ACCESSIBILITECH

Advanced methodologies to identify, assess and transfer innovative solutions for the accessibility of people with disabilities

Deliverable 3.2.c

Evaluation report of the beta transfer of the eLearning solution

Funded by the European Union

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1. Summary

The following deliverable offers the evaluation of the solution selected in the beta testing for the e-learning area within the Accessibilitech project, this solution has been extracted from the mapping tool created within the framework of the project, thus ensuring that the solutions that reached the beta testing phase were accessible to various disability profiles, as well as scalable, replicable, or transferable. This report is part of Accessibilitech Work Package 3.

2. Introduction

Beta testing is the best chance to find bugs and usability issues before a product is fully released. While internal testing can uncover many problems, nothing can truly simulate real users trying to complete real tasks.

Additionally, beta testing is the first opportunity to test software in an actual production environment versus a lab or stage setting. This ensures the software can perform under real workloads and that speed, storage, and scalability all work as expected.

In the context of the Accessibilitech project, this is of additional importance, as it has been observed that many products are currently not accessible, usable or designed from a user experience (UX) perspective.

Therefore, finding solutions to improve the lives of people with disabilities in e-learning, telework and telecare was indispensable. But this implies accessibility, which is why this beta testing procedure has been created to test whether the projects collected by the mapping tool are good examples for people with disabilities in these areas.

If you want to know more about the procedure carried out in the beta testing, see deliverable 3.2.a Beta testing project plan.

3. E-learning solution selection

In this case the beta testing process is done in a solution about eLearning. eLearning, or electronic learning, is the delivery of learning and training through digital resources. Although eLearning is based on formalized learning, it is provided through electronic devices such as computers, tablets and even cellular phones that are connected to the internet. Distance learning usually takes place via educational platforms or virtual campuses. These solutions have included learning platforms, videoconferencing tools, gamification tools, among others.

The 10 solutions chosen for partner voting in the e-learning category were:

- Buddy from Austria
- BigBlueButton from Germany
- Atutor from different countries of Europe

- Tleo from Spain
- PlatformQ Education from different countries of Europe
- Moodle from different countries of Europe
- Open LMS from UK
- Etraining4all from Spain
- Accessjobs from Spain
- Increasing Communication Rates Through a Tactile Phonemic Sleeve (TAPS) from different countries of Europe

Finally, the solution selected by the partners of the project in the final vote was Accessjobs, now we include the evaluation report of this solution.

4. Accessjobs

Accessjobs tries to break barriers that any person can find in videoconference tools by creating from scratch a web video conferencing platform, and incorporating end users, as well as accessibility and usability experts, from the design phase, in order to include their requirements and guidelines.

Accessibilitech team has carried out a web accessibility evaluation by reviewing the compliance with level AA of the Web Content Accessibility Guidelines 2.1 (WCAG 2.1) defined by the World Wide Web Consortium (W3C) to the e-learning solution selected.

4.1.   Legislation applied

Regarding the universal design and the accessibility of the application, the EN301549 and WCAG 2.1 standard has been used.

The EN 301549 standard entitled Accessibility requirements for ICT products and services, to find the different profiles we want to work with, in order to apply accessibility and usability, as well as looking for appropriate adaptations for each profile [1].

Going deeper into the standard, the functional accessibility requirements applicable to ICT products and services are specified, together with a description of the test procedures and evaluation methodology for each accessibility requirement, in a form that is suitable for use in public procurement processes within Europe. EN 301549 is intended to be used with web-based technologies, non-web technologies and hybrids that use both. It covers both software and hardware as well as services. It is intended for use by both providers and procurers, but it is expected that it will also be of use to many others as well.

