Designing Information Kiosks for South African users: A Case Study

EXTENDED ABSTRACT
Many South African users do not have access to the Internet and are thus denied access to the vast amount of information that can be found there. The level of computer literacy in South Africa is also very low. This paper discusses the design and evaluation of an interactive information kiosk at our University. This information kiosk was designed in order to empower those users without computer and Internet or Intrane access by providing alternative access to their required information. The user interface design and ease of use of the University information kiosk were considered as vitally important design issues.

The goal of modern human-computer interaction (HCI) research is to empower all users by providing access to usable information technology (IT). Developments in IT, however, are occurring at such a rate that insufficient research is being conducted in how to provide usable software for the range of interactive technologies currently available. This goal is further complicated in developing multicultural countries like South Africa where levels of computer literacy are low and access to modern technology limited. More research is needed to determine how to bridge the gap between the technology advantaged and disadvantaged sectors of our population most effectively.

Our University has found that an increasing number of the campus population do not have access to university information that is readily available to others with access to the university Intranet/Internet. The university Intranet was designed to provide general university, academic and administration information to the campus population. This population includes both students, academic, administrative and technical staff. Information is also not readily available to campus visitors. The goal was to design an easy-to-use information kiosk to provide selected information about the University for on-campus staff, students and visitors.

Whilst much research has been done into designing traditional graphical user interfaces (GUIs) and web-based applications, considerably less has been done on developing interactive information kiosks. Consequently, relatively few design guidelines exist on how to design usable multimedia information kiosks for multicultural users. This paper discusses the rationale and design of our University information kiosk and several ideas for future research.

There is a growing trend to provide information to the public through kiosks located in information centres, libraries, hospitals, and other public locations. The danger exists, however, that by not considering certain key usability factors, such public information kiosks can easily fail [3]. Although general usability guidelines are applicable (for example see [5]), some additional specific guidelines are required for public information kiosks [4], [3], [1]. Some of the main issues in the development of public information kiosks are discussed in this paper in order to assist designers of such systems, especially in the South African context.

A prototype for the University information kiosk was designed and implemented in 2000 and installed in June 2001. The goal of this system was to provide relevant, easy-to-access information about the University for on-campus staff, students and visitors. The primary source of this information was the University Intranet.

A user-centred approach was used to analyse the users’ needs and identify the key tasks that needed to be supported by the kiosk. The information needs of the different user groups were determined by means of questionnaires and
interviews. An analysis was also done of the information content of the existing Intranet. This analysis revealed that much of the information content of the Intranet was inappropriate and irrelevant to the target population of the proposed information kiosk. The analysis of the user profile revealed that most users were novice or casual computer users. A decision was thus made to adopt a key-modal interaction style, utilising a touchscreen as the input and output device [2].

The opening screen was designed to catch the attention of passing users. The screen is brightly coloured and contains several images of the University that alternate every ten seconds. This screen invites the user to press a button to start the information kiosk, thus reinforcing the user’s mental model that operation of the kiosk involves pressing buttons. The system auto-resets to the opening screen after two minutes if no input is made.

User feedback was considered vital to the success of the information kiosk. Usability testing was conducted both during design and after implementation. Users were given specific tasks to perform using the information kiosk, and observed from a short distance. Interviews were also conducted with several users to obtain feedback on specific usability issues such as ease of use, task support and visual aesthetics.

Multimedia information kiosks can represent a fairly low-cost solution to providing easy access to information for diverse users. The user interface design and mode of interaction of such information kiosks are critical factors for usability. The design should be user-centred and user interaction should be as obvious and intuitive as possible. Providing easy access to information for a diverse user population is a particular challenge for South African designers. The design guidelines and experiences discussed in this paper can provide an essential source of information for future research and development in this area.

REFERENCES
Usability testing: From theory to practice

EXTENDED ABSTRACT

Usability evaluation or usability testing is an essential part of the user-centered design process. Several methods exist for usability evaluation. Different techniques and procedures are more appropriate depending upon the purpose of the evaluation and the stage in the software development process. The aim of this paper is to review the goals of usability testing and to discuss the usability evaluation methodology that we have developed at our university.

This paper will propose a methodology for conducting a successful formal usability evaluation. The paper will also discuss the design and installation of a usability laboratory at our University. After describing the formal usability evaluation methodology, a case study is presented to illustrate how the theory can be implemented in practice.

Today, companies in South Africa have to become aware of the importance of usability testing in the software development cycle. By introducing usability testing, they can benefit from decreased development costs, fewer design changes, and lower support costs after the product has been released [5]. There is, however, a lack of expertise in user-centred design, as well as usability testing in South Africa. Most tertiary institutions lack usability testing facilities to formally or empirically evaluate system usability. No standard or suggested guidelines for usability testing in South Africa currently exist.

In the IT industry, usability evaluation has emerged as a way to (1) assess how people interact with the WWW, multimedia software and hardware; (2) identify the problems that people have using the software and hardware; and (3) test alternative designs of software and hardware [6]. The ISO 9241 standard defines how to specify and measure the usability of products, and defines the factors that have an effect on usability.

