PDF Accessibility: Considerations and Best Practices for Learning Objects and Other Library Materials

UNIVERSITY OF WATERLOO

Accessibility is vast, covering distinct disabilities like cognitive, vision, mobility, hearing, and neurological. The University of Waterloo (UW) Library Instructional Design (ID) team devised successful accessibility workflows and PDF tagging practices to assure a Universal Design for Learning (UDL) that enacts enhanced accessibility for diverse accessibility needs.

Our ID Team and Governing Bodies

The UW Library ID team consists of two permanent staff and one co-op student on a termly rotational basis. Additional co-op students from other departments work in ID part-time every term. The Accessibility for Ontarians with Disabilities Act (AODA) governs our work. AODA draws heavily from Web Content Accessibility Guidelines (WCAG 2.0) as well as UDL principles.

Our Workflow

PDFs require remediation, especially in the form of tagging, to be transformed into an accessible instructional format. The ID team has created and remediated hundreds of PDF resources for accessibility compliance using Adobe Acrobat Pro in a three-step process for maximum efficiency.

Step 1: Training
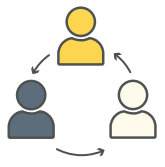
We train the co-op students on how to tag PDFs every term. We have identified facets of PDF tagging and created targeted training supports for these elements. Various in-house developed training resources are used:
- OER modules like Tagging PDFs for Accessibility & Universal Design for Learning hosted on our Online Learning Objects Repository (OLOR).
- Videos with steps on how it's done demonstrated and explained.
- Samples of correctly tagged PDFs for a comparison reference.
- The Ongoing Co-op Learning Document is a collective work of co-op students' accessibility learnings to share with the team preserving our knowledge and addressing the high turnover rate of co-op student team members.

Step 2: Tagging

Co-op students perform direct PDF tagging. After tagging is done, they run the PDFs through the NVDA screen reader to ensure that the accessibility standards are met.

Step 3: Auditing

Experts in identifying tagging issues, the full-time ID staff, review the PDF's manually to ensure they accurately match the document and are structured correctly. They check the reading order, heading levels, paragraphs, sections, lists, tables, images, alt-text, other page elements, along with other additional information. This final step is also an opportunity to provide feedback and coaching to our co-op students. Ultimately, the PDF is considered fully accessible and ready for publication only when all these steps have been completed.

Our Best Practices in Tagging PDFs

Proper tagging is not done automatically; it needs manual labor. From the beginning of a project, we design content that is geared towards accessible reading.

Our Core Tagging Elements

Reading Order
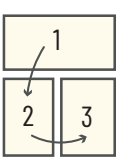
We start with this element and align it with the visual order for the screen readers to read the PDF in a meaningful order. For example, we'd want learners to hear instruction text before entering a data-entry field.
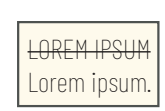
Headings

We use them rigorously for navigation and to communicate importance. We do not use bold or increased text for meaning.

Fonts

A A

Accessible and universal fonts like sans-serif Tahoma, Verdana, Calibri, or Arial are a priority. Font sizes are 12pt. minimum.

Punctuation

LOREM IPSUM
Lorem ipsum.

We employ proper punctuation to clarify sentence structure to the screen readers. Also, we avoid the use of all capitals.

Color

We never use color alone to convey meaning. We follow the WCAG 2.0 level AA guidelines for a 4.5:1 color contrast ratio between foreground and background elements.

Links

Our links are hyperlinked and unique to make sense out of context. Phrases like "click here" and "more" are avoided.

Alt Text

We use them as image equivalents so that users understand images in context. Hence, we do not describe the visual attributes of the image itself but convey the intended meaning of the image. Phrases like "image of" or "graphic of" are avoided, as well as abbreviations and excessive punctuation.

For example, punctuation such as *** will be read by a screen reader as "asterisk, asterisk, asterisk."

All non-informative images we label as decorative.

