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# Report from the arXiv Accessibility Forum 2023

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<https://accessibility2023.arxiv.org/>



# Purpose of the Forum

- Educate on the access needs of people with disabilities, specifically within academia
- Discuss work that needs to be done to meet these needs
- Plan whose responsibility it is to do that work

# Why have this discussion?

- While accommodations have become more available, there still exist major need gaps
- Many of these hurdles apply to research papers
- arXiv aims to spur development of the needed infrastructure for research papers to be more accessible

# Making research papers accessible to blind people

- The most common consumption tool is the screen reader
  - This software takes the text and then speaks it
  - Sometimes this is interfaced with a refreshable braille display
    - Hardware device that raises pins to convert the document to braille
- If and when that fails, some turn to Optical Character Recognition
  - Software that “views” the screen to try to determine what the text says
- If that doesn’t work, then the individual must seek the help of a sighted person

*Solutions that do not involve seeking help from a sighted person do nothing to aid in consumption of plots and figures*

# How do we make figures accessible?

- Screen readers and OCR cannot parse images, the paper must provide the relevant information in another way
- The gold standard is to use alt-text and/or extended descriptions
  - Both serve the same purpose, though alt-text tends to be shorter
  - Alt-text appears when you hover your cursor over a figure, while extended descriptions appear elsewhere
- Guidance discussed:
  - Describe what the figure shows, with a focus on what the underlying message of the figure is
  - Be as brief as possible without sacrificing understanding
  - *Do not repeat the caption.*
- Figures can trip up screen readers. Think carefully about what the message of your paper is and only include the figures necessary to make that point.

[W3C guide to descriptions \(we will look at example 1\)](#)

# How do we do this in *LaTeX*?

*You don't.*

- *LaTeX* has no native support of alt-text or image descriptions
- ACM journals have support built into their document style, but that is the exception to the rule
- Some 3rd party packages exist, but they are often not supported by journals
- As an example option, for my most recent paper I decided that the “best available” solution was to include extended descriptions in the Supplemental Materials
- Others have chosen to link to an accessible [HTML version](#) in the abstract of the [PDF](#)

At this time, there is no “good” solution that keeps everything within the main document

*But even if there were...*

# PDF is a highly inaccessible format

- Many *LaTeX* compilers do not produce the necessary tags for screen readers to interface with a PDF
  - The format still “works” without them, so they are often omitted
- It was not until very recently that PDF supported the tags necessary to include alt-text
  - *LaTeX* does not generate these tags
  - PDF editors can be used to manually add the tags
- But then the PDF reader, even before the screen reader, must support these tags
  - Many PDF readers flatten the alt-text tags, causing the information to be inaccessible
  - It was noted that Apple Preview is known to be the worst offender, flattening nearly all PDF tags that are necessary to for disabled people to consume documents

# What do we do about it?

## Two Convergent Approaches

### Improve *LaTeX* and the PDF

- “People should write with the tools that they are comfortable with. People will not move from a format that they like.”
- The *LaTeX* project is actively working to ensure that accessibility tags are present in the output - expected *this June*
- Alt-text still to come
- As PDFs become more and more accessible, pressure can be placed on PDF reader software to improve support

### Move away from the PDF (to HTML)

- “Why spend time improving a faulty standard when a fully functional solution already exists?”
- HTML supports accessibility by default
- As of January, all major browsers support MathML, a way to display equations that is accessibility friendly
- [ar5iv.org](https://arxiv.org) uses LaTeXXML to convert arXiv papers to HTML
  - Imperfect, but improving
  - arXiv intends to merge this with the main website soon



# What can you (we) do?

- Generate alt-text or figure descriptions for your papers and make it available in some way
- Teach your students and mentees to do the same
- Advocate for journals you submit to to develop tools to meet access needs
  - Some journals have moved to publishing both tagged PDFs and HTML
- Visit the [ar5iv.org](https://ar5iv.org) versions of your publications and check that everything converted correctly
  - There is active work to improve the conversion tool
  - The developer stated that reports of where articles didn't convert correctly are very helpful. There is a "Report an Issue" button at the bottom of the page.



*“Changing your work habits to work in accessible supports can be a pain at first, [...] things like better image descriptions, which require authors to more thoroughly think through how and why they’re incorporating graphical material can result in more effective use of those materials”*

# Thank You

*“The other angle to keep in mind is regarding your intended audience: what parts of your intended audience are you okay with excluding? Because when you know that certain different approaches are needed to ensure that your research is accessible to everyone who might want to read it, then choosing not to use those approaches means that you are choosing to exclude parts of your potential audience.”*

# Resources

- [arXiv Accessibility Forum 2023](#)
  - Notes and recordings of the forum
- [arXiv Accessibility Report](#)
  - Research into accessibility barriers to research papers and proposed solutions
- [UN Disability-Inclusive Language Guidelines](#)
  - Guidance for avoiding harmful language when speaking about people with disabilities
- [Tools to convert \*LaTeX\* to HTML](#)
  - arXiv will use LaTeXML
- [Tips for accessible presentations](#)
- [SIGCHI guide to accessible papers](#)
- [A step-by-step guide to converting a \*LaTeX\* paper to an accessible webpage](#)
- [W3C guide to alt-text and extended descriptions](#)
- [MSU guide to accessible \*LaTeX\*](#)
- [ACM guide to alt-text](#)
- [Example of a paper linking to an accessible HTML version](#)
  - [HTML version](#)
- [Accessible Color Sequences for Data Visualization](#)