



# **Digital Service and Web Designing Guideline for Inclusive Accessibility 2022**

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# Chapter-1

## 1.1 Background

According to the Bangladesh Bureau of Statistics Household Survey 2016, 6.94 percent of the total population in Bangladesh have some form of disability. On the other hand, As per the 'National Survey on Persons with Disabilities (NSPD) 2021' among the people of Bangladesh, 2.80% (near about 47.42 lakh) have at least one disability, there is 3.29% among males, and 2.34% among female population and 2.92% in the rural area and 2.45% in the urban area. Meanwhile, the Department of Social Services has identified and registered near about 30 lakh persons with disabilities in their Disability Information System (DIS) system. Currently in Bangladesh, all the 58 Ministries, 353 Departments, 8 Divisions, 64 Districts, 492 Upazillas, and 4554 Unions have active web portals integrated through the National Web Portal of Bangladesh. More than 33,000 government websites and more than 1,000 citizen e-services of various government offices in Bangladesh. In addition, citizens have even mainly become dependent on different digital services for seeking jobs, buying goods, or shopping. Consequently, various private services, including job portals, e-commerce, news portals, and banking services, are also being provided online. The persons with disabilities in Bangladesh also use the websites to receive various services and information using the required tools. But, some of the features are working as a barrier to letting that happen. As the websites are not fully accessible, they are not able to attain the services on their own. Therefore, a significant number of citizens with disabilities are being deprived of digital public services in Bangladesh.

The Government of the People's Republic of Bangladesh has already earned the admiration of persons with disabilities in the global arena. The Government of Bangladesh has set "disability" a priority in the country's development agenda. Bangladesh is one of the first 20 countries in the world to sign and ratify the UN Convention on the Rights of Persons with Disabilities (UNCRPD). The government passed the 'Persons with Disabilities Rights and Protection Act, 2013' to ensure the rights and overall development of persons with disabilities in Bangladesh where the digital inclusion and accessibility have been mentioned in a separate section. According to the Constitution of Bangladesh, all citizens have the right to enjoy their dignity and fundamental human rights and have social equality. To address the most vulnerable citizen with disabilities such as neuro-development, including autism spectrum, the Persons with Neuro-Developmental Disability Trust Act 2013 has been enacted. Besides, The government of Bangladesh has ensured the inclusion of disability in its National Education Policy, National Skills Development Policy, and other policy frameworks, such as Vision 2041, the 8th 5-Year Plan, and the Delta Plan of Bangladesh. The National Action Plan on Disability and the Government's Information and Communication Technology (ICT) Policy (Articles 3 and 4) have also included the issue of accessibility for persons with disabilities in all government and private services to ensure the rights of persons with disabilities. The importance of accessibility is not



only limited to national commitments but is also very important from various global perspectives. Article-9 of the UN Convention on the Rights of Persons with Disabilities (UNCRPD) ensures that persons with disabilities enjoy equal access to all information and communication technology-related services like other citizens, and Article-21 encourages to provide the information on the Internet in a disability-inclusive manner. In addition, all the United Nations Sustainable Development Goals (SDG) outline integrated service delivery by enabling disability-inclusive services that will help achieve the SDG targets and implement the 'Leaving No One Behind' concept. Therefore, considering the political, legal, and global commitments of the Government of Bangladesh, all the digital public services need to be disability-inclusive.

## 1.2 Objective

1. To provide Web, Mobile App, and Digital service provider and Decision-makers with the knowledge to develop Accessible Websites, Mobile Apps, Digital Services
2. Ensuring Inclusive accessibility to Web, Mobile App, and Digital service.
3. Web, Mobile App, and Digital service must be compatible with screen reading software.
4. Follow the WCAG 2.1 guideline or its updated version while developing Web, Mobile App, and Digital service.
5. Ensuring Web, Mobile App, and Digital service development in terms of UNCRPD.
- 6.

The objective of this guideline is to provide Web, Mobile App, and Digital service provider and Decision-makers with the knowledge to develop accessible websites, mobile apps, digital services, and relevant content following the WCAG 2.1 guideline. As the requirements for accessible Websites, Mobile Apps, and Digital services come into effect in Bangladesh, the ability to create them will be an asset to digital service providers and other relevant stakeholders across the country.

## 1.3 Definition of Disability & Web, App, and Digital Service Accessibility

According to the Rights and Protection of Persons with Disabilities Act, 2013, "Disability" means any long-term or permanent physical, mental, intellectual, developmental or sensory impairment or disadvantage of any person and the reciprocal effect of visual and environmental barriers to the person, due to which the person is not equal. are prevented from participating fully and effectively in society on grounds.

According to the Rights and Protection of Persons with Disabilities Act, 2013, "Accessibility" means the right of every person with a disability to receive the same opportunities and treatment

as others in all facilities and services available to the public, including physical infrastructure, transportation, communication, information, and information and communication technology.

Web, Mobile App, and Digital service accessibility refer to the tools and technologies used in Websites, Mobile Apps, and Digital services that are designed and developed in such a way that everyone including persons with disabilities, can access platforms and content independently. For persons with disabilities, digital accessibility means being able to access websites, apps, and digital services as effectively as a person without a disability. There is no associated cost to this accessibility process; the websites, apps, and digital services will become accessible by only following the accessibility guidelines during their development.

## **1.4 Target Community**

This guideline is expected to support web and app developers, tech companies, assistive technology providers, ICT specialists, program managers, all types of persons with disabilities, organizations of persons with disabilities (OPDs), Non-Government Organizations (NGOs), content providers, policy-makers and other decision-makers within the public and private sectors. These stakeholders can be partners in delivering services that support an all-inclusive approach to web accessibility.

# **Chapter-2**

## **2.1 Common Barriers Faced by Persons with Disabilities regarding Web and Digital Service Accessibility**

1. Inaccessible notice, publications such as Bangla PDF or JPEG format is not accessible for the persons with disabilities
2. Images used in most of the websites have no alternative texts to identify the purpose
3. The security codes and captcha codes are not available in audio or alternative formate on most of the websites
4. The shortcut key for navigating website is not available on many websites
5. Text Labeling is empty on most of the websites such form field
6. The videos published on the websites do not have descriptions
7. 'Jump to the main menu' and 'Jump to page top' are not available on many websites



8. Text resize options are not available on the websites
9. 'Color change' option is not available on most of the websites
10. Number of webpages cannot be synced with the screen reader software
11. A pop-up window is inaccessible to navigate
12. The number of tables and flow charts do not have accessible format
13. Proper description is not provided to alternative text
14. Contrast ratio is not properly maintained on most of the websites
15. Proper Image Description is not available on most of the websites
16. Font resizer option is not available on most of the websites
17. Navigation shortcut key command is not accessible on most of the websites
18. Most of the PDF documents are inaccessible because of scanned pdf
19. Floating window is not readable with screen-reader

## **2.2 Common Barriers Faced by Persons with Disabilities regarding App Accessibility**

1. Apps are not correctly navigable.
2. Alternative texts are not available in different icons, links, and images
3. Inaccessible virtual keyboards are used in most of the login sections of applications
4. No facilities are available to control Colors, Font Sizes, Contrast Ratios, and Skip Navigation
5. Navigation through assistive technologies is not user-friendly
6. The web-based sites are not mobile responsive
7. Forms are complicated in the application and not accessible.
8. Unnecessary texts are available.

## Chapter-3

### 3.1 Web Accessibility Framework Following the WCAG 2.1 Guideline

#### 1. Perceivable

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

##### *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.

##### *Success Criterion 1.1.1 Non-text Content*

(Level A)

All non-text content that is presented to the user has a text alternative that serves the equivalent purpose, except for the situations listed below.

##### Controls, Input

If non-text content is a control or accepts user input, then it has a name that describes its purpose.

##### Time-Based Media

If non-text content is time-based media, then text alternatives at least provide descriptive identification of the non-text content.

##### Test

If non-text content is a test or exercise that would be invalid if presented in text, then text alternatives at least provide descriptive identification of the non-text content.

##### Sensory

If non-text content is primarily intended to create a specific sensory experience, then text alternatives at least provide descriptive identification of the non-text content.

