



Accessibility testing: What, Why and How

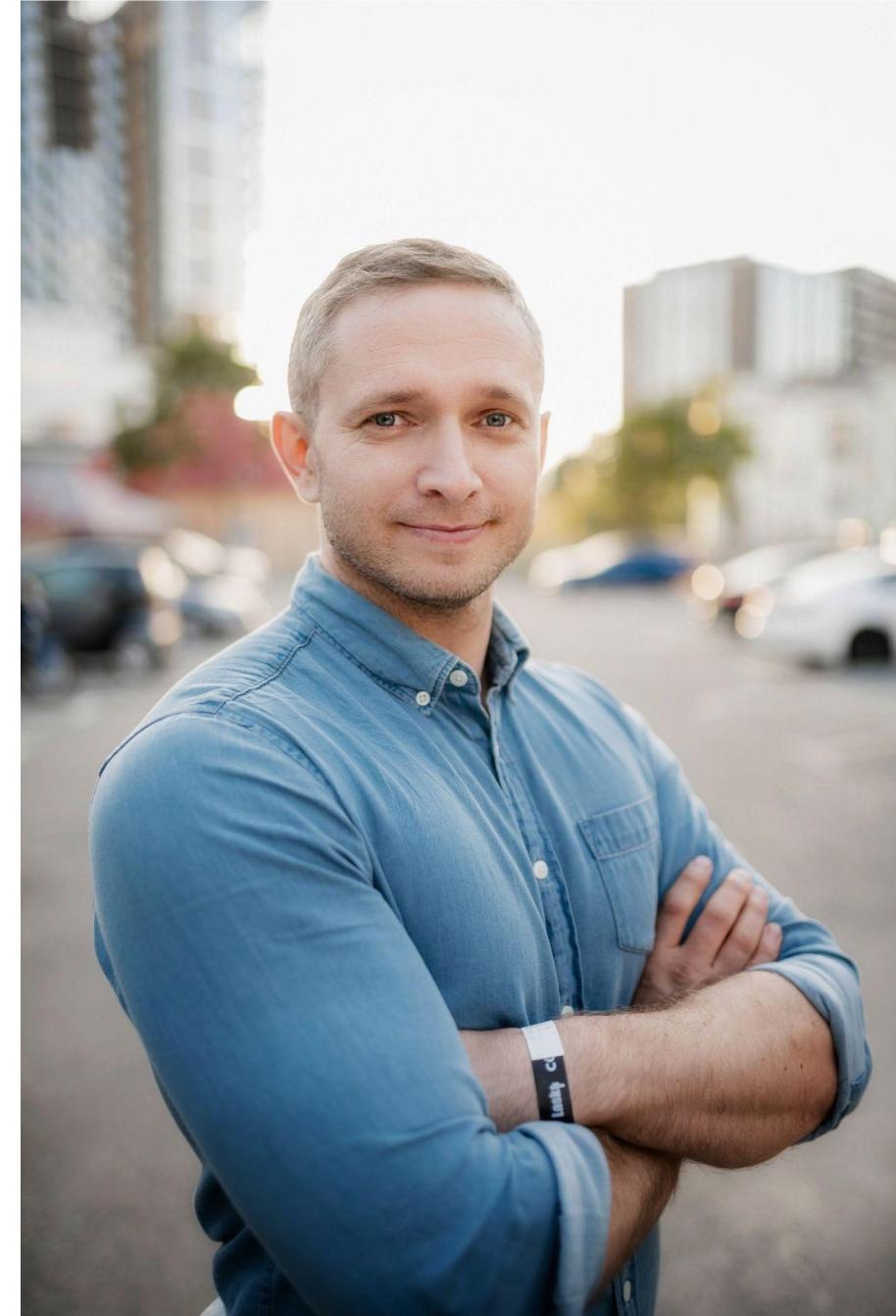
Serhii Sobur

Kyiv, 06-12-2022

About me

Serhii Sobur

- Test Lead at Levi9 / Principal QA Engineer
- 7+ in automation (JS/TS) and manual testing
- UI, API



AGENDA

01 Accessibility fundamentals

02 Requirements

03 Web-Accessibility testing

04 Tools

05 Questions and end slides

01

Accessibility fundamentals



What is accessibility?

Accessibility is the design of products, devices, services, vehicles, or environments so as to be usable by people with disabilities¹¹

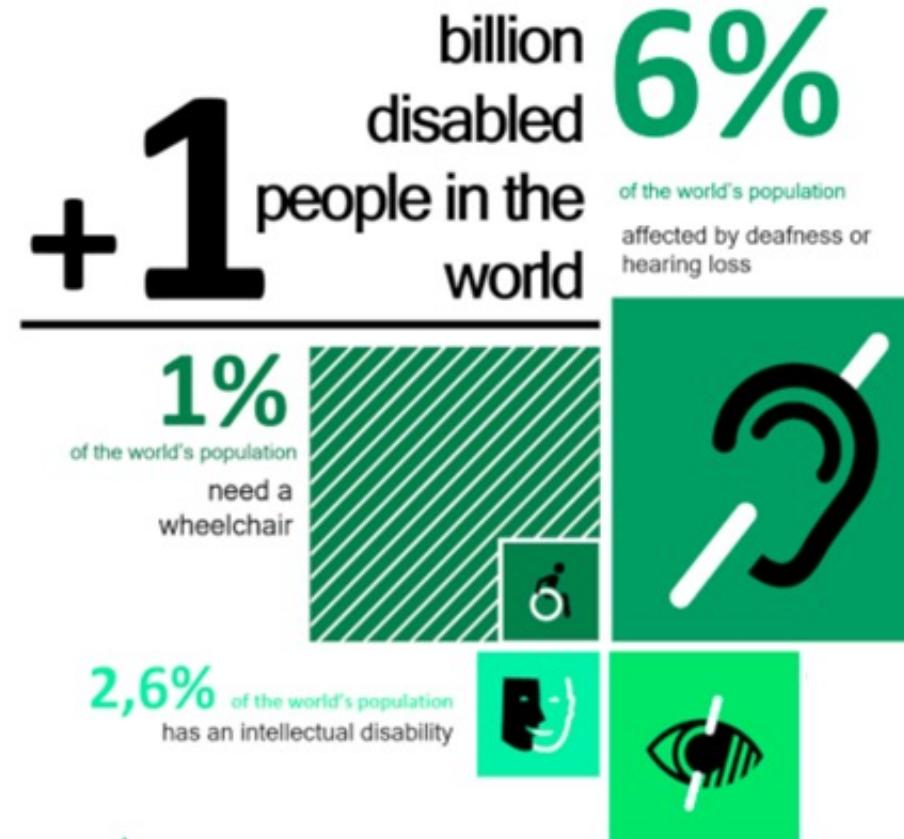
Web accessibility is the practice of making websites, applications, and web tools properly designed and coded, usable by as many people as possible



Global Statistics

According to World health organization:

- identified over **1,3 billion** disabled people
- **253 million (3,2%)** people are affected by some form of blindness and visual impairment
- **466 million (6%)** people have a disabling deafness and hearing loss
- **200 million (2,6%)** people have an intellectual disability (IQ below 75)



Digital accessibility in Ukraine

Study on the accessibility of e-government services and tools for the citizens of Ukraine (2020):

- **82 websites and 7 service platforms** were tested in Kyiv
- **0 sites** were WCAG 2.0 AA compliant
- **15 widespread issues** (10 of them are critical)



Persona

- visual disabilities (color blindness, blindness)
- auditory disabilities (hard-of-hearing, deafness)
- cognitive, learning, and neurological disabilities (poor memory, dyslexia)
- physical disabilities (hand movements, muscle slowness)
- speech disabilities (stuttering, mutism)
- multiple disabilities

	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

Reasons to consider accessibility improvements

WHY DOES IT MATTER?

