

esri

# Accessible Web Mapping Apps

Kelly Hutchins

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SEE  
WHAT  
OTHER  
CAN'T

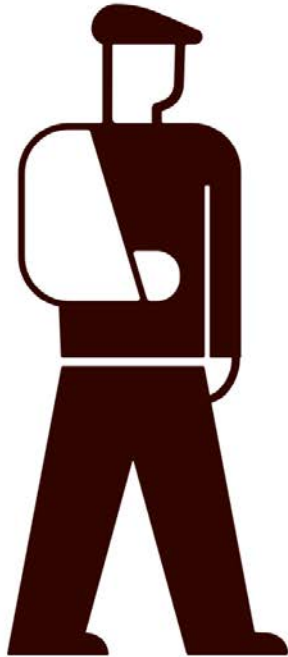
# What is accessibility

Make content usable for everyone regardless of abilities.

# Wide range of disabilities



Permanent



Temporary



Situational

# Why is accessibility important?

- The ADA and Section 508
- People with different abilities should have equal access
- Good accessibility is good user experience

# How is Esri doing?

Reviewing  
products for  
compliance

Voluntary Product  
Accessibility  
Templates (VPATs)

Fixing accessibility  
issues

Building accessible  
components,  
features, and apps

Sharing knowledge  
and best practices

# WCAG

## Web Content Accessibility Guidelines

[\[contents\]](#)

## Web Content Accessibility Guidelines (WCAG) 2.0

W3C Recommendation 11 December 2008

### This version:

<http://www.w3.org/TR/2008/REC-WCAG20-20081211/>

### Latest version:

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### Editors:

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### Previous Editors:

Wendy Chisholm (until July 2006 while at W3C)  
John Slatin (until June 2006 while at Accessibility Institute, University of Texas at Austin)  
Jason White (until June 2005 while at University of Melbourne)

Please refer to the [errata](#) for this document, which may include normative corrections.

See also [translations](#).

This document is also available in non-normative formats, available from [Alternate Versions of Web Content Accessibility Guidelines 2.0](#).

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### Abstract

Web Content Accessibility Guidelines (WCAG) 2.0 covers a wide range of recommendations for making Web content more accessible. Following these guidelines will make content accessible to a wider range of people with disabilities, including blindness and low vision, deafness and hearing loss, learning disabilities, cognitive limitations, limited movement, speech disabilities, photosensitivity and combinations of these. Following these guidelines will also often make your Web content more usable to users in general.

WCAG 2.0 success criteria are written as testable statements that are not technology-specific. Guidance about satisfying the success criteria in specific technologies, as well as general information about interpreting the success criteria, is provided in separate documents. See [Web Content Accessibility Guidelines \(WCAG\) Overview](#) for an introduction and links to WCAG

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## Web Content Accessibility Guidelines (WCAG) 2.1

W3C Recommendation 05 June 2018



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<https://w3c.github.io/wcag/21/guidelines/>

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<https://www.w3.org/WAI/WCAG21/implementation-report/>

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### Previous Recommendation:

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Wendy Chisholm (W3C)  
John Slatin (Accessibility Institute, University of Texas at Austin)  
Jason White (University of Melbourne)

Please check the [errata](#) for any errors or issues reported since publication.

See also [translations](#).

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### Abstract

Web Content Accessibility Guidelines (WCAG) 2.1 covers a wide range of recommendations for making Web content more accessible. Following these guidelines will make content more accessible to a wider range of people with disabilities, including accommodations for blindness and low vision, deafness and hearing loss, limited movement, speech disabilities, photosensitivity, and combinations of these, and some accommodation for learning disabilities and cognitive limitations; but will not address every user need for people with these disabilities. These guidelines address accessibility of web content on desktops, laptops, tablets, and mobile

# What we will cover today

- Focus and keyboard accessibility
- Color and color contrast
- Text alternatives
- Map for non-sighted users
- Test for accessibility





# Focus and keyboard accessibility



# Focus and keyboard accessibility

- WCAG 2.4.7: Interactive elements should have clear focus.



# Focus and keyboard accessibility

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- WCAG 1.3.2: Navigation (tab) order should be logical and intuitive.



