

Open community of users and developers working together gives a new take on assistive technology and shared knowledge

Assistive technologies (AT) and accessibility aids are becoming commonplace in many people's lives, not least those of disabled people. The advent of free and open source technologies, apps and widgets means that the power to acquire technologies and to adapt and build them is firmly in the hands of users and 'open' community experts. The focus is on sharing knowledge and overcoming issues that are perhaps not cost effective enough to be dealt with by the commercial sector. The value of the open community is described, along with details of primary research to establish the compatibility of e-book delivery platforms with AT. This research opens a debate about what constitutes 'accessibility' – if something is technically achievable, regardless of how difficult the process, does that make it accessible? This article highlights the importance of true, fully inclusive approaches to accessibility and development, and explains how the open communities are advancing the cause very rapidly indeed.



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Introduction

The following statistics are a stark reminder of the need for an inclusive approach to accessibility and development. There are

- over 6.9 million disabled people of working age in the UK, which represents 19% of the working population¹
- over ten million disabled people in the UK, of whom half are over state pension age²
- two million people with sight impairments in the UK³
- 770,000 disabled children under the age of 16 in the UK, equating to one child in 20⁴.

The advantage of open accessibility and open source assistive technology software (OATS) is that they combine the benefits of open development with accessibility.

'Open accessibility tools and programs may be openly shared, modified or studied. They are free or low cost, and yet reliable as problems are rapidly fixed. With open accessibility, users, friends and support staff discuss what they would like with developers and other 'techies' to create the software that they want. Good accessibility ideas can be freely shared and built

on. Open accessibility ensures that people with disabilities, including the elderly and children, can get the most from computers and ICT'.⁵

The Right to Read Alliance (consisting of 21 organizations, as of 2011) estimates that one in eight people have print impairments. Three million people in the UK are being denied the right to read on a daily basis just because they have a sight problem or reading difficulty⁶. There are many more for whom English is not their first language who would benefit from text and digital information being read aloud to aid understanding.

Is it therefore any wonder that the total UK disability equipment market is growing at an ever increasing rate? It was estimated at £1.46 billion in 2008 compared with £1.34 billion the previous year⁷. The global market for assistive devices for special needs reached £4.8 billion in 2010. This market is projected to increase by 5.2% annually, reaching more than £6.6 billion by 2013⁸.

One might assume that these figures would describe the full cost of AT in use, however they simply cannot factor in all of the accessibility components within operating systems, mainstream

office applications, smart phones and tablet devices, not to mention the myriad features not designed for accessibility purposes that, when exploited appropriately, can have huge impact for disabled users. Nor can the figures take into account the exciting developments in the free/open source software world or the apps development communities, where accessibility seems to have found a natural home, with true champions who are working collaboratively with users or being users themselves. These development communities are in turn influencing the commercial world as companies are having to employ new business models such as offering products under a 'freemium' model (i.e. a free basic service or software but where costs are applied for premium services or more advanced features). Nuance Communications⁹, for example, now offer a module of one of their key products, Dragon Dictate, as a free 'app', providing what was once a chargeable suite of software. Companies and large corporations are having to rethink their offer to this market.

Least of all do the statistics take into consideration the inventiveness of the users themselves who are now able to utilize web services like never before (for example, Accessible Twitter¹⁰), enabling them to really take advantage of the open digital world – be it adaptable open source software tools, open repositories, open access journals or publicly open library catalogues. Increasingly, users can find services and apps which allow them to move between formats to access text in their preferred form, be it adapted text, audio, Daisy or mind map.

Educational technologies

Within the sphere of learning technology, the need to satisfy a wide range of learning preferences, needs and entitlements (including enabling students to work with their aforementioned preferred formats) is an ever increasing demand. Given the high expectation of users, together with the sophistication of applications on offer to users through personally owned mobile devices and the web, as mentioned above, the work of the educational developer and learning technologist, often working within the constraints of an institution, is becoming more complex and demanding. The availability of free and open source software is also helping students who do not have a declared disability but simply prefer to use particular

technologies to do so, while the openness of the developer community and their willingness to share their knowledge, coupled with associated projects funded within the various UK sectors, is proving invaluable in meeting the requirement to support all students inclusively.

The Wide Project¹¹, funded by JISC to create open widgets for disabled users, has attracted commercial interest in its model. The Open Source Assistive Technology project¹² and its very active JISCmail list¹³ is a real asset to those working with users who often require one-off solutions (unusually, the list shares expertise across a range of sectors including education, health and social care). 'Hackdays' (e.g. ¹⁴) are becoming a part of this community development and provide a means of addressing tricky accessibility issues, where experts literally get together (often face to face) to dismantle and adapt software to meet a particular set of needs. All these active communities, where real issues are debated with rigour and solutions created, share back with the community to enable further development almost instantaneously. It is hard to conceive this type of activity happening on a regular basis within the traditional commercial models where competitive edge and routes to market would be fiercely protected.