Chapter 4 describes the functional performance of ICT enabling people to locate, identify, and operate ICT functions, and to access the information provided, regardless of physical, cognitive or sensory abilities. Any differences in ability may

be permanent, temporary or situational. The standard regulates 10 functional performance profiles, which are as follows:

1. Usage without vision

2. Usage with limited vision

3. Usage without perception of colour

4. Usage without hearing

5. Usage with limited hearing

6. Usage with no or limited vocal capability

7. Usage with limited manipulation or strength

8. Usage with limited reach

9. Minimize photosensitive seizure triggers

10. Usage with limited cognition, language or learning

Understanding WCAG 2.1 is an essential guide to understanding and using "Web Content Accessibility Guidelines 2.1" [2]. Although the normative definition and requirements for WCAG 2.1 can all be found in the WCAG 2.1 document itself, the concepts and provisions may be new to some people. Understanding WCAG 2.1 provides a non-normative extended commentary on each guideline and each Success Criterion to help readers better understand the intent and how the guidelines and Success Criteria work together. It also provides examples of techniques or combinations of techniques that the Working Group has identified as being sufficient to meet each Success Criterion. Links are then provided to write-ups for each of the techniques.

The guidelines and Success Criteria are organized around the following four principles, which lay the foundation necessary for anyone to access and use Web content. Anyone who wants to use the Web/App must have content that is:

1. **Perceivable** - Information and user interface components must be presentable to users in ways they can perceive.

   o This means that users must be able to perceive the information being presented (it can't be invisible to all of their senses)

   o Guideline 1.1 Text Alternatives: Provide text alternatives for any non-text content so that it can be changed into other forms people need, such as large print, braille, speech, symbols or simpler language.

- o Guideline 1.2 Time-based Media: Provide alternatives for time-based media.

- o Guideline 1.3 Adaptable: Create content that can be presented in different ways (for example simpler layout) without losing information or structure.

- o Guideline 1.4 Distinguishable: Make it easier for users to see and hear content including separating foreground from background.

2. **Operable** - User interface components and navigation must be operable.

   - o This means that users must be able to operate the interface (the interface cannot require interaction that a user cannot perform)

   - o Guideline 2.1 Keyboard Accessible: Make all functionality available from a keyboard.

   - o Guideline 2.2 Enough Time: Provide users enough time to read and use content.

   - o Guideline 2.3 Seizures and Physical Reactions: Do not design content in a way that is known to cause seizures or physical reactions.

   - o Guideline 2.4 Navigable: Provide ways to help users navigate, find content, and determine where they are.

   - o Guideline 2.5 Input Modalities: Make it easier for users to operate functionality through various inputs beyond keyboard.

3. **Understandable** - Information and the operation of user interface must be understandable.

   - o This means that users must be able to understand the information as well as the operation of the user interface (the content or operation cannot be beyond their understanding).

   - o Guideline 3.1 Readable: Make text content readable and understandable.

   - o Guideline 3.2 Predictable: Make Web pages appear and operate in predictable ways.

   - o Guideline 3.3 Input Assistance: Help users avoid and correct mistakes.

4. **Robust** - Content must be robust enough that it can be interpreted reliably by a wide variety of user agents, including assistive technologies.

   o This means that users must be able to access the content as technologies advance (as technologies and user agents evolve, the content should remain accessible)

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

WCAG 2.1 has several levels of conformance: [3]

- For **Level A** conformance (the minimum level of conformance), the Web page satisfies all the Level A Success Criteria, or a conforming alternate version is provided.

- For **Level AA** conformance, the Web page satisfies all the Level A and Level AA Success Criteria, or a Level AA conforming alternate version is provided.

- For **Level AAA** conformance, the Web page satisfies all the Level A, Level AA and Level AAA Success Criteria, or a Level AAA conforming alternate version is provided.

