What goes unseen in accessible publishing: good practice and remaining gaps

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Abstract: Accessibility to content for all users, regardless of physical ability, is increasingly added to the agenda of priorities for academic publishers. Both anti-discrimination laws as well as the technological advances of this century have made processes around scholarly communication easier for blind and visually impaired (BVI) researchers. Information provider Elsevier recently received an international award for its advancements in accessible publishing. Honored that our progress in this area has been recognised, we also acknowledge that gaps remain in embedding accessible functionalities in the entire workflow of scholarly communication. We believe that accessibility is a convergence of quality and usability applicable to all editors and publishers, and, as such, progress in this area will benefit from an industry-wide awareness and approach to finding solutions for these gaps.

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Imagine that you're a researcher and have spent several months running your experiment, analysing data, and finally writing your paper. You have verified your references, followed the formatting guidelines, added your figures into separate files and reviewed text for English style and use of abbreviations. You arrive at the next step in the publishing process: submitting your article to a journal.

Step by step you go through the lengthy process on the publisher's online submission platform.

After hitting the "submit your paper" button you feel an overall sense of relief that that part of the process is now complete. You can now allow yourself to sit back and await the confirmation email from the publisher. If all goes well with the submission, you look forward to the next workflow of approval and peer-review on the road to final publication.

Some days go by and still no email.

You find yourself picking up the phone to ask the journal manager at the editorial office if all is ok.

"No, I'm afraid we did not receive your article submission," is the answer you get.

After several back-and-forths "yes I did", "no we really did not receive it", you describe the submission steps you completed online, only to hear the journal manager say, "Aha... I see the problem. After clicking 'submit your paper', did you not see the pop-up asking to confirm your choice?" "No," is your reply. "My screen reader technology must not have picked up on that second pop-up. I am blind."

The above describes a situation visually impaired researchers all too often find themselves running into. If a simple button click can be a barrier to submitting a paper as a blind person, imagine the complexities involved in publishing with formatting, figures, and citation formats – all required by leading journals – if systems have not been designed with accessibility in mind.

More than 285 million people worldwide are visually impaired, according to 2014 estimates by the World Health Organization. BVI researchers form a portion of this number.

Increasingly accessibility is pushed up on the agenda of priorities for academic publishers, and in legislation such as the Americans with Disabilities Act (ADA) in the US and the Equality Act (EQA) in the UK. Combined with technological advances of this century, these developments have made processes around scholarly communication much easier for BVI researchers. Gaps in embedding accessibility in the entire workflow of scholarly communication however do remain.

During the London Book Fair in April this year, Elsevier won the 2016 Accessible Books Consortium (ABC) International Excellence Award for Accessible Publishing in the Publisher category, for "providing outstanding leadership and achievements in advancing the accessibility of commercial e-books or other digital publications for persons who are blind, visually impaired or otherwise print disabled."

At Elsevier, we believe everyone should be able to benefit from scholarship, and the scientific and medical discoveries we publish. Here are some facts and figures about what we're doing at Elsevier when it comes down to accessible publishing.

- All Elsevier books published since 2007 are XML first, allowing us to create a variety of formats including accessible HTML and EPUB3 with usability features designed for the widest population.
- On ScienceDirect, we have over 2500 journals and 33,000 books in an accessible HTML format – that's 20 percent of the world's scientific, technical, and medical research publications.
- Elsevier produces more than 1200 nursing skills animations and videos as companion products to our nursing textbooks. Most videos offer a text transcript, and all 144 videos in the Essentials module – the most important nursing skills within fundamentals and health assessment – have an audio description track and closed captioning.
- Our Digital Books Archive fulfills over 4600 requests for alternative formats a year from disability support services around the world, on the day we receive the request. Providing students an accessible book for a class before it begins is paramount to their success.
- Direct BVI user feedback is embedded as part of our product and process design; we've been working with representative test users since the mid-1990s; anyone

having accessibility issues can at any time contact our accessibility team through accessibility@elsevier.com.

- We have widened the distribution channels where people can find accessible books by partnering with the Accessible Books Consortium, Bookshare and Load2Learn. Elsevier is also a founding member of the AccessTextNetwork, a clearing house to allow easier electronic fulfilment of disability-related requests. These partnerships are invaluable when it comes to learning what's needed by visually impaired users and have helped us to implement the latest technologies and best practices in our products.

