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The prevailing obstacles in Web accessibility on three well-known websites for older people with sight difficulties

Sarah O'Reilly

A dissertation submitted in partial fulfilment of the requirements of
Dublin Institute of Technology for the degree of
M.Sc. in Computing (Assistive Technology)

September 2012

Declaration

I certify that this dissertation which I now submit for examination for the award of MSc in Computing (Assistive technology), is entirely my own work and has not been taken from the work of others save and to the extent that such work has been cited and acknowledged within the text of my work.

This dissertation was prepared according to the regulations for postgraduate study of the Dublin Institute of Technology and has not been submitted in whole or part for an award in any other Institute or University.

The work reported on in this dissertation conforms to the principles and requirements of the Institute's guidelines for ethics in research.

Signed: _____

Date: **16 September 2012**

Abstract

My research question is what are the prevailing obstacles in Web accessibility on three well-known websites for older people who have sight difficulties?

The Web is an increasingly important resource in many aspects of modern life, however to fulfil their potential websites must be accessible to all people. It may be surprising to note, that four in ten people over 50 years of age use the Web, and the second most visited site amongst older people is Facebook (UN Agency for Information and Communication, 2012). Disability among older people is higher than among the overall Irish population, and one of the most common disabilities affecting older people are sight difficulties or visual impairments. The Web must be accessible to older people in order to provide equal access to social networking websites such as Facebook thus helping protect against social isolation. The Web is also useful in providing knowledge such as citizen's rights information and information on government policies and laws. If information on the Web is accessible it could increase the quality of life of older persons with sight difficulties by increasing their independence through enabling greater access to information (Paciello, 2000 pg. 17-18; Graham, 2011). Three key websites for this demographic population are: Facebook.com (Social networking), The Citizen's Information website (information on citizen's rights) and The Department of Health website (information on health policies).

Methodology

Prior research has argued that there is no one best approach to evaluating web accessibility and proposes the adoption of multiple approaches. Following these proposals this research used three different approaches for evaluating accessibility on websites for accessibility to older persons with sight difficulties as there are advantages and disadvantages to each approach. Approaches used included: (1) Using automated tools to determine accessibility, which looks at the code of websites to get a general overview of accessibility issues. (2) Manually looking at the design, code and also how it might impact the user. This involved a manual assessment of each of the websites and comparison to the WCAG 2.0 guidelines (3) the third aspect of Web

accessibility is looking at the visual, thinking skills or cognition required by the user to access the website. The user testing evaluation method involved participants completing tasks on each of the three websites while participants were being videoed, and asked them to speak aloud at the same time to reflect on accessibility issues. The participants were then asked to complete an exit-interview based on the Principles of Universal Design.

The three approaches provided a complete holistic approach to accessing Web accessibility on the three key websites.

Results and conclusions

The majority of users rated themselves below 6 (out of 10) for Knowledge of computers despite using the Web daily. Surprisingly half of the participants were Facebook users and the majority had never accessed the Citizens Information website or the Department of Health website before.

In the automated tools accessibility audit and the manual comparison to WCAG 2.0 principles Facebook fared worse compared to the two governmental websites (The Citizen's Information website and The Department of Health website). In contrast from the user-testing evaluation method there were different opinions on each of the websites from the eight users involved in the testing with no consensus over which was the best or worst website in terms of accessibility. Common themes emerging from the exit-interview results were that most participants felt the websites had "*too much information*" or were "*too busy*" or "*too congregated*". The research also discovered there is also a relationship between the WCAG 2.0 principles and theories of cognition, such as attention. Suggestions for future study include producing a handbook for web designers to help demonstrate to them that accessibility goes beyond automated web tools.

Key words

The web, sight difficulties, accessibility, older people, visual impairments

Acknowledgements

I would like to thank my supervisor John Kelleher for all his hard work supporting me throughout this research project. I would like to extend my thanks to Damian Gordon and Brendan Tierney and all the staff in DIT for helping me with my initial research proposal. I would also like my family and friends for supporting me throughout this dissertation particularly my mother and sister, and also to my friends Deirdre and Niall.

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Chapter 1- Introduction

1.1. Introduction

The introduction chapter will be structured as follows: Section 1.2 will discuss the motivation for this research question along with statistics on visual impairments amongst older people and how they use the web. The three key websites for this population demographic will also be introduced in this section. Section 1.3 will discuss the Digital Divide and social inclusion, both of which impact on older people using the web. Section 1.4 will discuss visual impairments as many eye conditions become more prevalent as we age (NCBI, 2012), along with assistive technology that may be used to help them access the web. Section 1.5 will introduce the methodology used in this thesis and following this section and overview of the entire layout of the thesis will be given.

1.2 Motivation For This Research Topic

The “World Report on Disability” (WHO, 2011: pg 1-350) found that with the increase in medical advances there has been an increase in the number of ageing populations. In Ireland there are 467, 926 persons over 65 years of age or 11% of the population. It is estimated by 2041, 22% of the Irish population will be over the age of 65 years (Age Action Ireland, 2012: Ageing fact sheet). Disability among older people which includes intellectual, physical and sensory disabilities is higher than among the overall Irish population, 29.5% compared with 9.3% of the general population. Among the older population disability also increases with age, varying from 18.7% of 65-69 year olds to 58.6% of those aged over 85. One of the most common disabilities affecting older people and how they function in everyday life is visual impairments. In fact a study undertaken by the Eye Disease Research Group in the USA in 2004 (Kempen, 2004) which estimated the number of people affected by refractive errors found that 1/3 of persons over 40 in Western Europe had refractive error making it the most common reason for eye impairment (Dunaway, & Berger, 2004).

In Ireland people are living longer, healthier and more active lives (Age Action Ireland, 2012: Ageing fact sheet) and there is a myth that older people do not use or want to use the Web. In Ireland there are 3,042,600 Web users as of June 2010, or 65.8% of the population and four in ten persons over 50 years of age use the Web according to the UN Agency for Information and Communication (ITU, 2012). According to ComScore (2012) the top three visited websites for persons over 50 are Google (38%), Facebook (19%) and Ryanair (13%). The Web can be useful for addressing some of our most pressing social challenges such as facilitating older people and also older living in rural communities to stay in touch with other people by social networking websites such as Facebook. A social networking service is a website that focuses on building and reflecting of social networks or social relations among people, who, for example, share interests and/or activities. Examples include Facebook, Google + and Twitter, which are used worldwide (Social networking-Wikipedia, 2012). Most Facebook users are under 44 years of age but the number of older people accessing the website is increasing. In Ireland there are currently 2, 112 020 total Facebook users (45.69% of the Irish population) and 20% of over 50s have a Facebook profile (ComScore, 2012).

Another potential benefit is the Web can provide users with knowledge such as citizen's rights information or knowledge on government policies and laws including information on healthcare. Governments can provide information to citizens enabling governments to be more open and responsive and to provide better services to its citizens. With the social potential of the Web it is all the more important that these services should be available for older people with sight difficulties. The Web offers the possibility of unparalleled access to information and interaction for many older people with disabilities such as visual impairments. Research by Brophy and Craven (2007) has shown that people with disabilities are most at risk of being excluded from access to websites, and in particular people who are blind or visually impaired and those who use assistive technologies such as screen readers. Tim Berners-Lee, the inventor of the World Wide Web and Director of the W3C (Berners-Lee, 1996) cited by (Carter & Markel, 2001), has commented that:

"The power of the Web is in its universality. Access by everyone regardless of disability is an essential aspect."

Three key websites for older persons over 50 with sight difficulties chosen for this research project: a social networking website and two governmental websites that provide information on citizen's rights and health policies in Ireland.

- Facebook.com (Social networking)
- The Citizen's Information website (Information on citizens rights) and
- The Department of Health Website (Information on health policies).

1.3 The Digital Divide and Social Inclusion

The research question test-group will examine older persons with sight difficulties. This section will therefore look at the digital divide and social inclusion, both of which impact on older people and how the Web can assist against them.

The Digital divide

The term "Digital Divide" refers to the gap between individuals, households, businesses and geographic areas at different socio-economic levels with regard to both their opportunities to access information and communication technologies (ICTs) and to their use of the Web for a wide variety of activities (Organisation for Economic Co-operation and Development, OECD* 2012: Understanding the digital divide).

The ability of individuals to take advantage of the Web varies significantly across the OECD area as well as between OECD and non-member countries. Access to and development of information, communication and e-commerce resources are increasingly viewed as crucial for economic and social development (for reasons of efficiency and because of network effects).

Social inclusion and how the Web can help mitigate against social isolation

The Web in Ireland can also be useful for facilitating older people to stay in touch with other people by accessing social media, through using email and Skype and the global news thereby militating against social isolation. Social contact and activity is very important for all people as it has benefits for physical and mental health. Social isolation is a particular risk for older people, with potentially serious consequences Age Action Ireland (2012). In fact a report by The National Psychiatric In-Patient Reporting System (NPIRS) (2012) as cited by Age Action Ireland (2012) found that older people were more likely to be admitted to a psychiatric hospital with over 65s accounting for 12% of all admissions. More frequent admissions to such hospitals could be linked to reduced social contact and activity. The Living in Ireland Survey (2000) cited by Age Action Ireland (2012) found that older people were less likely than younger people to be members of sports or social clubs or organisations, particularly in rural areas. The Living in Ireland Survey (2000) also found that about two thirds of older people talk to their neighbours most days and two thirds of older people meet friends and relatives most days and others do so once or twice a week. If information of the Web is accessible it could increase the quality of life of persons with disabilities by increasing their independence with again the ease of communicating via social networks and allowing older users information on their rights that they may otherwise have to visit a city with a citizen's advice bureau or make a phone call to access the same information. If it information is not accessible, it could further isolate older people and prevent them from being full participants in the information society forcing them to rely on others to gain the same information. With the social and economic potential of ICT and the Web it is all the more important that websites should be available for older persons with disabilities including visual impairments such as refractive errors.

There has been a huge social impact from the presence of IT (information technology) and the Web in Ireland (UN Agency for Information and Communication, 2012). It should also be noted that the In December 2006 the United Nations adopted the Convention on the Rights of Persons with Disabilities (CRPD, hereinafter referred to as "the Convention") which Irish government has ratified. The Convention asserts a

range of fundamental rights and freedoms that people with a disability enjoy as members of society. Article 21 requires that States Parties provide information intended for the general public to persons with disabilities in accessible formats and technologies appropriate to different kinds of disabilities in a timely manner and without additional cost; and encouraging the mass media, including providers of information through the Web, to make their services accessible to persons with disabilities. If information of the Web is accessible it could increase the quality of life of older persons by increasing their independence through provision of information and facilitating easier communication with persons. If information on the Web is not made accessible to older people is not, it could isolate them and prevent them from being full participants in the information society (Paciello, 2000 pg. 17-18; Graham, 2011; Berners-Lee, 1998).

The accessibility barriers to print, audio, and visual media can be much more easily overcome through web technologies such as screen-readers which read out the text on a website or a magnifier which would increase the size of the text which may be impossible to do in a standard printed book. In fact the increasing provision of Web-based information resources has moved from a simple text interface to dynamic and interactive designs which use coding such as JavaScript and CSS to style the HTML coding. While this move has provided people with a more creative and flexible experience, there are dangers that some people will be excluded because they cannot use standard methods of access.

1.4 Visual Impairments

Introduction

Visual impairment or blindness is a sensory disability where the level of impairment varies greatly and can result from a number of diseases, disorders and injuries. Many diseases can lead to or cause blindness and many conditions may become more prevalent as we age. The number of vision impaired people in Ireland (using WHO definitions) aged 55 and over will increase by 180% between 2006 and 2031 (WHO, 2011). Also as ageing occurs, glasses or contact lenses may be required to correct the

vision. The user-testing proposed to specifically test older users with visual disabilities therefore the eye and visual impairments will be discussed in detail as there are a wide spectrum of visual disabilities that impact on Web use. This section will also briefly mention Assistive Technology that can be used by people with visual impairments in helping them access the Web.

Blindness

The Department of Social, Community and Family affairs defines 'blind' as seeing at six metres what other people see at 60 metres (FAS-Training and employment authority 2012: definition of *Blind*). In Ireland today, there are more than 13,000 people who are blind or vision impaired and known to NCBI (National Council for the Blind of Ireland, 2008: Eyes on the Future report). It is thought that this figure underestimates the overall numbers by approximately 30 % (National Council for the Blind of Ireland, 2012: Eye conditions). The number of blind people in the Republic of Ireland aged 55 years and over is likely to increase by 170% between 2006 and 2031 (WHO, 2011). The main causes for registration of blindness are: age related macular degeneration (25%), glaucoma (12%), cataract (11%), retinitis pigmentosa (7%), myopic degeneration (5%) and diabetic retinopathy (5%). This group of users with visual impairments is outside the scope of this study but is important to mention them due to the fact that many conditions associated with blindness increase with age.

Low vision

Whether your impairment is mild to severe, low vision generally means your vision does not meet your needs. Low vision is defined by the American Academy of Ophthalmology (2012) as when ordinary glasses or corrective lens implants don't give you clear vision, you are said to have low vision. This is not to be confused with blindness. There may be 4000 – 5000 people throughout Ireland that have significant difficulties with their eyesight but, for a variety of reasons, have either not been identified, or sought out the services that are available to them. This group of users with visual impairments is outside the scope of this study but is important to mention them as the number of vision impaired people in Ireland (using WHO definitions) aged 55 is set to rise (WHO, 2011).

Optical and Refractive errors

This research purposes to test older persons with refractive errors using three different websites

The global prevalence of refractive errors has been estimated at between 800 million to 2.3 billion (Dunaway, & Berger, 2004). A refractive error may be defined as a state in which the optical system of the non-accommodating eye fails to bring parallel rays of light to focus on the fovea. As refractive errors are the most common it made sense to do a study on this demographic (National Council for the Blind, 2008: Eyes on the Future report).

Myopia and hyperopia are the states of refractive error in which the optical system of the eye brings parallel rays of light into focus anterior and posterior to the fovea, respectively, resulting in blurred vision. If you have myopia, you have trouble seeing things that are far away (NCBI, 2008: Eyes on the Future Report). Short sightedness occurs when the physical length of the eye is greater than the optical length. This makes it more difficult for the eyes to focus light directly on the retina. If the light rays are not clearly focused on the retina, the images you see may be blurry (Kempen et al, 2004). Farsightedness or individuals with hyperopia have to work their intraocular muscles hard to see clearly at any distance, although the effort required is generally greatest at near. Farsightedness is the result of the visual image being focused behind the retina rather than directly on it. It may be caused by the eyeball being too small or the focusing power being too weak. As aging occurs, glasses or contact lenses may be required to correct the vision. Those with astigmatism, often described as the rugby ball effect, have blurred unaided vision at all working distances.

The following section will outline common assistive technologies that can be used to help people who have low vision, are blind or have refractive errors access the Web.

Assistive Technology

Assistive Technology consists of broad range of devices, technical aids and strategies, which can help solve problems faced by people with disabilities in every day life

education, employment or social (CRC, 2012). It includes Alternative means of computer access. Assistive Technology strives to offer people alternatives and options to facilitate their personal independence in everyday living. Today there is a wide range of technology devices that have become smarter, smaller, lighter and more affordable but it is often simply a lack of understanding of how our environment including websites can be adapted and modified that is the greatest barrier for people with disabilities in our society (CRC, 2012).

There are many examples of Assistive Technology which many older people who may not be aware of as they may not be blind or have low vision. These persons would therefore would not be registered with the National Council for the Blind and would not receive training in Assistive Technology (National Council for the Blind, 2012: Assistive technology: Irishjobs.ie, 2008). Simple examples of Assistive Technology include: For computer display- an antiglare screen away from direct sunlight and a minimal amount of icons and possible distractions on the computer desktop. Also, make the more useful icons bigger and change the background colour or font size in word if it doesn't suit the person. Windows also has accessibility features such as sticky keys and a magnifier from the Windows Accessibility Options, see Figure 1.0. it should be noted that if websites are accessible this age group may not need to make use of these facilities and this demographic would not have a difficulty accessing websites.

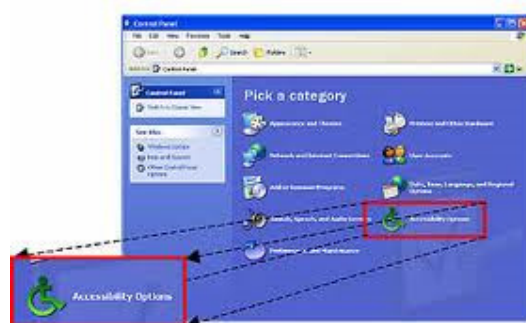


Figure 1.0 showing Windows Accessibility Options on the control panel of a computer

On the Web people who are blind would primarily use a screen-reader to access the content. A screen reader is a piece of software that enables a person with no sight to use all the functions of a computer, making it possible for them to read and write documents, use the Web and send email, using only a keyboard and without needing to

look at a computer screen. The screen reader speaks all the information that would appear on the screen. It is able to describe everything on the screen, including all the commands and buttons that you can use (NCBI, 2012: Assistive Technology). This interpretation is then re-presented to the user with text to speech, sound icons, or a Braille output devices. Common Screen readers include: JAWS from Freedom Scientific, Window-Eyes from GW Micro and Dolphin Supernova by Dolphin (Price, 2008; IrishJobs, 2008). There are different search strategies a screen-reader user can use for navigating rapidly through a website combined with the speech output such as using the headings in a webpage or tabbing through all the links on a webpage. Naturally this becomes more difficult when headings aren't correctly used or there are too many links on website. Adding into the HTML mark-up language items such as 'click to go to main navigation menu' or 'click to return to main menu' or 'this is the end of the webpage', can therefore be very useful for people using screen-readers to navigate more quickly through webpages. This type of HTML content can also be hidden through CSS if web designers don't want the general public to see it. Definitions of computing coding terms will be given in the methodology section.

On the Web many people with low vision use specialized monitors or software that increases the size of text or images large enough for an individual to see. Websites that use absolute font sizes make it difficult for the low vision user to make these adjustments using his or her computer. Additionally low vision users may have difficulty making out certain font styles such as italics without assistive software. People with low vision might also use a combination of Screen readers and magnifiers such as Zoom Text Magnifier or Reader from Ai Squared or NVDA for the open-source market (National Council for The Blind, 2012: assistive technology: Irishjobs.ie, 2008). In the following section the methodology used in this research project for analysing the accessibility on three different websites will be discussed.

1.5 Methodology for this research project

My research question as a result is as follows: what are the prevailing obstacles in Web accessibility on three well-known websites for older people who have sight difficulties?

Determining the accessibility of computing resources is a complex process, as computing technology evolves and changes, the means by which accessibility can be achieved must also grow and change (Nielsen et al, 2002). From the research there are three methods to analysing Web accessibility. The first approach is looking at the code behind the website to get a general overview of accessibility issues. The second is manually looking at the design, code and also how it might impact the user. The third aspect of Web accessibility is looking at the thinking skills or cognition required of the user to access the website. Cognition is what goes on in our heads when we carry out everyday activities. In science, cognition: refers to mental processes. These processes include attention, memory, and learning, perceiving things, understanding language, solving problems, and making decisions (Lycan, 1999).

Using all three evaluation methods to each show different information on different aspects of accessibility and also give a holistic analysis of accessibility of websites. As a result a variety of Web tools including both automated and manual tests and a selection of users from the key population demographic will be used to assess the accessibility of the three websites.

- The automated web tools were used to evaluate the accessibility of the code and to give quick overview of accessibility issues these include: **Fangs** to emulate how a screen reader perceives the webpage and show items such as how many links, frames and headings are used (Fangs Screen emulator: Add-ons for Firefox, 2012). The **W3 Validator** (W3School Validator, 2012) will be used to check that the HTML and CSS code are correct and valid in different browsers. The **Wave** Accessibility Toolbar was also used to give a quick overview of the main accessibility issues such as no alt text for images. **A-Checker** to check conformance with WCAG 2.0 Guidelines.
- Manually looking at the design, code and also how it might impact the user. For manual testing I hope to compare the Website informally against the 4 principles on Web Accessibility Guidelines 2.0. (**WCAG 2.0.**) (perceivable, operable, robust and understandable) and consider it against the 12 guidelines under each principle such: as text alternatives, time-based media, adaptable,

distinguishable, keyboard accessible, enough time, avoid seizures, navigable, readable, predictable, input assistance and compatible.

- The user-testing will involve task-completion on the websites while participants are videoed while asking them to speak aloud and reflect on accessibility issues. This technique is known as the "Think aloud protocol". Participants will then be asked to complete an exit-interview based on the Principles of Universal Design. The results of the exit-interviews will then be reflected on as to see how usable each of the websites are and to also mention the most relevant principle(s) in the design of the websites. (CEUD, 2012).