4.2.   Software used

The support products used for the evaluation have been:

- **Color Contrast Analyser:** free color contrast checker tool that allows you to easily determine the contrast ratio of two colors simply using an eyedrop tool. The CCA enables you to optimize your content–including text and visual elements–for individuals with vision disabilities like color-blindness and low-vision impairments. Features: Compliance indicators for Web Content Accessibility Guidelines 2.1 (WCAG 2.1). Multiple ways to select colors: you can manually enter CSS color formats, use an RGB Slider, or opt for the color picker tool. Color Blindness Simulator. Support for alpha transparency on foreground colors.
- **NVDA:** is a free and open-source, portable screen reader for Microsoft Windows. The project was started by Michael Curran in 2006. NVDA is programmed in Python. It currently works exclusively with accessibility APIs such as UI Automation, Microsoft Active Accessibility, IAccessible2 and the Java Access Bridge, rather than using specialized video drivers to "intercept" and interpret visual information. It is licensed under the GNU General Public License version 2.
- **JAWS:** JAWS, Job Access with Speech, is the world's most popular screen reader, developed for computer users whose vision loss prevents them

from seeing screen content or navigating with a mouse. JAWS provides speech and Braille output for the most popular computer applications on your PC. You will be able to navigate the Internet, write a document, read an email and create presentations from your office, remote desktop, or from home.

4.3.   Automatic analysis

It is recommended that the HTML code (structural) and CSS (styles) do not have errors, this is included in the WCAG 2.1 standard as one of the compliance level A criteria. To evaluate these aspects on the website, they have been used the following tools: W3C Validator for HTML and W3C Validator for CSS. These tools denote that there aren't any structural (HTML) and style (CSS) errors.

4.4.   Manual analysis

In the manual part of this analysis, some aspects related to the accessibility of the interface and the different functionalities of the videoconferencing platform will be discussed, as well as a checklist with the compliance with the WCAG 2.1 standard. For a detailed description of each WCAG 2.1 criterion, please refer to Annex I of this document.

The manual analysis of the tool has also been carried out with the tools listed in section 4.2. Comments on this analysis are included below.
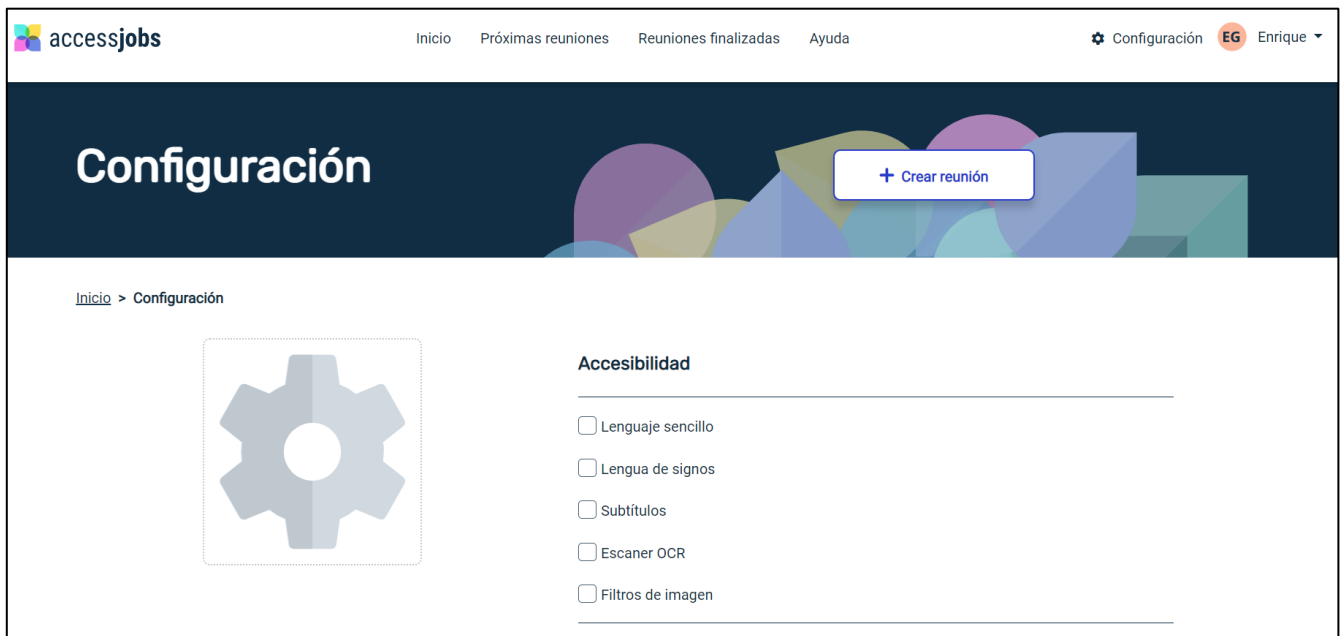

