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Assistive Technology: Going beyond the Disability

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Keywords

Disability, Assistive Technology, Inclusive, User Profiles

Summary

This paper is part of the ongoing research into designing and developing an Essentiality and Proficiency tool. The tool is a proxy service that will enable the user to view web content in a manner most beneficial to them. The research has stemmed from the inaccessibility of the web content even though standards and legislations such as Web Content Accessibility Guidelines 1.0 and the Disability Discrimination Act 1995 have come in to place (Elizabeth 1995; Brewer 1999). The paper will concentrate on the need to establish user profiles to ensure the tool can be used by all. However, for the purpose of my PhD research I have concentrated on the visually impaired as this is identified as the largest disability group (Kottapally, Ngo et al. 2003; Gooday and Christopherson 2004).

Introduction

Disability is deemed to be a limiting factor for any person. However, with the intervention of various types of assistive technology, that limitation is somewhat reduced. It has been argued that assistive technology offers the individual a means of gaining self-confidence and independence. Although, if assistive technology has been built with one user group in mind, does that mean that its use is limited to the one group?

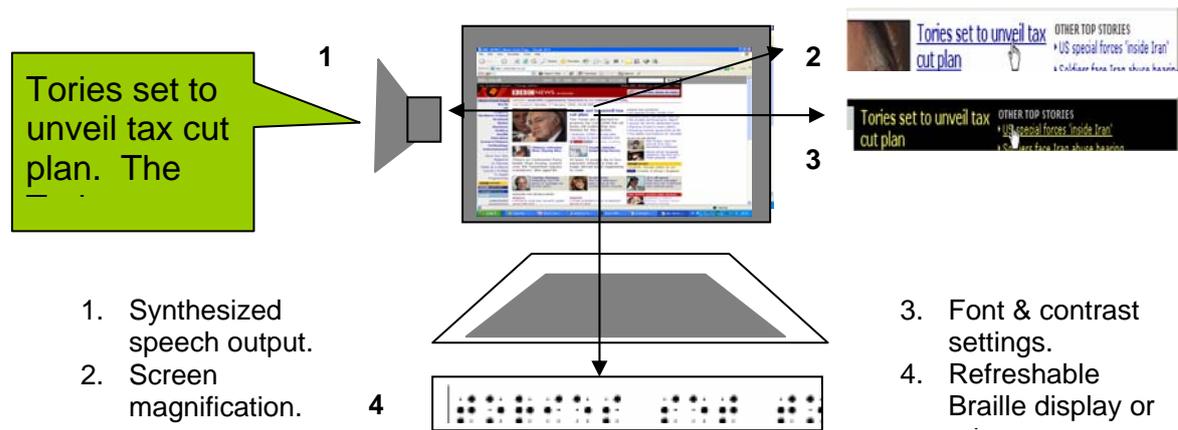
Disabilities

The UK has 10 million disabled people (Disability.gov.uk 2002). This is not a homogenous group, the disabilities range from sensory impairments, mobility to mental impairments. Each and every disability differs from the other. Hence the barriers that they experience in their daily activities also differ.

Assistive Technology

Assistive technology has stemmed from the need for disabled people to be able to go about their daily activities without the constant help from others. Assistive technology comes in many guises however for this paper we will concentrate on products that enable access to IT and the Internet. Visually impaired users may operate a range of devices such as screen reading software, refreshable Braille displays, screen magnification etc to access the information from the Internet (see Figure 1).

Figure 1 Assistive technology generated output for the visually impaired



The Internet

The Internet's importance is embedded into our daily lives (Clarkson, Coleman et al. 2003). It was originally developed by a close-knit group of technologists and academics. The knowledge and usability of the Internet was contained to these select few. However as it developed it became more widely available. The Internet was a means to access a very rich source of information. Furthermore as it was a text-based tool, it was a novel invention for the visually impaired as they could use screen readers to access the information (Fairweather, Hanson et al. 2002).

Increased access to information also leads to a better access to the labour market (Wattenberg 2004). Initially it was believed that the disabled people were unable to access the labour market due to transport and mobility problems (Christie and Mensah-Coker 1999). However, with the intervention of the Internet people are now able to work from home.

Case Study 1

Mick is a 54 year old web developer with no useful sight. Up until the 1995 he was unemployed and housebound. His daily lifestyle included doing household chores and once a week he attended a drop-in centre for the disabled.