1.6 Conclusion

The government is duty by bound by the UN convention for rights for people with older persons with visual impairments such as refractive errors (2008) to provide equal access to information such as providing information on citizen's rights or on health. The impact of disability is radically changed on the Web because the Web removes barriers to communication and interaction that many people face in the physical world such as in printed books. However, when websites, Web technologies, or Web tools are badly designed and don't allow users to access them via Assistive Technology or in a standard way they can create barriers that exclude people from using the Web. This is particularly important to consider because as we age visual impairments increase and decrease our ability to access websites and information unless they are accessible.

The thesis will be structures as follows: Chapter 2 in this dissertation will provide a literature review and background information on Web accessibility and Universal Design and previous accessibility studies completed. Chapter 3, the methodology chapter will discuss different approaches for assessing websites for accessibility including automated tools, manual checks and user testing with an exit interview based on the Principles of Universal Design. Chapter 4 will provide the results of the automated testing of the websites. Chapter 5 will provide the results of the manual testing. Chapter 6 will provide the results of the user testing. Chapter 7 will provide a conclusion including a synthesis of result and recommendations for the three websites

to improve their accessibility. This chapter will also discuss critical reflections, proposals for the websites evaluated and it will outline areas for future study.

Chapter 2 Literature review

2.1 Introduction

The literature review chapter will be structured as follows: In Section 2.2 Web accessibility will be discussed and in Section 2.3 the Web Accessibility Initiative and Web Accessibility Guidelines (WCAG 2.0). Section 2.4 will discuss how WCAG 2.0 relates to cognition and human computer interaction and Section 2.5 will discuss the relevance of WCAG 2.0 to the Principles of Universal Design. Section 2.6 discusses other studies that have completed on Web accessibility.

2.2- Web Accessibility

In Ireland the Web is an increasingly important resource in many aspects of life: education, employment, government, commerce, health care, recreation, and more. It is essential that the Web be accessible in order to provide equal access and equal opportunity to people with disabilities. An accessible Web can also help people with disabilities more actively participate in society (Web accessibility Initiative, 2012) by providing them with information provided by their governments enabling and enabling them to network socially via the Web thereby facilitating greater participation in society through provision of information and allowing greater communication through social networking websites such as Facebook. There is significant legislation and public policy relevant to accessible Web design in Ireland (CEUD, 2012). Please see the thesis on *Web Accessibility of eGovernment Websites* by Mulvey (2003) for a detailed discussion on both national and International legislation.

Research has shown that people with disabilities are most at risk of being excluded from access, and in particular people who are blind or visually impaired and who use assistive technologies such as screen readers (Brophy, & Craven, 2007). The goal of Web accessibility is to ensure that information or services delivered through websites are available to and usable by the widest possible audience. This requires that all users can: perceive and understand the information provided; perceive, understand and operate the website navigation and can perceive, understand and operate the controls

and inputs. To achieve this, the design must take into account that the ability to see, hear, make inputs, read text or process information varies from user to user, across time and across situations of use. An accessible website will make provision for these variations (Centre of Universal Design Website, 2012). Web accessibility means that people with disabilities can perceive, understand, navigate, and interact with the Web, and that they can contribute to the Web. Web accessibility also benefits older people with changing abilities due to aging such as reduced vision (Web Accessibility Initiative, 2012: WSC 2007).

The design of the website must take into account that the ability to see, hear, make inputs, read text or process information varies from user to user, across time and across situations of use. An accessible website will make provision for these variations (CEUD, 2012). Bearing in mind the human element of website accessibility and that it requires users to interact with websites this is linked with theories of cognition or thinking and therefore these are also important to consider in the design of websites. Therefore there are three aspects to analysing website accessibility, looking at the code behind the website to get a general overview of accessibility issues. Manually looking at the design, code and also how it might impact the user. The third aspect of Web accessibility is looking at the thinking skills or cognition required of the user to access the website. Cognition is what goes on in our heads when we carry out everyday activities (Lycan, 1999).

The next section will present the aspect of looking manually at the code and design of the website and how it might impact on the user accessing the website successfully; this will involve looking at the Web accessibility Initiative (WAI) and Web Accessibility Guidelines (WCAG 2.0). In recent years, the guidelines from WCAG 2.0 have been widely accepted as the definitive guidelines on how to create accessible websites.

2.3 Web Accessibility Initiative (WAI) and WCAG 2.0 (Web Accessibility Guidelines, 2008)

The Web Accessibility Initiative (WAI) develops strategies, guidelines, and resources to help make the Web accessible to people with disabilities. The mission of the Web accessibility Initiative is to lead the Web to its full potential to be accessible, enabling people with disabilities to participate equally on the Web. In 1999 the Web

Accessibility Initiative, a project by the World Wide Web Consortium (Web accessibility Initiative, 2012: WWC, 1999 & 2007), published the Web Content Accessibility Guidelines (WCAG 1.0). These were replaced in December 2008 when the WAI released the WCAG 2.0 as a recommendation. WCAG 2.0 was published as a W3C recommendation on December 11, 2008 (World Wide Web Consortium. 2012: Web Accessibility Initiative, 2012). WCAG 2.0 aims to be more up to date. WCAG 2.0 aims to be up to date and more technology neutral than WCAG 1.0. In recent years, the guidelines from WCAG 2.0 have been widely accepted as the definitive guidelines on creation of accessible websites and there are currently no other comparable guidelines that have been developed world wide on Web accessibility. WCAG 2.0 covers a wide range of recommendations for making web content more accessible to a wider range of people with disabilities, including blindness and low vision, deafness and hearing loss, learning disabilities, cognitive limitations, limited movement, speech disabilities, photosensitivity and combinations of these (World Wide Web Consortium. 2012: Web Accessibility Initiative, 2012). The four principles on WCAG 2.0 are perceivable, operable, robust and understandable and have guidelines for each principle (W3 School, 2012) against the 12 guidelines, for example: text alternatives, time-based media, adaptable, distinguishable. For each guideline, there are testable *success criteria*, which are at three levels, A, AA and AAA (highest rating).

Conformance Level to WCAG 2.0 Guidelines:

- **Level A:** For Level A conformance (the minimum level of conformance), the page must meet all the Level A Success Criteria
- **Level AA:** For Level AA conformance, the Web page satisfies all the Level A and Level AA Success Criteria
- **Level AAA:** For Level AAA conformance, the Web page satisfies all the Level A, Level AA and Level AAA Success Criteria, or a Level AAA conforming alternate version is provided. (Understanding WCAG 2.0 Compliance- W3School, 2012).

The WCAG 2.0 guidelines and principles aim to make content accessible to a wider range of people with disabilities. The WCAG 2.0 guidelines also make Web content

more usable by older individuals with changing abilities due to aging and often improve usability for users in general. WCAG 2.0 is designed to apply broadly to different Web technologies now and in the future, and to be testable with a combination of automated testing and human evaluation. It should be mentioned that there is no other similar comparable guide to manual evaluation of website accessibility that looks at the design, code and also how it might impact the user. The next section will look at how WCAG 2.0 is related to human thinking processes or cognition and human computer interaction which is essential to consider the WCAG 2.0 principles include understandable, robust and perceivable.

2.4 The principles of WCAG 2.0 and how they relate to cognition and human computer interaction

A vital foundation for Human Computer Interaction designers and those that design websites is an understanding of cognitive and perceptual abilities of the user. Cognition is what goes on in our heads e.g. our thinking skills, when we carry out everyday activities. In science, cognition: refers to mental processes including attention, memory, and learning, perceiving things, understanding language, solving problems, and making decisions (Lycan, 1999).

At the top of Web accessibility as defined in WCAG 2.0 are the four principles that provide the foundation for Web accessibility: perceivable, operable, understandable, and robust. Three of these principles are relevant to cognition. The fourth principle of WCAG 2.0 is robust, content must be robust enough that it can be interpreted reliably by a wide variety of user agents, including assistive technologies which means that users must be able to access the content as technologies advance (as technologies and user agents evolve, the content should remain accessible).

The principle of perceivable requires that information and user interface components must be presentable (it can't be invisible to all of their senses). In cognition perception is fundamental to interacting with computers, for example to use a computer a user

needs to perceive information that is presented by the interface. Perception can involve all the different senses (visual, hearing, touch, smell etc).

The principle of operable requires that user interface components and navigation must be operable which means that users must be able to operate the interface (the interface cannot require interaction that a user cannot perform) and therefore users must be able to understand how to operate the interface.

The third principle of understandable requires that all information and the operation of user interface must be understandable which means that users must be able to understand the information as well as the operation of the user interface (the content or operation cannot be beyond the user's understanding).

For all of these principles learning, memory, attention and problem-solving are essential to consider. Attention is the cognitive process of selectively concentrating on one aspect of the environment while ignoring other things (Anderson, et al, 2004), such as focusing on a search box on a website and ignoring everything else. Memory is the processes by which information is encoded, stored, and retrieved (Sperlin, 1963) such as remembering how to return to a home page on a website. The success of any website depends on the extent to which the users can learn and use the system. Understanding the basics of cognitive processes is important in order to understand the difficulties in learning to use a website when considering the user-component. Users of computer systems are often scared of making errors and anticipation of errors may hinder a user's interaction with a system. Therefore a website must provide safeguards and also good feedback by following WCAG 2.0 to make them accessible and thereby promote accessible websites (Norman, 1990: pp 3-20).

2.5 Web accessibility and Universal Design

In its most general sense, accessible Web design refers to the philosophy and practice of designing Web content so that it can be navigated and read by everyone, regardless of location, experience, or the type of computer technology used. Accessible Web design is usually discussed in relation to people with a disability, because this group is most likely to be disadvantaged if the principles of accessible Web design are not

implemented (Kane, 2009). A website should be designed to meet the needs of all people who wish to use it. This is a fundamental condition of good design. Similarly to accessible Web design Universal design requires that we consider the diverse needs and abilities of all throughout the design process (Centre for excellence in Universal Design, 2012). Evaluation of website accessibility used in this methodology will incorporate elements from the Principles of Universal design.

Universal Design creates products, services and environments that meet peoples' needs. Simply put, Universal Design is good design. Universal Design is the design of a product or environment, programs and services that embrace that goes beyond access codes and is usable for all people regardless of their age, size, ability or disability (Centre for excellence in Universal Design, 2012). It embraces the diversity of people regardless of age, gender etc, without the need for adaptation, specialized design. Universal Design will not exclude assistive devices that for particular groups of users with a disability this may be needed. An environment (or any website or product) should be designed to meet the needs of all people who wish to use it. This is not a special requirement, for the benefit of only a minority of the population. It is a fundamental condition of good design. If an environment or website is accessible, usable, convenient and a pleasure to use, everyone may benefit. Universal design requires that we consider the diverse needs and abilities of all throughout the design process. There are 7-principles to guide good web design according to the Centre for Universal Design in NCSU (2012), the principles and the guidelines for each maybe applied to evaluate existing designs, guide the design process and educate both designers and consumers about the characteristics of more usable products and better-designed websites. The principles and guidelines below as quoted from the Centre of Universal Design website (2012).

“The first Principle is Equitable Use-the design is useful and marketable to people with diverse abilities. The Guidelines for the principle of equitable when considering good design are: Provide the same means of use for all users: identical whenever possible; equivalent when not and Avoid segregating or stigmatizing any users. Provide provisions for privacy, security, and safety should be equally available to all users and make the design appealing to all users.

Principle 2 is Flexibility in Use-the design accommodates a wide range of individual preferences and abilities. The Guidelines for the principle of Flexibility in Use are to provide choice in methods of use and accommodate right- or left-handed access and use. Two other guidelines for this principle include facilitating the user's accuracy and precision and provide adaptability to the user's pace.

Principle 3 is Simple and Intuitive Use- use of the design is easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level. Guidelines for the principle of Simple and Intuitive include: eliminate unnecessary complexity and be consistent with user expectations and intuition. Three other guidelines for the principle of Simple and Intuitive include: accommodate a wide range of literacy and language skills and arrange information consistent with its importance and provide effective prompting and feedback during and after task completion.

Principle 4 is Perceptible Information -the design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities. Guidelines for the principle of Perceptible Information include: use different modes (pictorial, verbal, tactile) for redundant presentation of essential information and provide adequate contrast between essential information and its surroundings. Maximize "legibility" of essential information and differentiate elements in ways that can be described (i.e., make it easy to give instructions or directions). The final guideline for the principle of Perceptible Information is to provide compatibility with a variety of techniques or devices used by people with sensory limitations.

Principle 5 is Tolerance for Error -the design minimizes hazards and the adverse consequences of accidental or unintended actions. Guidelines for the principle of Tolerance for Error include: arrange elements to minimize hazards and errors: most used elements, most accessible; hazardous elements eliminated, isolated, or shielded and provide warnings of hazards and errors. The last two guidelines are to provide fail safe features and to discourage unconscious action in tasks that require vigilance.

Principle 6 is Low Physical Effort- the design can be used efficiently and comfortably and with a minimum of fatigue. There are four guidelines for the principle of Low Physical Effort these include: allow the user to maintain a neutral body position and use reasonable operating forces. The last two guidelines for this principle are to minimize repetitive actions and minimize sustained physical effort.

Principle 7 is Size and Space for Approach and Use- appropriate size and space is provided for approach, reach, manipulation, and use regardless of user's body size, posture, or mobility. There are four Guidelines these include provide a clear line of sight to important elements for any seated or standing user and make reach to all components comfortable for any seated or standing user. The last two guidelines are to accommodate variations in hand and grip size and provide adequate space for the use of assistive devices or personal assistance.” (CEUD, 2012)

2.6 Studies completed on website accessibility

Studies on website accessibility that informed the evaluation methods

Due to the importance of this topic it is not surprising that there have been other studies completed on website accessibility. From my research I also discovered there were three common methods for evaluating accessibility on websites for accessibility.

1. Using automated tools to determine accessibility
2. A manual assessment of each of the websites and comparison to the WCAG 2.0 guidelines.
3. User testing

Some of these studies use automated tools to evaluate websites for accessibility (Williams, & Rattray: 2005; Hassanzadeh & Navidi, 2010; Federici et al, 2005; Kane et al, 2007). Studies by (Federici et al, 2005), Kane et al (2009), Williams et al (2010) and (Centeno et al, 2006) all suggest the limitations of using automated tools such as Bobby alone without any manual testing as many of the 65 specifications on WCAG

2.0 which can only be checked by a human operator. Also since WCAG 2.0 is not written in a formalized manner, evaluation models may have different interpretations of what these rules mean. As a result different result may be obtained using different automated Web tools that check for accessibility on the same webpage. Some studies identified used manual evaluation methods to check accessibility such as comparison to WCAG 2.0 guidelines (Williams, & Rattray: 2005; Hassanzadeh & Navidi, 2010: Kane et al, 2007). Some studies identified used user-testing (Hassanzadeh & Navidi, 2010: Federici et al, 2005). Finally very few of the studies combine the three techniques with the exception of (Hassanzadeh & Navidi, 2010) where the advantages and disadvantages to all three evaluation methods are argued. It would also be very hard to conclude from automated and manual testing how well a person can navigate, understand or interact with the Web without the user which is the very definition of Web accessibility itself. We argue that this a difficulty as each technique in isolation ignores some aspects of the issue of website accessibility and usability. It would also be very hard to conclude from automated and manual testing how well a person can navigate, understand or interact with the Web without the user which is the very definition of Web accessibility itself. For this reason we adopt a holistic approach to the issue and combine all three techniques in our study. Also none of the studies look specifically at older people with visual impairments.

For this research a similar methodology used by Hassanzadeh & Navidi, (2010) will be used to ensure it is as balanced a study as is possible: incorporating both qualitative and quantitative aspects using a variety of Web tools to ensure as complete as possible a picture along with manual checking and user-checking. The next sub-section will discuss the research undertaken for accessibility studies undertaken on the three key websites for this population demographic.

Accessibility studies previously completed on the three key websites

From completion of an extensive literature review of accessibility studies which looked different websites there were a number of findings: limited investigations have been completed on Facebook or governmental websites in Ireland that consist of user testing or an in-depth analysis of more than just the home page on the website

Previous accessibility studies have relied on using automated tools to assess accessibility on websites. For example, previous research has been completed on the accessibility of governmental websites in Ireland but there have not been in-depth studies undertaken on The Department of Health website itself or The Citizen's Information website and none of the previous studies completed on any of three websites have included a combination of user-testing, automated tools and a manual check for accessibility. The aim of this research is to analyze the websites accessibility to persons with mild visual impairments over the age of 50 years of age therefore the research will evaluate the accessibility of three websites most likely to be accessed by an older-age group: Facebook.com-a market-leading social networking company and two different governmental Websites: Citizens Information Website and The Department of Health.

2.7 Conclusion

The Web is an increasingly important resource in many aspects of life. The Web removes barriers to communication and interaction that many older people with sight difficulties face in the physical world such as printed books where the formatting cannot be adjusted. However, when websites, Web technologies, or Web tools are badly designed, they can create barriers that exclude older people from using the Web. When the Web is better designed to meet the needs of older people it is also accessible to people with a diverse range of hearing, movement, sight, and cognitive ability (W3C, 2009: Web accessibility Initiative, 2012). This is particularly important to consider because as we age visual impairments increase and decrease our ability to access websites and information unless they are accessible. It is essential that websites are accessible if they are going to help reduce social isolation through social networking websites such as Facebook and provide equal access to information such as information on citizen's rights or on health policies thereby enabling older people to actively participate in society.

In the next chapter we will present the methodology for our study and draw on previous work, where appropriate, to provide a rationale for our methodology design.

Chapter 3 Methodology

3.1. Introduction

This research question examines what the prevailing obstacles in Web accessibility and usability on three well-known websites for older people who have sight difficulties. Three websites likely to be accessed by an older-age group Facebook.com (Social networking), The Citizen's Information website (Information on citizen's rights) and The Department of Health Website (Information on health policies).

Research outlined in Chapter 2 has argued that there is no one best approach to evaluating web accessibility and proposes the adoption of multiple approaches. Following these proposals this research used three different approaches for evaluating accessibility on websites for accessibility as there are advantages and disadvantages to each approach. Approached used included: (1) Using automated tools to determine accessibility, which looks at the code of websites to get a general overview of accessibility issues. (2) Manually looking at the design, code and also how it might impact the user. This involved a manual assessment of each of the websites and comparison to the WCAG 2.0 guidelines (3) the third aspect of Web accessibility is looking at the thinking skills or cognition required of the user to access the websites, this involved user testing and exit-interviews. The user testing evaluation method involved task-completion on each of the three websites while participants were being videoed, and asked them to speak aloud at the same time to reflect on accessibility issues. They were then asked to complete an exit-interview based on the Principles of Universal Design. The three approaches provided a complete holistic approach to accessing Web accessibility on the three key websites.

With this in mind Section 3.2 in the methodology will look at the websites in detail with a view towards why they were selected for testing. Section 3.3 will discuss different ways to test the websites for accessibility and usability to older people who have sight issues including automated and manual checks and user testing.

Section 3.2. The Websites

Three websites likely to be accessed by persons with sight difficulties over 50 years of age are: Facebook.com (Social networking), The Citizen's Information website (Information on citizen's rights) and The Department of Health website (Information on health policies).

As mentioned previously a social networking website is a website that focuses on building and reflecting of social networks or social relations among people, who, for example, share interests and/or activities (Social networking-Wikipedia, 2012). Social networking websites can be useful in allowing older people to stay in touch with other people. Facebook is a market-leading social networking company so hence this social networking website was chosen. The Citizen's Information website provides information on citizen's rights. Older people are therefore not reliant on making phone calls to government departments or on visiting Citizen's Advice bureaus to attain their required information. The Department of Health website provides information on health policies. Older people are more likely to have disabilities or health problems than the general population (Age-Action, 2012) so therefore access to policies on health is essential for them. A brief introduction of each of the websites will be given below and Section 3 will discuss in detail the methods used to evaluate accessibility on each of them.

Facebook

Facebook is a social networking website and was launched eight years ago and has more than 900 million active users or nearly 14% of the population of the world (Sengupta ,2012). The website is accessed on <http://www.Facebook.com> and is a private company. Users have a profile and can add other users as friends, exchange messages and photos and update their profile. Additionally, users may join groups or events, organized by workplace, school or college by other friends (Facebook.com, 2012) as cited in Eldon (2008). In Ireland there are 2, 112 020 total Facebook users (45.69% of the Irish population). With 47% are male and 53% female users (ComScore, 2012). Most users are aged 25-35 but there are a growing number of older

people accessing the site with 7-10% of those over 50 using the site. Facebook is also the 2nd most visited website by older people at 19% of all visits being to this website.

The Citizen's Information website

This Citizens Information website provides information on public services and entitlements in Ireland and is provided by the Citizens Information Board (Citizens Information Website, 2012).

The website is accessed on [Http://www.citizensinformation.ie/en](http://www.citizensinformation.ie/en). The website is run by the Citizens Information Board. The website gathers information from various government departments and agencies, and aims to have all the information citizen's need presented in an easy-to-understand way (Citizens Information Website, 2012).

The Department of Health Website

The purpose of The Department of Health website is to provide information on health policies and information for consumers. Another purpose of the website is to publish official communications made by The Department of Health. The website may be accessed on <http://www.dohc.ie/>. There are a large volume of links presented on the Department of Health homepage that connect consumers to other health related websites (Department of Health Website, 2012).