## CAPTCHA

If the purpose of non-text content is to confirm that content is being accessed by a person rather than a computer, then text alternatives that identify and describe the purpose of the non-text content are provided, and alternative forms of CAPTCHA (Example: Audio, Phone call, Text message,

Equation Solve, etc.) using output modes for different types of sensory perception are provided to accommodate different disabilities.

## Decoration, Formatting, Invisible

If non-text content is pure decoration, is used only for visual formatting, or is not presented to users, then it is implemented in a way that can be ignored by assistive technology.

### ***Guideline 1.2 Time-based Media***

Provide alternatives for time-based media.

#### *Success Criterion 1.2.1 Audio-only and Video-only (Prerecorded)*

(Level A)

For prerecorded audio-only and prerecorded video-only media, the following are true, except when the audio or video is a media alternative for text and is clearly labeled as such:

##### Prerecorded Audio-only

An alternative for time-based media is provided that presents equivalent information for prerecorded audio-only content.

##### Prerecorded Video-only

Either an alternative for time-based media or an audio track is provided that presents equivalent information for prerecorded video-only content. Sign language interpretation can be added).

#### *Success Criterion 1.2.2 Captions (Prerecorded)*

(Level A)

Captions are provided for all prerecorded audio content in synchronized media, except when the media is a media alternative for text and is clearly labeled as such.

#### *Success Criterion 1.2.3 Audio Description or Media Alternative (Prerecorded)*

(Level A)



An alternative for time-based media or audio description of the prerecorded video content is provided for synchronized media, except when the media is a media alternative for text and is clearly labeled as such.

*Success Criterion 1.2.4 Captions (Live)*

(Level AA)

Captions are provided for all live audio content in synchronized media.

*Success Criterion 1.2.5 Audio Description (Prerecorded)*

(Level AA)

Audio description is provided for all prerecorded video content in synchronized media.

*Success Criterion 1.2.6 Sign Language (Prerecorded)*

(Level AAA)

Sign language interpretation is provided for all prerecorded audio content in synchronized media.

*Success Criterion 1.2.7 Extended Audio Description (Prerecorded)*

(Level AAA)

Where pauses in foreground audio are insufficient to allow audio descriptions to convey the sense of the video, extended audio description is provided for all prerecorded video content in synchronized media.

*Success Criterion 1.2.8 Media Alternative (Prerecorded)*

(Level AAA)

An alternative for time-based media is provided for all prerecorded synchronized media and for all prerecorded video-only media.

*Success Criterion 1.2.9 Audio-only (Live)*

(Level AAA)

An alternative for time-based media that presents equivalent information for live audio-only content is provided.

***Guideline 1.3 Adaptable***

Create content that can be presented in different ways (for example simpler layout) without losing information or structure.

*Success Criterion 1.3.1 Info and Relationships*

(Level A)



Information, structure, and relationships conveyed through presentation can be programmatically determined or are available in text.

*Success Criterion 1.3.2 Meaningful Sequence*

(Level A)

When the sequence in which content is presented affects its meaning, a correct reading sequence can be programmatically determined.

*Success Criterion 1.3.3 Sensory Characteristics*

(Level A)

Instructions provided for understanding and operating content do not rely solely on sensory characteristics of components such as shape, color, size, visual location, orientation, or sound.

NOTE

For requirements related to color, refer to Guideline 1.4.

*Success Criterion 1.3.4 Orientation*

(Level AA)

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.

NOTE

Examples, where a particular display orientation may be essential, are a bank check, a piano application, slides for a projector or television, or virtual reality content where binary display orientation is not applicable.

*Success Criterion 1.3.5 Identify Input Purpose*

(Level AA)

The purpose of each input field in collecting information about the user can be programmatically determined when:

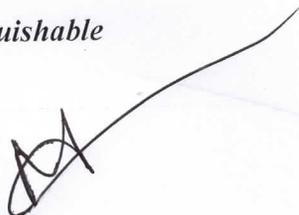
- The input field serves a purpose identified in the Input Purposes for User Interface Components section; and
- The content is implemented using technologies with support for identifying the expected meaning for form input data.

*Success Criterion 1.3.6 Identify Purpose*

(Level AAA)

In content implemented using markup languages, the purpose of User Interface Components, icons, and regions can be programmatically determined.

***Guideline 1.4 Distinguishable***



Make it easier for users to see and hear content including separating foreground from background.

*Success Criterion 1.4.1 Use of Color*

(Level A)

Color is not used as the only visual means of conveying information, indicating an action, prompting a response, or distinguishing a visual element.

NOTE

This success criterion addresses color perception specifically. Other forms of perception are covered in Guideline 1.3 including programmatic access to color and other visual presentation coding.

*Success Criterion 1.4.2 Audio Control*

(Level A)

If any audio on a Web page plays automatically for more than 3 seconds, either a mechanism is available to pause or stop the audio, or a mechanism is available to control audio volume independently from the overall system volume level.

NOTE

Since any content that does not meet this success criterion can interfere with a user's ability to use the whole page, all content on the Web page (whether or not it is used to meet other success criteria) must meet this success criterion. See Conformance Requirement 5: Non-Interference.

*Success Criterion 1.4.3 Contrast (Minimum)*

(Level AA)

The visual presentation of text and images of text has a contrast ratio of at least 4.5:1, except for the following:

Large Text

Large-scale text and images of large-scale text have a contrast ratio of at least 3:1.

Incidental

Text or images of text that are part of an inactive user interface component, that are pure decoration, that are not visible to anyone, or that are part of a picture that contains significant other visual content, have no contrast requirement.

Logotypes

Text that is part of a logo or brand name has no contrast requirement.



*Success Criterion 1.4.4 Resize text*

(Level AA)

Except for captions and images of text, text can be resized without assistive technology up to 200 per cent without loss of content or functionality.

*Success Criterion 1.4.5 Images of Text*

(Level AA)

If the technologies being used can achieve the visual presentation, the text is used to convey information rather than images of text except for the following:

Customizable

The image of text can be visually customized to the user's requirements;

Essential

A particular presentation of the text is essential to the information being conveyed.

NOTE

Logotypes (text that is part of a logo or brand name) are considered essential.

*Success Criterion 1.4.6 Contrast (Enhanced)*

(Level AAA)

The visual presentation of text and images of text has a contrast ratio of at least 7:1, except for the following:

Large Text

Large-scale text and images of large-scale text have a contrast ratio of at least 4.5:1.

Incidental

Text or images of text that are part of an inactive user interface component, that are pure decoration, that are not visible to anyone, or that are part of a picture that contains significant other visual content, have no contrast requirement.

Logotypes

Text that is part of a logo or brand name has no contrast requirement.

*Success Criterion 1.4.7 Low or No Background Audio*

(Level AAA)

For prerecorded audio-only content that (1) contains primarily speech in the foreground, (2) is not an audio CAPTCHA or audio logo, and (3) is not vocalization intended to be primarily musical expression such as singing or rapping, at least one of the following is true:



#### No Background

The audio does not contain background sounds.

#### Turn Off

The background sounds can be turned off.

#### 20 dB

The background sounds are at least 20 decibels lower than the foreground speech content, with the exception of occasional sounds that last for only one or two seconds.

#### NOTE

Per the definition of "decibel," background sound that meets this requirement will be approximately four times quieter than the foreground speech content.

#### *Success Criterion 1.4.8 Visual Presentation*

(Level AAA)

For the visual presentation of blocks of text, a mechanism is available to achieve the following:

- Foreground and background colors can be selected by the user.
- Width is no more than 80 characters or glyphs (40 if CJK).
- Text is not justified (aligned to both the left and the right margins).
- Line spacing (leading) is at least space-and-a-half within paragraphs, and paragraph spacing is at least 1.5 times larger than the line spacing.
- Text can be resized without assistive technology up to 200 per cent in a way that does not require the user to scroll horizontally to read a line of text on a full-screen window.

#### *Success Criterion 1.4.9 Images of Text (No Exception)*

(Level AAA)

Images of text are only used for pure decoration or where a particular presentation of text is essential to the information being conveyed.

#### NOTE

Logotypes (text that is part of a logo or brand name) are considered essential.

#### *Success Criterion 1.4.10 Reflow*

(Level AA)

Content can be presented without loss of information or functionality, and without requiring scrolling in two dimensions for:

- Vertical scrolling content at a width equivalent to 320 CSS pixels;
- Horizontal scrolling content at a height equivalent to 256 CSS pixels.