During 1995 Mick was introduced to IT with aid of assistive technology in the form of a screen reader. Mick learned new skills and gained an independence that he didn't think was possible.

Through the aid of the screen reading software, Mick has gained vast experience in IT. Mick now develops web sites, checks other sites for accessibility and also teaches other visually impaired students.

Although Mick has made these strides forward, it doesn't mean that he is being served as best as he could with his assistive technology. For example, the inaccessibility of some websites leads to the screen reader reading out all the link information. This is evidenced in case study 2.

Case Study 2

Alice (49) is a secretary and has no useful sight. Alice is proficient in the use of IT. Using a screen reader Alice creates spreadsheets, word documents and regularly checks and sends emails as part of her work.

However Alice avoids using the Internet due to the confusion and the visual clutterance she experiences. Alice dislikes having to read vast amounts of information as she feels overwhelmed before she even reaches the bit that she needs.

The internet and overall digital communications revolution has changed the way of social communication (Christie and Mensah-Coker 1999). They have enabled users to overcome their impairments and have the same access to information and services. However, it is argued that even though online technologies have been developed to increase social inclusion, they are failing due to their inaccessible nature, as is apparent in Case Study 2 (Ross 2002; Wattenberg 2004).

This is evident in the Internet where developments have lead to the inclusion of graphics and audio, which in turn have lead to inaccessibility for the users that accessed the Internet using assistive technology (Fairweather, Hanson et al. 2002). Hence according to Webcredible (2004) an estimated 48% of the UK population may experience problems accessing and using websites

The Problem

The increase in the use of the internet has given rise to the fear of a new type of exclusion. The 'information exclusion' may occur for low income families that cannot afford to purchase computers and access the internet (Christie and Mensah-Coker 1999; Wattenberg 2004). This is further aggravated for the disabled by the high costs of purchasing additional assistive technology.

Wattenberg (2004) believes that there is a requirement for individuals to be computer savvy in order to be productive citizens. This includes the ability to surf the Internet and participate in instant communication. However, this is not possible as the Internet has been designed for the average white male user. Hence the internet negates universal design and promotes 'information exclusion' to the disabled, the elderly and ethnic minorities (Christie and Mensah-Coker 1999). Companies are missing out on many potential customers/users. This is evident as disabled people that do have access to the Internet are more likely to make use of it. This is in contrast to the non-disabled with Internet access (Ross 2002; Wattenberg 2004). Carey (1999) highlights that the "design for all" approach needs technical standards to be set in order for the products to be developed for a bigger market that encompasses both disabled and non-disabled customers (Christie and Mensah-Coker 1999).

One of the technical standards that have been set is Web Content Accessibility Guidelines 1.0. which go some way to enforce universal accessibility in websites (Brewer 1999). The issue which then arises is that accessibility is often thought of as a sole problem; however it is actually a prerequisite of usability (Hudson 2004). The accessibility guidelines only play a small part towards making sites accessible. Accessible sites are not necessarily usable. What is actually required is usability testing to ensure sites are both accessible and usable.

The problem with disability legislation is that it allows services, employment and education sectors to get away with simply fulfilling the requirements of non-discrimination. This does not necessarily endorse a usable product or service (Hudson 2004). Wattenberg (2004) believes that the only way to overcome this problem is to go beyond the guidelines and legislations and incorporate the disabled users into the design process.

Another problem identified is that of retro-fitting. If the development of a product does not incorporate the needs of the disabled user during the design and testing phase, then there will be a need for costly retro-fitting (Christie and Mensah-Coker 1999). This is endorsed by Christie and Mensah-Coker (1999) and Wattenberg (2004) who state that to achieve social inclusion, the designers/developers of the products will have to involve disabled users in the design, rather than simply attempting to design for disabled people to gain independence. Furthermore they iterate the importance of joining the design for inclusion with changes in policies to promote an inclusive British society.

Moore reiterates that the inclusive design is fundamental to establishing and promoting an inclusive society. Moore highlights that the elderly and people with impairments experience increased disability due to the lack of good design. The most important issue is not to see the elderly and the disabled as additional to the proposed market of users but as a fundamental ingredient of the market and therefore eliminating the need for retro-fitting (Christie and Mensah-Coker 1999).

