



# Accessibility testing: What, Why and How

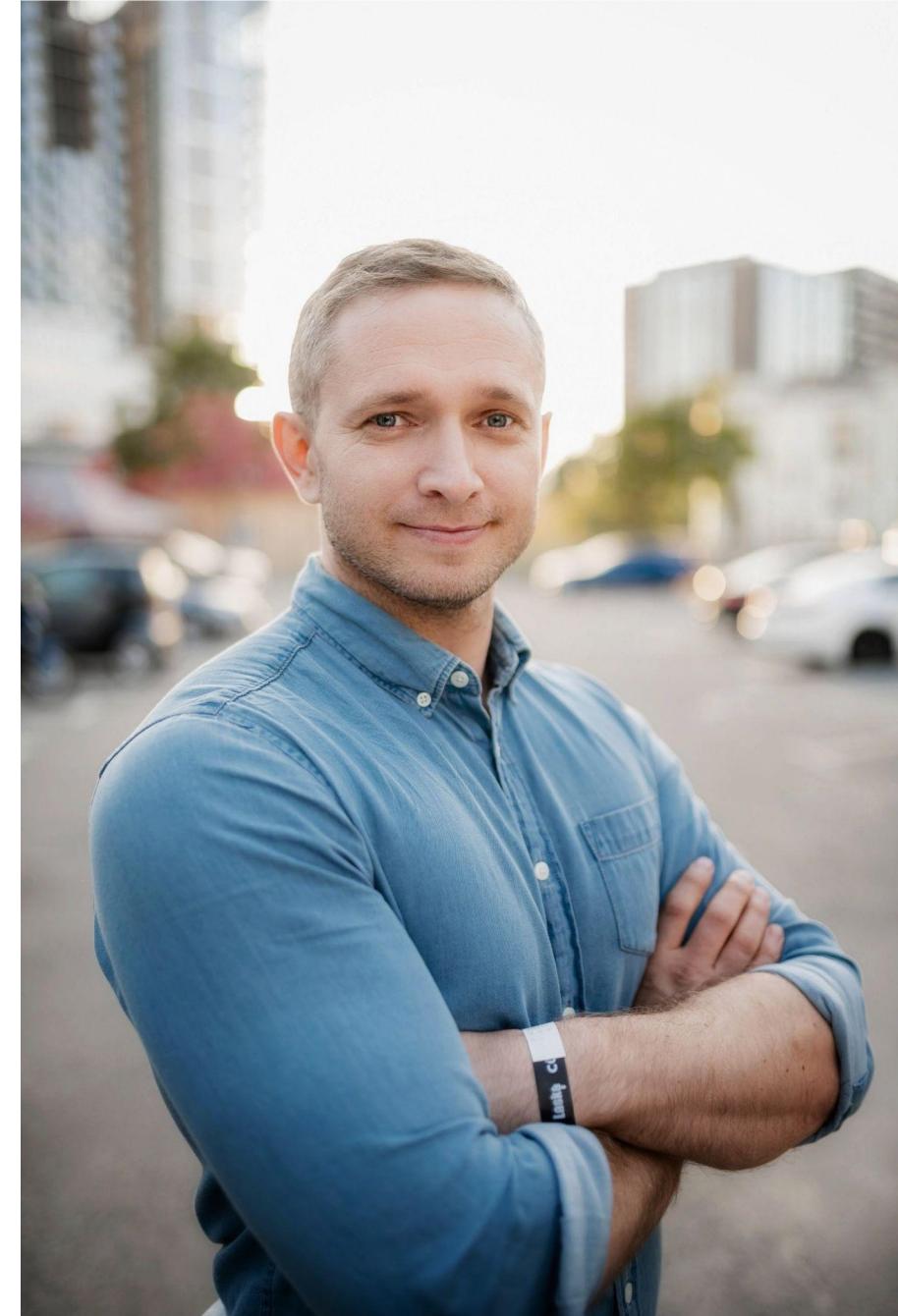
Serhii Sobur

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 disabilities<sup>11</sup>

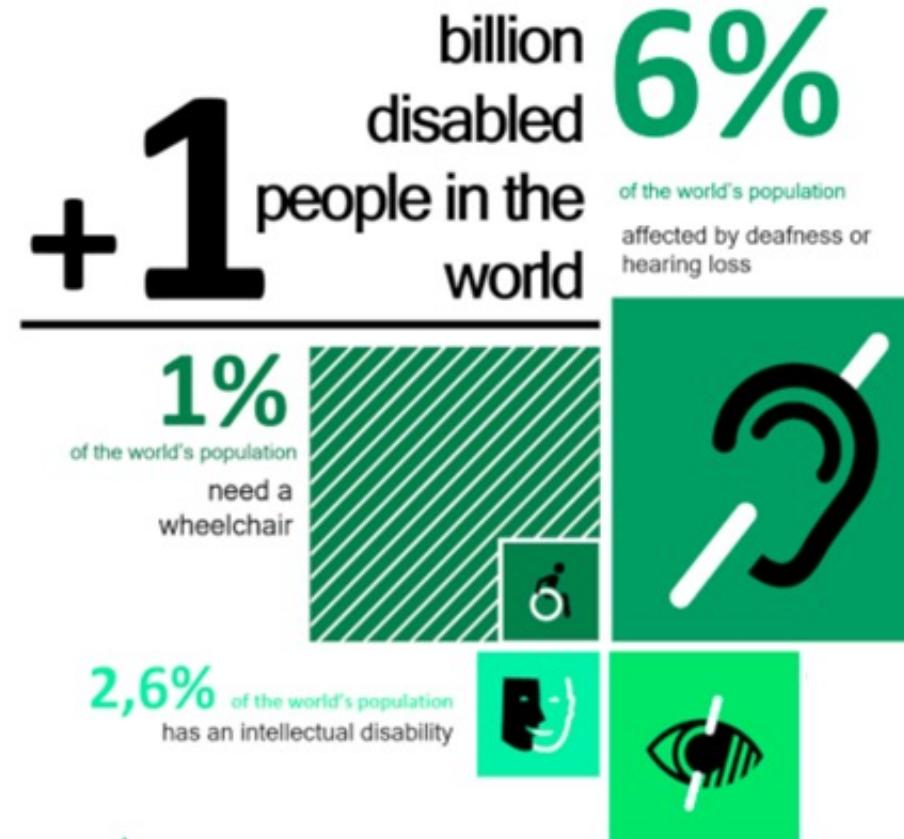
**Web accessibility** is the practice of making websites, applications, and web tools properly designed and coded, usable by as many people as possible



