



Creating Accessible Graphics

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Agenda

- Accessibility and Web Accessibility
- Web Accessibility at Sandia (Section 508)
- Accessibility Considerations for Graphics
- Putting it into Practice (Examples)
- Q&A



Accessibility and Web Accessibility

What is Accessibility?

also known as a11y (shorthand for accessibility a + 11 letters + y)

Accessibility is about inclusion and access for people of **all** abilities. It reflects the **ability** of people to **access** technologies, locations and products.

To improve accessibility, we **identify** and **mitigate** potential barriers to access for a variety of user groups.

The main categories of disabilities are **visual, auditory, mobility** and **cognitive**. Users can have one or multiple types of disabilities.

What is Accessibility? (continued)

	Permanent	Temporary	Situational
Touch	 One arm	 Arm injury	 New parent
See	 Blind	 Cataract	 Distracted driver
Hear	 Deaf	 Ear infection	 Bartender
Speak	 Non-verbal	 Laryngitis	 Heavy accent

Disabilities can also be categorized as permanent, temporary, or situational.

For example, while one person may be permanently blind, another could be temporarily unable to see due to a cataract. Even someone with full 20/20 vision could situationally be unable to see the road ahead of them while driving because they are distracted and looking elsewhere.



Web Accessibility at Sandia

Demographics

- 8.2% of Sandians (around 1300+ MOWs) have self-identified as disabled. However, we expect that number to be much larger as the **CDC estimates that 1 in 4 Americans have some type of disability**
- Oftentimes, people choose not to self-identify for fear of lack of career opportunities or general inclusion so we truly do not know the full amount of our coworkers or audience members with disabilities

Section 508

Section 508 is defined as “an amendment to the United States Workforce Rehabilitation Act of 1973 [and] a federal law mandating that all electronic and information technology developed, procured, maintained, or used by the federal government be accessible to people with disabilities”.

[Section 508 of the Rehabilitation Act of 1973](#)

WCAG (Web Content Accessibility Guidelines)

- There are various *versions* of WCAG (pronounced wick-ag)
 - WCAG 2.0 (2008), WCAG 2.1 (2018), and WCAG 2.2
- There are also different *levels* of WCAG
 - A is the lowest level of compliance
 - AA is a higher level and also includes the standards from A
 - AAA is the highest level, but is difficult to implement in solutions. Sometimes the standards do not apply or are not a good fit for the site
- **As of May 2018, the new guidelines for Section 508 are to adhere to the WCAG 2.0 AA standards** <https://www.section508.gov/create/applicability-conformance>

WCAG 2.0 A and AA

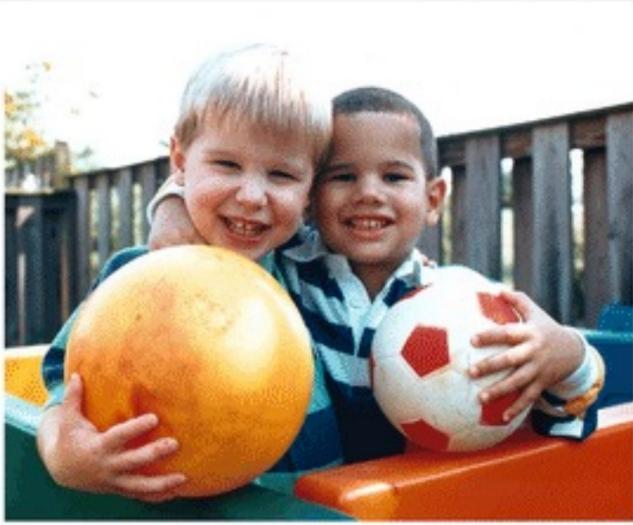
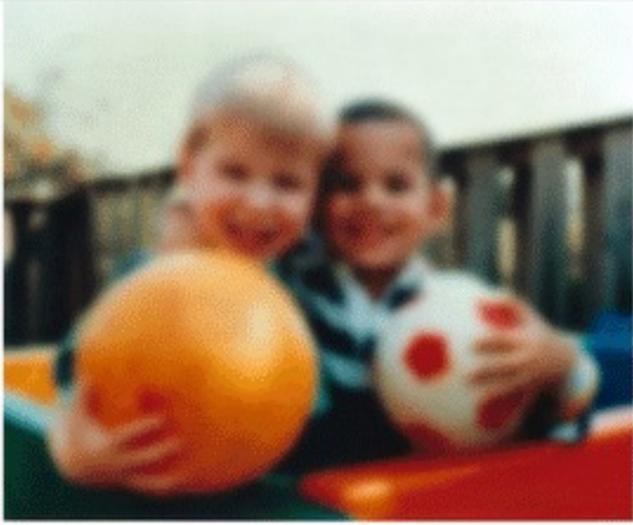
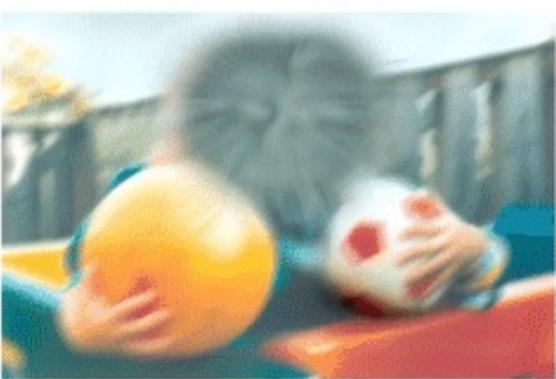
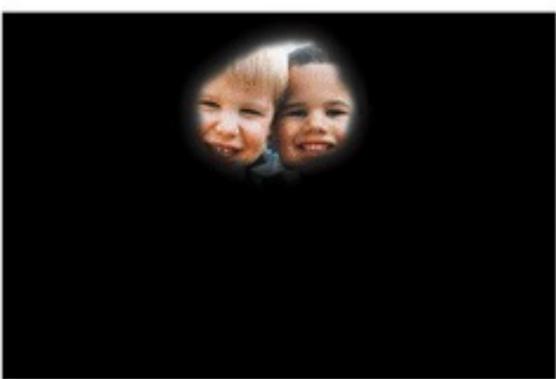
- There are 38 total standards within 2.0 A and AA
- Example: “**1.4.1 Use of Color:** Color is not used as the only visual means of conveying information, indicating an action, prompting a response, or distinguishing a visual element. (Level A)”
- Overall, all web accessibility best practices are based on some form of these standards



Accessibility Considerations for Graphics

Visual Disabilities

- The [CDC](#) estimates that 3 in 5 Americans over the age of 40 have vision and eye problems which is expected to more than double by 2050

Standard	Cataract	Diabetic Retinopathy
		
Glaucoma	Macular Degeneration	Tunnel Vision
		

Types of Visual Disabilities

Visual disabilities can range from mild or moderate vision loss in one or both eyes to substantial or complete loss of vision in both eyes. Some people experience reduced or lack of sensitivity to certain colors or color blindness, as well as sensitivity to brightness.

