Software Accessibility

In many countries, it is now a legal requirement that all software offered for sale be accessible to people with special needs.

For example, under the terms of the Americans with Disabilities Act (ADA), anyone wishing to sell software to the US government or its agencies must demonstrate that every possible effort has been made to accommodate people with certain special needs.

The EU is introducing similar legislation, and a number of countries already have laws in place.

Most such legislation covers both software applications and web-pages developed for profit.

The W3C maintains a list of legislation affecting web-design in various countries.

Among the special needs that should be considered are:

- Visual impairment/blindness
- Hearing impairment/Deafness
- Physical disabilities
- Speech impairment
- Cognitive & Neurological Disabilities

Web Accessibility Initiative

The W3C Web Accessibility Initiative (WAI) has issued a set of guidelines to help developers create accessible web-pages.

These are known as the Web Content Accessibility Guidelines (WCAG).

Version 1.0 was issued in May 1999. It comprised 14 Guidelines.

Version 2.0, issued in December 2008, was designed to be easier to remember and more easily testable than Version 1.0.

It comprises 12 Guidelines which relate to four general principles.

- Perceivable
    - users must be able to perceive the information being presented (it can't be invisible to all of their senses)
- Operable
    - users must be able to operate the interface (the interface cannot require interaction that a user cannot perform)
- Understandable
    - users must be able to understand the information of the user interface (the content or operation cannot be beyond their understanding)
- Robust
    - users must be able to access the content as technologies advance (as technologies and user agents evolve, the content should remain accessible)

Each guideline is accompanied by a number of *checkpoints* which are given priorities from 1 to 3:

- If Priority 1 checkpoints are not satisfied, the page will be *impossible* for some groups of users to access.
- If Priority 1 checkpoints are satisfied, but Priority 2 checkpoints are not, the page will be *difficult* for some groups of users to access.
- If Priority 1 and 2 checkpoints are satisfied, but Priority 3 checkpoints are not, the page will be *somewhat difficult* for some groups of users to access.

Web-pages can be rated for accessibility in terms of the checkpoint priority-levels they satisfy:

- Conformance level 'A' - satisfies all Priority 1 checkpoints.
- Conformance level 'AA' - satisfies all Priority 1 & 2 checkpoints.
- Conformance level 'AAA' - satisfies all Priority 1, 2 & 3 checkpoints.

The guidelines are summarised below, along with some of the Priority 1 checkpoints.

The full text of the guidelines, including all Priority 1, 2 and 3 checkpoints, can be found at http://www.w3.org/TR/WCAG20/.

Web Content Accessibility Guidelines

Perceivable - 1.1 Provide text alternatives for any non-text content so that it can be changed into other forms people need

- For example, use `NAME` and/or `ALT` to identify the purpose and/or describe the content of all non-text elements.
- Exceptions/special cases include:
    - Controls, Input
    - Time-Based Media
    - Test
    - Sensory
    - CAPTCHA
    - Decoration, Formatting, Invisible

Perceivable - 1.2 Provide alternatives for time-based media

- Pre-recorded Audio and Video material should be accompanied by alternatives that provide the same information through an alternative modality.
- Captions: unless the caption is an alternative for text (and is labelled as such), an alternative should be provided that is synchronised with the media

Perceivable - 1.3 Create content that can be presented in different ways without losing information or structure.

- Information, structure, and relationships conveyed through presentation can be programmatically determined or are available in text.
- When the sequence in which content is presented affects its meaning, a correct reading sequence can be programmatically determined.

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

Perceivable - 1.4 Make it easier for users to see and hear content including separating foreground from background.

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

Operable - 2.1 Make all functionality available from a keyboard.

- All functionality of the content should be 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.
- No Keyboard Trap: If keyboard focus can be moved to a component of the page using a keyboard interface, then it must be possible to move focus away from that component using only a keyboard interface

Operable - 2.2 Provide users enough time to read and use content.

- If a time limit is set by the content, ensure at least one of the following is true
    - The user is allowed to turn off the time limit before encountering it
    - 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
    - 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
- For moving, blinking, scrolling, or auto-updating information, ensure all of the following are true
    - For any moving, blinking or scrolling information that starts automatically, lasts more than five seconds, and is presented in parallel with other content, there is a mechanism for the user to pause, stop, or hide it
    - For any auto-updating information that (starts automatically and 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

Operable - 2.3 Do not design content in a way that is known to cause seizures

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

Operable - 2.4 Provide ways to help users navigate and find content

- A mechanism should be available to bypass blocks of content that are repeated on multiple Web pages.
- Web pages have titles that describe topic or purpose.
- 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.
- It should be possible to determine the purpose of each link from the link text alone or from the link text together with its programmatically determined link context.

Understandable - 3.1 Make text content readable and understandable.

- It should be possible to programmatically determine the default human language of each web page.

For example:

- Specify the language of the document (using the `lang` attribute in the HTML tag) so that automatic content-retrieval systems can locate documents in the required language.
- Identify sections (e.g., quotes, captions) in different languages by using the `lang` attribute, so that speech-synthesisers, etc., can adjust accordingly.

Understandable - 3.2 Make Web pages appear and operate in predictable ways.

- On Focus: When any component receives focus, it does not initiate a change of context.
- On Input: Changing the setting of any user interface component should not automatically cause a change of context unless the user has been advised of the behavior before using the component.

Understandable - 3.3 Help users avoid and correct mistakes.

- If an input error is automatically detected, the item that is in error should be identified and the error described to the user in text.
- Labels or instructions should be provided when content requires user input.

Robust - 4.1 Maximize compatibility with current and future user agents, including assistive technologies.

- In content implemented using markup languages, elements should:
    - have complete start and end tags
    - be nested according to their specifications
    - not contain duplicate attributes
    - where IDs are used, they should be unique
- Name, Role, Value: For all user interface components (including but not limited to: form elements, links and components generated by scripts):
    - It should be possible to determine the name and role programmatically
    - It should be possible to set states, properties, and values programmatically
    - notification of changes to these items should be available to user agents, including assistive technologies.

Conclusions

Studies have found that websites which pass all the WCAG checkpoints do not necessarily receive a high accessibility rating (Sloan et al., 2006)

Some level of accessibility is a prerequisite for usability, as a completely inaccessible page cannot be usable.

However, this does not necessarily mean that an accessible page is a usable one (Puhretmair & Meisenberger, 2005).