Except for parts of the content that require a two-dimensional layout for usage or meaning.

NOTE

Note: 320 CSS pixels is equivalent to a starting viewport width of 1280 CSS pixels wide at 400% zoom. For web content which are designed to scroll horizontally (e.g. with vertical text), the 256 CSS pixels is equivalent to a starting viewport height of 1024px at 400% zoom.

NOTE

Examples of content that require a two-dimensional layout are images, maps, diagrams, video, games, presentations, data tables, and interfaces where it is necessary to keep toolbars in view while manipulating content.

*Success Criterion 1.4.11 Non-text Contrast*

(Level AA)

The visual presentation of the following have a contrast ratio of at least 3:1 against adjacent color (s):

User Interface Components

Visual information required to identify user interface components and states, except for inactive components or where the appearance of the component is determined by the user agent and not modified by the author;

Graphical Objects

Parts of graphics required to understand the content, except when a particular presentation of graphics is essential to the information being conveyed.

*Success Criterion 1.4.12 Text Spacing*

(Level AA)

In content implemented using markup languages that support the following text style properties, no loss of content or functionality occurs by setting all of the following and by changing no other style property:

- Line height (line spacing) to at least 1.5 times the font size;
- Spacing following paragraphs to at least 2 times the font size;
- Letter spacing (tracking) to at least 0.12 times the font size;
- Word spacing to at least 0.16 times the font size.



Exception: Human languages and scripts that do not make use of one or more of these text style properties in written text can conform using only the properties that exist for that combination of language and script.

*Success Criterion 1.4.13 Content on Hover or Focus*

(Level AA)

Where receiving and then removing pointer hover or keyboard focus triggers additional content to become visible and then hidden, the following are true:

**Dismissable**

A mechanism is available to dismiss the additional content without moving pointer hover or keyboard focus unless the additional content communicates an input error or does not obscure or replace other content;

**Hoverable**

If pointer hover can trigger the additional content, then the pointer can be moved over the additional content without the additional content disappearing;

**Persistent**

The additional content remains visible until the hover or focus trigger is removed, the user dismisses it, or its information is no longer valid.

Exception: The visual presentation of the additional content is controlled by the user agent and is not modified by the author.

**NOTE**

Examples of additional content controlled by the user agent include browser tooltips created through the use of the HTML title attribute.

**NOTE**

Custom tooltips, sub-menus, and other nonmodal popups that display on hover and focus are examples of additional content covered by this criterion.

**2. Operable**

User interface components and navigation must be operable.

**Guideline 2.1 Keyboard Accessible**

A handwritten signature in black ink, consisting of a stylized, cursive name followed by a long horizontal line extending to the right.

Make all functionality available from a keyboard.

*Success Criterion 2.1.1 Keyboard*

(Level A)

All functionality of the content is operable through a keyboard interface without requiring specific timings for individual keystrokes, except where the underlying function requires input that depends on the path of the user's movement and not just the endpoints.

NOTE

This exception relates to the underlying function, not the input technique. For example, if using handwriting to enter text, the input technique (handwriting) requires path-dependent input but the underlying function (text input) does not.

NOTE

This does not forbid and should not discourage providing mouse input or other input methods in addition to keyboard operation.

*Success Criterion 2.1.2 No Keyboard Trap*

(Level A)

If keyboard focus can be moved to a component of the page using a keyboard interface, then focus can be moved away from that component using only a keyboard interface, and, if it requires more than unmodified arrow or tab keys or other standard exit methods, the user is advised of the method for moving the focus away.

NOTE

Since any content that does not meet this success criterion can interfere with a user's ability to use the whole page, all content on the Web page (whether it is used to meet other success criteria or not) must meet this success criterion.

*Success Criterion 2.1.3 Keyboard (No Exception)*

(Level AAA)

All functionality of the content is operable through a keyboard interface without requiring specific timings for individual keystrokes.

*Success Criterion 2.1.4 Character Key Shortcuts*

(Level A)

If a keyboard shortcut is implemented in content using only letter (including upper- and lower-case letters), punctuation, number, or symbol characters, then at least one of the following is true:



Turn off

A mechanism is available to turn the shortcut off;

Remap

A mechanism is available to remap the shortcut to use one or more non-printable keyboard characters (e.g. Ctrl, Alt, etc);

Active only on focus

The keyboard shortcut for a user interface component is only active when that component has focus.

### ***Guideline 2.2 Enough Time***

Provide users enough time to read and use the content.

#### *Success Criterion 2.2.1 Timing Adjustable*

(Level A)

For each time limit that is set by the content, at least one of the following is true:

Turn off

The user is allowed to turn off the time limit before encountering it; or

Adjust

The user is allowed to adjust the time limit before encountering it over a wide range that is at least ten times the length of the default setting; or

Extend

The user is warned before time expires and given at least 20 seconds to extend the time limit with a simple action (for example, "press the space bar"), and the user is allowed to extend the time limit at least ten times; or

Real-time Exception

The time limit is a required part of a real-time event (for example, an auction), and no alternative to the time limit is possible; or

Essential Exception

The time limit is essential and extending it would invalidate the activity; or

20 Hour Exception

The time limit is longer than 20 hours.



NOTE

This success criterion helps ensure that users can complete tasks without unexpected changes in content or context that are a result of a time limit. This success criterion should be considered in conjunction with Success Criterion 3.2.1, which puts limits on changes of content or context as a result of user action.

*Success Criterion 2.2.2 Pause, Stop, Hide*

(Level A)

For moving, blinking, scrolling, or auto-updating information, all of the following are true:

*Moving, Blinking, Scrolling*

For any moving, blinking, or scrolling information that (1) starts automatically, (2) lasts more than five seconds, and (3) is presented in parallel with other content, there is a mechanism for the user to pause, stop, or hide it unless the movement, blinking, or scrolling is part of an activity where it is essential; and

*Auto-updating*

For any auto-updating information that (1) starts automatically and (2) is presented in parallel with other content, there is a mechanism for the user to pause, stop, or hide it or to control the frequency of the update unless the auto-updating is part of an activity where it is essential.

NOTE

For requirements related to flickering or flashing content, refer to Guideline 2.3.

NOTE

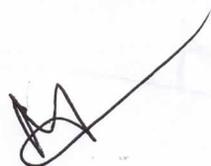
Since any content that does not meet this success criterion can interfere with a user's ability to use the whole page, all content on the Web page (whether it is used to meet other success criteria or not) must meet this success criterion. See Conformance Requirement 5: Non-Interference.

NOTE

Content that is updated periodically by software or that is streamed to the user agent is not required to preserve or present information that is generated or received between the initiation of the pause and resuming presentation, as this may not be technically possible, and in many situations could be misleading to do so.

NOTE

An animation that occurs as part of a preload phase or similar situation can be considered essential if interaction cannot occur during that phase for all users and if not indicating progress could confuse users or cause them to think that content was frozen or broken.



*Success Criterion 2.2.3 No Timing*

(Level AAA)

Timing is not an essential part of the event or activity presented by the content, except for non-interactive synchronized media and real-time events.

*Success Criterion 2.2.4 Interruptions*

(Level AAA)

Interruptions can be postponed or suppressed by the user, except for interruptions involving an emergency.

*Success Criterion 2.2.5 Re-authenticating*

(Level AAA)

When an authenticated session expires, the user can continue the activity without loss of data after re-authenticating.

*Success Criterion 2.2.6 Timeouts*

(Level AAA)

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.

NOTE

Privacy regulations may require explicit user consent before user identification has been authenticated and before user data is preserved. In cases where the user is a minor, explicit consent may not be solicited in most jurisdictions, countries or regions. Consultation with privacy professionals and legal counsel is advised when considering data preservation as an approach to satisfy this success criterion.

***Guideline 2.3 Seizures and Physical Reactions***

Do not design content in a way that is known to cause seizures or physical reactions.

*Success Criterion 2.3.1 Three Flashes or Below Threshold*

(Level A)

Web pages do not contain anything that flashes more than three times in any one second period, or the flash is below the general flash and red flash thresholds.

NOTE

Since any content that does not meet this success criterion can interfere with a user's ability to use the whole page, all content on the Web page (whether it is used to meet other success criteria or not) must meet this success criterion. See Conformance Requirement 5: Non-Interference.