- It's inclusive and provides equal access to everyone, especially people with disabilities
- It promotes usability
- It is the right thing to do
- Improved SEO
- Legal obligation

WHO BENEFITS?

- It's better for society and everyone
- It makes sense financially

02

Requirements



Accessibility Legislations

UN Convention on the rights of persons with disabilities

EU Web accessibility directive (EN 501–349)

Section 508

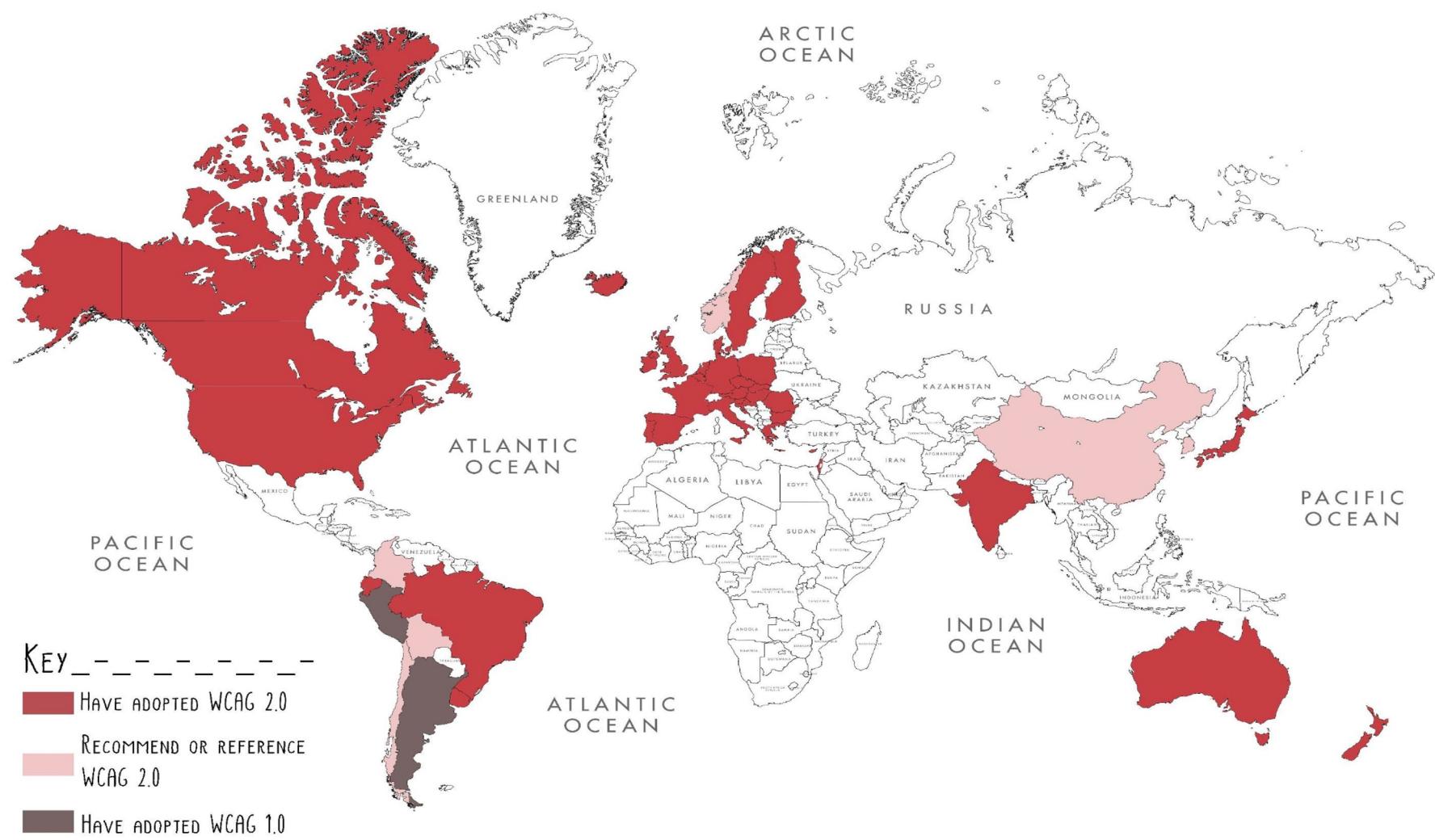
ADA (Americans with disabilities act)

Guidelines:

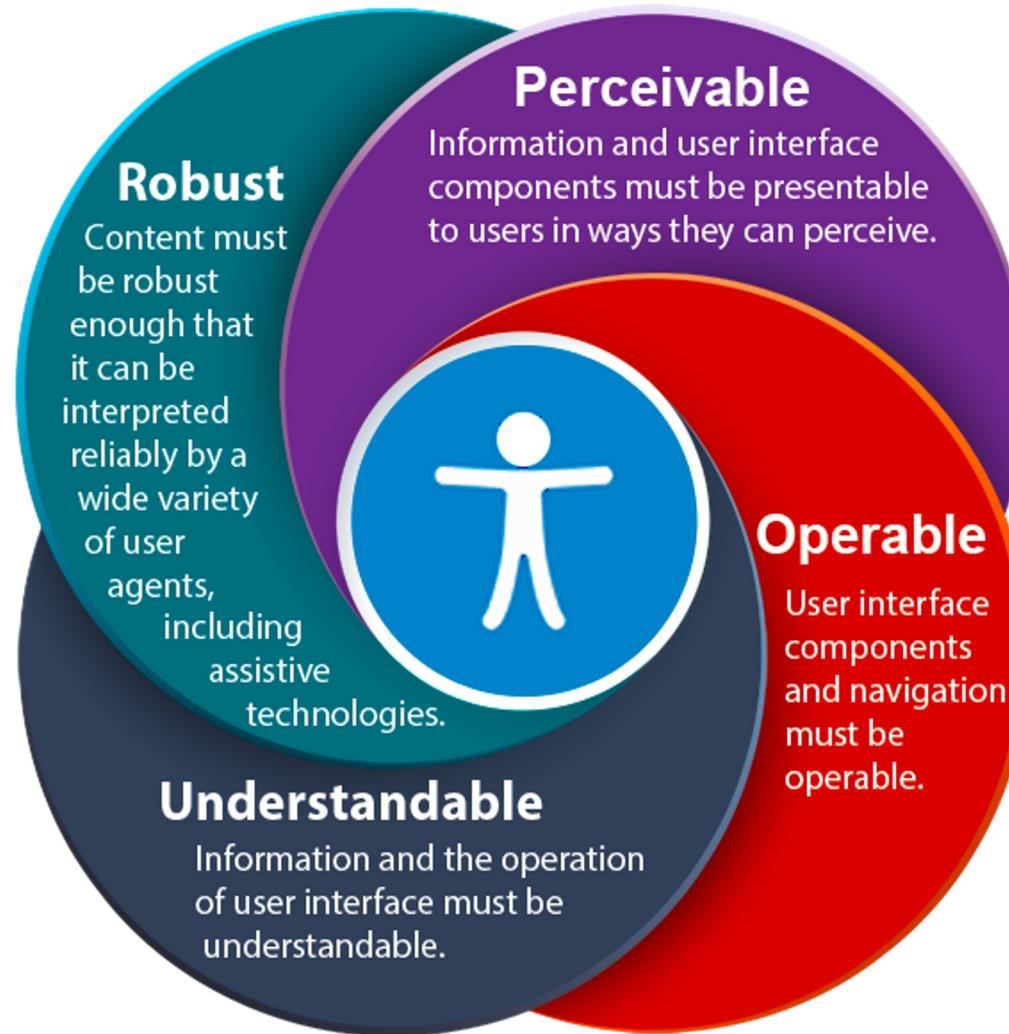
- WCAG 2.1 (Web content accessibility guidelines)
- WAI-ARIA (Accessibility rich internet applications)
- ATAG (Accessing tool accessibility guidelines)
- UAAG (User agent accessibility guidelines)



