

# Experimentation Project for Accessible Publishing: Publisher Workflows and Ebook Accessibility Report

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ASSOCIATION  
NATIONALE  
DES ÉDITEURS  
DE LIVRES



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## Executive Summary & Recommendations

The importance of accessibility in digital publishing is becoming increasingly recognized by publishers in Canada, and in order to identify and clarify a path to accessible publishing, NNELS (National Network for Equitable Library Service), eBOUND, and l’Association national des éditeurs de livres (ANEL) undertook this experimental project. Over the course of this project, NNELS worked closely with 11 independent Canadian publishers (six produce English language books and are members of eBOUND, and 5 produce French language books, and are members of ANEL) in order to learn about publisher workflows and the stages a book goes through, from submission to publication.

This report reviews what was learned about publisher workflows, and provides detailed recommendations on how publishers can improve the accessibility of their ebooks by making adjustments to their workflows. A key finding of this project is the knowledge that the burden of work, when it comes to improving accessibility, does not rest solely on the publisher, although they will need to be the driving force for change within their own organizations. But, changes can be made by all of the key players in the workflow, from the author, to the copy-editor, to the designer, to the conversion house/ebook producer.

## Key recommendations for improving accessibility in publishing:

1. Build accessibility into the publishing workflow right from the start. Each step publishers take will bring them closer to producing mainstream born accessible ebooks. Creating content with accessibility in mind makes good business sense, as it reduces additional costs to add accessibility after production.
2. Internal documentation should be updated to include accessibility requirements. This includes: instructions for authors (like writing image descriptions); editing and design workflows, processes, and even templates; requirements for conversion houses/ebook producers; checklists for final versions of files; and any other documentation that guides the creation and production of ebooks
3. Best practices should be communicated to all staff and contributors. Authors, editors, designers, ebook producers, and all participants in the ebook production and distribution supply chains can play a role in making more accessible books.
4. Consider making accessibility a core value in the production and dissemination of content, including developing a company policy statement to express the commitment to accessibility. This will inform and guide changes to the workflows to aim for accessible-by-design products.
5. Reach out to experts working on accessible publishing. Accessibility experts can support publishers by helping solve problems that publishers may encounter in implementing changes to their workflows, answer questions and provide advice on accessibility standards, and test accessibility features.

## Introduction

Digital content is inherently more flexible than hard copy books, and when an ebook is well-made, its benefits can be reaped by all readers, not only those with print disabilities.<sup>1</sup> Digital content can be manipulated by the user in order to meet their needs. Perhaps a person with low vision would like to enlarge the size of the text they are reading, or a person with a learning disability would like to have their textbook read out loud, or a person with no print disability at all would like to read in the dark – all of these scenarios can be solved simply by having access to a well-made digital version of a text.

Readers of all kinds, including those with print disabilities, can access ebooks or audiobooks through their computers, mobile devices including tablets and smart phones, and ebook readers. Readers with print disabilities use a variety of assistive technologies to interact with their devices, apps, and programs, including screen readers, screen magnification software, voice controls, and more.

A digital book (ebook or audiobook) that is accessible for one person may not be accessible for another, as there are different accessibility requirements depending on an individual's capabilities, skills and preferences. A completely accessible product offers the maximum flexibility of user experience for all readers and allows the content to be accessed and manipulated with ease by those with or without disabilities.

Over the past few years, organizations like NNELS (National Network for Equitable Library Service) and eBOUND have been working toward improving the standards of accessibility in Canadian publishing, and

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<sup>1</sup> Print disabilities refer to a subset of disabilities that are defined as mobility, cognitive, and visual impairments that prevent people from reading print.

in March of 2019 the government of Canada announced a five-year, \$22.8 million initiative which will support the sustainable production and distribution of accessible digital books (Department of Finance, 2019). With this financial support, even more organizations (such as the Association of Canadian Publishers (ACP), l'Association nationale des éditeurs de livres (ANEL), and more) and publishers have eagerly dove into the work that needs to be done in order to improve the accessible publishing landscape in Canada.

In partnership with eBOUND and ANEL, NNELS undertook the Experimentation Project for Accessible Publishing, to work with independent Canadian English and French publishers and help them enhance accessibility of their ebooks. Through this project, the NNELS team had the opportunity to work closely with publishers, and to go beyond simply looking at and evaluating their ebooks. We were able to learn about their production processes and workflows; their technical abilities and capacity for developing accessibility; and their relationships with their ebook producers (both large conversion houses and independent/ freelance ebook producers).

This report begins with a short discussion about accessible content, emphasizing the advantages of the accessible by design principle, and summarizes the expertise of the NNELS team in this area. The next section provides an overview of the project and methodology. Then, it summarizes what we learned about publishers' current workflows and highlights some of the aspects of EPUB files that require more attention to ensure they are accessible, provides recommendations to embed accessibility into publishers' workflows, and presents considerations for future research. The appendices in this document (a checklist of accessibility requirements and best practices for different genres, and instructions to check accessibility features using a screen reader) can be read independently. These appendices have been developed through this project as well as in conjunction with other work NNELS is doing with independent Canadian publishers thanks in part to support from the Government of Canada's Social Development and Partnership Program – Disability Component (SDPP-D). NNELS will share these appendices, as well as additional documents on [AccessiblePublishing.ca](https://www.accessiblepublishing.ca) (including guides on accessibility metadata, working with InDesign, ARIA roles, and more) so that the learnings of this project can be made available freely and accessed and implemented by as many publishers as possible.

This report captures what we learned about publisher workflows based on our work with both English and French publishers. Some of the recommendations included in this report are also drawn from similar work we did with other independent publishers. While a few publishers had issues that were unique to them, the information learned will be relevant and useful to most independent Canadian publishers.

## NNELS & Accessible Publishing

A key aspect of an ebook's accessibility is its design: accessible design creates products that are inclusive and useable by everyone, regardless of ability, without the need for adaptation. Accessibility also means the identification and removal of barriers that may prevent readers with print disabilities from using products or services. When content is created without following or considering accessibility guidelines,

additional work is often needed in order to make this content usable to all readers, including those with disabilities.<sup>2</sup>

Over the past several years, NNELS has undertaken various initiatives aimed to ensure services and materials for users with print disabilities are fundamentally informed by the accessible by design principle. NNELS works directly with Canadian publishers to help improve accessibility of their ebooks, and uses its expertise to teach publishers about how they can incorporate accessibility into their workflows and create books that are accessible by design rather than being made accessible after production. NNELS has grown as an advocate for accessible publishing, by offering accessibility audits and workshops to publishers, and convening an annual [Accessible Publishing Summit](#) in Canada. Much of this work has been made possible thanks in part to support from the Government of Canada's Social Development and Partnership Program – Disability Component (SDPP-D). The funds are used to support the framework of “born accessible publishing” wherein accessibility is incorporated into content at the time of production. Through its work on accessible publishing, NNELS has been able to work with publishers directly, which has led to the development of a rich base of knowledge about accessible publishing, as well as the challenges that publishers face. Based on this knowledge, and the experience of the accessibility testing team, NNELS has provided valuable advisory services to publishers, based on their unique questions and issues, and created documentation which can be used by anyone who is working on improving the accessibility of their digital books. The information NNELS shares is built to ensure that accessibility is designed into products and services from the start, rather than added in at the end stages of production through repeated testing and remediation. When accessibility guidelines and standards are followed, content can be accessed by everyone, regardless of device or ability.

NNELS recognizes that people with print disabilities are the experts with the capability to make positive contributions to accessible publishing and puts them at the centre of this work. NNELS has a team of accessibility testers comprised of individuals with lived experience of disability and who consume print content in non-traditional ways. The accessibility testing team has expertise in assessing the accessibility and usability of ebook (EPUB) files and reading systems, identifying accessibility barriers, and making recommendations for improvement.

## Project overview

The goals of this project were to: learn about publishers' workflows; assist publishers in the creation of accessible books and accessible workflows; and develop best practices around introducing accessible workflows into the publishing cycle to produce content that is born accessible.

Over the course of the project, the NNELS team of accessibility testers provided publishers with feedback on the accessibility of their files and specific advice on how to prevent accessibility barriers, in addition to recommending changes in their current publishing process to enhance the accessibility of

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<sup>2</sup> There are several factors that impact the accessibility of an ebook, including: the source document (which should be well-structured to support accessibility features; quality ingestion of the content by a Retailer to create a user-ready ebook which supports accessibility and preserves the features of the source manuscript; an accessible retail environment where users can find a book and then complete a purchase or loan process; and a Reading System which supports the accessibility requirements of the user.

their content. By partnering with publishers and assessing the accessibility of their ebooks throughout the production process, we gained a better understanding of publishers' workflows, including the tools they use, the people involved, and their technological capabilities.

