

Using disability scenarios for user-centred product design

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Abstract. This paper will discuss how the building of a disability persona and scenario helped to clarify functional user needs in a wireless communication and information device both for people with disabilities and for the wider population. The iterative scenario development process included meetings and workshops with user and technology researchers and with technologists and members of an Expert Panel on Disability to further expand specific requirements.

The Smart Internet Technology Cooperative Research Centre, a consortium of Australian universities and industry partners, is working on creating smart personal assistants with natural adaptive user interfaces in intelligent environments using smart networks. These aim to be easy to use and seamless for the end-user. The User-Centred Design project activates processes in conjunction with the technology teams for users' requirements to be considered at the design stage. The scenario methodology has been a valuable tool for ideas interchange between technology and user researchers.

Introduction

The development of disability personas and scenarios has assisted in formulating user needs in the development of a wireless communication and information device. This device will be potentially attractive for blind people and people with physical disabilities as well as the general community.

Methodologies such as personas and scenarios are utilised by the User-Centred Design team of the Smart Internet Technology Cooperative Research Centre (SITCRC). This Centre comprises a complex collaborative structure of universities and large industry partners as well as alliances with small and medium sized enterprises. The SITCRC has technology programs in the areas of Natural Adaptive User Interfaces (NAUI), Smart Personal Assistants (SPA), Intelligent Environments (IE) and Smart Networks (SN) as well as User Environments. The User-Centred Design team, situated in the latter program, has devised various methodologies for linking with the technology programs.

The linkages developed between the User Environments and Natural Adaptive User Interfaces programs using a disability persona called Whitney were so successful that they have led to the funding of a research project developing a prototype multimodal device. This paper outlines how user-centred design involving inter-disciplinary teams helped to achieve this.

The role of user-centred design

User-centred design places the user at the centre of the design from the beginning of the design process. UCD to date has most often been used in the corporate context. It focuses on the active involvement of the user in the design process, trying to obtain a clear understanding of the exact task requirements, involving an iterative design and evaluation process, and utilising a multi-disciplinary approach. [1] The key focus of user-centred design is that users play a critical role in the design of easy-to-use products throughout the entire development process.

Interaction throughout the design process is necessary between users and developers in order to understand and define the context of use, the tasks, and how users are likely to work with the future product or system. [2]

The SITCRC's User-Centred Design team felt that to achieve that interaction, it was necessary to establish a virtual "meeting place" where technology and user researchers could find common ground. This aimed to provide a forum for discussion of SITCRC research goals and to develop the linkages for collaborating on joint projects incorporating user-centred design in the methodology.

Linkage workshops was one method of obtaining communication in the "meeting place". The success of such a workshop is described in the following section. Part of this process was moving from a technology-centric to a user-focussed view. It is the possibility of accepting various user perspectives reflecting the diversity of our community which aims to enhance the research early in the developmental stages.

Prior to the establishment of the "meeting place", was the identification of potential needs of user groups for smart Internet technologies. The three groups selected by the User Environments program were young people, small and medium enterprises (SMEs) and people with disabilities.

To ensure that people with disabilities were included right from the beginning of the user-centred design process, an Expert Panel on Disability was formed. This comprised three people who have a disability and importantly, bring to the Expert Panel both their acquired personal knowledge together with their professional expertise.

The Expert Panel provides advice on the philosophical and ethical basis of projects, methodological approaches and offers ideas for future directions especially with regard to allied projects within the core technology programs and the impact on people with a disability. It has played a significant role in providing practical insight into the scenario development. It has allowed direct discussion between users, the technology teams and the UCD team and has also given an increased understanding amongst researchers of people with disabilities and their use of technology. This has provided a bridge between the disability personas and scenarios as a methodological research tool and the real lives of people.

Building personas and scenarios

The use of personas as a design methodology has been outlined by Cooper [3] as a means for giving specificity to the idea of a "user-focus" in software development. The User-Centred Design (UCD) team used elements of Cooper's persona methodology as a basis for developing collaborative links between the UCD team and the technology program members. This aimed to move technology researchers away from the implicit or explicit view of "users being like themselves".

The personas could be considered as "archetype users". Personas are different from an actual user, though understanding the actual user is a very important basis for developing the persona. Personas have names, details, and goals, which prevent the user from becoming elastic. The personas have to be specific.

Scenarios can then be developed based around activities of the persona. In the software design context, there are various definitions of scenarios and approaches to their use. [4] They range from stories to specific task-related scripts. Cooper uses detailed scenarios to define tasks, differentiating daily scenarios, necessary use scenarios which must be performed from time to time, and edge case scenarios which need not be designed for.

The SITCRC UCD team developed personas and scenarios for use by the technology teams. However, the most successful outcomes for this methodology was achieved when user and technology researchers could create their own personas and scenarios in inter-disciplinary teams.

This was achieved when the UCD team organised a three-day linkage workshop in November, 2002 which brought together a number of technology researchers from the Natural Adaptive User Interfaces (NAUI), Smart Personal Assistant (SPA), Intelligent Environments (IE) and Smart Networks (SN) programs with the members of UCD.