Many South African organizations now recognize the need for usability in their systems, as well as the benefits that usable systems can deliver [2]. There is still, however, a lack of guidance on how to “do” usability when developing software [3]. ISO 13407 (1999) now describes how a human-centered design process can be used to achieve usable systems [1]. This standard is intended to supplement existing lifecycle models and provides a framework for applying human-centred design.

Usability evaluation ranges from experiments with large sample sizes and complex test designs, to very informal qualitative studies with only a single participant. The overall goal of usability evaluation is to identify and rectify usability deficiencies in computer-based and electronic equipment and their support material prior to release. There are several usability methods that can and should be used to gather data, including heuristic evaluation and empirical evaluations of actual user performance [4].

Formal usability testing is an empirical method that requires -the design of a formal usability experiment that is undertaken under controlled conditions in a usability laboratory. Evaluators give a user a specific task to perform. Evaluators observe the problem(s) the user has, videotape the user, and then analyze the observational logs and videotapes. Essential components of such an evaluation include: A usability laboratory with special-purpose hardware and software; a test plan for the usability experiment; a methodology used to conduct the usability experiment and the analysis of the results obtained from the experiment. The results of formal usability testing can provide essential empirical information for the software design process.

The lack of usability laboratories in South Africa, together with the lack of knowledge about formal usability testing, motivated the installation of a usability laboratory at our University. This laboratory will be used to do research and development in usability evaluation and user interface design. This paper discusses the design of this laboratory and the hardware and software requirements of such a laboratory.
Several guidelines exist in the literature on how to conduct a formal usability evaluation [5], [6]. Most of these are, however, very general and do not give specific guidance on how to conduct the evaluation. This paper proposes a methodology that we have developed to successfully conduct a formal usability evaluation.

This paper then uses a case study to illustrate the application of this methodology to conduct a formal usability evaluation. The case study selected was a specific component of Microsoft Outlook, namely the scheduling appointment function. This evaluation revealed several usability problems with Microsoft Outlook.

Both the literature review and the case study support the conclusion that formal usability testing can produce significant empirical results. Formal usability testing does, however, require careful planning and specialized hardware and software. The methodology developed at our University can be used to successfully conduct such usability evaluations.

REFERENCES:
3. Curson, I. and Bevan, N., Planning and Implementing User Centered Design using ISO 13407. in CHI’99, (Pittsburgh, 1999), ACM.
Smooth Transitions Between Images and their Textual Explanations

INTRODUCTION

One of the goals of interactive presentation techniques is to provide smooth transitions between states of a user interface. Abrupt transitions, such as when instantaneously replacing an object visualized on a computer screen by another object, are confusing, distracting and irritating (Shneiderman:1998). Instead, smooth transitions spreading over a short period of time, like having an object shrink to the point of disappearing and another one grow into appearance, give the user a chance to comprehend and appreciate the operation and its implications. Newer inexpensive graphics hardware is enabling real-time animations to be carried out in user interfaces. This forms a technological basis for providing smooth transitions. The problem, however, is to find useful animations between states such that they provide the necessary information to users without getting in the way of the interaction tasks.

One area which has thus far evaded such smooth transitions is the integration of images and text with one another. This topic is of vital importance in providing textual explanations for images especially in cases where the available screen space is small (e.g. electronic books). The problem here is that it is difficult to provide textual explanation for an image without either covering part of the image or scaling it down: both options may not produce desirable results. As a solution to the problem of space we have developed a concept called Dual Use of Image space (Chigona et. al. 2001) i.e., pixels represent both text which can be read and, at the same time, shading information in images. In this paper we show how a smooth transition can be achieved between these two states i.e. representation of an object as an image to text and vice versa.

METHOD

We assume a scenario in which the user is presented with an image and wishes to obtain textual information about individual objects being displayed. First, the user interacts with an image to select an object about which he or she wishes to extract text. This is done by simple pointing and clicking. In previous systems, the text would now typically be added into the image, either as a label beside the object, or as a balloon on top of it. Alternatively, a new browser window might be created for the text associated with the object.

Instead, our method is based on the concept of the legibility of an object. The underlying principle is that every image is dithered with text (as opposed to dithering with dots or lines as is usually the case), except that without any further manipulation, the characters are too small to be recognized.

After selecting an object, the user turns up the legibility. This means that over time, we have found that about a second is sufficient, the characters comprising the text are enlarged, starting from a size of one pixel up to the point where the characters are large enough to be recognized by the naked eye. From a technical point of view,
the effect of turning up the legibility is that the dither matrices used to render the selected object are enlarged quickly one pixel at a time, while the size and shading of the object are kept constant.

An example will illustrate this basic concept of legibility of text in an image. The top-most image in Figure 1 shows a close-up rendition of a sword. The user now turns up the legibility; over a short period of time, the successive frames of Figure 1 are introduced as an animation. The text which appears is the Webster's dictionary definition of a sword (Webster, 1983). Note how the pixels representing the object are used in two ways. On the one hand, they display the object itself and the other hand, they display the text about the image.