In the configuration screen, you can see different accessibility measures (in English) such as plain language, sign language, subtitles, OCR scanner and image filters.
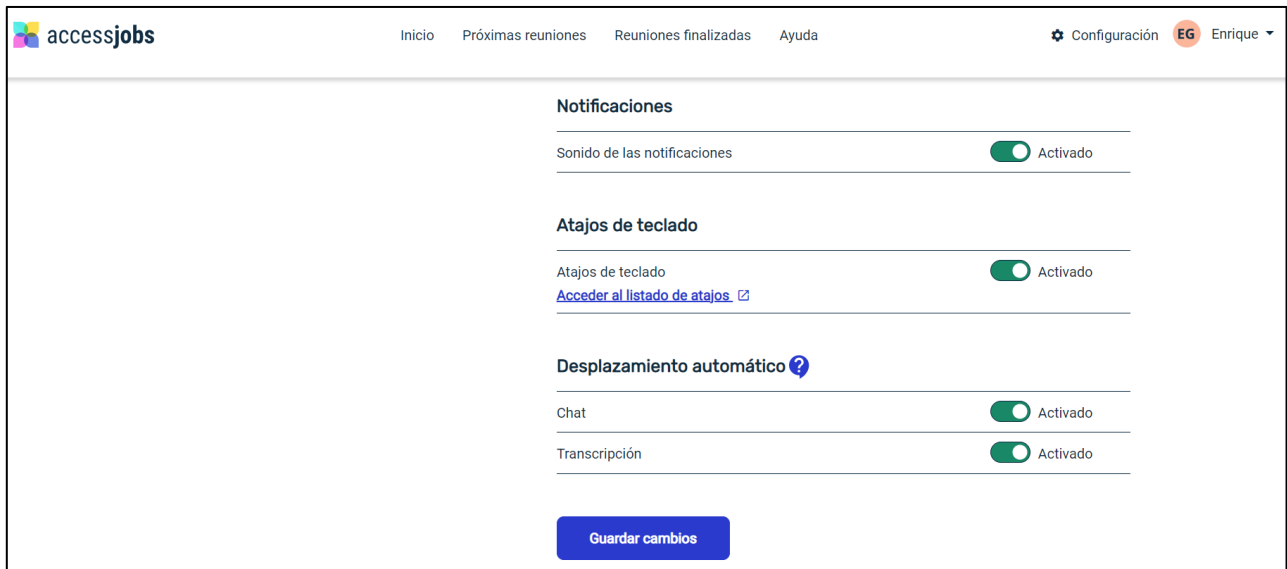
In this part you can also find other options related to Notifications, keyboard shortcuts and automatic movement. Inside the meeting there are other accessibility settings, like the different options for the subtitles as font size, text and background colour, customisation of colours, identifying people who speak in different ways and deciding whether to display the profile picture. You can see an example in the following image:
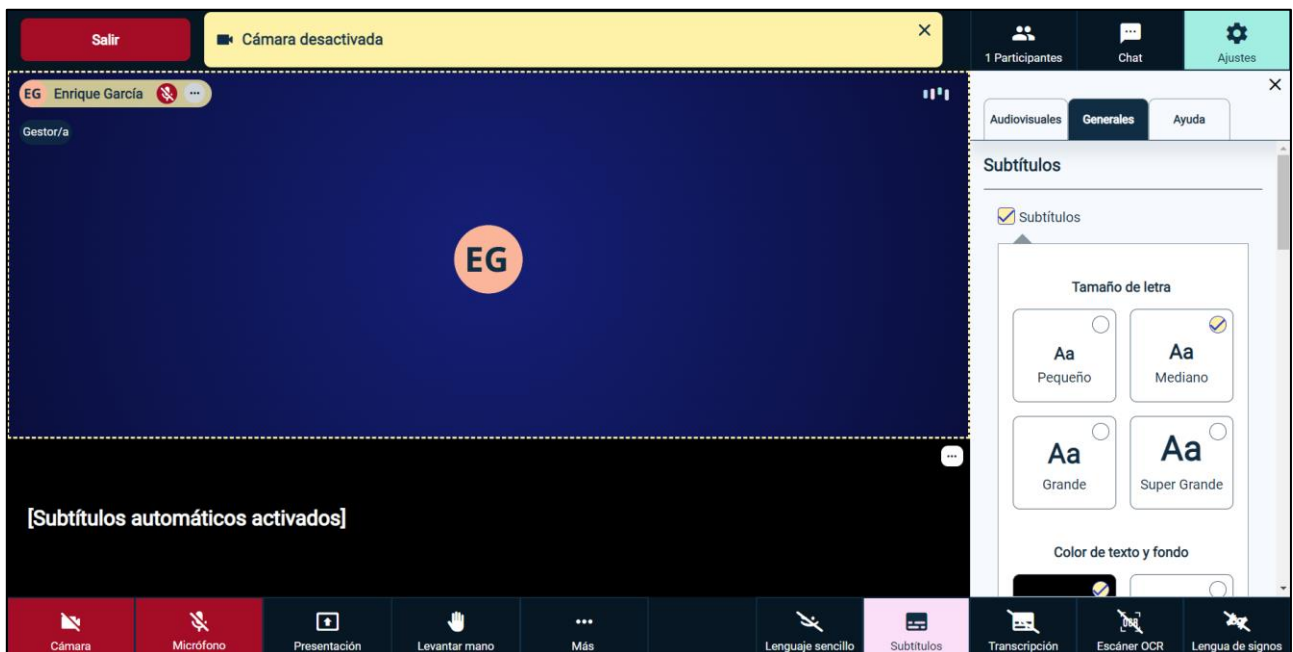
In the accessjobs application, contrasts are adequate, headings are in a consistent order, font size is good and keyboard navigation is complete for people with total visual impairment. All these features provide a good level of accessibility and usability. With regard to compliance with the aforementioned standard, the result

