

ENABLING DIGITAL FIRST:

A CASE STUDY OF SIGHT- IMPAIRED USERS IN WALES

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In Partnership With
The Royal National Institute of Blind People



Yn cefnogi pobl
â cholled golwg
Supporting people
with sight loss

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Executive Summary

This document provides a summary of the findings from qualitative research into the digital media usage of sensory impaired people in Wales. Three focus groups were run between 14–22 May 2018 as part of a research project based at Swansea University, funded by the Challenging Human Environments and Research Impact for a Sustainable and Healthy Digital Economy Centre (CHERISH-DE). The research was achieved with the cooperation of the Welsh arm of the charity Royal National Institute of Blind People (RNIB) and their network of members.

Lloyds Bank UK Consumer Digital Index 2021 shows that Wales has seen a lower level of digital enablement comparing to other regions in the UK. In the year 2020, 13% of the Welsh population have not used the Internet in the last three months, which shows a remarkably high rate within the context of COVID-19 lockdowns. However, the same report also reveals that when online, Welsh citizens are confident digital users, only lagging behind London in proportion. These data demonstrate that comparing to other regions in the UK, digital exclusivity affects Wales in particular.

Digitally excluded people tend to be associated with demographic attributes such as age, disability, economic status, education, etc. According to Digital Communities Wales (n.d.), digital exclusion tends to affect people who are aged over 65, have disabilities or long-term health conditions, have lower education attainment, are from low socio-economic status, live in rural areas, speak Welsh as their first language, are socially isolated and/or homeless. It is often less noted that these demographic attributes could be co-related. Certain disabilities are often age-related, and a reduced ability (such as sight impairment) could affect employment and the socio-economic status of the individual or family.

According to the RNIB, there are over two million people living with some form of sight loss in the UK and 107,000 of them reside in Wales (RNIB 2017). Our report based on a nation-wide survey of RNIB members (2018) also found that 73% of people are over the age of 65. Data shows that although significant recent progress has been made to widen access to communication technologies in Wales, visually impaired users are still disadvantaged when accessing information and digital services (Wu et al. 2018). The aim of this research was, therefore, to

provide an updated and more detailed examination of visually impaired community's access to and usage of digital technology, focusing on the effectiveness of training in reducing digital skill gaps and current challenges associated with accessibility of devices, software and applications.

By conducting empirical research with sight-impaired users, we aim to provide a first-hand account of the user experience to inform digital inclusivity policy. Specifically, we will firstly assess support networks provided to sight-impaired users - in particular, local support group and Welsh Government funded projects including digital communities in this report. In addition, we will investigate barriers faced by sight impaired users to the full use of accessible features across devices, software and applications. Finally, through experimental interactions with Amazon Alexa and Google Duplex, we aim to develop consumer-led recommendations to improve inclusive technology.

Our research reveals the importance of digital trainings in disseminating knowledge, implementing changes, triggering bottom-up approach of peer learning and self-learning. For the future, support towards setting up devices and training on online security and data protection are crucial in involving and protecting vulnerable users. In a highly competitive market, the tech industry and service industry tend to focus on the most active and affluent users. While sensory impaired users are overlooked in this market-driven and technology-oriented approach, accessibility features are often treated as add-ons to 'fix' any potential problems if needs must, resulting in incompatibility in operating systems, web browsers, mobile devices, and platforms.

Based on the analysis of our focus group data, we put forward recommendations on four key topics: web/app accessibility; better integration and standardisation; more user participation in technology development; and continuous support and training towards the sight impaired community. In addition to recommending better standardisation through adherence to, development and refinement of appropriate design guidelines and best practice, we also encourage a bottom-up approach for web and app accessibility guidelines. Involving users into the process of technology design and development would assure the technology capacity is tailored around the need of the user. Ultimately, inclusive design is to improve the quality of life for everyone, whatever their ability.

Background

The world we live in has been increasingly digitalised, showing potentials in benefiting people in many aspects of social life. Recognising that digital exclusion and digital skill gaps could create hindrance for disabled community, we aim to gain a better understanding of the usage of technologies by sight-impaired users and investigate the possible solutions to their barriers to enjoying the benefits that come from using digital services.

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Methodology

We conducted a series of focus groups with RNIB members in May 2018. We chose this approach as focus groups have been found to encourage participants to share ideas that may be sensitive or elusive and thus difficult to elicit (Vaughn et al., 1996), allowing us to gain a deeper understanding of our participants' digital experiences.

We recruited 13 participants for three focus groups from RNIB members in Wales — all but two were selected from the RNIB members based on their level of digital literacy. As such, the composition of our focus groups and the research technique employed cohere to generate a 'most likely' scenario for the study of digital media engagement among sight-impaired users. While we do not intend to paint the most comprehensive picture of the Welsh sight-impaired population, focus groups have been shown to provide insights that represent the 'most likely' critical cases (Flyvbjerg, 2006: 14).

The focus group interviews were conducted on Swansea University's Singleton Campus on the 14th, 18th and 22nd of May 2018 and lasted from 10am to 4pm with breaks throughout the day. In the design of the focus groups, we adopted a semi-structured strategy which involves

inviting participants to talk about how they use digital media and technologies as well as on-site technological demonstration and hypothetical technology development activities.

