

I. Introduction: accessibility and usability

- **Our motivation: a significant population of people with various disabilities use the web**
- **51.2 million people (18%) have some level of disability**
- **4 million children (11%) 6 to 14 have a disability**
- **72% of people > 80 have disabilities, the highest of any age group**
- **36% of people 15-64 with a severe disability use a computer and 29% use the net at home, respectively**
- **For those without a disability: 61% and 51%**

• http://www.census.gov/Press-Release/www/releases/archives/facts_for_features_special_editions/010102.html



I. Introduction: accessibility and usability

Typical disabilities include

Blindness

Low or limited vision

Color blindness

Deafness or hearing impairment

Physical or motor impairments

Cognitive disorders

Neurological disorders



I. Introduction: accessibility and usability

- ✦ The web is increasingly important in many aspects of life: education, employment, government, commerce, health care, recreation, and more
- ✦ The web must be accessible to provide equal access and opportunity to people with disabilities
- ✦ Accessibility barriers to print, audio, and visual media can be overcome through web technologies
- ✦ It is becoming more important to ensure that ICTs are accessible to and usable by all
- ✦ This involves social, technical, financial, and policy factors

✦ <http://www.w3.org/WAI/intro/accessibility.php>



Introduction: accessibility and usability

Problem: there is a need for a more holistic approach to help disabled people to access digital information, services and experiences

Low levels of usability and accessibility for them indicates a focus on the adoption of guidelines by content authors, tool developers and policy makers is not sufficient for an inclusive web

It is important to see the web from the disabled person's perspective

Complicating factors: available browsing and assistive technologies, their ability to use them, and the difference between what is available and what they need



Introduction: accessibility and usability

The meanings of accessibility and usability are contested as the relationship between them

What they share is a goal of making ICTs available to the widest possible audiences

Usability is a powerful tool for improving accessibility

Assumption: there is a growing recognition that users with disabilities have the same right as others to access information with ICTs

Particularly for people with disabilities, web access is an important goal and challenging problem for web content developers and designers



I. Introduction: accessibility and usability

- ✦ There are good business reasons as well
- ✦ People with disabilities tend to be loyal when they find a responsive business or other organization
- ✦ This is a market of ~54 million with discretionary income of ~175 billion
- ✦ "An accessible web site is very similar to an accessible building. An accessible building offers curb cuts, ramps, and elevators to allow a person with disabilities to enter and navigate through the building with ease. An accessible web site offers similar functionality."

Lazar, J, et.al. (2003). Improving web accessibility: a study of webmaster perceptions. Computers in Human Behavior.

www.apa.org/divisions/div21/MemberActivities/chb2004/jl.pdf





Trends

- In addition: accessibility is often seen as an impediment to creative design

The guidelines are seen as restrictions leading to a gap between accessibility and design

“They look at sites that are meant to serve as models of accessibility and are appalled by the aesthetics. For most designers, accessibility equates with boring, uninteresting designs. The state of accessibility on the web today represents a failure of the imagination.”

Regan, B. (2004). Design: Accessibility and design: a failure of the imagination. Proceedings of the International Cross-Disciplinary Workshop on Web Accessibility. 29-37.



Trends

An accessibility dilemma at the production end

There is social problem at the core of most accessibility recommendations

Web application and content developers are required to spend too much time working on accessibility for which they receive too little

Creating accessible web content is a substantial investment of time and money

On some sites, hundreds or thousands of pages of "legacy" content must be changed



Possibilities

Take seriously contexts of use

Characteristics of people using ICTs: the abilities and disabilities of the target users

Domain requirements: the tasks that need to be supported, group, social and cultural dynamics, communication patterns, environmental factors...

Technological requirements: availability of hardware and software and the availability of plug-ins

Performance requirements: task success rates, task-completion times, satisfaction ratings, and quality of task output



Possibilities

The key measure of an ICT is whether it fits its context of use

Can the people for whom it is designed use it with acceptable levels of usability and accessibility?

Can they use it for the tasks that they need to do, in any social setting in which these tasks take place with the same relative level of effort as an abled person?