3.3 Different Methods Used To Evaluate Accessibility

From my research there were three common methods for evaluating accessibility on websites and proposes the adoption of multiple approaches to provide a holistic overview of accessibility obstacles. Therefore this research used three methods for evaluation of accessibility on Facebook, The Department of Health website and the Citizens Information website.

The approaches were as follows:

- (1) Using automated tools to determine accessibility. This involves looking at the code of websites to get a general overview of accessibility issues.
- (2) Manually looking at the design of the website, its code and also how this might impact on the user. This will involve a manual assessment of each of the websites and comparison to the WCAG 2.0 guidelines.
- (3) The third aspect of Web accessibility is looking at the thinking skills or cognition required of the user to access the website this involved user testing and exit-interviews.

In the following paragraphs the advantages and disadvantages for each of these approaches will be presented concluding with the rationale for a holistic approach to evaluating Web accessibility.

Automated evaluation:

Automated tools for evaluating web accessibility are those that scan pages of a website and evaluate it according to the checkpoints of either the guidelines of the Worldwide Web Consortium. Such evaluation software programs are very fast and convenient for website evaluation and save time and human effort (Hassanzadeh & Navidi, 2010. pg. 6). They are often also free of charge and do not require a great knowledge of web accessibility. For example Cynthia Says (<http://www.cynthiasays.com/>), and WAVE (<http://www.wave.Webaim.org/wave/indexjsp>) are examples of free online checking services.

Brophy, & Craven (2007:pg.14) suggest semi-automatic and automatic testing using validation tools to check that valid mark-up has been used and accessibility checking tools to check that accessible mark-up has been used. But the same authors claim that Also report that results from automated testing will not provide the whole picture in terms of accessibility. The W3School as cited by Brophy & Craven (2007, pg 14) suggest using multiple methods when evaluating websites for accessibility. Studies by (Federici et al, 2005), Williams et al (2010) and (Centeno et al, 2001, pg 1) all suggest the limitations of using automated tools alone without manual testing or evaluation. A study of the accessibility of 134 UK higher education library websites, conducted for the Resources for Visually Impaired Users of the Digital Library project (Brophy & Craven, 2007), identified a number of examples of accessible web design, with 49 of

the 134 home pages evaluated being eligible for the Bobby Approved Icon. However, the study also however acknowledged that using an automated checker such as Bobby alone has its limitations, citing examples of accessibility problems identified manually that were not identified by Bobby such as the design of the website and how it affects the user. Another study by Hassanzadeh, & Navidi (2010, pg. 7) suggested that expert evaluation of some aspects of Web accessibility requires manual examination and also judgment by experts to provide suggestions to improve accessibility.

A comprehensive list of free online checking tools is available at <http://www.w3.org/WAI/ER/existingtools.html>.

Manual evaluation:

Another method for technical evaluation is manual evaluation that is completed by professionals with knowledge of Web design and of accessibility. Evaluation by this method has a number of steps during which the expert examines specific pages including the homepage, pages containing tables and forms, and search pages according to accessibility checkpoints (Hassanzadeh, & Navidi, 2010. pg. 6). After an overall examination of the page, images, audio files, font sizes, frame loadings, etc. are looked at. Finally, to evaluate clarity, simplicity, and clarity of the text, specific parts of some of the webpages are looked at (Hassanzadeh, & Navidi, 2010. pg. 6). Brophy & Craven (2007: pg. 14) suggest using manual evaluation using relevant criteria for assessment such as the Web such as Web Content Accessibility Guidelines (WCAG).

For manual testing this research looked towards the most precise and accredited guidelines available today, which is the Web content accessibility guidelines (WCAG) originally developed in 1999 by the Web accessibility initiative (WAI) now known as **WCAG 2.0** (Web Content Accessibility Guidelines (WCAG) 2.0, 2008). Most of the 65 specifications on WCAG can only be checked by a human operator in order for them to be accessible for people with different browsers and people with disabilities. Also since WCAG is not written in a formalized manner, evaluation models may have different interpretations of what these rules mean. As a result different results may be obtained using different automated Web tools that check for accessibility on the same webpage. A disadvantage to using a manual check to evaluate Web accessibility is that

the person who evaluates a Web site needs to have knowledge and understanding of Web site accessibility and must be able to provide suggestions for overcoming their shortcomings. Hassanzadeh & Navidi, 2010. (pg. 7) suggest this method alone is unlikely to discover all of the barriers of website accessibility as it would be very hard to conclude from automated and manual testing how well a person can navigate, understand or interact with the Web without the user which is the very definition of Web accessibility itself.

User testing:

Brophy & Craven (2007, pg 14) suggested that user testing is essential for testing of specific features of a website; this should include people with different technical abilities and users of assistive technologies. A study of the accessibility of museum, library, and archive websites (City University, 2004) tested a sample of 300 such websites in England and 25 international websites, using both automated tools and user testing, for compliance with WCAG 1.0 checkpoints. In general, 22 percent of the problems experienced by the user panel were not identified by automated testing of WCAG 1.0 checkpoints. The most common problems identified were poorly named hypertext links and lack of provision to skip through the navigational links (SKIP NAV) directly to the content. A lack of descriptions for images (alternative text), poor colour schemes, and lack of accessibility options were also mentioned. The Disability Rights Commission (2004, pg. 47-48) found that using guidelines and automated testing tools were not enough to evaluate the accessibility of websites. The DRC (2004) found that involving users and particularly people with disabilities in the design and testing process of building websites helped to improve accessibility and usability.

King et al (2004) reported that methods developed for user testing included expert approaches such as heuristic evaluation and cognitive walk-through, to basic interaction with the users themselves: simply asking them to comment on their experiences using website or specific features of a website. More formal user testing can be achieved through using structured or semi structured task based exercises with observational and interview techniques (Craven & Brophy, 2007). This may then be followed by query techniques such as focus groups or questionnaires. Disadvantages of user-testing are that it takes more time, is costly, and the results may be generalized across a group of users (Hassanzadeh, & Navidi 2010. pg. 7).

Holistic approach:

With this in mind, some individuals and organizations have decided to take a more holistic approach to Web accessibility rather than relying on existing guidelines and recommendations. The focus is to take a more pragmatic approach to accessibility (Brophy, & Craven, 2007: pg. 10). Hassanzadeh, & Navidi (2010) suggested using a combination of user testing, manual checking and using automated tools to assess accessibility as there are advantages and disadvantages to all three. In order to address the experience of the end user it is critical in the research to include a broad range of research methods to address the research question from both a qualitative and a quantitative viewpoint. With this in mind the research question will be addressed by using a combination of all three evaluation methods.

Hackett and Parmanto (2009) found that in Web accessibility evaluating the homepage of a particular website is not sufficient to detect the accessibility of the website. Evaluating the homepage and first-level pages gives more accurate results of entire site accessibility. Hence this research looked at least four pages on each of the websites for the manual, automated tools and user testing of the websites. Multiple pages were selected for each site based on frequency of use and the criteria specified in the MeAC Guidelines (2010) which provide an overview and methodology to undertaking accessibility audits in websites. This methodology recommends sample pages are taken from a website which include the following:

1. The Home page of each of the websites
2. Representative page (if the structure is different from the home page)
3. Site map (if available)
4. A page with a form (preferably the contact page or search page)

Automated tests were performed on each of the Urls listed with tests being done on four webpages on The Department of Health and Citizens Information website and on the six Facebook pages.

The following pages were accessed on the Facebook website:

<http://www.Facebook.com/>

<http://www.Facebook.com/?sk=welcome>

<http://www.Facebook.com/?sk=welcome#!/profile.php?id=100003644343730>

<http://www.Facebook.com/?sk=welcome#!/profile.php?id=100003644343730&sk=friends>

<http://www.Facebook.com/?sk=welcome#!/profile.php?id=100001670616318>

<http://www.Facebook.com/?sk=welcome#!/messages/100001670616318>

The following pages were accessed on The Citizen's Information website:

<http://www.citizensinformation.ie/en/>

<http://whatsnew.citizensinformation.ie/>

http://www.citizensinformation.ie/en/how_to_use_this_site.html

http://www.citizensinformation.ie/en/housing/owning_a_home/home_owners/household_charge.html

The following pages were accessed using the manual and automated checks along with the user testing on The Department of Health website:

<http://www.dohc.ie/>

<http://www.dohc.ie/foi/>

http://www.dohc.ie/about_us/contact/

and the search page on The Department of Health which uses Google:

<http://www.google.com/cse?cref=http://search.gov.ie/customcse/www.dohc.ie&q=customer+service&x=41&y=8#gsc.tab=0&gsc.q=customer%20service&gsc.page=1>

The research question again is what are the prevailing obstacles in accessibility and on three well-known websites for older people who have sight difficulties?

This research will therefore investigate all three websites using a range of technical tests including both automated accessibility Web tools and then manually checking the websites against the Web accessibility guidelines (WCAG 2.0) (Caldwell et al, 2008) as outlined in Chapter 2. The research will also use user-testing.

The next sections in the methodology will be structured as follows: Section 3.4 will discuss the automated tools in detail chosen for this research. Section 3.5. will discuss the manual check used for this research, and finally, Section 3.6. will discuss the user-testing methods used for this research.

3.4 Automated Tools Used to Evaluate Accessibility

Introduction

Determining the accessibility of computing resources is a complex process (Brophy, & Craven, 2007, pg.1) for this reason a variety of automated tests will be used to evaluate each of the websites due to each approach showing different information on diverse aspects of accessibility and to also give a holistic analysis of the area rather than producing the same results twice if similar Web tools were used. The tools were taken from the WAI website <http://www.w3.org/WAI/ER/tools/complete> .

Automated tools used included: the **A-Checker** to check conformance levels with WCAG 2.0, **Wave Toolbar**, the **W3 Validator for HTML** and the **W3 Validator for CSS** to inspect elements of code. The screen-reader emulator, **Fangs** was also used. All of the tools used were Open-source and therefore free to use tools and both A-Checker and Wave were based on WCAG Guidelines. Bobby, which was a commonly mentioned tool in the research completed prior to this study but was closed down in 2005 and consequently not used in this study. However the authors of Bobby recommend using the Wave Toolbar instead (CAST, 2008). Cynthia Says (2012) was also checked by and it performed a similar analysis to the Wave Toolbar (providing a quick overview of the main accessibility issues) and the researcher felt it more worthwhile to have a different analysis of the websites rather than repeating

information, for example using a different tool to look at different aspects of coding etc. Similarly Total Validator was checked and this performed similar conformance checks to WCAG 2.0 guideline to A-Checker.

A brief description of computer coding terms such as HTML and CSS will now be given followed by a detailed description of each of these automated web tools used in this research.

Definitions of computer codes and terms

It is important to mention what various computer code terms mean before outlining the automated tools. HTML is a language for describing webpages (W3C School-Introduction HTML, 2012). **HyperText Markup Language (HTML)** is the main mark-up language for displaying webpages and other information that can be displayed in a web browser. HTML elements consist of Mark-up tags enclosed in angle brackets such as <html> and they often occur in pairs such as . The **<!DOCTYPE>** declaration is very first thing in your HTML document, before the <html>, it is an instruction to the web browser about what version of HTML the page is written in. An example would be HTML 5.0 or HTML 1.0. HTML 5.0 is the fifth major revision of HTML and HTML 1.0 is the first version used. HTML transitional lets you use a few presentational attributes and elements that aren't available in HTML strict. This is important to ensure so the browsers render the content correctly (W3C School- HTML Doctype, 2012: W3 School- from HTML 4.0 to HTML 5.0).

A **web browser** reads HTML documents and composes them into visible webpages. The browser does not display the HTML tags but uses the tags to display the content. HTML tags can refer to **CSS (Cascading style sheets)** to define the appearance of text and the layout of the webpage (W3C School-Introduction CSS, 2012). The W3 School (2012) encourages CSS rather than HTML to be used for presentation. **JavaScript** is a scripting language used to add more interactivity to a website and is normally embedded directly into HTML pages (W3C School-Introduction JavaScript, 2012). **AJAX** means Asynchronous JavaScript and XML and can create dynamic webpages that are updated asynchronously by exchanging small amounts of data with the server

behind the scenes meaning the webpage does not have to be re-loaded (W3C School-Introduction Ajax, 2012).

The next section will discuss the automated tools that interpret the code of websites to determine if they are accessible.

A-Checker

A- Checker (version 0.8.6) was developed by ATRC University of Toronto in January 2006. It is an online accessibility checker that tests webpages for conformance to accessibility guidelines including WCAG 1.0, 2.0. A-Checker is open-source software which is easy to use. This tool is used by copying and pasting in the URL of the webpage that is to be evaluated and clicking 'Check it'. The default guidelines are WCAG 2.0 Level AA, and the guidelines can be changed by selecting the 'Options' link. A-Checker identifies accessibility issues under three types of problems:

1. **Known problems:** You must modify your page to fix these problems;
2. **Likely problems:** These are problems that have been identified as probable barriers, but require to be checked by a person.
3. **Potential problems:** may not have to modify webpage to fix these problems (AChecker Handbook, 2012)

Wave Accessibility Toolbar

The **Wave Accessibility Toolbar** was used to give a quick overview of the main accessibility issues on the Websites such as no alternative text for images (Wave Accessibility Toolbar, 2012). The Wave toolbar (Web accessibility Toolbar) is downloadable off the website: Mozilla Firefox Add-ons (2012).

The WAVE Toolbar provides button options and a menu that will modify the current Web page to reveal the underlying accessibility information within Mozilla Firefox.

Wave has over 80 possible icons show missing form labels, table structure, script elements and event handlers, document structure and reading order, and more. A full list of all icons may be found on <chrome://wavetoolbar/content/icons.htm> (WAVE 2012). Wave uses three different colour icons to display: accessibility errors, alerts and accessibility features on a website:

- All **RED** icons indicate accessibility **ERRORS**. Their presence will almost certainly cause accessibility issues.
- All **YELLOW** icons indicate **ALERTS**. They may or may not be accessibility issues, but typically indicate an area where accessibility is often an issue or where it may be made better. They should each be checked for possible issues (require a human operator to check).
- All **GREEN** icons indicate **ACCESSIBILITY FEATURES** that the author should check for accuracy
- All **LIGHT BLUE** icons indicate **STRUCTURAL, SEMANTIC, or NAVIGATIONAL ELEMENTS** that may aid accessibility. They should be checked for proper use. (WAVE: Icons key, 2012).

Wave checks that the guidelines are compliant with the WCAG 1.0 and Section 508. This online checker works with the following browsers: Internet Explorer, Mozilla/Firefox and Netscape. Wave offers four types of reports as follows:

- Errors, Feature and Alerts
- Structure/Order View
- Text-only view, and
- Outline view

Wave is free open source software developed by WebAim. The URL for this evaluation tool is <http://wave.webaim.org/>.

Figure 2 is an example of how the Wave Toolbar works on a website with errors numbered 1-7.

1. As you can see on number 1 there are 46 accessibility errors that would

certainly impact somebody with a visual disability and also someone using an assistive technology.

2. On number 2, the red “h?” icon shows a missing header at the top of the page affecting the search strategy a user might use when using a screen-reader. On the right hand side of the page the red-hand shows missing alternative text. On the left hand side there is a yellow magnifying glass that shows small text is being used. A picture of a yellow icon with mouse shows an event handler is present on the webpage.
3. On number 3 you can see a picture of a yellow hand this is an alert which indicates the alternative text to a link does not make sense out of content. Anybody hovering their mouse over this link of this would not understand where the link would take them to.
4. On number 4 small text is used on the website (under 9 pixels). This would make it hard for someone with myopia to see the text.
5. On number 5 is an alert which shows “access keys” are used. For example you can press 2 to navigate to the link rather than use a computer mouse. The alert warns that the short-cut may not be meaningful to people.
6. An example of an accessibility error on Figure 1 is number 6 which shows that there is a linked image with no alternative text which would impact on somebody accessing the website via a screen reader. In this case a screen-reader would simply read out the HTML content.
7. On number 7 on Figure 2 you can see the yellow icons with eyes to show content is hidden by CSS. This indicates there is content in the HTML which is hidden that maybe seen by someone using a screen reader but not by a sighted user and maybe an issue for the user.

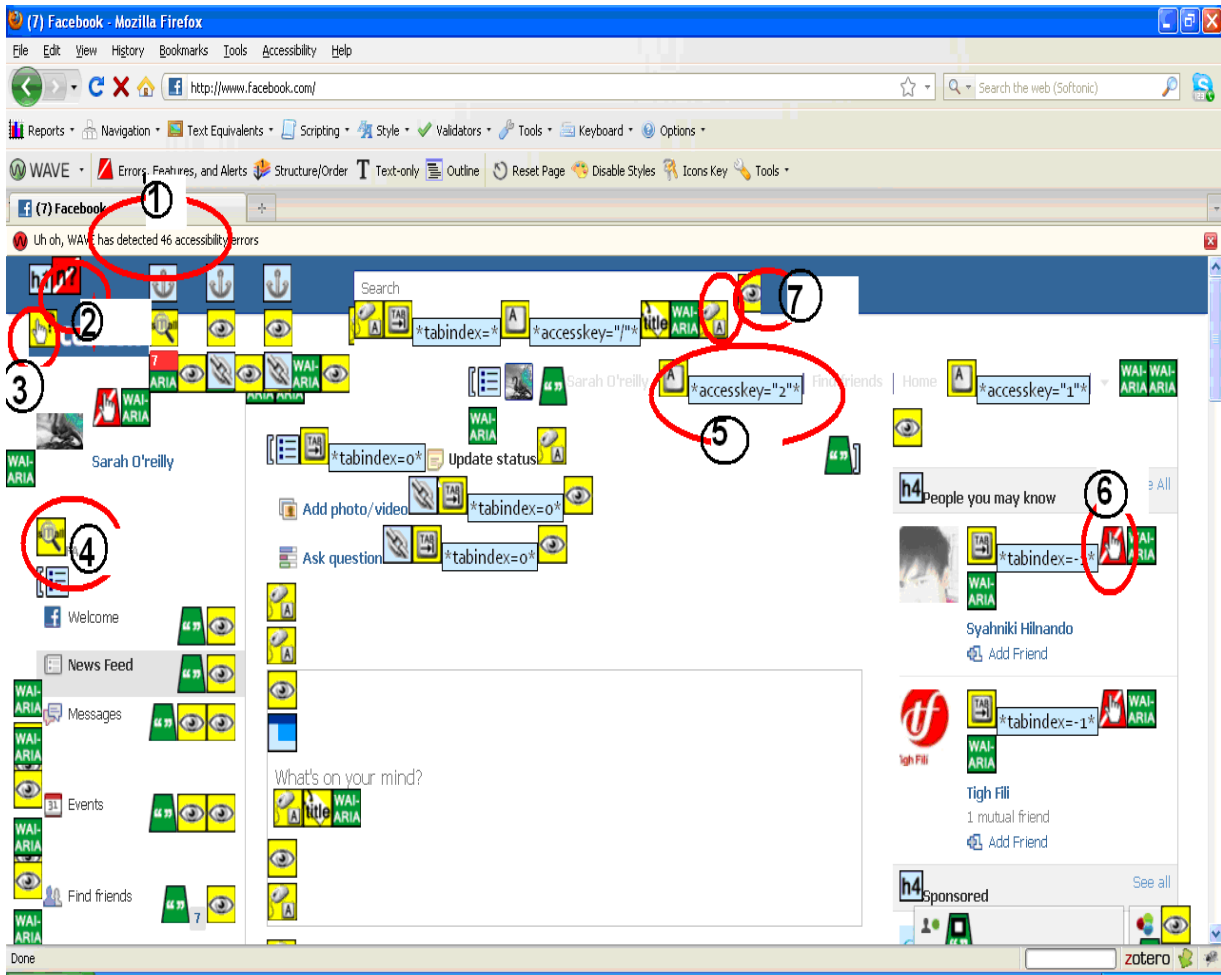


Figure 2: Wave toolbar in action on Facebook.com

Fangs

A screen reader is software used by people who are blind or visually impaired to access content or text on websites. **Fangs** is a Mozilla Firefox extension that creates a textual representation of a webpage similar to how the webpage would be read by a modern screen reader such as JAWS (Fangs Screen emulator: Add-ons for Firefox, 2012). Fangs also gives a list of the amount of headings used, their order, the volume of links on a webpage and whether or not frames are used. This again would impact on a navigation strategy used by somebody using a screen-reader (for example using headings to navigate through sections on the webpage). Figure 3 shows the original

webpage and Figure 4 shows how a screen-reader would interpret that webpage.

On Figure 4 on number 1 you can see the number of headings, frames and links in total are on the webpage that both a person has to either visually scan through or use a screen-reader to read them all out. On this sample there over 500 links and 45 headings a person would have to either visually scan or use an assistive technology such as a magnifier or screen-reader to read out. On number 2 the heading and its level is read out, in this case the heading is a level 1 heading which is the largest heading on a webpage. Number 3 shows a sample link on the webpage.