A handwritten signature in black ink, consisting of a stylized 'M' followed by a long horizontal line extending to the right.

*Success Criterion 2.3.2 Three Flashes*

(Level AAA)

Web pages do not contain anything that flashes more than three times in any one second period.

*Success Criterion 2.3.3 Animation from Interactions*

(Level AAA)

Motion animation triggered by interaction can be disabled unless the animation is essential to the functionality or the information being conveyed.

**Guideline 2.4 Navigable**

Provide ways to help users navigate, find content, and determine where they are.

*Success Criterion 2.4.1 Bypass Blocks*

(Level A)

A mechanism is available to bypass blocks of content that are repeated on multiple Web pages.

*Success Criterion 2.4.2 Page Titled*

(Level A)

Web pages have titles that describe the topic or purpose.

*Success Criterion 2.4.3 Focus Order*

(Level A)

If a Web page can be navigated sequentially and the navigation sequences affect meaning or operation, focusable components receive focus in an order that preserves meaning and operability.

*Success Criterion 2.4.4 Link Purpose (In Context)*

(Level A)

The purpose of each link can be determined from the link text alone or from the link text together with its programmatically determined link context, except where the purpose of the link would be ambiguous to users in general.

*Success Criterion 2.4.5 Multiple Ways*

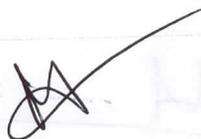
(Level AA)

More than one way is available to locate a Web page within a set of Web pages except where the Web Page is the result of, or a step in, a process.

*Success Criterion 2.4.6 Headings and Labels*

(Level AA)

Headings and labels describe the topic or purpose.



*Success Criterion 2.4.7 Focus Visible*

(Level AA)

Any keyboard operable user interface has a mode of operation where the keyboard focus indicator is visible.

*Success Criterion 2.4.8 Location*

(Level AAA)

Information about the user's location within a set of Web pages is available.

*Success Criterion 2.4.9 Link Purpose (Link Only)*

(Level AAA)

A mechanism is available to allow the purpose of each link to be identified from the link text alone, except where the purpose of the link would be ambiguous to users in general.

*Success Criterion 2.4.10 Section Headings*

(Level AAA)

Section headings are used to organize the content.

NOTE

"Heading" is used in its general sense and includes titles and other ways to add a heading to different types of content.

NOTE

This success criterion covers sections within writing, not user interface components. User Interface components are covered under Success Criterion 4.1.2.

***Guideline 2.5 Input Modalities***

Make it easier for users to operate functionality through various inputs beyond the keyboard.

*Success Criterion 2.5.1 Pointer Gestures*

(Level A)

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.

NOTE

This requirement applies to web content that interprets pointer actions (i.e. this does not apply to actions that are required to operate the user agent or assistive technology).

*Success Criterion 2.5.2 Pointer Cancellation*

(Level A)

For functionality that can be operated using a single pointer, at least one of the following is true:



#### No Down-Event

The down-event of the pointer is not used to execute any part of the function;

#### Abort or Undo

Completion of the function is on the up-event, and a mechanism is available to abort the function before completion or to undo the function after completion;

#### Up Reversal

The up-event reverses any outcome of the preceding down-event;

#### Essential

Completing the function on the down-event is essential.

#### NOTE

Functions that emulate a keyboard or numeric keypad key press are considered essential.

#### NOTE

This requirement applies to web content that interprets pointer actions (i.e. this does not apply to actions that are required to operate the user agent or assistive technology).

#### *Success Criterion 2.5.3 Label in Name*

(Level A)

For user interface components with labels that include text or images of text, the name contains the text that is presented visually.

#### NOTE

A best practice is to have the text of the label at the start of the name.

#### *Success Criterion 2.5.4 Motion Actuation*

(Level A)

Functionality that can be operated by device motion or user motion can also be operated by user interface components and responding to the motion can be disabled to prevent accidental actuation, except when:

#### Supported Interface

The motion is used to operate functionality through an accessibility-supported interface;

#### Essential



The motion is essential for the function and doing so would invalidate the activity.

#### Success Criterion 2.5.5 Target Size

(Level AAA)

The size of the target for pointer inputs is at least 44 by 44 CSS pixels except when:

##### Equivalent

The target is available through an equivalent link or control on the same page that is at least 44 by 44 CSS pixels;

##### Inline

The target is in a sentence or block of text;

##### User Agent Control

The size of the target is determined by the user agent and is not modified by the author;

##### Essential

A particular presentation of the target is essential to the information being conveyed.

#### Success Criterion 2.5.6 Concurrent Input Mechanisms

(Level AAA)

Web content does not restrict the 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. Understandable**

Information and the operation of the user interface must be understandable.

#### ***Guideline 3.1 Readable***

Make text content readable and understandable.

#### Success Criterion 3.1.1 Language of Page

(Level A)

The default human language of each Web page can be programmatically determined.

#### *Success Criterion 3.1.2 Language of Parts*

(Level AA)

A handwritten signature in black ink, consisting of a stylized 'M' followed by a horizontal line extending to the right.

The human language of each passage or phrase in the content can be programmatically determined except for proper names, technical terms, words of indeterminate language, and words or phrases that have become part of the vernacular of the immediately surrounding text.

*Success Criterion 3.1.3 Unusual Words*

(Level AAA)

A mechanism is available for identifying specific definitions of words or phrases used in an unusual or restricted way, including idioms and jargon.

*Success Criterion 3.1.4 Abbreviations*

(Level AAA)

A mechanism for identifying the expanded form or meaning of abbreviations is available.

*Success Criterion 3.1.5 Reading Level*

(Level AAA)

When text requires reading ability more advanced than the lower secondary education level after removal of proper names and titles, supplemental content, or a version that does not require reading ability more advanced than the lower secondary education level, is available.

*Success Criterion 3.1.6 Pronunciation*

(Level AAA)

A mechanism is available for identifying specific pronunciation of words where the meaning of the words, in context, is ambiguous without knowing the pronunciation.

***Guideline 3.2 Predictable***

Make Web pages appear and operate in predictable ways.

*Success Criterion 3.2.1 On Focus*

(Level A)

When any user interface component receives focus, it does not initiate a change of context.

*Success Criterion 3.2.2 On Input*

(Level A)

Changing the setting of any user interface component does not automatically cause a change of context unless the user has been advised of the behaviour before using the component.

*Success Criterion 3.2.3 Consistent Navigation*

(Level AA)

Navigational mechanisms that are repeated on multiple Web pages within a set of Web pages occur in the same relative order each time they are repeated unless a change is initiated by the user.



*Success Criterion 3.2.4 Consistent Identification*

(Level AA)

Components that have the same functionality within a set of Web pages are identified consistently.

*Success Criterion 3.2.5 Change on Request*

(Level AAA)

Changes of context are initiated only by user request or a mechanism is available to turn off such changes.

**Guideline 3.3 Input Assistance**

Help users avoid and correct mistakes.

*Success Criterion 3.3.1 Error Identification*

(Level A)

If an input error is automatically detected, the item that is in error is identified and the error is described to the user in text.

*Success Criterion 3.3.2 Labels or Instructions*

(Level A)

Labels or instructions are provided when content requires user input.

*Success Criterion 3.3.3 Error Suggestion*

(Level AA)

If an input error is automatically detected and suggestions for correction are known, then the suggestions are provided to the user, unless it would jeopardize the security or purpose of the content.

*Success Criterion 3.3.4 Error Prevention (Legal, Financial, Data)*

(Level AA)

For Web pages that cause legal commitments or financial transactions for the user to occur, that modify or delete user-controllable data in data storage systems, or that submit user test responses, at least one of the following is true:

Reversible

Submissions are reversible.

Checked

Data entered by the user is checked for input errors and the user is provided with an opportunity to correct them.



Confirmed

A mechanism is available for reviewing, confirming, and correcting information before finalizing the submission.

*Success Criterion 3.3.5 Help*

(Level AAA)

Context-sensitive help is available.

*Success Criterion 3.3.6 Error Prevention (All)*

(Level AAA)

For Web pages that require the user to submit information, at least one of the following is true:

Reversible

Submissions are reversible.

Checked

Data entered by the user is checked for input errors and the user is provided an opportunity to correct them.

Confirmed

A mechanism is available for reviewing, confirming, and correcting information before finalizing the submission.