## Methodology

In order to identify potential publishers for this project, eBOUND and ANEL put calls out to their members, outlining the expectations of the project. Publishers submitted applications, and were selected based on: their interest in improving accessible publishing; the genres they produce; and (for the English publishers only) their geographic location. The goal was to select publishers who produced a wide range of genres (i.e., fiction, children's books, non-fiction, poetry) that have text, images, graphs and other non-text attributes, as well as represented as much geographic diversity as possible.

We worked with six English publishers, all of whom outsource ebook production to a conversion house or independent ebook producer. The publishers are listed below, as well as their location and the type of book(s) they shared in this project (with notable features and/or descriptors):

- Annick Press, Toronto, ON (children's books: one picture book, one novel)
- Athabasca University Press, Edmonton, AB (scholarly non-fiction with complex figures including images, tables, flowcharts, and graphs, as well as footnotes and a bibliography)
- Brick Books, Kingston, ON (poetry)
- Coach House Books, Toronto, ON (non-fiction)
- Fernwood Publishing, Black Point, Nova Scotia (scholarly non-fiction with images, footnotes, index, and a bibliography)
- Goose Lane Editions, Fredericton, NB (a novel and a biography)

We worked with five French publishers who were selected by ANEL, three of which outsource ebook production; the other two (Fonfon and Éditions Prise de parole) produce their ebooks in-house:

- Lux Éditeur, Montréal, QC (scholarly non-fiction with a tables, footnotes and a bibliography)
- Guy Saint-Jean Éditeur, Laval, QC (novel with complex structure)
- L'instant même, Longueuil, QC (novel)
- Fonfon, Montréal, QC (children's picture book)
- Éditions Prise de parole, Sudbury, ON (historical non-fiction with a complex table, extensive footnotes, a bibliography, and complex structure)

We also talked to two conversion houses:

- Amnet, Chennai, India
- De Marque, Quebec City, QC

We were able to work closely with De Marque, as they produced one of the French publishers' books, and were eager to learn from our feedback. We also had the chance to speak with some of the independent ebook producers used by some of the English publishers.

Each publisher provided at least one new title within the specified time period. Our initial plan was to work with two publisher files, but this was not always possible due to publishers' own timelines. We assessed two titles for Annick Press and Goose Lane, the only two publishers participating in this project whose timelines allowed us to do this.

The first step for the NNELS team was to send a questionnaire to the publisher to learn about their workflow, their current understanding of accessibility standards, and the tools they use to produce their ebooks. The next step was to match two accessibility testers with each publisher, and to have an initial meeting which included the project coordinators, two accessibility testers who were assigned to the publisher, and the publisher, including Managing Editors, Production Editors, Creative Directors, Designers, independent ebook producers, a Digital And Distribution Coordinator, a Web, Digitization & Design Technician, and an Acting Director. During this meeting, the NNELS team provided information about accessibility and assistive technology, and answered initial questions from the publisher. Accessibility testers explained common barriers they face when reading ebooks that are not designed with accessibility in mind.

The next step was for publishers to provide their current EPUB files for assessment by the accessibility testers. Our original plan was to work with multiple files relevant to the different stages of the production workflow, including Word, print-ready and InDesign files. However, we found that, although interesting, looking at files from the copyediting and proofreading stages was not highly useful for this project. Our team has expertise with the EPUB format, which is the mainstream standard format for ebooks, and the most recommended format for accessible ebooks. In contrast, PDF files are more challenging to work with in terms of markup and structure; and, they are also not the standard distribution format for ebooks. We had the opportunity to work with a couple of InDesign files, but determined that this was not a useful step as it is still necessary to undertake quite a bit of post-export work after creating an EPUB file from an InDesign (.INDD) file. By evaluating the EPUB files, the testers were able to develop recommendations for multiple stages of the publisher workflows.

The accessibility testers assessed the EPUB files and identified features and issues that pose accessibility barriers. A detailed review of the HTML and CSS code of the EPUB was conducted. Another important step in the evaluation was usability testing of the files in different reading systems.<sup>3</sup> Based on this testing and assessment, the NNELS team provided a report with feedback for the publisher, highlighting features that are already accessible, describing accessibility barriers present in the files, explaining why they are problematic, and offering recommendations for eliminating the accessibility barriers (issues specific to each title) and enhancing accessibility. Throughout the project, the testers responded to publishers' questions and advised them on what can be done to improve accessibility.

When timelines permitted, publishers incorporated our recommendations and sent us remediated files to reassess. This allowed our team to test the revised ebooks for accessibility and usability to ensure these requirements were met.

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<sup>3</sup> The term Reading System refers to a tool used to access and navigate an ebook, including a reading application for a computer or mobile device, and also to the assistive technology being used (e.g. screen reader or magnification software).

After the publisher had an opportunity to go over the feedback (and in some cases, revise their files), the NNELS team and the publisher had a second phone meeting to discuss feedback and lessons learned.<sup>4</sup>

The NNELS team also had the opportunity to speak with a few third-party producers, including both larger organizations (Amnet and De Marque) as well as independent, freelance contractors, who convert publisher files into EPUB. Understanding about accessibility was quite variable. Some were very familiar with some of the basics of accessible publishing and were already incorporating accessibility features into their files (such as the large conversion house, Amnet, which provides services to large publishers producing scholarly content, and has expertise in accessible publishing), while others were just beginning to learn. Through these conversations we gained a better understanding of what makes some of the accessibility features more challenging to implement than others, as well as about communication needs.

## Publisher Workflows

Most of the English publishers that participated in this project already had a good understanding of accessibility, some of them had attended workshops conducted by NNELS in 2018 and 2019 to teach them how to create more accessible files, and some had also had their titles audited by NNELS in previous years. It should be noted that this project was the first time that NNELS had had the capacity to reach out to French publishers.

### **An Overview of Publisher Workflows at the Outset of the Project**

The entirety of each publishers' workflow—taking a book from submission to publication—has many more steps than will be reviewed in this document. In order to present our recommendations and best practices as concisely and helpfully as possible, we will only discuss key steps and points at which changes to the workflow can be made to facilitate the creation of more accessible books. The following sections provide an overview of the practices of publishers who took part in this project, based on their responses to the questionnaire and our discussions at the initial meetings.

#### *Initial Files*

All publishers receive author submissions as Microsoft Word (Word) documents, and do initial editing of the files in Word (some may work by marking up a printed copy, and then making the changes in the Word file). Depending on the phase of editing, some publishers export a PDF version of the edited work from Word, and editorial staff carry out editing, copyediting and proofreading by adding comments to the PDF. Final changes are applied to either the Word document, or if they have begun laying out the book in their design program, the changes are applied to the book in that program (almost all publishers participating in this project use Adobe InDesign, and one uses Quark Xpress).

#### *Layout/Design/Typesetting*

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<sup>4</sup> The original plan was to have in-person meetings with publishers, but due to the Covid-19 pandemic this was not possible. There is only one publisher, Fernwood, with whom we were not able to arrange a meeting in time to capture their feedback and incorporate it in our report.

Once the files are fully edited, they are laid out (if that has not already been begun). As noted, almost all publishers layout their books using InDesign, except for one that uses Quark Xpress.

The designers (who are all in-house for the publishers involved in this project) create the print-ready version of the book (laying out text and images, setting paragraph and character styles, etc.). Once this is done, the page proofs are checked over by the editorial staff, and possibly the author. Corrections and requested changes are made, and an index might be created and added after final pagination is set. Once complete, the print-ready file will go to print, and the same file will be sent for EPUB conversion.

### *Sending for Conversion*

For most publishers, the ebook production process begins with the final, formatted InDesign (INDD) files. These are sent to their conversion house/ebook producer, while some send PDFs. Conversion takes from a few days to six weeks, averaging about two weeks for most publishers.

All publishers receive EPUB files back from the converter, and some also receive PDF, Mobi, WebPDF, and XML (XML files are generally just for archival purposes). Most publishers receive EPUB 3, but a few publishers are still requesting EPUB2 files. While the sample size of publishers in this project is small, it should be noted that only French publishers are still producing EPUB 2 files (three out of the five that participated in this project).