Is the ICT accessible in different contexts of use?

Can it be made available to people who need it at a reasonable cost?



What are accessibility concerns?

- ✱ Low visual acuity
- ✱ Color blindness
- ✱ Deafness
- ✱ Language impairments
- ✱ Cultural differences



Why make pages more accessible?

- ✦ Reach as many readers as possible
- ✦ Automation tools and search engines work better
- ✦ Concern over customer alienation



Accessibility Strategies

- Adhere to accessibility guidelines
- Test for accessibility
- Provide alternate pages to accommodate users with varying needs



Accessibility Guidelines - part 1

- ✱ Tables are fine, IF they read left-right/top-bottom
- ✱ Text columns are ok if the spacing works in various environments
- ✱ 'Fancy Stuff' - i.e. fonts, style sheets - as long as page is functional with these options turned off
- ✱ Provide 'ALT' text for graphics
- ✱ Make image maps client side
- ✱ Provide useful text links (e.g. not 'click here')




Accessibility Guidelines - part 2

- Provide good keyboard navigation
- Alternatives for controls and applets
- Frames/Noframes, (be sure to provide a reasonable 'noframe' option)
- Be aware of unusual formats
- Avoid scrolling marquees
- Provide titles/names for most objects



Testing for Accessibility

- ✖ Turn off graphics
 - ✖ Turn off sound
 - ✖ Turn off style sheets
 - ✖ Choose "high contrast" option
 - ✖ Use largest font size
 - ✖ Re-size browser window
 - ✖ Navigate using keyboard
 - ✖ Select all text and copy into clipboard, paste elsewhere
 - ✖ Use a specialized browser or analysis tools
- 



Accessibility

- This can be considered to be a subset of usability, in that accessibility can be defined as providing easy access to a system for people with disabilities.
- Accessibility is really about designing your site so that more people can use your web site under the widest possible variety of conditions.

Functional Limitations

- ✦ There are two categories of limitations:
 - (1) Functional limitations pertain to disabilities, such as blindness or limited use of hands.
 - They can be visual, physical, or cognitive (which includes language and learning disabilities).
 - Disabilities can be temporary (e.g., an injured arm prevents you from using the mouse), permanent (e.g., multiple sclerosis), or a gradual diminishment of abilities due to aging or degenerative disease.
 - Between 15% and 30% of Americans have some sort of functional limitations. Most of the legal requirements for accessibility are concerned with meeting the needs of people with these limitations.



Situational Limitations

• There are two categories of limitations:

– (2) Situational limitations relate to the prevailing circumstances, environment, or device.

• These limitations can affect anybody, not just people with disabilities.

Examples include mobile devices and device limitations, such as having no mouse, or constraining circumstances, such as interacting with a web site through a computer integrated into a car's dashboard, where use of the hands and eyes is limited.





Implementing Accessibility

- Many web developers and designers were recently made aware of accessibility issues because of Federal regulations such as *Section 508 of the Rehabilitation Act*.
- The focus of accessibility is often limited to meeting standards and guidelines. Often this means technical aspects get emphasized at the expense of the human interaction aspect.

Implementation Example

- A simplified example of something that can “pass” an automated check for accessibility and still not be usable is alternative text for an image (adding an alt attribute to the element to describe the graphic). Alternative text can be provided that does not help users without access to the image at all. The alt text must be meaningful in the context of the page for the page to be usable without images.



Web Content Accessibility Guidelines 2.0

W3C Working Draft 24 June 2003

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<http://www.w3.org/TR/2003/WD-WCAG20-20030624/>

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<http://www.w3.org/TR/WCAG20/>

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[Abstract](#)

The W3C provides guidelines for designing accessible websites @

<http://www.w3.org/TR/WCAG20/>

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

Web Content Accessibility Guidelines (WCAG) 2.0

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.