**4. Robust**

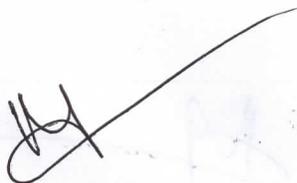
Content must be robust enough that it can be interpreted by a wide variety of user agents, including assistive technologies.

***Guideline 4.1 Compatible***

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

*Success Criterion 4.1.1 Parsing*

(Level A)

A large, stylized handwritten mark or signature in black ink, consisting of several loops and a long horizontal stroke extending to the right.

In content implemented using markup languages, elements have complete start and end tags, elements are nested according to their specifications, elements do not contain duplicate attributes, and any IDs are unique, except where the specifications allow these features.

#### NOTE

Start and end tags that are missing a critical character in their formation, such as a closing angle bracket or a mismatched attribute value quotation mark are not complete.

#### *Success Criterion 4.1.2 Name, Role, Value*

(Level A)

For all user interface components (including but not limited to: form elements, links and components generated by scripts), the name and role can be programmatically determined; states, properties, and values that can be set by the user can be programmatically set; and notification of changes to these items is available to user agents, including assistive technologies.

#### NOTE

This success criterion is primarily for Web authors who develop or script their own user interface components. For example, standard HTML controls already meet this success criterion when used according to specification.

#### *Success Criterion 4.1.3 Status Messages*

(Level AA)

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.

## **5. Conformance**

This section lists requirements for conformance to WCAG 2.1. It also gives information about how to make conformance claims, which are optional. Finally, it describes what it means to be accessibility supported since only accessibility-supported ways of using technologies can be relied upon for conformance. Understanding Conformance includes a further explanation of the accessibility-supported concept.

### ***5.1 Interpreting Normative Requirements***



The main content of WCAG 2.1 is normative and defines requirements that impact conformance claims. Introductory material, appendices, sections marked as "non-normative", diagrams, examples, and notes are informative (non-normative). Non-normative material provides advisory information to help interpret the guidelines but does not create requirements that impact a conformance claim.

The key words MAY, MUST, MUST NOT, NOT RECOMMENDED, RECOMMENDED, SHOULD, and SHOULD NOT are to be interpreted properly.

## **5.2 Conformance Requirements**

In order for a Web page to conform to WCAG 2.1, all of the following conformance requirements must be satisfied:

### **5.2.1 Conformance Level**

One of the following levels of conformance is met in full.

- 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.

#### **NOTE**

Although conformance can only be achieved at the stated levels, authors are encouraged to report (in their claim) any progress toward meeting success criteria from all levels beyond the achieved level of conformance.

#### **NOTE**

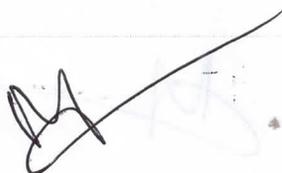
It is not recommended that Level AAA conformance be required as a general policy for entire sites because it is not possible to satisfy all Level AAA Success Criteria for some content.

### **5.2.2 Full pages**

Conformance (and conformance level) is for full Web page(s) only, and cannot be achieved if part of a Web page is excluded.

#### **NOTE**

For the purpose of determining conformance, alternatives to part of a page's content are considered part of the page when the alternatives can be obtained directly from the page, e.g., a long description or an alternative presentation of a video.



## NOTE

Authors of Web pages that cannot conform due to content outside of the author's control may consider a Statement of Partial Conformance.

## NOTE

New A full page includes each variation of the page that is automatically presented by the page for various screen sizes (e.g., variations in a responsive Web page). Each of these variations needs to conform (or needs to have a conforming alternate version) in order for the entire page to conform.

### ***5.2.3 Complete processes***

When a Web page is one of a series of Web pages presenting a process (i.e., a sequence of steps that need to be completed in order to accomplish an activity), all Web pages in the process conform at the specified level or better. (Conformance is not possible at a particular level if any page in the process does not conform at that level or better.)

An online store has a series of pages that are used to select and purchase products. All pages in the series from start to finish (checkout) conform in order for any page that is part of the process to conform.

### ***5.2.4 Only Accessibility-Supported Ways of Using Technologies***

Only accessibility-supported ways of using technologies are relied upon to satisfy the success criteria. Any information or functionality that is provided in a way that is not accessibility supported is also available in a way that is accessibility supported. (See Understanding accessibility support.)

### ***5.2.5 Non-Interference***

If technologies are used in a way that is not accessibility supported, or if they are used in a non-conforming way, then they do not block the ability of users to access the rest of the page. In addition, the Web page as a whole continues to meet the conformance requirements under each of the following conditions:

1. when any technology that is not relied upon is turned on in a user agent,
2. when any technology that is not relied upon is turned off in a user agent, and
3. when any technology that is not relied upon is not supported by a user agent

In addition, the following success criteria apply to all content on the page, including content that is not otherwise relied upon to meet conformance, because failure to meet them could interfere with any use of the page:



- 1.4.2 - Audio Control,
- 2.1.2 - No Keyboard Trap,
- 2.3.1 - Three Flashes or Below Threshold, and
- 2.2.2 - Pause, Stop, Hide.

#### NOTE

If a page cannot conform (for example, a conformance test page or an example page), it cannot be included in the scope of conformance or in a conformance claim.

For more information, including examples, see Understanding Conformance Requirements.

## 3.2 Mobile App Accessibility Guidelines

This guideline offers general guidance to developers on how to create content and applications that work well on mobile devices. It is focused on the accessibility of mobile web and applications to people with disabilities.

All the reference points have been used in this section available in the above '**Web Accessibility Framework Following the WCAG 2.1 Guideline**' section.

### 1.1 WCAG 2.1 and Mobile Content/Applications

"Mobile" is a generic term for a broad range of wireless devices and applications that are easy to carry and use in a wide variety of settings, including outdoors. Mobile devices range from small handheld devices (e.g. feature phones, smartphones) to somewhat larger tablet devices. The term also applies to "wearables" such as "smart"-glasses, "smart"-watches, and fitness bands, and is relevant to other small computing devices such as those embedded into car dashboards, airplane seatbacks, and household appliances.

While mobile is viewed by some as separate from "desktop/laptop", and thus perhaps requiring new and different accessibility guidance, in reality there is no absolute divide between the categories. For example:

many desktop/laptop devices now include touchscreen gesture control,



many mobile devices can be connected to an external keyboard and mouse, web pages utilizing responsive design can transition into a "mobile" screen size even on a desktop/laptop, and mobile operating systems have been used for laptop devices.

Furthermore, the vast majority of user interface patterns from desktop/laptop systems (e.g. text, hyperlinks, tables, buttons, pop-up menus, etc.) are equally applicable to mobile. Therefore, it's not surprising that a large number of existing WCAG 2.1 techniques can be applied to mobile content and applications. Overall, WCAG 2.1 is highly relevant to both web and non-web mobile content and applications.

That said, mobile devices do present a mix of accessibility issues that are different from the typical desktop/laptop. The "Discussion of Mobile-Related Issues" section, below, explains how these issues can be addressed in the context of WCAG 2.1 as it exists or with additional best practices. All the advice in this document can be applied to mobile web sites, mobile web applications, and hybrid web-native applications. Most of the advice also applies to native applications (also known as "mobile apps").

Note: WCAG 2.1 does not provide testable success criteria for some of the mobile-related issues. The work of the Mobile Accessibility Task Force has been to develop techniques and best practices in these areas. When the techniques or best practices don't map to specific WCAG success criteria, they aren't given a sufficient, advisory or failure designation. This doesn't mean that they are optional for creating accessible web content on a mobile platform, but rather that they cannot currently be assigned a designation. The Task Force anticipates that some of these techniques will be included as sufficient or advisory in a potential future iteration of WCAG.

The current document references existing WCAG 2.1 Techniques that apply to mobile platform and provides new best practices, which may in the future become WCAG 2.1 Techniques that directly address emerging mobile accessibility challenges such as small screens, touch and gesture interface, and changing screen orientation.

## **1.2 Other W3C-WAI Guidelines Related to Mobile**

### **1.2.1 UAAG 2.0 and Accessible Mobile Browsers**

The User Agent Accessibility Guidelines (UAAG) 2.0 is meant for the developers of user agents (e.g. web browsers and media players), whether for desktop/laptop or mobile operating systems. A user agent that follows UAAG 2.0 will improve accessibility through its own user interface, through options it provides for rendering and interacting with content, and through its ability to communicate with other technologies, including assistive technologies.