- Collaborating with other organisations has become part of our accessibility mantra and is specifically mentioned as a guiding principle in our company's accessibility policy. We've learned a great deal by working directly with some fantastic organisations around the world that serve the needs of visually impaired people.

- And we share our knowledge and experience, too. With web platforms, our in-house experts have successfully helped companies such as Highcharts, the leading chart library company, to incorporate web content accessibility into their products. We presented the accessible chart work at CSUN 2016, the premier international conference for technology for people with disabilities.

- Integration of accessibility testing into our development process to ensure that websites and content follow the international Web Content Accessibility Guidelines (WCAG 2.0). This approach ensures that we consider the entire disability spectrum, not just people with visual impairments.

Challenges remain

While our strides in accessible publishing have been recognised by our visually impaired platform users and customers, pain points remain. Many of these will require collaborative solutions within and beyond our industry to solve. Efforts by organisations such as the Accessible Books Consortium which combine the know-how of a variety of stakeholders, including author and publisher groups as well as organizations directly serving BVI individuals, develop guidelines and best practices. Conferences, workshops, and meetings held around the globe also offer a podium to share (user) experiences and create awareness for what works, what doesn't, and to collectively discuss how to address the challenges on our wish list of accessible publishing. A significant challenge faced by publishers is that reading systems and screen-reading technology do not always support and correctly display or interpret the accessibility features built into books and journals. Therefore, working closely together with technology companies such as Adobe, Amazon, and Apple, which deliver those systems, is crucial.

Some obstacles from practice, as recently reported by Dr NA Giudice, Associate Professor, a visually impaired author and researcher with the School of Computing and Information Science at the University of Maine, include:

- Many conference paper submission systems are particularly clunky and lack even basic web accessibility such as well labelled buttons, form fields or graphical elements. Also, modern user interface controls such as auto-suggest and nested drop-downs are often inaccessible and cumbersome.

- Paper submission systems are rated overall as a C for web accessibility whereas bank sites overall are an A.

- It is hard to figure out what has been changed in a manuscript, eg track changes and edits (the essay you are reading now also manifested this pain point).

- User is unable to comment on a change using page numbers, which are not always announced by JAWS or similar screen reading devices, for example in a Word margin.

- Use of inaccessible PDFs or locked PFDs that do not allow screen access technology or conversion to an editable form.

Further suggested by Dr Giudice are some tips and tricks to work around these obstacles:

- Ask reviewers to use designated symbols (eg brackets or initials) instead of colours to highlight where items have been changed.

- Recruit sighted assistance to help submit the final manuscript since there are so many files involved and figures, cover letters, etc. Or, email the editor of a journal directly (or journal manager) and ask them to help upload the files.

- For verification use embossed printer/tactile version of figures to confirm they match with the print version.

- Use manuscript snippets instead of a page number for providing review comments to others.

Although helpful, it must be noted that these workarounds do require time and expensive equipment, and reduce productivity and efficiency. They also hamper the ability to complete a review or article submission process independently – an aspect of publishing which is ranked just as highly in importance by BVI researchers as other scholars.

Different formats for different needs

For publishers, understanding which formats are used by which user group is key to helping ensure no one is excluded. People with dyslexia or other learning difficulties find PDFs very usable and useful when using literacy tools which highlight screen text while narrating through speech. However, PDFs can be a nightmare to access for someone who is blind and uses a screen reader, especially if files are scanned images or lack proper tagging. Some people with visual impairments may prefer braille and large text, and while this is more easily fixed for digital formats, for print content these alterations are prohibitively expensive and difficult for most publishers to produce. Creating a flexible format such as XML in the beginning will set publishers up for delivering a variety of accessible formats, and thus taking a wider selection of disabilities into consideration. HTML is an example of an XML descendant; HTML can be a very accessible format for people with different visual impairments because of the available and comprehensive palette of HTML markup and the excellent support for reading the content through web browsers and assistive technologies.