These include:

- **Color blindness** - difficulty distinguishing between colors generally red and green, or yellow and blue, and sometimes the inability to perceive any color
- **Low vision** - includes blurry vision, seeing only the middle of the visual field, seeing only the edges of the visual field, and clouded vision
- **Blindness** - substantial loss of vision in both eyes

Source: Yale's [Types of Disabilities](#)

Considerations for Visual Impairments

- Text size and spacing
- Alternative text
- Color contrast
- Use of color

Text Size, Font and Spacing

- Keep body text size at a minimum 12pt or 16px. This is a general rule of thumb that doesn't always translate well through all mediums though, so I always like to think "If I was presenting to an in-person audience, would the folks in the back of the room be able to read the text?"
- Use sans serif fonts (e.g. Arial, Helvetica) and avoid serif fonts (e.g. Times New Roman, Garamond) which can be more difficult to read

Text Spacing

Text spacing – *WCAG 2.1, 1.4.12, Level AA*

- Line height (line spacing) to at least 1.5 times the font size;
- Spacing following paragraphs to at least 2 times the font size;
- Letter spacing (tracking) to at least 0.12 times the font size;
- Word spacing to at least 0.16 times the font size.

Alternative Text

- Alternative text (Alt Text) is a textual substitute for non-text content in web pages like images.
- Screen readers announce alternative text in place of non-text content, helping users with visual or certain cognitive disabilities perceive the content and functionality.
- Although alternative text isn't necessarily a design-focused aspect of accessibility, it is crucial to think about when designing graphics that are more complex than a simple icon

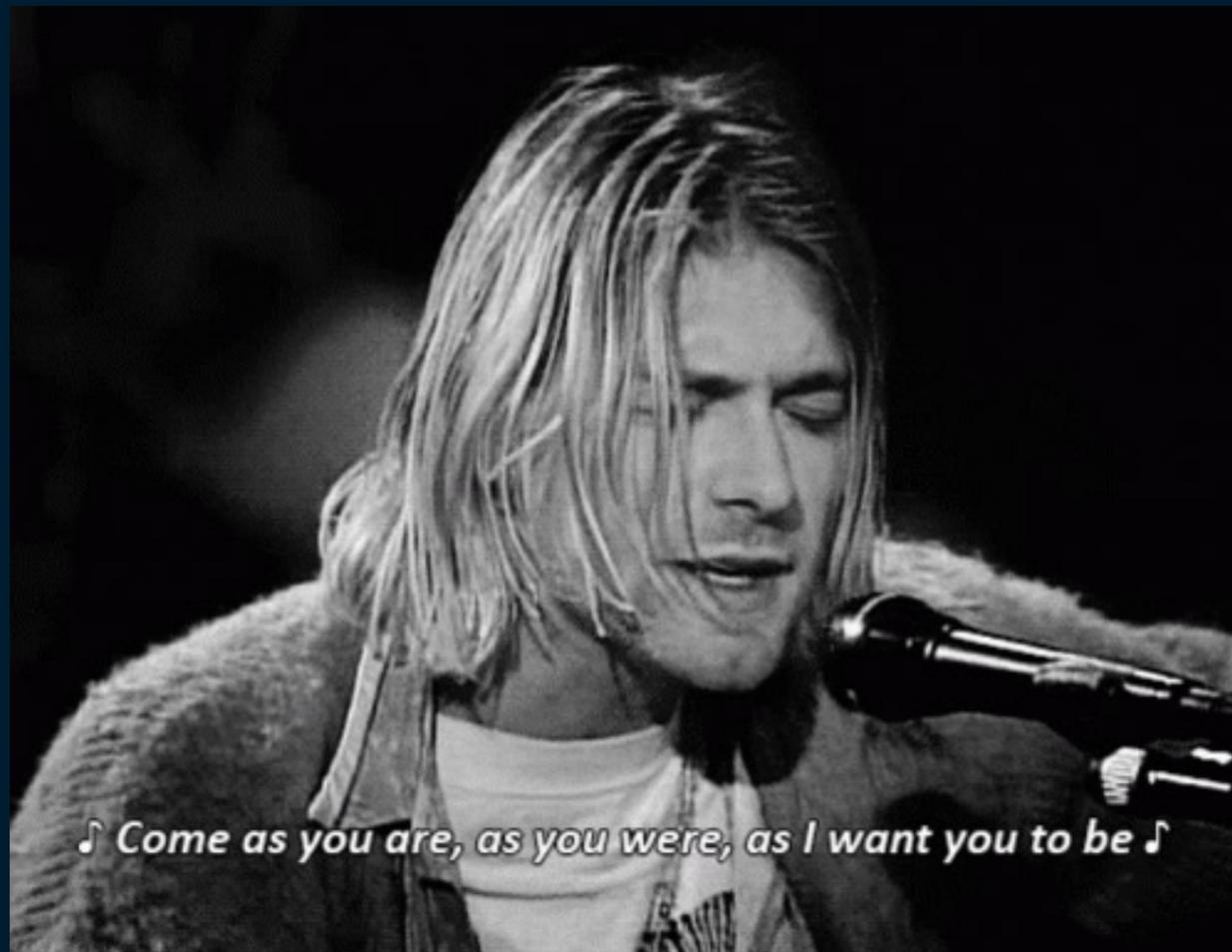
Alt Text Tips

Review alt text of images, icons, and animations. Good alt text:

- Is short and descriptive
- Does not include “image of” or “photo of”
- Is written for non-decorative images only
 - Decorative images are images that do not convey relevant or important information. You should add an empty alt value in this case (e.g. ``)
- Use this [alt text decision tree](#) when in doubt!
- View Mangools [“Image alt text”](#) article more information and examples

Alt Text for Images With Text

If an image contains text within itself, the alt text must include a full equivalent copy



Alt Text: Kurt Cobain singing into a microphone with lyric caption of “Come as you are, as you were, as I want you to be”

Color Contrast (Regular Text)

Ensure that there is strong contrast (ratio of at least 4.5:1) between regular text and background colors – *WCAG 2.0, 1.4.3, Level AA*

Use the WebAIM's [Contrast Checker](#)

✓ DO

Ensure there is enough contrast between the text and what is behind it.