# Focus and keyboard accessibility

- WCAG 2.4.7: Interactive elements should have clear focus.
- WCAG 1.3.2: Navigation (tab) order should be logical and intuitive.
- WCAG 2.1.1: Keyboard users should be able to use functionalities using keyboard only.



# Focus and keyboard accessibility

- WCAG 2.4.7: Interactive elements should have clear focus.
- WCAG 1.3.2: Navigation (tab) order should be logical and intuitive.
- WCAG 2.1.1: Keyboard users should be able to use functionalities using keyboard only.
- WCAG 2.1.2: Content does not "trap" keyboard focus within subsections.



Demo: Focus and tab order

Demo: Focus trap in dialog

Example: Accessible App of Electric Charging Stations



# Default map navigation

Action	MapView behavior
Arrow Keys	Nudge the view to left, right, up or down
N	Adjust the view to point north
A	Rotate the view counterclockwise
D	Rotate the view clockwise
+	Incrementally zoom in at the center of the map
-	Incrementally zoom out at the center of the map

<https://developers.arcgis.com/javascript/latest/api-reference/esri-views-MapView.html>

# Test focus and tab order

- Tab through page to verify all interactive elements have focus
- Focus order matches intended reading order
- Interact with all links and controls using only keyboard
- No keyboard trap except for modals
- Off-screen/invisible content should not receive focus

# Color and color contrast



# Color and color contrast

- WCAG 1.4.1: Color is not the only visual means of conveying information.



# Color and color contrast

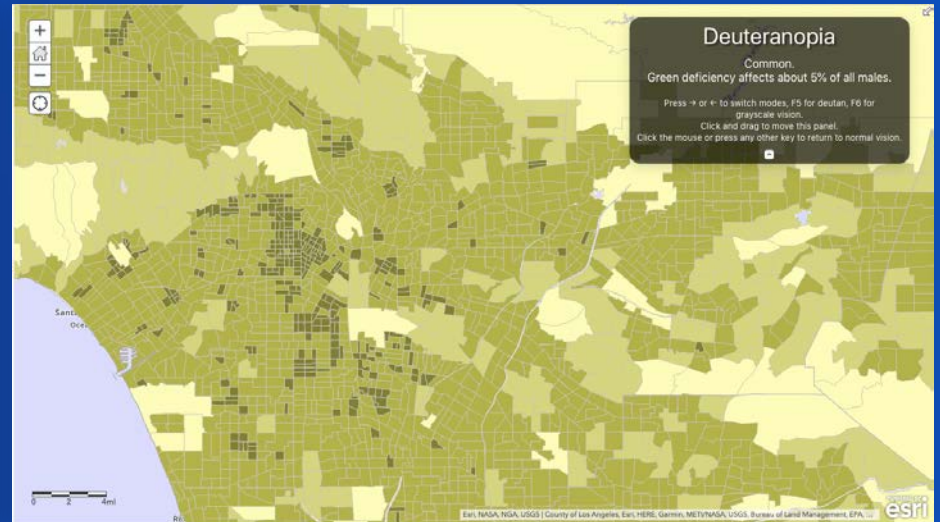
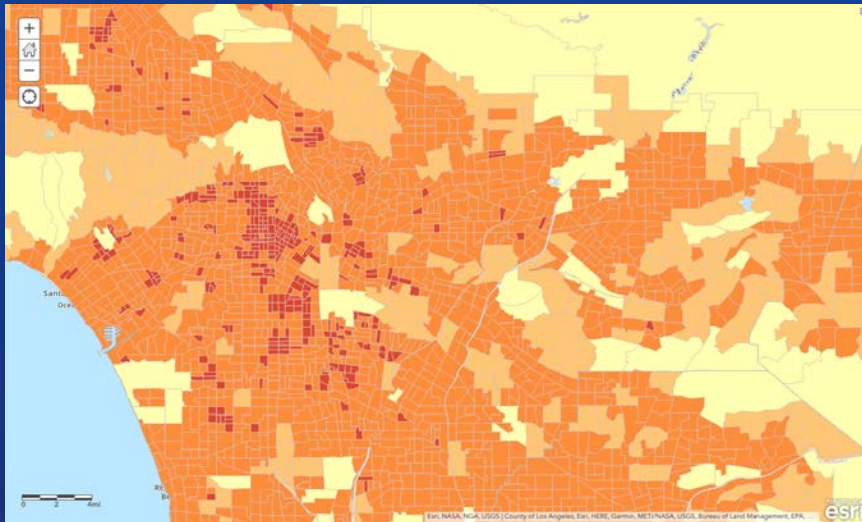
- WCAG 1.4.1: Color is not the only visual means of conveying information.
- WCAG 1.4.3: Text needs to have contrast ratio of at least 4.5:1.