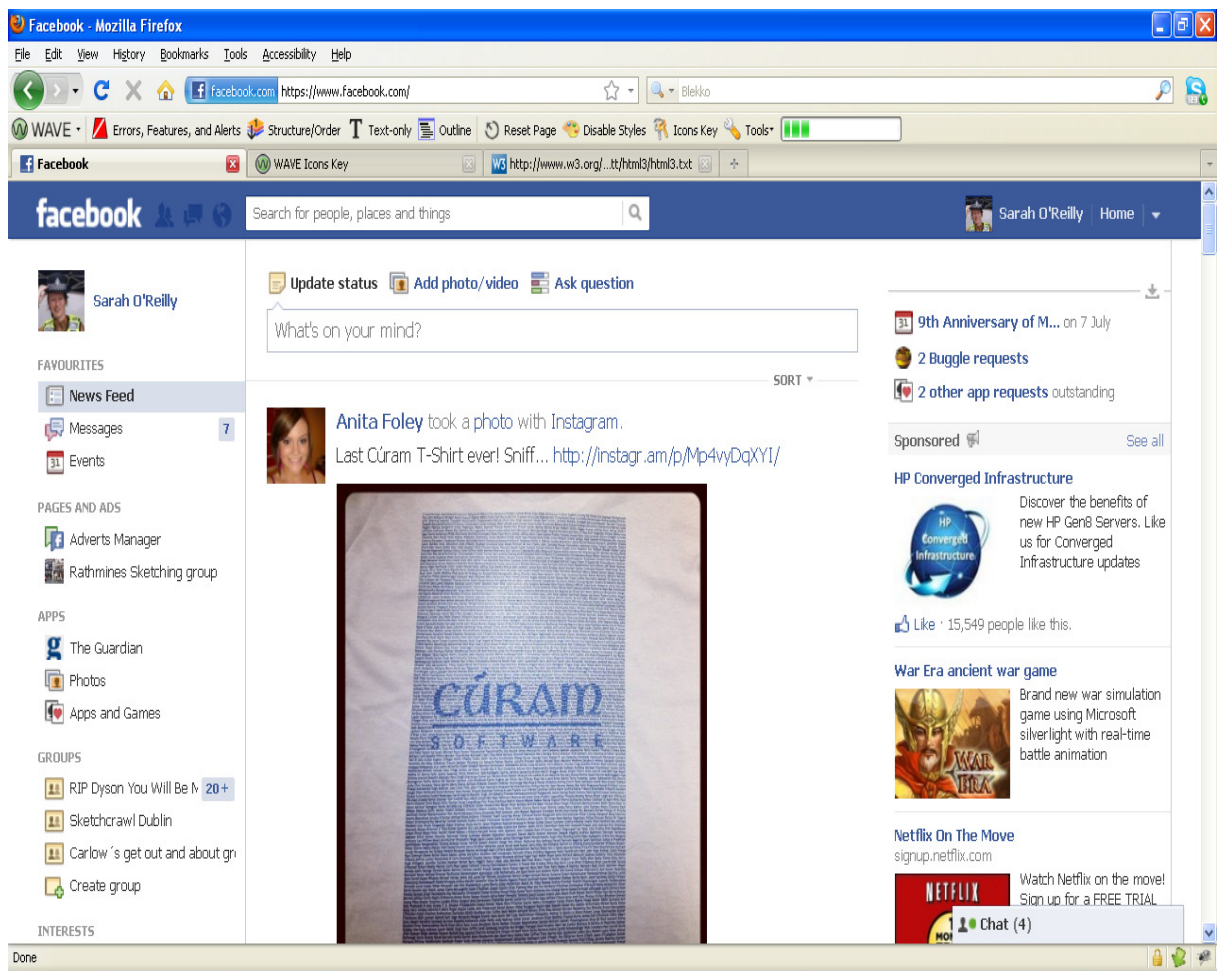


Figure 3. A sample webpage

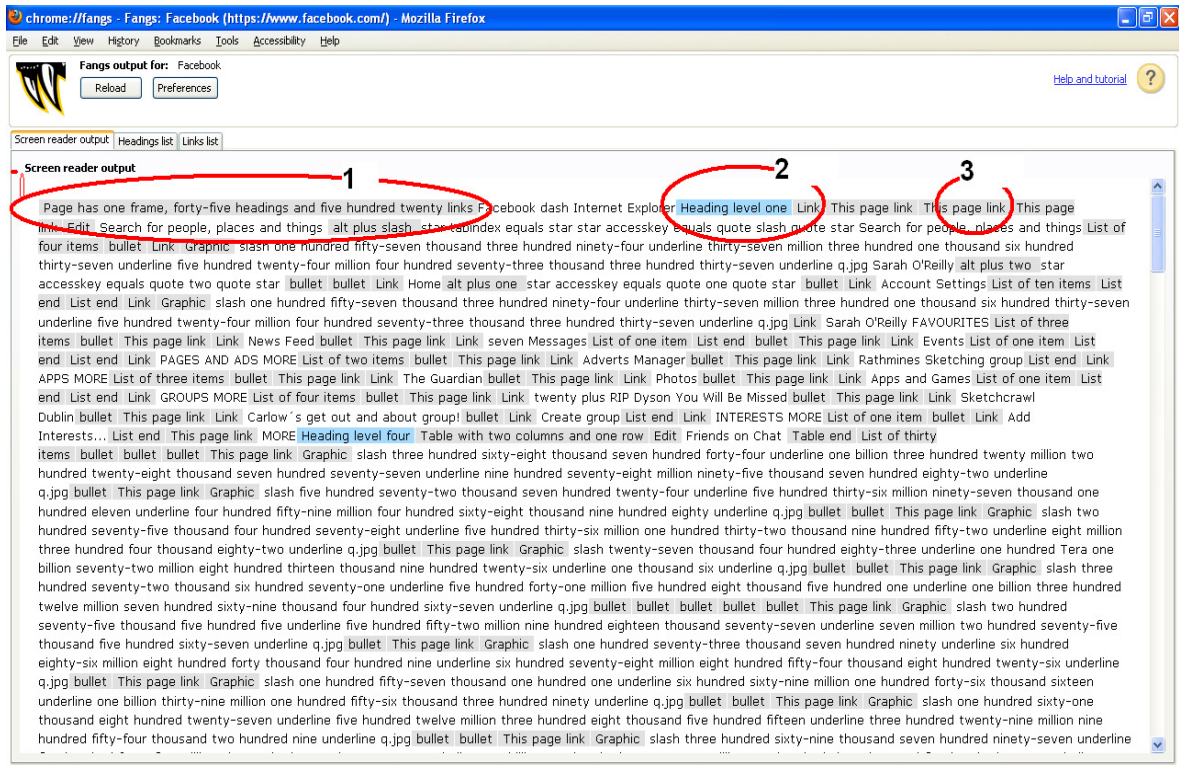


Figure 4: Fangs in action, you will notice at the top it says how many frames/ links/ heading are used on the page.

The W3 Validator for CSS and HTML

The W3 Validators will be used to check the code is adequate and valid in different browsers. The code behind the Website is important to consider for cross browser validation and checking what standard the code is. The W3 CSS and HTML Validators were accessed on the W3School website (2012) on <http://validator.w3.org/> where you simply copy and paste in the link of the website which you want to check the HTML code. The W3school Validators used in this research will be used to check the mark-up validity of Web documents in HTML and CSS.

Both W3 Validators give the total number of errors on a website along with a description of what they are and the version of HTML used. Figure 5 demonstrates the HTML Validator. XHTML Mobile profile 1.0 is used in the doctype and there are HTML 43 errors.

| Errors found while checking this document as XHTML Mobile Profile 1.0! | |
|--|---|
| Result: | 43 Errors |
| Address: | http://m.facebook.com/?refsrc=http%3A%2F%2Fwww.facebook.com%2F%2F_rdr |
| Encoding: | utf-8 (detect automatically) |
| Doctype: | XHTML Mobile Profile 1.0 (detect automatically) |
| Root Element: | html |
| Root Namespace: | http://www.w3.org/1999/xhtml |

Figure 5. Doctype and number of HTML errors

In Figure 6 on the same website two of the sample HTML errors found are listed in the example. You can see there is no attribute in HTML called “autocomplete” and on the second error character data is not allowed where it currently is positioned.

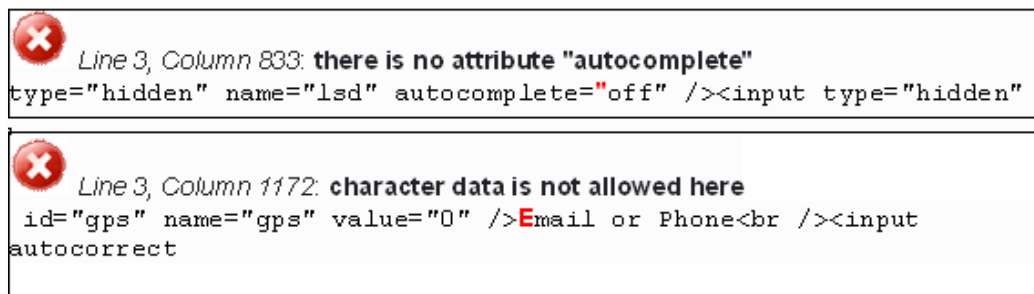


Figure 6. Example of HTML errors on the same website

3.5 Manual Tools Used to Evaluate Accessibility (comparison to the WCAG 2.0 guidelines)

Introduction

Part 2 of the research methodology will involve comparing the websites to the Web Accessibility Guideline 2.0 and the principles of perceivable, operable, understandable and robust. Furthermore the manual technical checks completed on WCAG 2.0 would pick up on any accessibility issues not presented by the automated tools. As mentioned in Chapter 2 there are four principles on WCAG 2.0 (perceivable, operable, robust and understandable) with guidelines for each principle (W3C, 2007: WCAG 2.0) For manual testing the websites will be compared against these guidelines. The principles and the guidelines are detailed below.

WCAG 2.0 and the guidelines for manually checking websites for accessibility

Web Content Accessibility Guidelines (WCAG) 2.0 defines how to make Web content more accessible to people with disabilities and is designed to apply broadly to different Web technologies now and in the future, and to be testable with a combination of automated testing and human evaluation. There is no other similar comparable guide to evaluation of website manually. Please see Chapter 2 for more details on WCAG 2.0 and how it was developed. The definition for each principle as outlined in Chapter 2 is repeated below in order to clarify.

Perceivable – this principle requires that information and user interface components must be presentable to users in ways they can perceive which means that users must be able to perceive the information being presented (it can't be invisible to all of their senses). The guidelines for checking the principle of perceivable on website include checking the following:

1. Provide text alternatives for any non-text content so that it can be changed into other forms people need, such as large print, Braille, speech, symbols or simpler language. Provide alternatives for time-based media.
2. Create content that can be presented in different ways (for example simpler layout) without losing information or structure.
3. Make it easier for users to see and hear content including separating the foreground of a webpage from the background e.g. so it is clear to users where the main sections of the webpage are.

Operable – for this principle user interface components and navigation must be operable which means that users must be able to operate the interface (the interface cannot require interaction that a user cannot perform). The guidelines for checking the principle of operable on website include checking the following:

1. Make all functionality available from a keyboard:
2. Provide users enough time to read and use content.
3. Do not design content in a way that is known to cause seizures.
4. Provide ways to help users navigate, find content, and determine where they are.

The third principle is **Understandable** and this principle requires that all information

and the operation of user interface must be understandable which means that users must be able to understand the information as well as the operation of the user interface (the content or operation cannot be beyond their understanding). The guidelines for checking the principle of understandable on website include checking the following:

1. Make text content readable and understandable.
2. Make webpages appear and operate in predictable ways.
3. Help users avoid and correct mistakes.

The fourth principle is **Robust** – for this principle content must be robust enough that it can be interpreted reliably by a wide variety of user agents, including assistive technologies which means that users must be able to access the content as technologies advance (as technologies and user agents evolve, the content should remain accessible). The guidelines for checking the principle of robust on website include checking the following

1. Maximize compatibility with current and future user agents, including assistive technologies.

In the manual evaluation each of the webpages on each of the websites were looked at, and compared to each of the WCAG 2.0 guidelines to see if they met or didn't meet the guidelines. This included the home-pages, and search pages. After an overall examination of each of the pages any images, audio files, font sizes, frame loadings, etc. were looked at including the code and design of the webpage.

The next section will discuss the user testing component of the methodology.

3.6 User testing methodology

There were three main goals for user testing was as follows:

1. To ensure the correct demographic population was tested in keeping with the research question. This was done via a screening questionnaire.

2. To capture quantitative data, such as time taken to complete tasks on websites and statistics from the questionnaires used. Tasks were designed and recorded via video for each website
3. To capture qualitative data, such as participants attitudes towards the usability of the three different websites. Exit-interviews were used for this.

The following sections will describe each of these components in more detail.

Screening Questionnaire

The screening questionnaire was designed to ensure persons who did not fit the testing demographic were excluded from the study. Therefore the questionnaire needed to ensure those who were tested were over 50, used the Web and had difficulty seeing things (whether diagnosed or not).

This section discusses how the questionnaire was designed and deployed. Users were asked to fill out a questionnaire prior to performing the tasks on the 3 websites to articulate what if any problems they had with their vision and to determine their knowledge of the Web and 3 the websites involved in this study: Facebook, The Citizen's Information website and The Department of Health website. The questionnaire responses were in-putted into the Microsoft Excel spreadsheet which was used to store the data from the testing of the websites.

Cooper & Schindler (2003) states that there are two types of questions that can be used in a questionnaire - these are structured responses (closed response) or unstructured response (open-ended response). Primarily closed response questions were used in this questionnaire as its function was to establish a base-line for users involved in the study.

Each questionnaire was coded using User 1-User 8 to provide anonymity for the respondents. Questions were coded using 1 or 0 (Yes or No) as indicated by the respondent ticking the relevant box beside either yes or no (Questions 1, 2, 3, 7, 8 and 9). Open-ended questions were used in the interview afterwards. Two questions used a Likert scale, according to Burgess (2001), the Likert scale is a popular approach for questionnaires to scale subjective responses to questions which can't be answered by a simple yes or no. For example, the 1-10 wide range scale captures the intensity of a participant's feelings on a given question. Questions 5 and 6 used a Likert scale and asked respondents to rate their self-perceived knowledge of the web and of computers on a scale of 1-10.

Pilot study and adjustments to questionnaire

An initial pilot study using the first subject was undertaken to determine if the questions and tasks involved in the study were understandable and in case any modifications needed to be done. Based on the findings from the pilot study the questions remained unchanged. It was however decided to change the font to bold on the Yes and No Questions that needed to be circled by participants. It was also decided to add two lines of instruction telling users how to complete the questionnaire. Please see Figure 7 for the screening questionnaire that was developed from the pilot study and the questions used. In Appendices A you can see the questionnaire and it's the real-life size (font-wise).

Questionnaire questions:

Instructions: Please circle either Yes or No, or a number if the question uses one a scale 1-10

1. Do you have any problems with you vision? **Yes OR No**

If yes, please name condition and accuracy of both eyes (if known) or what you find hard seeing _____

2. Do you have any other diagnosed medical condition that might affect using the Internet? **Yes or No**

Please name _____

3. Do you use the internet? **Yes OR No**

If yes, what type of computer do you use to access the Internet

4. How often would you use the Internet? _____

5. How would you rate your knowledge of computers?

(No knowledge) 1 2 3 4 5 6 7 8 9 10 (expert user)

6. How would you rate your knowledge of the Internet?

(No knowledge) 1 2 3 4 5 6 7 8 9 10 (expert user)

7. Do you use Facebook? <http://www.facebook.com/>

If yes, how often would you use it? _____

If No, do you know what it is used for? _____

8. Have you ever accessed the department of health website? <http://www.dohc.ie>

If yes, how often would you use it? _____

If No, do you know what it is used for? _____

9. Have you ever accessed the Citizen's Information website?

If yes, how often would you use it? _____

If No, do you know what it is used for? _____

Figure 7 the questionnaire that was developed from the pilot study

Question 1 was used to establish whether or not users themselves felt they had difficulties seeing things. The main intention of the third part of this study was to use a group of users with mild visual impairments over 50 years of age to check how accessible the websites were. The second half of *Question 1* was used to determine if users had been diagnosed by an optician as having a visual impairment. If the users were unsure of the name of their condition they could simply state what they found hard seeing and the researcher could categorize this accordingly. *Question 2* was asked to assert whether or not users had any conditions that might affect them using the Web. This could include a hearing, cognitive impairment etc. *Question 3* was asked in order to exclude from the study any users that had never used the Web with the second-half of *Question 3* determining if users accessed the Web from a desktop computer, a laptop or both which might impact on screen-size and where the person would be using it. *Question 4* was asked to see if users involved in the study were regular or infrequent Web users. *Question 5* asked users how knowledgeable users felt they were at using a computer. The question used a Likert scale of 1-10 to get allow for a better range of answers to these questions. 10 was expert user and 1 was no knowledge of computers. Similarly, *Question 6* was asked so it could be determined how knowledgeable users felt they were at using the Web. The question used a Likert scale of 1-10 to get allow for a better range of answers to these questions. 10 was expert user and 1 was no knowledge of the Web. *Questions 7, 8 and 9:* were asked to assess if users had ever accessed the three websites and how often they used them (Facebook, Citizens information and The Department of Health). This was determine their familiarity with the websites prior to engaging in tasks on them and to see if this might be a factor in how they engage with the websites. Participants were also used to determine if they knew what each of the websites was used for if they hadn't accessed them again to find out their familiarity with the websites.

User testing and tasks performed on the websites

The second section of user testing once the target population was identified through the screening questionnaire was getting the users to perform tasks on the websites. This will be discussed in detail below.

The user were asked to perform a number of tasks on each of the websites, speaking aloud using the "Think aloud protocol". Think aloud protocols involve participants thinking aloud as they are performing a set of specified tasks. This is a method used to gather data in Usability Testing in product design and development. Users are asked to speak out loud whatever they are looking at, thinking, doing, and feeling, as they go about their task (to reflect on the task). This enables observers to see first-hand the process of task completion (rather than only its final product) (Lewis, 1982). The tasks chosen on Facebook were the most frequent ones a user would need to do in order to be able to use the application such as log in and send a message. The tasks on the other two websites were again chosen based on commonly used functions and areas on the websites such as the topical household charge and on the Department of Health knowing how to make a Freedom of Information application. On most websites the users had three tasks to complete with the user completing five tasks on Facebook as this was the prime website involved in the study. Please see Figure 8 which outlines exactly what tasks the participants were given and please see Appendices A for the pilot task sheet and the one-used thereafter.

Task-sheet

What is Facebook.com?

Facebook helps you connect and share with the people in your life. It is a social networking Website launched in February 2004. It is operated and privately owned by Facebook, Inc.

Task 2

Go to <http://www.Facebook.com/> on your Web browser

- 1) Sign into Facebook using you're the logon details below
Email address: D10122523@mydit.ie and your **password is cleopatra65**
- 2) Click on your "wall"
- 3) Update your Status on your wall to reflect how you feel.
- 4) Locate your friend Rathmines Sketchers on your friends list, click on them
- 5) Send them a message

What is The Department of Health Website?

The purpose of The Department of Health Website is to provide information on: health polices consumer information and official communications made by The Department of Health.

Go to <http://www.dohc.ie/> on your Web browser

- 1) Find out how you would **contact/ring** The Department of Health
- 2) How much it costs to make an **freedom of information ACT** application
- 3) Type "**customer service**" into the search box.

What is the Citizens' information Website?

This site provides information on public services and entitlements in Ireland. It is provided by the Citizens Information Board.

Go to <http://www.citizensinformation.ie/en/>

- 1) Click on "**what's new**" on the Website
- 2) Find the link that says "**how to use**" the Website
- 3) Find out about the new "**household charge**"

Figure 8.0. The tasks participants completed. Refer to appendices A for correct font sizes and spacing used

Pilot study and adjustments

After completion of the pilot test using with the first user it was decided to introduce each website on the top of each page (for example to state what the website was and what it used for). The tasks that user had to complete on each website were introduced a single and larger font was also used with adequate spacing. Please see Appendices A for initial tasks sheet used in the pilot study and the one that was used thereafter. It was also decided after completing the pilot study to randomize the order of the websites rather than having each user starting each session with the same website.

When carrying out the task the researcher filmed the user completing the task and asked participants to speak out loud when completing the tasks. The researcher also assisted the participants by reading out the list of task for each website so that their concentration would not be diverted from the tasks on the websites. The researcher used a HTC mobile phone to film participants along with a Canon Ixus. After completion of the 8 user studies it was decided to use Microsoft Excel to chart the amount of time taken on each task on each website. The transcript from the videos was not used in the results as users were concentrating so much on completing the tasks they forgot to speak aloud. The time taken to complete the tasks was compiled on an Excel spreadsheet.