[Click here](#) to learn more

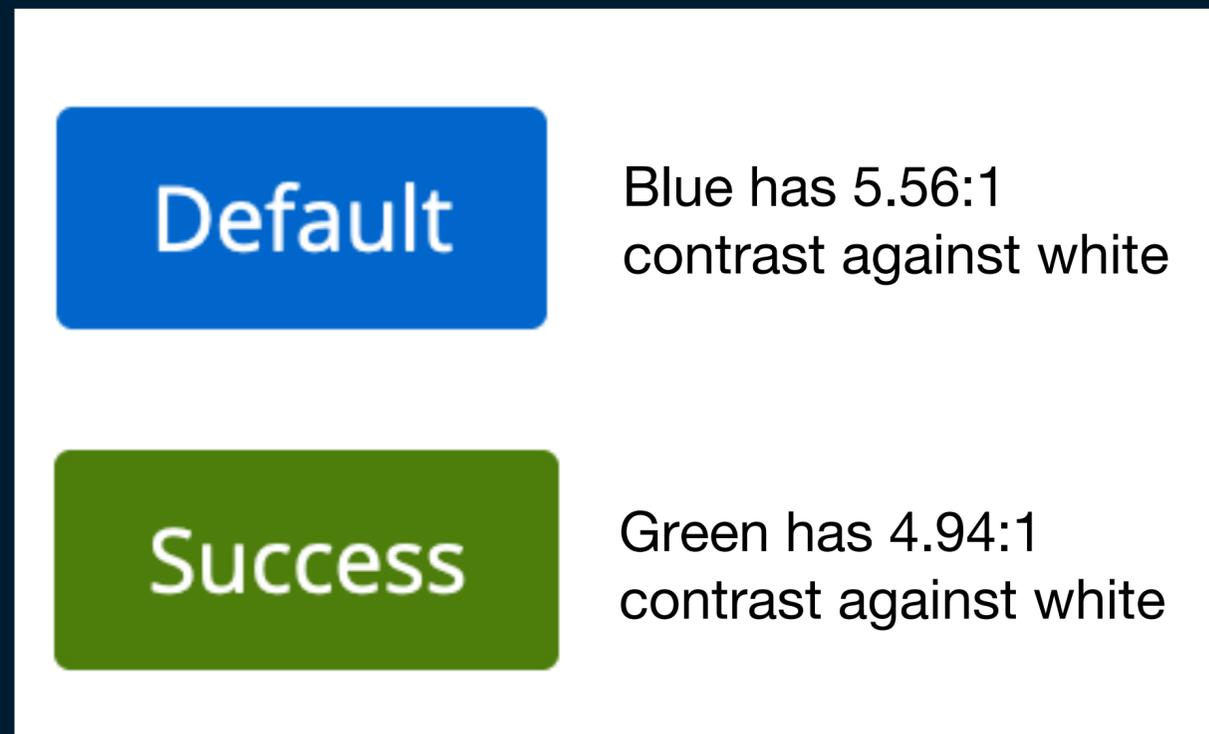
✗ DON'T

Don't choose colors that vibrate with each other and make text difficult to read.

[Click here](#) to learn more

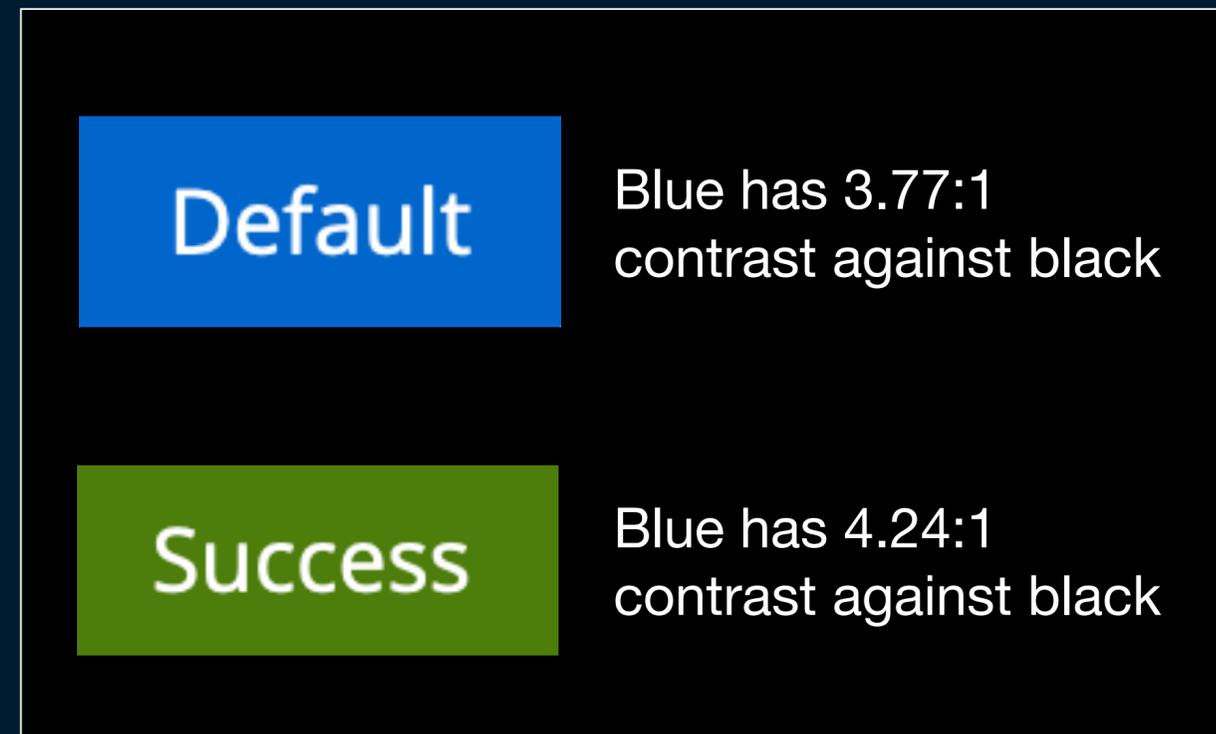
Color Contrast (Graphical Elements & Large Text)