Countries that have adopted WCAG

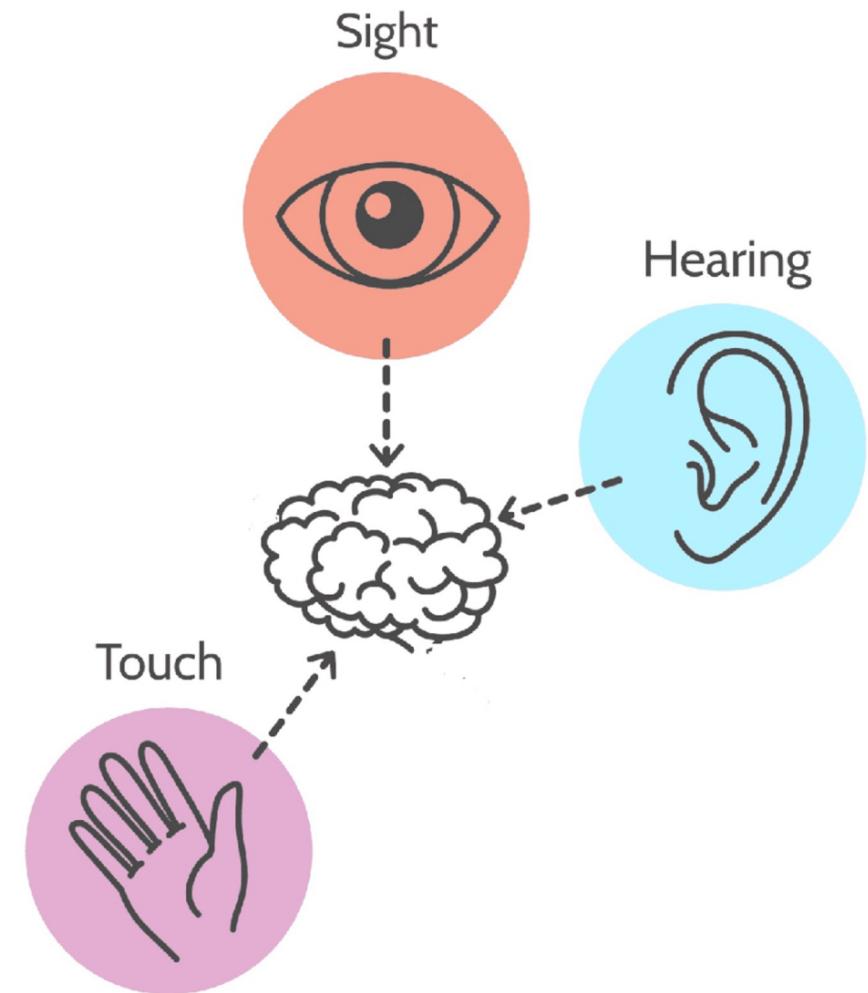


WCAG - Four Principles of Accessibility



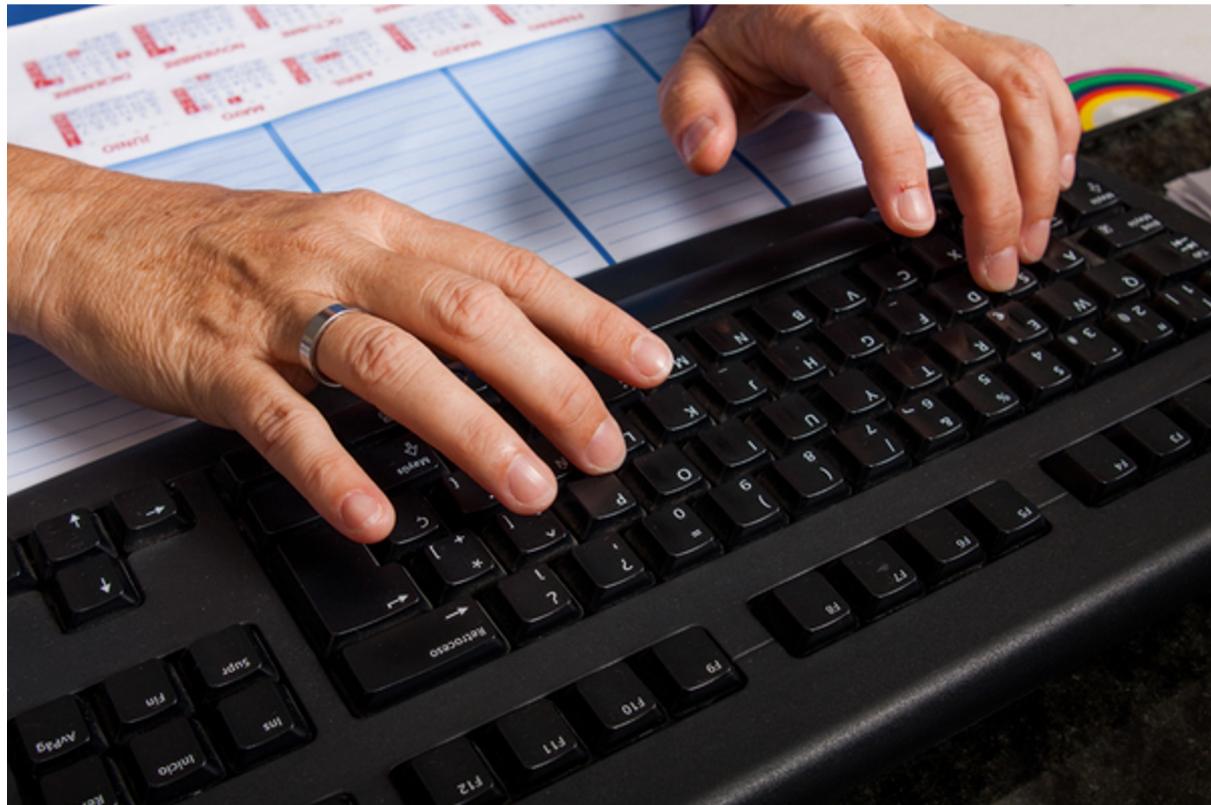
Perceivable

- 1.1. Providing text alternatives for non-text content
- 1.2. Providing text alternatives for time-based media
- 1.3. Create content that can be presented in different ways
- 1.4. Make it easier for users to see and hear content including separating foreground from background