User testing on each of the Websites: Semi Structured Interviews

After completing the tasks users were asked to complete a semi-structured interview with the researcher. The interview was recorded using a HTC mobile phone. The questions were not changed after the first pilot interview. The questions used to guide the interviews questions were based on the Principles of Universal Design obtained from the Centre of Universal Design (CEUD, 2012). Universal Design is outlined in detail in the previous chapter.

The Interviews

The interviews were broken down into 14 questions based on the principles of Universal Design. The questions were retrieved from the centre of Universal Design Ireland. As a reminder the principles are as follows:

- Principle 1 Simple and Intuitive Use
- Principle 2. Size and Space for Approach and Use
- Principle 3: Low Physical Effort
- Principle 4 : Flexibility in Use
- Principle 5: Equitable use
- Principle 6: Perceptible Information
- Principle 7: Tolerance for Error

Please refer the literature review for a detailed explanation of each principle and the guidelines for each.

Not all guidelines for each principle detailed on the CEUD's website (2012) were used as interview questions in this research project. Some were re-worded, aggregated or made into one question. Some questions were more relevant to this study and other questions were left out as they would be more relevant to the design of a physical product. Please see Appendices A for the full list of questions under each principle that should be considered and see the list below this section for all of those included in this study.

The results for the questions were displayed under each question according to general response to all three of the websites, individual responses to the websites. The last two questions were asked were very general and gave the opportunity for users involved in the study to feedback on how they felt about the websites (Questions 15 and 16).

The questions used in the Exit-Interviews by the researcher were divided up by principle:

Principle 1- Simple and Intuitive Use

Question 1: Were the websites unnecessarily complex or were they simple to use?

Question 2: Were the websites consistent with your expectations?

Question 3: Do the websites accommodate a wide range of literacy and language skills?

Question 4: Was Information on the websites arranged in consistency with its importance?

Question 5: Was there effective prompting and feedback during and after task completion on the websites?

Principle 2: Size and Space for Approach and Use

Question 6: Was there a clear line of sight to important elements on the websites?

Principle 3: Low Physical Effort

Question 7: Use reasonable operating forces e.g. lots of clicking/ lots of effort to find things?

Principle 4: Flexibility in Use

Question 8: Was there a choice in method of finding items/ navigation on the websites?

Principle 5: Equitable use

Question 9: Do you feel the websites provide the same means of use for all users: e.g. identical whenever possible; equivalent when not e.g. avoiding segregating or stigmatizing any users?

Principle 6: Perceptible Information

Question 10: Do the websites Use different modes (pictorial, verbal, tactile) for redundant presentation of essential information?

Question 11: Do the websites provide adequate contrast between essential information and its surroundings?

Question 12: How legible is essential information and its surroundings?

Principle 7: Tolerance for error

Question 13: Are there minimal hazards / errors website e.g. most used elements, most accessible?

Question 14: do the Websites Provide warnings of hazards and errors and Provide fail safe features?

And the *last two questions* were asked to get general feedback from users and allow them an opportunity to mention anything the principle-questions did not cover:

Question 15: Is there anything you would change on the 3 websites?

Question 16: Do you have any other Comments or feedback?

3.7 Conclusion

The purpose of the research was to **examine the prevailing obstacles in Web accessibility on three well-known websites for older people who have sight difficulties**. The three websites chosen were relevant to the population demographic and included:

- Facebook.com-a market-leading social networking company and two different governmental Websites:
- The Citizen's Information website (Citizen's rights) and
- The Department of Health (Information on health policies).

A variety of evaluation methods will be used to evaluate the accessibility of the three websites including: automated, manual tests and user-testing. A group of users with visual disabilities over 50 was identified for user-testing. The research will use semi-structured interviews based on the principles of Universal Design and got users to complete tasks on three commonly used websites to enrich the quantitative findings. The interviewing and task process will enable identification of obstacles to

accessibility that extends beyond the missing alternative text from images and the use of deprecated mark-up language.

Chapter 4- Data Analysis of automated evaluation

4.1 Introduction

This chapter outlines the main findings of the automated testing of the three websites: Facebook, Citizen's Information and The Department of Health.

Automated tools for Web accessibility scan pages of a website and evaluate it according to the checkpoints of the Guidelines of the Worldwide Web Consortium or local accessibility authorities in that jurisdiction. Automatic testing using validation tools check that valid mark-up has been used and accessibility checking tools are used to check that accessible mark-up has been used.

4.2. Results of the Automated Testing

Facebook Website

6 pages from the Facebook website were selected based on the expectation that these would be the main pages visited by users and making sure to pick the home page, and a representative page as in the MeAC Guidelines (2010) for accessibility audits. None of urls met the conformance levels for WCAG 2.0, either A, AA or AAA.

| A-Checker Conformance Level with WCAG 2.0 Guidelines | |
|---|-------------------------|
| URL of each page | WCAG 2.0 Rating (A, AA) |
| http://www.Facebook.com/ | Fail |
| http://www.Facebook.com/?sk=welcome | Fail |
| http://www.Facebook.com/?sk=welcome#!/profile.php?id=100003644343730 | Fail |
| http://www.Facebook.com/?sk=welcome#!/profile.php?id=100003644343730&sk=friends | Fail |
| http://www.Facebook.com/?sk=welcome#!/profile.php?id=100001670616318 | Fail |
| http://www.Facebook.com/?sk=welcome#!/messages/100001670616318 | Fail |

The global error statistics on Facebook were as follows:

- The **Wave Toolbar** which shows the global number of accessibility errors showed there were 41 errors on five of the Facebook webpages viewed and only 9 errors on Facebook’s *home page*. The **Wave Toolbar** also shows accessibility errors, alerts and features as outlined in the methodology chapter (automated tools) in detail. The main accessibility issues here were as follows: There was no use of alternative text on images or links. For example the mark up used was “”, which would result in a screen reader reading out the file name such as *cat.jpeg* rather than a “*picture of a cat*”. Wave also showed on the *home page* under the “signing up” section the labels are missing or not labelled correctly on gender, date of birth. The Wave Toolbar also showed that few links had alternate text to say what they connected to for those using a screen reader and for the few links that did have alternative text this was not meaningfully labelled in alternative text. The Wave Tool also warns if JavaScript used and it on Facebook which would limit what kind of screen reader can be used. On a positive note **the Wave Toolbar** showed that Facebook uses access keys 1-9 to allow navigation with a keyboard which is useful for somebody not using a mouse to access the website or someone who memories the short-cuts. Unfortunately the links are not linked to meaningful webpages and are not in order.

- **Fangs**, a screen reader emulator was used to gauge the number of links, frames and headings on a webpage which would impact on how much visual scanning a person might have to do or how many links they would have to have read out to them via a screen-reader. The average number of links on 5 of the 6 pages ranges from over 100 hundred to 200 with 39 Links on the home page. No headings were used on the home page with an average of 7-29 on the rest of the webpages. Primarily H4, 5, 6 were used on the headings. As there is no definitive order on headings it would make a search of the website content via a screen-reader impossible. Facebook uses frames on all of its webpages with 2 most of its webpages except the *home page* which has one frame and the *Logged in* page which has 3. This again impacts on how a screen-reader interprets codes as it splits it into different screens in which to navigate.
- **The W3 HTML Validator** was used to check the HTML code was adequate and valid in different browsers. For example if a person was using an older browser they might find a website harder to access and a screen reader would have more difficulty interpreting the code. An average of 40 XHTML errors were found when checking the HTML against HTML 1.0 mobile profile on all 6 of the Facebook pages used in the audit. On a positive note **The W3 CSS Validator** was used to check the CSS code was valid. For example all styling for webpages is done in the CSS rather than the HTML in case the person is using something like the WAVE toolbar to change the style of the web page to make it more accessible. An average of 3 CSS errors was found on all 6 pages when checking against CSS 2.1.

Citizens Information Website

I selected 4 pages from the Citizens Information website based on the expectation that these would be the main pages visited by users and through following the MeAc(2010) Guidelines for accessibility audits. One of the urls met the conformance levels for WCAG 2.0 for AA and the rest of the URLs failed the A, AA and AAA- conformance rating.

| A-Checker Conformance Level with WCAG 2.0 Guidelines | |
|---|------------------------|
| URL of each website | WCAG 2.0 Rating (A,AA) |
| http://www.citizensinformation.ie/en/ | Fail |
| http://whatsnew.citizensinformation.ie/ | AA rating |
| http://www.citizensinformation.ie/en/how_to_use_this_site.html | Fail |
| http://www.citizensinformation.ie/en/housing/owning_a_home/home_owners/house | |

The global error statistics on the website were as follows:

- The **HTML Validator** found only 2 HTML errors on the Citizens Information website on the *Home page* and *Household Charge* pages while checking against HTML 4.0 (transitional) which is a the type of HTML code declared in doctype and therefore would impact on how the web browser interprets the code. The main issue being that there was no character encoding declared at document level. The **W3 HTML Validator** also found issues in that there are links to PDF documents which are inaccessible to screen readers without modification. There were 3 HTML errors found on the *How To Use the Website* page and 76 HTML errors with 6 warnings on the *What's New* page. **The W3 CSS Validator** was used to check that the CSS code was valid, three of the four webpages had 52 CSS (2.1) errors with 194 CSS errors on the *What's New* page.
- The **Wave Toolbar** which shows the global number of accessibility errors on the Citizens Information website, where there was an average of 1 accessibility errors on all 4 pages viewed. This was a positive result.
- The Wave Toolbar** also picked up some accessibility issues which were as follows: on the *Home Page* were as follows: the title social welfare had an incorrectly ordered heading (it was not a H1 or H2 heading as you would expect for a title of a home page) and this would impact on screen-reader navigation. The search box on all 4 webpages had no label on them and a JavaScript hover menu is used on the main navigation menu. On the *What's New* page Wave flagged a broken link for the mobile site. On the same webpage there were also empty headings on content and a broken link for the date on main text in the webpage. This would impact on a sighted user not be able to use the link and the empty headings would make navigation via

headings on a screen reader more difficult. On the Citizens Information website 2 of the webpages there are also links to PDF documents.

- **Fangs** was used to gauge the number of links, frames and headings. On a positive note the Citizens’ Information website has 14-22 headings on each of its 4 webpages audited with no frames used. However there were too many links used on 3 out of 4 webpages, between 138 and 214 links with 99 being used on the *How To Use the website* page. Also the number and type of headings used is not consistent, for example each of the webpages differ in what type of headings they use for example, the *What’s New* webpage has ten Heading 1s, nine Heading 5s and three Heading 3s while the *Home Page*, *Household Charge* page and the find out *How To Use The Website* page use primarily H2s.

Department of health Website

5 pages were selected from the Department of Health website based on the expectation that these would be the main pages visited by users and through following the MeAc(2010) Guidelines for accessibility audits. Three of the urls met the conformance levels for WCAG 1.0 for A and the search page powered by Google failed the A, AA and AAA- conformance rating.

| A-Checker Conformance Level with WCAG 2.0 Guidelines | |
|---|---------------------|
| URL of each website | WCAG Rating (A, AA) |
| http://www.dohc.ie/foi/ | WCAG 1.0 (A) |
| http://www.dohc.ie/about_us/contact/ | WCAG 1.0 (A) |
| http://www.google.com/cse?cref=http://search.gov.ie/customcse/www.dohc.ie&q=customer+service&x=41&y=8#gsc.tab=0&gsc.q=customer%20service&gsc.page=1 | Fail |
| http://www.dohc.ie | WCAG 1.0 (A) |

The global error statistics on the website are detailed below.

- **Wave** was used to identify the global number of accessibility errors on the Department of Health website and the results were positive in that 4 out of 5 pages did not have any accessibility errors. However accessibility issues were identified by Wave on all pages in that JavaScript was used in the main header and the Search box on each of the webpages was not labelled. Both of these errors would impact on somebody using a screen reader and also on how a person visually scans a webpage meaning there is more data for them to scan. Wave also showed on *The Freedom of Information Act* page and the *Fees and Charges page* that there was very small text on the link to get back to *Home Page* which was 9 pixels or smaller. There was also links to PDF documents. On the *Search Results* page (which is powered by Google, a different website which might be a reason for the variance) there were 7 accessibility errors. On the same webpage headings were not marked up as headings and The Department of Health logo has no alternative text for someone accessing the website via a screen-reader.
- **The W3 School HTML Validator** found 2 HTML errors on the *Home Page*, *Freedom of Information Act* page and on the *Contact Us* page (while checking against HTML 1.0 strict). The *Fees and Charges Page* passed the HTML 1.0 validator and 28 HTML errors (1.0 strict) were found on the *Search Results* webpage. *The Fees and Charges* webpage passed the HTML 1.0 validator.
- **The W3 School CSS Validator** found only 5 CSS errors on 4 of the webpages (CSS 2.1) and 4 CSS errors for the *Search results* page.
- **Fangs** found there were no frames were used on this website. The average number of links was between 30 and 50 would impact on long somebody has to look to see a link and also how many links have to be read out to a blind person using a screen reader. Another positive finding from Fangs was that most the webpage had only 2 or 3 headings with the exception of the *Fees and Charges* page which had 9 and the *Search results page* which had no headings. The main headings used were H2 and H1.

4.3 Automatic Evaluation Summary

Overall Facebook fared worse than the two governmental websites on the automated testing. Results show all three websites had accessibility issues such as too many links or the use of JavaScript hover menus. All of the URLs failed the conformity ratings for WCAG 2.0. **Facebook** had an average of 41 accessibility errors and 40 XHTML errors on each of the 6 pages looked at and there was minimal use of alternative text on images or links and those images that did have alternative text were not meaningfully marked up e.g. “*jpeg cat*”. There were frames used and a large number of links ranging from over 100 hundred to 200.

Most of the pages on the government websites had zero accessibility errors with minimal HTML errors. 3 out of 4 pages checked also met the criteria for WCAG 1.0 conformance rating. One of the exceptions to this on the governmental websites was the *Search page*, **Department of health**, which had 7 accessibility errors. The *Fees and Charges page* there were 28HTML errors (1.0 strict) which is the type of HTML code declared in the Doctype and that the web browser interprets. There were also links to PDF documents on The Department of Health website which are inaccessible to some screen readers.

On the *What's New* Webpage there were 70 HTML errors on **The Citizen's Information** website. There was between 138 and 214 links on this website and a JavaScript hover menu is used on the main navigation menu which would make it challenging for somebody visually scanning all those links and also somebody who has to have them all read out via a screen reader. 3 out of the URLs did not meet the conformity for WCAG 2.0 with the *What's New* page getting an AA rating for conformance to WCAG 2.0 Guidelines.

Chapter 5 Data Analysis from manual evaluation

5. 1 Introduction

This chapter outlines the main findings of the manual testing of the three websites: Facebook, Citizen’s Information and The Department of Health.

Manually evaluation is completed by a professional with knowledge of web design, and of accessibility. The person reviews the webpages and is able to give specific details on the pages and feedback. Evaluation by this method has a number of steps during which the expert examines specific pages including the homepage, pages containing tables and forms, and search pages according to accessibility checkpoints. For manual testing this research used WCAG 2.0 (Web Content Accessibility Guidelines (WCAG) 2.0, 2007). The code on each of the webpages was manually checked on each of the webpages and compared to the (see the section in the methodology chapter called Manual Evaluation of Each of the Websites for a detailed description of each of the principles and the guidelines that were used for each. To re-iterate the principles in WCAG 2.0 were:

- 1. Perceivable**
- 2. Operable**
- 3. Robust**
- 4. Understandable**

A manual evaluation was completed using the WCAG 2.0 to look again at the code, design and how it impacts on the user. Also it is not possible to check all accessibility issues with a computer alone. We do find issues here outside the automated evaluation’s scope, for example results that could only be identified by a human operator.

5.2 Results from Manual Evaluation

Facebook

1. Perceivable

On the negative aspects of accessibility there was no text alternative for non-text content such as pictures which contradicts the WCAG 2.0 principle of perceivable. There was no use of alternative text for images on all of the Facebook webpages. No time based material was used but it is possible to post up videos and there are no requirements on Facebook for captions or sign-language to facilitate people with disabilities accessing the website. If you removed the styling on Facebook and viewed it in text-only format you would be able to log in but it is not accurately labelled where you would sign up (you would have to read to end of text). There is no option to skip sections. A Captcha security check also appears on the text only version of this page which is not present on the normal version of Facebook which would make it inaccessible for persons with a visual disability using a screen-reader to log in. On the other pages viewed in the text only version hidden content such as friend's requests are displayed, there is a lot of information compared to the normal viewing Facebook and there is no way to skip content. There is no separation between the foreground and the background on Facebook. For example for the navigation they have the same small icons for navigation at the top of each of the pages but apart from that they have different layouts.

2. Operable

On the positive aspects of accessibility there is no time- limit on viewing media which is a positive thing as the page would not time out on somebody who can't see it. Facebook does not use any flashing images known to cause epilepsy. Facebook uses access keys 1-9 to allow navigation with a keyboard but not to meaningful links or sections and there is no-order to them. This would be useful for allowing people using a mouse only to navigate through the website or somebody who memories the short-cuts to get to their chosen webpages.

On the negative aspects: Facebook does not clearly say what page you are on or provide very obvious links to get back to where you were, it presumes you remember. There are small icons at the top (profile, friends, news feed with no help text when you hover over them. These icons are on the top of each page you view. Help text indicating where the icons take you is only provided for your profile link. The message icon is small and separate from all other links. There are 3 different navigation columns with links. On the *List of Friend's* Page there are 6 different navigation sections with links which again is a lot for anybody visually scanning the website trying to find their chosen link.

3. Understandable

On the positives: Facebook colour scheme is the same for each page. And the small navigation icons at the top stay the same for each page viewed which allows for consistency rather than having the user guess where main navigation links are.

On the negative aspects of accessibility Facebook uses non-familiar terms such as “profile, news feed and wall” which are abstract if you have not used them or heard of the terms before. However the picture icons are not properly marked up with help text if this is to be the main navigation menu. All the content and layout changes from 3-6 navigation sections on each of the webpages viewed meaning there is no consistency. There also is no help text apart from profile as to where a link takes you. The “help” link itself is very small. Sending a message it is not clear how you reply to a message, or if the small box is where you enter text as a lot of people might want to write more than a single line of text. There are too many links and options to click on and no main search box.

4. Robust

On the negatives: Facebook uses Ajax, Captcha and Javacript all of which are inaccessible to screen-readers. JavaScript requires version 11 of Jaws and a certain setting to work correctly and might not work with open ware screen-reading software. Captcha's are unreadable. There are lots of HTML errors on Facebook which would mean it might not operate well on some browsers and would impact on using a screen

reader. Facebook uses both plain text or rich text format but does not offer options such as “skip to main content” so you would have to read through a lot of content on a screen reader without this functionality.

Citizen’s Information website

1. Perceivable

On the positive aspects of this website: there was no time-based media used on this website. The foreground is separated from the background on each of the webpages which are divided up into 3 sections with 2 links navigation section and main text is. There are no pictures used on the 4 pages viewed on The Citizen’s Information website which means the page relies solely on text to communicate, some sighted people would prefer pictures and blind would not.

On the negative accessibility aspects of this website: there is a clear option to change the size of the font. However a JavaScript hover menu is used on the main navigation menu throughout all the webpages which limits some screen readers that can interpret it (screen readers other than Jaws). If you view the Citizen’s Information website in plain-text format disabling styles, you have to scroll through all links to reach relevant section. There is also “No skip to content”. There are over a hundred links on some of the webpages which would make it difficult to scan.

2. Operable

On the positives: there is no content that would cause seizures. The webpage does not time out on users which means if they won’t have re-direct their web browsers to a new page. On the *Household Charge* page there is a “you are here section” which shows how the person found the page and provides the option of a quick link to return to the page they were viewing e.g. “home> housing> owning a home > home owners>household charge.” (This also shows what category the household charge is under).

On the negative aspects of accessibility there is no navigation aide on the *What’s New page* but is done on the *How To Use This Website* page. The main links section at the top stays consistent for all different webpages viewed on the site but the right hand

column of links changes for each webpage which could be disorientating for sighted people and those using screen readers. The main navigation menu on the website uses a JavaScript hover menu would not be accessible if someone was using just a keyboard. On the *Home Page* there are lots of links in main content section (over a hundred) which could be confusing for somebody having to visually scan the whole page in order to find a link.

3. *Understandable*

On the positives: The Citizen's Information website is written in simple, clear English and does not use slang or abbreviations. There is the option to translate the site into Polish, Romanian and Irish. The main navigation links at the top of the each webpage do not change in either colour or format. The webpages appear and operate in predictable ways, apart from the *What's New* webpage which lacks a navigation map to allow you to get back to the home page. The navigation aides on the pages with one could be bigger.

On the negative aspects of accessibility, the links section on right hand side changes for each of the four webpages viewed. There is no site map on the website and a large volume of links particularly on the *Home-page*. There are too many options for users to click on and then must return to the home page again if is not to the relevant link (limit the amount of information displayed to avoid user clicking wrong thing). The search box on the website should be in a more prominent position on the website to enable users to make use of this when finding relevant information.