- Ensure that there is strong contrast (**ratio of at least 3:1**) between user interface components and graphical objects against adjacent colors – *WCAG 2.1, 1.4.11, Level AA*
- Again, you can use WebAIM's [Contrast Checker](#) 😊



Two examples of color contrast on a white background. The first example shows a blue rounded rectangle with the word "Default" in white text, with a note stating "Blue has 5.56:1 contrast against white". The second example shows a green rounded rectangle with the word "Success" in white text, with a note stating "Green has 4.94:1 contrast against white".

Default	Blue has 5.56:1 contrast against white
Success	Green has 4.94:1 contrast against white



Two examples of color contrast on a black background. The first example shows a blue rounded rectangle with the word "Default" in white text, with a note stating "Blue has 3.77:1 contrast against black". The second example shows a green rounded rectangle with the word "Success" in white text, with a note stating "Blue has 4.24:1 contrast against black".

Default	Blue has 3.77:1 contrast against black
Success	Blue has 4.24:1 contrast against black

WebAIM Contrast Checker Example

Remember that Section 508 is met by adhering to WCAG 2.0 AA guidelines. The contrast checker will actually specifically tell you when you have met level AA compliance depending on the type of element you are working with.

The screenshot displays the WebAIM Contrast Checker interface. It features two main panels: 'Foreground' and 'Background'. The 'Foreground' panel shows a hex value of #8080FF, a color picker, an alpha value of 1, and a lightness slider. The 'Background' panel shows a hex value of #FFFFFF, a color picker, and a lightness slider. Below these panels, the contrast ratio is displayed as 3.25:1, with a 'permalink' link. The interface is divided into three sections: 'Normal Text', 'Large Text', and 'Graphical Objects and User Interface Components'. Each section shows the WCAG AA and AAA compliance status and a sample of the text or element being checked.

Foreground

Hex Value: #8080FF

Color Picker

Alpha: 1

Lightness

Background

Hex Value: #FFFFFF

Color Picker

Lightness

Contrast Ratio: **3.25:1**

[permalink](#)

Normal Text

WCAG AA: **Fail**

WCAG AAA: **Fail**

The five boxing wizards jump quickly.

Large Text

WCAG AA: **Pass**

WCAG AAA: **Fail**

The five boxing wizards jump quickly.

Graphical Objects and User Interface Components

WCAG AA: **Pass**

Text Input

Use of Color

Look out for red-green color combinations as Deuteranopia and Protanopia (red & green color blindness) are very common and this color combination should be avoided if possible

