Issues of technology for people with disabilities

Abstract

This document will outline the main problem with Cyber Essentials which is the disabilities Visual Impairment and Hearing Impairment. There is a short introduction on what visual impairment is and the types of them. The document will give a clear understanding of content on what visual impaired users suffer from and why. It will explain the technology they can use to help them work within systems with the disability they suffer from. The documentation will also outline the Hearing impaired users and how this disability impacts them when working on the system within the company. The documentation will also explain the technology and different ways users who suffer from such disabilities can use to help them when working on a computer. An explanation will be given on the attacks that both these users suffer from and how they are vulnerable to these attacks. It will explain some of the solutions that professionals have come across to tackle Cyber-attacks.

What is visual impairment?

Visual impairment is a disability that many people around the UK suffer from. There are about 2 million people who suffer from this disability and an estimated amount of 360, 000 people are registered as blind or partially sighted. When a person finds out about being visually impaired it can come across to them as a big shock and they may have many emotions going through them as they will be told that is something that cannot be fixed back to a normal level.

Many people suffer from different types of visual impairment the following explains the differences between them:

Visual impairment in glaucoma(rise of fluid pressure in the eyelids)

Cataract(vision is cloudy and blurry can result in total loss of eyesight)

Equality is a factor that plays a big role in computing. “ Equal opportunity legislation in many nations state that people with disabilities have access to the same opportunities as others. Unfortunately there still exists a digital divide that separates people with disabilities from achieving the equal opportunity and equal access they seek” *(Thompson, Burgstahler, & Comden, 2003)* . This explains that not all users are treated equal. There are many countries and nations that treat people with disabilities and people without disabilities the same. The system designer will build an application that is equal for both disables and non-disables.

The article gives a description about the visual impaired. This here talks about a wide range of disabilities within computing such as hearing and visual impairment. There are programmes that help users with such disabilities one of which is called W3, this programme helps users access the content they wish to do so no matter what disability they suffer from.

Vision

This article explains assistive technology and how it helps the visual impaired user when working on a computer system. *Brady 2013* that assistive technology can help users who suffer from this disability achieve their objectives whether it is personal, professional or educational. Assistive technology is vital for these users as they would be using a computer system

most of their day working online or on a system within the business, having been educated will help them achieve their best.

The brighter the screen is then the more likely a user will see flicker. The human eye is very sensitive to flicker, this can cause discomfort and annoyance to the visually impaired. A user who suffers from these may also suffer from headaches and nausea. (LRD, 1991) states even if a user does not suffer from any of the above the brain will still register them with such results such as headaches or even epileptic fits. (Human computer interaction, Christine Faulkner, Chapter 2. 3, page 20).

Christine Faulkner talks about how she had once come across a system a purple background with yellow text. Also, that in theory both these colours will not be used together as it is not very appealing but the designer who had created the system then explained that two colours work best for the visually impaired. Christine Faulkner was later told by a student that that these had been the two colours they preferred as it help them visually. (Human computer interaction, Christine Faulkner, Chapter 2. 4, page 23)

The screen layout on a computer system is very important for the visually impaired such as the design, this must be visually appealing, and it must be effective. The designer must make sure that the screen is not cluttered, and the navigation of the system should be arranged in a suitable way for the visually impaired. The font is also key so when designing the system, the same font should be used the whole way throughout as different font will create a jumbled effect. (Human computer interaction handbook,). Find chapter and author and page

The application will have to comply with the client’s needs which is to make the system suitable for the visual impaired. Detailed explanation was given by one of the professionals “ In addition to challenges encountered due to the structure and design of web pages, there are other cyber security challenges that users who are blind confront when surfing the web.” (Holman, 2008) This is explaining that visual impairment plays a big role within cyber security. Users who are visual impaired struggle to read off a screen when it is badly structure or designed. The structure or design could mean that the colours of the font and background do not go together.

The environment for a person who suffers from the disability visual impairment should be given a good environment to work in. When working within a company they should be given a place to work in where there is good lighting this will make it easier for them to use their vision effectively. Users must have good glare free lighting as it will be required when they are reading upon something.

This particular research refers to more what the system designer would like to improve for the client. “ Web accessibility has been defined as, “ all people, particularly disabled and older people, can use websites in a range of contexts of use, including mainstream and assistive technologies; to achieve this, websites need to be designed and developed to support usability across these contexts” [83]. Essentially, web accessibility researchers and designers aim to minimize the barriers found by people with various disabilities when using technology” (Daniela Napoli, May 2018). This research explains what the system designer built. The system designer created an application which fits the client’s needs. The user will minimize as

many barriers for the visual impaired as possible. They have used appropriate colours for the application and designs, they have also used appropriate font.