was as follows. Please refer to appendix 1 of this document for details of each criterion.

Level A

Compliance criterion	Does it comply?
1.1.1 Non-text Content	Yes
1.2.1 Audio-only and Video-only (Pre-recorded)	Not applicable
1.2.2 Captions (Pre-recorded)	Not applicable
1.2.3 Audio Description or Media Alternative (Pre-recorded)	Not applicable
1.3.1 Info and Relationships	Yes
1.3.2 Meaningful Sequence	Yes
1.3.3 Sensory Characteristics	Yes
1.4.1 Use of Colour	Yes
1.4.2 Audio Control	Not applicable
2.1.1 Keyboard	Yes
2.1.2 No Keyboard Trap	Yes
(New) 2.1.4 Character Key Shortcuts	Not applicable
2.2.1 Timing Adjustable	Not applicable
2.2.2 Pause, Stop, Hide	Not applicable
2.3.1 Three Flashes or Below	Yes
2.4.1 Bypass Blocks	Yes
2.4.2 Page Titled	Yes
2.4.3 Focus Order	Yes
2.4.4 Link Purpose (In Context)	Yes
(New) 2.5.1 Pointer Gestures	Not applicable
(New) 2.5.2 Pointer Cancellation	Not applicable
(New) 2.5.3 Label in Name	Yes
(New) 2.5.4 Motion Actuation	Not applicable
3.1.1 Language of Page	Yes
3.2.1 On Focus	Yes
3.2.2 On Input	Yes
3.3.1 Error Identification	Yes
3.3.2 Labels or Instructions	Yes
4.1.1 Parsing	Yes
4.1.2 Name, Role, Value	Yes