The first group, Group A, involved four highly skilled digital users who worked with RNIB on the Online Today project supported by the Big Lottery funding. Among them, A1 is in her 30s and registered as severely sight-impaired, but according to her, her sight impairment is 'like the least important thing'. A2 is registered blind, living with a partner who is fully sighted. A3 and A4 are not registered as sight-impaired – one wears standard correctional lenses for his eyesight and the other has age-related sight problems. The inclusion of A3 and A4 are because they both have worked as digital officers and have gained insights into the usage of technology by RNIB members.

The second group consists of four dual-sensory impaired users. All of them are registered as blind-deaf who are members of both RNIB and DeafBlind. B1 is female veteran in her 50s, is the most capable users among the group and is most often the spokesperson representing the voices from the group. B2, male, in his 20s and works part time currently. B3, in her 50s, was self-employed previously and lost sight seven years ago due to illness. B4, in her 70s, has multiple health problems and disabilities. B3 and B4 are less engaged with digital media and seldom use digital technologies.

The third group consists of five RNIB members from a local self-support group who are all retirees. They show medium to high digital skills. Three males from the group, C1, C4 and C5, are in their 60s. One female member C3 is in her 50s and the other female member C2 is in her 70s. C3 works as a local volunteer with the RNIB. In addition to showing high level of digital skills, C3 is an active community member and playing the role in supporting other RNIB members with getting on with digital technology.

In this report we present the overriding themes that emerged from our deductive thematic analysis (Braun and Clarke, 2006) of data gathered from three focus groups. We have anonymised each participant, using a letter corresponding to their focus group and a unique integer to protect the confidential information regarding their health and disability.

Findings

Tiers of Digital support and Interdependencies in Wales

We identified at least three mechanisms in terms of digital support to sight-impaired users in Wales. The first tier is the state-level projects; the second tier is from civil society – including charities or commercial entities; and the third tier consists of grassroot support groups organically grown within the blind and sight-impaired community.

The first-tier support provided by government and lottery fund lays the foundation for the promotion of digital literacy projects run by charity organisations (e.g., RNIB, DeafBlind, and Infosound). Civil society plays a major role in disseminating information, organising training events, creating new networks, and optimising existing networks. Through recruiting sight-impaired trainers and volunteers into the localised networks, sight-impaired users can catch up with technological developments and share experiences of use. The building of training networks also offers a sense of familiarity, authenticity, and flexibility.

Digital training programmes run by charities and civil societies are essential because they spur the growth of local voluntary networks that offer on-the-spot support to users when family help is not available. Participants mentioned that their children and grandchildren bought them a smartphone or Amazon Echo as a Christmas or birthday gift (C3), with their sighted children helping to set up the devices (C5). Despite the possibility of intergenerational learning, many point out that family support is not always available due to work commitments or childcare duties. RNIB's Online Today project was particularly praised for its one-to-one home visits:

C4: There is support out there, especially with the RNIB online [today] do actually get people online.

C2: Oh, yes, I found that. You phone them up or [...] you text them, they're brilliant that way.

C1: You have a one-to-one person come to the house...

Facilitator: Somebody comes to the house and gives you support?

C1: ...iPad or your computer system.

C4: They set my Google up for me.

As our previous report shows (Wu et al., 2018), 73% of RNIB Cymru members are over the age of 65. Training for the ageing population

needs patience and perseverance because the frustration resulting from poor training could create a sense of fear in the trainees and prevent them from engaging with technologies. A3, a RNIB Digital Officer, says:

A3: we work with lots of older people, a lot of those people have had this same experience where someone in their family has said, "You should be using one of these. Let me show you how it works." They've gone, da, da, da, rapid, rapid, rapid, assuming that they understand what is going on, because for that person showing them, it's like breathing or eating, this stuff. Because they feel like they've been shown how to do it and they still don't have a clue, then that again goes back to that confirmation in their mind that this is not their world. It's not for them. It's for other people.

This was echoed among older users. Slow, repetitive, step-by-step demonstration, and 1-to-1 onsite help (in particular, home visits) is regarded as the best practice. Besides, training often takes more than one visit to teach the participant basic skills. C2, in her 70s, shared the following experience:

C2: At the moment, I'm learning how to do emails on [my smartphone]. I've got a very, very patient tutor, he's marvellous. He's going through everything gradually with me because I did find it really, really difficult. Whether my fingers are old and stiff? I don't know, but the flicking part of it I found difficult to get it right.

C4, in his 60s, lives by himself. His previous employment did not involve the use of a computer hence he is less confident in handling digital devices. Home visits and continuous digital support proved to be particularly important to get him online.

C4: I [...] got in touch with him, volunteers like you, and one came out a couple of weeks ago. Then he set mine up for me. He left me his number. "Any problems," he said, "Don't hesitate to ring. Just pick up the phone and give me a bell."