# 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

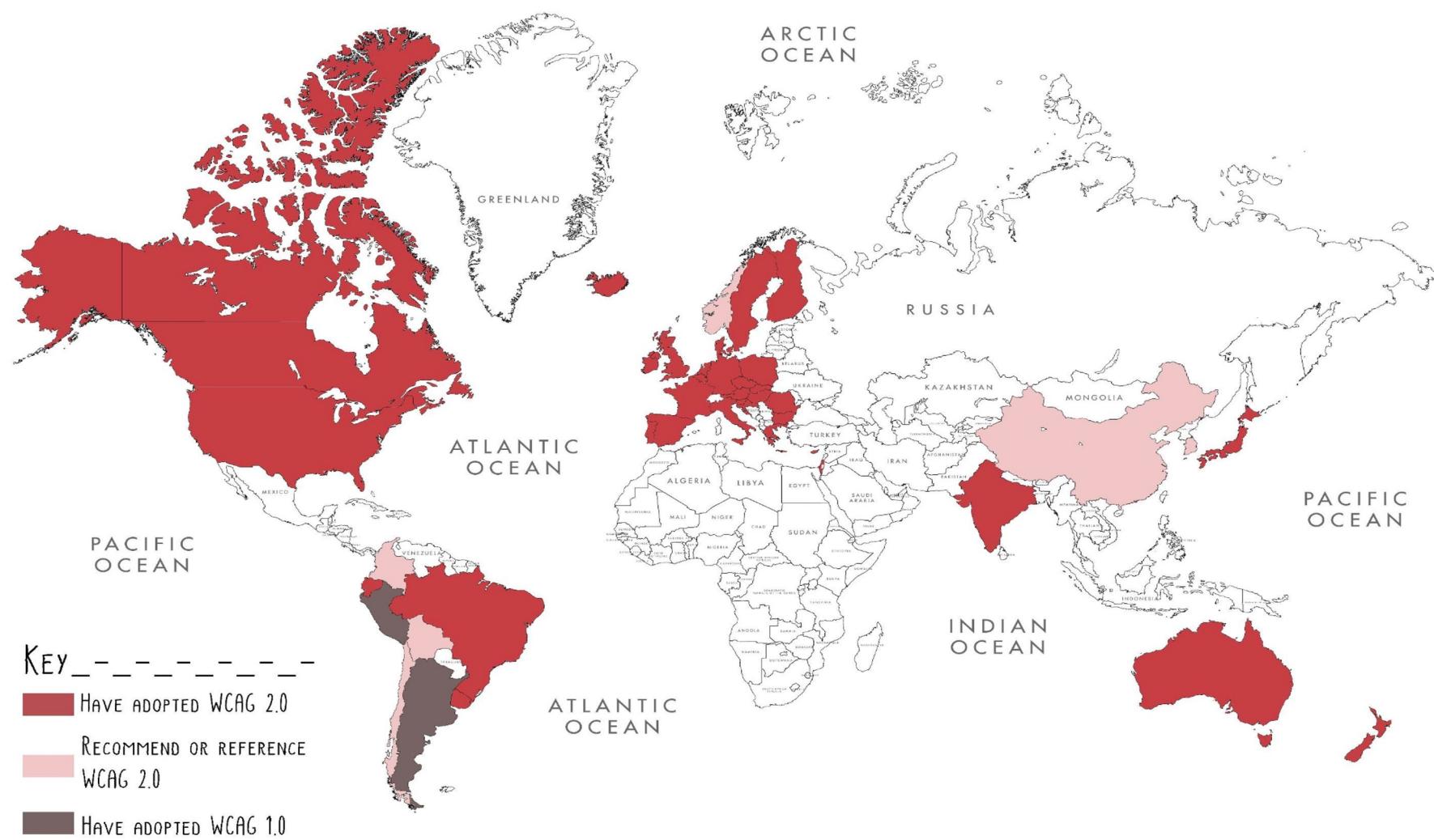
ADA (Americans with disabilities act)