Ensure that there is no reliance on color to convey meaning



Key

 Incorrect

 Correct

Not so great

Key

 Incorrect

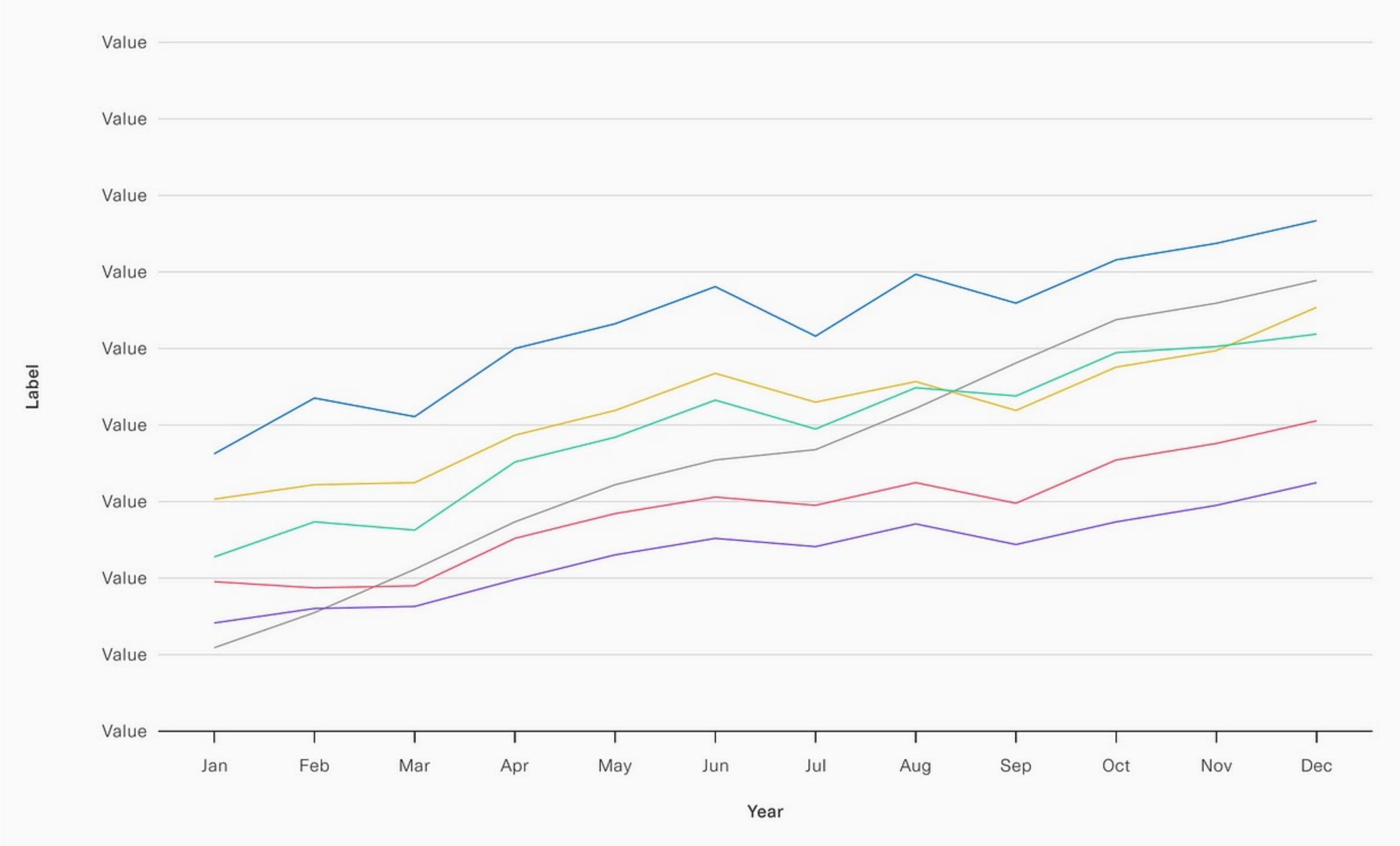
 Correct

Much better!



Putting it into Practice

Data Viz Example (with color)



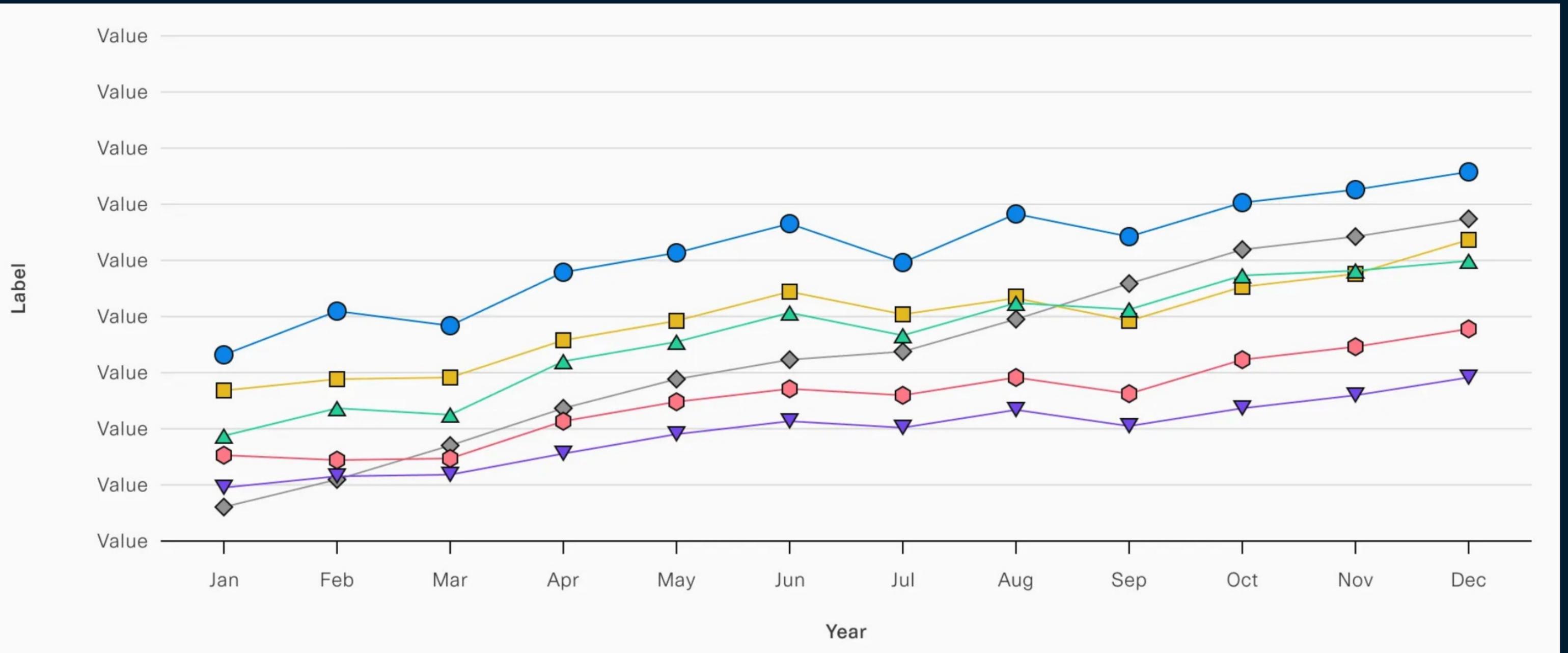
Source: [Visually Accessible Data Visualization](#)

Data Viz Example (with Deuteranopia filter)