Operable

- 2.1. Keyboard Accessible
- 2.2. Enough Time
- 2.3. Seizures and Physical Reactions
- 2.4. Navigable
- 2.5. Input Modalities



Understandable

- 3.1. Readable
- 3.2. Predictable
- 3.3. Input Assistance



Robust

4.1. Compatible: Maximize compatibility with current and future user agents, including assistive technologies



03

Web-Accessibility testing



MANUAL
accessibility testing

The process

Accessibility testing - type of testing to determine the ease by which users with disabilities can use a component or system.

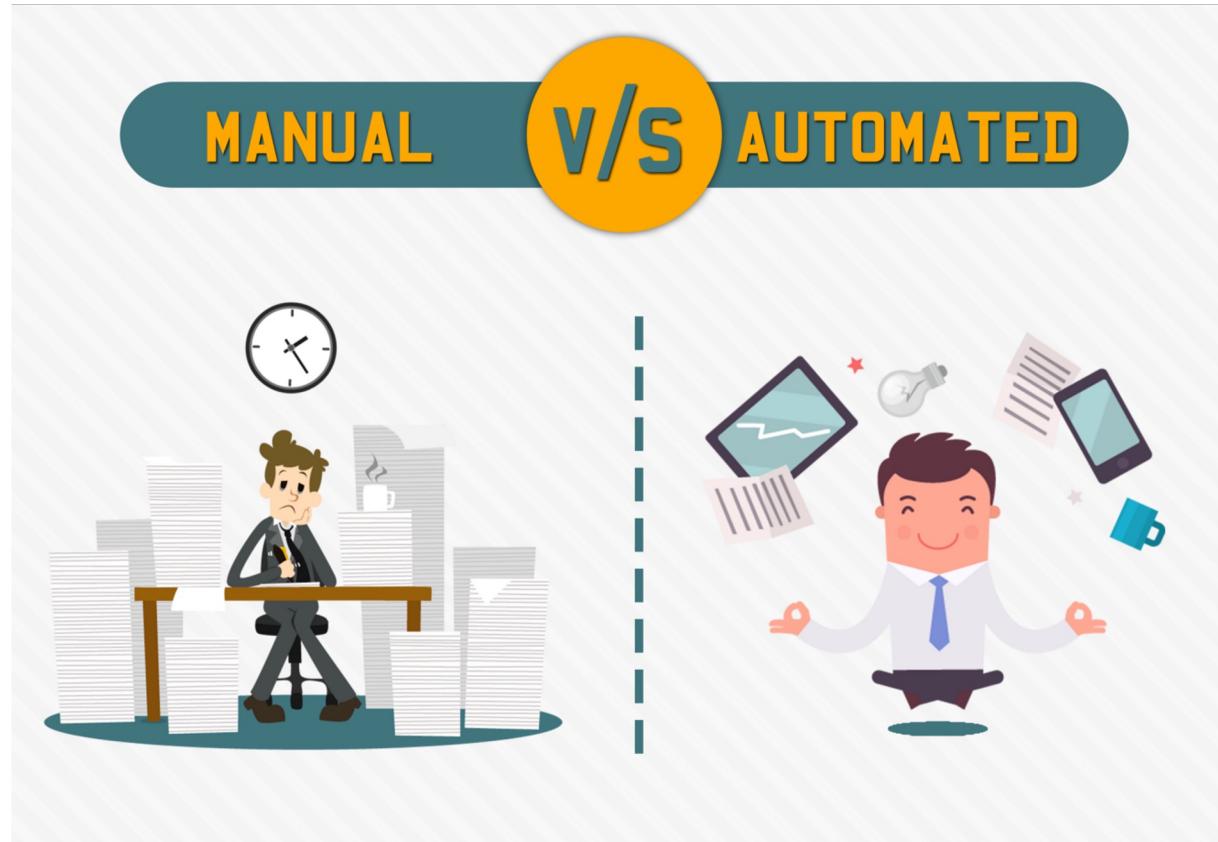
Steps:

- Assessment
- Testing
- Remediation
- Compliance
- Maintenance



How can we test?

- Manual testing/human checking
- Testing with assistive technology
- Testing with web accessibility evaluation tools
- User testing



When should we test? It depends...

Reasons

- You or your client have a legal obligation
- You need to increase the user base
- You have a stable product and would like to increase the quality

How often?

- The general recommendation - every 4-6 months
- External audit - every year
- Rule of thumb - developing with accessibility in mind



