Developing User Interfaces for Managing Bio-diversity and Human Resource Data in Nature Conservation

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Abstract - CyberTracker was a successfully implemented ICT4D project implemented in 1996. Current research is assessing the effectiveness and sustainability of the project to date. In addition this project aims to assess the effectiveness of a participatory methodology for designing and implementing user interfaces for querying data used in nature conservation. Participatory action research combined with UCD methodologies were utilized to assess current design issues and develop alternative designs for the user interface. Designs were then compared in order to ascertain if there is any advantage to using UCD approaches in the developing world context. The analysis phase of the research has shown that lack of telecommunications infrastructure hinders the adoption of technologies for remote users. Computer literacy and user motivation played major roles in individual adoption and enthusiasm towards technologies. Changes in software versions proved problematic when users were not consulted in the upgrade and versioning process. This work in progress discusses technical issues and reflections on the design methodologies.

Keywords - Software

I. INTRODUCTION

CURRENT user-centered approaches to design and methodology in the developing world context include participatory action research and UCD methods such as contextual enquiry, paper-prototyping and participatory design [1]. While these approaches have enjoyed success in developed countries and markets there are inherent problems with these methodologies when they are applied to the developing world context. Current research being conducted in the Kruger National Park has highlighted some of the issues with these approaches.

CyberTracker was an early ICT4D project developed in 1996 for use by functionally illiterate animal trackers for recording observations and sightings of animals and/or their tracks [2]. The project's focus was preserving and disseminating indigenous knowledge by encouraging use of tracking skills among illiterate, but otherwise skilled, rangers. The original project used the earliest of UCD methodologies and users were consulted from the very early stages.

Current research hypothesizes that the limited implementation of the software is due to the lack of a user-centered design approach in later revisions of the software. In addition certain technical changes in hardware and software were not considered and this also hindered adoption of the technology. The research also attempted to assess the suitability of UCD practices and participatory action research in developing a new interface.

II. METHODOLOGY

The research being conducted includes three iterations of the participatory action research (PAR) cycle. The stages of the cycle are planning, taking action, observing, evaluating and critical reflecting. Iterations were conducted on various fieldtrips to Kruger National Park.

The first iteration involved doing a contextual enquiry into the current usage and application of the system in the park. The hardware and software were assessed using ethnographic techniques, interviews and artifact walkthroughs.

The second iteration involved paper prototyping and participatory design. A new and alternative interface was proposed and stake holders at all levels contributed to the design process.

The third and final iteration included a hi-fidelity prototype and rigorous artifact walkthroughs and semi-structured interviews.

III. PRELIMINARY FINDINGS

A. User Hierarchy for Interaction and Motivation

CyberTracker version 2.x performed three main functions: firstly it provided a user interface for the mobile units used to collect data, secondly it provided an interface for creating and modifying the sequences used in the mobile interface and lastly it provided a means of querying the resulting data. The first iteration revealed some telling characteristics of the existing software and users' opinion towards its use and adoption.

Users from various levels of the organization were utilizing only one feature of the software at any given time. This resulted in the other functionality cluttering the interface and reducing usability.

In addition the motivation to utilize the software for a particular purpose varied depending on the type of user. For example management would be motivated by different factors than, say, field rangers would be. It became clear that there was a lack of motivation for middle management to utilize software on a regular basis and therefore adoption of the software by users at a lower level was also affected.

B. Technical Issues Influencing Adoption

There were two main technical issues affecting the

adoption of CyberTracker in the Kruger National Park.

Firstly the units were powered by batteries which lasted only a few days. This proved problematic for rangers who had patrols which lasted a number of days at a time without returning to base camp. The units lost data when the power cells were depleted.

One possible solution to this was attempting to utilize cellphone coverage in a store-and-forward type manner. The unit would push data to the server when it came into a connection rich environment. This solution was not effective as the coverage in Kruger National Park was too sparse and too weak in order to transmit data regularly enough or in large enough batches.

The second problem that rangers encountered was the change in the storage of the GPS co-ordinates in version 3.x of the CyberTracker software. Most section rangers utilized these GPS timer points to ascertain and calculate area coverage for their section. This supported the hypothesis that user involvement is necessary in all stages of software development in order to create effectively used ICT systems.

IV. Methodology Evaluation

The methodology used showed strengths and weaknesses in different areas. The UCD tools dealing with analysis proved extremely valuable to the research and the participants while those UCD tools dealing with design proved to be inadequate in achieving the project's objectives.

A. Analysis Methods

UCD practices like contextual enquiry and ethnographic style observations proved to be extremely valuable, especially within the participatory action research framework. They effectively high-lighted the context in which the work of the entire structure took place and brought forward important usage trends for this technology.

In addition participants in the study were able to better understand their own work processes and were able to identify how the current technology was aiding or hindering their work flow and processes.

B. Design Methods

Many users had a generally poor understanding of their work processes or the directives for their jobs. This made them unable to participate fully in participatory design methods such as paper-prototyping sessions. This proved to be a major drawback in the design process.

Even those users who knew their jobs and its functions well had low levels of computer literacy. This made it difficult for them to understand abstract computing ideas or develop and design interfaces collaboratively with researchers.

C. Meeting User Needs

One of the more interesting points of the methodology used was that users seemed to misunderstand the focus of the research. When participating in participatory design sessions participants would often asked for technical issues to be addressed which were outside the scope of the research. These requests were often addressed as they helped build rapport with the users.

V. Conclusion

Developing ICT systems for the developing world comes with its own unique challenges. While user-centered design methods may work well in the developed world, it appears that the analysis tools are useful while the design tools and methods are ineffective due to many social and environmental factors.

Existing methodologies for developing new technologies in the developing world need to be rigorously tested for suitability and new methodologies need to be explored and developed.

References

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