[Understanding Guideline 1.1](#)

1.1.1 Non-text Content: 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. (Level A)

[How to Meet 1.1.1](#)
[Understanding 1.1.1](#)

- **Controls, Input:** If non-text content is a control or accepts user input, then it has a name that describes its purpose. (Refer to [Guideline 4.1](#) for additional requirements for controls and content that accepts user input.)
- **Time-Based Media:** If non-text content is time-based media, then text alternatives at least provide descriptive identification of the non-text content. (Refer to [Guideline 1.2](#) for additional requirements for media.)
- **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 using output modes for different types of sensory perception are provided to accommodate different disabilities.
- **Decorative, 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 it can be ignored by assistive technology.

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

[Understanding Guideline 1.2](#)

1.2.1 Audio-only and Video-only (Prerecorded): 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: (Level A)

[How to Meet 1.2.1](#)
[Understanding 1.2.1](#)

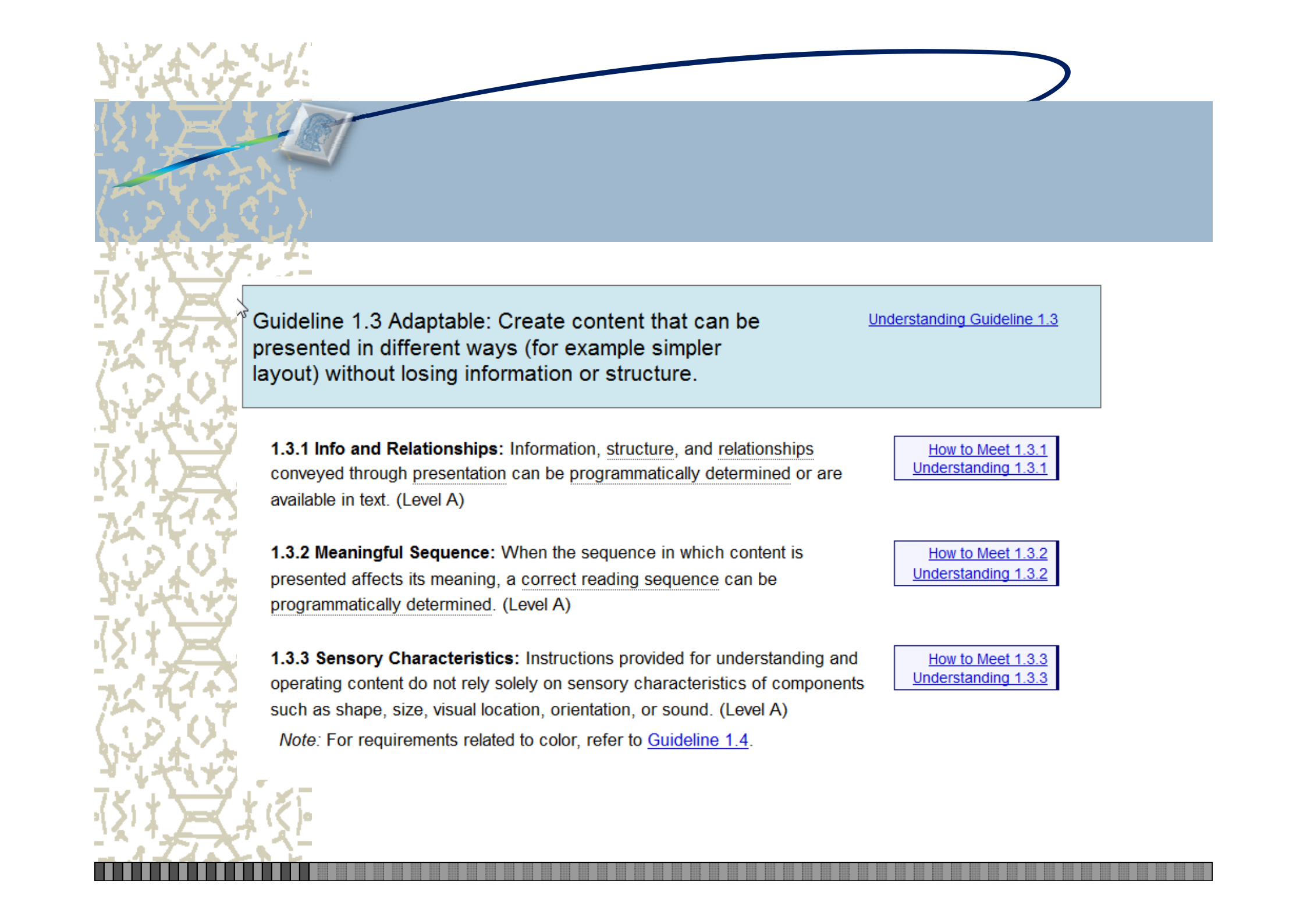
- **Prerecorded Audio-only:** An alternative for time-based media is provided that presents equivalent information for prerecorded audio-only content.
- **Prerecorded Video-only:** Either an alternative for time-based media or an audio track is provided that presents equivalent information for prerecorded video-only content.