## Guidelines:

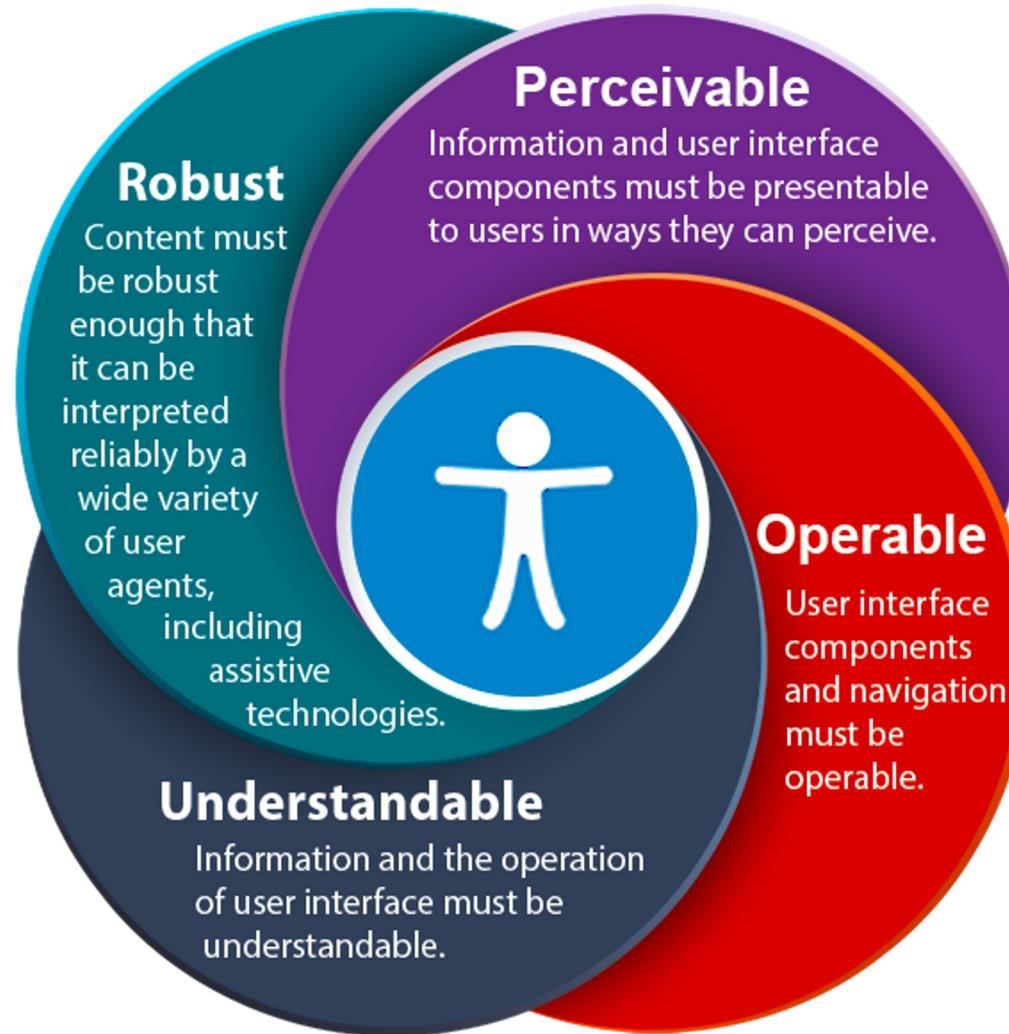
- WCAG 2.1(Web content accessibility guidelines)
- WAI-ARIA (Web accessibility initiative )
- ATAG (Accessing tool accessibility guideline)
- UAAG (User agent accessibility guideline)