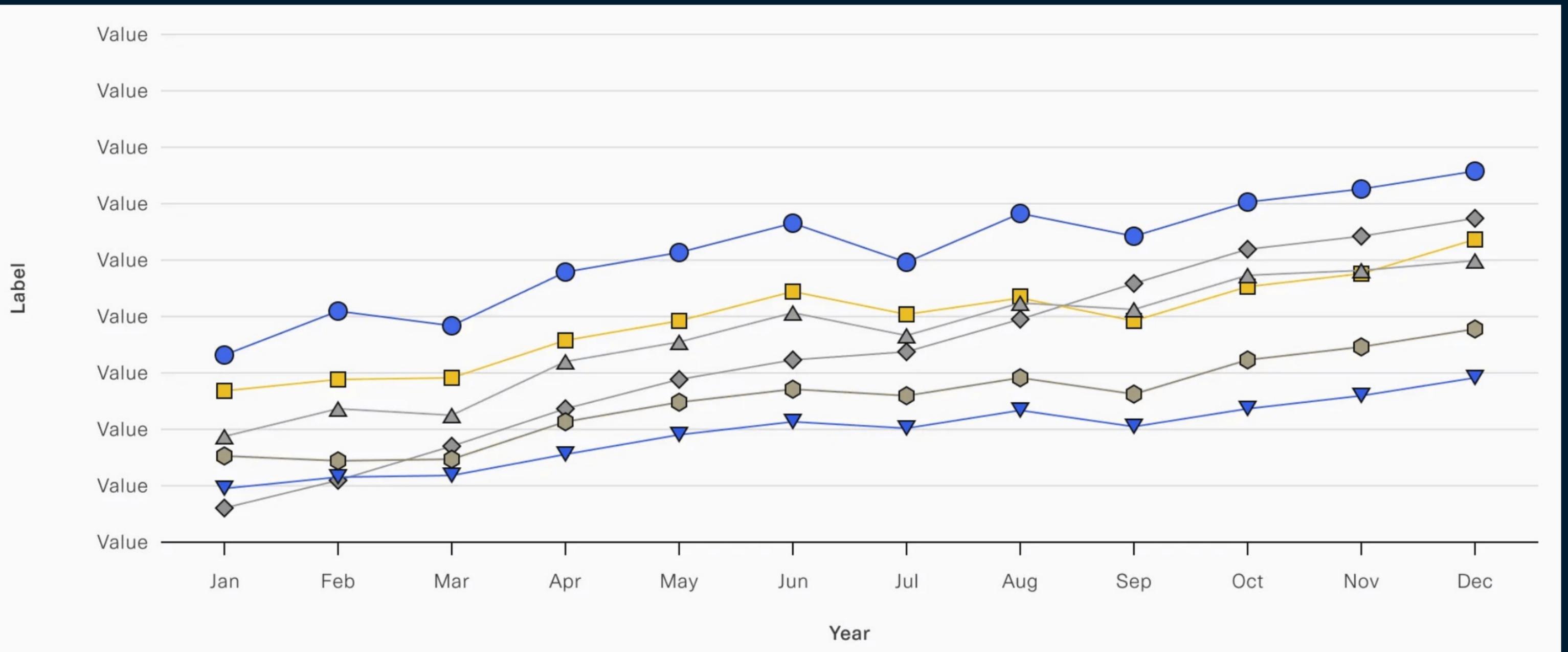
Source: [Visually Accessible Data Visualization](#)

Data Viz Example With Extra Elements



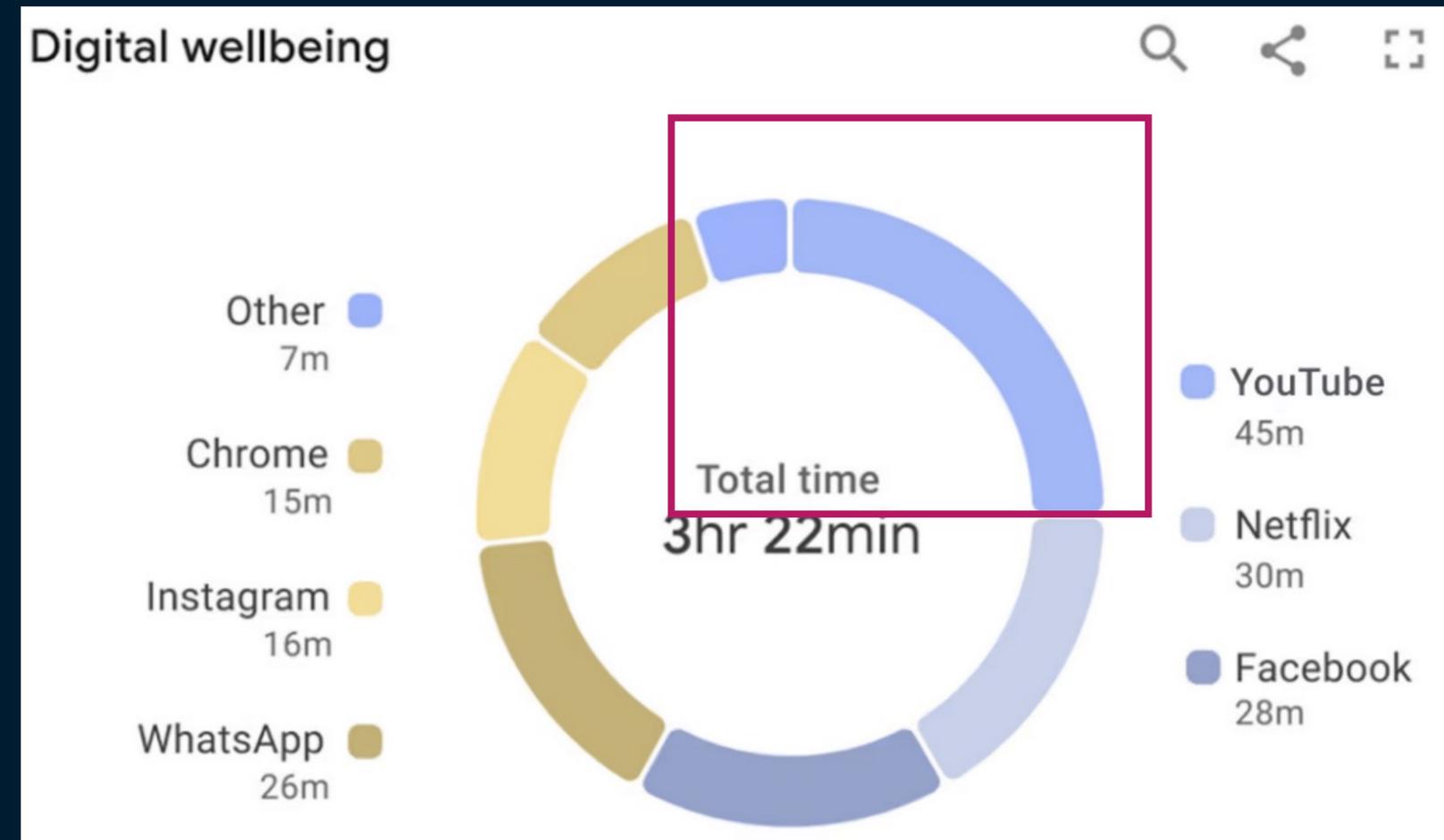
Source: [Visually Accessible Data Visualization](#)

Data Viz Example With Extra Elements (with Deuteranopia filter)