Demo: Color and color contrast

# Color ramp

Use Color Oracle to simulate color blindness



# Color ramp

Use Color Brewer to select colorblind safe colors

The screenshot displays the ColorBrewer 2.0 web application interface. The main panel shows a map of the United States with a blue color ramp applied to county-level data. The interface includes several control panels on the left and top.

**Top Panel:** "Number of data classes: 5" and "Nature of your data: sequential" (selected). Navigation links: "how to use", "updates", "downloads", "credits".

**Left Panel:**

- Pick a color scheme:** Multi-hue and Single hue options with color swatches.
- Only show:** ☒ colorblind safe, ☐ print friendly, ☐ photocopy safe.
- Context:** ☐ roads, ☐ cities, ☒ borders.
- Background:** ☒ solid color, ☐ terrain.
- Color transparency:** A slider bar.

**Right Panel (5-class PuBu):**

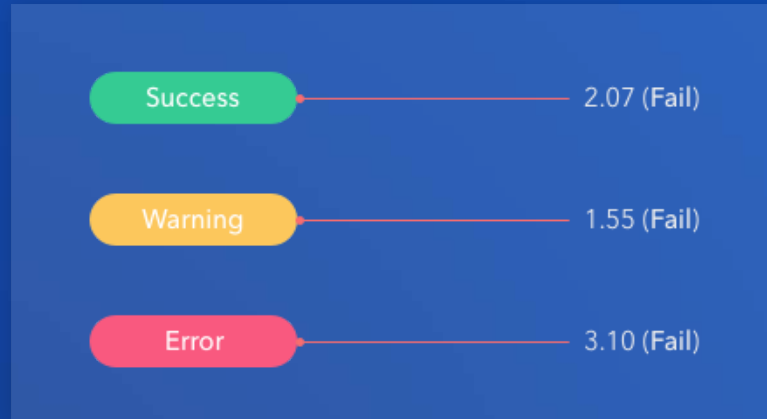
- HEX color codes: #f1eef6, #bdc9e1, #74a9cf, #2b8cbe, #045a8d.
- EXPORT button.

**Footer:**

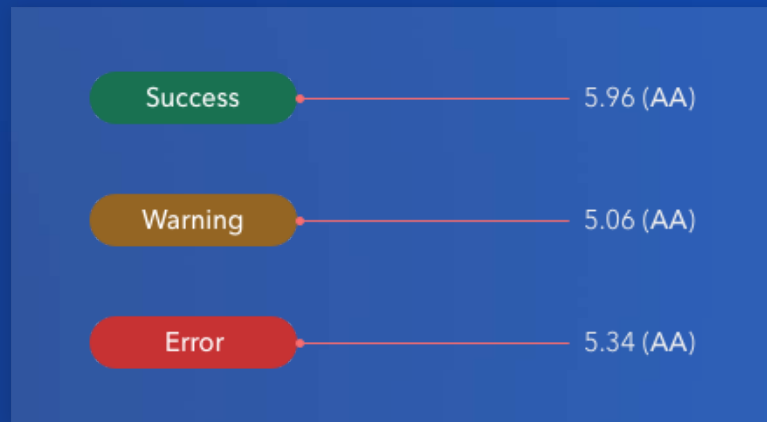
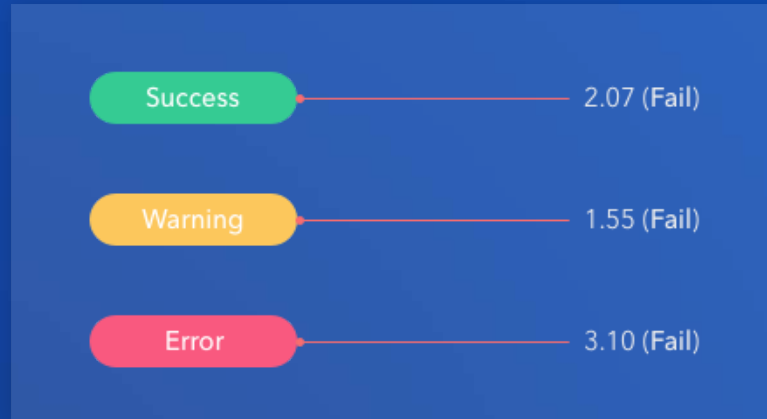
- © Cynthia Brewer, Mark Harrower and The Pennsylvania State University
- [Source code and feedback](#)
- [Back to Flash version](#)
- [Back to ColorBrewer 1.0](#)
- axismaps logo