### *Testing Converted Files*

Once the conversion house/ebook producer returns the EPUB file, the publisher begins QA checks and testing of the files. There is a wide range of steps that publishers take at this point, including: checking the EPUB against the print book to ensure that its visual presentation is correct; reviewing the files on a variety of programs/apps and devices (Adobe Digital Editions, Kobo (iOS), and iBooks (iOS), etc.), as well as checking the styles and in-book metadata in Calibre and Sigil.

In addition to this manual testing, many publishers also use automated tools to check their EPUB files. They may use an EPUB checker for EPUB 3 validation (such as EPUBCheck, Born Accessible Content Checker, SnowFlower EPUB Validator), and/or Ace by DAISY, a free, open source app/tool designed for checking the accessibility of EPUB files.

### *Remediating Converted Files*

After issues have been identified, publishers ensure that they are remediated. They will send a list of requests to the conversion house/ebook producer, or perhaps make the changes in-house, depending on what the issues are and the resources/capabilities of the publisher. In the latter case, the ebooks are re-checked once returned.

Publishers in this project use a variety of programs for ebook editing, including InDesign, Sigil, Calibre, BBEEdit, Adobe InDesign (pre-export) and Brackets (post-export HTML).

### *Final Steps*

Some publishers add accessibility metadata to the ebooks after it has been converted, checked, and approved, while others ensure that their conversion house/ebook producer includes it in the ebook.

When the files are complete, they are uploaded and distributed to their final destinations, including eBOUND, CoreSource, the publishers' websites, vendors, etc., and also archived.

## Best Practices for Publisher Workflows

Before embarking on this project, many of the participating publishers had done some research and read about existing accessibility standards and guidelines, but it was difficult for them to contextualize everything that they had learned. They were not sure what features should be prioritized, and in some cases they did not know where to begin; they had little idea of how far they should go as they had no point of reference. Many of the publishers commented that our report(s) on their files validated what they have been doing (with respect to taking steps toward accessibility), but also made them aware of some aspects that they had not known about, or had not understood when doing their own research. It was helpful to get the full picture and detailed feedback, including “options” (i.e. things that they should do/must do/could do, etc.). Almost all of the participating publishers felt confident that they would be able to produce more accessible ebooks based on what they had learned from the reports.

Publishers use a variety of workflow processes, depending on the kind of publishing they engage in and the formats with which they work.. While it is not possible to create a generic workflow template that covers every type of publication, there are considerations that can help everyone and offer principles for best practice.

A note on the Best Practices: we recognize that publishers will face challenges as they begin to build a more accessible workflow. To address this, wherever possible, we have included “Alternate Approaches” (i.e. “Second” Best Practices). We hope that, by including options, publishers will be able to identify features and steps that they can incorporate into their production processes. The items in this section range from general considerations, and increase in specificity.

### *1. Layout for Print vs. Digital*

We learned that some publishers try to design the layouts of their books in ways that that are good for both print and digital production, but most of them do not. Some publishers are still tied to the idea of replicating the visual print layout of a book in the digital version, and have a hard time adjusting to a digital layout mindset.

The designer of one of the English publishers said that they are already moving away from the replication of the print file. In first working with ebooks, they wanted to replicate the reading of a print book in a digital format. They are now learning about readers with print disabilities, and also about how ebooks are a totally different platform and product than print books. One publisher put it very eloquently: “Book as aesthetic experience vs. book as stream of knowledge.” When you consider that ebooks will not look the same even across applications, the flexibility of an ebook designed as digital content may greatly improve the experience of all readers.

Sometimes, it is not worth the effort of replicating the print file, as this can result in files that have features that disrupt the reading experience for readers with print disabilities. This is especially true for fixed layout ebooks, as their content cannot be adjusted to meet user needs. The most accessible files are ones where structure, content and appearance can be separated and manipulated individually according to user requirements. This gives greater flexibility in delivery.

**Best Practice:** Let go of attempting to replicate the design of the print book in the ebook version, and embrace the flexibility of the digital format, and the potential sophistication and robustness of EPUB 3.

**Genres:** Applicable to all genres.

## 2. Fixed Layout vs. Reflowable

Most ebooks are published in a reflowable layout. Reflowable layout is the preferred layout for most books as it is the most accessible. In reflowable format, devices fit text and images to the screen, and allow elements to be resized to suit the reader's needs. Text scrolls seamlessly from one page to the next, and images are placed at a logical position in the reading order. Fixed layout, on the other hand, explicitly sets the position of text and images on the screen. Because text and images are held to a pre-defined page, elements cannot be resized. Text is strictly paginated, and images are placed at an exact position on that page.

Publishers typically turn to fixed layout for image-heavy content. Each page might begin with a photo, which text flows around to create a particular visual effect. This style is problematic for readers with print disabilities because the text is broken into words and cannot be easily and smoothly read by screen readers.

In this project, we assessed three books with heavy image content, and all of them were fixed layout.

The largest issue with the fixed layout file format is that each individual word is usually wrapped in a span tag, so each word is read one-by-one, as demonstrated in this [short video the impact of a fixed layout format](#). Instead, it is possible to place phrases on the page rather than on individual words within the span tags, and it improves readability significantly, since there is no interruption between words, just phrases.

**Best Practice:** Use reflowable layout whenever possible. If producing fixed layout (eg. for image-heavy content), publishers should work toward improving the reading experience for screen reader users by working with their designer and conversion house/ebook producer to ensure that phrases/sentences, instead of individual words, are placed within the span tags, as it improves readability significantly.

**Genres:** Applicable to all genres, but of particular importance for children's books and other heavily illustrated books.

## 3. EPUB Version

EPUB 3 is based on HTML 5, which allows semantic richness to be added to content so that it is machine-readable. HTML 5 elements are incredibly beneficial for people who use screen readers as the elements are widely used and recognized by most, if not all, digital systems that someone may use. Compared to EPUB 2 files, EPUB 3 files offer much richer navigation, media integration, and accessibility features.

NNELS has been assessing the accessibility of EPUB files for several years. When we started, more than half of publisher files we evaluated were in the EPUB 2 format. In this project, however, all files from English publishers were in EPUB 3, an indication that adoption of the latest version of the EPUB standard (released in 2011) may be finally happening. Conversely, 60% of participating French publishers (three out of the five) are still producing files in the older EPUB 2 format. Based on conversations with French publishers, and with one conversion house, one reason for this hesitancy is the perception that EPUB 3 files are not compatible with older devices, which is incorrect.

EPUB 3 files are backwards compatible with older devices, as long as an NCX navigation file is included. Some EPUB checkers (such as EPUBCheck, Born Accessible Content Checker, SnowFlower EPUB Validator, etc.) may issue a warning that "the book may not work correctly" but as long as the table of

contents NCX file (toc.ncx) is present, it will work. This is an issue that is especially relevant as publishers work on their backlist files, many of which are most likely in EPUB 2 format.

**Best Practice:** Revise workflows to produce EPUB 3 files. Offering an NCX navigation file, in addition to the XHTML format of EPUB3, will provide backward compatibility for most legacy reading systems, this factor does not need to be a concern. EPUB 3 has been widely accepted in publication and ingestion sectors across the country, and there is no better time to adopt it in than now.

**Genres:** Applicable to all genres.

#### *4. Image Descriptions*

Including image descriptions is one of the most important steps a publisher can take to improve the accessibility of their ebooks, and is not so difficult to do. Alt-text (i.e., alternative text, the technical name for image descriptions) can be easily embedded in images in both Word and InDesign, and will then be exported when the file is converted to EPUB. However, obtaining and/or creating image descriptions is a challenging task for publishers, whether they want to write it themselves or request it from authors.

First, it takes time to learn how to describe different types of images to ensure the relevant information is conveyed via the alt-text. Most of the publishers we spoke with said that it would be better for their workflow if the authors provided image descriptions, as authors best know the image's purpose. Unfortunately, they also noted that many authors are not receptive to this kind of requests, and it is difficult to even obtain captions from authors, let alone more detailed descriptions. This would mean that the alt-text for image descriptions would also need to be copyedited, which could be done at the editorial stage.

Publishers are aware that when content is embedded in an image, it is not available to readers with visual impairments or to those who may need to adjust the presentation. Tables or text presented as images (including text on cover pages) cannot be read by a screen reader, leaving users unable to access all of the content in a manageable way.

Regardless of the source, all of the publishers were aware of the importance of image descriptions, and if they were not already including it, they commented that they would work toward this for all meaningful visual content.

**Best Practice:** Publishers should request image descriptions from the author, as they are closest to their content. Explain that these descriptions will be used to enhance the accessibility of their books, which will help them reach a larger audience. Refer them to NNELS' [Image Description Guide](#).