1.2.2 Captions (Prerecorded): 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. (Level A)

[How to Meet 1.2.2](#)
[Understanding 1.2.2](#)

1.2.3 Audio Description or Media Alternative (Prerecorded): 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. (Level A)

[How to Meet 1.2.3](#)
[Understanding 1.2.3](#)



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

[Understanding Guideline 1.3](#)

1.3.1 Info and Relationships: Information, structure, and relationships conveyed through presentation can be programmatically determined or are available in text. (Level A)

[How to Meet 1.3.1](#)
[Understanding 1.3.1](#)

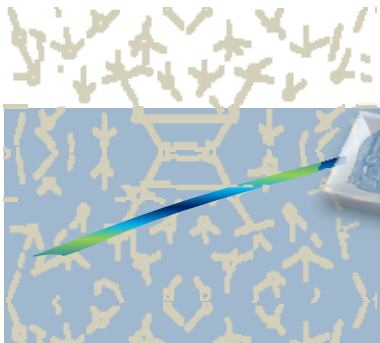
1.3.2 Meaningful Sequence: When the sequence in which content is presented affects its meaning, a correct reading sequence can be programmatically determined. (Level A)

[How to Meet 1.3.2](#)
[Understanding 1.3.2](#)

1.3.3 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. (Level A)

[How to Meet 1.3.3](#)
[Understanding 1.3.3](#)

Note: For requirements related to color, refer to [Guideline 1.4](#).



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

[Understanding Guideline 1.4](#)

1.4.1 Use of Color: Color is not used as the only visual means of conveying information, indicating an action, prompting a response, or distinguishing a visual element. (Level A)


[How to Meet 1.4.1](#)
[Understanding 1.4.1](#)

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.

1.4.2 Audio Control: 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. (Level A)

[How to Meet 1.4.2](#)
[Understanding 1.4.2](#)

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](#).

 **1.4.3 Contrast (Minimum):** The visual presentation of text and images of text has a contrast ratio of at least 4.5:1, except for the following: (Level AA)

- **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 minimum contrast requirement.

1.4.4 Resize text: Except for captions and images of text, text can be resized without assistive technology up to 200 percent without loss of content or functionality. (Level AA)

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

[Understanding Guideline 2.1](#)