### **1.2.2 ATAG 2.0 and Accessible Mobile Authoring Tools**

A handwritten signature or mark, possibly initials, written in black ink. It consists of a stylized 'M' or similar shape with a long horizontal line extending to the right.

The Authoring Tool Accessibility Guidelines (ATAG) 2.0 provides guidelines for the developers of authoring tools, whether for desktop/laptop or mobile operating systems. An authoring tool that follows ATAG 2.0 will be both more accessible to authors with disabilities (Part A) and designed to enable, support, and promote the production of more accessible web content by all authors (Part B).

## **Discussion of Mobile-Related Issues**

### **2. Mobile accessibility considerations primarily related to Principle 1: Perceivable**

#### **2.1 Small Screen Size**

Small screen size is one of the most common characteristics of mobile devices. While the exceptional resolution of these screens theoretically enables large amounts of information to be rendered, the small size of the screen places practical limits on how much information people can actually view at one time, especially when magnification is used by people with low vision.

Some best practices for helping users to make the most of small screens include

1. Minimizing the amount of information that is put on each page compared to desktop/laptop versions by providing a dedicated mobile version or a responsive design:
  - a. a dedicated mobile version contains content tailored for mobile use. For example, the content may contain fewer content modules, fewer images, or focus on important mobile usage scenarios.
  - b. a responsive design contains content that stays the same, but CSS stylesheets are used to render it differently depending on the viewport width. For example, on narrow screens the navigation menus may be hidden until the user taps a menu button.
2. Providing a reasonable default size for content and touch controls (see "B.2 Touch Target Size and Spacing") to minimize the need to zoom in and out for users with low vision.
3. Adapting the length of link text to the viewport width.
4. Positioning form fields below, rather than beside, their labels (in portrait layout)

#### **2.2 Zoom/Magnification**

A variety of methods allow the user to control content size on mobile devices with small screens. At the browser level, these methods are generally available to assist a broad audience of users. At the platform level, these methods are available as accessibility features to serve people with visual impairments or cognitive disabilities.

The methods include the following:

1. OS-level features



- a. Set default text size (typically controlled from the Display Settings). Note: System text size is often not supported by mobile browsers.
- b. Magnify the entire screen (typically controlled from the Accessibility Settings). Note: Using this setting requires the user to pan vertically and horizontally.
- c. Magnifying lens view under user's finger (typically controlled from the Accessibility Settings)

## 2. Browser-level features

- a. Set default text size of text rendered in the browser's viewport
  - i. Reading mode that renders main content at a user-specified text size
- b. Magnify browser's viewport (typically "pinch-zoom"). Note: Using this setting requires the user to pan vertically and horizontally.
  - i. Note: Some browsers have features that might modify this type of magnification (e.g., re-flowing the content at the new magnification level, the overriding author attempts to prevent pinch-zoom).

The WCAG 2.1 success criterion that is most related to zoom/magnification is

- Resize text (Level AA)

SC 1.4.4 requires text to be resizable without assistive technology up to 200 percent. To meet this requirement, content must not prevent text magnification by the user.

The following methods might be used:

- i. Ensure that the browser pinch zoom is not blocked by the page's viewport meta element so that it can be used to zoom the page to 200%. Restrictive values for user-scalable and maximum-scale attributes of this meta element should be avoided. Note: Relying on full viewport zooming (e.g., not blocking the browser's pinch-zoom feature) requires the user to pan horizontally as well as vertically. While this technique meets the success criteria, it is less usable than supporting text resizing features that reflow content to the user's chosen viewport size. It is best practice to use techniques that support text resizing without requiring horizontal panning.
- ii. Support for system fonts that follow platform-level user preferences for text size.
- iii. Provide on-page controls to change the text size.

Accessibility features geared toward specific populations of people with disabilities fall under the definition of assistive technology adopted by WCAG and thus cannot be relied upon to meet the success criteria. For example, a platform-level zoom feature that magnifies all platform content and has features to specifically support people with low vision is likely considered an assistive technology.

## 2.3 Contrast



Mobile devices are more likely than desktop/laptop devices to be used in varied environments, including outdoors, where glare from the sun or other strong lighting sources is more likely. This scenario heightens the importance of the use of good contrast for all users and may compound the challenges that users with low vision have accessing content with poor contrast on mobile devices.

The WCAG 2.1 success criteria related to the issue of contrast are:

- i. 1.4.3 Contrast (Minimum) (Level AA) which requires a contrast of at least 4.5:1 (or 3:1 for large-scale text) and
- ii. 1.4.6 Contrast (Enhanced) (Level AAA) which requires a contrast of at least 7:1 (or 4.5:1 for large-scale text).

SC 1.4.3. allows for different contrast ratios for large text. Allowing different contrast ratios for larger text is useful because larger text with wider character strokes is easier to read at lower contrast. This allows designers more leeway for the contrast of larger text, which is helpful for content such as titles. The ratio of 18-point text or 14-point bold text described in the SC 1.4.3 was judged to be large enough to enable a lower contrast ratio for web pages displayed on a 15-inch monitor at 1024x768 resolution with a 24-inch viewing distance. Mobile device content is viewed on smaller screens and in different conditions, so this allowance for lessened contrast on the large text must be considered carefully for mobile apps.

For instance, the default point size for mobile platforms might be larger than the default point size used on non-mobile devices. When determining which contrast ratio to follow, developers should strive to make sure to apply the lessened contrast ratio only when text is roughly equivalent to 1.2 times bold or 1.5 times (120% bold or 150%) that of the default platform size. Note, however, that the use of text that is 1.5 times the default on mobile platforms does not imply that the text will be readable by a person with low vision. People with low vision will likely need and use additional platform-level accessibility features and assistive technology such as increased text size and zoom features to access mobile content.

### **3. Mobile accessibility considerations primarily related to Principle 2: Operable**

#### **3.1 Keyboard Control for Touchscreen Devices**

Mobile device design has evolved away from built-in physical keyboards (e.g., fixed, slide-out) towards devices that maximize touchscreen area and display an on-screen keyboard only when the user has selected a user interface control that accepts text input (e.g., a textbox).

However, keyboard accessibility remains as crucial as ever, and most major mobile operating systems do include keyboard interfaces, allowing mobile devices to be operated by external



physical keyboards (e.g., keyboards connected via Bluetooth, USB On-The-Go) or alternative on-screen keyboards (e.g., scanning on-screen keyboards).

Supporting these keyboard interfaces benefits several groups with disabilities:

People with visual disabilities who can benefit from some characteristics of physical keyboards over touchscreen keyboards (e.g., clearly separated keys, key nibs, and more predictable key layouts).

People with dexterity or mobility disabilities, who can benefit from keyboards optimized to minimize inadvertent presses (e.g., differently shaped, spaced, and guarded keys) or from specialized input methods that emulate keyboard input.

People who can be confused by the dynamic nature of onscreen keyboards and who can benefit from the consistency of a physical keyboard.

Several WCAG 2.1 success criteria are relevant to effective keyboard control:

- I. 2.1.1 Keyboard (Level A)
- II. 2.1.2 No Keyboard Trap (Level A)
- III. 2.4.3 Focus Order (Level A)
- IV. 2.4.7 Focus Visible (Level AA)

### **3.2 Touch Target Size and Spacing**

The high resolution of mobile devices means that many interactive elements can be shown together on a small screen. But these elements must be big enough and have enough distance from each other so that users can safely target them by touch.

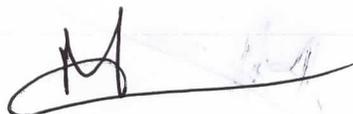
Best practices for touch target size include the following:

- I. Ensuring that touch targets are at least 9 mm high by 9 mm wide.
- II. Ensuring that touch targets close to the minimum size are surrounded by a small amount of inactive space.

Note: This size is not dependent on the screen size, device or resolution. Screen magnification should not need to be used to obtain this size because magnifying the screen often introduces the need to pan horizontally as well as vertically, which can decrease usability.