Level AA

Compliance criterion	Does it comply?
1.2.4 Captions (Live)	Not applicable
1.2.5 Audio Description (Pre-recorded)	Not applicable
(New) 1.3.4 Orientation	Not applicable
(New) 1.3.5 Identify Input Purpose	Yes
1.4.3 Contrast (Minimum)	Yes

Compliance criterion	Does it comply?
1.4.4 Resize Text	Yes
1.4.5 Images of Text	Yes
(New) 1.4.10 Reflow	Yes
(New) 1.4.11 Non-Text Contrast	Yes
(New) 1.4.12 Text Spacing	Yes
(New) 1.4.13 Content on Hover or Focus	Yes
2.4.5 Multiple Ways	Not applicable
2.4.6 Headings and Labels	Yes
2.4.7 Focus Visible	Yes
3.1.2 Language of Parts	Yes
3.2.3 Consistent Navigation	Yes
3.2.4 Consistent Identification	Yes
3.3.3 Error Suggestion	Yes
3.3.4 Error Prevention (Legal, Financial, Data)	Not applicable
(New) 4.1.3 Status Messages	Not applicable

Level AAA

Compliance criterion	Does it comply?
1.2.6 Sign Language (Pre-recorded)	Not applicable
1.2.7 Extended Audio description (Pre-recorded)	Not applicable
1.2.8 Media Alternative (Pre-recorded)	Not applicable
1.2.9 Audio Only (Live)	Not applicable
(New) 1.3.6 Identify Purpose	Not applicable
1.4.6 Contrast (Enhanced)	Yes
1.4.7 Low or No Background Audio	Not applicable
1.4.8 Visual Presentation	No
1.4.9 Images of Text (No Exception)	Yes
2.1.3 Keyboard (No Exception)	Not applicable
2.2.3 No Timing	Yes
2.2.4 Interruptions	Not applicable
2.2.5 Re-authenticating	No
(New) 2.2.6 Timeouts	Yes
2.3.2 Three Flashes	Yes
(New) 2.3.3 Animation from Interactions	Yes, no animated movements
2.4.8 Location	Yes
2.4.9 Link Purpose (Link Only)	Not applicable
2.4.10 Section Headings	Yes
(New) 2.5.5 Target Size	Yes
(New) 2.5.6 Concurrent Input Mechanisms	Not applicable
3.1.3 Unusual words	No
3.1.4 Abbreviations	No
3.1.5 Reading Level	No

Compliance criterion	Does it comply?
3.1.6 Pronunciation	Not applicable
3.2.5 Change on Request	Not applicable
3.3.5 Help	Not applicable
3.3.6 Error Prevention (All)	Not applicable

5. Conclusions

After beta testing the web application Accessjobs within the framework of the Accessibilitech project, we can conclude that the choice was the right one and that this project has identified a solution within the e-learning environment that is accessible, useful and complies with the accessibility standards for this type of solution.

- No errors were found in the automatic analysis
- Support products that help people with disabilities have been used in the process.
- Good level of contrasts
- Good navigation with screen reader
- Accessibility functionalities relevant and well included in the design.
- Customised subtitles
- Sign language
- Privacy issues

As we discussed with the development team, they conducted several surveys, interviews, requirements gathering and user testing in order to fine-tune the software and its design for all.

6. References

[1] «EN 301 549 V3.1.1 (2019-11) Accessibility requirements for ICT products and services,» [En línea]. Available: https://www.etsi.org/deliver/etsi_en/301500_301599/301549/03.01.01_60/en_301549v030101p.pdf.

[2] «W3C Introduction to Understanding WCAG 2.1,» [En línea]. Available: https://www.w3.org/WAI/WCAG21/Understanding/intro.

[3] «W3C Conformance Requirements WCAG 2.1,» [En línea]. Available: https://www.w3.org/TR/WCAG21/#conformance-reqs.