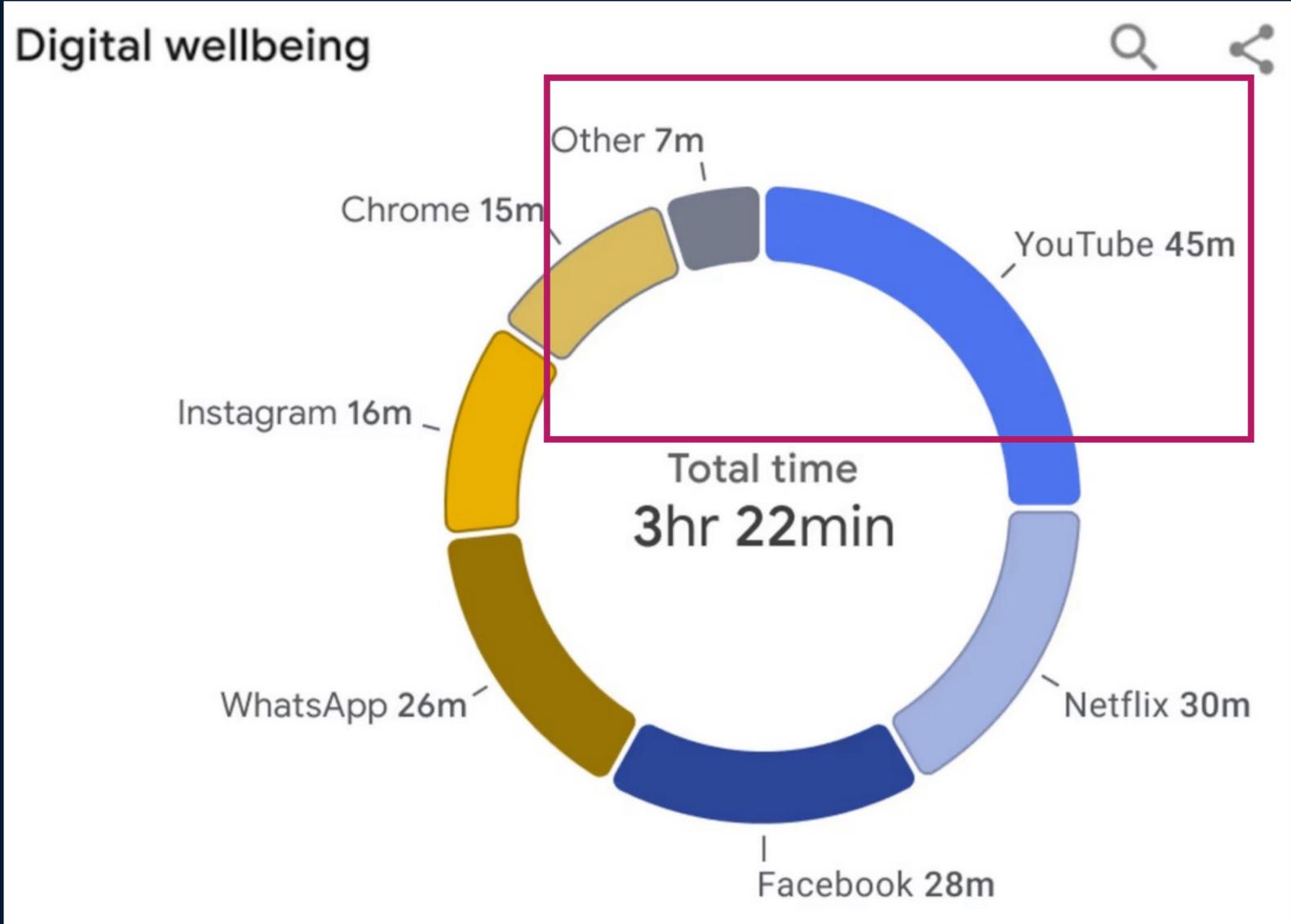
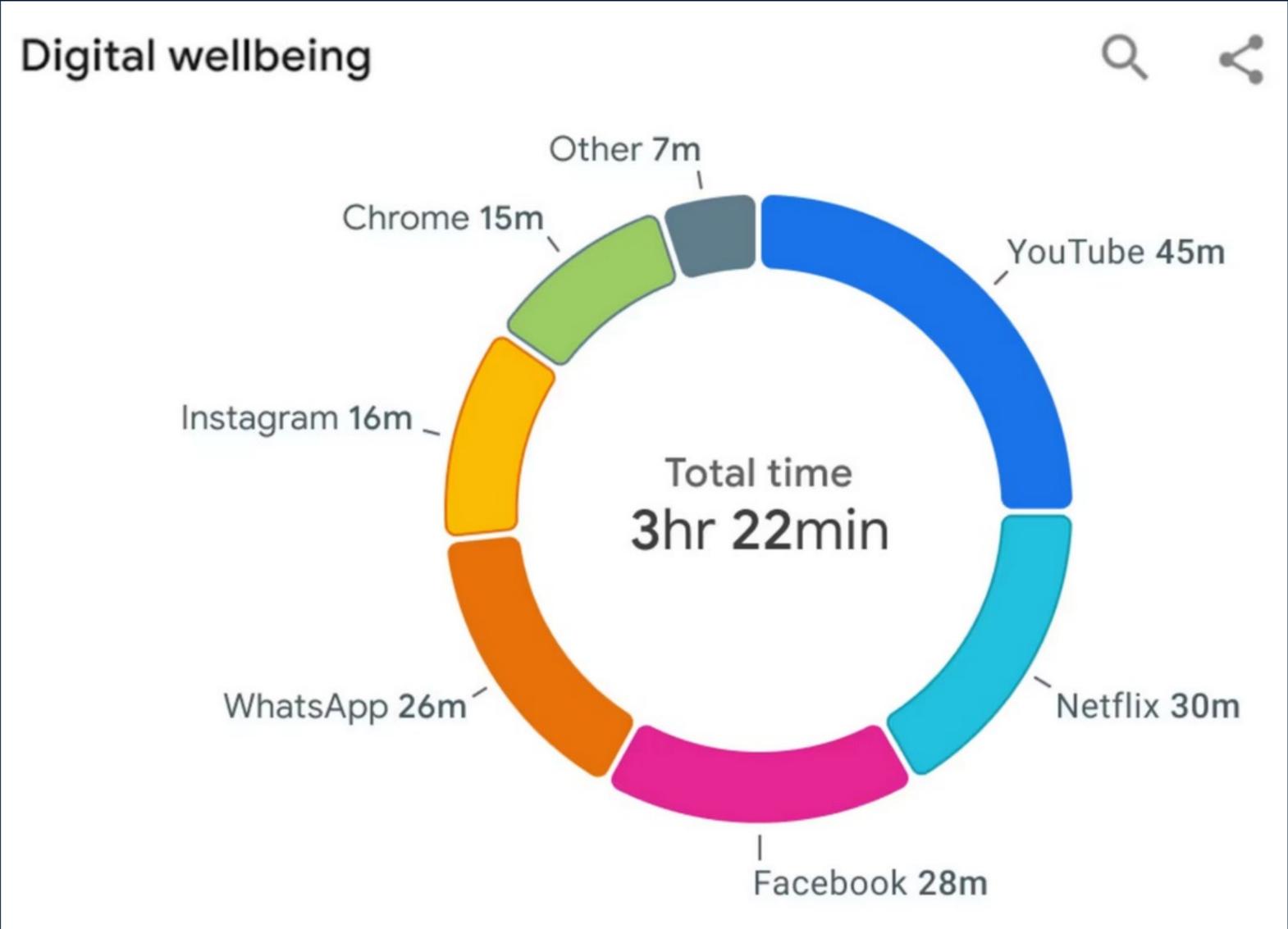
Source: [Visually Accessible Data Visualization](#)