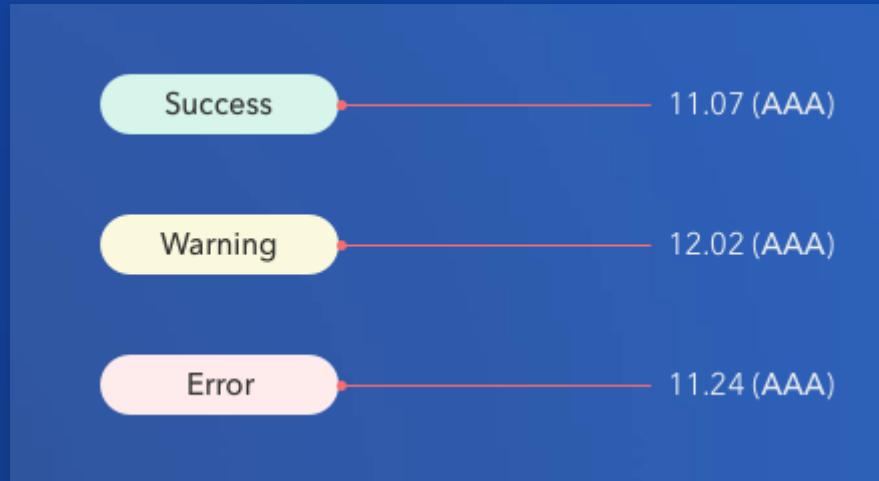
# White text on colored background



# White text on colored background



# Flipping the contrast



Success	11.07 (AAA)
Warning	12.02 (AAA)
Error	11.24 (AAA)

# Test color and color contrast

- Look for content differentiated by color only
- Use a contrast ratio calculator
- Review color contrast issues reported by automated test tool (aXe)

# Text alternatives

WCAG 1.1.1: Non-text content has text alternative.



If an image conveys meaning, write effective alternate text.

If an image is decorative, use `alt=" "`.

