Slide number	Description of presentation
Slide 1	Data visualisation and digital accessibility: how can we help?
Slide 2	Hello. My name is Hannah Thomas I work for the Government Analysis Function. And my role is to help people in government improve the communication of their data, statistics and analysis. A big part of my team's work is about digital accessibility.
Slide 3	Digital accessibility is all about making content published online easy to access and use for all users, regardless of impairment, medical condition or disability.
Slide 4	The best way to get a better understanding of it is to do some empathy exercises
Slide 5	First up, alternative text
Slide 6	This is an example of how a chart might look in a government statistical publication. The headline title reads: Figure 1: European and North American residents helped to push visits to the UK in May 2022 up higher than the previous year The statistical title reads: Overseas residents' visits to the UK by month, January 2018 to May 2022 The legend reads: All visits (thousands) North America (thousands) Europe (thousands) Other countries (thousands) Then there is the chart Followed by the source information: Office for National Statistics – International Passenger Survey Then information on how youcan download the chart (an image, a csv file or an Excel file)
Slide 7	For screen reader users they might get the following content read out to them The headline title, the statistical title and then something like this in place of the chart:

	Clickable link all visits thousands, Clickable link North America thousands clickable link Europe thousands clickable link other countries thousands
	May 22 Dec 21 July 21 Feb 21 Sept 20 Apr 20 Nov 19 Jun 19 Jan 19 Aug 18 Mar 18
	Zero comma zero zero zero comma one zero zero zero comma two zero zero zero comma three zero zero zero comma four zero zero zero comma five
	This would be followed by the source and download information.
Slide 8	Or they may get something like this:
	The headline title, the statistical title, then something like this in place of the chart: "Image of line chart showing overseas residents' visits UK Jan 2018 to May 2022"
Slide 9	Or they may get a spreadsheet showing the data used in the chart instead of a description
Slide 10	But, remember a screen reader user is unlikely to be able to see the layout of the spreadsheet properly so will be relying on what is read out, which could be something like this:
	"A1 wrap text Figure 1: European and North American residents helped to push visits to the UK in May 2022 up higher than the previous year A2 Overseas residents' visits to the UK by month, January 2018 to May 2022
	Blank A3, Blank B3, Blank C3, A4 Notes A5 Unit A6 Blank A7 Blank A8 Jan-18 A7 Blank B7 All visits (thousands) C7 North America (thousands) D7 Europe (thousands) E7 Other countries (thousands) A8 Jan 18 B8 2734 C8 321 D8 1790 E8 623 F8 BLANK G8 BLANK A9 Feb 18

	B9 2573 C9 262 D9 1870 E9440 A10 Mar 18 B10 3240 C10 354 D10 2405 E10 480 A11 Apr 18 B11 3404 C11 453 D11 2423 E11528"
Slide 11	How can we help?
Slide 12	Rule: All non-text content has a text alternative that serves the equivalent purpose.
Slide 13	Let us implement this rule. Let us go back to the original example.
Slide 14	A fully descriptive text alternative would be better in place of the chart. The suggestion on this slide is something like this: Visits to the UK by overseas residents fell sharply to very low levels in April 2020 due to the coronavirus (COVID-19) pandemic. Visits from residents of North America have remained low since that time but have started to increase in recent months, standing at 420,000 visits in May 2022. Visits from European residents rose slightly towards the end of 2020 before falling back. In July 2021 they started rising again. In May 2022, there were 2,000,000 visits, almost equal to pre-pandemic levels.
Slide 15	But where should this text alternative go?
Slide 16	When considering where it should go we should remember that the text alternative is not just for screen reader users. This slide shows what the content may look like for people with low vision. They may be able to zoom in and see the text but the chart is harder to zoom in on as to understand charts properly you generally need to see them on one screen. Also, depending on the format

	the chart may get pixelated if you zoom in too close.
Slide 17	Other users who may need a text alternative are those who just don't understand charts.
Slide 18	Or those who struggle to differentiate between colours.

We can help by using different colours, but with line charts it is pretty much impossible to pick colours that work for all users. |
| Slide 19 | So, we need to make space for the text alternative |
| Slide 20 | It should go directly underneath the chart before the information on sources or data downloads and before any notes. |
| Slide 21 | In some situations, a table may be a good text alternative. You can publish some charts on GOV.UK that have a toggle function, allowing people to toggle between a chart or a table view.

But the table must be fairly short and simple. It must be marked up properly so screen reader software can understand it. |
| Slide 22 | On Twitter we can add alt text.