2.1.1 Keyboard: 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. (Level A)

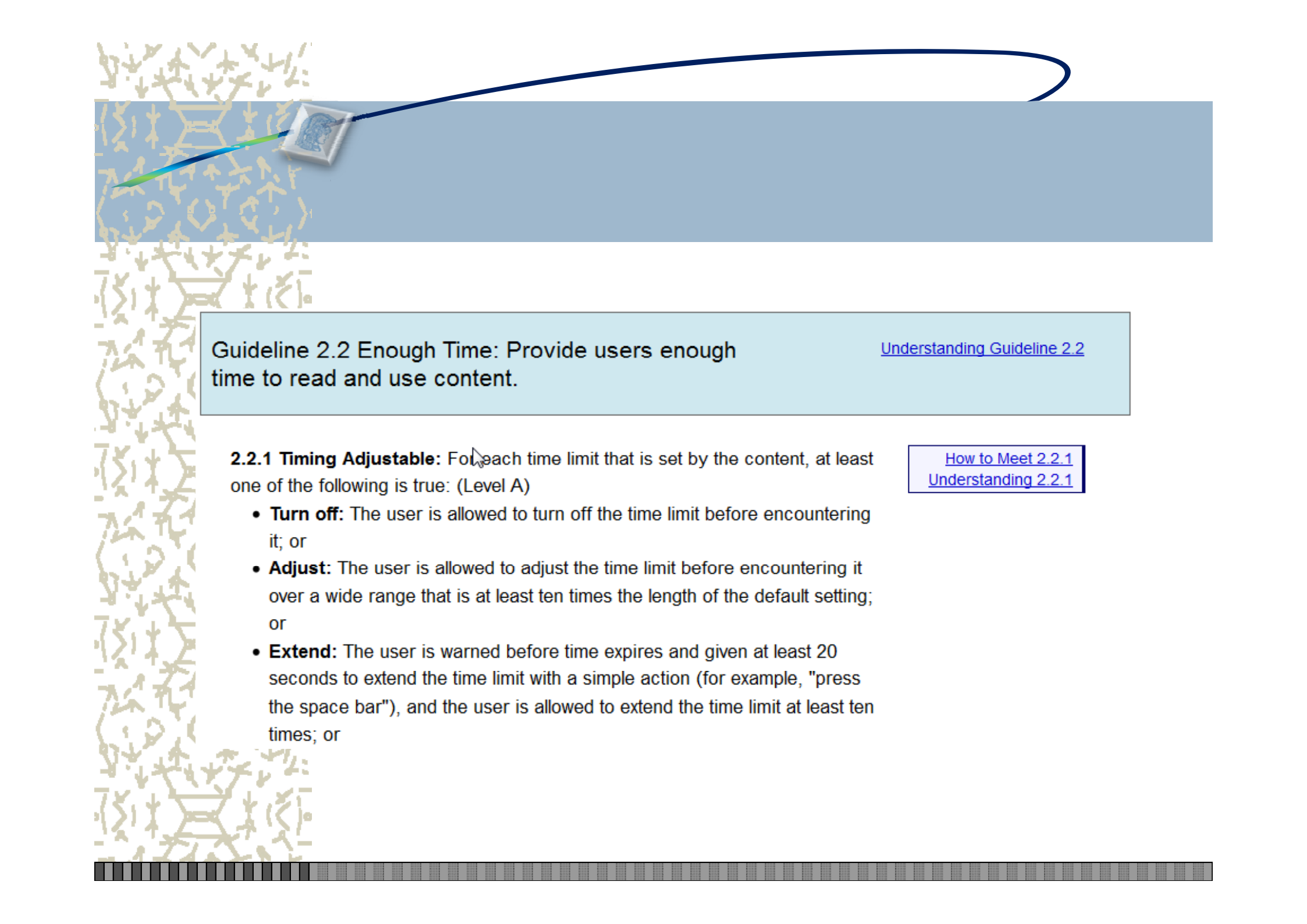
Note 1: This exception relates to the underlying function, not the input technique. For example, if using handwriting to enter text, the input technique (handwriting) requires path-dependent input but the underlying function (text input) does not.

Note 2: This does not forbid and should not discourage providing mouse input or other input methods in addition to keyboard operation.

[How to Meet 2.1.1](#)
[Understanding 2.1.1](#)

2.1.2 No Keyboard Trap: 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 focus away. (Level A)

[How to Meet 2.1.2](#)
[Understanding 2.1.2](#)



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

[Understanding Guideline 2.2](#)

2.2.1 Timing Adjustable: For each time limit that is set by the content, at least one of the following is true: (Level A)

- **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

[How to Meet 2.2.1](#)
[Understanding 2.2.1](#)



2.2.3 No Timing: 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. (Level AAA)

[How to Meet 2.2.3](#)
[Understanding 2.2.3](#)


2.2.4 Interruptions: Interruptions can be postponed or suppressed by the user, except interruptions involving an emergency. (Level AAA)

[How to Meet 2.2.4](#)
[Understanding 2.2.4](#)

2.2.5 Re-authenticating: When an authenticated session expires, the user can continue the activity without loss of data after re-authenticating. (Level AAA)