The initial face-to-face training often triggers an enthusiasm for learning from trainees who then use appropriate information sources to keep up with the learning. A major part of the learning comes from organisations such as the RNIB, Infosound and Calibre, as mentioned by focus group participants, who publish supporting material talking books supplied on CD, USB sticks or via streaming service.

C1: There's an organisation Infosound that's national and they used to send it out on a CD form to visually impaired people.

C5: I get podcasts with Infosound on now.

RNIB's Online Today training sessions, workshops, and home visits not only provided important initial digital skills knowledge but could also trigger a chain of learning activities. For example, once the official support was in place, users often seek peer support and learning to supplement it.

C1: It's in those workshops that we learn more information and we share it amongst ourselves and that's where it's all spread out.

Peer-learning takes different forms, and often involves meeting up in person, which helps to reduce social isolation. This was reported consistently across three groups:

C2: We formed a club last month for all learners of iPhones. We decided if we got together, we could tell each other what we knew and build up our knowledge that way. One would know, the other wouldn't, you know, and so forth. [...] That was where I learned about Seeing AI, because F, the other lady that turned up, had it on her phone and she was showing it to us.

Some volunteers working for the RNIB were previous beneficiaries of the RNIB Online Today program. They became opinion leaders among their peers and acted as ambassador and trainer, like in C3's case:

C3: We tend to do that, because we have so many local groups and we do so many workshops like shopping with confidence, how to manage your money, transport, boarding a train, plane, whatever. It's a social thing as well [...] It's all about helping each other really.

Digital support from civic groups and organisation not only fulfils the purpose of skills training, but also helps to reduce digital waste:

C1: There's one good charity, Leonard Cheshire. They lend out computer systems, iPads, etc. [...] These computers and iPads are reconditioned ones that have belonged to the NHS, the armed services or the police, and they're about two or three years old. But then Leonard Cheshire services everything - printer broke or the monitor broke. We would phone them up and they would send you a replacement, but you've got to send the old item back.

Independence as the Key Motivation for Getting Training for Technology

Desire and motivation for access training and support depends on the age, disability and the digital training received prior to sight loss. B1, who is a dual-sensory impaired veteran in her 50s, is a confident and capable user who often volunteers service in her local community and her social networks:

B1: I did below degree level, just below degree level, in computers and computing when computers had jumpers on the motherboard. [...] I can build laptops and that, so I did it as a hobby. So setting up a smart TV isn't hard. I'm one of these people that believe that if you make a mistake there's no shame in it.

In contrast, B3 and B4, who lost sight in their 50s and 70s due to age-related health issues, had little experience with technology with previous jobs before retirement. They chose to use little digital technology, As B4 said:

B4: I got my television. I got a little gadget to switch it off and on. I tape all my programmes but if anything goes wrong with the electric, I am hopeless. I call P [nephew] and he comes. I don't know how many times he'd done it for me. I press the wrong button and I bugged it up again. I only got my television and my phone.

Accessing training and using digital technology was linked to expressed notions of 'being normal', which was used when some users described the feeling of empowerment that technology brought to their lives. This meant that despite the sight impairment, one can still do 'everything' online including booking holidays; online banking; online shopping; using Google maps; playing games (A2; B1 and B2); checking weather; keeping up with emails; accessing information on digital media; and using social media (A1). Technology was highlighted as the key to achieving that independence in today's world:

A2: I'm just really amazed with the way technology is going, with my sight loss. I can work, I can see now and I want to go and find, I don't know, Tesco. To put it in my phone using maps, and the walking. I know everybody else can do that, but the fact that I could just go with my guide dog now and do that, that's really

independent. Where, five years ago, somebody would never be able to go anywhere, really, on their own.

For people who lose sight due to health-related issues, the process of losing sight and abilities can be quick and emotional, entailing feelings of denial, anger, fear, anxiety, self-doubting, and depression (RNIB, n.d.). Technology is critical in maintaining the abilities and skills one has had before losing sight. As A4, a digital skills officer commented:

A4: You just don't think of it. Suddenly you can't drive anymore because you've lost your sight to the point where you can no longer drive and, now, it's really useful to be able to go on a device and order shopping from Tesco or Asda, or wherever, and get it delivered to the door. Whereas, before, you didn't need to do that because you just went to the shop in your car and bought your food, and brought it back. So, suddenly, that device is now a real, inestimable value to you.

For older users who are in the process of losing sight due to age-related health issues, catching up with digital technologies was regarded as a mitigating measure for the future:

C3: I haven't done online shopping or anything yet, but it's something I'm going to try because I just think you need to be that little bit ahead.

This was echoed by C2, in her 70s, who preferred to do the shopping herself instead of relying on other family members:

C2: I want to do it, my husband's 82. He's not going to be able to do shopping much longer and if anything happened to him, I'm lost. I haven't got anybody to do my shopping, so I'll have to learn to do it myself.

B1, a dual-impaired user, commented that an aspect of independence is that she can use digital devices for day-to-day activities such as travel:

B1: Today you've got the GPS and you've got the google map [on your smartphone]. So, for me, if I'm going to London or Liverpool, on the train I can look because it's free internet access obviously. So I can learn the route on the train and then I get off the train. I don't need to look that because I've got my headphones on. I don't need to do any of that. I memorised as much as I can. So people don't know that I can't actually see.