Displaying text on the image space implies that some compromises will be necessary. First, users are used to reading text from rectangular regions (windows) rather than in irregular shaped regions which may be defined by silhouette of objects. Second, displaying text in an object whose surface varies in how much light it reflects means that the colors of the surface will be uneven, this implies that the fonts in which the text is represented will also vary strongly making reading the text difficult. Third, varying the amount of text being displayed within a region means particular attention has to be paid to issues related to the text layout and word breaks. Our solutions to these problems also involve changes of state in the user interface, here we have also established that employing smooth transitions between the states yields desirable results. For instance, on users request, the shape of an object may change shape into a rectangle in order to increase legibility (Chigona, 2001). In order to help the user comprehend the change in the shape, the object morphs from the original shape into the rectangle in a smooth transition illustrated in Figure 2.

APPLICATION

Dual-Use of Image Space has an important application to navigation on the web. A new trend is towards multiple links associated with individual words or image maps. Solutions to the interaction tasks for such links are available in the realm of text (Zellweger et. al., 1998). To date, little has been done for multiply linked image maps. The techniques we develop in this paper are shown to solve problems which arise in that domain.
Figure 1: Turning up legibility. The definition of the sword is introduced in a smooth animation.

Figure 2: Smoothly changing the shape of the object into a rectangle to improve legibility of the object. In this example, from the map of Germany the user has selected the state of Saxony-Anhalt. The left most image is the original, in the right-most image the shape of the Saxony-Anhalt has changed into a rectangle. The middle image shows an middle frame in the animation.

REFERENCES
Cultural Variables in Usability Assessment

Extended Abstract:

This paper puts forward two main points, which are supported by action research in a South African financial institution.

1. That there is a “computer culture” in South Africa, a subset of a global computer culture that all computer users belong to. Characteristics used to describe different cultures, can certainly apply to the computer culture. These include common understanding, symbols, language, etc. which are manifest in the routine and behavior of working life. People can belong to more than one culture, e.g a country culture and a religious culture, in the same way they could also belong to a computer culture.

2. No specific interface design adaptations are necessary for different cultural groups in South Africa, using the same system, once users have achieved a basic level of computer literacy. South African computer users can, through the ability that people have to learn, effectively use a South African culturally accepted user interface. A further reason for that is that usability of an interface is linked to the ability to achieve a goal. The users of a common system would primarily have the same goal to achieve.

These interfaces may also be generally accepted international interfaces, as South African computer users, for whom the official language of business is English, have already become familiar with interfaces and functionality contained in Microsoft products, and the Internet.

Action research was conducted with users in a South African financial institution during the introduction of an “international product”, developed in the United Kingdom. The product stores and allows users to view reports on screen that have previously been printed from the mainframe. This exercise was done with 25 people, 10 of whom where Non-European, from a user base of approximately 240. The users where involved in the analysis stage of the project to determine if it was feasible for them to use these reports on screen rather than the known paper version, for cost reasons. A short demo was given to these users in small groups showing them the product and how to use it. The users where also interviewed one-on-one. This was to determine how they use the reports and if it would be feasible to work on screen.

A review based evaluation was also done, in which the users where requested to logon to an example report on the new environment. They where observed to determine if they would be able to use the product if they had no additional training. The users involved in the exercise where either managers or supervisors, so they had a good understanding of the work, and had been exposed to other computer systems that the financial institution uses. This particular system uses the internet/intranet navigation norms, which most of the users where not familiar with.

The outcome of this exercise indicated that there was no real difference in the ability of different cultural groups, to use this new interface. Factors which emerged more strongly than culture in their effect on product usability, were:
1. Familiarity with web interfaces and the standard functionality of web interfaces.
2. Familiarity with computer systems and applications in general.
3. The problem solving and exploratory skills that are associated with higher levels of computer literacy.
4. Age of the user and the ability to change/adapt to new ways of working.

A preliminary conclusion drawn from this is that for interface design we should look at the computer users in South Africa, with its diverse population groups, as one culture. In this study it was found that, irrespective of race, the people who were familiar with business practices and the associated use of computers, were usually able to adapt to new computer interfaces, more than those who were not. This is provided that the correct training and change management, appropriate to the user group, accompanied the implementation of new systems.

Due to the history of South Africa, certain cultural groups where not provided with the same opportunities to achieve general and computer literacy. It is felt that this, rather than purely cultural factors, influences their ability to use certain computer interfaces. The emphasis should then be on upgrading their computer literacy.

It is recommended that the focus for the future in South Africa should be to ensure that the future generation, those presently at school, have as much exposure as possible to technology and the use of international standard interfaces e.g. Windows. This would enable them to develop a general ability with regard to computers and therefore adapt to the English software globally available. As a general strategy this should be more of a priority and money better invested than trying to go to endless lengths to adapt computer user interfaces to the levels of competence of the present generation who have the disadvantage of a backlog of general skills.