Our Library Specific Tagging Elements

Lists

Bulleted lists are to be used primarily. Numbered lists should be used only for itemized conclusions or steps in a procedure. For proper tagging, they should follow this PDF structure:

- List <L> - it is the main list tag
  - List items <LI> ········· Reflects how many bullets there are.
    - List item label <Lbl> ········· Symbolizes the number of bullets.
    - List item body <LBody> ········· Contains the actual text of the list item.

Nested children tags
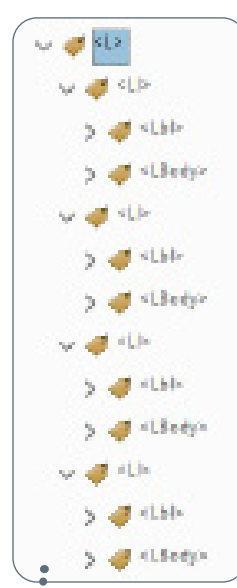
Lessons Learned

Sometimes tagging lists through the reading order does not work properly because sections are too close, and everything mixes. Our workaround is to create empty list items tags, then select the empty label and the text at once, and pick Create Tag From the Selection feature to put the selected text into the empty tag. The results of such an edit are shown on the right.

You can modify your results to focus on particular aspects:
- ☐ Limit to **Available Online**
- ☐ Limit to **Peer-reviewed** articles or books
- ☐ Limit by **Date** to find the most current research
- ☐ Limit to **Reviews** which provide easy to read overviews of the topic

Tables

We use tables for tabular data only, not for layout purposes. All tables in a PDF document must have table headers cells; it could be a column header or a row header. For proper tagging, they should follow this PDF structure:

- Table element <Table> - it is the main table tag
  - Table row cells <TR> ········· Reflects each row of the table.
    - Table header cell <TH> ········· Contains the header cell of the table row.
    - Table data cells <TD> ········· Contains the actual text/content of the cell item.

Nested children tags

Lessons Learned

For the table data to be tabular, the logical relationships among text, numbers, images, or other data must exist in two dimensions (vertical and horizontal). Our workaround is to simultaneously create data tables with row and column header cells.

	Indigenous Concept	Youth Concept	Sports Concept
Author keywords	Aboriginal First Nations Metis	Teens Teenagers	Sport Athletics Athletes Hockey
Medical subject headings (MeSH)	Indigenous Peoples Indians, North American	Adolescent	Sports Hockey

Citations

Citations are library specific, and punctuation and formatting are vital components in creating accurate references to communicate citation styles.

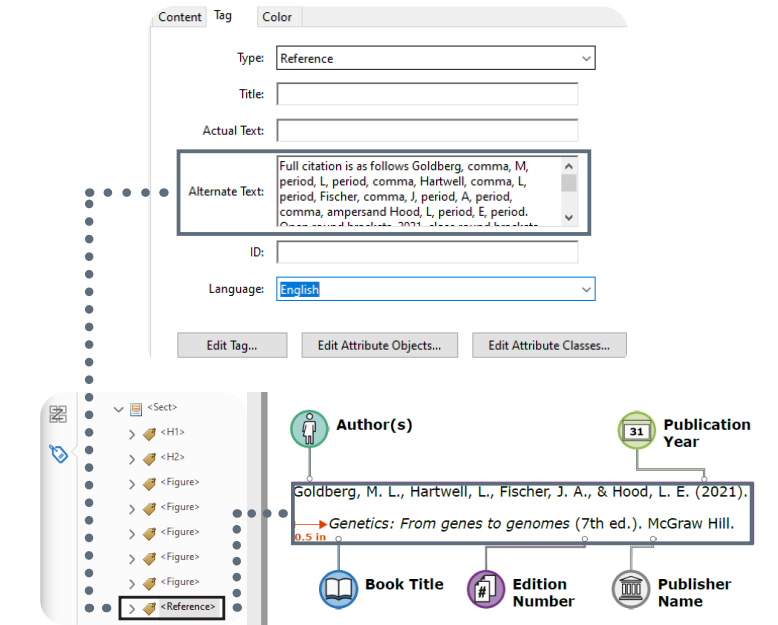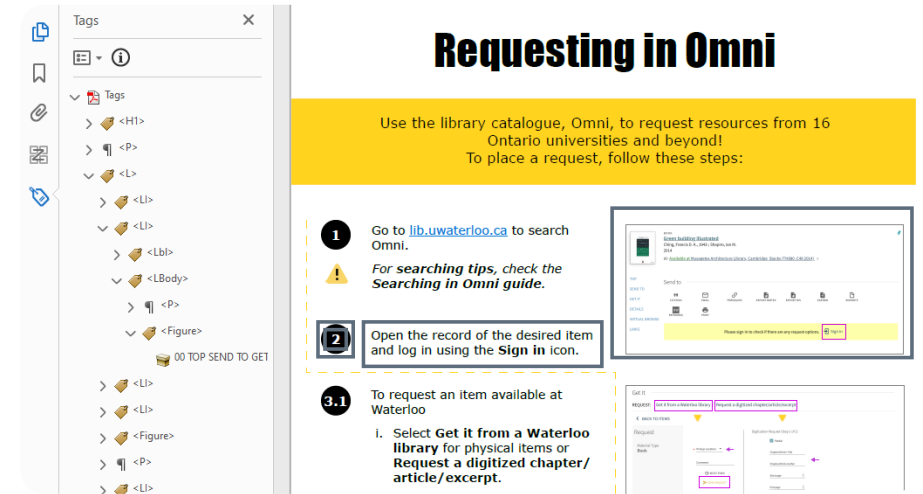**Lessons Learned**