For young sight-impaired users, the ability to grasp digital technologies links strongly to their forming of identity and sense of belonging. A4 shared a client's experience:

A4: I've got a young girl. She's 12. She was 12 the day I started working with her. When she found that she would be able to use an iPhone- I demonstrated the iPhone for her and she got it really quickly because kids do. She's losing her sight quite rapidly. She was in tears because, you know, 'I'm not going to be different from all my friends. My friends use these. I can use this. I'm not going to be different'.

In addition to independent living, participants expressed their view of the right digital tools that enriched their lives, or enhanced the quality of lives:

A2: I remember the Kindle first came out, right? Absolutely brilliant, the fact that you could make it big. It was the first time I'd read a book in 10 years, fully, page to page. I just remember crying. Being, like, the first time, actually included in something

A4 shared a story of a client, who used a tablet to manage her own medication:

A4: She takes medication, 17 pills a day and 5 times a day. She has got alarms set up, and her device, if she touches it, it will tell her what pill she is supposed to be taking, so she can check what she is taking.

Digital technology also plays a key role in eliminating social isolation:

C1: [Digital technology] doesn't make you isolated. You're in contact even if you don't go outside your home, you're in contact with the outside world. You can physically phone the family, find the information you want, ask Siri, ask Amazon and Google. But it makes you a little bit more independent. It's the isolation part, once you become isolated people withdraw in on themselves, then the other problems come along.

A2 talked about managing one's life independently and eliminating social isolation being closely linked to emotional well-being:

A2: There is an App called Seeing AI that we use. Being able to read a birthday card and Christmas card, it's quite emotional really

to be able to have that independence of reading the back of packaging or maps.

It seems that the more skills one has, the more willingly one is to sustain and enhance such skills via self-learning. However, the initial training that propels self-learning or peer-learning could take a long time to take effect. As A4 recalled, on average, clients need around 24 hours of real-time training to be able to use a digital device fluently. C2, a lady in her 70s, spent almost a year patiently going through training courses to learn how to use her smartphone and iPad. The achievement of managing technology independently provided her a sense of empowerment:

C2: A lady came to one of the meetings from the library and told us about BorrowBox. I went home and I thought I'll try this myself. I actually got the app up myself on the phone, I was proud of that.

Areas of Training Needed Most

Our findings also identified two key areas in the existing training provision for sight-impaired people, in part due to limitations in the design of existing technologies.

Setting Up Technologies

Several users mentioned that they received digital devices from family members as gifts. However, setting them up proved to be the most challenging part of owning them. A1 and A2 both pointed out the problem of inaccessible format of the setting up devices:

A2: The setting up ... as soon you turn the device on, straightaway you've got to go through the process. None of that is in an accessible format.

A1: I think the biggest thing of working with people now is that there aren't instruction booklets for anything, which is probably the biggest [challenge].

Unfortunately, while recent smartphone technologies have made progress in terms of improving accessibility, critical challenges remain. For example, many technologies still have barriers to entry that make setup of accessibility features challenging for sight-impaired users, in which a sighted person may be required to provide support:

A3: An iPhone has accessibility features, but they are not there right at the start for the bit where you set everything up. [...] You can see, when you set up an iPhone, you can see they have tried

to break it down to make it simple. If we are talking about for someone with sight loss there's a whole other issue.

While this challenge can be overcome sometimes by engaging directly with retailers, not all retailers provide such support:

A4: You buy an Apple device from the Apple store, you can tell them what condition you have, what problems you have. "I need these accessibility features turned on when I get this device." They will do it for you. But, Android, no.

Although set-up might seem like a rare or one-off challenge, with the popularisation and use of new voice-activated smart technologies in the home (Porcheron et al., 2018), the setting up of devices become more and more of a daily challenge for sight-impaired users. In the case of C2 and C3, despite being capable users, they had their Alexa devices set up by friends and family members. C5, a very capable user, obtained help from his sighted children in installing and setting up a Hive system for controlling indoor heating. In all these cases, it became clear to us that despite efforts by manufacturers, even technologically literate sight-impaired users are still reliant upon help from sighted people in the configuration of technologies.

Online Safety and Security

The sense of vulnerability associated with disability often lends the RNIB users a sense of distrust of location-based technologies. This sense of lack of control of security is reinforced from the very first step of setting up devices, as A1, a digital officer says,

A1: Now, if you try and set [an Apple phone] up, "What location services do you want? Do you want Siri on?" There are so many steps. If you are part of that, "I don't understand this thing at all", then you are thinking, "What is the use of my location?" There is this whole panic of, "What does that actually mean? What am I agreeing to? I can't even make a call yet. What am I agreeing to?"

Once the devices were set up and were in use, users often had to deal with spam emails which could simply result from signing up for an online service by giving an email address. C2, a visually impaired user in her 70s, shared her experiences:

C2: K, my tutor said to me, 'Do you want me to get rid of some of these emails?' I said, 'Yes, I haven't got many because I haven't

given my number out to everybody.’ He said, ‘You’ve only got 250.’
(Laughter)

C4: I bet you half of those were junk ones.

