Turing Lecture Review

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Abstract

Chris Mairs, Director and Senior Vice President of Data Connection Ltd, addressed The IEE/BCS Manchester Turing Lecture 2006 with a speech entitled *Lifestyle Access for the Disabled*. Throughout his speech, Chris Mairs addressed several aspects of accessibility in technology and the consequences of providing, or not providing a design that was accessible to all. A majority of the talk paralleled work written in [2] and [3], all of which stressed the need to make interfaces more usable and content more accessible in order to help create a more inclusive society in which everybody can participate. The talk concluded with the optimistic view that future technologies have the potential to diminish the problems of accessibility.

1 Introduction

Technology is encroaching upon the daily lives of people as each day passes, with the provision of information and its delivery affecting users the most. The IT devices that most people take for granted are inaccessible to the disabled due to a lack of awareness of the needs of disabled people, poor interfaces and a culture of closed design within technology vendors.

To emphasis this point, Mairs began his talk with a light-hearted example. He displayed on screen the headline from a newspaper reading *"OAPs in Orgy Protest"*. Using two widely available speech synthesizers, the audience were able to experience what visually impaired users experience on a regular basis and compare the speech synthesiser interpretation with that which a sighted user would read.

The English language uses stress to alter the meaning of sentences by emphasising the key parts of the phrase. One speech synthesizer placed the stress of the sentence on *"OAPs in Orgy"* which gave the sentence an interpretation that a group of OAPs were involved in an orgy and now they are protesting. The second synthesizer placed the stress of the sentence on *"in Orgy Protest"*, giving the interpretation that OAPS were protesting because of an orgy taking place.

Generally speaking, sighted users would assume the second interpretation. This is due to the fact that sighted users can interpret information better than the technology because of previous experience and knowledge of the content [3]. Whilst the example was humorous, it highlighted the serious message that access to every day lifestyle experiences and choices, such as education and work, are limited to people with disabilities because of inaccessible technology.

There are 8.6 million people with a disability in the UK, with an estimated £50 billion spending power per annum. As such, it makes economic, social and moral sense to fully integrate the disabled into society. The UK Government has recognised the need for integration and has set an ambitious target of having full lifestyle choices available to all by 2025.

2 The Evolution of Technology

Technology often oscillates from being accessible for many to being accessible for only a few. The telephone, for example, began life being accessible to most people. The user would pick up the receiver and ask an operator to make a connection to the person whom the user wanted to speak to. As the telephone developed, it became less accessible. Dial

phones were difficult to use because of the need to find the correct numbers and rotate the dial. Touch phones improved the situation slightly, but the modern mobile phone is incredibly difficult to use due to its reliance of on-screen menus, the navigation of which is necessary in order to use the phone functions.

Even when companies do attempt to provide services for various disability groups, it can often be to the detriment of other sectors of society. Mairs recounted how Virgin Trains have recently installed new lavatory facilities on board their trains. The doors are wider to cater for wheelchair access and the buttons are large to facilitate easy operation of the door. While these new lavatories have aided wheelchair users, they have made it more difficult for visually impaired people to use the toilet facilities as well as for sighted people. The buttons that operate the door are a large distance away from the door, making them difficult to find. There is no audio feedback to indicate that the door is open or closed and it is not clear which button within the lavatory is the toilet flush mechanism. The good intentions of Virgin Trains have simultaneously assisted and frustrated two groups of people.

In some respects, the World Wide Web (Web) has had a similar existence. The Web began life as a simple text-based hyperlink environment. Being text-based, it was possible for people with and without disabilities to have access to the large repository of information that had become available on the Web. In particular, visually impaired people benefited from tools that could "read" the HTML aloud, producing an audio version of the page. As the Web increased in popularity, people demanded more from it, and advances in technology - including graphics, scripting languages, audio and video - were developed to transform the simple text-based Web into a visual-centric communications medium [3]. The evolution of the Web has simultaneously benefited and hindered its users. While Web technologies have developed and increased the functionality of the Web, the complexity that this has produced has created a large usability gap between Web users with disabilities and those without [2].

3 Accessible Technology

Technology can help liberate people from a disability and aid them in fulfilling a lifestyle of their choosing. Chris Mairs, an avid water-skier, was involved in a project to create a device to allow him to water-ski competitively. A device was developed - consisting of a car alarm, a sensor from a printer and a general purpose microprocessor - that sounded an alarm when the angle between the boat and skier was too great. Aided by the device, Mairs was able to compete with non-disabled competitors during an international water-ski slalom competition.

Even though the water-ski device used readily available components, the total costs from design to implementation was approximately £40,000. The costs of bespoke accessible technology can be a barrier to people making use of accessible devices. Therefore, accessibility design concepts should be incorporated into the design process of products from the initial stages of the design process. This will reduce the costs of creating accessible technology and also allow readily available products to be accessible to all users.

