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Using Extended Personas to achieve Accessible ICT Solutions

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Abstract: When designing solutions for people and especially disabled people, including them in the development process and accessibility testing is an important success factor. However, in practise doing so is costly and difficult especially as they are hard to find and often reluctant to participate. Consequently, other measures are needed. A well-crafted, research-based extended persona can smooth out the idiosyncrasies of real individual people while retaining the patterns of needs and behaviours in the target market. Such an extended persona also offers a practical and cheap solution to the resource and availability issue. The extended persona will when properly used ensure more accessible ICT solutions, by providing support through all stages of the development cycle.

1. Introduction

Today, there is a strong focus on making ICT solutions available for all users, including users with sensory, motoric and cognitive impairment. This represents new challenges for the suppliers of ICT solutions and services which for the most part hitherto, has not regarded accessibility as an integrated part of their product or service. This is to some extent due to lack of knowledge, understanding and cost. In many design documents at best, accessibility requirements are mentioned as a section late in the document referencing W3C/WAI/WCAG [1] requirements in general.

In our work we have, based on a study into development methods both agile and more traditional waterfall methods, concluded that there are no hindrances in the methodologies themselves preventing much tighter inclusion of all kind of users including those with disabilities, in the development and testing of new ICT solutions. Development methodologies do not address accessibility and end-users with disability throughout a development cycle – but merely as one of many facets of the system development process. One challenge with agile methods when ensuring accessibility is that accessibility need to be strongly integrated into all parts of the development process, and not to be regarded as one of many requirements a system need to satisfy. Accessibility cannot be viewed as a function of a system, it has to be an integrated part of all aspects of an ICT system.

However, in real projects often the only users involved are stakeholders like the system owner, super-users and the like. The (disabled) end-users are seldom part of the specification and design process. This represents in a real problem. Modern ICT development often involves multidisciplinary design teams, consisting of numerous individuals, working on different components of the design, often in geographically dispersed locations. Furthermore, we know that design decisions are made based on common biases in the stakeholders brain which use their own most easily-retrieved examples to compare against, whether it is the CEO who is influenced by an article he read that morning, or the product manager who knows that one guy who is just like your target market, or the designer who is really designing for himself.

Properly conducted research can help improve the understanding of the needs, goals and behavior of the targeted user group. However, to address this problem properly, real users including those with disabilities should ideally be much more involved in the whole development cycle of ICT solutions. Experience shows however, that especially when involving users with disabilities, it is often costly, time consuming and difficult to organize. Also, the wanted resources are difficult to find and their organizations does not want to help. They quickly loose interest and they have their own agenda.

In our work we therefore concluded that a possible solution to this problem could be using persona. A well-crafted, research-based persona can smooth out the idiosyncrasies of real individual people while retaining the patterns of needs and behaviors in the target market. At the same time, a persona retains enough human detail to feel like a real person. However, as design for all types of users requires special attention to people with disabilities, so does the persona that describes the particular user. A lot of personas are already developed and available to developers, including some personas describing people with disabilities. Despite the growing popularity of the persona, its efficiency is also debated. Therefore, the purpose of our research was to address the needed extensions and improvements of a persona aimed at describing people with disabilities and furthermore, to test if using this extended persona offers support to the development process of ICT solutions and eventually lead to development of better and more inclusive solutions for users with disabilities.

2. Background – state-of-the art

Personas are mostly used to evaluate the user experience; it is used to identify potential problems in the user interaction scheme with a focus on usability, so that the developer of a user interface interaction could "take the role" of the persona, and try out the user interaction from the persona's perspective and find usability flaws in the interaction design. As the persona descriptions have evolved, many personas have accessibility requirements as demonstrated by personas developed in the European AEGIS project [2]. The European AEGIS project has developed personas with Cognitive impairment, hearing impairment, vision impairment, communication received and producing impairments, and upper limb impairments [3]. The use of the AEGIS persona and other personas developed does not however, address the problem on how to develop an accessible system in a sufficient way. Especially, the traditional problem is that accessibility issues are brought into the development process too late as part of the usability testing. When accessibility issues are discovered late in the development process, solving the problem is often quite expensive, and as a consequence the problems are often not addressed, resulting in less accessible systems. It is also our experience that many developers do not have sufficient knowledge about accessibility techniques.

In this paper we are proposing a methodology that will address these issues. The extended persona description is designed to answer these questions. Usually personas are used to evaluate and test the user interaction scheme. The extended persona is designed to be of help throughout the development process and guide everybody involved in all aspects of the development. When planning a system, the use of an extended persona will help remind you that users with special needs must be reflected in the system requirements and the extended persona will also provide some guidance for which requirements you should include. When developing the system the extended persona will provide examples for the developers on how to implement the different requirements, and furthermore, techniques that can be used to meet these requirements.