Example of descriptive alt text

Example of empty alt text

# Write effective alternate text

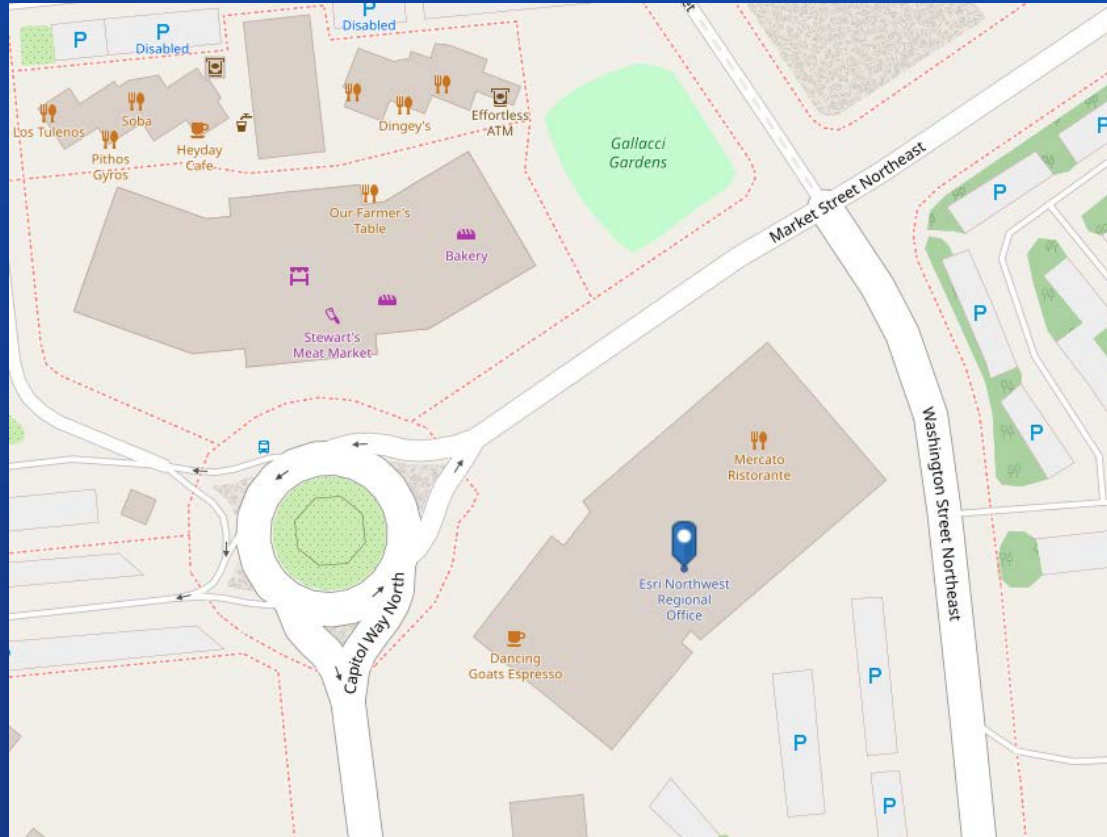
- Think about how users will be doing with the information
- Be accurate in presenting the content in images
- Be succinct
- No need to use the phrase "image of ..." to describe images



Map for non-sighted users



# Display a text description of the map



"The Esri Olympia regional office is located at 111 Market St NE Suite 250 across the street from the Farmer's Market."

# Provide data in an alternate format

- Example: Zone Lookup without map
- Example: Zone Lookup with map

# WCAG-BasicViewer

## Incident Map

Search:

### Feature list

- ☐ Release of Substance incident on August 7, 2008
- ☐ Serious Injury (NEB or TSB) incident on August 14, 2008
- ☐ Fire incident on August 25, 2008
- ☐ Fire incident on September 3, 2008
- ☒ Serious Injury (NEB or TSB) incident on September 15, 2008

Incident Number : INC2008-092  
Incident Types : Serious Injury (NEB or TSB)  
Reported Date : September 15, 2008  
Nearest Populated : Valemount Centre

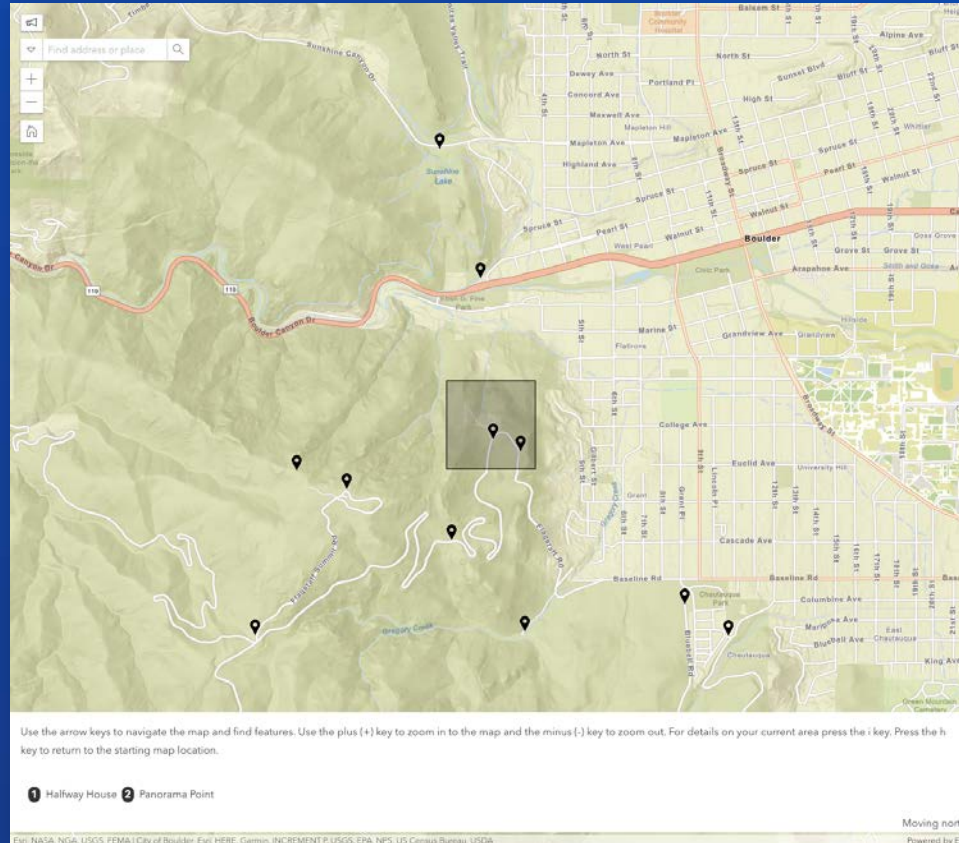
Press ALT + 0 to 7 keys for fast navigation