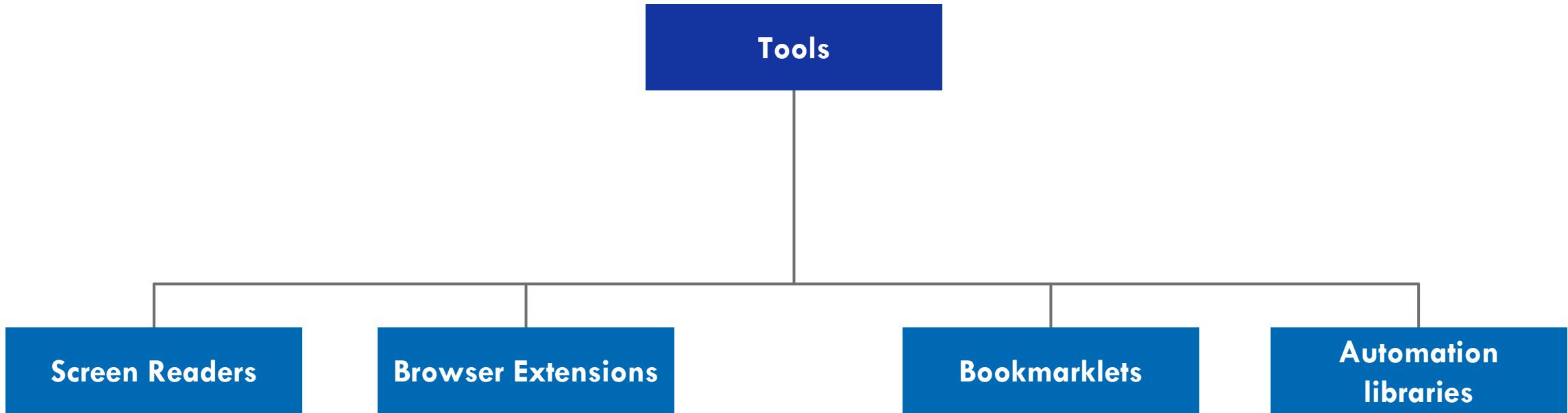
04

Tools



HYBRID
accessibility testing

Accessibility testing tools



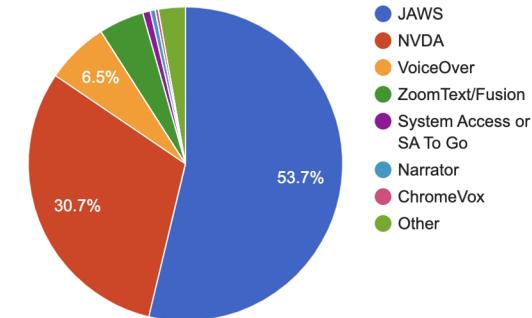
Screen Readers Usage

Screen Reader / Browser Combinations

Most common screen reader and browser combinations

Screen Reader & Browser	# of Respondents	% of Respondents
JAWS with Chrome	500	32.5%
NVDA with Chrome	246	16.0%
JAWS with Edge	194	12.6%
NVDA with Firefox	149	9.7%
JAWS with Firefox	74	4.8%
VoiceOver with Safari	72	4.7%
NVDA with Edge	55	3.6%
ZoomText/Fusion with Chrome	33	2.1%
JAWS with Internet Explorer	30	1.9%
VoiceOver with Chrome	24	1.6%
ZoomText/Fusion with Edge	18	1.2%
Other combinations	144	9.4%

Primary Screen Reader



Which of the following is your primary desktop/laptop screen reader?

Response	# of respondents	% of respondents
JAWS	832	53.7%
NVDA	476	30.7%
VoiceOver	100	6.5%
ZoomText/Fusion	72	4.7%
System Access or System Access to Go	12	0.8%
Narrator	8	0.5%
ChromeVox	5	0.3%
Other	43	2.8%

What should be checked

General recommendations

- Switch off the monitor and listen to the full page
- Use “Tab” key to navigate through all the interactive items
- Use the arrow keys to navigate through the page
- Navigate through landmarks, links, and headings only

Extra attention

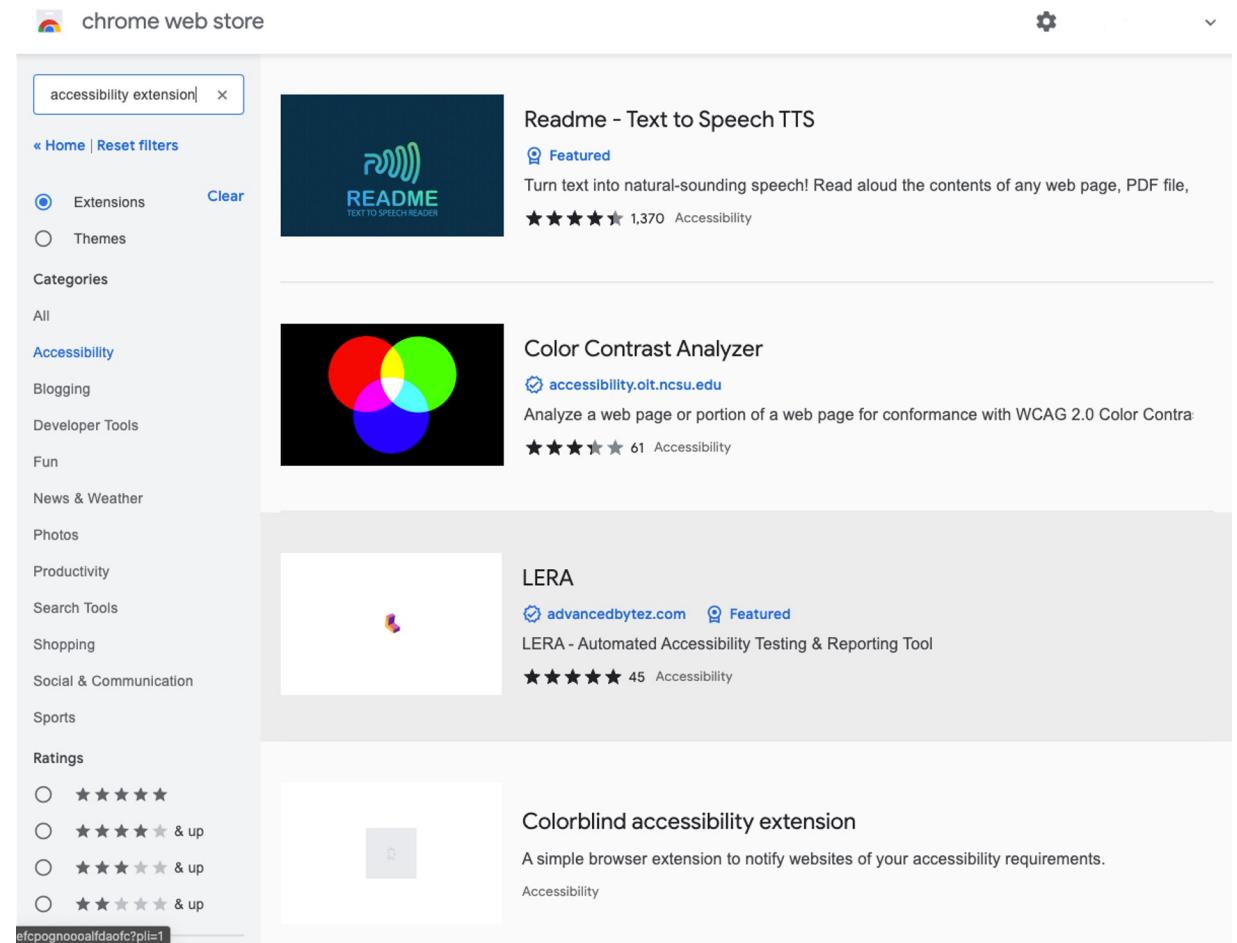
- Form elements
- Tables
- Accordions
- Carousels and slide shows
- Images
- Alerts, errors, popups



Browser Extensions

Most popular:

- WAVE
- Google Lighthouse
- Axe Browser Extension
- ARC Toolkit
- Web Developer
- a11yTools Web Accessibility (Safary)



WAVE

WAVE
web accessibility evaluation tool
powered by WebAIM

Styles: OFF ON

Details

Summary Details Reference Structure Contrast

19 Errors

- 1 X Spacer image missing alternative text
- 1 X Missing form label
- 13 X Empty link
- 4 X Broken ARIA menu

5 Contrast Errors

- 5 X Very low contrast

100 Alerts

- 2 X Suspicious alternative text
- 1 X Missing first level heading
- 3 X Skipped heading level
- 3 X Possible heading



Solutions Cases Services Career Art

We are ready to push your company forward.



Accelerate Your Development

Zero server management, no upfront provisioning, and cost-effectiveness.

Convert Data Into Value

Big data changes how businesses are functioning and how they create value.