C2: 90 per cent.

Voice-activated digital devices are great facilitator for sight-impaired users to achieve independent living. However, many users worry whether the voice-activated devices ‘are listening to’ them, invading their private space or even gathering information about them.

C5: I was reading my Daisy book one afternoon and the fellow on the book that was reading the book asked a question, and Siri answered it.

The use of passwords can be a guarantor for online privacy and safety but also can be challenging for sight-impaired users because the combination of letters and numbers often made audio-input impossible. When living independently, users have to learn to navigate the digital space with a sense of caution in terms of protecting their personal data and privacy. Lack of safety and security could put sight-impaired users off from digital devices. A3, RNIB digital officer said:

A3: A lot of them won’t touch something like online banking because they hear the horror stories and because they don’t have a concept of how the Internet works. They can’t conceptualise how to stay safe.

External Factors Affecting sight-impaired Users’ Access to Digital Services

Once the devices are set up, and the users have strong motivation to use digital media, external factors including poor web/app accessibility, lack of integration and standardisation could prohibit access to services for sight impaired users.

Poor Web/App Accessibility

The Equality Act 2010 requires all national and devolved government and some charity and non-governmental organisation websites and apps to follow relatively strict guidelines which ensure they are accessible to all users (GOV.UK, 2021). However, such restrictions do not extend to commercial websites in Wales or the UK. While commercial websites do sometimes follow the Web Content Accessibility Guidelines 2.1, approximately 97% of a sample of the ‘top’ million website homepages

fail to comply with the standards (WebAIM, 2021). Typically, the design of the layout of web page is dominated by User Experience design concepts about how users visually scan a webpage's content (Shrestha et al. 2007). For users with sight loss or impairment, such design layouts create hurdles for accessing information.

A4: Often because [the webpage] is laid out in columns or little blocks, so things are dispersed around the page. It will read that bit because that's one continuous bit, but as soon as that continuous bit stops, that's it. If you don't know there is any more, it's like, 'Where do I go now? Why has that stopped? Where has it gone?'

A1: In the middle of an article, it then does a little bit that is maybe another article, or a link says, 'Read more', and then it goes back to the story.

'Read more' links in the text, depending on the context, could carry users to different directions. When this happens, as one of the digital skills officers' comments, it 'reduces the persons confidence [in using digital media] more and more' (A2) and reinforcing the belief that the sight-impaired users are not capable of navigating the digital space.

Before working as a digital skills officer, A4 had more than 30 years of industry experience. Based on his experience of building websites for companies and organisations, he lamented that most companies do not pay particular attention to good website accessibility:

A4: [They] are only interested in complying with law. It's like, as long as you comply with the law and they can't be sued, they are happy. It's very easy to copy and paste the same vault tag into every image. [...] You know it doesn't make sense, but it still complies with the law. The law should say, 'It has to make sense.'

As websites for organisations today have become more and more a marketing tool and carry the mission of advertising the organisation, website design has been prioritised for marketing while overlooking accessibility features. Many of our participants shared their experiences of having difficulties accessing online banking services or using service apps.

A1: Things like the [an online bank] page. Now, I can't see where the box is to type in. You can't see it. They used to have a nice dark black border around it, "This is where you type in your name

or your password.” Suddenly, it is virtually invisible against the page. I can’t see it.

Even when some companies create accessible websites, the online service today often requires further authentication processes. The most often is the CAPTCHA test, that is, *Completely Automated Public Turing test to tell Computers and Humans Apart*. This process is to stop viruses or bots by involving users to verify their humanity by selecting word, or in worse cases, image tiles from a given image grid. Accessible alternatives such as listening and transcribing audio clips have been developed, but remain considerably challenging for sight-impaired users as audio CAPTCHA is often presented in the format of an audio recording of a series of numbers or letters with background noise. Research is still on-going to identify suitable solutions (e.g., Kuppusamy and Aghila, 2018; Holman et al., 2007).

A1: Quite often you have either a word, or you have lots of images, ‘Choose all the ones that have...’ Whatever, pictures, which are always horrific. They do have, very helpfully, an accessibility where you can listen, but that’s actually much harder than just looking at the words.

The fast-changing digital environment means that companies and organisations alike often update their websites and applications in order to optimise branded search for goal-oriented promotions. Nevertheless, in terms of assuring the quality of online services, in particular the accessibility features in the digital services, there is not any guarantee these survive updates.

A4: I have got a client who was happily using online banking with X bank. They updated their website, allegedly improved it. Suddenly, she couldn’t use it anymore. [...] Obviously you get a set of developers who develop something, and over time it’s beaten into them, ‘You need to make this accessible.’ They kind of get it right, and that goes on for, usually, a very short time. Then someone goes, ‘We need to get a new look.’ They do a new look, and often the developers have changed, and you get a load of people for whom accessibility is not in their heads.

It seems our participants felt that while malice is rarely assumed, sight-impaired users are often neglected in design processes in favour of marketing-led redesigns.

