Everyone, everywhere, all at once: an accessibility story

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> "The one argument for accessibility that doesn't get made nearly often enough is how extraordinarily better it makes some people's lives. How many opportunities do we have to dramatically improve people's lives just by doing our job a little better?"
>
> Steve Krug, Usability/User Experience Consultant

The winner of the 2023 Academy Award for Best Picture, the sci-fi multiverse comedy 'Everything Everywhere All at Once', is a film in which every imaginable universe is unique and bizarre (take the universe in which the lead character has hot dogs for fingers, for example). Imagine if there was a universe in which everyone could access everything they needed, everywhere or anywhere they went, at any time they wished.

Yet, in our universe, much of the content we create remains undecipherable and inaccessible to many.

Why create materials that a sizeable proportion of our audience cannot read, simply because we thought that green text on a red background would look nice for a seasonal marketing campaign?

There are many factors that can affect accessibility. For example, older age groups may not be familiar with digital formats, or people who have English as a second language may require simplified content. Additionally, there are socio-economic determinants of health that could affect health literacy – here, both non-digital formats and non-technical writing could have a huge impact.

How else can we make a difference? A snapshot from 2020–2021 showed that an estimated 1.3 billion people, approximately 16% of the global population, are living with a disability.[1] A study in the UK found that in individuals with a disability, impairments affected a wide range of abilities, including dexterity (23%), hearing (10%) and vision (9%), all of which have an impact on access to healthcare materials. Many disabilities are 'invisible', with an estimated 15–20% of the UK population thought to be neurodiverse[2,3] (conditions include attention deficit hyperactivity disorder, autism, dyscalculia and dyslexia), so tailoring materials to accommodate these individuals would have a significant positive impact on improving the accessibility of health information.

That being said, not all disabilities are permanent. You may have an ear infection and experience temporary hearing loss, or you may be standing under the Heathrow flight path, where anyone would have trouble hearing. The same goes for vision – you may have just had eye surgery and have blurred vision for several weeks, or you may be stuck in a tunnel on a train without sufficient lighting, such that it is impossible to read an advert in a medical journal in which a paragraph of white text has been creatively positioned on a bright photographic background.

The 'curb-cut effect' refers to the notion that **breaking down barriers to serve one population may end up benefiting another**: removing the edge on pavements to provide a ramp for those who use wheelchairs has also benefited parents with pushchairs and toddlers on scooters; closed captions has benefited anyone watching a video in a noisy environment and people learning to read.

We also need to consider the power of language. Medical information can be littered with jargon and acronyms that act as barriers to readers. Health information should be clear, balanced and accessible to support health literacy,[4] which is the ability to understand and to act on health information.[5] Poor health is strongly correlated with low health literacy.[6] The consequences of low health literacy are stark – for instance, 43% of adults are reportedly unable to calculate the paracetamol dose for a child.[7]
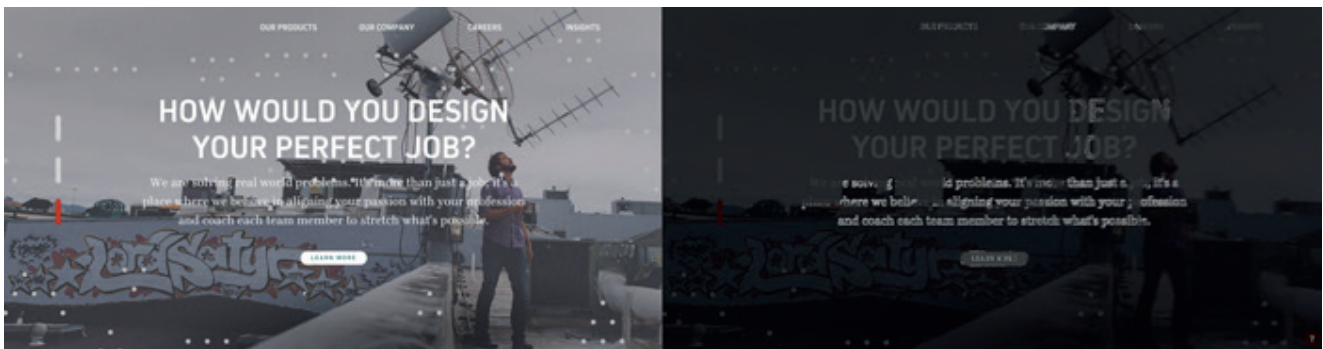
Example of text that might be difficult to read for someone with a visual impairment.
Left: the background image used on a website is both faded and visually busy, making the white text difficult to read. Right: a tool for contrast ratio analysis confirms that the white text does not have adequate contrast with the background (the dark, non-outlined areas are those that do not possess the sufficient contrast ratio of 4.5:1 for small-sized text).
Image and description adapted from: https://www.nngroup.com/articles/text-over-images/.
Alt text: Illustration of the importance of checking colour contrast to ensure text can be read on certain backgrounds.