Stay Competitive As A Software Vendor

Stay focused and keep your competitive edge.



Google Lighthouse

The screenshot shows the Levi9 website. At the top, there's a large headline: "We are ready to push your company forward." Below this are two service cards:

- Accelerate Your Development**: Features a photo of two people from behind, one wearing a shirt that says "TALENT SCOUT" and a large blue number "9".

Zero server management, no upfront provisioning, and cost-effectiveness.
- Convert Data Into Value**: Features a photo of two women, one with her arm around the other. Both are wearing blue shirts with the text "KEEP CALM & HATCH MOVIES" and a rainbow graphic.

Big data changes how businesses are functioning and how they create value.

At the bottom of the page are two more images: one of balloons and another of a banner with the word "Levi9".

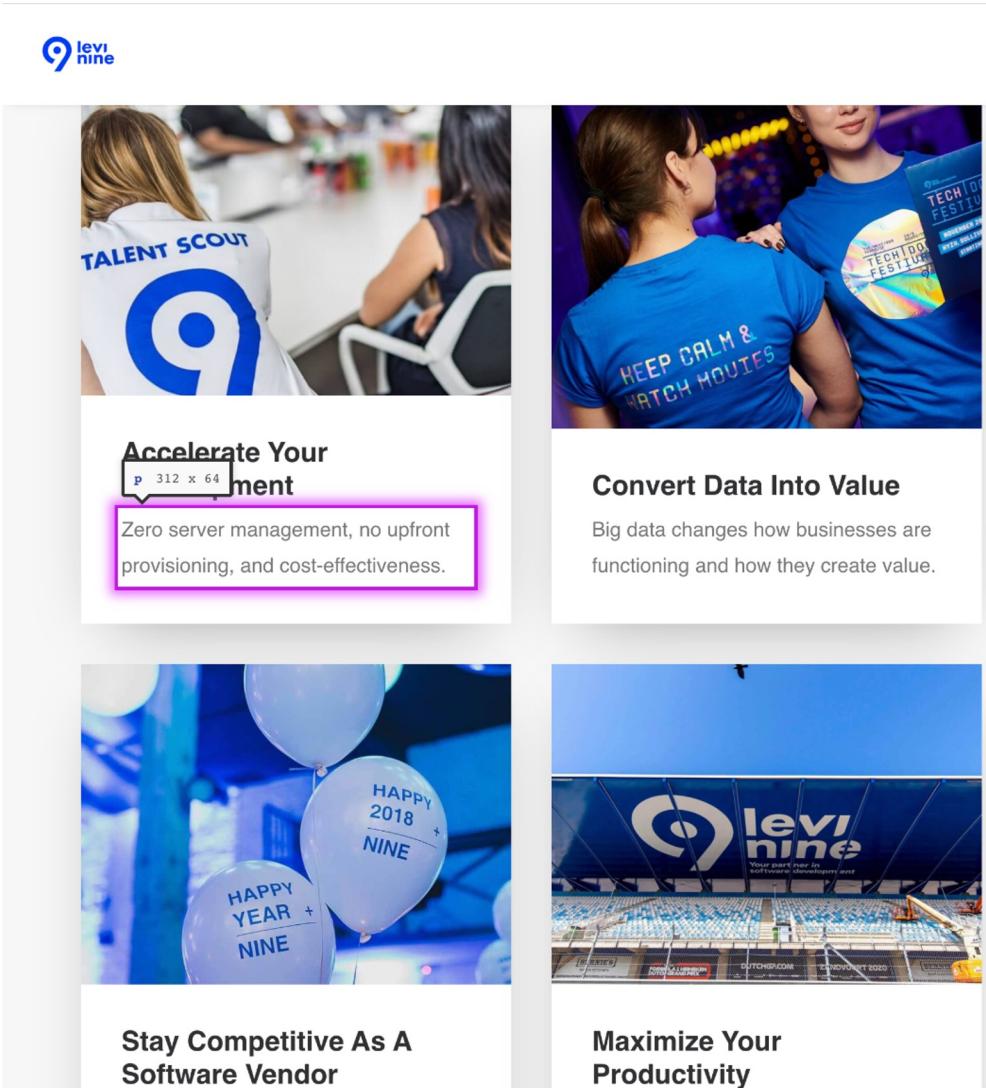
The screenshot shows the Google Lighthouse audit results for the Levi9 website. The overall score is 94. The main summary section shows two scores: Accessibility (94) and Best Practices (92). The accessibility audit details are as follows:

- Score: 94**
- Contrast**: A note that background and foreground colors do not have a sufficient contrast ratio.
- Names and Labels**: A note that links do not have a discernible name.
- Navigation**: A note that heading elements are not in a sequentially-descending order.

At the bottom, there's a link to "ADDITIONAL ITEMS TO MANUALLY CHECK (10)".