**Alternate Approach:** If publishers cannot obtain image descriptions from authors, determine who is the most suitable person to provide the alternative text descriptions for images or other graphics (e.g. the author, editor, illustrator) depending on the publisher size and the genre/type of books published, and provide them information on how to do this, as well as why it matters.

**Genres:** Applicable to all genres, and of particular importance for non-fiction and scholarly content used in educational settings, children's books and other heavily illustrated books, where the images are key to understanding the text.

#### *5. Structure & Navigation*

Perhaps the most commonly-neglected piece of the accessibility puzzle in the files we assessed was a lack of semantic structure. Assistive technology relies on semantic tags to relay different types of content. Almost every book we evaluated presented headings that were out of hierarchical order, did not tag headings at all, or wrapped content in generic containers. These oversights create an unpredictable reading experience, but represent one of the easiest things for content creators and producers to solve. Publishers were receptive to this feedback, and most made immediate changes to their workflow to begin correcting it in future titles.

In an ideal world, all structure would be added before a manuscript is even submitted. The author or content creator should ensure that the concepts included in the content are correctly nested within a coherent structure. Publishers could consider giving their authors some instructions about the importance of effective structure and how to follow in-house styles that may already be established. When used correctly, Word's built-in styles can be preserved when placing the text into InDesign, and then it is simply a matter of editing the paragraph styles to map to the correct HTML tags.

**Best Practice:** Revise guidelines for editors to convey the relevance of a sound structure with meaningful semantic tags and ensure designers preserve these elements.

**Genres:** Applicable to all genres

## *6. Headings*

Headings give structure to the content. Without them, assistive technology just sees a wall of text; screen readers cannot understand them as structural elements unless they are properly formatted. Every section in an EPUB file should start with a heading (including parts and chapters, as well as front and back matter like copyright pages, dedications, etc.). In this project, we found that some publishers did not employ a logical hierarchy, or used headings incorrectly. Correcting this is quite straightforward, and publishers were eager to address this key issue.

**Best Practice:** Ask authors to use Word's built in heading styles to create a document structure that can be preserved all the way through to ebook production.

**Alternate Approach:** Ask editors, or others who work on the book before the designer, to use Word's built in heading styles to create a document structure.

**Genres:** Applicable to all genres

## *7. Table of Contents*

Most reading applications have a Table of Contents feature, which allows readers to skip to different sections of the book. The list of readable sections is taken from the book's navigation file, and presented as a list to the reader. If some sections do not appear in the book's navigation file, it is difficult to find them. Failing to offer navigation to every section makes it extremely challenging to get a feel for how the book is laid out.

**Best Practice:** The best Table of Contents pages are created during the design stage, before the files are sent for EPUB conversion. Designers should ensure that items in the Table of Contents items link to their corresponding sections, in order to improve navigation within the ebook. Presenting the section links as a list is also a best practice, as screen readers will announce the number of items in a structured list, adding organization and predictability to your content.

**Genres:** Applicable to all genres

### *8. Tables as Images*

We learned from publishers that tables are often converted to images during the ebook production process; this is an issue as images are completely inaccessible to screen readers. Generally, if the table is more than four columns, then the conversion house/ebook producer will convert it into an image, because many device viewports are unable to accommodate wide tables, and setting it as an image allows the user to zoom in and out, and pan around on some devices.

**Best practice:** In order to be accessible, publishers can modify the table, or ask their conversion house/ebook producer for properly coded tables; adding an HTML table would be ideal. Another possibility would be adding a link to an HTML table elsewhere in the text, or perhaps even hosted on the website of the publisher or author, which would allow the user to navigate to the table and then return to the text.

**Genres:** Applicable to all genres, but particularly important for more complex and technical books, such as scholarly non-fiction.

### *9. Tables for Visual Presentation*

Sometimes, publishers use tables to achieve a desired visual layout, but the information in the table is not technically tabular data. It is difficult for screen readers to read the information in a table, and they should only be used in their intended way.

**Best Practice:** Only use tables for tabular data, and not for presentation of other content. Designers should use the formatting capabilities within their design program to achieve their desired visual presentation.

**Genres:** Applicable to all genres

### *10. Dropcaps*

We found that some publishers used “dropcaps”, where the first letter of a line is larger than the rest of the text. This visual element does not work well with screen readers, as it will read the dropcap separately from the rest of the sentence (e.g., if the word “The” uses a dropcap, the screen reader will voice it as “T” “he” which breaks up the narration). In addition, when the font is enlarged in some applications, the layout can become problematic: the dropcap becomes superimposed with the text.

**Best Practice:** Publishers should consider avoiding dropcaps in ebooks, or stop using them completely.

**Alternate Approach:** If it is within the skillset of the designer, there is a complex workaround. See under “General” in Appendix 1: Accessibility Features Checklist for more information.

**Genres:** Applicable to all genres

### *11. Emphasis*

Italics and bold styling can be added to text for multiple reasons, and it is important to distinguish between words that should be said with emphasis (i.e. in the sentence “I didn’t say that she stole the *money*”, the word money must be emphasized to convey meaning), and words that do not require emphasis (i.e., when italics are used to indicate a title or reference). While some publishers were aware that these should be treated differently, many were not.

This resulted in most conversion houses/ebook producers converting all italics and bold to <em> and <strong> tags (which causes words to be said with emphasis), and employing inline styling instead of <i> and <b> at all (which cause the words to only be distinguished visually). This is something that some publishers were remediating after the fact, which is time consuming and inefficient.

**Best Practice:** Publishers should ask authors to use the “emphasis” and “strong” styles in Word for text that needs to be read with emphasis, and “italic” and “bold” styles for words that do not require emphasis. If this is done at an early stage, this styling can be preserved from the Word file, all the way to the final EPUB.

**Alternate Approach:** If the author does not employ these styles, the editorial team could take this task on using Word. It could also be a task for the designer, working in InDesign.

If these styles are not applied correctly, it can be done at a remediation stage, once the EPUB has been created and sent to the publisher. This method is not ideal, as it is likely that emphasis will be missed on some words, and it is also time-consuming.

**Additional information:** To learn more about how to preserve styles all the way from Word to EPUB, NNELS has written a guide to [Working with InDesign](#)

**Genres:** Applicable to all genres

## 12. Metadata

Including accessibility metadata is key to describing the accessibility features of the book, and is indispensable to readers who are looking for specific features. Readers with print disabilities need to know before purchase – and even before publication – whether a particular ebook will meet their needs. Accessibility metadata can be inserted in the EPUB itself as well as added to the book's ONIX record. When distributed within the standard ONIX metadata, data aggregators, libraries and retailers can be aware of the level of accessibility of a particular ebook before the title itself is available, and can present this information to potential purchasers and readers within their catalogue. It's another great way to advertise a book's accessibility - while promoting it to a wider audience in the process.

Our assessments of EPUB files and our conversations with publishers suggest that creating accessibility metadata is challenging. A lot of the technical documents available are unnecessarily complicated, and it is hard for publishers to determine what should and should not be included. Of the publishers who participated in this study, some had even added metadata properties to their files that did not accurately reflect the accessibility features within the book. At NNELS, we are developing a simplified guide about accessibility metadata which will give an overview of the tags and what they mean. It can be found on [AccessiblePublishing.ca: A Simplified Guide to Accessibility Metadata](#)

**Best Practice:** A set of accessibility metadata should be created by the publisher, as they are the most familiar with their content, and this metadata should be shared with the conversion house/ebook producer. The publisher can request that the accessibility metadata be included in the OPF file (a fundamental EPUB file in XML that holds the metadata, manifest, and reading order of the ebook). This metadata can also be included in the ONIX file.

**Alternate Approach:** If it is a service that the publisher’s conversion house /ebook producer offers, publishers can ask them to create and include accessibility metadata. If it is not a current service, it would be an important discussion for the publisher and ebook producer to have.

**Genres:** Applicable to all genres

### *13. Language*

Screen readers can use language tags to specify the pronunciation of words with an applicable accent. The dominant language(s) of the book should be specified in its metadata, and the primary language of each chapter should be set in its head.

We found that publishers did not always note the language in the book’s metadata, or if they did, they did not also note the language in each chapter.

**Best Practice:** The designer should note the language of the book in both the metadata and the head for each chapter, or work with their conversion house/ebook producer to ensure these elements. Additionally, phrases that appear throughout the book in a different language should be tagged separately. This avoids a synthetic voice trying to pronounce foreign language words with an English lexicon.