# Countries that have adopted WCAG

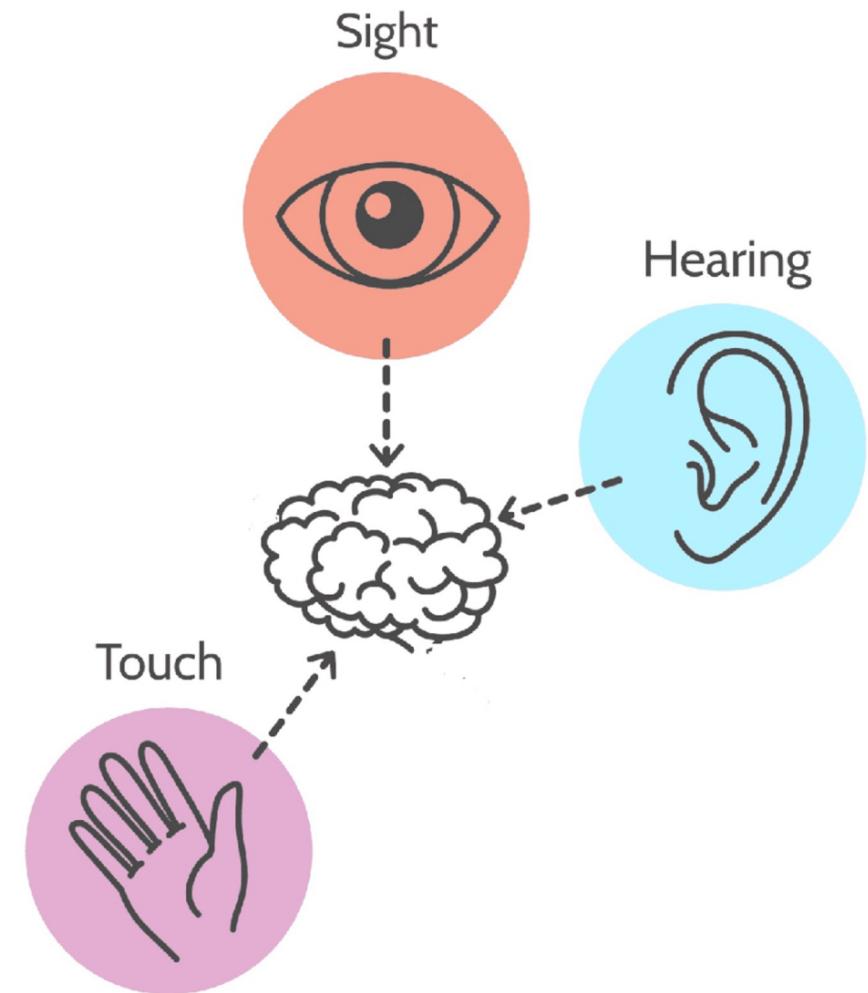


# WCAG - Four Principles of Accessibility



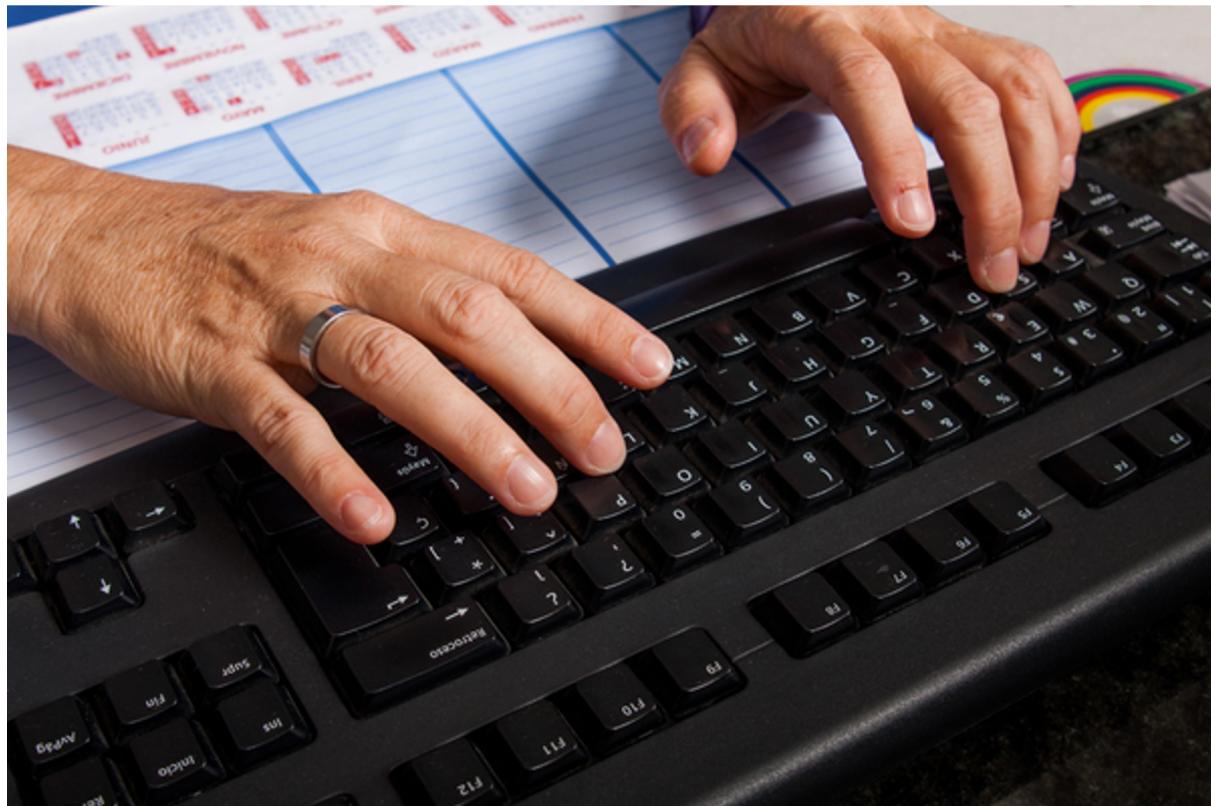
# Perceivable

- 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.