4. *Robust*

On the negative aspects of accessibility the Citizen's information website uses a JavaScript hover menu. This requires a certain setting on JAWS 11.0 and would not be usable with other screen readers; this is not indicated in the HTML mark-up which could assist a screen-reader user by reading out the settings they need to have if they were using JAWS 11.0. The Citizens Information website has over a hundred links and 10-20 headings per webpage, so this would be time consuming for a person to navigate through as there is no option to "skip to main content" or "return to main navigation

menu”. This website also uses PDF elements which if not formatted correctly are inaccessible to somebody with a visual impairment.

The Department of Health Website

1. Perceivable

On the positive aspects of accessibility there is no time-based media used on this website. If viewing the website in plain text format and disabling styles the website is easier to navigate. Functional areas like the “search box” and “contact us” are also at the top of each webpage making them easier to see. On the *Freedom of Information page* the main navigation menus on top and on the bottom of the page and therefore in the same position as they are on the *Home Page* with only the main body of text being different colour, the same consistent formatting is used for the *Fees and Charges page*. There is minimal use of pictures which means the page relies solely on text to communicate. Some sighted people would prefer pictures and most blind would not. Those pictures that are present have alternate text, which enable them to be read out to somebody using a screen reader. The only webpage on this website that doesn’t have alternative text The *Search Results page* where there is no alternative text for the logo or for any of the links.

On the negative aspects of accessibility this website also uses JavaScript. There is no “skip to content or menu” links. On the website itself there are three main navigation sections and three more links sections in main content which rely on colour and lines to separate each section from each other. This assumes somebody can see the colour and lines. On the *Home page* there is no clear separation between the foreground and background on this page. There is no separation on search page or navigation menu to get back.

2. Operable

On the positive aspects of accessibility for this WCAG 2.0 principle there is no time limit on accessing the website and the content is accessible by a keyboard. There is also no content that would cause seizures for those with epilepsy. . On the *Freedom of*

Information Act webpage you can click on “by post” to skip to the relevant section without having to read all the content to get to the relevant section, this speeds up accessibility for a sighted user and a screen reader user by limiting the amount of scrolling they have to do to navigate through the webpage. There is also a navigation aide at the top left of the freedom of information page which also allows you a quick link to return to the *Home Page*.

On the negative aspects of accessibility the text for the navigation aide is smaller than all the other text on the page so it would be very easy to miss for somebody with myopia. It should be noted in a separate issue there is also no link back to the *Home Page* on the main navigation column on the left hand side (this navigation menu stays the same for all webpages viewed). This is apart from a smaller navigation menu on the top right of the webpage which has very tiny writing. On the *home page* there is no opportunity to skip content. The *Contact Us* and *Home Page* links on the navigation menu on the top right hand side are smaller than the links. The “search box” which is beside the menu has very small text.

3. *Understandable*

The website does not use slang or unfamiliar words apart from this. All the web pages appear and operate in similar ways pages apart from *Search Results* page but this is operated by Google which is a separate website from the Department of Health.

On the negative aspects of accessibility some of the wording used on this website is in Irish; there should always be an English equivalent for any sighted users or screen reader users who don't speak Irish. There is also no option to translate the webpage into foreign languages. There should also be navigation icons to return to the *Home Page* as users would be forced to use the back button on browser. Small text is used on the navigation aide that is too small to be functional even for somebody with excellent vision. The “search box” used on the website is also very small. A further accessibility note is that there is no site map on the website.

4. Robust

On the negatives the website uses JavaScript. The website does not say in the HTML mark-up what setting to use on a screen reader or what screen readers are accessible. The website should offer “skip to main content or menu” links to assist people using screen-readers. It should also be mentioned that the number of HTML errors on the *Search Results* page should be improved, as this will impact on persons accessing the page from different web browsers.

5.3 Manual evaluation Summary

On the WCAG 2.0 manual evaluation of the **Department of Health** website there is a navigation aide that allows you to return to the *Home Page* but the text is very small even for somebody with perfect vision. There also no clear separation between the foreground and the background of the webpages. The “search box” is small and hard to see for somebody with myopia. Disabling styles on the website made it easier to operate. However there are no “skip to main content” or “return to main menu” link options. Furthermore, the website uses JavaScript which requires a particular setting in JAWS 11.0. This is not mentioned in the HTML mark-up on the website to somebody who would be accessing the website via a screen reader. It should also be mentioned that some of the website is in Irish and there is no option to change the website into different languages.

The Citizen’s Information website uses a JavaScript hover menu which is inaccessible on a lot of screen readers and would make the website difficult to interact with via a keyboard alone. There is also PDF elements with no plain text version which are inaccessible to persons who are blind. There are over a hundred links on some of the pages with no site map which would impact on long it takes for somebody to navigate through the website. On the *What’s New* page there is also no navigation aide. There is however the option on The Citizen’s Information website to change to different languages which is a positive for anybody not fluent in English.

On **Facebook** Ajax, Captcha and JavaScript are used which are inaccessible to certain screen-readers. There is limited use of alternative text for screen-readers and the website is impossible to navigate without styling. There is no separation between the foreground and background and there are as many as six sections with links that change depending on which page you are looking at. This means there is limited consistency between the designs of each of the webpages. The main navigation links are small icons and are difficult to see and unlabelled.

5.4 Chapter Summary

Similar to the automated testing Facebook fared worse than the two governmental websites on manual testing. However on both automated and manual testing the results show that all of the websites had accessibility issues such as too many links or use of JavaScript hover menus. It was obvious Chapter 4 that automated tools had been used by the web authors of some of the government webpages, however results from the manual evaluation show that some of the pages still had accessibility issues.

Chapter 6 Results- User testing

6.1 Introduction

This chapter outlines the main findings of the user-testing of the three websites: Facebook, Citizen's Information and The Department of Health. This chapter first presents the results of the screening-questionnaire and videos. This chapter then presents the results of the Exit-interviews.

6.2 Screening-Questionnaire

The screening-questionnaire was designed to ensure persons who did not fit the testing demographic were excluded from the study. Therefore the questionnaire needed to confirm those who were tested were actually over 50, used the Web and had difficulty seeing things (whether diagnosed or not). This section discusses how the questionnaire was designed and deployed and the response rate. It also has a brief conclusion for the questionnaire results.

Contacts were made by the researcher to 8 persons over 50 years of age both male and female who were known to the researcher to use the Web and also to have sight problems. These people were contacted initially by telephone and the purpose of the research project and what participation entailed was explained to them. All 8 respondents consented to participate in the study and none were excluded. Of the participants there were 3 males and 5 females. The questionnaire was anonymous - no names or organisation names were required by participants. Also the researcher was on-hand to assist with any queries the respondents had on any of the questionnaires. This was to ensure that the participants understood fully what each of questions meant to limit any ambiguity if participants were unclear. The following section details the results from each of the questions asked on the screening questionnaire. The questions that are related to each other are grouped together.

Question 1: Do you have any problems with you vision? (Part B) If yes, please name condition and accuracy of both eyes if known, or what you find hard seeing. Question 2 asked if users had any other diagnosed medical condition which might impact on using the web.

7 out of the 8 persons involved in the user testing felt they had problems with their vision. 1 of the users reported they did not but was observed during the video analysis as leaning very close to the computer screen. The most commonly mentioned condition affecting the users website was myopia and hyperopia (short and distance vision). Other less commonly mentioned eye conditions included stigma and lazy eye (affecting two of the participants), please see Figure 9. All of the users involved in the study reported they did not have a diagnosed medical condition that might affect using the Web.

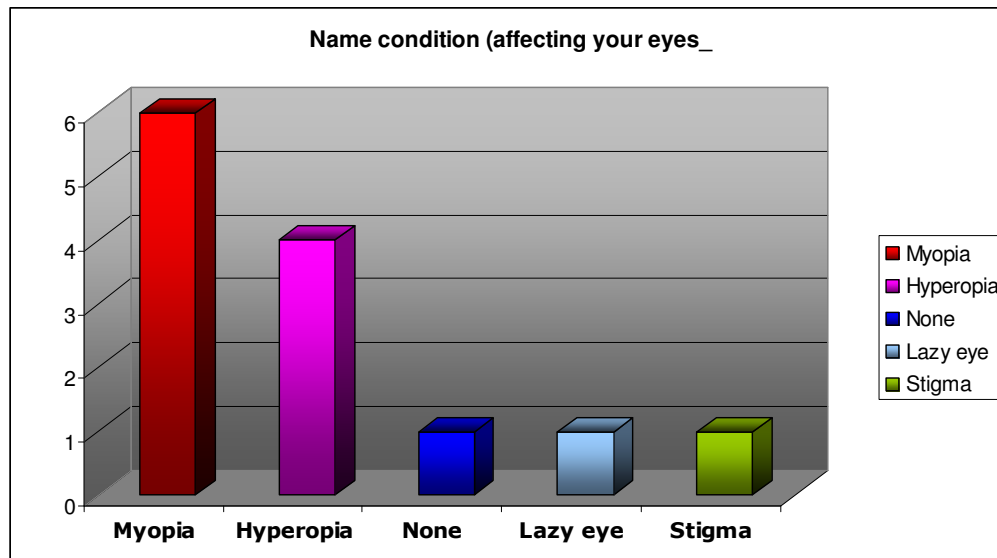


Figure 9.0 Eye conditions affecting participants

Question 3: Do you use the Web? Question 3 (part B) If yes, what type of computer do you use to access the Web? And Question 4: How often would you use the Web?

All 8 respondents reported they use the Web. With All persons involved in the study used either a desktop or laptop to access the Web. 7 out of the 8 users reported they used the Web daily. The other respondent reported they use it weekly.

Question 5: How would you rate your knowledge of computers? Question 6: How would you rate your knowledge of the Web?

This question was asked so it could be determined how knowledgeable users felt they were at using a computer. The most common self-rating score was 6 out of 10 for knowledge of computers with most other scores given being below 6. The most common self-rating score was 6 out of 10 for knowledge of computers. 6 users scored themselves either 6 or less (72%).

Questions 7, 8 and 9: Have you ever accessed the websites (Facebook, The Citizens Information website or The Department of Health)?

6 users had never accessed The Department of Health website or The Citizen's Information website. The chart also shows that half of all users have accessed Facebook.com with 2 using it daily and 2 users said they used it 3 times a week, or rarely.

All 8 participants knew what the website Facebook was used for. Of the 6 users who had never used The Department of Health website only one person knew what it was used for. Of the 6 users who hadn't used The Citizen's Information website half of them knew what The Citizen's Information website was used for. The results show most users were more familiar with the purpose of the Facebook then the other websites even those that have never used it.

6.3 Summary of results from Questionnaire

The majority of users rated themselves below 6 for Knowledge of computers and the Web and the most common condition affecting participants was myopia. None of the users had another medical condition that might impact on Web use. Half of the participants were Facebook users and most participants had never accessed the two governmental websites before. Most users used the Web daily.

6.4 Videoing of the tasks

This section discusses how long it took users to perform tasks on the websites using video analysis. This section did not use the results from the *Speak Aloud Technique* referred to in the methodology section. However it was extremely useful to see how long it took persons to perform the individual tasks on each of the websites as the results varied per person, per website and per task and hence these results are present below. There was no video for User 1 or 8 and part of User 4 due to the file corrupting in the saving process. The score is counted in seconds to complete each task on each website. Please refer to Appendices B for a table of exact time taken per user per task and per website.

Facebook- time taken to complete tasks

Most users took an average of 9-15seconds to complete a task on Facebook except for User 6. There was no large difference in times taken to complete the 7 different tasks on the website between Facebook and non-Facebook apart from User 6 who is not a Facebook user but also reported having 3 different eye conditions. User 6 spent an average of 35 seconds performing tasks on Facebook.

Citizens Information website –time take to complete tasks

Most users spent on average 21-36 seconds performing the tasks on the website. User 5 who had used The Citizen's Information website before had one of the quickest times in task completion. User 4 who noted in the questionnaire that they did not have a visual disability spent an average of 33 seconds on each task. The same User rated

themselves 3 out of 10 on both knowledge of computers and the Web on the questionnaire.

The Department of Health website–times take to complete tasks

Most users spent on average 16-24 seconds completing tasks. User 5 has used The Department of Health Website before and has the quickest on average times for task completion on the Website. User 4 was again noted to spend more time on tasks than any other user.

Observations on video and methodology

This section did not use the results from the *Speak Aloud Technique* referred to in the methodology section as the users discussed the task itself upon analysis of the video rather than the websites themselves. The majority of participants were observed to speak aloud the task itself such as “*find the search box*” (on The Department of Health website) a number of times rather than reflecting out loud on the websites. Participants were observed to be so concentrating so hard on the tasks that they found it hard to multi-tasks or split their attention e.g. access the website and reflect aloud on it at the same time.

It should be noted that none of the participants gave up trying to complete any of the tasks despite some taking over minute to find certain items on the website (another reason why timing the tasks turned out to be useful).

6.5 Summary of video results

The majority of users had quicker task completion times on Facebook than the two government websites. It should be noted that User 6 who is not a Facebook user and who reported having 3 different eye conditions spent an average of 35 seconds performing tasks on Facebook which is more than most of the other users apart from

User 4. User 4 took 57.8 seconds on average per task and also gave themselves a 3 for 'knowledge of web' and 'computers' on the questionnaire spent more time completing tasks on both the government websites on average then any other

The next section presents the results of the exit-interviews.

6.6 Semi Structured exit-Interviews

This section presents the exit-interview results and analysis afterwards. The interviews were completed after users completed tasks on each of the websites.

The interviews were broken down into 14 questions based on the principles of Universal design. The questions were retrieved from the centre of Universal Design Ireland (2012).

- Principle 1. Simple and Intuitive Use
- Principle 2. Size and Space for Approach and Use
- Principle 3: Low Physical Effort
- Principle 4 : Flexibility in Use
- Principle 5: Equitable use
- Principle 6: Perceptible Information
- Principle 7: Tolerance for Error

The presentation structure of the exit-interview results is laid out as follows:

1. Each question presents all of the general responses given to the three websites.
2. This is then followed by all of the users who gave specific responses to each of the websites in the following order: Facebook, then The Citizen's Information website and finally the Department of Health website.
3. The last two questions give the participants an opportunity to give feedback on the three websites in case the principles of universal design did not cover this.

It was decided to include nearly all of the quotes given in the interview due to the diversity of responses, in order to present balanced results and due to the fact that not all users mentioned all websites in response to each question asked.

Principle 1: Simple and Intuitive Use

This principle states that use of the design (of the website) needs to be easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level.

Guidelines that were developed into questions were taken directly from the Centre of Universal website (2012) and include:

- Eliminate unnecessary complexity.
- Be consistent with user expectations and intuition.
- Accommodate a wide range of literacy and language skills.
- Arrange information consistent with its importance.
- Provide effective prompting and feedback during and after task completion.

All 5 of the guidelines were relevant to web design and were taken from CEUD (2012), some were re-worded and others made into the same question depending on their relevancy to web design and accessibility. The following questions were used for the exit-interview:

Question 1: Were the websites unnecessarily complex or were they simple to use?

Question 2: Were the websites consistent with your expectations?

Question 3: Do the websites accommodate a wide range of literacy and language skills?

Question 4: Was information on the websites arranged in consistency with its importance

Question 5: Was there effective prompting and feedback given during and after task completion on the websites?

The responses given by participants to these questions will now be given as follows:

Question 1: Were the websites unnecessarily complex or were they simple to use?

Comments on all of the websites

User 6 felt all the Websites were “*a little congregated*”. In contrast User 2 felt all the websites were reasonably good and User 4 similarly felt the websites were not complex. User 3 reported on the governmental websites there was a lot of information presented to them:

“There was an awful amount of information on the page, it was very hard to figure out which bit refers to you. It was a bit overwhelming ...they have to have information, but there just seems to be an awful lot of small text facing you and it is hard to isolate out what you are looking for”.

This is from a similar finding on the manual testing whereby there was lots of links used on the websites and the automated testing which find text smaller than 9 pixels.

Users who commented on Facebook

User 7 reported they didn't like the Facebook website and there were too many things on the Facebook website, they also reported:

“...the print was very small and I think you'd need to be using it daily.... I definitely found it the most difficult of the three to use”.

Users who commented on Citizens Information website

Users 5 and 8 specifically mentioned the Citizen's Information website. User 8 thought The Citizen's Information website was good.

User 5 there was a lot of information on the page and:

“...your inclined to think would you go this way or would you go that way for that application”.

Specific comments on The Department of Health website

User 8 reported there was too much information on the webpage:

“The Department of Health one wasn’t good. There was too much information on the page, and the search icon was misplaced (department of health).”

User 1 felt it was overly complex for “*someone going into it for the first time*”.

Question 2: Were the websites consistent with your expectations?

Comments on all websites

Users 5 and 4 reported all the websites were consistent with their expectations.

User 3 reported that there was a lot of information on the two governmental websites:

“Well I mean I know from experience that that’s the way government websites are, because they are trying to give a whole load of information on a small screen, yeah well it would have to been what I expected”.

Specific comments on Facebook

User 2 stated that Facebook was straightforward and was not a Facebook user. User 3 reported they were used to the website.

User 1 reported that “*the Facebook isn’t that easy unless you are using it regularly*”.

Specific comments on Citizens Information Website

On The Citizen’s Information website User 2 felt the website was straightforward and User 1 liked the way it was organized and similarly User 7 also felt it was easy enough to use.

User 3 felt there a “*whole load of information on a small screen*”. User 6 had a

suggestion regarding the organization of the webpage that

“it would be better if items were just itemized on the top of the webpage so that you could go into each one separately.”

Specific comments on The Department of Health Website

On The Department of Health website User 7 reported it was as they expected and easy enough to use and it would need to be. User 1 liked the way it was organized.

User 8 felt it did not meet their expectations *“I would have expected better from a government department”*. User 6 felt the organization of items on the website should be changed:

“it would be better if items were just itemized on the top of the webpage so that you could go into each one separately”.

User 3 mentioned there was a whole lot of information on a small screen. User 2 had a lot to say on this Website and how it should be made *“unbusy”* as it is currently:

“very complex....if you were looking for something in a hurry you could spend all day looking for something in front of your face.”

User 2 also felt it should be redesigned to make it user-friendly.

“...in a way that would make people want to go into it, make it user friendly. The Department of Health Website needs to be updated and made user-friendly.”

Question 3: Do the websites accommodate a wide range of literacy and language skills?

Comments on all websites

Users 5 and 4 felt all the websites accommodated a wide range of literacy and language skills.

User 6 felt that the amount you use the websites impacted on how well you understood the language in them:

" I suppose it comes to use. If I was used to the language of webpages I would be better at it. I would say it's the language rather than things were. But definitely if you need to need to learn more about it should be highlighted if you are looking for ways to improve it".

User 1 felt on that ob all the websites "*Once you've found what you are looking for the language is okay*". User 2 felt web designers need to bring in people who have no experience in using the Web to attain better websites "*there could be difficulties for somebody not used to using the Web*". User 3 felt on both the government websites that it would be very difficult for someone with literacy skills to go through them,

"..the amount of information is overwhelming and the language would be quite formal."

Specific comments on Facebook

On Facebook User 2 also reported "*I understood most of the terms on Facebook*" and had never used Facebook before.

User 7 felt Facebook did not accommodate a range of literacy abilities

"I was able to understand all languages apart from the Facebook website".

Specific comments on Citizens Information website

On The Citizen's Information website User 3 as mentioned felt the language was quite formal and the amount of information overwhelming. User 7 was able to understand the language used.

Specific comments on The Department of Health website

On The Department of Health website there were similar results to The Citizen's Information website in that User 3 mentioned felt they felt language was quite formal and the amount of information overwhelming and again User 7 was able to understand the language used.

Question 4: Was Information on the websites arranged in consistency with its importance?

Comments on all websites

Users 8, 4, 5 and 2 felt information was arranged in consistency with its importance on all websites.

Specific comments on Facebook

User 1 felt it was "*straightforward*" on Facebook.

Specific comments on Citizens Information website

On The Citizen's Information website there were numerous responses relating specifically to this Website. User 1 reported specifically the Citizens Information website was straightforward.

However, user 7 felt the "How to Use link" should have been written in bigger text and reported this link:

"was sort of buried .. maybe I am used to using websites so I was able to find it quickly but I feel it should have been maybe bigger print or more obvious".

User 3 reported it was also hard to find the link to the "household charge" as it was not

at the forefront of the webpage:

“Well I think things like the household charge which are current were at the forefront. But it was just a bit difficult to try and find them.... I think they could have highlighted things like the household charge maybe something flashing or that... it would be confusing for older people.”

Specific comments on The Department of Health website

There was only one comment specifically on The Department of Health website by User 1 who stated *“The first one again I just found it busy, it put me off looking at it”*.

Question 5: Was there effective prompting and feedback given during and after task completion on the websites?

Comments on all websites

Users 1, 2, 5, 7, 6 and 8 felt effective feedback was given on all of the websites.

Specific comments on Facebook

User 3 who is a Facebook user had difficulty sending a message and reported they would have given up trying to send one:

“I would have had to give up sending a message..I don’t think I would have pushed the reply button at all I would have given up...”