### What is health literacy and why is it relevant?
Low health literacy is remarkably common. Nearly 50% of adults from a selection of European countries may have problematic or insufficient health literacy, and 88% of US adults may not be able to make effective use of health information from community sources, with only 12% having proficient health literacy.[8]

In the UK, five key populations with disproportionately low or inadequate health literacy have been identified: disadvantaged socio-economic groups; people from migrant communities and some ethnic minorities; people with long-term health conditions; people living with a disability; and people over the age of 65 years.[9]

To reduce health inequalities, it is necessary to improve health literacy.

Improving health literacy can, in part, be tackled by developing appropriate and accessible healthcare information. For this reason, it should not be a question of whether we *should* create our materials with accessibility in mind, but *how* we go about doing so.

Making data accessible is not a new concept. Florence Nightingale famously saw the need to 'simplify the complex' and made strides in novel data visualization techniques with her rose diagram, intended to present statistics in an engaging and accessible medium to attract a greater breadth of readers. Her efforts ultimately led to a reform in health and sanitation policy in Victorian Britain.[10] In our AI and Data Science Team, we are keen to present data with a visual impact that maintains a focus on clarity. The example below shows the interrelation of diseases based on overlapping drug mechanisms of action to identify possible new indications for an existing product portfolio.
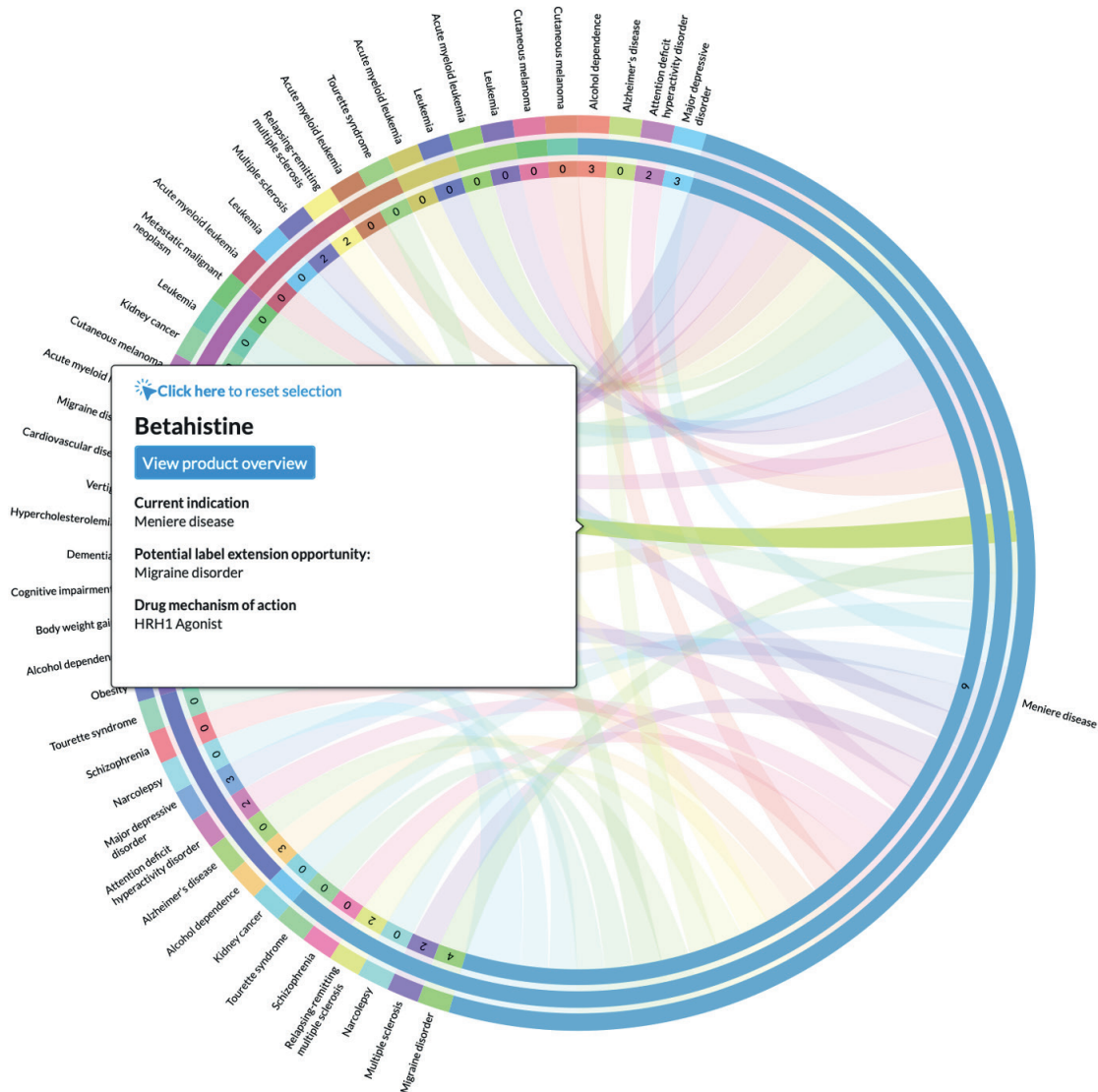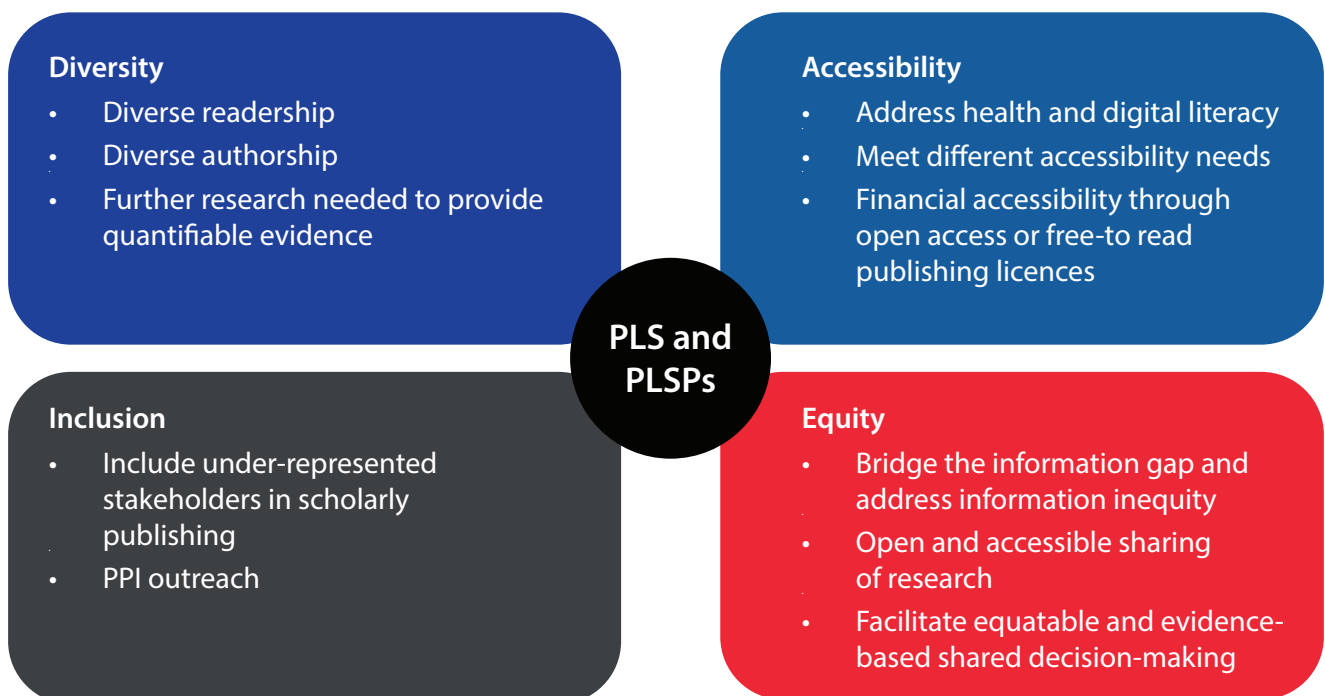

The interrelation of indications to identify possible new indications for an existing product portfolio based on overlapping drug mechanisms of action.

Alt text: Spirograph-like figure depicting the interrelation of indications to identify possible new indications for an existing product portfolio. HRH1, histamine H_1 receptor.