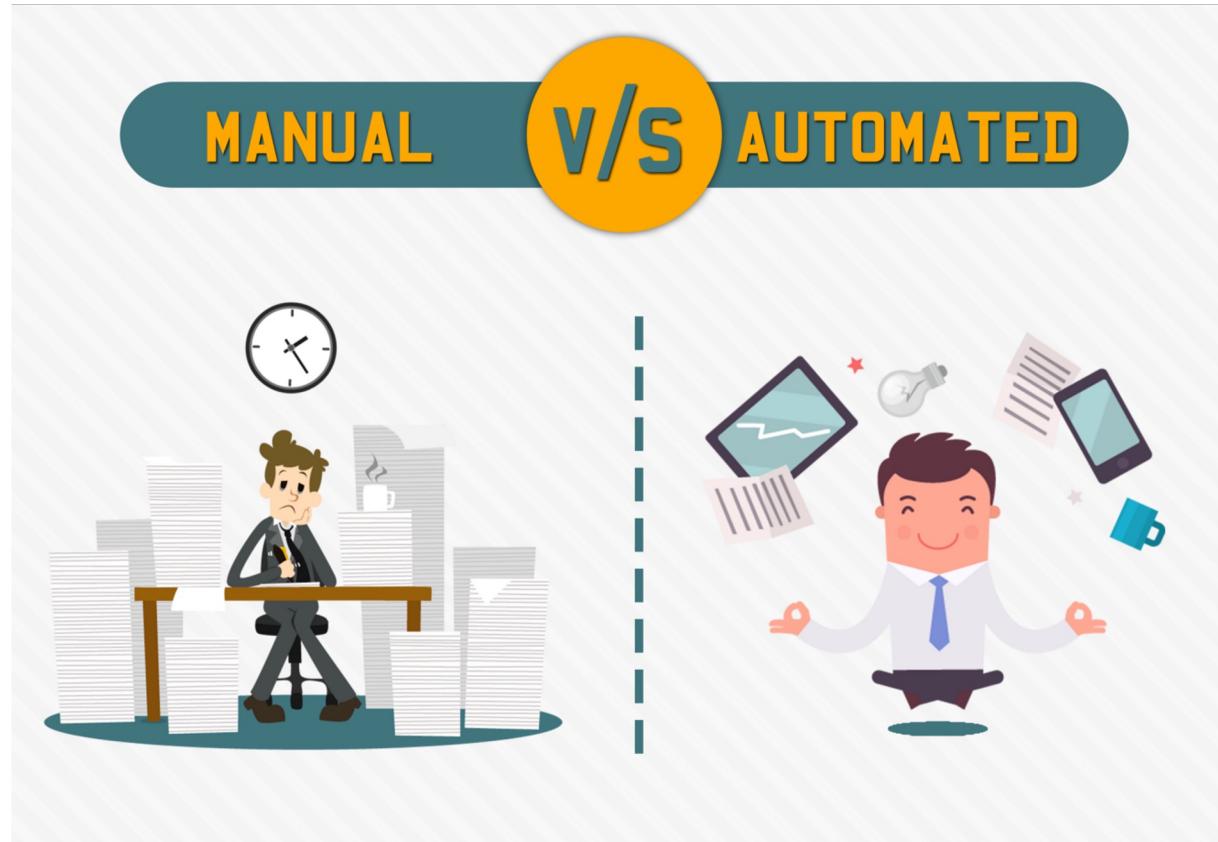
## Steps:

- 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



# What should we check?

## Minimal checks (Level A)

- Page title
- Image text alternatives (“alt text”)
- **Text:**
  - Headings
  - Contrast ratio (“color contrast”)
  - Resize text
- **Interactions:**
  - Keyboard access and visual focus
  - Forms, labels, and errors
- **General:**
  - Moving, flashing, or blinking content
  - Multimedia alternatives
  - Basic structure checks