The map displays the western provinces and states of North America, including British Columbia, Alberta, Saskatchewan, Washington, and Montana. It is densely populated with icons representing various incidents: green flames for fire incidents and blue figures for serious injury incidents. A blue circle highlights a specific incident location in the Fraser Plateau region of British Columbia. The map includes geographical features like the Neghako Plateau, Fraser Plateau, Queen Charlotte Sound, Columbia Mountains, and Snake River. Major cities like Seattle and Portland are marked. The map is powered by Esri and other data sources like HERE, DeLorme, FAO, NOAA, USGS, and EPA.

GitHub repo: <https://github.com/EsriCanada/WCAG-BasicViewer>



# Accessible map prototype



GitHub repo: <https://github.com/Esri/a11y-map>

# Test for accessibility

1. Automated test
2. Keyboard test
3. Screen reader test
4. Color test



# Automated test with aXe

The screenshot displays the aXe accessibility testing tool interface. On the left, a sidebar lists various accessibility issues found on the page, with 'Images must have alternate text' highlighted as the current issue. The main panel shows the details for this issue, including its description, impact (critical), and a list of elements that violate the rule. The 'Element location' field shows the path `.sdk-home-banner-image > img`, and the 'Element source' field shows the HTML snippet `<img src='./assets/img/home/homepage-banner-sample.png'>`. On the right, a section titled 'To solve this violation, you need to:' provides a list of specific fixes that can be applied to resolve the issue.

**Images must have alternate text**  
</> Inspect Node Highlight

All issues found 96 Run again

ARIA attributes must conform to valid names 2

Elements must have sufficient color contrast 65

Frames must have title attribute 5

**Images must have alternate text 1**

ARIA role must be appropriate for the element 6

Heading levels should only increase by one 3

**Issue description**  
Ensures <img> elements have alternate text or a role of none or presentation

Impact: **critical**  
[Learn more](#)

**Element location**  
.sdk-home-banner-image > img

**Element source**  
<img src='./assets/img/home/homepage-banner-sample.png'>

**To solve this violation, you need to:**  
Fix at least one (1) of these issues:

- Element does not have an alt attribute
- aria-label attribute does not exist or is empty
- aria-labelledby attribute does not exist, references elements that do not exist or references elements that are empty
- Element has no title attribute or the title attribute is empty
- Element's default semantics were not overridden with role="presentation"
- Element's default semantics were not overridden with role="none"

Issue tags: category: text-alternatives wcag2a wcag111 section508 section508.22.a

- Tests rendered page in browser
- Less false positives
- Accessible

Demo: Automated test using aXe



# Keyboard test

Key	Action
Tab, Shift + Tab	Move keyboard focus
Enter	Click links
Enter, Space	Click buttons
Arrow keys	Move within menus, tabs, radio buttons

# Screen reader

<b>OS</b>	<b>Screen reader</b>	<b>Browser</b>
MacOS	VoiceOver	Safari
Windows	NVDA	Firefox
Windows	JAWS	IE/Edge

# Screen reader basics

- A11ycasts: VoiceOver
- A11ycasts: NVDA

# Color test

- Automated color contrast test results may need manual verification
- Look for information differentiated only by color