Hearing

Hearing is one of the most important sense a human can have as this is the second most important means of communication. Hearing impairment is frequent amongst the elderly. As well as the elderly any other person can also suffer from hearing impairment and the age does not matter. Most will not admit having this disability as they society is not very supportive about it. As a result, designers must make sure when creating a system for the visually impaired it should also be a system that is available for the people who suffer with hearing loss. Right colour codes can help a user to see better as they would not have to listen in to any audio if there is any output coming from the computer. (Human Computer Interaction, chapter 2. 5 page 25).

This here talks about sign videos *, Necati Cihan Camg¨oz* explains that sign videos are normally displayed at the bottom of the screen. " Sign videos are displayed at the bottom of the screen with a smaller size than the size of the question sign video." Sign videos help user who suffer from hearing loss, users are able to use such videos to help them to hear what the output of that video is. The video will interpret what it is saying by using hand gestures (sign language) to help the hearing impaired.

Many devices are out there to help users who suffer from all sorts of disabilities, one of the disabilities we are looking at is hearing impairment a professional explains that they had come across a person who suffered from

hearing loss “ Abdel Hamid Larib, who mainly uses sign language to communicate, has an app on his mobile phone that allows him to translate text messages into sign language, making it easier for him to communicate with his managers.” This tells us that there have been several ways implemented for users who work with disabilities to communicate with their employers or colleagues. Use such devices and software to communicate with colleagues and employers will rise the confidence of a worker who suffers from this disability.

Previously explained there are several ways to communicate even when suffering with hearing loss. “ Being hard of hearing can make learning and socialising as part of a group difficult for me,” said Liam who wears a cochlear implant and can lip read and prefers one-to-one interaction. He added: “ At the moment, being with Mitie is all about getting experience and hopefully I will eventually get a job. I have a mentor at Mitie who I am job shadowing to learn more about the job I am doing with them.” Liam explains that there are other ways to communicate but he prefers a one to one interaction and prefers to lip read. He also explains that it is hard to socialise, this is something most users who suffer from hearing loss are scared of as they may find a job they would like to apply for but they worry if they get it they then would not be able to socialise or communicate with colleagues, this brings their confidence down.

Hearing loss is caused by many ways such as genetics or loud noise. Those who suffer from hearing impairment will have to be given a quiet environment to work in. as we talk about before people who suffer from vision loss will need a system with good colour codes and good lighting to

work in. it is the same for those who suffer from hearing loss. A quiet place to work will not only give them ease when working it will also help them concentrate. “ cause of hearing loss is repeated exposure to loud noise. 25–30 million people in Europe work daily in conditions that pose a potential risk to hearing.” The professional *Quaranta* explains that hearing loss can be caused of noise working in company that deals with systems can be just as loud as working for a construction company therefore a quiet environment is vital.

Technology

Smart glasses have been invented for the visually impaired. An explanation of how useful these glasses are given. “ Reading text and ‘ visual interpretation’ are two of the most successful use cases for smart glasses in the blind or low vision community. We’re proud to be able to offer these services in Cyber Eyez to our user community everywhere they go.” *(Sean. T, CEO & Co-Founder of Cyber Timez, 2016)* . Sean Tibbets has explained that using these glasses will benefit the users with this disability as these glasses will give a visual interpretation of what the information on the screen is displayed. Sean Tibbets has also given an explanation here to say that the smart glasses are also a big help as they can read the text which is given on screen.

The visual impaired have devices for users that suffer from this disability. One of which was already explained above by another author. Another two devices that users who suffer from this disability can use to help the read the information which is displayed on screen, or the information to be read out

for them off the screen. Above this an author explained smart glasses which is used to read text out or to help the visually impaired to read the text themselves off a computer screen. Visual impaired users rely on assistive technology the reason is because it helps them navigate through a computer system. As well as this it also gives them the chance to have the same opportunities a person without this disability will have. There are other devices that are out there that can help users such as screen readers. This reads text off a screen for users who are unable to read because of their eyesight. Braille watches is a device which reads out the time for users who have problems with using their eyesight. *(* Yueng Delahoz, November 2017).