The linkage workshop started with presentations on current projects conducted by the technology programs. This acted as a good frame of reference for the following days' activities. The workshop then moved into the practical part of jointly developing personas and extending these into scenarios. This was done in small groups, each comprising UCD and technology researchers. While the UCD team had previously developed personas and scenarios, it was important to build new personas which then had common "ownership" by both the user and technology researchers. This exercise was also a way of communicating in a more informal manner and learning to understand both the commonalities and differences in research approaches.

As the UCD team was concentrating on young people, small and medium enterprises (SMEs) and people with disabilities, personas and scenarios were built around these types of users.

The second day of the workshop refined some of the personas and scenarios. From this process, three personas and scenarios were identified as having most relevance to the technology researchers.

One of these was Whitney – a single parent in her 20's who is blind. Whitney is self-employed with a Braille transcription business. She relies on a number of communications modes – e-mail, home phone and mobile phone. This works well for her but she needs to be contactable all day. One problem is taking and picking up her son from school. This can take up to an hour as she is forced to use public transport. It is difficult for her to be "offline" from her clients for that long; but she has no other choice, as it is very hard for her to check her e-mail while on the road.

During the scenario development process, some options were discussed, and technology researchers realised that something could be done using the CRC's technology to help Whitney get her work done.

One project involved spoken natural language interfaces that culminated in the design of a prototype called InCA [5] that ran on a handheld personal digital assistant (PDA). This personal assistant communicated with the user through means of natural speech interaction and provided a small set of Internet-oriented and information management services – such as news, e-mail, weather information, exchange rates, and translations¹. One of the limitations, however, was that the prototype used wireless communications (known as WiFi, or 802.11b) which have a range of approximately 100 metres. None of the computation, speech recognition or speech synthesis was done on the PDA, because such devices lack the computational power to do these things; rather they were done on a server which was connected to the PDA through the WiFi connection.

During further discussions, ideas were generated which gradually evolved into a project proposal initiated by the technology researcher. It was based on the fact that recent advances in personal area networks (namely, Bluetooth technology) mean that no physical connection is

¹ Published papers, photographs, screenshots and movies of InCA can be found at:
<http://www.cse.unsw.edu.au/~inca/>

required between the user and the computer. This allows for a very convenient design that is termed the “brick in a bag” – the user carries a computer in their handbag, using a wireless (Bluetooth) headset and speech input/output as the primary interface.

A meeting of the CRC Expert Panel on Disability was held on the second day of the workshop. One of the Panel members, Tim Noonan is blind and when presented with the Whitney persona, felt it sounded realistic. He also recounted part of his daily experience and explained the devices he had with him that day. These were a laptop, a Braille reader/writer, a Dictaphone, an electronic book reader, and a mobile phone – and, in 2002, he still could not access certain useful services including SMS messages. It is obvious that the wide array of devices to be carried is unwieldy.

As a result of these discussions, the Amivox project was born. Amivox will consist of a wireless headset and a very small laptop with many communications (namely: GSM, GPRS, WiFi and Bluetooth) interfaces. This would allow us to reduce the device count, to allow a natural speech interface to build a “killer application” for blind people and people with physical disabilities that then has the potential to cross over to the mass market.

Commencing the Amivox project

From its beginnings as the development of a persona and scenario for Whitney in the UCD linkage workshop, Amivox is now a fully-fledged project – with an associated inter-disciplinary team. Collaborative research funding has been obtained to develop Amivox to a prototype stage. It is expected that Whitney’s scenario will remain a core reference, reinforced by the real experience of Tim Noonan and other blind users, but to a large extent it has performed its initial function of enabling this team and detailed project to be established.

It is important to note that the Amivox research methodology incorporates the UCD approach. This means that apart from the initial literature review and detailed environmental scanning of the market, there will be focus groups and an ethnographic study before the technological development commences. The ethnographic study will evaluate peoples' use of and interest in the type of application offered by Amivox.

This will include real-life testing of people's use of a two-way device requiring them to walk along a street while conversing with the device. This will gain insights into privacy and other social implications. The outcomes of this research will inform the design of the prototype. After the prototype has been developed in 2004, evaluation will take place in real-world settings and this will offer opportunities to revise the design as needed.

The user-centred design process may vary from project to project, but in the case of Amivox, it acts as “bookends” to the technical process. The initial UCD scenario development led to the creation of Amivox. However, Amivox is based on an existing SITCRC mobile speech platform with several communications interfaces which delivers voice services. It is the ethnographic studies which will clarify what services and facilities are most important for users. Once that UCD process has taken place, the technical development occurs which is then subjected to further user testing before the prototype is finalised.

This is the beginning of the Amivox project and it will significantly test the user-centred design process in general and the continued use of the Whitney person in particular.

Conclusion

Using the Whitney persona and scenario has opened an opportunity to build communication between research teams and to stimulate further work through visualisation of how a “constructed” individual needs a particular solution. Those needs can then be translated into applications.

One of the successes of the Whitney persona is based on creating a persona and scenario which is relevant to the technologies being developed by the research teams without losing the integrity of the user population represented by the persona. This is indeed a balancing act but, if successful, can have significant outcomes both for the research teams in relation to new challenging problem-solving but most importantly, could lead to the development of potentially valuable tools for users such as Amivox.

References

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