Donut Chart Example (inaccessible version)



Source: [How Accessibility Standards Can Empower Better Chart Visual Design](#)

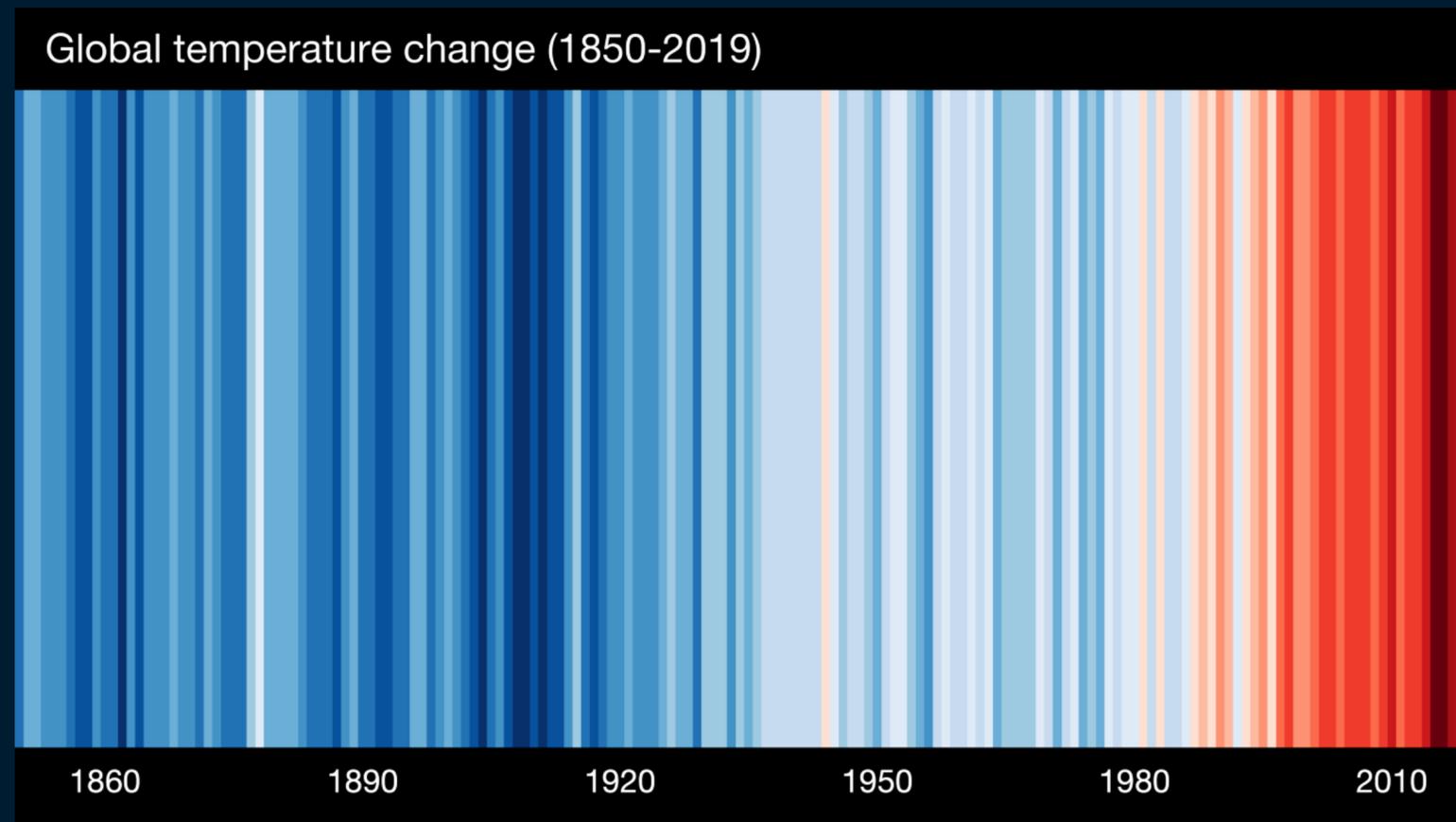
Donut Chart Example (accessible version)



Source: [How Accessibility Standards Can Empower Better Chart Visual Design](#)

Alt Text of Data Visualizations

Remember that informative images/graphics should always include alt text which conveys a text summary of the data or information displayed. If further explanation is needed it should go in the image caption or body copy itself



Alt Text: Colored stripes of chronologically ordered temperatures where they increase in red to show the warming global temperature -

Source: [Writing Alt Text for Data Visualization](#)

One last thought...

It is important to verbally relay any key content that is presented visually so that if someone cannot see your screen, they still know what is being displayed and can follow along.

We often assume that everyone we are meeting with can see what we are sharing and we might say something like "As you can see here..." or throw up some sort of graph and not explain the data.

Have you ever had experience where you're calling into a meeting on your phone where you couldn't see what was being shared? I bet you were frustrated at times when people referenced things they were seeing but you couldn't.

Questions?

Please email me at micburk@sandia.gov if you would like a copy of these slides or have other accessibility-related questions 😊