

## CHECKLIST FOR DATA VISUALIZING ELEMENTS AND TABLES

The purpose of these guidelines is to ensure that non-photograph visual elements such as graphs, diagrams, tables, infographics or other data visualizations present in academic publications fulfil the accessibility requirements regarding the suitability of presentation, use of color and contrasts. The target audience of the guidelines is publishing editors, designers and others who work with the images included in the digital publications.

NB: The guidelines are not intended to assess the accessibility of photographs or artistic images. For these, carefully written alternative descriptions as well as ensuring adequate image quality are essential for accessibility. For purely decorative images one should ensure the code mark-up is correct.

### 1. The reasoning behind using a visualization or tables

A. Content-related reasons:

- clarifies the presentation of information
- helps reader to identify patterns or make comparisons
- standard method of presenting information in the field of study

B. Layout-related reason: to add visual liveliness or color within the publication

If A, read sections 2-5.

If B, go to section 6.

### 2. Choose the most suitable way to present the information in question

If it's a field specific way to present the information (e.g. heat maps, tree diagrams), see section 7.

If it is general data visualization, use the following criteria to pick suitable presentation.

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## Diagrams

Use the most appropriate type of diagram. For simple diagrams, consider the following examples:

### Pie chart:

- Illustrates numerical proportions: the entire pie represents an entirety (100%), each slice a proportion thereof.
- The number of slices should be moderate so that they can be distinguished by color (and texture).
- Slices should not be too thin to remain visible.
- It is recommended to include labels directly on the chart.

### Bar chart:

- Each bar represents a category of data, the length or height of the bar is proportional to the value it represents and to the values of other bars within the chart.
- Can be horizontal or vertical: one axis represents different categories (e.g. different years) while the other represents the values. The category names and values should be clearly displayed.
- The different bars need to be easy to tell apart: use space between bars, make sure the contrast ratio between the bars and the background is at least 1:3.
- Use of color: if different colors are used to represent different groups or categories, make sure the color is not the only way to distinguish categories: use shades or textures or clearly label with text.

### Line chart:

- Data points connected with line segments to demonstrate changes in value, read from left to right.
- A horizontal axis represents progression (usually time), a vertical axis represents the values of chosen data points.
- If the chart includes multiple lines, make sure they can be distinguished: use colors that can be told apart even in greyscale, or different line textures. Avoid “line spaghetti”.
- If possible, put labels or explanations close to each line.

Evaluate the suggested diagram type for the data set in question, change the type if necessary. If there's a lot of data within one chart, meeting every WCAG criteria may prove difficult: consider breaking it to smaller units or aim to make it as clear and concise as possible, and provide the alternative description or better still long description (see section 4).

## Tables

While tables are not exactly data visualizations, they are a common way to represent data, and their accessibility needs to be considered:

- Ensure the table contains data that will be compared across rows. Avoid presenting lists in adjacent columns unless they are being compared. If not, use a more appropriate format and layout (e.g. lists, text boxes).
- To avoid horizontal scrolling, choose more vertical table settings, i.e. fewer columns and more rows.
- Ensure the correct table mark-up for accessibility: mark-up header cells, define tables areas and scopes properly if the table is not regular.

## 3. Check compliance with WCAG criteria related to visual presentations

### WCAG 1.4.1 Use of Color

Information must not rely solely on color. Is the diagram or table understandable in grayscale? If yes, color use is likely acceptable. If not, check the following:

- Are there labels, keys and other explanatory text? If not, add text/numbers close to the bars, lines or slices they refer to. Make sure the text is readable.
- If necessary, add guiding lines to indicate what each label refers to.
- If the table uses background color or text color to convey information, add explanatory text or symbols to ensure perception regardless of color.

### WCAG 1.4.3 Contrast (minimum)

The contrast ratio between text and background must be at least:

- 4,5:1 for regular text
- 3:1 for large text (at least 18 pt or 14 pt and bold).

Use automatic tools to calculate contrast ratios between colors.

### **WCAG 1.4.11 Non-text Contrast**

In diagrams, the contrast ratio between adjacent colors must be at least 3:1. For pie and bar charts, using dark borders around slices or bars is often helpful—then the color next to the segment is the border color. Ensure that line colors in line charts have sufficient contrast against the background (e.g., white).

### **WCAG 1.4.5 Images of text**

Avoid using images of text when the content can be presented as text, e.g. tables or text boxes. Note that this criterion does not include text that is part of a picture that contains significant other visual content, such as graphs, screenshots, and diagrams which visually convey important information through more than just text.

## **4. Has an alternative description been provided?**

For accessibility, all meaningful images must have an alt-text, or, if necessary, a long description. Note: In case of multilingual publications, note that alternative text within the alt-attribute cannot include language tagging: the text of the alt-text is always read in the main language of the publication. If multiple languages are needed, choose another way to describe the image, such as linking a long description near the image.

- A. An alt-text has been provided: is it comprehensive? Is the visualization understandable based on the body text, possible caption and alt-text alone? If not, consider adding a long description.
- B. No alt-text has been provided: unless the image is purely decorative, add or request alt-text.
- C. A long description has been provided: choose a suitable format. Long descriptions can include tables, lists or language tagging.

## **5. Other things to check**

Image quality: is the image clear, not pixelated or blurred. Can it be moderately enlarged without a significant loss in quality?

Image format: EPUB supports the following image formats: jpg, jpeg, png, webp, gif and svg. Png is generally preferred for data visualizations unless a vector format (svg) is available.

Text on image: if the image contains text, ensure the font size is sufficient and text is easily readable within the text, as unlike the body text within a reflowable publication, the text within an image cannot be enlarged (note that WCAG does not set minimum requirements for font size or type).

## **6. Layout images: the aim or the image is to bring visual liveliness**

If the image can be produced in an accessible way, feel free to add images even if they are not important for content. The purpose of accessibility requirements is not to reduce the number of images, but to ensure that as many people as possible can understand the information they contain. If the image does not contain any information but is purely decorative (e.g. color blocks or other non-informative elements), make sure it is marked up correctly. A decorative image must contain empty alt attribute (`alt=""`) and a role as a presentation. A decorative image cannot have a caption, nor be referenced in the body text.

## **7. Justified reason for a specific presentation type or format**

If there is a justified reason to use a specific format, WCAG requirements related to visual presentation should be followed only when it is possible. A justified reason can be e.g. a customary or field-specific way to represent certain data set. For example, a heat map that uses only color to convey information is allowed, as it is a well-established way to represent information.