Traditionally personas are used to increase the usability of a system, as one research paper point out "…through using personas, designs with superior usability characteristics were produced…"[4]. In our research we have looked into how personas could be enhanced

to improve the accessibility and therefore the overall usability of a system. We have added information for the buyers/project owners, guiding them on what and how specific requirements should be added to the system specification. We are also adding practical examples for use by the implementers, and how everything could be assessed by the complete system.

3. Objectives

The objectives of this paper are:

- To assess how various development methodologies and processes include accessibility issues and in particular, for people with disabilities in practice.
- To assess the effectiveness of using extended personas as a tool in supporting the whole ICT solutions development meeting the needs of people with various disabilities.

4. Methodology

At the core of this research is a project "Citizens on the Net" (Nettborger in Norwegian [5]) that was conducted together with ICT development specialists, research institutes, users with disabilities and their organisations as well as providers of ICT services on the Internet.

Firstly, we did a survey into development methods and processes to study whether we could find elements in the method and or the process itself, which could cause problems related to accessibility. We concluded that no accessibility issues could be related to the methods but more so to lack of knowledge, cost and availability of the needed resources. Also, to document that the results of using the development methodologies mentioned actually resulted in solutions with a number of accessibility issues we did a number of checks by experts.

We also carried out research on persona. In short we did research into how a functional persona describing individuals with disabilities should be made in order to make the quality good enough to describe the technical and functional requirements related to the particular disability, and at the same time retain a feeling of a real person. Eventually, we used the personas in proper tests and reported the results to the solution developers as well as back to the development group developing the personas.

To identify accessibility issues and changes required of systems to make the systems more accessible, we also researched several evaluations of web systems and the required changes and improvements necessary to make these systems more accessible. We researched a social web for learning opportunities, and common problems identified in using other social media web sites. We also reviewed interviews and user testing of a fully accessible version of FaceBook named BrailleBook and the techniques used to make this version accessible. The group of users used for evaluating the different web sites was recruited from The Norwegian Association of the Blind and Partially Sighted, The Norwegian Cerebral Palsy Association and the The Norwegian Dyslexia Association.

5. Technology Description

Traditionally personas are used to evaluate the user interaction scheme, to make sure that users with different backgrounds would find the information they are seeking as efficient as possible. There are also suggestions that Persona descriptions should be linked with use cases and guidelines [6] to increase accessibility, in our case we are extending the persona description to also include technological implications based on the persona description, combining all necessary information into one tangible unit – the extended persona. The extended persona also includes considerations of how to meet the needs of the persona when you work with system requirements when designing and planning the solution.

The extended persona description is designed to meet all stages of a development:

- Planning, requirement analysis, requirement definitions
- System design, implementation, integration and testing
- Maintenance, further development

In the "Citizens on the Net" project we have developed and adapted 5 personas, that are evaluated by real users with similar needs as described in the persona. In addition we have added information on how the needs of the user should be addressed in the system. What are the planning requirements, the design requirements and how the requirements can be implemented in the solution? The following example shows a subset of an extended persona, only those elements that shows how an extended persona could be used is included. The complete extended persona description is fuller and richer in all aspects, it also contains a much more detailed description of technical considerations.

*5.1. Short **simplified** extended persona example*

Persona background

- Name; Elisabeth Bjørknes
- Age: 33
- Education: Bachelor in social science
- Hobbies: listening to music, reading books, surfing the net and meeting friends.
- Impairment: No vision, the user is Blind

Technical requirements

The WCAG 2.0 criteria "1.1.1 Non-text Content: All non-text content that is presented to the user has a text alternative that serves the equivalent purpose, except for the situations listed below. (Level A)" as an example, and the use of alternative text and a long description of the content i.e. for HTML the use of the ALT attribute and the LONGDESC attribute.

Planning

If the system will display images, you need to decide where the images are stored, if the images are stored within a file system or within a database. Many systems today use a database for storing images i.e. an image database. If your system will use an image database you need to ensure that when uploading a image to the database, at the same time you need to provide information as an alternative text describing the image, and a longer detailed description for the same image if the space for the alternative text is not sufficient. If your system is multilingual, you also need to provide a description of the image in relevant languages.

Requirements:

- All images should have a field for representing alternative text in the language of the system.
- All images should have a field for representing a more thorough description – a long description of the image in the languages of the system.
- All long descriptions should be made available as a URI, and a service for providing that need to be present.

Implementation

All images should be retrieved from the image database, when presenting a image the ALT description need to be extracted and placed within the value of the ALT attribute e.g.