This slide shows a tweet saying: "Imagine if all photos you saw on Twitter looked like this? You'd feel like you were missing out, wouldn't you? I'm blind and this is what I see. But YOU can change this by simply hitting the ALT (alternative text) button and adding an image description. It's that easy!" The tweet has a blurred image underneath the text. |
| Slide 23 | This slide has a second screenshot of a tweet showing an example of where someone has added a fairly detailed image description of a person eating a pastry using the alt text function on Twitter. |
| Slide 24 | It is not always easy to write alt text on Twitter for charts. This slide shows a screen shot of a tweeted chart with an |

	image description that could be seen as too brief.
Slide 25	This slide shows another screenshot of a tweet with a very in depth text description of a chart.
Slide 26	Regardless of difficulties we should always try to provide alt text on Twitter. This slide has two screenshots of tweets. One from Twitter Accessibility which says "If you haven't already, here are instructions on how to enable the image description (alt text) reminder". The other shows the Twitter homepage for an account called "Accessibility Awareness".
Slide 27	Now lets talk about colours!
Slide 28	Back to some empathy exercises
Slide 29	This slide shows a stacked bar chart that a person with no impairments, medical conditions or disabilities, would have no problems seeing properly.
Slide 30	This slide shows how this chart might look to people with two different types of colour blindness. They would not be able to see the difference between the light pink and light blue used in the chart.
Slide 31	Colours are also important for communicating information on legends. This slide shows a clustered bar chart with a legend.
Slide 32	Some users will not be able to match the label to the data series using the legend as the colours look too similar. This slide shows the clustered bar chart with four different types of colour blindness filter to illustrate this point.
Slide 33	How can we help with colours?
Slide 34	There are two rules for colours in data visualisations. These come from the success criterion in the internationally recognised Web Content Accessibility Guidelines 2.1. They are:

	3 to 1 contrast ratio for adjacent elements. And: Do not use colour alone to communicate a message
Slide 35	This slide shows our recommended colour palette for categorical data. All colours in this palette have a 3 to 1 contrast ratio with a white background. When used in the order presented, the adjacent colours have at a 3 to 1 contrast ratio.
Slide 36	Let us look at using this colour palette. This slide shows a clustered bar chart with four data series.
Slide 37	This chart passes the first rule – all adjacent elements have at least a 3 to 1 contrast ratio.
Slide 38	This slide considers if the clustered bar chart passes the rule about not using colour alone to communicate a message
Slide 39	This slide shows the clustered bar chart fails this rule because it uses a legend to match the data series label to the bars
Slide 40	This slide shows the clustered bar chart with a colour blindness simulation shown on top. It illustrates that some users will not be able to match the series label to the bar as two of the colours appear the same.
Slide 41	How can we help people use the legend?
Slide 42	We can add in a sentence underneath the title that says "The legend is presented in the same order and orientation as the bars in each cluster". This allows users to match the labels using placement alongside colour
Slide 43	What about line charts? This slide shows a real life chart with multiple lines for covid cases per million people for selected European countries.

Slide 44	This line chart fails the contrast ratio rule but technically passes the rule about not using colour alone as the lines are labelled instead of using a legend. Arguable though as you do need colour to follow the lines through the chart.
Slide 45	How can we help make this chart better?
Slide 46	Sometimes dotted and dashed lines are suggested. This can be argued to technically pass the rule about not only using colour to communicate as it technically uses colour and shape. But it would probably fail the colour contrast rules as you have orange on orange and blue on blue. It is also quite obvious that this not a great chart.

Furthermore, dotted and dashed lines can also cause misinterpretation. People may think the data is incomplete, provisional, forecasted, a target or a subcategory.
Finally, they add clutter.
They can be useful in some situations, but they are not the answer here. |
Slide 47	Data markers are also sometimes suggested. But again they add clutter and there are still issues with contrast where some lines cross. They do not really solve the problem either.
Slide 48	A focus chart is better – bring out the story you want to tell. This may technically have some issues passing the rules as the grey is too light against the white background to pass the contrast requirements. But if you argue that the essential parts of the chart pass then you can argue the rules are met.
Slide 49	Small multiples are a very useful tool in this instance. They pass all the accessibility rules and they allow for much easier comparison between countries than when all the lines are on the same chart.
Slide 50	Other formatting notes
Slide 51	Slide shows two charts. One is more cluttered than the other

Slide 52	The cluttered chart has a red cross over it. The message is – keep charts simple. Don't use background colours, avoid legends when possible, don't use data markers.
Slide 53	Slide shows two bar charts. One has slanted text and vertical bars. The other has horizontal text and bars.
Slide 54	The bar chart with slanted text has a red cross over it. The message is – always keep text horizontal.
Slide 55	The slide has two line charts. One has 15 dark grey gridlines. The other has 8 light grey gridlines.
Slide 56	The chart with 15 dark grey gridlines has a red cross over it. The message is – do not have too many gridlines and do not make them too dark or they make it hard to see the data. The contrast requirements do not apply to gridlines as they are not a necessity to understand the data.
Slide 57	Thank you. You can access all the guidance and support we provide on our support page. Please let us know what you thought of this presentation by filling out our survey.