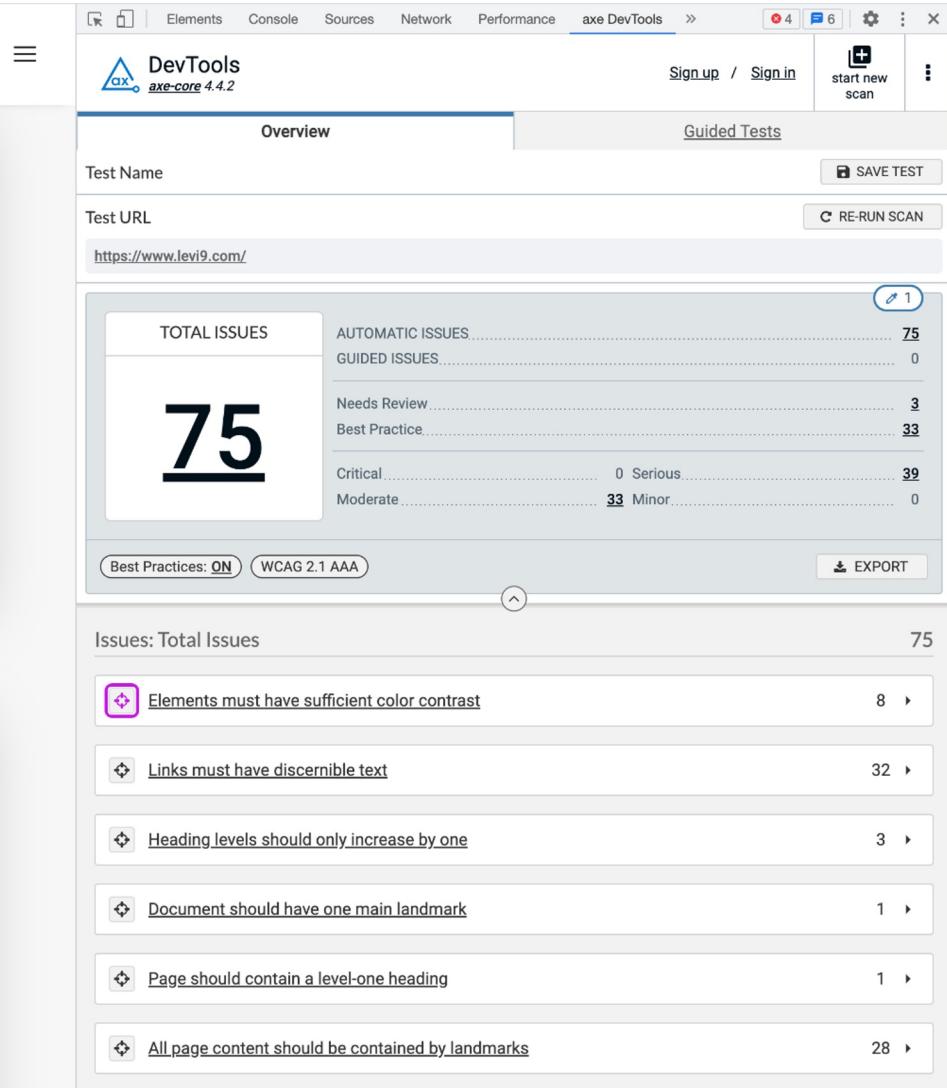


Axe Browser Extension



The screenshot shows the Levi Nine website with several accessibility features highlighted:

- Talent Scout:** A person wearing a white t-shirt with "TALENT SCOUT" and a large blue "9" logo on the back.
- Accelerate Your Development:** A section with a button labeled "p 312 x 64". A tooltip says "Zero server management, no upfront provisioning, and cost-effectiveness." A pink box highlights this area.
- Convert Data Into Value:** A section with the text "Big data changes how businesses are functioning and how they create value."
- Balloons:** Blue balloons with "HAPPY 2018 NINE" and "HAPPY YEAR + NINE" printed on them.
- Stay Competitive As A Software Vendor:** A section with the text "Maximize Your Productivity".
- Maximize Your Productivity:** A section with the text "Maximize Your Productivity".



The Axe DevTools interface shows the following data:

TOTAL ISSUES	
75	
AUTOMATIC ISSUES	75
GUIDED ISSUES	0
Needs Review	3
Best Practice	33
Critical	0 Serious
Moderate	33 Minor

Issues: Total Issues

- Elements must have sufficient color contrast (8)
- Links must have discernible text (32)
- Heading levels should only increase by one (3)
- Document should have one main landmark (1)
- Page should contain a level-one heading (1)
- All page content should be contained by landmarks (28)



ARC Toolkit

The screenshot shows two promotional banners. The left banner features a woman in a white t-shirt with a large blue '9' logo and the text 'TALENT SCOUT'. Below it is the headline 'Accelerate Your Development' and the subtext 'Zero server management, no up provisioning, and cost-effectiveness.' The right banner features two women in blue t-shirts; one has 'KEEP CALM & HATCH MOVIES' on the back. Below it is the headline 'Convert Data Into Value' and the subtext 'Big data changes how businesses functioning and how they create value.'

The screenshot shows the ARC Toolkit interface version 5.4.2. The top navigation bar includes 'Elements', 'Console', 'Sources', 'Network', 'Performance', 'ARC Toolkit', and other icons. The main area is titled 'Results by messages' with a link to 'Get help fixing these errors'. A 'View by elements' button is also present. A red box highlights an error message: '5 Error(s) (insufficientNormalTextContrast) Insufficient normal text contrast'. The description states: 'Description: There is insufficient color contrast between the foreground and background of normal text content.' It links to 'WCAG 2.1 AA Success Criterion 1.4.3 Contrast (Minimum)' twice. The 'Topic' sidebar lists categories like 'Total', 'Audio / video / multimedia', 'Content adaptability', 'Contrast' (which is selected), 'Custom widgets', 'Errors / status', 'Order & focus', 'Images', 'Keyboard', 'Interactive controls', 'Page navigation & language', 'Parsing', 'Pointer / motion', 'Repetitive content', 'Sensory', 'Structure & semantics', 'Dynamic changes & timed behavior', and 'Usability / Best Practice'. The 'Contrast' section shows 5 errors, 0 alerts, and 0 best practices. Below the sidebar are three examples of the error: '

<p></p>

' with details: contrast ratio: 4.48:1, foregroundColorRGB: rgb(119, 119, 119), foregroundColorHEX: #777777, backgroundColorRGB: rgb(255, 255, 255), backgroundColorHEX: #ffffff, font-size: 18px, and font-weight: 400. Similar examples are shown for the other two sections.



Web Developer Toolbar

The screenshot shows a web page with a dark blue background. At the top left is the levi nine logo. In the center, there's a form field with the placeholder "example@example.com" and a "SIGN ME UP!" button. Below this is a horizontal line with four sections: "Contact", "Offices", "Explore", and "Explore". The "Contact" section contains address information for Muidstraat 1, 1011 PZ Amsterdam, The Netherlands, with phone number T: +31 (0)206701947 and email M: info@levi9.com. The "Offices" section lists Amsterdam, Belgrade, Novi Sad, Zrenjanin, Kyiv, Lviv, and Iasi. The first "Explore" section links to Solutions, Industries, Career, and Contact. The second "Explore" section links to Privacy Policy, Cookie Policy, and Whistleblower Policy. At the bottom right are social media icons for Facebook, LinkedIn, Instagram, YouTube, and Twitter. A small upward-pointing arrow is in the bottom right corner of the page area.

levi nine

Sign up for our articles

example@example.com

SIGN ME UP!

Contact

Muidstraat 1
1011 PZ Amsterdam
The Netherlands
T: +31 (0)206701947
M: info@levi9.com

Offices

Amsterdam
Belgrade
Novi Sad
Zrenjanin
Kyiv
Lviv
Iasi

Explore

Explore

→ Solutions
→ Industries
→ Career
→ Contact

→ Privacy Policy
→ Cookie Policy
→ Whistleblower Policy

f in @ y t w



Bookmarklets

[Headings Bookmarklet](#)

[Lists Bookmarklet](#)

[Tables Bookmarklet](#)

[Images Bookmarklet](#)

[ARIA-Hidden Bookmarklet](#)

[Iframe Bookmarklet](#)

[Text Spacing Bookmarklet](#)

[Tabindex Bookmarklet](#)