**Genres:** Applicable to all genres

### *14. Page numbering/Page list*

Research material benefits strongly from page numbers. However, we found that every producer neglected at least one aspect of accessible page breaks. A structured page list should be included in both navigation files, so all devices can navigate by page. This is especially important to readers who need to know specific page numbers, such as students or researchers who need to cite their sources, or people in book clubs who refer to a specific page numbers as part of their discussion.

**Best Practice:** Use page numbers when there is a print equivalent of the ebook, to ensure that all readers have access to this information. The designer should clearly mark print page numbers, and the conversion house/ebook producer should undertake the page list.

**Additional Information:** When there is a print-equivalent book it is also important to include the ISBN of the source of the page numbers in the package metadata for the EPUB as well as in the page list in the navigation document. For more information about how to do this, see “Non-fiction Material” in Appendix 1: Accessibility Features Checklist.

**Genres:** Applicable to all genres, but particularly important for more complex and technical books, such as scholarly non-fiction.

### *15. Footnotes*

Each footnote in an ebook should be set up with an internal hyperlink, so the reader can jump to the Notes section simply by clicking the appropriate number from the main text. After reading the note, a link back to the point of reading should also be provided. If the reading application does not have the ability to return to the place of reading on the previous page, the reader is left stranded at the end of

the chapter or book. This is an important feature for all readers, not only screen reader users and readers with print disabilities.

In this project, we were pleased to see that every publisher who used footnotes was already using linked footnotes and endnotes, and had links which returned the reader to the main text.

**Best Practice:** Ask authors to use Word’s built in references feature to create linked footnotes or endnotes; this document structure can be preserved all the way through to ebook production.

Alternate Approach: Ask the book designers to always insert linked footnotes and endnotes using InDesign.

**Genres:** Applicable to all genres which use footnotes and endnotes.

### *16. XML-first Workflow*

None of the publishers we worked with for this project have an XML-first workflow. This change would mean a large overhaul of the book production process for most publishers; this would be resource-intensive, time-consuming, and somewhat complex, requiring time and training. But, publishers who choose to explore this path will find that their ebook production process becomes more streamlined, and their ebooks are more sophisticated and require less remediation. We include it here to bring awareness to this option.

**Best Practice:** An “XML-first” workflow would be the best way forward for digital content creation when it comes to non-fiction books, particularly for academic or highly specialized content. A master XML file with structure and content can be used to feed any number of different appearances and delivery formats. HTML5, with additional semantics, such as those provided in EPUB 3 may be a practical approach to introducing an XML workflow. The advantage of this is that this type of workflow builds in all the accessibility features at the start, making this workflow truly accessible-by design.

**Genres:** Applicable to all genres, but particularly important for more complex and technical books, such as scholarly non-fiction.

### *17. Testing and Quality Assurance*

**Best Practice:** Publishers should expand the testing of their finished EPUB files to include testing for accessibility, if they are not already. This means using the Ace checker, as well as loading their book into an app on a mobile device and using a screen reader, which is how many readers with print disabilities read books. They could do this in-house, or hire accessibility testers (i.e., people who are: experts in using assistive technologies, trained in evaluating for accessibility, and users of alternative formats/people with print disabilities).

**Additional Information:** For guidance on testing with a screen reader, see Appendix 2.

Regardless of factors such as the intended audience and publication purpose (e.g. leisure, general information, academic research), all elements within a source file need to be marked-up so that all readers are given the same opportunity to perceive and understand the content. In order to achieve full accessibility, publishers will need to use different techniques depending on the type of elements in the source file.

**Genres:** Applicable to all genres.

### *Final Thoughts on Best Practices*

There are many features that can be included in EPUB 3 files which will not only enhance the accessibility of ebooks, but will also ensure that the digital content is sophisticated and robust. It is important to learn what these features are, how to implement them, and who should be responsible for doing the work. All those involved in the production process, both in-house staff and contractors, need to be aware of accessibility standards and recommendations; everyone has a part to play in making accessibility “business as usual”. As accessible and inclusive workflows and products become more commonplace, publishers will need to develop internal documentation and organizational accessibility standards.

Choosing the right tools and programs, and knowing how to use them is also key, as is being fully aware of the potential costs involved in accessible publishing. And, of course, people are always a precious resource; publishers should consider how to involve contributors at each stage of the publishing process—authors, editors, designers, typesetters, proofreaders, indexers and other external contributors. Each has a part to play to ensure the final source files are capable of generating accessible formats.

It will take time to implement all of the available accessibility features into a publisher’s workflow, but making one or two small changes regularly will make a big difference over time. Accessible publishing isn't just up to the publisher. Ideally, it will start with the author, editorial and in-house design team, and be refined by the conversion house/ebook producer. When everyone is on-board, the process of creating accessible ebooks becomes much easier.

### **Working with Conversion Houses and Ebook Producers**

Third-party producers are often the ones who decide the best way to convert a book to an ebook. In some cases, publishers send specific instructions to their conversion houses/ebook producers regarding things like structure, images, and/or elements of the design that they would like to preserve. This is especially true for publishers who already have knowledge about accessibility issues.

We learned that at least half of the publishers that outsource production do not request specific accessibility features and that in most cases, the layout the publisher provides is designed for print, and this print-ready file is not always ready for producing a distinct, well-formatted ebook. Some publishers used the feedback we provided on their files to make a list of changes they want to see from the conversion houses/ebook producers going forward.

When it comes to how responsive conversion houses/ebook producers are to implementing new requests, it is dependent on the relationship with the publisher. The type of changes requested can also depend on the type of producer creating the EPUB files. Those publishers who have a more established relationship with their producer usually have strong communication channels, and can easily request changes and have a back-and-forth with someone who is knowledgeable about the ebook production process. In one case, the conversion house and the publisher worked together to create a new checklist of accessibility features, as the publisher wanted to make sure that nothing was missed. Conversely, some publishers use a company where they do not necessarily communicate directly with the individual doing the conversion, and they have less of a chance to discuss and check on specific features, although they can always make requests. Regardless, an important factor in the discussion is the publisher’s own technical knowledge and ability. The following section “Communicating with Conversion Houses” offers guidance that will help publishers in their conversations with conversion houses.

During this project, we provided feedback to the conversion house that produced the ebook of one of the French publishers (with their permission), and they were eager to receive our accessibility report and learn all they could. It was clear that they were interested in improving the accessibility of their ebooks, and were receptive to all of our recommendations.

Overall, while many of the participating publishers had lots of informal back and forth with their conversion houses and ebook producers during this process, it remains to be seen to what extent the conversion houses will add new features more broadly.

### *The Price of Accessibility*

Some publishers said that minor changes to improve the accessibility of their files have not incurred additional charges from conversion houses. For example, conversion houses were responsive to adding alt-text to images or including an NCX file (a navigation file which ensures the backwards-compatibility of EPUB 3 files with older devices) at no additional cost.

For accessibility features that are more time consuming (such as document titles, page lists, or accessibility metadata), publishers were unsure whether the conversion houses would charge additional costs.

Some conversion houses generally quote their prices after seeing the type of work required to create a specific ebook, including number of images, file structure, etc., while others (including larger companies like Amnet and the [Canadian Electronic Library](#)) have set fees per page. Fees increase with the complexity of the content, as well as the requested file types, additional accessibility features, and the source file type.

In Canada, as well as internationally, there is a growing awareness about accessible publishing, and accessibility and inclusion in general. In the area of ebook production, this means that more and more publishers are asking for accessibility features, and more and more conversion houses are having to meet these new expectations. In some cases, for some features, raised prices may be inevitable, but these companies and freelancers will also want to remain competitive, so it is likely that they will try to minimize cost increases. One feature that would necessarily result in an increased cost is the provision of image descriptions (alt-text). While it does not cost more to embed the alt-text into the file, if the conversion house needs to write it themselves, it will charge a fee per image description, ranging from \$2 for very simple images, to about \$30 for very complex image descriptions.

The conversion house we worked with in this project said that they were actively discussing and working towards making decisions on how best to proceed with adding additional accessibility features to books. They noted that while they would certainly prefer not to raise costs, it might be necessary in some cases, such as for writing image descriptions.

Some conversion houses/ebook producers are cognizant that certain accessibility features improve the reading experience for all users, such as detailed tables of content linking to the corresponding headings within the ebook. Arguments can be made that many “accessibility features” should actually be standard features for ebooks, and some conversion houses may factor this into their decision making.

One publisher involved in this project was exploring bringing ebook production in-house, as they had people with the skill and ability to do this. An in-house approach to ebook conversion is only sustainable if a publisher invests in training for themselves or keeps in contact with a freelancer capable of doing the

work. Whether or not this would be a money-saving move would be very dependent on a number of factors, such as how many books the publisher produces, and if they can identify the right person for the task.