Lack of Integration and Standardisation Across Devices and Platforms

With the popularisation of portable digital devices, smartphones and voice-activated technology, highly skilled sight-impaired users are now using a range of digital devices to assist independent living. Among our participants, most of them have smartphones, tablets, and eBook readers. Six of them have smart speakers at home (Amazon Echo Dots); five have access to professional computer screen reader programs such as JAWS for Microsoft Windows; and four, due to employment, have access to assistive and accessible technologies at work and at home. However, working across platforms and devices could be challenging due to incompatibility among devices or operating systems.

B1: Specific phones have specific hearing aid devices. The iPhone has it for Apple hearing aids. Everything else has it for a generic hearing aid. But the phone that K got is like an RNIB phone that is a specialist phone, if I remember. So his is, again, it's a different level. So that software, again, is different.

The lack of integration and incompatibility among technologies in the home remains a constant challenge. For example, while some technologies - such as Smart TVs - may offer assistive interfaces that allow navigation by sight-impaired users, these do not necessarily integrate with other devices such as set top boxes:

A1: Navigating those is pretty difficult, like knowing what programmes are on and that kind of thing. I know that there are Smart TVs that do talking, but then it works on their own Smart. If you have something like Sky or another on-demand-service, it won't work with that.

For sight-impaired users, having multiple technologies with multiple incompatible interfaces creates a burden. The alternative, where devices only work with a specific manufacturer's device, is equally undesirable. It seems the lack of standardisation, means sight-impaired cannot freely embed and connect multiple technologies together with any sort of ease.

Technologically adept users may seek help which often involves seeking manufacturer assistance online. Increasingly, customer service is conducted online, and for users with impairments, the idea of using the device to seek help is daunting:

A3: For someone who has not touched the Internet, perhaps ever, the concept of what it is, it's like this dark grey cloud. Then when

you are trying to get someone to understand the idea that they can ask this device a question that they have to help them to use this device, it becomes this really dark, weird, mixed-up thing, you know?

In reality, users with or without sight impairments face the difficulties of lack of standardisation across devices, platforms, and services. The demand for standardisation is especially important today to facilitate independent living for visually impaired people as technology now touches on almost every aspect of life.

A4: Yes, and consistency. I mean, it's unlikely to happen but it would be nice if, across platforms and across devices, the same things, [...]. It would be nice if there was a standard. If there was a consistency because, otherwise, especially if these things start to appear in public spaces, people need to know it works this way and it's not, you're on this system, so it's working this way.

Lack of Participation in the Technology Development Process

While acknowledging the benefits digital technologies bring to their lives, sight-impaired users reported unsatisfactory experiences with using technology, and in particular the lack of integration or standardisation of assistive and accessible technologies. A range of factors including the lack of more explicit legislation on accessibility were regarded as contributing to the problem, but ultimately, this resulted from the technology development process. The Digital Skills Officers commented that computer operation systems to a large degree decide accessibility:

A1: That's because [some brands] start with their accessibility right at the start, and that shows in their products. Unlike other [brands] that bolt it on at the end. [...] I think that's because generally accessibility is seen as an add-on afterwards.

A4: Yes. It's not built in from the start.

With the first-hand experience of digital exclusion, capable sight-impaired users are keen to take part in shaping the future development of technology. B1, who has both sight and hearing loss in her 50s, has strong interest in participating in technology development:

B1: I think the biggest mistake that companies make is, you were kind enough to invite us today so you'll have the social interaction with a group that has different needs, but companies don't do that at the design stage, and we should be present when they're doing

the casing, when they're doing the software, so that we can interact [...] Being dual-sensory, our needs always get overlooked. [...] I think if they worked with groups like us from the bottom up, and looked at the case, and the design of the case, and the shapes of the computers and that, then it might be more acceptable in our homes.

This sense of separation from the technology development process, as B1 commented, could further the sense of isolation and fragmentation of sensory impaired people in society. In their defence of rights of equal access to digital technologies for deafblind people, our users emphasise that some seemingly low-tech design could be added to the existing technology. This may even reduce the cost of digital devices and make the devices more user-friendly for people with specific needs and requirements.

Audio description was mentioned by many members in Group C as a useful tool available through broadcast media, streaming services, theatres, and transportation hubs. However, an issue was raised by C3, a local RNIB volunteer, in that the audio service at train station still often requires assistance from staff to enable:

C3: At the railway station the other night because we'd been doing the training, and I said to the guy, "Is that ticket machine audible?" and he said, "What's audible?" I said we can't do our tickets because we've got vision impairment, and he said, "Oh, well, there we are."

B1 regards that the high cost that assistive technology has as a hurdle for the community. A more person-focused approach in technology design and development, in her view, would help to bring down the cost of technology, relieve the financial burdens of many users, and encourage sight impaired people to participate in the workforce.

B1: They [tech companies] need to sit down and they need to think about the cost implications to the RNIB community or deaf and blind people and people in general, there's a socioeconomic question here. [...] The government needs to look at - if they're saying there's a level playing field and they want everybody in the workforce irrespective of ability, then they have to get these companies to bring the costs down and get raw materials out there that incorporate addressing our needs as well as society as a whole.

