exhibit was structured into several topics, such as "common", "technical" and "social" information. Within each topic there was audio text to be heard over the headphone as well as image and video material related to the text. This hierarchical content structure was to be represented visually in the design.

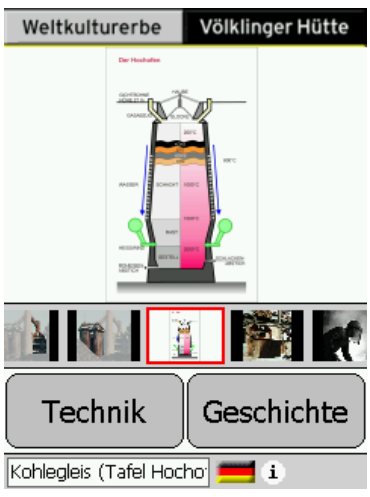
Layout and functionality

In order to present image and video data, a substantial part of the screen had to be reserved as an image area. The remaining space had to contain widgets that would allow the choice of image material within the current topic as well as alternative topics. For these choices, we preferred sets of radio buttons over pull-down menus in order to simultaneously show all available choices. For the topics, these buttons were labeled with Text, for the image and video material, they consisted of thumbnail images.

As Handhelds are usually used with with a pen in the dominant hand, there is a risk of occluding parts of the screen when clicking on others. An efficient UI design should arrange widgets in a way that important parts of the screen, such as those yielding visual feedback for the current interaction, aren´t occluded. Finally, the content hierarchy was to be preserved visually, which suggested arranging its different levels in the correct order. Since a choice at one level would reveal the available choices at the level below, the logical consequence was to arrange the whole layout from bottom to top (see figure on the right) in order to preserve visual feedback.

First experiences and improvements

The first version of the mobile museum guide went out with a UI very close to this design. A menu was added in the status bar to manually choose other locations within the museum, which was especially helpful for demonstrating the system without actually having to walk through the site. Also, an info button with operating instructions was added, and a small flag to choose a different language at any time. The interface worked to the full satisfaction of all who had helped designing it.



Then, after testing the interface with a few visitors, it was found that problems occurred where we hadn´t expected them at all. People who had never used handhelds before, for example, didn´t like the use of a pen. They said that they would rather use their fingers to make choices on the screen. People not having plugged in their earphones entirely, desperately sought the volume control. Also, the volume control provided by the operating system turned out to be an often used

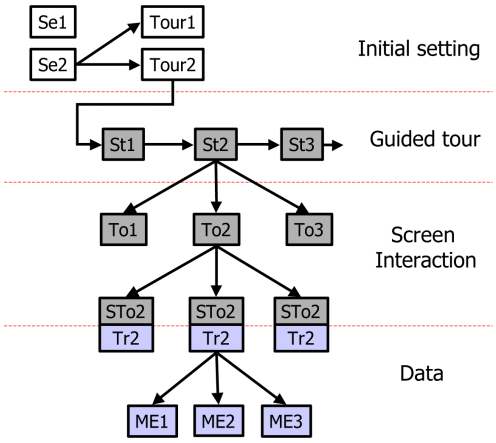
feature that was too hidden and difficult to manipulate. Consequentially, volume control was assigned to an up and down button on the left side of the device, that was unused by the museum guide before, but was often tried by those people who didn´t know where the volume control was. The screen buttons for the topics were enlarged to be clickable by finger. The Thumbnail images had already been sufficiently big to be usable by finger, so in order not to loose any more screen space, they were kept the way they were. The station menu, language flag and info button were also kept the same, since their size was determined by the status bar of the operating system and people were not expected to use them on a regular basis anyway.

Further analysis and reorganization

After testing this revised design with more visitors, we found out a more fundamental problem. Most of the visitors were new to handhelds. Some even held them upside down and only after switching on the device, became aware of their error by looking at the text and images on the screen. The pure fact of holding such a device of relatively high technology in their hands then led many visitors to concentrate on the device instead of the exhibits. They would stand around and explore all available information without actually walking the tour. The person responsible for guided tours actually described this as the visitor´s *urge to click* and it was agreed that this kind of curiosity and free exploration, while being a good thing in general, was inappropriate here and had to be *tamed*. It is not entirely clear whether this phenomenon was caused more by the devices themselves or by the actual user interface, but since the devices were given, we decided to analyze and modify the user interface.