Whether a publisher chooses to use a large company, freelance to an individual, or bring ebook production in-house, it is likely that there would be an increase in costs, but it may not be an unmanageable amount. In addition, there are many things a publisher can do during the editorial and design process to ensure that their source files are designed with accessibility in mind, which will ensure that the resulting ebook has improved accessibility, even if there are limited changes or requests made to the conversion house.

The changes that are made to a workflow in order to produce files with accessible features should be thought of as an investment that will save publishers money in the long run. When files are designed with accessibility in mind from the start, there is no cost for remediation later on.

### **Communicating with Conversion Houses**

In order to be sustainable, born accessible publishing needs to involve the whole team. Everyone has a crucial role to play, and the conversion house is no exception. No matter how accessible the book is, there are some final features that can only be added to the EPUB after conversion.

Below, we have included an accessibility checklist for conversion houses as well as list of questions that publishers can ask to assess their accessibility readiness.

#### *Accessibility Checklist for Conversion Houses*

The below elements are great things to request for publishers' EPUB files. They make it clear what you want, and ensure everyone is working toward the same goal.

Each item in this checklist links to a Best Practice recommendation in "[Accessible Publishing Best Practices: Guidelines for Common EPUB Issues in Plain Language](#)", a document that the NNELS team wrote in 2019. The Best Practices offer guidance on how to achieve these recommendations, as well as provide explanations on their importance.

<b>Recommendation</b>	<b>More Information</b>
Make the text reflowable	<a href="https://www.accessiblepublishing.ca/accessible-publishing-best-practices/#reflowable">https://www.accessiblepublishing.ca/accessible-publishing-best-practices/#reflowable</a>
Include image descriptions	<a href="https://www.accessiblepublishing.ca/accessible-publishing-best-practices/#images-alt-text">https://www.accessiblepublishing.ca/accessible-publishing-best-practices/#images-alt-text</a>
Attach semantic tags to all headings	<a href="https://www.accessiblepublishing.ca/accessible-publishing-best-practices/#structure">https://www.accessiblepublishing.ca/accessible-publishing-best-practices/#structure</a>
Use a single heading for each section	<a href="https://www.accessiblepublishing.ca/accessible-publishing-best-practices/#single-headings">https://www.accessiblepublishing.ca/accessible-publishing-best-practices/#single-headings</a>

Reference all sections in navigation files	<a href="https://www.accessiblepublishing.ca/accessible-publishing-best-practices/#comprehensive-ToC">https://www.accessiblepublishing.ca/accessible-publishing-best-practices/#comprehensive-ToC</a>
Add return-to-text links to footnotes and endnotes	<a href="https://www.accessiblepublishing.ca/accessible-publishing-best-practices/#notes-return">https://www.accessiblepublishing.ca/accessible-publishing-best-practices/#notes-return</a>
Set the Table of Contents up as a list, with active links to each entry	<a href="https://www.accessiblepublishing.ca/accessible-publishing-best-practices/#ToC-linking">https://www.accessiblepublishing.ca/accessible-publishing-best-practices/#ToC-linking</a>
Attach an ARIA role of presentation to decorative images	<a href="https://www.accessiblepublishing.ca/accessible-publishing-best-practices/#ARIA-roles">https://www.accessiblepublishing.ca/accessible-publishing-best-practices/#ARIA-roles</a>
Set the title page as text	<a href="https://www.accessiblepublishing.ca/accessible-publishing-best-practices/#images-title-pages">https://www.accessiblepublishing.ca/accessible-publishing-best-practices/#images-title-pages</a>
Set column titles up as table headers	<a href="https://www.accessiblepublishing.ca/accessible-publishing-best-practices/#tables-columns">https://www.accessiblepublishing.ca/accessible-publishing-best-practices/#tables-columns</a>
Attach ARIA roles and labels to page numbers	<a href="https://www.accessiblepublishing.ca/accessible-publishing-best-practices/#ARIA-roles">https://www.accessiblepublishing.ca/accessible-publishing-best-practices/#ARIA-roles</a>
Correctly emphasize text	<a href="https://www.accessiblepublishing.ca/accessible-publishing-best-practices/#emphasis-strong">https://www.accessiblepublishing.ca/accessible-publishing-best-practices/#emphasis-strong</a>
Publish in EPUB 3	<a href="https://www.accessiblepublishing.ca/accessible-publishing-best-practices/#choosing-EPUB3">https://www.accessiblepublishing.ca/accessible-publishing-best-practices/#choosing-EPUB3</a>
Employ a sound semantic structure	<a href="https://www.accessiblepublishing.ca/accessible-publishing-best-practices/#structure">https://www.accessiblepublishing.ca/accessible-publishing-best-practices/#structure</a>
Include accessibility metadata	<a href="https://www.accessiblepublishing.ca/accessible-publishing-best-practices/#metadata">https://www.accessiblepublishing.ca/accessible-publishing-best-practices/#metadata</a>
Revise document titles to accurately describe their content	<a href="https://www.accessiblepublishing.ca/accessible-publishing-best-practices/#HTML-document-titles">https://www.accessiblepublishing.ca/accessible-publishing-best-practices/#HTML-document-titles</a>

### *Questions for Conversion House to Assess Accessibility Practices*

Here are some questions publishers can ask to get an idea of their producer's current accessibility practices. Their answers should give publishers a better understanding of what they know about accessibility, and have the capacity to implement.

<b>Topic Area</b>	<b>Questions</b>
General	In general, what accessibility features do you include in your books? Do you produce ebooks in version EPUB 3? Do you produce reflowable ebooks?
Testing	Do you run accessibility checks on the files you produce? For example, do you do any manual checks for accessibility, or use Ace by DAISY?

Images	<p>Do you add alt-text to images?</p> <p>Do you attach an ARIA role of presentation to decorative images?</p> <p>Do you wrap figures in figure classes rather than wrapping them in div containers? Using figure and figcaption classes allows the image and caption to be linked, which improves accessibility.</p>
Metadata	<p>Do you add accessibility metadata to the OPF files of the EPUBs you produce?</p> <p>Do you create a specific set of metadata for each book that you produce?</p> <p>If we (the publisher) provided you with a set of metadata for the book, could you include it in the OPF file?</p>
Titles	<p>Do you amend the title tag of each document in the EPUB so that it carries the name of that section, not the filename or title of the book?</p>
Headings	<p>Do you denote the headings at the start of sections with the semantic tags of &lt;h1&gt;, &lt;h2&gt;, etc?</p> <p>Do you use a single heading for each section, so that the chapter number and title are encased in a single heading?</p>
Navigation	<p>Do you reference every section in the navigation files, including front matter like the title page?</p>
Style	<p>Do you use semantic tags for style, such as &lt;i&gt; for italic and &lt;b&gt; for emphasis?</p> <p>Do you differentiate between italic &lt;i&gt; and emphasis &lt;em&gt;, and bold &lt;b&gt; and strong &lt;strong&gt;?</p>
Table of Contents	<p>Do you add an internal table of contents to the book in a place that we specify (i.e., after the copyright page)?</p> <p>Do you set the items in the table of contents up in a list, with active links to each section?</p>
Semantic Structure	<p>Do you use semantic tags to uniquely identify content like sidebars, blockquotes, and citations?</p>
Tables	<p>Do you build a header section for every table, with column titles encased in tags?</p> <p>If a large table needs to be set as an image, do you link out to an accessible edition of the table?</p>
Page List	<p>Do you use a structured page list for our navigation files?</p> <p>Do you include ARIA roles and labels in each page break to indicate the page number for assistive technology?</p>
Notes	<p>Do you design footnotes and endnotes so that they can be read by simply clicking the number in the text?</p> <p>Do you use a "Return to Text" link for each note, so readers can find their place back into the main narrative?</p>
Title Page	<p>Do you retain the normal appearance of our title page without setting it as an image?</p>

## Areas of Future Research & Work

Working closely with publishers allowed us to identify a number of areas which would either benefit from more in-depth research and study, or would be a valuable resource for publishers. There are many aspects of accessible publishing which are straightforward and easily implemented, but there is also a wealth of areas that would benefit from further research and the creation of guiding documents.