One of the major barriers to accessibility in most technology products and services is bad interface design. The closed nature of device interfaces plays a large part in facilitating this inaccessibility. Companies, often for commercial reasons, prevent other companies and individuals from altering their designs. In an attempt to make closed design interfaces accessible, companies try to make a single interface that is accessible by all. Accessible design for all is impossible as different disability groups have different needs.

The trend in closed interface design has recently started to change and companies are now creating more open designs for their products. Opening up the interfaces of products allows disabled people to access technology through the creation of alternative interface solutions. Mairs provided an example of how it is now possible to write small Java applications for mobile phones, which has led to the development of a speech synthesizer that will read aloud a text message, making mobile phone text messaging more accessible to the visually impaired.

The shift towards open interfaces can be attributed to the concept of a Smart Home. With a Smart Home, users will be able to use multiple devices together. For example, speakers located in the kitchen will be able to play music stored on a PC in the living room. For the Smart Home to operate effectively, a universal set of open communication protocols and data standards will be necessarily. Two such standards are XML and RDF. XML is a text based data format that allows a user to describe rules for structuring information using embedded markup. This gives the user control of how their information is represented by allowing the creation of a vocabulary that more accurately describes the data elements and attributes contained within the information [2].

RDF provides a simple yet flexible framework for describing properties of any Web resource. RDF is a data model and syntax that represents metadata The data model produces triples, also known as statements, of the format *(Resource, Property, Value)* where a *resource* is any object that has a Unique Resource Identifier (URI); a *property* expresses a relationship between the resource and a value; and a *value* may be an atomic value, such as a string, or other resources [2].

By using XML and RDF, multiple devices will be able to access the same data and have more understanding of what the data means, allowing them to more accurately render the data in a way that better suits the needs of the target device. For mobile phones, this may involve creating a customised version of a Website that better suits the limited display area of the mobile phone screen. For disabled users, this may involve creating data and user interfaces that are more accessible than currently available.

Accessible design can also benefit non-disabled users. An example given by Mairs to support this claim was that of Tesco's online grocery shopping Website. Approached by the RNIB because its Website was inaccessible, Tesco embarked upon the design of a parallel site for use by its disabled customers. The site became popular amongst disabled and non-disabled customers alike as people with disabilities could buy their groceries and people without a disability improved their shopping productivity by 35%. Due to the success of the site, Tesco is now creating a single Website that can be accessed by all.

4 Related Work

While a majority of Chris Mairs' talk has been written about in [2, 3], two key points made during his presentation parallels research we are currently conducting. The first key point was that there is a need for the separation of the actual content and/or functionality of the technology from the presentation to the user. The second was that accessible design should not occur at the detriment to other groups in society. These two points compliment work we are conducting in the SADIe project [4] and the Visual Complexity Project.

SADIe will research Web page transcoding. Current trends in Web design have led to a separation of the Web content and the presentation of the content. The content is stored within an XHTML file and the presentation and layout is stored within a CSS file. A more detailed explanation of the functionality and design concepts of SADIe is provided in [1], but it can be shown that SADIe can exploit the document structure that the XHTML provides and use this to transcode a Web page into a different, more accessible format. Currently SADIe is concerned with the profoundly visually impaired, but by applying different transcoding rules to the XHTML, various disabilities and various devices could all benefit from SADIe.

A further aim of SADIe is that sighted users can view the web page as the Web designer intended, yet visually impaired users can have better access to the information by transcoding the page [4]. This creates an experience that benefits both sighted and visually impaired users alike as opposed to degrading the visual impact of a Web page in order to make it more accessible to visually impaired users.

The Visual Complexity Project focuses on Web page design and the structure of the Web page. In [3], we are attempting to identify the characteristics that make a design visually complex or not. From this we hope to gain an understanding of how visual attention differs between a visually simple and a visually complex page layout. This is to provide feedback to visually impaired people of what to expect when

they reach a page.

5 Conclusion

Technology can often create social groups and cultures. Games consoles have created a culture of gamers and iPods have become a social necessity. Often these technologies, by being inaccessible, exclude disability groups from society. Since disabilities are so diverse, a single solution to the design of accessible technology is an impossible dream due to the fact that different groups have different needs.

An increased awareness of accessibility issues has been partly responsible for the current positive drift in the development of accessible technology. In particular, recent trends of separating the content and functionality of a device from its presentation has provided the potential for tailoring interfaces to suit the needs of different disability groups. Making interfaces more usable and content more accessible will help to create a more inclusive society and take us closer to the 2025 goal of equal lifestyle choices for all.

It is worth noting that disabilities can occur due to the natural processes of aging. As the average age of the population increases, so too will the number of people with disabilities. Having the foresight to create accessible technology will not only help others, but also help our future selves.

References

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