# **Making scientific content accessible**

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| **Type of Content** | **Multiple/Alternative Formats** | **Technologies & Guidance Assistive Technologies** | **Difficulties and Disabilities** |
| Text | Structured documents with styles, headings etc. docx, accessible HTML, XML, ePub3 and tagged PDFs. | Making Accessible Documents[[1]](#endnote-1), have regard for complex scientific words, numbers and units working with synthesised speech[[2]](#endnote-2) and acronyms  Screen reader users, text to speech, text highlighting, magnification, Braille displays | Print impairments to include blindness, visual impairment, visual stress, dyslexia, dexterity, motor and general reading difficulties |
| Videos /simulations /animations | Mov (Mac OS) WMV (Windows) but best MP4 with good compression, works with HTML5 | Make sure quality is good, player keyboard accessible and experiments and scientific content has good audio descriptions as speaker may not explain all that is seen on the screen. W3C multimedia advice about captions, transcriptions and audio descriptions[[3]](#endnote-3) Captioning tools include Amara[[4]](#endnote-4) and YouTube guidance[[5]](#endnote-5) | Deaf, hearing impairments, blind visual impairments (using audio descriptions), dyslexia where watching may be easier than reading. Learners for whom English is a second language. |
| Audio | MP3, AAC (Mac OS), WMA (Windows), Vorbis (Linux) but MP3 | Make sure quality is good and player is accessible. Provide a transcript that may need added explanations and a glossary as a supporting resource[[6]](#endnote-6) | Deaf, hearing impairments and those wishing to read text before listening. |
| Images | Concise alternative text descriptions (alt text) and longer descriptions in captions or summary if necessary | UKAAF guidance[[7]](#endnote-7) and DIAGRAM Image Description Guidelines[[8]](#endnote-8) for Screen reader users, text to speech, magnification, Braille displays | Blindness, visual impairment to include visual acuity difficulties and visual agnosia where image recognition may be impaired |
| Line graphs / diagrams | Alt text descriptions, caption and summary in document Tactile 2D graphics, 3D diagrams | UKAAF guidance and DIAGRAM center Poet software to correctly describe diagrams[[9]](#endnote-9) and Central Access Reader[[10]](#endnote-10) to produce diagrams to support screen reader user, swell paper and standard printer (2D graphics), 3D printer[[11]](#endnote-11) | Blindness, visual impairment to include visual acuity difficulties and visual agnosia where image recognition may be impaired. Dyspraxia and dyslexia where complexities may cause difficulties |
| Line graphs / diagrams | Electronic sonification (visualisation in sound) or haptic feedback (tactile feedback) | DIAGRAM center Poet software to correctly describe diagrams  Audio Graphing Calculator[[12]](#endnote-12)  Tactile Graphics with a Voice[[13]](#endnote-13) using QR codes linked to description  Technologies for haptic feedback[[14]](#endnote-14) | Blindness, visual impairment to include visual acuity difficulties  Haptic feedback for deaf / blind |
| Maths equations | Structured formulae using the MathML or LaTeX (in web content or ePub), MathType or Micosoft equations in docx. If only images possible then should have clear Alt tags describing equation correctly for the level and audience. Tag as formula in PDFs. | Making maths accessible[[15]](#endnote-15) for screen reader users, text to speech, text highlighting, magnification, Braille displays. Reading Maths with MathPlayer and other assistive technologies[[16]](#endnote-16), STEMReader[[17]](#endnote-17) | Blindness, visual impairment, dyscalculia and dyslexia |
| Chemistry and other formulae | Alt text when images but can be structured as per CML standards[[18]](#endnote-18) | Making Chemistry formulae accessible  for screen reader users, text to speech, text highlighting, magnification, Braille displays. | Blindness, visual impairment, dyscalculia and dyslexia |

1. LexDis guide to making the initial text document accessible for other formats <https://www.lexdis.org.uk/guides/accessibility/making-microsoft-word-documents-accessible/> [↑](#endnote-ref-1)
2. STEMReader guidelines for reading Maths notation – aimed at level 2 Maths but applicable to all Maths <https://stemreader.org.uk/guidelines/> [↑](#endnote-ref-2)
3. W3C Multimedia Accessibility FAQ <https://www.w3.org/2008/06/video-notes> [↑](#endnote-ref-3)
4. Amara closed captioning tool <http://amara.org/en/> [↑](#endnote-ref-4)
5. YouTube closed captioning (subtitles) guidance https://support.google.com/youtube/answer/2734796?hl=en-GB [↑](#endnote-ref-5)
6. ICT4IAL Making your audio accessible <http://www.ict4ial.eu/guidelines/making-audio-accessible/how-make-audio-information-accessible> [↑](#endnote-ref-6)
7. UKAAF (UK Association for Accessible Formats) guidance for accessible images <http://www.ukaaf.org/accessible-images/> [↑](#endnote-ref-7)
8. Benetech DIAGRAM Center Image Description Guidelines <http://diagramcenter.org/table-of-contents-2.html> [↑](#endnote-ref-8)
9. Benetech DIAGRAM Center Poet <http://diagramcenter.org/making-images-accessible.html#poet> [↑](#endnote-ref-9)
10. University of Washington Central Access Reader <https://www.cwu.edu/central-access/reader> [↑](#endnote-ref-10)
11. RNIB Making tactile graphs and diagrams <http://www.rnib.org.uk/insight-online/making-tactile-graphs-and-diagrams> [↑](#endnote-ref-11)
12. Viewplus Audio Graphing Calculator <https://viewplus.com/product/audio-graphing-calculator/> [↑](#endnote-ref-12)
13. Tactile Graphics with a Voice iOS app <https://itunes.apple.com/us/app/tgv-tactile-graphics-with-a-voice/id922661675?mt=8> [↑](#endnote-ref-13)
14. BenetechTechnologies for haptic feedback <http://diagramcenter.org/integrating-haptic-feedback.html> [↑](#endnote-ref-14)
15. University of Bath Methods to produce flexible and accessible learning resources in mathematics <http://www.bath.ac.uk/study/mash/maths-access/> [↑](#endnote-ref-15)
16. Design Science Mathplayer <https://www.dessci.com/en/products/mathplayer/manual.htm#mathplayer_and_word> and <https://www.dessci.com/en/solutions/access/atsupport.htm> [↑](#endnote-ref-16)
17. STEMReader <https://stemreader.org.uk/> [↑](#endnote-ref-17)
18. Wikipedia Chemical Mark-up Language <https://en.wikipedia.org/wiki/Chemical_Markup_Language>

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    [↑](#endnote-ref-18)