Non-text content

A key concept in accessibility is making sure that any content

conveyed non-textually has a text equivalent (eg an alt tag). This means that if you provide an image of Albert Einstein with his tongue out, you also need to provide a label that adequately describes him and his countenance. The standards for producing accessible online content are well specified through the Web Content Accessibility Guidelines (WCAG 2.0). However, because non-text content types in publishing can include anything from video, audio, charts and graphs to mathematical symbols, publishers have yet to crack the whole nut for making all these assets accessible. This is a complex problem but there have been notable improvements, especially in assistive technology. For example, MathML is a machine-readable version of mathematical symbols that can be displayed in browsers and read by text-to-speech engines. Video players on the web can provide captions for the hearing impaired and audio-described tracks for helping blind people understand the action in a visual scene.

How to nudge content creators

Twitter recently announced the ability to allow users to provide alternative text for their image content, which will open up a more inclusive experience for people who are blind. Similarly, Facebook is working on technology to automatically recognise images and tag them with meaningful labels for people who are blind. Web and IT companies realise they can attract loyal users who have disabilities by keeping accessibility in mind from the start of product development. For example, Apple has dominated the market for mobile phone users who are blind by including the very capable VoiceOver screen reader in the iPhone and iPad. Microsoft announced that their design strategy will drive innovation by focusing on the needs of people with disabilities. Luckily, most companies realize that improving accessibility usually also means investing in higher quality product development – something which benefits *all* customers. Unfortunately it can also take a kick in the shin by litigation for content producers to take action such as in the recent Harvard/MIT suit which stemmed from a variety of videos lacking closed captioning for those with hearing impairment.

Authors should have a say in the level of accessibility of their published work and have a vested interest in reaching the widest reading population with their ideas and discoveries. Ideally author submission systems should be fully accessible themselves and incorporate structured opportunities for author feedback should be embedded in submission workflows. In the same way that Twitter and Facebook are promoting new accessible functionalities, author systems should also provide mechanisms for researchers to produce accessible content such as alt text for figures, or closed captioning for video content.

Legal issues

US legislation around web accessibility is evolving. Although the Department of Justice has been working on finalising a regulation defining how the ADA applies to websites (and thus a lot of publisher content), the ADA in its current form doesn't include official details on website accessibility, and so is not as clearly defined as for other industry specific regulations. For example, and by comparison, the airline industry and the recent Air Carrier Access Act specifically require all airlines operating in the US to have every webpage conformant to level AA of the WCAG 2.0. An expected revision of ADA Title III to include websites as a place of *public accommodation* would require all publishers and private website vendors to take action towards accessibility. As a foreshadowing example, Scribd, an internet publisher of thousands of book and audiobook titles, has been sued under ADA Title III with its website regarded as a "place of public accommodation".

The Department of Justice provides over 20 examples of ADA-related suits that involve websites within different industry sectors, including higher education. For example, Louisiana Tech University was sued in 2013 for utilising a homework website which was unusable to a blind student. There have been over 30 universities that have faced similar lawsuits in the US under the ADA. Universities themselves realise the legal risk of providing inaccessible IT services and platforms. Publishers have felt a trickle-down effect from this risk by facing strict purchase agreement policies from universities which require materials to follow established accessibility guidelines such as the WCAG 2.0 and US 508. Of course this isn't the only reason why publishers should care, as accessible sites and content are commonly known to have usability benefits for everyone and also boost other digital quality measures such as search engine optimisation and product/platform independence.

The Equality Act 2010 (EQA) is the UK equivalent to the US ADA and protects the rights of people with disabilities (and rights of other diverse groups). The legislation is mainly aimed at libraries, schools, shops, restaurants, and hotels, but includes all those that provide goods or services to the public. It therefore applies to publishers of print and digital materials. However, like the ADA, the EQA does not include language referring to websites as services that need to be accessible to people with disabilities. In addition to the general protection under this disability legislation, people who are blind or who have serious visual impairments can also benefit from a copyright exception under the UK Copyright (Visually Impaired Persons) Act 2002. This law defines a visually impaired person as someone who is blind, or a person who is partially sighted or whose sight cannot be adequately improved by the use of corrective lenses, or a person who is unable through physical disability to hold or manipulate books or to focus or move their eyes. It provides two different copyright exceptions, with slightly different conditions, which are applicable to commercially published literary, dramatic, musical or artistic works (including typographical copyright), but they do not apply to recorded performances or databases:

1. A single copy for personal use – individuals may make, or they may ask others (such as teachers, librarians, parents or carers) to make for them, free of charge and without asking permission from the rights holder(s), a single accessible copy in another format. This could, for example, mean a braille format or a more accessible digital version of the work. It is necessary for the copies to be made from lawfully acquired originals, and these must not be adapted unnecessarily. The copies must

also carry a statement that they are made under the Act, and carry an acknowledgment. Copies cannot be made when a commercially produced text in a suitable format is available.