ALT=”The image shows a complex chart”. The value of the LONGDESC attribute should be a URI referring to the longdesc description in the database e.g. LONGDESC=http://mydomain.com/service/getImageLongdesc?id=ab123&lang=eng.

When using images for decoration the ALT attribute should be empty or contain only whitespaces. This will cause assistive technologies to ignore the information, e.g. ALT=””.

A complete example for an image would then be:

```
<img src=”http://mydomain.com/service/getImage?id=ab123”
alt=”The image shows a complex chart”
longdesc=”http://mydomain.com/service/getImageLongdesc?id=ab123&lang=eng”/>
```

Maintenance

When the system is further developed it is important that all images include the alternative and long description are retained. This need to be remembered when new templates are developed.

5.2. Usage

As demonstrated in this short and simple extract of a extended persona we have included information that provides a detailed explanation on how to meet one of many accessibility requirements and user needs[7]. Providing this type of information should help all parties in the development process to meet the requirements of people with disabilities. This is increasingly important as legislation requires ICT systems to be accessible by all, and to meet the needs of all users. We have focused on providing functional requirements, not technology.

6. Developments

The extended personas are developed in the Norwegian “Citizens on net” project. In this project we focused on the development of a highly accessible FaceBook implementation, named: “Braillebook”. Throughout the development of this solution, we have captured the accessibility techniques used that meet different accessibility requirements. These requirements have been included in the descriptions of the persona. In addition real users with a variety of disabilities have tested and evaluated the persona and the accessible system. After the evaluation of the persona descriptions we updated the personas to be more harmonised with real user needs and real user requirements, and techniques that meet the real users problem.

7. Results

In our research on how the various development methods and models included accessibility issues, we reached the following results:

- It seems that the agile methods allow for better user-participation throughout the development process. Not only, as is often the case in waterfall based methods, in the beginning and then in the testing phase.
- We also conducted expert analysis of systems [8] developed primarily based on an agile process. We were sorry to find that really most of the ICT services investigated could not be approved for usage by disabled people. Consequently, we concluded that the real problem is not the development methods or models, it is lack of knowledge of how to design and develop solutions for people with various disabilities and furthermore, lack of knowledge of how to involve disabled users in the development projects, cost of doing it and resource availability (how to find people with disabilities?).

We also concluded that as real users could not be included in the projects for various reasons mentioned before, we had to look for something that could replace the real person in the projects. What we found was the persona. A persona is normally used for guiding the user interface, and personas describing accessibility issues addresses various aspects of accessibility considerations. However, usually the use of persona does not guide the technical development of new solutions, which we found is absolutely fundamental. Our research shows:

- Using an extended persona clearly improved the accessibility.
- The use of persona must be included in the entire development process, not only in the testing.
- To enable the extended use of persona, technical information needs to be added to it.
- The technical additions should include information detailing the technical requirements and how it should be met.

Finally, the result of our research also clearly indicates that an extended persona also provided the ICT business with a practical tool that will help them conduct their development projects in a timely and cost effective manner.

8. Business Benefits

The benefit for businesses using the results of this project is primarily:

- Access to a practical low cost tool, the extended persona, which will enable the development of better more useful and accessible ICT solutions and services.
- A template and knowledgebase for development of new persona.
- Raised awareness on accessibility requirements throughout the development process.
- Increased knowledge about accessibility among developers and procurers.

As European and many countries legislation are requiring accessible ICT systems, there is a need for tools supporting the development process, and evaluation of the accessibility and functionality of ICT systems, tools and services. The benefit of using the extended persona is that everyone participating in the development of an ICT system will benefit from the information provided. The organisation procuring the system will have a tool to ensure that necessary requirements are included, and how the requirements should be expressed. The developers have guidance on how to meet the requirements put forward by the procuring organisation.

9. Conclusions

To make systems accessible, we need to address accessibility and take into account users with disabilities throughout all aspects of the ICT development cycle. We cannot merely look at accessibility as just another requirement we need to check off, before delivering a system. The cost of applying accessibility to a completed system is too big, however when accessibility is an integrated part of all aspects of the development cycle, the cost of ensuring accessible ICT systems are almost neglect able. To ensure accessibility and users with disability we need to involve these users as well into the user centric design approach.

However, for several reasons including real users in development projects are costly and not very practical. We wanted to check if a research based well-crafted extended persona could be of help. Our research concludes that using an extended persona is promising. However, we have in the relatively short “Citizens on net” project not been able to perform adequate studies addressing the reliability and validity of the method. We therefore recommend that such research is carried out. Furthermore, we also see that all companies developing ICT solutions cannot develop their own extended persona;

consequently there is a need to establish a “bank” of such extended persona descriptions that can be utilized by everyone with a need. We recommend therefore, that further research into how this can be established; including service delivery model and business model should be carried out.

Acknowledgements

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