Specific comments on Citizens Information website

The Citizens Information website was not specifically commented upon.

Specific comments on The Department of Health website

User 3 felt on The Department of Health website that effective feedback was not given on the search page and there was no easy way to get back to the Home page:

“The search page I think I went wrong there as well, my answer to that is just to go back to where I was and push the go-back button.”

Principle 2: Size and Space for Approach and Use

This principle requires that appropriate size and space is provided for approach, reach, manipulation, and use regardless of user's body size, posture, or mobility. Guidelines that were taken from the Centre of Universal Design website (2012) include:

- Provide a clear line of sight to important elements for any seated or standing user.
- Make reach to all components comfortable for any seated or standing user.
- Accommodate variations in hand and grip size.
- Provide adequate space for the use of assistive devices or personal assistance.

Out of all these guideline one of the guidelines was more relevant to web design and was hence reworded into a question for the exit-interview:

Question 6: Was there a clear line of sight to important elements on the websites?

The responses to this question given by participants will now be given below.

Question 6: Was there a clear line of sight to important elements on the websites?

Comments on all websites

User 4 reported that all websites had a clear line of sight to important elements. User 2 reported the two governmental websites were clear or easy to navigate.

User 8 felt all websites had a clear line of sight to important elements except for the search on The Department of Health website. User 3 reported on that on all websites they felt they “*needed more time*”.

Specific comments on Facebook

User 1 felt Facebook was straightforward.

User 7 felt the login on Facebook should have been bigger. User 5 found sending a private message on Facebook unclear. User 5 who is not a Facebook user and reported: *“I didn’t find that was clear...I didn’t think the error was till the next box.”* User 2, a Facebook user reported they also had difficulty sending a message on the website.

Specific comments on Citizens Information website

On The Citizen’s Information website User 7 felt it was *“fine”*. User 2 liked the way it was organized and User 1 felt it was straightforward.

User 6 had trouble finding the link for the ‘Household charge’.

Specific comments on The Department of Health website

User 2 liked the way The Department of Health website was organized.

On The Department of Health website User 1 reported it was too busy,

“it was too busy, too difficult to find what you are looking for you could spend all day looking at the page looking for what you want”.

Similarly user 5 reported it took them a while to access the website:

“there was a lot of print there..it just took while..it was essentially easy enough to get it but there was a lot to read first”.

And user 8 reported they had problems finding the ‘Search’ box in The Department of Health website.

Principle 3- Low physical effort

This principle requires that the design can be used efficiently and comfortably and with a minimum of fatigue. Guidelines that were taken from the Centre of Universal Design website (2012) include:

- Allow user to maintain a neutral body position.
- Use reasonable operating forces.
- Minimize repetitive actions.
- Minimize sustained physical effort.

Three of the guidelines were collated into one question that was relevant to web design and was re-worded into the following questions for the exit-interview:

Question 7: did the websites use reasonable operating forces e.g. lots of clicking, or lots of effort to find things?

The responses given by participants to this question will now be given as follows:

Question 7: Did the websites use reasonable operating forces e.g. was lots of clicking or effort required to find items on the websites?

Comments on all websites

Users 2, 4 and 5 felt they didn't have to make lots of effort in finding things on all websites with User 2 reporting the maximum times they had to click the mouse was three or four times. User 3 reported they didn't have to click lots of times but "*certainly scanning that dense text on the two government webpages*".

Specific comments on Facebook

User 6 reporting, Facebook was the easiest as there "*wasn't as much information on the webpage*".

User 7 was again the only person who reported difficulties on Facebook, "*they would have been lost on Facebook*". It should be noted that User 7 had reported earlier "*they did not like Facebook*".

Specific comments on Citizens Information website

On The Citizen's Information website only User 3 mentioned the website when they

said it required lots of scanning of dense text as quoted above.

Specific comments on The Department of Health website

User 8, 6 and 1 reported they did have to make an effort finding things on The Department of Health website with User 3 reporting that scanning the dense text took a long time.

Principle 4: Flexibility in Use

This principle requires that the design accommodates a wide range of individual preferences and abilities. Guidelines that were taken from the Centre of Universal Design website (2012) include:

:

- Provide choice in methods of use.
- Accommodate right- or left-handed access and use.
- Facilitate the user's accuracy and precision.
- Provide adaptability to the user's pace.

The guidelines that were the most relevant to web design was then re-worded into the following question for the exit-interview:

Question 8: Was there a choice in method of finding items and in navigation on the websites?

The participant responses to this question are now given below.

Question 8: Was there a choice in method of finding items and in navigation on the websites?

Comments on all websites

User 8 and 5 felt there was choice in finding things on all the websites. User 2 felt *“I think there are reasonably good standard all of the websites: I think these are fairly big websites so they have a reasonably good website”*.

User 6 reported that *“There possibly there was but I wouldn’t know them.”* User 4 was not sure either way.

Specific comments on Facebook

No user specifically identified Facebook in answering this question.

Specific comments on Citizens Information website

Users 3, 1 and 7 specifically mentioned The Citizen's Information website. User 1 it was quite easy and there was number of venues to find items.

User 7 stated had difficulties,

"I think when you asked me to find out about the new household charge I automatically thought of what's new... I presume there would have been a search box I could have gone into? ...I couldn't find it".

User 3 felt finding the Household Charge might have been confusing as there was two different ways to get to the link

"that could have been confusing. If I don't see it looking at me and I use the search strategy and hope that that will find it".

Specific comments on The Department of Health website

On The Department of Health website User 7 felt they might have had difficulties finding items on the website without the Search Box.

Principle 5: Equitable use

This principle requires that the design is useful and marketable to people with diverse abilities. Guidelines that were taken from the Centre of Universal Design website (2012) include:

- Provide the same means of use for all users: identical whenever possible; equivalent when not.
- Avoid segregating or stigmatizing any users.
- Provisions for privacy, security, and safety should be equally available to all users.
- Make the design appealing to all users.

The first two guidelines were aggregated into one question that was relevant to web design and was developed into the following questions for the exit-interview:

Question 9: Do you feel the websites provide the same means of use for all users: e.g. identical whenever possible; equivalent when not e.g. avoiding segregating or stigmatizing any users?

The responses given by participants to this question will now be listed below:

Question 9: Do you feel the websites provide the same means of use for all users: e.g. identical whenever possible; equivalent when not e.g. avoiding segregating or stigmatizing any users?

Comments on all websites

7 out of 8 users who answered these questions felt that some groups of users would find it hard to use all three of the three websites reviewed. Users 6 and 7 felt that persons with visual disabilities might find the websites hard to use and User 2 felt that people who weren't used to the websites might find them hard.

User 1 felt:

"I would say the elderly people, I'd say the people who senior citizens would find difficult to get into, to find what they're looking for and confusing" .

User 3 stated regarding the 2 governmental websites that the pages on two government website were very dense and *" I would say if you had visual or literacy problems you'd be put off using them, I would think so yeah..... I would say if you had visual or literacy problems you'd be put off using them."*

Specific comments on Facebook

User 8, a Facebook user explicitly stated she found the website easier to use because she was a user, *"I didn't find anything challenging on the Facebook website."*

User 2 and 5 who were not Facebook users reported certain people may have had difficulty accessing the site. User 5 reported *"..because it was my first time to go into*

it, it probably would be challenging” and User 2 stated “I think for users not used to the Web maybe the Facebook would be a bit too much”.

Specific comments on Citizens Information website

Users 6 and 3 reported that The Citizen’s Information website might be hard to use by some users if they had visual or literacy problems. User 5 also felt it wasn’t the easiest to use with User 8 mentioning it did not stigmatize users.

User 6 reported,

“I would say yeah they wouldn’t be accessible to all users. I would say people with visual difficulties I think the citizens information Webpage as it had so many items.”

Specific comments on The Department of Health website

User 5 reported it was the easiest but also that they use it regularly.

User 8 reported The Department of Health one was hard and User 3 felt the pages were not inviting and were very dense and also that people with literacy or visual problems would be put off using them.

User 1 reported elderly people might find the website hard to use:

“they would find difficult to get into, to find what they’re looking for and confusing. ..if it were used by some people of a certain age they would find it very frustrating”.

Principle 6: Perceptible Information

This principle requires that the design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities. Guidelines that were taken from the Centre of Universal Design website (2012) include:

- Use different modes (pictorial, verbal, tactile) for redundant presentation of essential information.

- Provide adequate contrast between essential information and its surroundings.
- Maximize "legibility" of essential information.
- Differentiate elements in ways that can be described (i.e., make it easy to give instructions or directions).
- Provide compatibility with a variety of techniques or devices used by people with sensory limitations.

All of the guidelines were aggregated into three different questions that were relevant to web design and was developed into the following questions for the Exit-interview:

Question 10: Do the websites Use different modes (pictorial, verbal, tactile) for redundant presentation of essential information?

Question 11: Provide adequate contrast between essential information and its surroundings?

Question 12: How legible is essential information and its surroundings?

The responses to these questions will now be given as follows for the principle of perceptible information.

Question 10: Do the websites use different modes (pictorial, verbal, tactile) for redundant presentation of essential information?

Comments on all websites

User 5, 6 and 8 reported there on most of the website they were primarily made up of text rather than pictures.

User 3 felt in regard to all websites, they were all text and people with literacy skills might find them hard to use.

“as I remember it was all text. Yeah having little boxes breaks up the text but maybe pictures would help people with literacy skills”.

User 1 felt not too many pictures should be used:

“.., maybe a small splattering of pictures to make it a little more user-friendly. But all text but not over-ridden with pictures because that would confuse the whole issue”.

Specific comments on Facebook

User 2, 4, 7 and 6 agreed that there were pictures on the Facebook as well as text. User 7 reported Facebook had pictures but that was “*more confusing*” than anything else.

And user 2 reported,

“Facebook one seems geared towards children. Mainly text on two main Websites but pictures on the Facebook which suits because young people are more illiterate now, they need more photographic information”.

Specific comments on Citizens Information website

The Citizen’s Information website was not specifically commented on.

Specific comments on The Department of Health website

The Department of Health was commented on by User 1 they felt it should be “*less busy, break up the first page into two or three pages or do a cover index.*”

Question 11: Provide adequate contrast between essential information and its surroundings?

Comments on all websites

Users 1, 2, 4, 5, 6, 7 and 8 felt there was adequate contrast on all the websites. User 3 felt there was not adequate contrast on The Department of Health and Citizens Information websites.

Specific comments on Facebook

All users felt Facebook provided adequate contrast.

Question 12: How legible is essential information and its surroundings?

Comments on all websites

User 8, 5 and 2 felt on all websites essential information was legible. User 4 felt it was Ok. However User 3 reported the websites they were easy enough to read once you found it what you were looking for.

User 6 who reported three different eye conditions reported on all websites.

“I found it personally difficult when I’m reading if from, if it was at home I would print something out off from the laptop rather then read from the laptop I do it a lot of the time. It’s my eyesight more then anything else”.

Specific comments on Facebook

There were no specific comments on Facebook with regard to this question.

Specific comments on Citizens Information website

User 7 liked the blue and white used on The Citizen’s Information website to provide contrast.

Specific comments on The Department of Health website

User 1 specifically mentioned The Department of Health in that they felt the print was very small,

“but I’m sure that could have been broadened using your screen but certain people wouldn’t be able to do that.. I think the text was very small, but again if you were very proficient with PCs there might be something where you could expand the fonts but not everyone would know how to do that”.

Principle 7: Tolerance for error

This principle requires that the design minimizes hazards and the adverse consequences of accidental or unintended actions. Guidelines that were taken from the Centre of Universal website (2012) include:

- Arrange elements to minimize hazards and errors: most used elements, most accessible; hazardous elements eliminated, isolated, or shielded.
- Provide warnings of hazards and errors.
- Provide fail safe features.
- Discourage unconscious action in tasks that require vigilance.

All of the guidelines were aggregated into three different questions that were relevant to web design and were then developed into the following questions for the exit-interview:

Question 13: Are there minimal hazards or errors on the website, for example are most used elements accessible?

Question 14: do the websites provide warnings of hazards and errors and provide fail safe features?

The responses to these questions will now be given as follows for the principle of tolerance for error.

Question 13: Are there minimal hazards or errors on the website, for example are most used elements accessible?

Comments on all websites

Users 2 and 8 gave generic answers when they reported that all the websites were easy. User 7 reported that the two government ones were very clear how you would use them and that you were less likely to make mistakes on them.

User 3 also felt it was easy enough to get lost on the two governmental websites.

User 4 had this to say about the websites *“Yes one could make mistakes, and I made mistakes.”*

Specific comments on Facebook

User 5 had a different opinion and felt it was *“obvious”* what to do on the website.

Users 7 and 2 felt it was easier to make mistakes on the Facebook. User 3 reported *“I couldn’t manage the Facebook, but Facebook it is not essential”*.

Specific comments on Citizens Information website

User 7 in contrast felt this website was very clear and harder to make mistakes.

User 6 reported,

“Once you go into it, its fine. Once you find what you are looking for”.

User 3 similarly reported,

“It was easy enough to get lost .. on the government websites there might be things that are essential that you are not able to find.”

Specific comments on The Department of Health website

User 7 reporting the website was clear.

User 3 and 1 felt it was easy to make mistakes on The Department of Health website with User 5 also reported it wasn’t clear how to find information on certain links:

“Again the freedom of information act and going for fees or charges I wasn’t sure which I should be going into first”.

Question 14: Do the websites provide warnings of hazards and errors and provide fail safe features?

Comments on all websites

User 1, 4 and 6 felt in general on all the websites appropriate warnings of errors and provide fail safe features. User 5 did not notice any warnings on any of the websites. . User 3 reported they had made mistakes on the two government websites “*If you didn’t know to go back. There is no clear way to knowing how to get out of it*”.

Specific comments on Facebook

User 5 felt it was obvious what to do on Facebook

Specific comments on Citizens Information website

User 2 could not see a help section on The Citizen’s Information website.

Specific comments on The Department of Health website

The Department of Health Website was not specifically mentioned in answering this question.

Open questions

There next two open-questions were asked to allow participants to give any feedback on the websites that was not covered by the Principles of Universal Design in the first fourteen questions. The questions asked were as follows:

Question 15: Is there anything you would change on the 3 websites?

Question 16: Do you have any other Comments or feedback?

The responses given by the participants are detailed below:

Question 15: Is there anything you would change on the 3 websites?

Comments on all websites

With regard to all websites User 8 reported,

“All websites were very legible, and the print was very easy to read. The important things were highlighted, like the blue... that you could go into them”.

User 6 stated there was a lot of information on all the websites. User 3 also reported there was too much information on the government websites,

“...are overwhelming. Maybe you could go into them highlight information and don't have such dense text. Maybe you could go into them and then get all that information. ..they don't need to put all that information in on these pages and perhaps some sort of visual cues. Well as I said some of them tried to break it up but boxes in them and so and I think that would be a good idea”.

Specific comments on Facebook

User 3 did not mention Facebook. User 8 felt they would not change anything on Facebook. User 2 reported the design was as they expected and User 4 reported *“Well, Facebook was ok because it didn't have a lot of unnecessary information.”*

In contrast User 7 reported,

“There were too many things on the website, it was too difficult you could see by the way I was using it, the print was very small and I think you'd need to be using it daily. I definitely found it the most difficult of the three to use.

Users 5 had a similar opinion and stated,

“There's a lot of information there to take in straight away you know, there's a lot of columns. Yeah. A lot to take in”

User 1 reported *“The Facebook one wouldn't appeal to me”.*

Specific comments on Citizens Information website

User 1 liked the way the website was organized. User 8 stated:

“Well, I would make the search button on The Citizen’s Information website more visible if possible.. The important things were highlighted, like the blue... that you could go into them. It was obvious where the household charge was on The Citizen’s Information website.”

User 6 reported there was a lot of information first of all *and*

“I would feel items that items of importance for someone that doesn’t use them that of ten.. For example ‘how to use’ should be on the top line, it should be separate On the citizens information page?”.

User 5 had a similar opinion, *“The citizens advice- a lot of information, nearly too much on the first page”.*

User 4 gave similar feedback

“The other two websites had a lot of information on them. Some of it I didn’t particularly need at the time. Well perhaps have less information on the first page.”

User 3 as quoted above felt there was too much dense text on the website.

Specific comments on The Department of Health website

User 1 liked the way they website was organized.

User 3 as quoted above felt there was too much dense text. User 4 reported there was lot of information that was not needed. User 5 in contrast reported *“, it could have been that what I was going into find on The Department of Health I found easy”.* User 2 stated,

“Again I’m repeating myself but the first one I would make less busy and more user-friendly..., the first one to repeat myself I would redesign it in a way that would make people want to go into it user friendly again”.

Question 16: Do you have any other comments or feedback?

Comments on all websites

User 2 felt all the websites were “*pretty good*”.

User 6 reported that all websites should use more highlighting and bolder letters. User 3 felt with regard to the government websites

“Its in their interest to have it user friendly because they are trying to cut down on the number of people contacting them, and that’s what happens if people can’t access information easily they just give up, and pick up the phone.”

User 4 felt “*well they are somewhat complicated because they carry a lot of information on the two public service websites*”.

Specific comments on Facebook

And User 4 reported,

“Facebook, that’s straightforward. Facebook had less information to show. Oh yes, well I couldn’t...it was difficult to see (log in webpage), but I know where it is now. I never did that before, it would be hard to see if you were a new user”.

User 7 reported “*it was obvious I didn’t like the Facebook website at all, cluttered up with everything*”.

Specific comments on Citizens Information website

User 7 reported they preferred The Citizen’s Information website.

User 3 felt the website should be made more user-friendly. User 4 felt there was too

much information on the website.

Specific comments on The Department of Health website

Again on The Department of Health User 7 reported they preferred The Citizen's Information website.

User 3 felt the website should be made more user-friendly. *User one similarly felt "it needs to be updated and made user-friendly"*. User 4 felt there was too much information on the website.

6.7 Conclusions

They were different opinions on each of the websites from the 8 users involved in the testing. There was no consensus over which was the best website in terms of accessibility. However common themes did emerge from the results. Most people felt all the Websites had "*too much information*" on them. They were "*too busy*" or too "*congregated*". This was particularly the case on the two governmental websites.

The principles of Simple and Intuitive and Perceptible Information featured strongly in the results in that more of the guidelines for each the two principles of Universal Design were relevant to web design hence users were asked more questions on these principles.

User 6 who has three different eye conditions reported regarding all of the websites

"I found it personally difficult when I'm reading if from, if it was at home I would print something out off from the laptop rather then read from the laptop I do it a lot f the time. It's my eye sight more then anything else".

Only 2 users mentioned there was too much information on the Facebook website with one of the two mentioning they did not like Facebook at the start of the interview.

4 users out of 8 were Facebook users and most users had never looked at the two

governmental websites prior to the research.

On The Department of Health website three of the users felt that there was too much information on the website and 2 users felt it should be made more user-friendly with one participant suggesting people are more likely to phone the Department of Health more often if the website is not made user-friendly.

On The Citizen's Information website 4 users felt that there was too much information and that important links and items like the search-box should be made more visible.

Chapter 7 - Conclusion

7.1 Introduction

The research question was what are the prevailing obstacles in Web accessibility on three well-known websites for older people who have sight difficulties?

Web accessibility means that people with disabilities can use the Web. More specifically, Web accessibility means that people with disabilities can perceive, understand, navigate, and interact with the Web, and that they can contribute to the Web (W3C School Website, 2012). The research used three different approaches for evaluating accessibility on websites for accessibility as there are advantages and disadvantages to each approach and each approach provides a different aspect to accessibility e.g. looking at the code, design and user. Approaches used in this research included using automated tools to determine to identify difficulties with the code, a manual assessment of each of the websites including a comparison to the WCAG 2.0 guidelines and the website compliance to them, and finally user testing. The three approaches were used in order to complete a holistic approach to assessing web accessibility and usability

Chapter 7 will provide a conclusion including a synthesis of result and recommendations for the three websites to improve their accessibility. This chapter will also discuss critical reflections and outline areas for future study.

7.2 Synthesis evaluation of results and proposals for websites

In the automated tools accessibility audit and the manual comparison to WCAG 2.0 principles Facebook fared worse compared to the two governmental websites. It is interesting to note that in contrast to the manual and automated accessibility evaluations: from the user-testing this is not the case and there were different opinions on each of the websites from the 8 users involved in the testing with no consensus over which was the best or worst website in terms of accessibility. One user however reported,

“I couldn’t manage the Facebook ,but Facebook it is not essential (compared to the other two Websites”.

Both the automated and manual evaluation results show all three websites had accessibility issues such as too many links, or the use of JavaScript hover menus and not all webpages on of the governmental websites had minimal accessibility errors despite some of the them passing the automated testing.