2. Multiple copies for collective use – educational organisations and not-for-profit bodies such as the Royal National Institute of Blind People (RNIB) may make multiple copies of the same copyright work for their members without permission. However, this exception cannot be applied when an accessible format is commercially available, or when a relevant licensing scheme exists. If this exception is used to create multiple copies, those copies must be made from lawfully acquired originals, they must carry a statement that they are made under the Act, and they must carry an acknowledgment. The organisation making the copies must notify the rights holder that the copies have been made. Where technological protection measures have been disabled in order to access the text, they must be reapplied before the copy is sent to the user.

Making works accessible in Europe

Every European country has a copyright exception for people with print disabilities, but the precise definitions of beneficiaries, and details of how the exception operates, will differ from country to country. In 2009 a 'Stakeholders Dialogue' was convened by the European Commission, and brought together representatives from the European Blind Union and the Federation of European Publishers to find practical ways of enabling the cross-border transfer within Europe of accessible formats created by charities that support people with print disabilities. These accessible formats are often very expensive to create and it was recognised as an expensive duplication of effort that the same file might be made into accessible formats more than once. In June 2010 a Memorandum of Understanding was agreed between the parties. This was signed on 14 September 2010 by the European Blind Union, the European Dyslexic Association, the European Writers' Council, the International Federation of Reproduction Rights Organisations, the International Association of Scientific, Technical, and Medical Publishers, and the Federation of European Publishers. Although the European Blind Union withdrew from the project in early 2011, other partners went on to launch the European Trusted Intermediaries Network (ETIN), which is a network of organisations that are authorised to create accessible copies under national copyright exceptions and then transfer these across borders within the European Union. A model licence for this network was agreed in September 2011, the governing Board met for the first time in February 2012, and its by-laws were finalised in April 2012, and thus, the the enabling system for cross-border transfer of accessible works is laid in Europe.

In summary

Adopting accessible practices involves a convergence of quality and usability for editors and publishers alike, and is an opportunity to expand offerings to everyone, regardless of ability. At Elsevier we are committed to these practices and have seen undeniable long-term benefits of our efforts: customers around the world reaching their full potential.

Ultimately, it is through sharing this knowledge that remaining gaps in accessibility will be closed. At that point workflows will become seamless and BVI researchers will not need to pass article submission deadlines due to a misclick of a button.

Useful resources on accessible publishing

Recently in the media:
Scholarly Kitchen, 12 July 2016
Guest Post, Darrell Gunter: Accessibility Is The New Innovation

Organisations
- Accessible Books Consortium (ABC) – an inclusive partnership led by the World Intellectual Property Organization (WIPO) aiming to increase the number of books worldwide in accessible formats (braille, audio and large print) and make them available to people who are blind, visually impaired or otherwise print disabled. @ABCBooks4all | www.accessiblebooksconsortium.org
- Bookshare - offers accessible e-books to people with qualified print disabilities anywhere in the world. Currently, it has members in over 70 countries who are able to access a collection of more than 254,000 book titles.
- Load2Learn - a UK-based service delivered by RNIB and Dyslexia Action to offer access to book titles in accessible formats. Load2Learn is completely free and enables learners who cannot read standard print, including those with dyslexia and who are blind or partially sighted, to read the same books at the same time as their classmates.
- Accesstext Network - founded and supported by the Association of American Publishers and leading textbook publishers, AccessText is a conduit between the publishing world and colleges and universities across the US with a shared mission to ensure students with disabilities have equal access to their textbooks in an accessible format and in a timely manner.

Guides & best practice overviews in accessible publishing
- Accessible Publishing Best Practice Guidelines for Publishers
- BISG Quick Start Guide to Accessible Publishing
- Accessible EPUB 3 Best Practices for Creating Universally Usable Content
- Create and Verify PDF Accessibility
- The International Association of Accessibility Professionals (IAAP)
- Publishers Association guidelines for meeting the permissions needs of people with a print disability in further and higher education
- World Wide Web Consortium accessibility standards and guidelines for web-based products