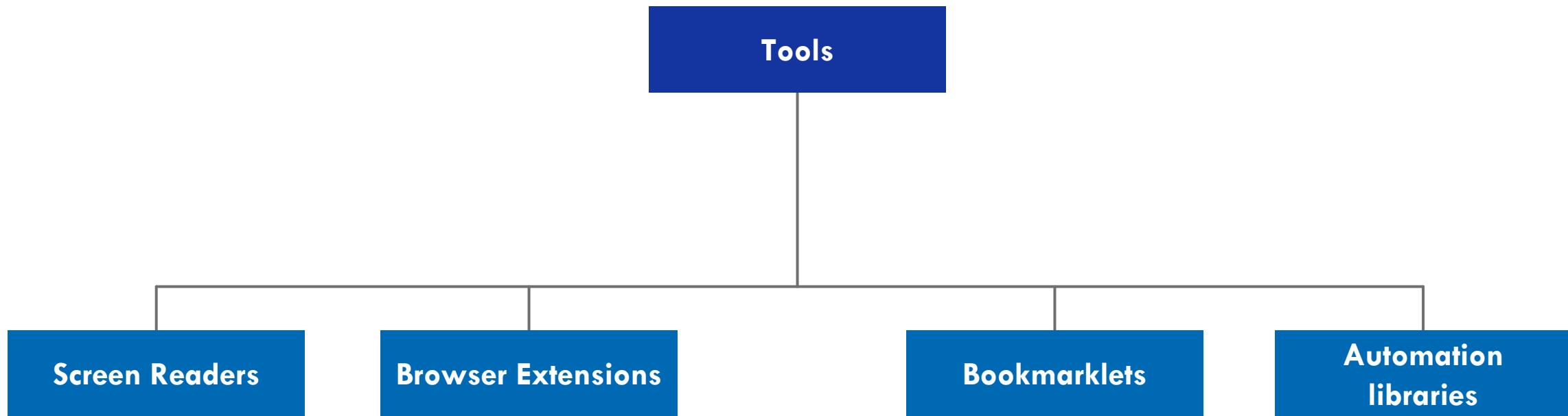
# 04

## Tools



**HYBRID**  
accessibility testing

# Accessibility testing tools



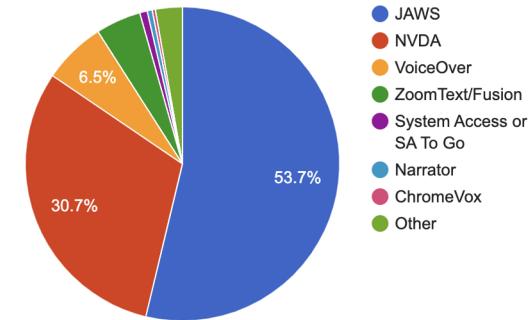
# Screen Readers Usage

## 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

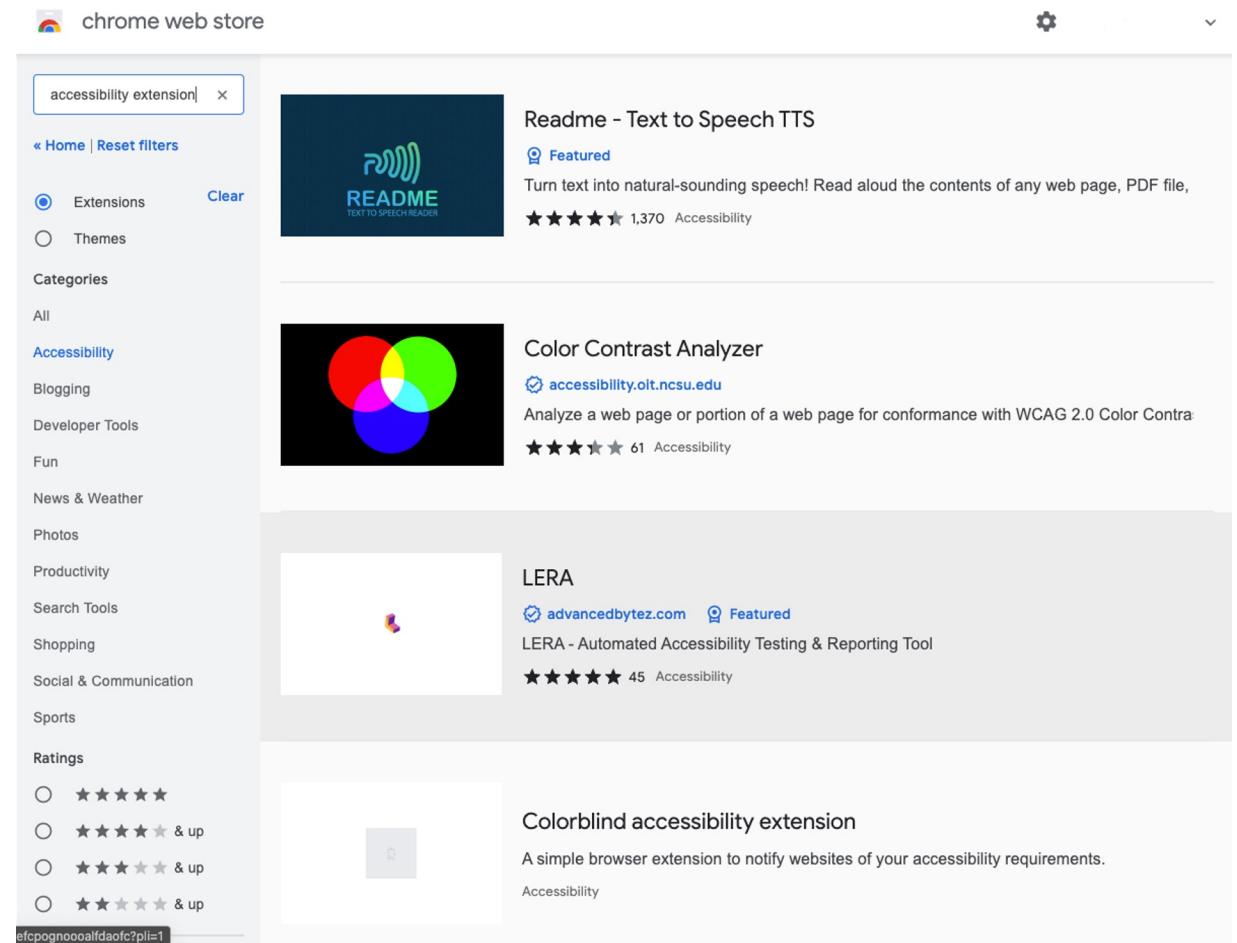
- Form elements
- Tables
- Accordions
- Carousels and slide shows
- Images
- Alerts, errors, popups



# 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 banner with the text "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 white t-shirt with "TALENT SCOUT" and a large blue number 9. The card text says: "Zero server management, no upfront provisioning, and cost-effectiveness."
- Convert Data Into Value**: Features a photo of two women, one in a blue t-shirt with "KEEP CALM & HATCH MOVIES". The card text says: "Big data changes how businesses are functioning and how they create value."

At the bottom, there are two more images: one of balloons with "HAPPY 2018" and another of a blue surface with the Levi9 logo.

The screenshot shows the Google Lighthouse audit results for the URL <https://www.levi9.com/>. The overall score is 94. The audit results are categorized as follows:

- Accessibility: 94**
- Best Practices: 92**
- Performance: 94**

**ACCESSIBILITY**  
These checks highlight opportunities to [improve the accessibility of your web app](#). Only a subset of accessibility issues can be automatically detected so manual testing is also encouraged.

**CONTRAST**  
▲ Background and foreground colors do not have a sufficient contrast ratio.

These are opportunities to improve the legibility of your content.

**NAMES AND LABELS**  
▲ Links do not have a discernible name

These are opportunities to improve the semantics of the controls in your application. This may enhance the experience for users of assistive technology, like a screen reader.

**NAVIGATION**  
▲ Heading elements are not in a sequentially-descending order

These are opportunities to improve keyboard navigation in your application.

**ADDITIONAL ITEMS TO MANUALLY CHECK (10)**



# Axe Browser Extension

The image displays four screenshots of the Levi Nine website:

- Talent Scout:** Shows a person wearing a white t-shirt with "TALENT SCOUT" and a large blue "9". A tooltip says "Accelerate Your Development" with dimensions 312 x 64.
- Convert Data Into Value:** Shows two people in blue t-shirts. One shirt has "KEEP CALM & WATCH MOVIES". The other shirt has "TECH DAY FESTIVAL".
- Stay Competitive As A Software Vendor:** Shows blue balloons with "HAPPY YEAR + NINE" and "HAPPY 2018 + NINE".
- Maximize Your Productivity:** Shows a stadium with a large screen displaying the Levi Nine logo and text: "Your partner in software development", "DUTCHIE 2018", "DUTCHIE 2020", and "ELEVEN".