# What we covered today

- Focus and keyboard accessibility
- Color and color contrast
- Text alternatives
- Map for non-sighted users
- Test for accessibility



# Additional resources

- MDN: Accessibility
- Google Developers Web Fundamentals: Accessibility
- The A11Y Project
- GeoNet: Accessibility

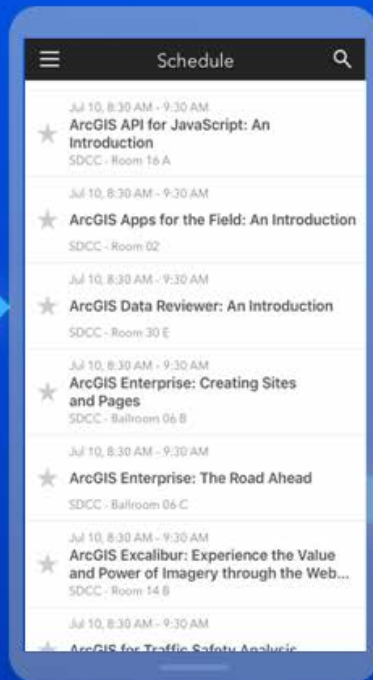


# Please Share Your Feedback in the App

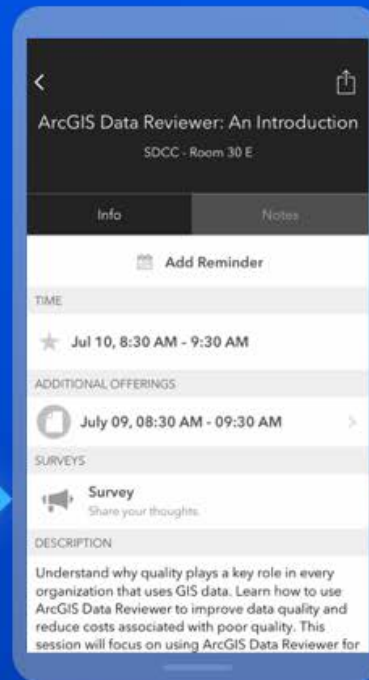
Download the Esri Events app and find your event



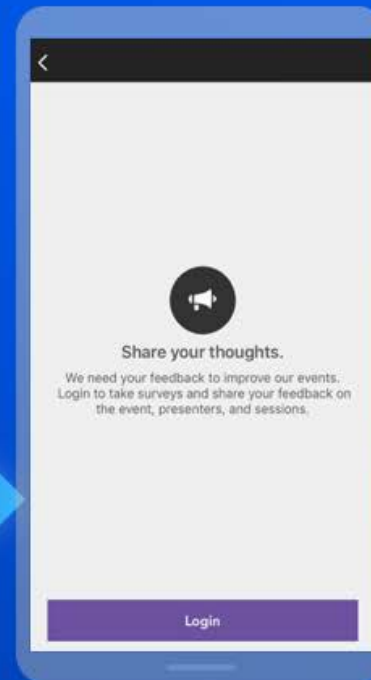
Select the session you attended



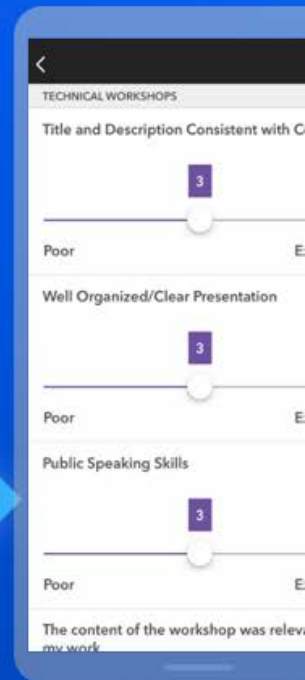
Scroll down to "Survey"



Log in to access the survey



Complete the survey and select "Submit"





our apps and suggestions with us...

apps!

impressions on the latest API

for next UC or Developer Summit related to web development

A detailed topographic map of a mountainous region, featuring contour lines and various shades of green, brown, and white representing different elevations and terrain types. The map is the background for the lower half of the slide.

[jsapi\\_pm@esri.com](mailto:jsapi_pm@esri.com)



# Questions?

Link to slides: <https://arcg.is/1jGXS5>