Most screen readers do not verbalize citation elements like punctuation, typographic symbols, and formatting. The NVDA screen reader, which we use to check our tagging, verbalizes punctuation the least. Our workaround to convey punctuation is to insert alt text that reads the exact punctuation and formatting from the source of the original content into reference tags. Hence, we explicitly verbalize the presence and location of punctuation and symbols used like periods, commas, colons, semi-colons, question marks, exclamation marks, quotes, brackets, indentations, and italicization as they are otherwise not read, and the meaning gets lost.

Goldberg, M. L., Hartwell, L., Fischer, J. A., & Hood, L. E. (2021). Genetics: From genes to genomes (7th ed.). McGraw Hill.

Database Screenshots

Another library-related aspect is databases that we need to teach about for research purposes. When introducing these, it is critical to accompany the descriptive text with adjacent non-decorative screenshots to preserve the meaning of instructions to visually impaired users.

Lessons Learned

In line with best practices, the screenshots we include are marked as decorative if they do not contain additional details from the text they supplement. Descriptive alt text that is added to the visuals focuses on the function of the screenshot, which is to aid navigation through the webpage. We employ ordered lists that correspond to the added numbers on the screenshots, clearly labelled page elements and sections. We also apply consistent tag naming within the tag tree and meticulous attention to how we structure the reading order so that the components will come together for screen reader users.

Requesting in Omni

Use the library catalogue, Omni, to request resources from 16 Ontario universities and beyond! To place a request, follow these steps:

1. Go to lib.uwaterloo.ca to search Omni.
   For searching tips, check the Searching in Omni guide.
2. Scroll the record of the desired item and log in using the Sign in icon.
3. To request an item available at Waterloo:
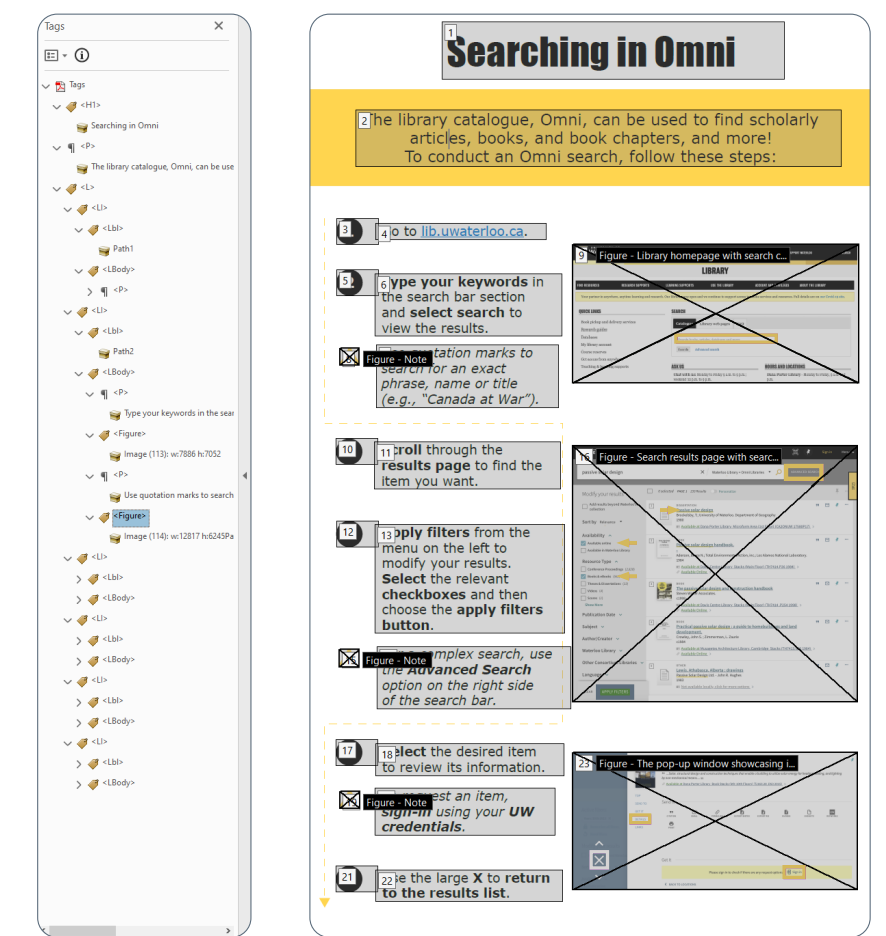   - Select Get it from a Waterloo library for physical items or Request a digitized chapter / article/ excerpt.

Our Workflow Insights

- Do not auto tag, do it manually.
- Wait 24 hours to start tagging after submitting the PDFs for review and feedback. Edits might be required, and it will throw off the tagging resulting in a retag of the full PDF.
- The efficient method to tag is to use the Reading Order tool, first for figures and then for texts using the Create from Selection function.
- Even though Adobe Acrobat is the best tool for PDF tagging, there are bugs. So, save frequently.
- Leave time for troubleshooting, new challenges always come up.
- Use screen readers to double check your tagging.

⚠ PDF tagging is a time-consuming and tedious process but imperative!

Searching in Omni

The library catalogue, Omni, can be used to find scholarly articles, books, and book chapters, and more! To conduct an Omni search, follow these steps:

1. Go to lib.uwaterloo.ca.
2. Type your keywords in the search bar section and select search to view the results.
   Note: For an exact phrase, name or title (e.g., "Canada at War").
3. Scroll through the results page to find the item you want.
4. Apply filters from the menu on the left to modify your results. Select the relevant checkboxes and then choose the apply filters button.
5. For a complex search, use the Advanced Search option on the right side of the search bar.
6. Select the desired item to review its information.
7. Sign in as an item, in request using your UW credentials.
8. Use the large X to return to the results list.

Our Work

Search OLOR to see our PDF infographics.

We understand that library users have diverse needs, and we are committed to ensuring that these needs are met. Therefore, we create all our online learning objects with accessibility in mind to guarantee that library resources are accessible and inclusive of individual abilities.

Open Discussion

Future Work

- How could we improve tagging to make it more efficient? Which document source is better? Should we start in Word and convert into a PDF? Use InDesign rather than Adobe Acrobat?
- We have a method that works for citations, but how can we better it?
- What is the correct reading order? We use a particular reading order that helps convey the meaning of our library-specific instructional materials to learners as dictated by the learning objectives, but is that the correct reading order for everyone? Does accessibility tagging mean imposing our decisions on interpreting or consuming content onto our learners and how can we do that better?

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