The Axe DevTools interface shows the following data:

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

Issues: Total Issues (75)

- 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

We are ready to push your company forward.

Accelerate Your Development

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

Convert Data Into Value

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

## ARC Toolkit

Version: 5.4.2

Results by messages

View by elements

5 Error(s) (insufficientNormalTextContrast)

Insufficient normal text contrast

Description: There is insufficient color contrast between the foreground and background of normal text content.

WCAG 2.1 AA Success Criterion 1.4.3 Contrast (Minimum)

WCAG 2.1 AA Success Criterion 1.4.3 Contrast (Minimum)

Topic	Total	44	27
Audio / video / multimedia	-	-	-
Content adaptability	-	-	-
Contrast	5	0	0
Custom widgets	-	-	-
Errors / status	-	-	-
Order & focus	-	-	-
Images	0	1	0
Keyboard	-	-	-
Interactive controls	10	2	15
Page navigation & language	0	34	0
Parsing	-	-	-
Pointer / motion	-	-	-
Repetitive content	0	1	1
Sensory	-	-	-
Structure & semantics	0	6	1
Dynamic changes & timed behavior	-	-	-
Usability / Best Practice	0	0	10

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contrast ratio: 4.48:1  
foregroundColorRGB: rgb(119, 119, 119)  
foregroundColorHEX: #777777  
backgroundColorRGB: rgb(255, 255, 255)  
backgroundColorHEX: #ffffff  
fontSize: 18  
fontWeight: 400

contrast ratio: 4.48:1  
foregroundColorRGB: rgb(119, 119, 119)  
foregroundColorHEX: #777777  
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# 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 sign-up form with the placeholder "example@example.com" and a "SIGN ME UP!" button. Below the form is a horizontal line. At the bottom, there are four sections: "Contact", "Offices", "Explore", and "Explore". The "Contact" section lists address, phone number, and email. The "Offices" section lists locations: Amsterdam, Belgrade, Novi Sad, Zrenjanin, Kyiv, Lviv, and Iasi. The first "Explore" section lists Solutions, Industries, Career, and Contact. The second "Explore" section lists Privacy Policy, Cookie Policy, and Whistleblower Policy. At the very bottom right is a small navigation icon.

levi nine

Sign up for our articles

example@example.com

SIGN ME UP!

---

Contact

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

Offices

Amsterdam  
Belgrade  
Novi Sad  
Zrenjanin  
Kyiv  
Lviv  
Iasi

Explore

→ Solutions  
→ Industries  
→ Career  
→ Contact

Explore

→ Privacy Policy  
→ Cookie Policy  
→ Whistleblower Policy

f in @



# Bookmarklets

[Headings Bookmarklet](#)

[Lists Bookmarklet](#)

[Tables Bookmarklet](#)

[Images Bookmarklet](#)

[ARIA-Hidden Bookmarklet](#)

[Iframe Bookmarklet](#)

[Text Spacing Bookmarklet](#)

[Tabindex Bookmarklet](#)

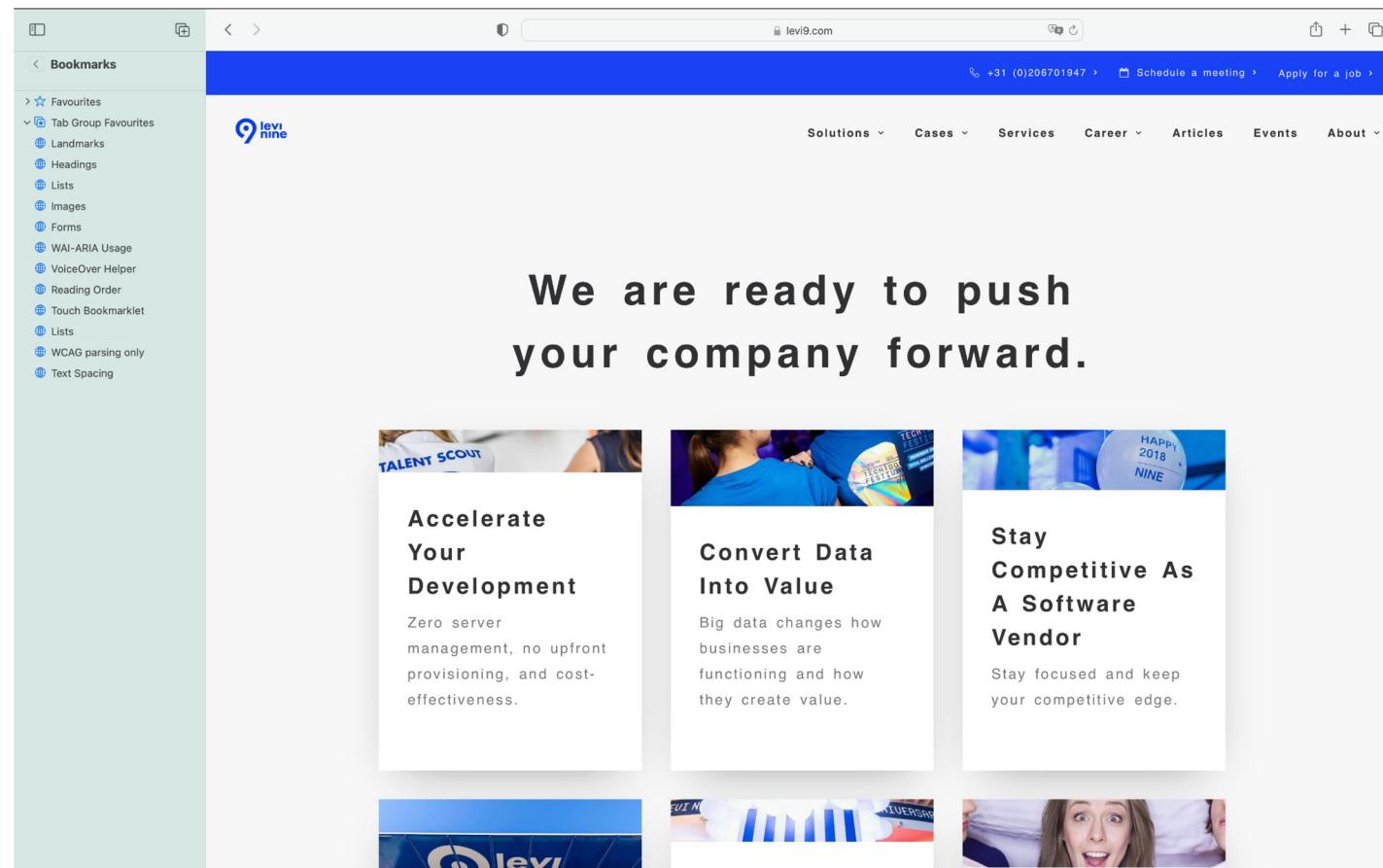
[Force Focus Bookmarklet](#)