### **3.3 Touchscreen Gestures**

Many mobile devices are designed to be primarily operated via gestures made on a touchscreen. These gestures can be simple, such as a tap with one finger, or very complex, involving multiple fingers, multiple taps, and drawn shapes.



Some (but not all) mobile operating systems provide work-around features that let the user simulate complex gestures with simpler ones using an on-screen menu.

Some best practices when deciding on touchscreen gestures include the following:

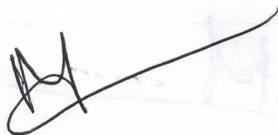
- I. Gestures in apps should be as easy as possible to carry out. This is especially important for screen reader interaction modes that replace direct touch manipulation with a two-step process of focusing and activating elements. It is also a challenge for users with motor or dexterity impairments or people who rely on head pointers or a stylus where multi-touch gestures may be difficult or impossible to perform. Often, interface designers have different options for how to implement an action. Widgets requiring complex gestures can be difficult or impossible to use for screen reader users. Usually, design alternatives exist to allow changes to settings via simple tap or swipe gestures.
- II. Activating elements via the mouseup or touchend event. Using the mouseup or touchend event to trigger actions helps prevent unintentional actions during touch and mouse interaction. Mouse users clicking on actionable elements (links, buttons, submit inputs) should have the opportunity to move the cursor outside the element to prevent the event from being triggered. This allows users to change their minds without being forced to commit to an action. In the same way, elements accessed via touch interaction should generally trigger an event (e.g., navigation, submits) only when the touchend event is fired (i.e., when all of the following are true: the user has lifted the finger off the screen, the last position of the finger is inside the actionable element, and the last position of the finger equals the position at touchstart).

Another issue with touchscreen gestures is that they might lack onscreen indicators that remind people how and when to use them. For example, a swipe in from the left side of the screen gesture to open a menu is not discoverable without an indicator or advisement of the gesture. See Touchscreen gesture instructions.

### 3.4 Device Manipulation Gestures

In addition to touchscreen gestures, many mobile operating systems provide developers with control options that are triggered by physically manipulating the device (e.g., shaking or tilting). While device manipulation gestures can help developers create innovative user interfaces, they can also be a challenge for people who have difficulty holding or are unable to hold a mobile device.

Some (but not all) mobile operating systems provide work-around features that let the user simulate device shakes, tilts, etc., from an onscreen menu.



Therefore, even when device manipulation gestures are provided, developers should still provide touch and keyboard operable alternative control options.

- 2.1.1 Keyboard (Level A)

Another issue with control via device manipulation gestures is that they might lack onscreen indicators that remind people how and when to use them.

### **3.5 Placing buttons where they are easy to access**

Mobile sites and applications should position interactive elements where they can be easily reached when the device is held in different positions.

When designing mobile web content and applications, many developers attempt to optimize use with one hand. This can benefit people with disabilities who may only have one hand available; however, developers should also consider that an easy-to-use button placement for some users might cause difficulties for others (e.g., left- vs. right-handed use, assumptions about thumb range of motion). Therefore, flexible use should always be the goal.

Some (but not all) mobile operating systems provide work-around features that let the user temporarily shift the display downwards or sideways to facilitate one-handed operation.

## **4. Mobile accessibility considerations related primarily to Principle 3: Understandable**

### **4.1 Changing Screen Orientation (Portrait/Landscape)**

Some mobile applications automatically set the screen to a particular display orientation (landscape or portrait) and expect that users will respond by rotating the mobile device to match. However, some users have their mobile devices mounted in a fixed orientation (e.g., on the arm of a power wheelchair).

Therefore, mobile application developers should try to support both orientations. Suppose it is not possible to support both orientations. In that case, developers should ensure that it is easy for all users to change the orientation to return to a point at which their device orientation is supported.

Changes in orientation must be programmatically exposed to ensure detection by assistive technology such as screen readers. For example, if a screen reader user is unaware that the orientation has changed, the user might perform incorrect navigation commands.

### **4.2 Consistent Layout**



Components that are repeated across multiple pages should be presented in a consistent layout. In responsive web design, where components are arranged based on device size and screen orientation, web pages within a particular view (set size and orientation) should be consistent in the placement of repeated components and navigational components. Consistency between the different screen sizes and screen orientations is not a requirement under WCAG 2.1.

For example:

- I. A Web site has a logo, a title, a search form, and a navigation bar at the top of each page; these appear in the same relative order on each page where they are repeated. On one page, the search form is missing, but the other items are still in the same order. When the Web site is viewed on a small screen in portrait mode, the navigation bar is collapsed into a single icon, but entries in the drop-down list that appears when activating the icon are still in the same relative order.
- II. A Web site, when viewed on the different screen sizes and in different orientations, has some components that are hidden or appear in a different order. The components that show, however, remain consistent for any screen size and orientation.

The WCAG 2.1 success criteria that are most related to the issue of consistency are:

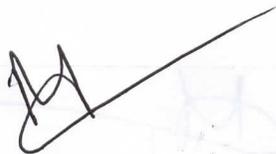
- I. 3.2.3 Consistent Navigation (Level AA)
- II. 3.2.4 Consistent Identification (Level AA)

#### **4.3 Positioning important page elements before the page scroll**

The small screen size on many mobile devices limits the amount of content that can be displayed without scrolling.

Positioning important page information, so it is visible without requiring scrolling can assist users with low vision and users with cognitive impairments.

If a user with low vision has the screen magnified, only a small portion of the page might be viewable at a given time. Placing important elements before the page scroll allows those who use screen magnifiers to locate important information without having to scroll the view to move the magnified area. Placing important elements before the page scroll also makes it possible to locate content without performing an interaction. This assists users that have cognitive impairments such as short-term memory disabilities. Placing important elements before the page scroll also helps ensure that elements are placed in a consistent location. Consistent and predictable location of elements assists people with cognitive impairments and low vision.



#### **4.4 Grouping operable elements that perform the same action**

When multiple elements perform the same action or go to the same destination (e.g., link icon with link text), these should be contained within the same actionable element. This increases the touch target size for all users and benefits people with dexterity impairments. It also reduces the number of redundant focus targets, which benefits people using screen readers and keyboard/switch control.

The WCAG 2.1 success criterion that is most related to the grouping of actionable elements is:

- I. 2.4.4 Link Purpose (In Context) (Level A)
- II. 2.4.9 Link Purpose (Link Only) (Level AA)

For more information on grouping operable elements, see H2: Combining adjacent image and text links for the same resource technique.

#### **4.5 Provide a clear indication that elements are actionable**

Elements that trigger changes should be sufficiently distinct to be clearly distinguishable from non-actionable elements (content, status information, etc.). Providing a clear indication that elements are actionable is relevant for web and native mobile applications that have actionable elements like buttons or links, especially in interaction modes where actionable elements are commonly detected visually (touch and mouse use). Interactive elements must also be detectable by users who rely on a programmatically determined accessible name (e.g., screen reader users).

Visual users who interact with content using touch or visual cursors (e.g., mice, touchpads, joysticks) should be able to clearly distinguish actionable elements such as links or buttons. Existing interface design conventions are aimed at indicating that these visual elements are actionable. The principle of redundant coding ensures that elements are indicated as actionable by more than one distinguishing visual feature. Following these conventions benefits all users, but especially users with vision impairments.

Visual features that can set an actionable element apart include shape, color, style, positioning, text label for an action, and conventional iconography.

Examples of distinguishing features:

1. Conventional shape: Button shape (rounded corners, drop shadows), checkbox, a select rectangle with an arrow pointing downwards
2. Iconography: conventional visual icons (question mark, home icon, burger icon for the menu, floppy disk for save, back arrow, etc.)
3. Color offset: shape with the different background color to distinguish the element from the page background, different text color



4. Conventional style: Underlined text for links, color for links
5. Conventional positioning: Commonly used position such as a top-left position for the back button (iOS), the position of menu items within left-aligned lists in drop-down menus for navigation

The WCAG 2.1 success criteria do not directly address the issue of clear visual indication that elements are actionable but are related to the following success criteria:

- I. 3.2.3 Consistent Navigation (Level AA)
- II. 3.2.4 Consistent Identification (Level AA)

#### **4.6 Provide instructions for custom touchscreen and device manipulation gestures**

The ability to provide control via custom touchscreen and device manipulation gestures can help developers create efficient new interfaces. However, custom gestures can be a challenge for many people to discover, perform, and remember.