- The costs, knowledge, and capabilities of conversion houses/independent ebook producers
- How to improve the accessibility of more complex genres, and genres that rely on fixed layout formats (i.e., children's books, comics and graphic novels, poetry, and other heavily illustrated books)
- The issues presented by the inconsistencies and differences among retailers (e.g., audio issues with Apple; highlighting issues with Kobo).
- Further research needs to be done in relation to vendors and distributors, and how they use (or don't use) accessibility metadata.
- Research on image descriptions, and the creation of a detailed guide to description for publishers, authors, and conversion houses/ebook producers.
- In-depth research and the creation of guidance for publishers on developing an XML-first workflow.
- Media-overlays (synchronized text and recorded audio) are a great accessibility feature offered in the EPUB 3 format. Further research is required to develop guidance for authors on implementing it successfully.

Finally, many publishers expressed their desire for an advisory service that they could turn to for specific questions, as well as request on-demand file assessment/evaluation. They agreed that participating in this project was incredibly valuable because of the individualized advice, and would appreciate the continuation of similar service.

## Communication & Dissemination of Results

The information produced throughout this project will be of great benefit to the Canadian publishing sector as it works to improve and increase the accessibility of published works. In order to share the relevant results as widely as possible, the following steps will be taken.

First, the project report and appendices will be shared with eBOUND and ANEL. With this information, they will be able to develop their understanding of the ways that accessibility can be incorporated into the workflow, and be able to better support the needs of their publishers.

The next step will be to share the documentation (in the Appendices and Further Reading Section) developed over the course of this project directly with the publishers who participated.

Finally, the project coordinators will be creating a presentation about the project with [BookNet](#), to be posted as a part of their online series which is replacing the 2020 TechForum, where they were originally scheduled to give a presentation on what has been learned in this project. Also, information in the report including the appendices and related documents will be posted publicly on [AccessiblePublishing.ca](#).

## Conclusion

When content is created with accessibility in mind, it becomes an organic part of the process, increasing efficiency and providing a great experience for everyone, while avoiding the cost of remediating for accessibility after production. Publishers need to make sure that accessibility is embedded in their workflow.

The potential market for accessible content will only continue to grow, as the population ages and develops age-related conditions that may impact their ability to read conventional print books. It makes great business sense to make the most of this market. Furthermore, sales can also depend on whether content is accessible: increasingly, institutions such as colleges and universities are required to give purchasing preference to content that is accessible.

Producing ebooks that are designed with accessibility in mind and are born accessible not only means that users of all abilities can enjoy them, it also means that those ebooks are more accessible and easier to use for everyone, regardless of whether or not they have a disability.

## About NNELS

The National Network for Equitable Library Service (NNELS) is a digital public library of books for people with print disabilities in Canada, and an advocate for an accessible and equitable reading ecosystem for all people in Canada. The goals of NNELS are to build capacity and employment opportunities for people with print disabilities, to advance the agenda of born accessible publishing, and to develop and maintain a digital repository of accessible books for people with print disabilities in Canada, delivered through the network of public libraries in Canada. NNELS is hosted by the BC Libraries Cooperative, a community service not-for-profit cooperative and a national leader in information and technology services.

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-from the NNELS Team, National Network for Equitable Library Service

- Leah Brochu, Accessible Publishing Coordinator
- Danny Faris, Accessibility Tester
- Daniella Levy-Pinto, Accessibility Testing and Consulting Coordinator

## Further Reading

The NNELS accessibility testers have created the following resources to help publishers and ebook producers improve the accessibility of their book:

- [Accessible Publishing Best Practices: Guidelines for Common EPUB Issues in Plain Language](#)
- [EPUB Semantic & ARIA Roles](#)
- [Evaluating Your EPUB's Accessibility](#)

- [A Guide to Image Description](#)
- [A Simplified Guide to Accessibility Metadata](#)
- [Working with InDesign](#)
- [A Crash Course in EPUB Accessibility \(YouTube video series\)](#)

There are also many other helpful guides and resources that have been developed by other organizations and individuals:

- [Australian Inclusive Publishing Initiative: Inclusive Publishing in Australia : An Introductory Guide \(2019\)](#)
- [EPUB Accessibility Using InDesign with Laura Brady \(a Lynda.com course\) \(2018\)](#)
- [The Book Industry Study Group: Quick Start Guide to Accessible Publishing \(2013\)](#)
- [Accessible EPUB 3 by Matt Garish \(2013\)](#)
- [Accessible Books Consortium: Accessible Publishing Best Practice Guidelines for Publishers \(2011\)](#)

## Appendices

### Appendix 1: Accessibility Features Checklist

The following section includes sets of detailed recommendations which contains a non-exhaustive list of accessibility features that can be included in ebooks. It builds on an earlier Best Practices document written by the NNELS team, which continues to be expanded. Wherever possible, the recommendations below are linked to their corresponding section in that document: [Accessible Publishing Best Practices: Guidelines for Common EPUB Issues in Plain Language](#).

Note: Items in the below checklists are ranked by importance. The first section includes recommendations that will be helpful to publishers of all genres, and there is additional information for publishers of non-fiction material and children's books, and a brief discussion for publishers of poetry.

#### *General*

The following guidelines apply to all electronic publications. This general list lays the foundation for a well-designed ebook, relevant for all genres and publishers. If a publisher follows these recommendations, they will be able to create an almost perfect ebook for a simple format like a novel.

1. [Choose reflowable format](#). Fixed layout books are challenging to navigate, difficult to understand and impossible to customize. This creates an enormous barrier for all readers with print disabilities.
2. [Describe and mark-up images](#). Alternative text tells readers with print disabilities what is happening in a photo or figure. Without sufficient descriptions, those who cannot see pictures will have no access to their content. It is recommended to use extended descriptions for complex images such as graphs. Mark decorative images with the presentation role, so assistive technology can skip over them.
3. [Use text](#). It may be tempting to set the title page (or a complex table) up as an image, but we strongly recommend never setting text as an image, in all cases. Even well-described images are less accessible than text.
4. [Include headings](#). Every section title in the book should be set up as a heading, including sections in the front and back matter. Headings tell readers that a new section has begun, and specify its title. Headings also provide valuable navigation points for non-traditional readers. For this reason, only use headings at the start of a section, never just for style.
5. [Cascade headings](#). Heading levels should be used to indicate the importance of a section. The titles of top-level sections should be assigned a level-one heading. Content under a main section should be introduced with a level-two heading, and child sections should be headed with a level-three heading. This brings clarity to the structure of a book, making it clear where the user is in the reading order. Also, take care to use only one heading per section, encasing the chapter number and title in a single set of heading tags for example.
6. [Link to all sections from the table of contents](#). Reading systems use the book's navigation file to move efficiently through the content. Sections that are excluded from the navigation file, therefore, are difficult or impossible to access. The goal is to link to every section in the book - even front and back matter - so it can be easily navigated from cover to cover. A sound heading structure will assist a reader greatly.
7. [Include a Table of Contents](#). Readers use a Table of Contents to familiarize themselves with the content of a book. It is thus really valuable to include a table of contents somewhere in the front matter. This page should be set up as a list, with active links to each section.

8. [Emphasize text properly](#). The tags that are present within the ebook offer semantic meaning to assistive technology. As a result, it's important to mark words that should be vocally emphasized, so synthesizers can pick up on this inflection. It is important to ensure that emphasis is only placed on such passages, and not just on all italicized words. This is a job for the author and editor, but care must be taken to preserve (and not change) these valuable tags throughout design and conversion to EPUB. If you work with InDesign, learn more about how to do this here: [Working with InDesign](#).
9. [Avoid dropcaps](#). Whenever a screen reader encounters a change in text style, it treats it as a new sentence. A dropcap on the word "the", therefore, causes it to be read as "t he". Use a different presentation layout than dropcaps.
10. Use title case instead of all caps. Because text-to-speech engines are trained to spell out acronyms, many systems will spell out all uppercase words, one letter at a time. This is frustrating to listen to and makes the text extremely difficult to comprehend when the first line or sentence of a chapter appears in all caps. As a good rule of thumb, uppercase words should be avoided entirely. Important words in titles should only have the first letter capitalized. Accurate, semantic tags for emphasis and italics should be employed to offset important phrases.
11. [Publish in EPUB 3](#). Because EPUB is based on the language of the web (HTML 5), it is more accessible than any other format. The very best experience comes from the latest version of the specification as it includes rich navigation, presentation and accessibility features. EPUB 3 files are widely accepted, and are far more scalable than their version 2 predecessors.
12. [Include accessibility metadata](#). Metadata can tell potential buyers and readers what accessibility features the book offers. These features range from basic text access to full semantic markup and described images. For help on getting started or improving your accessibility metadata, visit [NNELS' Simplified Guide to Accessibility Metadata](#).
13. Title the documents. Some e-readers will announce a document's title when a new section is opened, or on command as a kind of "Where am I" feature. As such, the title tag should always hold the name of the chapter or section contained in that document. Ensure this tag is set to announce helpful, accurate information to readers, to distinguish it from other documents in the book. Usually, the text found in the first heading of each section works nicely here.