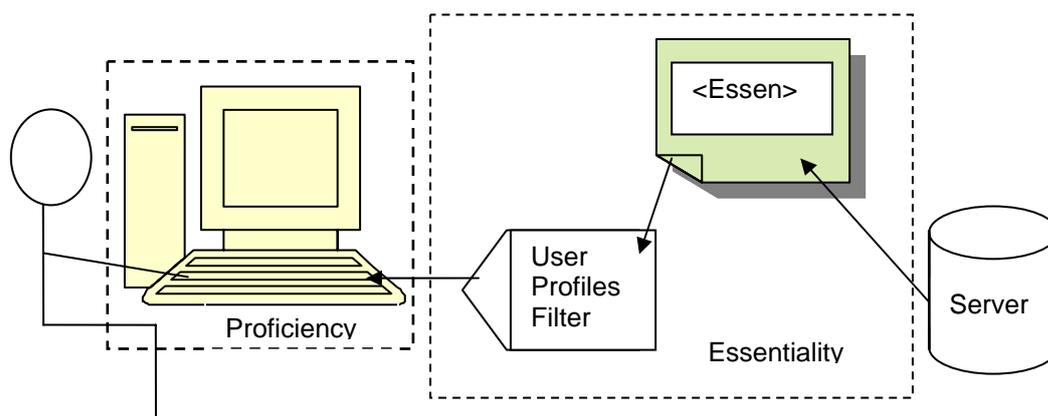
“A key message in this is that the ‘one size fits all’ approach does not work, however a well designed user interface will suit many.” (Clarkson, Coleman et al. 2003) This is the key to my work. We will attempt to build a user interface that can be used by many usergroups rather than being used solely by one group of people. Hence the premise of my work is to develop user profiles from gathering user requirements. The user requirements will come from different groups of people.

Gibson (1979) states that in an ideal world we should not have to understand the technology to be able to use it (Clarkson, Coleman et al. 2003). For a product to be usable and accessible there is a prime requirement for the collaboration between the user and the developer (Kottapally, Ngo et al. 2003). This ensures that the product will not fall short from a wide scale of users. This is also endorsed by Christie (1999) who states that too many designers rely on their own opinion of what is required rather than asking the potential users.

The Solution

The Essentiality and Proficiency tool is a proxy service that will enable users to pick a user profile (based on requirements captured through a survey and interviews). The user will be able to view content of a web page in accordance to their needs. The essentiality has a two-fold purpose (see Figure 2). Firstly it refers to the author’s mark-up in accordance to what they identify as most essential for the user, when conveying information through their website. Secondly, the essentiality also encapsulates the needs of the user through the user profiles. The proficiency defines the rendering capabilities of the device being used, i.e. whether it be laptop, PDA or mobile phone.

Figure 2 Essentiality and Proficiency in Practice



A prototype was developed which applied user preferences client side but now we are trying to build a system that works server side, this is to ensure cross-browser compatibility.

User Profiles

The importance of generating a range of user profiles lies in the ability for a product to be accessible to a range of users rather than one specific group (Sugiyama, Hatano et al. 2004). Although retro-fitting is constantly criticised by specialists, there is a need for it, as the Internet has been present for a number of years and is constantly developing in terms of audio, visual and graphics. Furthermore although accessibility standards, such as WCAG 1.0, have been taken up by a number of governments as part of their legislations, not all developers are developing accessible sites. The retro-fitting of these websites will take a number of years to ensure that they are all accessible.

Hence the inaccessibility leads to the importance of the Proficiency and Essentiality tool so that users can access the sites. To cater to the needs and requirements of a larger user base, the tool will have a number of user profiles that have been developed from the captured user requirements. Figure 3 shows an example of the different user groups within the field of visual impairment.

Figure 3 Visually Impaired User Profiles

Strength of Visual Impairment	Assistive Technology
Low vision	<ul style="list-style-type: none"> ▪ Large font ▪ Different background
Mild/ Moderate vision	<ul style="list-style-type: none"> ▪ Screen magnification software
No vision	<ul style="list-style-type: none"> ▪ Screen readers ▪ Refreshable Braille displays

Further Work

Once the information has been collected and the different requirements have been assigned to the user profiles, we will begin the process of developing the Essentiality

and Proficiency tool. Having incorporated the users in the design stage, we will include the users in the process of development and evaluation.

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