Recommendations

Based on the analysis of our focus group data, we put forward recommendations on four key topics: web/app accessibility; better integration and standardisation; more user participation in technology development; and continuous support and training towards the sight impaired community.

Web/App Accessibility

In the UK, there is a legal duty established by the Equality Act 2010 for all public sector and some third-sector websites to follow guidelines to ensure all websites and applications are accessible to users, including those with impaired vision, motor difficulties, cognitive impairments or learning disabilities and deafness or impaired hearing (GOV.UK, 2021). These include the Web Content Accessibility Guidelines 2.1 (W3C, 2018).

However, such legal mandates do not extend to all websites. Based on our participant's feedback, there is still much room for improvement. A major issue raised is the layout of websites which creates disconnected pages. While such designs may appear attractive to users with full vision, they cause issues for users rely on screen readers and other accessibility software. Here our core recommendation is that the law should establish a minimum standard with which websites should follow.

With regards to applications, greater work is needed to establish suitable standards which are currently lacking. In the same manner that website guidelines were driven by international consortia of businesses, governments, and individuals, we would encourage a bottom-up approach for app accessibility guidelines.

Better Integration and Standardisation

Smart home technology has grown dramatically in recent years. Used effectively, smart home technologies, including voice-activated technologies, could help manage everyday life and facilitate independent living for many visually impaired users. Although research has shown how these technologies can be used as accessible computing devices (Pradhan et al., 2018), greater work is needed to support interoperability through standardisation and integration for sight-impaired users.

While manufactures may be loath to adopt open standards for fear of lost income, the lack of standardisation and cross-device compatibility for technologies creates barriers for sight-impaired users, and often

requires them to rely upon friends, family, or shop assistants to configure technology.

As such, we believe that greater cooperation between manufacturers is needed to enable interoperability between and for assistive technologies. Standardisation can also be encouraged through adherence to, development of and refinement of appropriate design guidelines and best practice. For example, hearing aids should not be restricted to compatibility with a single device manufacturer, and Smart TVs should be able to enable accessible interfaces on set top boxes from TV providers. This cooperation need not be mandated through law in an ideal situation. Instead, manufacturers and those implementing assistive technologies may need to engage with communities dedicated to improving inclusivity in technology, such as the Open Voice Network for voice assistants and the ACM Special Interest Group on Accessible Computing.

User Participation in Technology Development

In the future development of technologies, there needs to be a reflexive feedback process from users who use the technology to the companies who are producing the technology. This participatory approach has been adopted by many large tech companies. However, more could be done at the national and local levels to enhance digital service. Users' participation in the development of technologies needs to be meaningful and effective so that commercial and public entities can gain profound insights into what works, what does not work and how to tailor technologies to serve different demographics in the society.

Such a practice is documented in the human-centred design, or HCD, ISO standards (International Organization for Standardization, 2019). HCD involves human perspectives at every stage of the design process to iteratively design and refine solutions for and with specific people (Giacomin, 2014). Methods to support HCD include co-design to create with all relevant stakeholders to collaboratively research and connect with different people's experiences, skills and resources to provide new, practical knowledge (Steen et al., 2011). Putting people at the heart of the design process draws upon valuable insights to design technology for whom it is going to be used by. As one RNIB Digital Skills Officer (A4) summarised: "In a long way, making it essential that [accessible features] are built in from the start rather than just bolted on after the thing has been produced".

Continuous Support and Training Towards the Sight Impaired Community

RNIB's Online Today project has brought positive changes to the blind and sight impaired community. However, with the completion of the lottery-funded project, a continuation of support and training is high on agenda. Our research reveals that peer learning and self-learning plays a significant role in disseminating knowledge and implementing changes. Grassroots voluntary groups in particular provide more than just knowledge, but also social networking opportunities to the users, reducing the sense of isolation. However, peer learning and self-learning can only be effective after the initial training takes place. For the existing visually impaired communities, support towards setting up devices is essential to introduce users to the digital life; a continuing support and education on online security and data protection is crucial in protecting vulnerable users. At the same time, with the rising ageing society, many adults will face the challenges of losing sight at later stage and have to re-learn about digital media in managing lives. The initial training that is vital in supporting these people and needs to be continued.

Conclusion

From this research in partnership with RNIB, we evaluated the effectiveness of digital training in narrowing skills gaps between the sight impaired community and mainstream society, recognised barriers that prevent sight impaired people from fully utilising digital services, and identified problems associated with technology design.

Our research reveals the importance of digital trainings in disseminating knowledge, implementing changes, triggering bottom-up approach of peer learning and self-learning. For the future, support towards setting up devices and training on online security and data protection are crucial in protecting vulnerable users. In a highly competitive market, the tech industry and service industry tend to focus on the most active and affluent users. While sensory impaired users are overlooked in this market-driven and technology-oriented approach, accessibility features are often treated as an add-on product to 'fix' any problems, resulting in incompatibility in operating systems, web browsers, mobile devices, and platforms. In addition to recommending better standardisation through adherence to, development of and refinement of appropriate design

guidelines and best practice, we also encourage a bottom-up approach for web and app accessibility guidelines. Involving users into the process of technology design and development would assure the technology capacity is tailored around the need of the user. Ultimately, inclusive design is to improve the quality of life for every user, respective of their abilities.