Plain language summaries and accessibility

Our Open Pharma initiative aims to improve the publications model of research sponsored by pharmaceutical companies by connecting the pharmaceutical industry with innovations in publishing to increase the transparency of, and the access to, research outputs. One element of this initiative is the use of plain language materials to improve the accessibility of scientific information.[11] In the past few years, there has been an increased focus on plain language summaries (PLS) within medical publishing.[12–15] PLS are short and accessible peer-reviewed summaries of journal articles that are written in non-technical language and in a range of formats, from text to infographics.[12–15] PLS of publication articles (PLSPs) are stand-alone manuscripts that summarize primary publications in plain language.[16] PLSPs are citable, indexed and can include the patient perspective.[16–17] These documents support accessibility in two ways: through the access to scientific information[11] and through the use of accessible language and formats to address health literacy. The provision of enhanced formats of PLS and PLSPs using audio and visual features also allows for a broad range of users, including those with accessibility needs,[11] to engage with content.

Diversity
- Diverse readership
- Diverse authorship
- Further research needed to provide quantifiable evidence

Accessibility
- Address health and digital literacy
- Meet different accessibility needs
- Financial accessibility through open access or free-to read publishing licences

PLS and PLSPs

Inclusion
- Include under-represented stakeholders in scholarly publishing
- PPI outreach

Equity
- Bridge the information gap and address information inequity
- Open and accessible sharing of research
- Facilitate equatable and evidence-based shared decision-making

How PLS and PLSPs improve the accessibility of scientific information.
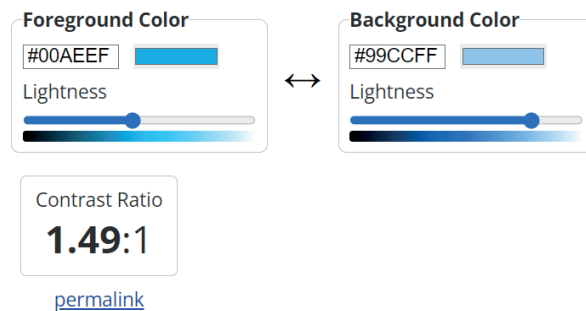Alt text: A diagram summarizing how PLS and PLSPs can improve the accessibility of scientific information.
PLS, plain language summary; PLSP, plain language summary of publication article; PPI, patient and public involvement.

Digital and creative considerations

In our Digital, Creative and Learning Design Teams, we aim to build our materials with various accessibility measures. Visual perceivability is high up on the list. If you, either in childhood or more recently, have opened a children's picture book, you will have noticed a trend of printing text on coloured backgrounds; although this may help to fill these wonderful books with colour, it unfortunately makes text very difficult to read in low-light settings (i.e. bedtime) for someone with average visual acuity, and impossible for someone with a visual impairment. There are contrast standards and readily available tools, certainly for digital assets, that designers should use so that everyone is able to perceive the content.

Here is an example of text that fails the Web Content Accessibility Guidelines test for colour contrast: the light-blue text on the light background might not be visible to someone with a visual impairment, whereas the dark-blue text on the same light-blue background would likely be visible.

Foreground Color
#00AEEF

Lightness

↔

Background Color
#99CCFF

Lightness

Contrast Ratio
1.49:1

permalink

Normal Text

WCAG AA: **Fail**
WCAG AAA: **Fail**

The five boxing wizards jump quickly.

Large Text
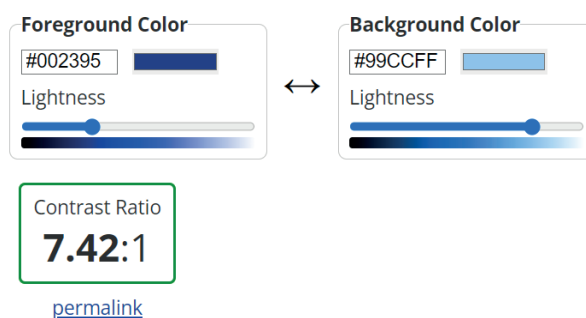
WCAG AA: **Fail**
WCAG AAA: **Fail**

The five boxing wizards jump quickly.

Graphical Objects and User Interface Components

WCAG AA: **Fail**

✓

Text Input

Foreground Color
#002395

Lightness

↔

Background Color
#99CCFF

Lightness

Contrast Ratio
7.42:1

permalink

Normal Text

WCAG AA: **Pass**
WCAG AAA: **Pass**

The five boxing wizards jump quickly.

Large Text

WCAG AA: **Pass**
WCAG AAA: **Pass**

The five boxing wizards jump quickly.

Graphical Objects and User Interface Components

WCAG AA: **Pass**

✓

Text Input

An example of the dashboard from the WebAIM Contrast Checker. WebAIM Contrast Checker. Institute for Disability Research, Policy and Practice. Available from: https://webaim.org/resources/contrastchecker/.