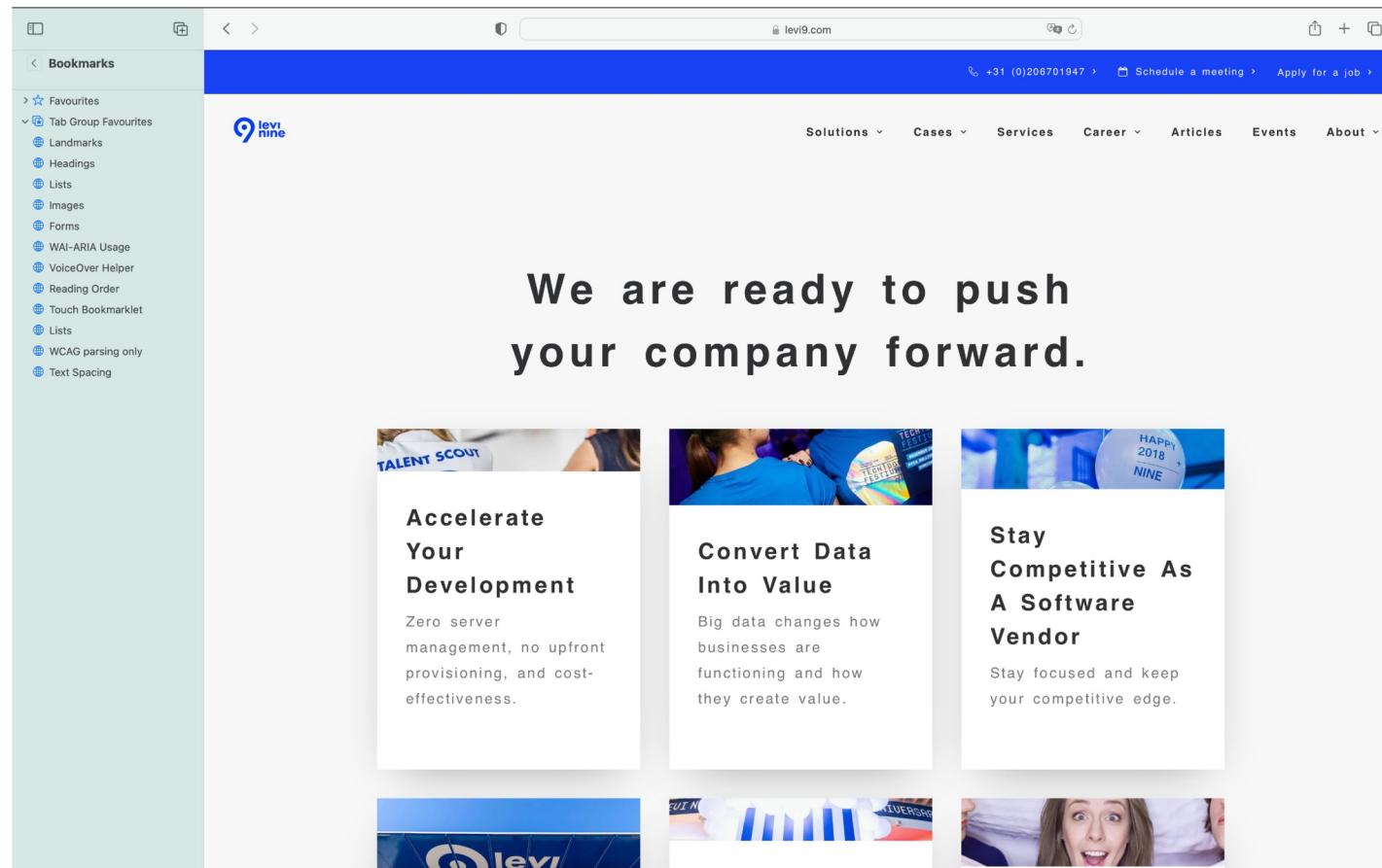
[Force Focus Bookmarklet](#)

[ARIA-Label Bookmarklet](#)

[Landmark Bookmarklet](#)

[Lang Bookmarklet](#)

[WCAG 2.1 parsing error bookmarklet](#)
and many more



Automation libraries and applications

Axe-core

Tenon.io

Pa11y (cli, CI, dashboard)

Microsoft UI Automation

Apple's Accessibility APIs

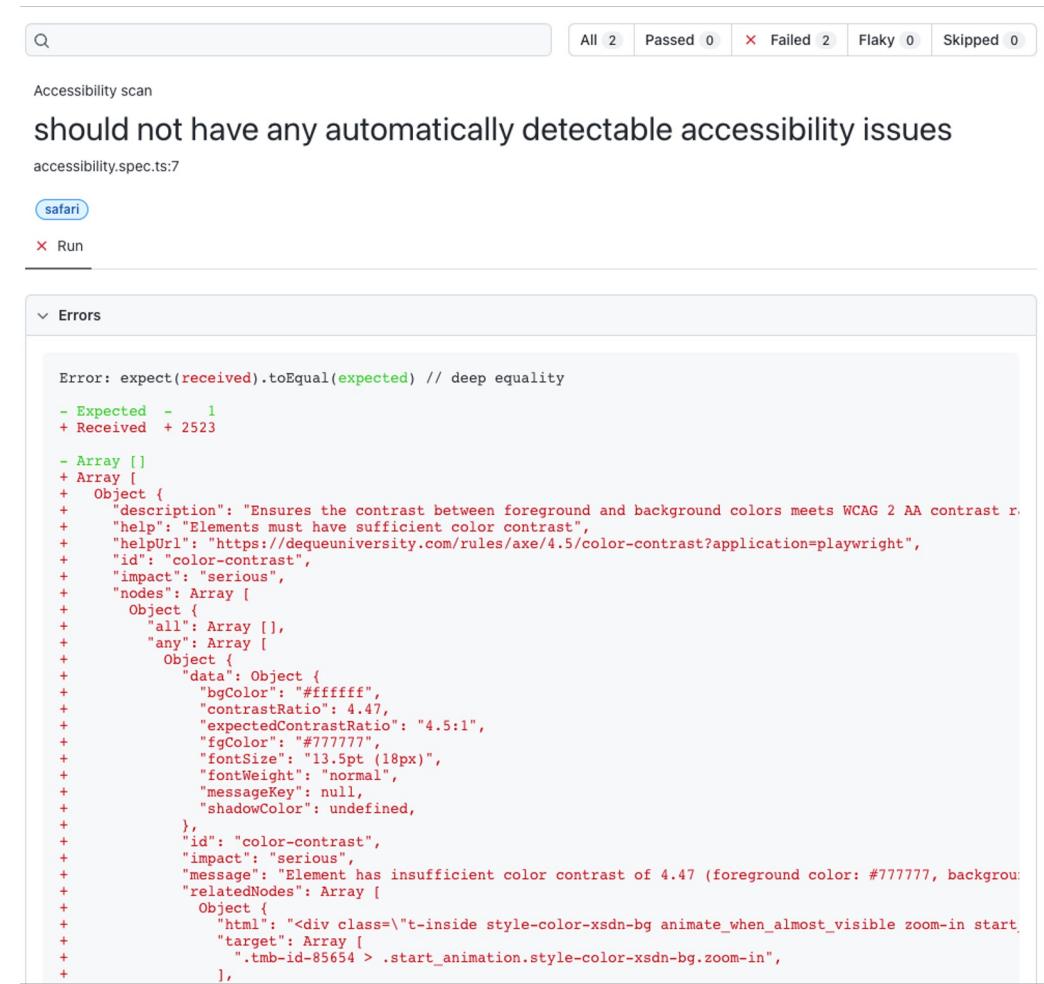
Apple Accessibility Inspector

Google's Accessibility Test

Framework (GATF)

Google Accessibility Scanner

Accessibility Linters



“

Slides and Additional Information



GitHub Reference



QUESTIONS



Technology Services

THANK YOU

UKRAINE / KYIV

Levi9 Ukraine
Volodymyrska Street, 101/1
Kyiv 01033, Ukraine



Technology Services