Eighteen months after the focus group research, the world saw the outbreak of COVID-19 global pandemic in 2020, which has heightened the whole society's digital reliance and exacerbated the existing digital inequalities. Lockdown measures changed how people work, socialize, travel and get information, service and entertainment. Such changes have particular impact on visually impaired community. More research is needed in this area in investigating how sight-impaired community deals with the changes brought about by the global pandemic and how continuous support could be put in place to support this community.

References

Braun, V. and V. Clarke. (2006). 'Using Thematic Analysis in Psychology', *Qualitative Research in Psychology*. 3(2): 77-101.

Digital Communities Wales. (n.d.). Digital Inclusion in Wales. *Digital Communities Wales*. <<https://www.digitalcommunities.gov.wales/digital-inclusion-in-wales-2/>>. Accessed: 28 August 2021.

Flyvbjerg, B. (2006). 'Five Misunderstandings about Case-study Research', *Qualitative Inquiry*. 12(2): 219–245.

Giacomin, J. (2014). 'What is Human Centred Design?'. *The Design Journal*, 17(4), 606-623.

GOV.UK (2021). Understanding accessibility requirements for public sector bodies. *Central Digital and Data Office*. 9 July. <<https://www.gov.uk/guidance/accessibility-requirements-for-public-sector-websites-and-apps>>. Accessed: 28 August 2021.

Holman, J., J. Lazar, J. H. Feng, and J. D'Arcy. (2007). 'Developing usable captchas for blind users'. In *Proceedings of the 9th International ACM SIGACCESS Conference on Computers and Accessibility, Assets '07*, NY, USA: Association for Computing Machinery. Pp. 245–246.

International Organization for Standardization. (2019). Ergonomics of human-system interaction — Part 210: Human-centred design for interactive systems. *ISO Standard No. 9241-210:2019*.

<<https://www.iso.org/standard/77520.html>>. Accessed: 28 August 2021.

Kuppusamy, K. S. and G. Aghila. (2018). ‘Human: An Accessible, Polymorphic and Personalized CAPTCHA Interface With Pre-emption Feature Tailored for Persons With Visual Impairments’, *Universal Access in the Information Society*, 17(4):841–864.

Lloyds Bank (2021) UK Consumer Digital Index 2021. *Lloydsbank.com*. <https://www.lloydsbank.com/assets/media/pdfs/banking_with_us/whats-happening/210513-lloyds-consumer-digital-index-2021-report.pdf>.

Accessed: 1 October 2021.

Porcheron, M., J. E. Fischer, S. Reeves, and S. Sharples. (2018). ‘Voice Interfaces in Everyday Life’. In *Proceedings of the 2018 ACM Conference on Human Factors in Computing Systems, CHI '18*, NY, USA. Association for Computing Machinery. Pp. 1-12.

Pradhan, A., K. Mehta, and L. Findlater. (2018). ‘“Accessibility Came by Accident”: Use of Voice-Controlled Intelligent Personal Assistants by People with Disabilities’, in *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems, CHI '18*, NY, USA. Association for Computing Machinery. Pp. 1–13.

RNIB. (2015) People With Sight Loss in Later Life: RNIB Evidence-based review. RNIB.org.

<<https://www.rnib.org.uk/sites/default/files/Evidence-based%20review%20later%20life%20FINAL.pdf>>. Accessed: 28 August 2020.

RNIB. (2017) 4.1 million people will be affected by sight loss in the UK by 2050. RNIB.org. <<http://www.rnib.org.uk/nb-online/eye-health-statistics>>. Accessed: 3 October 2017.

RNIB. (n.d.) Coming to Terms with Sight Loss. Rnib.org <<https://www.rnib.org.uk/recently-diagnosed/coming-terms-sight-loss>>. Accessed: 28 August 2021.

Shrestha, S., K. Lenz, B. Chaparro, J. and Owens. (2007). ‘“F” Pattern Scanning of Text and Images in Web Pages’. *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*, 51(18):1200–1204.

Steen, M., M. Manschot, and N. De Koning. (2011). 'Benefits of Co-design in Service Design Projects'. *International Journal of Design*, 5(2): 53-60.

Vaughn, S., J. S. Schumm and J. Sinagub. (1996) *Focus Group Interviews in Education and Psychology*. SAGE.

W3C (2018). Web Content Accessibility Guidelines (WCAG) 2.1. *World Wide Web Consortium*. <<https://www.w3.org/TR/WCAG21/>>. Accessed: 27 September 2021.

WebAIM (2021). 'The WebAIM Million'. *WebAIM*. <<https://webaim.org/projects/million/>>. Accessed: 27 September 2021.

Wu, Y. S. Lindsay., J. Cable, R. Jones., L. Evans. X. Xie (2018) Digital Media Usage of Sensory Impaired Users in Wales 2018 Report. *Swansea University*. <<https://cronfa.swan.ac.uk/Record/cronfa45949>> Accessed: 28 August 2020.