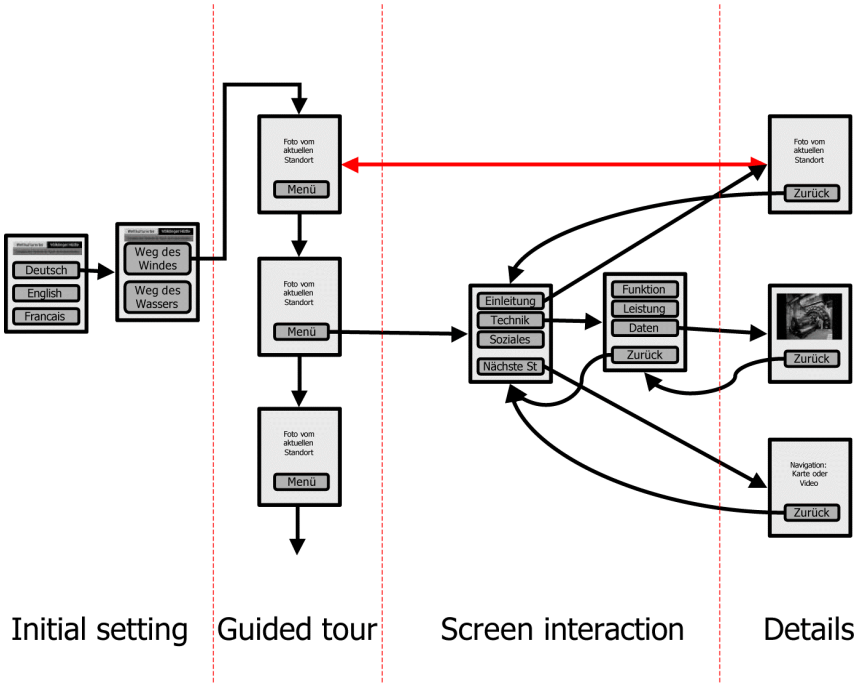
Objects and Actions

According to [5] we developed an abstract model of the information units and actions in our system and divided the usage into different phases: In an initial phase, several sessions (e.g., german, english) and several possible tours are available. A given tour then consists of a sequence of stations, each of which has a tree of hierarchically structured information underneath it. This information is divided into topics, which in turn contain subtopics (nested potentially arbitrarily deep). The smallest subtopics translate into tracks, which are sequences of media elements, such as audio, video, graphics, or text with additional scheduling information (e.g., show picture 23 after 5 sec. into audio text 17). These tracks are the smallest units of information exposed to the user.



Corresponding UI elements

With these objects and actions in mind we then tried to find a matching graphical representation that would channel the urge to click and not leave any unwanted possibilities. We removed all widgets from the screen that didn´t belong to the current interaction step and reduced the number of decisions that had to be made radically to one decision per screen. The graphical equivalent of this is a nested system of full screen menus as shown on the right. This interface structure is more boring and less efficient (it takes more



clicks to access any given information) than the initial design in terms of information access. Also, the global overview is eliminated. The interface thus discourages arbitrary exploration of the information space. It rather takes visitors by their virtual hand and forces them to decide step by step what information they want to access. While there are established techniques for the reduction of interface complexity, such as the ones discusses in [6] or the adaptive menus in newer microsoft products, these techniques are mostly concerned with the reduction of visual clutter, the elimination of useless information or unlikely choices. With an average of 3 topics per station and 5 images per topic, it is hard to see, why it should be better to eliminate overview or slow down access to information.

Lessons learned and open questions

The main lesson learned from this project is that UI designs have to be target group specific. Our first user interface, which was designed for efficient access to information at different levels with few and simple interaction steps, but had a complex visual appearance, was well suited for computer experts and people with a clear understanding of the hierarchical structure of the information space, namely the designers of the UI. It failed to work well with the general public expected to use the system. Questioning and observing museum visitors led to a UI design that partially contradicts principles of efficient design, but leads visitors to work on a step by step basis and confronts them with only one decision at a time.

The more general questions suggested by this experience are: How do user interfaces have to be designed for different target groups? Are well-known UI principles, such as “Overview first, zoom in, details on demand”[5] rendered invalid in certain application scenarios? Are there target groups that prefer to be taken by the hand and led through a task? Would this show a possible way towards user interfaces for unskilled people?

Future work

The most pressing next step is to further evaluate the new design and again make refinements according to user´s comments. We expect this process to converge eventually, and at the time of the workshop there will be more results about this. Since the original design worked well with expert users, we considered keeping both interfaces in the software and allowing visitors to switch between a novice and an expert mode. But then again: who would honestly choose the novice mode? People´s experience is that in expert mode one has access to more functionality and certainly everybody would prefer to be called an expert. Another important question is how well this structure of the information space can be transferred to other types of museums, and what Implications for the UI design this will bring. For example, in different types of museums, there might be many more topics for a given exhibit, so the simple full screen menu might become inappropriate eventually.

We also considered hiding certain choices after a while on the grounds that the user had not made similar choices before, but then refrained from implementing this, because it would lead to situations where part of the content was lost, i.e. would never become available to the user. It would certainly be interesting to find a design that allows the regulation of the level of overview and control a user has. With such an interface, this level could be adapted automatically to the observed behaviour of the user.

Acknowledgements

The work discussed in this paper is the result of a shared effort among the development team at Eyeled GmbH and the project partners at the “Weltkulturerbe Völklinger Hütte” who also provided all of the content. Thanks go to all visitors who helped evaluating the system, sometimes without knowing.

References

1 Eyeled GmbH, Stuhlsatzenhausweg 69, 66123 Saarbrücken, http://www.eyeled.de/

2 Weltkulturerbe Völklinger Hütte, Zentrum für Kunst und Industriekultur, 66302 Völklingen, http://www.voelklinger-huette.org/

3 GMD & FhG: HIPS, http://hippie.gmd.de/ , http://www.fit.fraunhofer.de/projekte/hips/index_en.xml

4 HP CoolMuseum: http://www.coolmuseum.de/

5 Ben Shneiderman: Designing the User Interface, 3rd Edition, Addison Wesley Longman, (1998) http://www.awl.com/dtui/

6 Paul De Bra, Peter Brusilovsky and Geert-Jan Houben: Adaptive Hypermedia: From Systems to Framework, ACM Computing Surveys 31(4), December 1999