It is surprising that the majority of users rated themselves 6 or below for ‘knowledge of Computers’ and the ‘Web’ despite using them daily. Most users tested had never accessed the two government websites which might have been a reason for rating these websites lower then expected compared to the results from the manual and automatic evaluation. For example Facebook users had quicker task completion times for most tasks on the website as discovered via the video analysis and User 6 who is not a Facebook user and who reported having three different eye conditions spent an average of 35 seconds performing tasks on Facebook or more then any other user. Indeed one of the users who rated themselves 3 “for knowledge of the Web” and “of computers” on the screening-questionnaire reported they did not have a diagnosed visual disability. The same user is noted to have spent more time completing tasks on the government websites then any other user taking 57.8 seconds on average, per task.

A finding from the automated testing would also be that Facebook is not usable if you disable the styling (CSS).For example it would be challenging for anybody who is using a screen-reader to access the website.

Common themes emerged from the exit-interview results with the principles of Simple and Intuitive and Perceptible Information Universal Design featuring most prominently. For example, most people felt all the websites had “*too much information*” on them. They were “*too busy*” or “*too congregated*”. This was particularly the case on the two governmental websites. The principle of Simple and intuitive in Universal Design that the website is easy to understand, regardless of the user’s experience, knowledge, language skills, or current concentration level (CEUD, 2012). If there is too much information or a website is too congregated this does not make it easy to use. The principle of Perceptible Information requires the design of the

website communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities (CEUD, 2012). Again if a website is too congested someone with myopia might find it hard to discern between different words or links on a webpage. Therefore these principles therefore may be the most relevant to web design and to this research project. For example, Universal Design also can also include abstract design principles for products, services and environments. The findings from the interview also suggest that people are different and have different needs and websites need to take account of this and aim to be designed for everyone. This is comparable to the goal of universal design. The principles of Universal Design are similar to the WCAG 2.0. Principles of perceptible and understandable. In terms of the manual and automated evaluation, both the Universal Design principles and the principles of WCAG 2.0. relate to for example, the lack of alternative text used in images on Facebook, and the lack of meaningful labels used. On the government websites it might be the large amount of links used.

The success of any website depends on the extent to which the users can learn and use the system: e.g. learning, memory, attention and problem-solving are essential to consider for the principle of understandable, this was considered in the user-testing when the participants were given tasks to complete on websites which involved cognition. Most participants who were observed undertaking several of the tasks on the websites were observed to speak out loud what they were asked to do a number of times before they actually completed the tasks. This was not what they were asked to do as they meant to reflect on the websites (The Speak-Aloud technique). It could be deduced that the participants were concentrating very hard on the tasks themselves and could not multitask (reflect out-loud) indicating that participants were using sustained rather alternating attention throughout undertaking the tasks on the three websites. It should also be noted that none of the participants actually gave up trying to complete a task no any of the websites despite some of them taking over minute to find certain items on the websites. This finding was another reason why timing how long it took to do the tasks turned out to be useful in the video-analysis.

Another finding relevant to the principle of Understandable in WCAG 2.0 and Simple and Intuitive in Universal design is that the use of Irish on The Department of Health website. This might be difficult for somebody who never learned Irish in school. A

positive example of a helping to make a website Understandable is on The Citizen's Information website where you have the option to change to Polish and to other commonly used languages in Ireland. This makes the website more accessible to a greater range of people living in Ireland.

Critical causes of Web accessibility issues

From completing this research it was apparent that the two government websites had used automated accessibility tools when designing their websites. This was obvious due to the low number of coding and accessibility errors on a number of pages. It was obvious that it was unlikely either a manual or an automated evaluated evaluation had been completed on Facebook.com.

In this section I will give a general summary of proposals to improve the major accessibility issues on each of the website starting with Facebook, then The Citizen's Information website and finally The Department of Health website.

Facebook

- A recommendation for Facebook would to reduce the number of XHTML and accessibility errors on their webpages and to provide meaningful alternative text for images. For example, the findings show all the Facebook pages had an average of 41 accessibility and 40 HTML errors on each of the 6 pages evaluated. There was also no use of alternative text on images or links and those images that did have alternative text were not meaningfully marked up so they could be read by some using a screen reader.
- Another recommendation for Facebook would be to reduce the volume of links used and to avoid using frames. For example the automated results showed there were frames used and a large number of links ranging from over 100 hundred to 200 this would make the pages easier for people to visually scan.
- A recommendation from the manual checking would of Facebook would be to avoid using Ajax, and Captcha and to make their website more accessible for somebody who wants to navigate it without CSS styling. For example the manual evaluation using comparison to WCAG 2.0 guidelines showed on

Facebook that Ajax and Captcha are used, which can be inaccessible to persons using screen-readers. The website is also not possible to navigate without CSS styling. The HTML markup should be accessible without CSS to someone using a screen reader.

- Another recommendation for Facebook would be to separate between the foreground from the background on its webpages. For example not to have so many navigation links in so many different sections and to avoid the use of frames. This will also help to increase consistency on the website on different pages. For example, the results from comparison to WCAG 2.0 guidelines show there are as many as 6 sections on some of the webpages and the links change depending on which page you are looking at.
- Another proposal would be to increase the size of the main navigation links as currently these are small icons and are difficult to see and unlabelled.
- Similar to the results from the automating checking two of the users mentioned there was too much information on the Facebook website. This could be improved by reducing the volume of links and making the page simpler linking. For example, User 7 reported “*There were too many things on the website, it was too difficult you could see by the way I was using it, the print was very small and I think you’d need to be using it daily. I definitely found it the most difficult of the three to use.*”

The Citizen’s Information website

- A recommendation for The Citizen’s Information website would be to reduce the number of accessibility errors on their “*What’s New*” page. For example while evaluating the Citizens’ Information Website using the Wave toolbar there was an average of 1 Errors on all 4 pages viewed apart from the “*What’s new*” Webpage on The Citizen’s Information website.
- Another proposal would be to reduce the number of links and information on the webpages. The automated testing, manual checking and user-testing showed there were a large number of links used on The Citizen’s Information website. The manual evaluation of the Citizens Information webpage showed there were over a hundred links on some of the pages with no site map. On the

user-testing section of the evaluation half of the participants felt that there was too much information presented on the webpages and that important links and items like the search-box should be made more visible. User 5 reported, “*a lot of information, nearly too much on the first page*”.

- Another recommendation from the manual check of the website would be to avoid the use of JavaScript hover menu as this is inaccessible to some screen-readers and also hard for an older person to navigate on. For examples results show that a JavaScript hover menu is used on the main navigation menu on The Citizen’s Information website. It is recommended in the HTML code to say what screen reader and what setting people should use if JavaScript is being used.
- A final proposal would be to add a navigation aide on the *What’s New* page.

The Department of Health website

- A recommendation for The Department of Health website would be to reduce the number of accessibility and HTML errors on two of their webpages. For example findings from the automated testing show that the government websites had 0 accessibility and most pages did not have HTML errors. One of the exceptions to this on the governmental websites was the “*Search page*”, Department of health, which had 7 accessibility errors. The *Fees and Charges* there were 28HTML errors (1.0 strict).
- Another recommendation from the automated testing would be not to use PDF elements as these are not readable by persons using a screen reader. Include Ms Word documents as well.
- A proposal from the manual check would be to increase the size of the navigation aide used to Arial size 12. For example the manual evaluation of the website showed different results for The Department of Health website. For example the website had a navigation aide that allowed you to return to the Home Page but the text was very small.
- Another recommendation from the manual check would be to separate the foreground from the background and to make the search box easier to see along with adding skip to main content or return to main menu options.

- Another proposal would be to avoid using JavaScript and to provide English translations of anything written in Irish. For example the manual check showed the website also uses JavaScript. Some of the website is in Irish and there is no option to change the website into different languages.
- A further proposal from the user-testing evaluation recommended the website be made less busy (less information) and more user-friendly. For example, three of the user’s feedback was that there was too much information on the website. Two users also suggested the website be made more user-friendly. One participant suggested people are more likely to make a phone call to The Department of Health rather than use the website if it is not made user-friendly. User 2 stated

“Again I’m repeating myself but the first one I would make less busy and more user-friendly..., the first one to repeat myself I would redesign it in a way that would make people want to go into it user friendly again”.

7.3 Critical reflections

Critique of Methodology

One of strengths of this study is the use of three approaches to access the accessibility on Facebook, The Citizen’s Information website and The Department of Health website. If we remember Web accessibility means that people with disabilities can use the Web including perceive, understand, navigate, and interact with the Web (W3C, 2007: WCAG 2.0). On that basis automated and manual testing alone would not be able to provide enough information. For example we can see from the findings most participants felt Facebook was not the worst website in comparison to findings from both the automated and manual testing, they also reported on issues such as there was too much information presented on the two government websites which did not arise in the initial check for accessibility errors using the Wave Toolbar (automated testing). It would also be very hard to conclude from automated and manual testing how well a person can navigate, understand or interact with the Web without the user which is the very definition of Web accessibility itself. For example, enabling the user to access the

Web is the key to Web accessibility. Therefore in some ways it would be negligent not to include users in an accessibility evaluation of a website.

However a positive aspect of using automated tools is that they are generally free to use and simple to use: providing a very quick overview of the main accessibility issues on a particular website. For example, Wave found 41 errors (on average) on each of the Facebook pages and 28 accessibility errors on the “*Fees and Charges*” webpage on The Department of Health website. A manual evaluation is also useful to use because some accessibility issues can only be picked up by a human operator (or somebody with accessibility knowledge), and it allows the websites to be compared against standards or guidelines (WCAG 2.0).

Another key strength of this research project is that it examined a number of pages on each of the three websites. For example, on the two government websites they were not consistently error free in terms of HTML and Accessibility errors (the “*Fees and Charges webpage*” on The Department of Health and the “*What’s New*” page on the Citizens Information webpage). A critique of websites using the manual and user-testing for their websites is that although they are comprehensive they are also quite tedious as each webpage needs to be looked at.

On the Questionnaire it was interesting to note that most people only gave themselves a 6 on knowledge of computers and the Web. Is this their actual skills actual level or does it show a lack of confidence amongst this population demographics and is this possibly impacting on how well users were able to perform task and what they said in interview about the websites?

A critique of the methodology might be that the results section did not use the results from the *Speak Aloud Technique* referred to in the methodology section as the users discussed the task itself upon analysis of the video rather than the websites themselves. The majority of participants were observed to speak aloud the task such as “*find the search box*” (on The Department of Health website) a number of times before they were successful in completing the task, in this case finding the search box. None of the participants gave up trying to complete a task despite some taking over minute to find certain items on the website (another reason why timing the tasks turned out to be

useful). Participants were to be so absorbed in the tasks that they found it hard to multi-tasks or split their attention e.g. access the website and reflect aloud on them.

Critiquing the Exit-interview it was felt the structure of the interview was very comprehensive but more layman English could have been used on each of the questions. For example, the guiding questions were taken straight off the Universal Design website (CEUD, 2012) and some users gave generic answers and no particular comments. This might suggest that they did not understand the question (even when reworded by the researcher) or perhaps they weren't taking this information in when they were looking at the website (most users were very task-oriented), for example some users spent a lot of time completing the task on the websites and only one user was able to reflect out loud and complete the tasks on the websites at the same time.

7.4 Future work

WCAG 2.0 and its relationship to Universal design and cognition

Completing this research also enabled the researcher to compare the similarity of the principles of Universal Design to the Web accessibility guidelines (WCAG 2.0). From my own background as an occupational therapist it is also clear that the principles of both WCAG and Universal Design are linked to cognition and theories of Human Computer Interaction. For example perception can involve all the different senses. A set of guidelines for displays in HCI are by Smith and Mosier (1986). Who offer five high-level goals for designing websites:

1. Consistency of data display
2. Efficient information assimilation by the user
3. Minimal memory load on the user
4. Compatibility of data display with data entry
5. Flexibility for user control of data display

It would be useful for future research to expand more on these findings and perhaps provide more definitive links between the different WCAG 2.0 Guidelines and the

Universal Design Principles. This would provide a holistic multidisciplinary view on the area of accessibility.

It would also be interesting to do a discussion group rather than interviews to gauge opinions on accessibility if a similar study were to be repeated. For example, when completing the user-testing when there was more than one participant present the same two users ended up engaging in a debate with each other about which website was the most accessible. This would be useful to capture in a future study.

Another idea might be to evaluate one website and cover all the webpages, this would ever be outside the scope of this study as for some of the Websites involved in this study there was over a hundred links that would need to be evaluated. However, it was noticed in this study that on each of the webpages the number of accessibility and HTML errors changed and was not consistent so it would certainly be important for any future study to not just evaluate the home page of a website for accessibility. I also noticed from my study that the numbers of errors change over time and therefore this study provides only a snapshot in time of accessibility issues and therefore it might be useful to complete a longitudinal study.

It would be interesting in a future study to include people with moderate to severe impairments and people under 50 years of age. I would also recommend if researchers are recording data via video to use professional video cameras rather than cheap commercial alternatives like smart phones as this would be a more reliable method of recording data.

Another useful idea for future researchers might be to produce a handbook for Web designers on accessibility issues encountered on the websites to ensure Web developers have a full understanding of accessibility rather than just focusing on using automated tests.

7.5 Conclusion

Overall Facebook fared worse on both the manual and automated Web testing, but the two government Websites also had some accessibility issues that need to be improved on some of their webpages. There was no consensus on which website performed the best on the user-testing but the two government websites did not fare as well on this approach with most users feeling the websites had too much information presented on them. Given the findings produced different results for each approach it is clear that it is not enough to just use automated tools for checking Web accessibility on websites.

On the methodology used the '*Speak Aloud*' technique did not work as envisioned as users were too absorbed with the task and forget to reflect aloud.

A future area of study might be to expand on the links between Universal Design, WCAG 2.0 and theories of cognition and to develop a handbook for Web developers on a holistic approach to Web design.

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Appendices Part A

- (i) Consent form and task form given to participants
- (ii) Questionnaire issued to participants after pilot
- (iii) Specific questions used in exit-interview

(I) Consent form and task form given to participants

I hope to investigate the accessibility of particular Websites to persons with reduced vision. To do this I will look at two governmental Websites and compare them to a privately owned Website. The Websites include: Facebook.com (a privately owned Website designed to allow persons to share information), The Department of Health (a government-run broadcasting Website) and The Citizens' Information Website (a government run broadcasting Website).

The user testing aspect of this website will involve:

- 1) Getting participants complete a questionnaire to be completed to gauge their response to the websites

- 2) Getting participants to complete tasks on all 3 websites with them speaking aloud throughout the tasks and reflecting on the elements that they find easy/ hard to use. I will record their interactions with the Websites via video camera.

- 3) A brief interview after this to find out your reaction to the Websites.

Points to note before signing the consent form

- 1) The participant's identity will remain anonymous. The video recording will not include any head shots.
- 2) The write up of my research will not include any identifiable information
- 3) The transcripts of the videos, questionnaires and consent forms will be stored on an encrypted folder/ locked cupboard and will be deleted or destroyed on completion of this study.
- 4) Participants can keep the cover page of this pamphlet if they want to obtain more information on the project or relevant organizations to the research.

Consent signature

I _____

Have been fully informed on the purpose of this research and give my consent for the information collected to be use in part completion of a dissertation by the above named researcher.

Task 1 completing the questionnaire-

Please complete as many questions as possible as this will make for a better result.

Task 2- accessing the Websites

Please speak out loud when you are completing this task reflecting on how easy/ hard it is to do things and that you feel could be changed.

Task 3- feedback your reflections on each via a short interview

What is Facebook.com?

Facebook helps you connect and share with the people in your life. It is a social networking Website launched in February 2004. It is operated and privately owned by Facebook.Inc.

Task 1

Go to <http://www.Facebook.com/> on your Web browser

1) Sign into Facebook using you're the logon details below

1. Email address: D10122523@mydit.ie and your password is cleopatra65

1. Click on your "wall"
2. Update your Status on your wall to reflect how you feel.
3. Locate your friend Rathmines Sketchers on your friends list, click on them
4. Send them a message

What is The Department of Health Website?

The purpose of The Department of Health Website is to provide information on: health polices consumer information and official communications made by The Department of Health.

Task 2

Go to <http://www.dohc.ie/> on your Web browser

1. Find out how you would **contact/ring** The Department of Health
2. How much it costs to make an **freedom of information ACT** application
3. Type “**customer service**” into the search box.

What is the Citizens’ information Website?

This site provides information on public services and entitlements in Ireland. It is provided by the Citizens Information Board.

Task 3

Go to <http://www.citizensinformation.ie/en/>

1. Click on “**what’s new**” on the Website
2. Find the link that says “**how to use**” the Website
3. Find out about the new “**household charge**”

Appendices A- Part II

Questionnaire *Instructions: Please circle either Yes or No, or a number if the question uses one a scale 1-10*

1. Do you have any problems with you vision? **Yes OR No**

If yes, please name condition and accuracy of both eyes (if known) or what you find hard seeing_____

2. Do you have any other diagnosed medical condition that might affect using the Web? **Yes or No**

Please name_____

3. Do you use the Web? **Yes OR No**

If yes, what type of computer do you use to access the Web

4. How often would you use the Web?_____

5. How would you rate your knowledge of computers?

(No knowledge) 1 2 3 4 5 6 7 8 9 10 (expert user)

6. How would you rate your knowledge of the Web?

(No knowledge) 1 2 3 4 5 6 7 8 9 10 (expert user)

7. Do you use Facebook? <http://www.Facebook.com/>

If yes, how often would you use it? _____

If No, do you know what it is used for? _____

8. Have you ever accessed The Department of Health Website?

<http://www.dohc.ie>

If yes, how often would you use it? _____

If No, do you know what it is used for? _____

9. Have you ever accessed the Citizen's Information Website? _____

If yes, how often would you use it? _____ **If No**, do you know what it is used for?

Appendices A- Part III

Universal design-Interview

Simple and intuitive

- 1) **Do the Websites** Eliminate unnecessary complexity/ Be consistent with **user expectations and intuition.** ?
- 2) Accommodate a wide range of **literacy and language** skills/ Arrange **information consistent with its importance?**
- 3) Provide effective prompting and feedback during and after task completion?

Size and space for approach for use

- 1) Provide **a clear line of sight to important elements** for any seated or standing user. Provide adequate space for the use of assistive devices or personal assistance

Low physical effort.

- 1) Use **reasonable operating forces.** Minimise repetitive actions. **Minimise sustained physical effort e.g. lots of clicking/ lots of effort to find things?**

Flexibility in use :

- 1) Is there a **choice in method** of finding items/ navigation? E.g Accommodate right-handed or left-handed access and use/ Facilitate the user's accuracy and precision/ Provide adaptability to the user's pace

Equitable

- 1) Do you feel the Websites Provide the same means of use for all users: identical whenever possible; equivalent when not e.g. Avoid **segregating or stigmatizing** any users. Provisions for privacy, security and safety should be equally available to all users. Make the **design appealing** to all users

Perceptible information

- 1) Do the Websites Use **different modes (pictorial, verbal, tactile)** for redundant presentation of essential information?.
- 2) Provide adequate **contrast** between essential information and its surroundings?.
- 3) **How legible** is essential information and its surroundings?

Tolerance for error .

- 1) Are there **minimal hazards** / errors Website e.g. most used elements, most accessible?
- 2) .2) Do the Websites **Provide warnings** of hazards and errors and provide **fail safe features**?

What would you change? What was good/ bad about the design of the Websites?
Comments and feedback?

Appendices B

Time taken to complete tasks (Videos) on each website

Facebook- times taken to complete tasks in seconds

| User | Task 1-log in | Task 2- profile | Task 3 - wall | Task 4- status | Task 5-friend | Task 6- message | Task 7-send message |
|------|---------------|-----------------|---------------|----------------|---------------|-----------------|---------------------|
| 1 | | | | | | | |
| 2 | 5 | 2 | 4 | 6 | 13 | 15 | 100 |
| 3 | 2 | 4 | 2 | 18 | 7 | 2 | 10 |
| 4 | 15 | | | | | | |
| 5 | 5 | 18 | 3 | 7 | 5 | 10 | 26 |
| 6 | 160 | 22 | 29 | 13 | 15 | 2 | 5 |
| 7 | 35 | 6 | 24 | 4 | 10 | 10 | 2 |
| 8 | | | | | | | |

Citizens Information Website –times take to complete task in seconds

| User | Task 1 | Task 2 | Task 3 |
|------|--------|--------|--------|
| 1 | | | |
| 2 | | 5 | 14 |
| 3 | | 60 | 29 |
| 4 | | 132 | 40 |
| 5 | | 4 | 25 |
| 6 | | 10 | 60 |
| 7 | | 5 | 10 |
| 8 | | | |

The Department of Health Website–times take to complete task in seconds

| User | Task 1 | Task 2 | Task 3 | Task 4 |
|------|--------|--------|--------|--------|
| 1 | | | | |
| 2 | | 16 | 13 | 2 |
| 3 | | 4 | 15 | 2 |
| 4 | | 50 | 60 | 75 |
| 5 | | 5 | 8 | 17 |
| 6 | | 17 | 32 | 47 |
| 7 | | 8 | 8 | 4 |
| 8 | | | | |