ANNEX I WCAG 2.1 Conformance Criteria

Level A

- **1.1.1 Non-text Content**: Provide text alternatives for non-text content

- **1.2.1 Audio-only and Video-only (Pre-recorded)**: Provide an alternative to video-only and audio-only content

- **1.2.2 Captions (Pre-recorded)**: Provide captions for videos with audio

- **1.2.3 Audio Description or Media Alternative (Pre-recorded)**: Video with audio has a second alternative

- **1.3.1 Info and Relationships**: Logical structure

- **1.3.2 Meaningful Sequence**: Present content in a meaningful order

- **1.3.3 Sensory Characteristics**: Use more than one sense for instructions

- **1.4.1 Use of Colour**: Don't use presentation that relies solely on colour

- **1.4.2 Audio Control**: Don't play audio automatically

- **2.1.1 Keyboard**: Accessible by keyboard only

- **2.1.2 No Keyboard Trap**: Don't trap keyboard users

- **(Nuevo) 2.1.4 Character Key Shortcuts**: Provide a mechanism to configure keyboard shortcuts

- **2.2.1 Timing Adjustable**: Time limits have user controls

- **2.2.2 Pause, Stop, Hide**: Provide user controls for moving content

- **2.3.1 Three Flashes or Below**: No content flashes more than three times per second

- **2.4.1 Bypass Blocks**: Provide a "Skip to Content" link

- **2.4.2 Page Titled**: Use helpful and clear page titles

- **2.4.3 Focus Order**: Logical order.

- **2.4.4 Link Purpose (In Context)**: Every link's purpose is clear from its context

- **(Nuevo) 2.5.1 Pointer Gestures**: All functionality that uses multipoint or path-based gestures for operation can be operated with a single pointer without a path-based gesture, unless a multipoint or path-based gesture is essential.

- **(New) 2.5.2 Pointer Cancellation**: To help avoid inadvertent activation of controls, avoid non-essential down-event (e.g., onmousedown) activation when clicking, tapping, or long pressing the screen.

- **(New) 2.5.3 Label in Name**: For user interface components with labels that include text or images of text, the name contains the text that is presented visually.

- **(New) 2.5.4 Motion Actuation**: Functionality that is triggered by moving the device (such as shaking or panning a mobile device) or by user movement (such as waving to a camera) can be disabled and equivalent functionality is provided via standard controls like buttons.

- **3.1.1 Language of Page**: Page has a language assigned

- **3.2.1 On Focus**: Elements do not change when they receive focus

- **3.2.2 On Input**: Elements do not change when they receive input

- **3.3.1 Error Identification**: Clearly identify input errors

- **3.3.2 Labels or Instructions**: Label elements and give instructions

- **4.1.1 Parsing**: No major code errors

- **4.1.2 Name, Role, Value**: Build all elements for accessibility

Level AA

- **1.2.4 Captions (Live)**: Live videos have captions

- **1.2.5 Audio Description (Pre-recorded)**: Users have access to audio description for video content

- (New) **1.3.4 Orientation**: Content does not restrict its view and operation to a single display orientation, such as portrait or landscape, unless a specific display orientation is essential.

- (New) **1.3.5 Identify Input Purpose**: Input fields that collect certain types of user information have an appropriate autocomplete attribute defined.

- **1.4.3 Contrast (Minimum)**: Contrast ratio between text and background is at least 4.5:1

- **1.4.4 Resize Text**: Text can be resized to 200% without loss of content or function

- **1.4.5 Images of Text**: Don't use images of text

- (New) **1.4.10 Reflow**: No loss of content or functionality occurs and horizontal scrolling is avoided when content is presented at a width of 320 pixels.

- (New) **1.4.11 Non-Text Contrast**: A contrast ratio of at least 3:1 is present for differentiating graphical objects (such as icons and components of charts or graphs) and author-customized interface components (such as buttons, form controls, and focus indicators/outlines).

- (New) **1.4.12 Text Spacing**: No loss of content or functionality occurs when the user adapts text line height/spacing to 1.5 times the font size, paragraph spacing to 2 times the font size, word spacing to .16 times the font size, and letter spacing to .12 times the font size.