[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

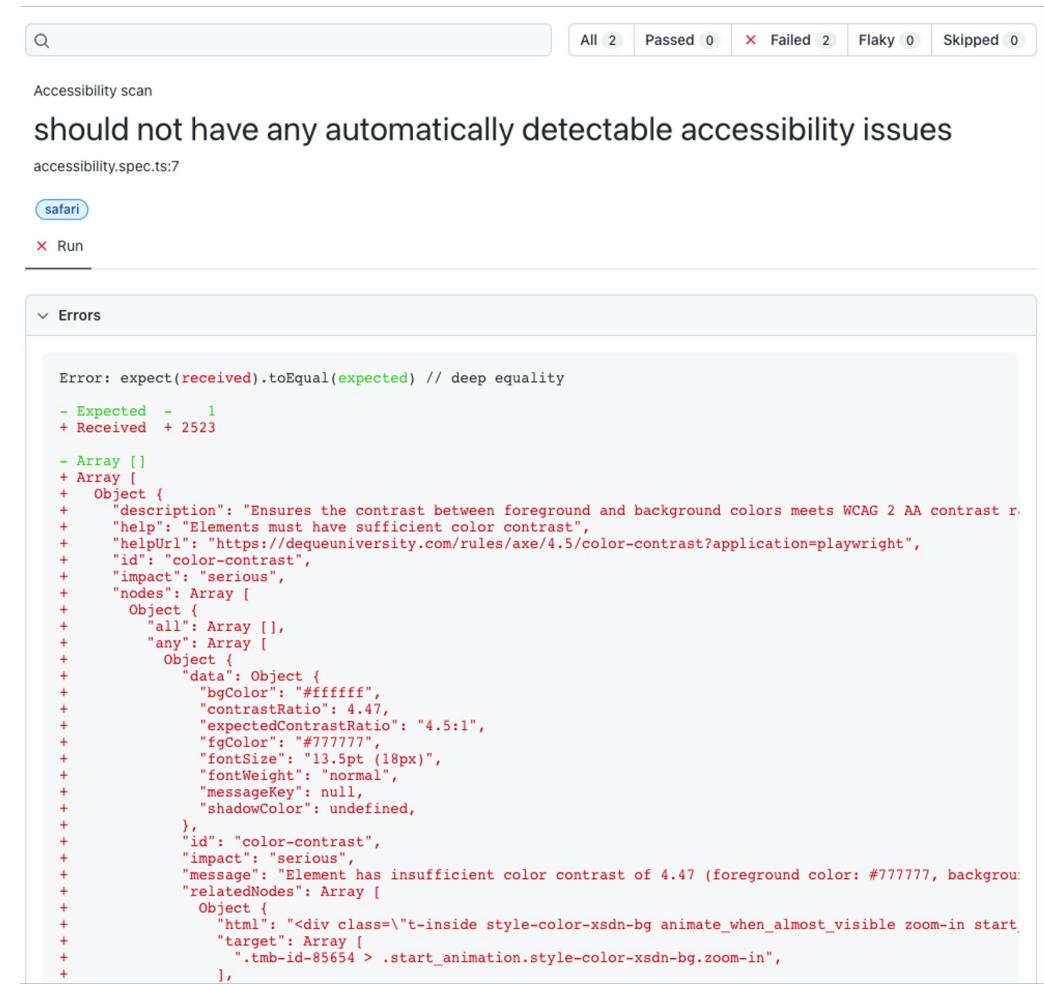
# Apple Accessibility Inspector

# Google's Accessibility Test

## Framework (GATF)

# Google Accessibility Scanner

# Accessibility Linters



“

# Slides and Additional Information



GitHub Reference



# QUESTIONS

Subtitle



Technology Services

# THANK YOU

UKRAINE / KYIV

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



Technology Services