



The city of ears)))
hearing is believing

Christopher Frauenberger • frauenberger@dcs.qmul.ac.uk
Interaction Media Communication • Department of Computer Science
Queen Mary, University of London
Mile End Road • E1 4NS London • UK

1 Introduction

“Why is that thing beeping?” was the title of an article at a usability related web site that discussed the use of sounds in product and user interface design. Looking at most recent technologies that are ubiquitously incorporated in our everyday lives however, shows that there are surprisingly few devices that use sound to convey information. For example, the Apple iPod™, the worlds most famous portable music player, has a single sound designed to improve interaction: the clicking of the wheel. This leaves it almost unusable, as is, for visually impaired users or users having their vision occupied by other tasks like walking down a lively street. The question therefor is “Why does technology widely neglect such a powerful human modality as auditory interaction?” Considering the capabilities of human hearing one might conclude that it has high potential to improve usability and efficiency in human-technology interaction. Many research prototypes have proven that auditory displays can be effectively employed in a wide range of contexts. However, in contrast to these results, auditory display design has little significance in most products and is mostly restricted to the use of speech in assistive technology. Arons stated in 1994 “... the lack of design guidelines, common for the creation of graphical interfaces has plagued interface designers who want to effectively build on previous research in auditory interfaces” and little as changed since. Many design decisions regarding audio are made in an ad-hoc way which often leads to inappropriate and inefficient use of audio. The aim of my thesis therefore is to bridge the gap between the existing design knowledge in the community and the lack of guidance for auditory display design for a broader audience of designers. The hypothesis is that if we can create a framework in which designers can effectively access design knowledge and re-use it for their own design problems, audio will be more widely employed and improve accessibility and usability of technology.

2 A design framework called ears)))

ears))) is a collection of methods in a framework to create, share, maintain and apply design knowledge for auditory displays. As carrier of the knowledge design patterns are used which have proven to be adaptable to many diverse design disciplines. ears))) organises them in the context space - the organising principle used to navigate the design knowledge; each pattern has its unique descriptor in this space. There follows a more detailed presentation of this key concept:

The concept space is a multi-dimensional space in which design solutions, design problems and design patterns can be classified by their context. Similar to the ontology used in model based interface design it features the user, the environment and the platform (together the context of use) as key dimensions. Furthermore, it is necessary to

incorporate the task or the purpose of the interface within the workflow of the user. While the context of use can be represented by a set of ordinal dimensions (e.g. level of user skill in the application domain, level of restrictions regarding the privacy in an environment or the audio capabilities of a platform) the task is a nominal dimension and is represented by keywords. The main purpose of the context space besides navigating the design knowledge is to match descriptors of design problems with descriptors of design solutions in order to guide designers towards re-usable design knowledge.

The following describes how the context space is used in a concrete example workflow within ears))) . An expert designer has created an auditory display for an MP3 player, evaluated her design and created a design pattern called "Hierarchical navigation & selection" reflecting the way she implemented the navigation on the device. She localises the solution in the context space and seeks to extend the pattern along each of the dimensions of the context space. By extending the design pattern she creates new versions of the pattern or entirely new patterns covering bigger sub-spaces in the context space. Subsequently, a novice designer is asked to develop an auditory display to facilitate efficient navigation in an email client. She locates the problem in the context space, retrieves the design patterns that match with her problem and applies them.

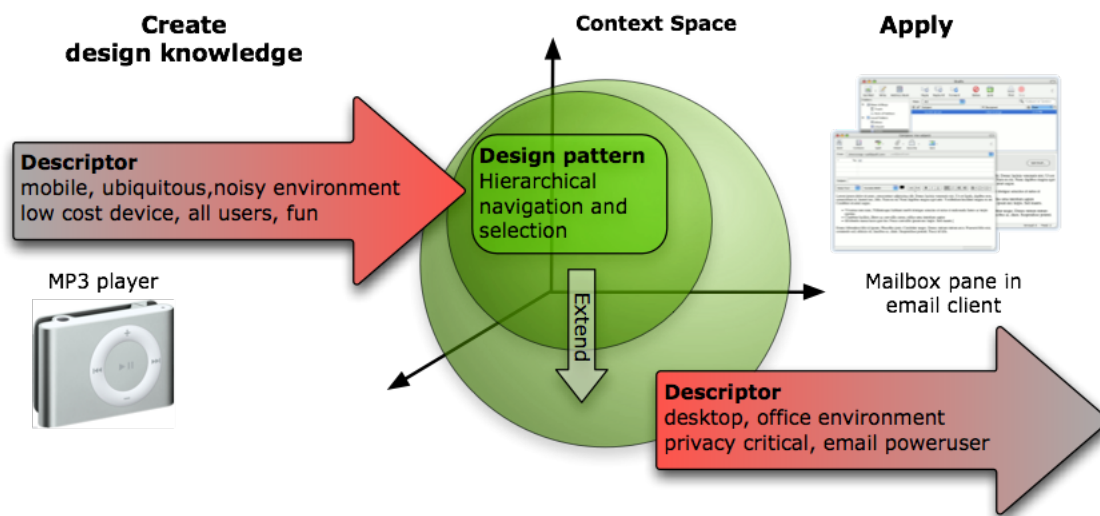


Figure 1: An example workflow: creating design knowledge from a successful MP3 player design, extending it in the context space, generalising and creating new design patterns, applying it to the design of the navigation in an email client.

3 The city of ears)))

For ears))) being a success it must be supported by efficient tools. Expert designers in the community have to see benefits in using ears))) and the system has to be as easily accessible for novices as possible. We intend to develop an online information system that reflects the workflow of ears))) . A set of wizards will lead users through the methods and we seek to exploit a common metaphor to convey the organisation of the design patterns in the context space.

The city of ears))) is one of these initial concepts: A virtual city representing the context space in which the architects (= expert designers) build up design knowledge. They begin with small huts, but may extend their building work over a whole district (e.g. the district of mobile devices). Looking for guidance in solving a design problem as a novice designer (= visitor) makes you taking a cab around the city, visiting the districts, streets and buildings that will provide you with the information needed.