Many devices are built for the visual impaired, but there are also sites where agents can help the disable to do things they could not do on their own because of their disability. " The visually impaired user opens the app or presses a button on their glasses, which calls one of 15 trained agents. With the help of a special dashboard, an agent can see the users' surroundings either through smart glasses or a phone camera. The agent can then verbally walk the user through what's around them and answer questions." *(* Anita Balakrishnan *, December 2016)* . This device is not complied with computing as much as it is for physical use. This device relates to how the visually impaired can contact someone that could help them with just a click of a finger and they would be there and be able to see everything and can help the disable with whatever task they wish to carry out.

BrookesTalk is another tool that helps the user navigate themselves around the website they are on this is also a screen reader. The way this tool work is that it will read the information off the screen but it will be done so in audio

form. The tool does not depend on any other browsers as it works off its own browser. Using this tool will help the visually impaired as if they are not able to see clearly they can listen to the content and it will also help them as the navigation of the system will also be easy to use and it will be clear. *(* Fajar Kusumaningayu *, 2017).*

Many tools are used to help the visually impaired screen readers in one of them as this was explained previously above. Screen reader tools help the visually impaired to read the description off the screen, this helps users who have a problem with their sight. The article explains that screen readers is one of the biggest ways people with visual impaired use to get the information they need off the web. It explains that as well as using these tools they may also use tools such as screen magnifiers to help them look at the text which is displayed, they may use screen magnifiers because the font is too small or because the font that is displayed cannot be read clearly.

Tools such as screen readers are tested in many web pages. This is also explained above these tools are a big risk especially when using screen readers in public. The visually impaired are vulnerable to cyber-attacks this is because of the limitation of using these tools. Such tools may cause them to have loss of privacy meaning any personal details can be stolen when using these tools as they read text out loud.

Attacks

Visually impaired users face many challengers on the internet this can be from looking at videos or reading text from a computer screen. “ There are various challenges that Internet users who are visually impaired experience

when surfing the Web, including cybersecurity concerns and accessibility issues” *(Domingo, 2012)* . An explanation is given which describes the visually impaired. User who have this disability face everyday problems when typing up emails, reading or even watching videos. Users with this disability have concerns with navigating through sites. This quotation explains that users are worried on what they click online as one click of button could make them vulnerable to security threats.

Security is a big issue for the visual impaired, they are likely to be vulnerable to security attacks specially when using screen readers. “ People who use screen readers in public spaces are vulnerable to audio eavesdropping. This is especially threatening when they are completing business that requires identification or bank account information.” *(* Jackie Edwards). Here is an explanation of how vulnerable users are using screen readers. This explains that using screen readers are a big disadvantage reason as it is a big security issue. Vulnerable users will be under threat if their personnel details are exposed in public such as bank details or any sort of log in credentials.

Previously as explained eavesdropping is a huge cyber threat for the vulnerable. The professional (Jeff Melnick *, 2018)* also explains how large of a threat this is. Users who suffer from hearing impairment are more at risk of giving out their personal details as they may use devices such as screen readers on the computer system these devices will read out whatever is in front of them on the screen.

The visual impaired users need some sort of technology to inform them of any potential attacks. A professor of computer science (Akbar Namin)

explains that a screen reader struggles to read everything off a screen. This here explains that there is a security gap with using screen readers such as when there is a potential attack users who suffer from visual impairment may not know this as the screen reader may not read out the warning on the computer which is being displayed. Assistive technology has been put in place where the screen reader will make a sound instead of reading the warning to tell users who suffer from this disability to let them know of potential risks.

Visual and the hearing impaired are very likely to be more vulnerable to cyber-attacks than a person who does not duffer from either of these disabilities. This will be because of several reason one of which may be because of the lack of software they have to inform them of any cyber threats. There are some ways to try and help prevent cyber-attacks such as CAPTCHA and session time outs. (Morley 1999). The professional explains how they have tried to create such solutions to prevent cyber-attack for these users that suffer from these disabilities but still then it is below the expectation to meet the needs of the visual impaired and hearing impaired users.

Conclusion

To conclude this document the designer has showed an interest on what visual impairment is and has also explained how it impacts user when working on a computer system. The designer has explained how visual impaired users struggle to read off a computer screen and to help them the devices they use to translate off the screen such as screen readers. The

documentation explains what hearing impairment is and also the technology that can be used to help users see what content is in front of them on the computer screen. An example of a technology that is mentioned is sign video, this is basically a video that is at the bottom of the screen and it will sign out the text that is displayed on screen. Cyber-attacks have been explained clearly and it is also explained some ways to prevent as many threats as possible. The system designer will concentrate on visual impairment and hearing impairment. When they design and build the application they will take into consideration about threats can be caused and how they can make the application better than the ones that are already out there.

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