Alt text: Dashboard of a contrast ratio checker with an example of colours that pass and fail accessibility standards on certain backgrounds.

Long description: In this example of a contrast ratio checker, a light colour on a light background fails contrast standards for normal text, large text and graphical objects. Dark text on a light background passes contrast ratio standards for normal text, large text and graphical objects.

When developing our learning materials, we ensure that all images and icons that need to be considered by the learner have alternative text (alt text); for complex images, we also include additional detailed descriptions for screen readers to read out. We also ensure that users with fine motor control restrictions (e.g. Parkinson disease) and larger motor control issues (e.g. multiple sclerosis), and those who do not have a mouse (e.g. iPads, iPhones), can access our materials. This includes creating assets with a logical screen reading order for those navigating with their keyboards and removing drag-and-drop questions (which require a mouse or trackpad to function). For people with dyslexia, we establish a minimum font size (14 point), avoid centrally aligned text and ensure 1.5 line spacing on slides or module screens.

> **Does artificial intelligence have the scope to improve the accessibility of health information?**

Artificial intelligence to support accessibility

It is impossible to ignore the increasing role of artificial intelligence (AI) in our lives. Does it have the scope to improve the accessibility of health information? A *generative* AI tool, such as ChatGPT, is adept at creating analogies to simplify complex explanations. In response to patient questions, AI-elicited answers have been rated by patients more highly on empathy and quality than those from a physician.[18] Will the use of generative AI provide better-quality and more accessible health information, making it available to more people than ever before? It is a possibility; with the right tools (e.g. plugins that supply references to check facts), generative AI can provide accurate information, and there are even AI models that specialize in the medical domain. However, we must acknowledge the potential risks of this technology in instances in which the generated output is considered to be trustworthy without rigorous fact-checking.

Legal and ethical obligations

It is important to note that there are legal and ethical obligations for our industry to ensure inclusive communication. For example, the Equality Act 2010 passed by the UK Parliament prohibits discrimination against individuals with disabilities, and requires companies like ours to make reasonable adjustments to accommodate their needs.

Steps towards accessibility in healthcare communications

When embarking on a project, it is key to understand all the accessibility needs of your audience properly. Accessibility goes beyond the ability to perceive and to understand documents. The first step is to consider whether any assumptions you make about the audience's needs are based on sufficient knowledge or if they are lacking or biased. It is best to undertake some research, including asking audience members for feedback, because this can uncover unexpected accessibility needs.

For instance, when setting up a patient advisory board, what hardware or software do the participants have access to? Can they access a survey or contract if they do not have Adobe Acrobat/Microsoft Office? Do they have ready and reliable access to the internet? Do they only have a mobile device? Do they have a printer or laptop to access information? Is the file size too large? Can the participants physically access or afford to attend a face-to-face meeting, or should it be virtual? How should an agenda be structured to facilitate access? Do any of the participants need a translator or carer present?

Do they need alt text or closed captions enabled? Do they need additional time to participate in a meeting? Are there certain times of the day that are inconvenient, thereby reducing access to a meeting?

This can feel like considering everything, everywhere, all at once, but making the extra effort to understand the accessibility needs and solutions of your audience, as well as being open to improvements and feedback throughout a project, is of vital importance.

1. **Incorporate accessibility principles within the culture of your organization and prioritize inclusive design.** Ensure compatibility with assistive technologies such as screen readers and alternative-input devices.

2. **Simplify language.** Use clear and plain language techniques to simplify complex medical jargon and instructions. This benefits not only individuals with disabilities, but also those with low health literacy or limited English proficiency.

3. **Provide multiple formats.** Offer healthcare information in multiple formats, including text, audio and visual, to accommodate various accessibility needs. Incorporate captions, transcripts and audio descriptions to ensure accessibility for individuals with hearing or visual impairments.

4. **Train communicators.** Educate your peers on disability awareness, communication strategies and the use of assistive technologies.

5. **Seek community feedback.** Engage with individuals with disabilities and advocacy groups to seek their insights and feedback on healthcare communication materials. Their perspectives can help to identify barriers and to guide improvements to enhance accessibility.

By prioritizing accessibility – to provide equitable access to our materials for all individuals – we can contribute to more effective training and communications, alongside enhanced patient engagement, with the end goal to improve healthcare outcomes. Let's commit to breaking down barriers and ensuring everything we do is accessible to everyone, everywhere, all at once.

What one thing will you do to make a difference?

If you'd like to learn more about the information in this article, please contact sarah.griffiths@pharmagenesis.com or jamie.singer@pharmagenesis.com.

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