It would seem that some users are happy with a less polished product if it can do the basic job required – the widespread success of the AccessApps¹⁵ sticks (bundles of free accessibility and productivity aids to provide users with a range of tools they can use anywhere, any time) proves that having ready access to free, less polished tools (such as XMind¹⁶, for example) is an effective alternative for many users, rather than purchasing more highly featured software. AccessApps also has the added benefit of ensuring that there exists a ready suite of assistive software available for commercial developers to trial for compatibility with their own software developments prior to engaging in full user testing. Even slightly older information sources, such as the Open Schools site¹⁷ are still of value and provide useful materials.

It could be that previously, solutions for very small client groups with very specific needs would never have surfaced due to their lack of profitability, whereas it would seem with the advent of the apps and the open source developers, who seem to enjoy real challenges, there now exists a community that is ready and willing to take on

these challenges and offer their solutions under open licensing arrangements. In many cases this has allowed other developers or commercial parties to be able to benefit from their enthusiasm and skill. A key example of this is the IMS Global Learning Award-winning Xerte¹⁸ project, giving non-technical authors the chance to make highly accessible and interactive learning materials easily. The Xerte Developer Community¹⁹ listen to the needs of educators and users and have solved such conundrums as accessible drag-and-drop activities, to such an extent that large corporations now seek guidance from their developers.

None of this would be possible without open source software, or open publishing routes to share the knowledge created.

E-books

Books in digital formats offer numerous benefits to all users, but they offer disproportionate benefits to readers with disabilities. As a service, JISC Techdis²⁰ has been aware over a number of years of the issues that disabled users face when trying to access information – more recently, access to e-books has featured on the service's helpdesk queries in significant numbers, overtaking the previous hot topic of making learning materials and resources accessible. As a result of this demand, in collaboration with JISC Collections²¹ and the Publishers Licensing Society²² we researched the accessibility of e-book delivery platforms and produced a document²³ aimed at changing practice in this area.

Access to the text content of an e-book is surprisingly multi-layered for an average user. For

example, a user may have to negotiate up to eight separate stages, including a multitude of systems, windows or frames, such as if the e-book is held within a learning platform (see Figure 1, the Accessibility Bridge model for a graphical illustration of these eight stages). A user with specific access requirements depends on every stage being accessible to their assistive technology. In conducting research in this area, our focus was placed at the point where the supplier's responsibilities begin: logging on to the e-book platform itself. To isolate the individual accessibility problems that currently occur in a range of e-book platforms, JISC Techdis tested them with a range of disabled users.

E-book platform accessibility testing

Nine platforms were studied, with users completing an objective questionnaire based on typical use scenarios, for example logging onto the platform, searching for a book, reading pages, navigating within the book, etc. Expert AT users were asked to objectively measure the number of actions required for each user scenario on each platform and to comment on the ease or difficulty of the task.

The focus was on ease of use, not technical standards. Testers looked for:

- personalization options – font size, colour and style
- accessibility information – plain English advice for disabled users
- assistive technology compatibility when performing key tasks.

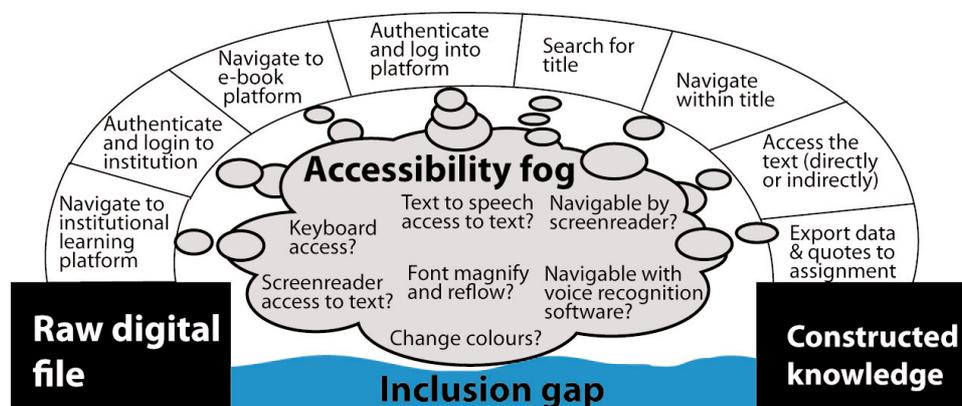


Figure 1. Accessibility Bridge model

Diagram courtesy Alistair McNaught, JISC Techdis

Navigation by:	Platform W	Platform X	Platform Y	Platform Z
keyboard only	125	170	3	11
mouse only	7	5	9	3
screen reader	9	18	not possible	9
voice input	6	7	not possible	6

Table 1. Number of 'actions' needed to browse to a book and read three pages

The results showed huge disparities between the accessibility of different systems to different types of users when performing a given task. The results also raised questions as to what 'counts' as an accessible system – if a task is technically possible within a given platform for a given user, but requires ten or even 50 times more clicks or 'actions' to achieve than a different platform, is it really accessible? (see Table 1.)