Therefore, instructions (e.g., overlays, tooltips, tutorials, etc.) should be provided to explain what gestures can be used to control a given interface and whether there are alternatives. To be effective, the instructions should themselves, be easily discoverable and accessible. The instructions should also be available anytime the user needs them, not just on first use, though on first use they may be made more apparent through highlighting or some other mechanism.

These WCAG 2.1 success criteria are relevant to providing instructions for gestures:

- I. 3.3.2 Labels or Instructions (Level A)
- II. 3.3.5 Help (Level AAA)

### **5. Mobile accessibility considerations related primarily to Principle 4: Robust**

#### **5.1 Set the virtual keyboard to the type of data entry required**

On some mobile devices, the standard keyboard can be customized in the device settings and additional custom keyboards can be installed. Some mobile devices also provide different virtual keyboards depending on the type of data entry. This can be set by the user or can be set to a specific keyboard. For example, using the different HTML5 form field controls (see Method Editor API) on a website will show different keyboards automatically when users are entering in information into that field. Setting the type of keyboard helps prevent errors and ensures formats are correct but can be confusing for people who are using a screen-reader when there are subtle changes in the keyboard.

#### **5.2 Provide easy methods for data entry**



Users can enter information on mobile devices in multiple ways such as on-screen keyboard, Bluetooth keyboard, touch, and speech. Text entry can be time-consuming and difficult in certain circumstances. Reduce the amount of text entry needed by providing select menus, radio buttons, check boxes or by automatically entering known information (e.g. date, time, location).

### **5.3 Support the characteristic properties of the platform**

Mobile devices provide many features to help users with disabilities interact with content. These include platform characteristics such as zoom, larger fonts, and captions. The features and functions available differ depending on the device and operating system version. For example, most platforms have the ability to set large fonts, but not all applications honor it for all text. Also, some applications might increase font size but not wrap text, causing horizontal scrolling.

## **Chapter-4**

### **4.1 Access Audit of the Websites, Apps, and Digital Services**

During the testing in the development phase and before the launching of any websites, apps, and digital services accessibility audit needs to be ensured. A team of experts with disabilities is required to be engaged as Accessibility Auditors who will conduct access audits. The accessibility auditors will audit the accessibility of the websites, apps, and digital services and guide the relevant developers to make them accessible for all. Govt. approved testing labs and authorities must ensure accessibility testing by engaging the Accessibility Auditors.

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## **4.2 Capacity Development for Service providers, Content Providers, and User agents**

To ensure disability-inclusive websites, apps, and digital services, the relevant stakeholders must have the capacity to follow the guideline for making them accessible. The capacity development of Service providers will pave the way for platform accessibility of the websites, apps, and digital services, and the content providers will ensure the accessibility of the content. The user agents need to be trained as they can provide training to the end-users so that they can be able to access the websites, apps, and digital services using assistive technologies.

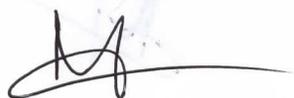
### **Annexure**

#### **Annexure 1: A Quick Checklist for Web & Digital Service Accessibility**

- 1) Provide text alternatives for non-text content
- 2) Provide an option for video-only and audio-only content



- 3) Provide captions for videos with audio
- 4) Ensure logical structure
- 5) Present content in a meaningful order
- 6) Don't use any presentation that relies solely on color
- 7) Don't play audio automatically
- 8) The website or web platform must be operable by keyboard only Don't trap keyboard users
- 9) Time limits have user controls
- 10) Provide user controls for moving content
- 11) No content flashes more than three times per second
- 12) Provide a 'Skip to Content' link
- 13) Use helpful and clear page titles
- 14) Ensure every link's purpose is clear from its context
- 15) Ensure that every page has a language assigned (If several languages are used equally, Bengali should be chosen as the default human language)
- 16) Elements do not change when they receive focus
- 17) Elements do not change when they receive input
- 18) Clearly identify input errors
- 19) Label elements and give instructions
- 20) Build all elements for accessibility
- 21) Live videos have captions
- 22) Users have access to audio descriptions for video content
- 23) Text can be resized to 200% without loss of content or function
- 24) Don't use images of text
- 25) Offer several ways to find pages. If there is any finding option, ensure that will be in an accessible format
- 26) Use clear headings and labels
- 27) Ensure keyboard focus is visible and clear
- 28) Tell users when the language on a page changes
- 29) Use menus consistently
- 30) Use icons and buttons consistently
- 31) Suggest fixes when users make errors
- 32) Provide sign language translations for videos
- 33) Provide extended audio descriptions for videos
- 34) Provide a text alternative to videos
- 35) Provide options for live audio
- 36) The contrast ratio between text and background is at least 7:1
- 37) Audio is clear for listeners to hear
- 38) Offer users a range of presentation options
- 39) Accessible by keyboard only, without exception



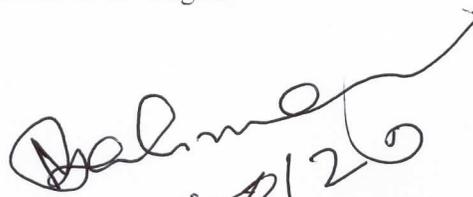
- 40) No time limits
- 41) Don't interrupt users
- 42) Save user data when re-authenticating
- 43) Let users know where they are
- 44) Every link's purpose is clear from its text
- 45) Break up content with headings
- 46) Explain any strange words
- 47) Explain any abbreviations
- 48) Ensure that everyone can read your content
- 49) Explain any terms that are hard to pronounce
- 50) Don't change elements on your website until users ask
- 51) Provide detailed accessibility help and instructions on every web page
- 52) Reduce the risk of all input errors, especially for sensitive data. The error message should be provided in an accessible format
- 53) Provide user control on time-based content/ media
- 54) Every page should have keyboard short-cut access
- 55) Descriptive Audio descriptions of video content, subtitles, and other accessible captions need to be ensured on every website.

## **Annexure 2: A Quick Checklist for Mobile App Accessibility**

- 1) Design the applications more simply so that users can easily navigate and proceed through accessing them.
- 2) Use alternative text in all non-text elements
- 3) The system-built keypad should be accessible, especially the credential input section following the accessibility standards
- 4) Provide an accessibility plugin that lets the users be able to control the Colors, Font Sizes, Contrast Ratios, and Skip Navigation.
- 5) Ensure navigation through the application by assistive technologies
- 6) Ensure easy layout of the forms and provide alternative text in all the form fields.
- 7) Ensure smart presentation of the texts which are easily understandable and specific.
- 8) Minimize the amount of information on each page (compared with a desktop or laptop) by providing a dedicated mobile website or designing the site responsively
- 9) Provide a reasonable default size for content and touch controls to minimize the need to zoom in and out for users with low vision.
- 10) Adapt the length of link text to the viewport width.
- 11) Position form fields below, rather than beside, their labels.

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- 12) Design touch targets to be at least 9 mm high by 9 mm wide.
- 13) Add inactive space surrounding smaller touch targets (closer to the minimum size above).
- 14) Place buttons where they are easy to access.
- 15) Allow flexible use for all interactive elements.
- 16) Create alternatives to allow simple tap or swipe gestures in place of more complex ones.
- 17) Native apps should be designed in such a way so that users can easily go back and fix their course in case of unintentional actions such as accidental clicking.
- 18) Components repeated across pages in a mobile application should be presented in a consistent layout.
- 19) In responsive web design, webpages in a particular size and orientation should be consistent in where they place repeated components and navigational elements—for example, a logo, a title, a search form, and a navigation bar. At the top of each page, these elements appear in the same relative order and position.
- 20) When the app is viewed on a smaller screen in portrait mode, ensure that the navigation bar collapses into a single icon with a drop-down list, but the elements in that list are still in the same order.
- 21) In the Description of content, avoid unnecessary text.
- 22) Reduce the amount of text entry required by providing select menus, radio buttons, or checkboxes or by auto-filling known information (e.g., date, time, location).
- 23) Providing alternatives such as autofill, data sharing between apps, or dictation improves the overall app experience and prevent errors.
- 24) The text should have a color contrast ratio of at least 4.5:1 (larger text at least 3:1).
- 25) Allowing different contrast ratios for larger.



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