### *Non-Fiction Material*

In addition to the General features noted previously, there are several elements designed specifically for research books and other non-fiction material. This is especially true for books that have endnotes, footnotes, bibliographies etc. Try to include as many features as possible.

1. [Link notes](#). Ebooks have many different ways of navigating content, and notes are a great example. Footnote and endnote numbers should be clickable, and each note should have a link to return to the text. This lets readers seamlessly peruse the notes in the book, without fear of losing their place in the chapter.
2. [Label table columns](#). As readers move through a table with assistive technology, they hear the title of the current column, followed by the information in that cell. This is made possible through table headings - column titles that appear in the top row of the table. Please title the columns of your tables, and mark them up as table headers so assistive technology can use them.
3. [Caption links](#). Hyperlinks harness the full power of electronic publishing, as they allow readers to effortlessly jump to different areas of interest. The text of such a link, however, is crucial to informing non-visual readers of its purpose. When a link is highlighted through assistive

technology, only its text is spoken. For this reason, it's important to caption links with the title of the document it points to. Also, set web addresses up as active links, wherever possible, to make them easier to find and activate.

4. [Include a page-list](#). A page-list allows readers to offer page navigation to their users, relying on anchors throughout the text to jump effortlessly to any page in the book. This layer of navigation makes it easy to find your place in a lengthy textbook or manual. If page numbers are derived from the print edition, don't forget to specify the print ISBN in the ebook's metadata, and refine that tag to confirm it was the source of the page correlation.
5. [Tag page numbers](#). Assistive technology can announce page numbers as it reads the text, and speak the current page number when asked. This is made possible through the use of ARIA roles. Add a role of doc-pagebreak to your page breaks, and title them with the number of the current page.
6. [Use semantic elements](#). Assistive technology relies on semantic tags to render your content properly. Specific tags exist for things like figures, sidebars, captions, and citations. Using these tags will take care of the heavy lifting on the design side of things, while providing valuable context, navigation and structure to assistive technology. From there, even greater meaning can be implied with epub:type semantics and ARIA roles.

### *Children's Books*

Books for very young readers are often heavily image-based, with specific spots in the text where pictures are designed to go. In order to match the printed edition, these ebooks usually require a fixed layout style. Fixed layout content poses numerous challenges to assistive technology, but there are some things you can do to minimize the disruption.

1. [Set the position of phrases \(instead of individual words\) wherever possible](#). Never set positioning on parts of a word, and include punctuation within the word boundary. This helps minimize broken words and lengthy pauses in the narration.
2. [Pay close attention to navigation points and the page list](#). Fixed layout content frequently neglects these key areas, making the book even more challenging to read.
3. **Consider including an audio overlay with the book**. Media overlays allow publishers to bundle an audiobook edition with the text portion, and even synchronize the text with each sentence of narration. This gives non-traditional readers an accessible alternative to a book that may not work well with their assistive technology.

### *Poetry*

Artistic expression is limited only by a poet's imagination. And where the predictably-rhyming style of Robert Service told a story in verse, modern poets have expanded their style to go well beyond the printed word. Some books anchor the first line as a title. Other works use complex spacing, line justification, and concrete poetry to increase their impact. These are sizable considerations that will require more research and in-depth study. We hope to tackle these issues in future projects.

For now, please implement as many of our general guidelines as you can. Use semantic styles like sections, horizontal rules, and sidebars to add separation to your content. Employ headings at the beginning of sections, and at the top of each poem wherever possible. In order to continue to improve the accessibility of poetry books, further research is required for this genre.

## **Appendix 2: Testing EPUB files' Accessibility using a screen reader**

Below are some features that enhance accessibility in EPUB files, and instructions to check for them using a screen reader in a mobile device.

For these tests, it is simpler to use the built-in screen reader on a mobile device (VoiceOver in iOS, TalkBack in Android), as they are easier to use than the screen readers for desktop computers.

To start the screen reader:

- iOS device: tap Settings, then General, then Accessibility. Select VoiceOver, and turn the toggle switch on. For more information on doing accessibility testing using VoiceOver (including a list of gestures for all core functions) see this guide from WebAIM: [Using VoiceOver to Evaluate Web Accessibility](#). For additional reference, see this [complete list of VoiceOver gestures from Apple](#).
- Android: Tap Settings, then Accessibility. Select TalkBack, and turn the switch on. For more information on doing accessibility testing using TalkBack (including a list of gestures for all core functions) we recommend this Android Accessibility guide from Google Support: [Use TalkBack Gestures](#).

Note: these accessibility features allow touch-screen exploration, and the device will behave differently when they are enabled.

Install the Bookshelf application from Vital Source. This is a free app that offers a stable, reliable interface. It is available on iOS and Android, has a read-aloud feature, and does a good job of correctly identifying different parts of the book.

Load the book into the Bookshelf app, either by browsing for it on the device's built-in storage, or exporting it right from Dropbox. For more detailed instructions on opening a book with Bookshelf, check out VitalSource's page on [Sideloaded EPUBs with Bookshelf](#) (with instructions for macOS, Windows, Android, and iOS.)

### *Fixed Layout*

Open the book in the Bookshelf app in and enable the screen reader.

Press Listen. Titles produced in a fixed layout style are usually read one word at a time. If the text is narrated smoothly, the test passes.

### *Images*

Find a page in the book that contains an image, and tap the Listen button. When narration arrives at the image, it will speak the alternative text that was provided for it. If the screen reader speaks the filename of the JPEG, or just says "image" or "graphic" this test fails. If the image has useful alt-text and the screen reader reads it out, the test passes.

### *Headings*

Flip to the start of a section in Bookshelf, turn on the screen reader, and tap a heading. The section title should be announced, followed by "**Heading Level #.**"

### *Table of Contents*

With the book open in Bookshelf, turn to the contents page. Activate the screen reader and tap the last item on the page. The screen reader should speak the name of the section being announced. The word

"Link" should then be spoken, to indicate that the item can be easily selected and activated. Finally, the screen reader should indicate whether the items in this section are classed as a structured list. VoiceOver will say "List end," and TalkBack should say "In list, [#] items." If it is not possible to click links.

### *Notes*

Turn to a page that contains a footnote or endnote, and tap its reference number. This should activate a link to that particular note. There should also be a "Return to Text" link that the screen reader should announce once it has completed reading the note in the notes section. If both these links are present and functioning, this test passes.

### *Tables*

If the book contains tables, they should make sense to readers who cannot see them; headings and cells need to be properly marked up

In Bookshelf, find a table in the book, turn the screen reader on, and tap a cell in the table. The screen reader should speak the title of the column, followed by the text in the cell. An announcement will usually follow to give the cell's position in the table. For example, feedback of "City, Vancouver, row 1 column 1" is typical. If the screen reader does not say anything about the column's title, the headings in the table are likely not set up properly, so this test fails.

### *Links*

Look for a link in the book and read its text with the screen reader by focusing on it, without looking at the surrounding narrative. Captions that simply say "Here" or "Go" are not helpful, as they do not explain the destination of the link. Also, if the screen reader speaks only the full URL, then this test fails. As long as the caption makes sense on its own (such as "Visit the [Author's Home Page](#)" or "Click here for [Further Resources](#)"), this test passes.

### *Semantic Structure*

Readers who cannot see visual elements (e.g. horizontal lines that separate small sections, sidebars that provide additional information) rely on their screen reader to indicate different elements. If a sound semantic structure is used throughout the book, they can provide this feedback and indicate these different elements.

To test this, with the EPUB file open in Bookshelf, tapping a horizontal line should cause the screen reader to announce "Separator." In a sidebar, the screen-reader should read its text, followed by the word "Complementary." And touching an image will cause its alternative text to be spoken. If the book has any of these elements and they are well-described by the screen reader, this test passes.

### *Final Thoughts*

The above tests provide a valuable benchmark for how a user relying on a screen reader may have access to those elements in an EPUB file. For a full picture of a file's accessibility, however, publishers should consider hiring a trained accessibility tester.

For more information on how to address these issues, see the following resources:

- [Accessible Publishing Best Practices: Guidelines for Common EPUB Issues in Plain Language](#)
- [A Crash Course in EPUB Accessibility](#)