- (New) **1.4.13 Content on Hover or Focus**: When additional content is presented on hover or keyboard focus: The newly revealed content can be dismissed (generally via the Esc key) without moving the pointer or keyboard focus, unless the content presents an input error or does not obscure or interfere with other page content; the pointer can be moved to the new content without the content disappearing; the new content must remain visible until the pointer or keyboard focus is moved away from the triggering control, the new content is dismissed, or the new content is no longer relevant.

- **2.4.5 Multiple Ways**: Offer several ways to find pages

- **2.4.6 Headings and Labels**: Use clear headings and labels

- **2.4.7 Focus Visible**: Ensure keyboard focus is visible and clear

- **3.1.2 Language of Parts**: Tell users when the language on a page changes

- **3.2.3 Consistent Navigation**: Use menus consistently

- **3.2.4 Consistent Identification**: Use icons and buttons consistently

- **3.3.3 Error Suggestion**: Suggest fixes when users make errors

- **3.3.4 Error Prevention (Legal, Financial, Data)**: Reduce the risk of input errors for sensitive data

- (New) **4.1.3 Status Messages**: In content implemented using markup languages, status messages can be programmatically determined through role or properties such that they can be presented to the user by assistive technologies without receiving focus.

Level AAA

- **1.2.6 Sign Language (Pre-recorded)**: Provide sign language translations for videos

- **1.2.7 Extended Audio description (Pre-recorded)**: Provide extended audio description for videos

- **1.2.8 Media Alternative (Pre-recorded)**: Provide a text alternative to videos

- **1.2.9 Audio Only (Live)**: Provide alternatives for live audio

- (New) **1.3.6 Identify Purpose**: In content implemented using markup languages, the purpose of User Interface Components, icons, and regions can be programmatically determined.

- **1.4.6 Contrast (Enhanced)**: Contrast ratio between text and background is at least 7:1

- **1.4.7 Low or No Background Audio**: Audio is clear for listeners to hear

- **1.4.8 Visual Presentation**: Offer users a range of presentation options

- **1.4.9 Images of Text (No Exception)**: Don't use images of text

- **2.1.3 Keyboard (No Exception)**: Accessible by keyboard only, without exception

- **2.2.3 No Timing**: No time limits

- **2.2.4 Interruptions**: Don't interrupt users

- **2.2.5 Re-authenticating**: Save user data when re-authenticating

- (New) **2.2.6 Timeouts**: Users are warned of the duration of any user inactivity that could cause data loss, unless the data is preserved for more than 20 hours when the user does not take any actions.

- **2.3.2 Three Flashes**: No content flashes more than three times per second

- (New) **2.3.3 Animation from Interactions**: Motion animation triggered by interaction can be disabled, unless the animation is essential to the functionality, or the information being conveyed.

- **2.4.8 Location**: Let users know where they are

- **2.4.9 Link Purpose (Link Only)**: Every link's purpose is clear from its text

- **2.4.10 Section Headings**: Break up content with headings

- (New) **2.5.5 Target Size**: Clickable targets are at least 44 by 44 pixels in size unless an alternative target of that size is provided, the target is inline (such as a link within a sentence), the target is not author-modified (such as a default checkbox), or the small target size is essential to the functionality.

- (New) **2.5.6 Concurrent Input Mechanisms**: Web content does not restrict use of input modalities available on a platform except where the restriction is

essential, required to ensure the security of the content, or required to respect user settings.

- **3.1.3 Unusual words**: Explain any strange words

- **3.1.4 Abbreviations**: Explain any abbreviations

- **3.1.5 Reading Level**: Users with nine years of school can read your content

- **3.1.6 Pronunciation**: Explain any words that are hard to pronounce

- **3.2.5 Change on Request**: Don't change elements on your website until users ask

- **3.3.5 Help**: Provide detailed help and instructions

- **3.3.6 Error Prevention (All)**: Reduce the risk of all input errors