The main technological barriers were due to incompatibilities between the e-book platform and the user's assistive technology – e.g. text not being readable by their screen reader, or tab functions not moving into particular fields or 'frames' within the platform. However, it could be concluded that for most AT users most e-book platforms were more accessible than printed books²⁴. Encouragingly, it would appear that from this intensive research, accessibility is entirely achievable: a composite platform with the best aspects of all the platforms tested would be very close to an ideal system. Good practice will continue to evolve.

One of the outcomes of this research has been the creation of the Accessibility Bridge model as a result of open discussions between JISC Techdis, the Publishers Licensing Society and JISC Collections. The model, along with related advice²⁵, was made available and open to all publishers and developers. The diagram of the Bridge gives an overview of the steps required to move a user from raw digital files to constructed knowledge, the potential for losing users in the 'accessibility fog', and, most importantly, suggesting who is responsible for making more accessible each part of the process. (See Figure 1.)

Conclusion

There are many factors influencing the accessibility arena, not least the skills of the users; as fast as developers bring out a new app or a widget, someone with a need will exploit a particular

function and hence new assistive technologies and solutions are born.

Having seen an impressive demonstration of the free tools afforded to visually impaired users via an iPhone and free web services such as Dropbox²⁶ for file sharing and document conversion, and considering the plethora of apps for android and Apple platforms, it has become increasingly obvious that the goal-posts are moved almost daily by users and by the community of developers, with accessibility featuring strongly on their priority lists.

The challenge for industry, education and libraries is – as ever – to keep up and maintain an awareness of what users are bringing to the table and what is on the horizon that will soon arrive in our daily lives. Perhaps the only way to do so successfully is to join the 'open community' and be a part of the future.

References

1. Disability Rights Commission, July 2008.
2. Family Resources Survey (FRS) Disability prevalence estimates 2007/8.
3. RNIB 2010.
4. Contact A Family 2010.
5. Steve Lee Fullmeasure 2010
<http://fullmeasure.co.uk> (accessed 27 May 2011).
6. RNIB, ref. 3.
7. Disabled Living Foundation
<http://www.dlf.org.uk/content/key-facts> (accessed 27 May 2011).
8. Market Research.com
<http://www.marketresearch.com> (accessed 27 May 2011).
9. Nuance Communications
www.nuance.co.uk/naturallyspeaking (accessed 27 May 2011).

10. Accessible Twitter
<http://www.accessibletwitter.com/> (accessed 27 May 2011).
11. The Wide Project
<http://arc.tees.ac.uk/WIDE> (accessed 27 May 2011).
12. The Open Source Assistive Technology project
<http://www.oatsoft.org/> (accessed 27 May 2011).
13. OATS active JISC mail list
<https://www.jiscmail.ac.uk/cgi-bin/webadmin?A0=OATS-SIG> (subscription page accessed 27 May 2011).
14. Details of FullMeasure Hack Day
http://www.ukoln.ac.uk/events/devcsi/accessibility_hackdays/ (accessed 27 May 2011).
15. Access Apps
http://www.jisctechdis.ac.uk/techdis/pages/detail/online_resources/AccessApps (accessed 27 May 2011).
16. XMind as a mind mapping tool
<http://www.xmind.net/> (accessed 27 May 2011).
17. Open Source Schools
<http://opensourceschools.org.uk/open-source-accessibility-making-programs-and-content-available-everyone.html> (accessed 27 May 2011).
18. Xerte
<http://www.nottingham.ac.uk/xerte> (accessed 27 May 2011).
19. Xerte Developer list
20. JISC Techdis (a leading UK Advisory Service focussing on accessibility and technology)
www.jisctechdis.ac.uk (accessed 27 May 2011).
21. JISC Collections
www.jisccollections.ac.uk (accessed 27 May 2011).
22. Publishers Licensing Society
www.pls.org.uk (accessed 27 May 2011).
23. Accessible e-books publication
<http://www.jisctechdis.ac.uk/assets/Documents/goingdigital/TowardsAccessibleBookPlatforms.pdf> (accessed 27 May 2011).
24. Accessible e-books, ref. 23.
25. Accessible e-books, ref. 23.
26. Nuance Communications, ref. 9.

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