[How to Meet 2.2.5](#)
[Understanding 2.2.5](#)





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

[Understanding Guideline 2.4](#)

2.4.1 Bypass Blocks: A mechanism is available to bypass blocks of content that are repeated on multiple Web pages. (Level A)

[How to Meet 2.4.1](#)
[Understanding 2.4.1](#)

2.4.2 Page Titled: Web pages have titles that describe topic or purpose. (Level A)

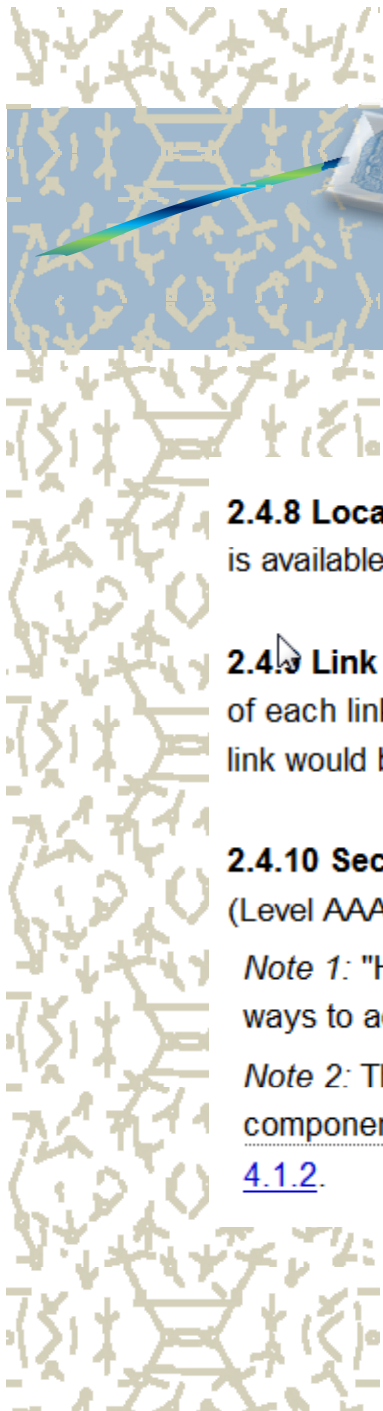
[How to Meet 2.4.2](#)
[Understanding 2.4.2](#)

2.4.3 Focus Order: 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. (Level A)

[How to Meet 2.4.3](#)
[Understanding 2.4.3](#)

2.4.4 Link Purpose (In Context): 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. (Level A)

[How to Meet 2.4.4](#)
[Understanding 2.4.4](#)



2.4.8 Location: Information about the user's location within a set of Web pages is available. (Level AAA)

[How to Meet 2.4.8](#)
[Understanding 2.4.8](#)

2.4.9 Link Purpose (Link Only): A mechanism is available to allow the purpose of each link to be identified from link text alone, except where the purpose of the link would be ambiguous to users in general. (Level AAA)

[How to Meet 2.4.9](#)
[Understanding 2.4.9](#)

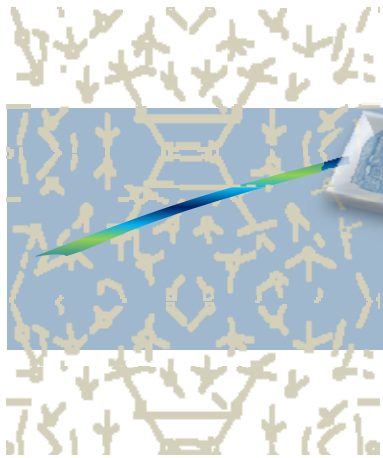
2.4.10 Section Headings: Section headings are used to organize the content. (Level AAA)

[How to Meet 2.4.10](#)
[Understanding 2.4.10](#)

Note 1: "Heading" is used in its general sense and includes titles and other ways to add a heading to different types of content.

Note 2: This success criterion covers sections within writing, not user interface components. User Interface components are covered under [Success Criterion 4.1.2](#).





Guideline 3.1 Readable: Make text content readable and understandable.

[Understanding Guideline 3.1](#)

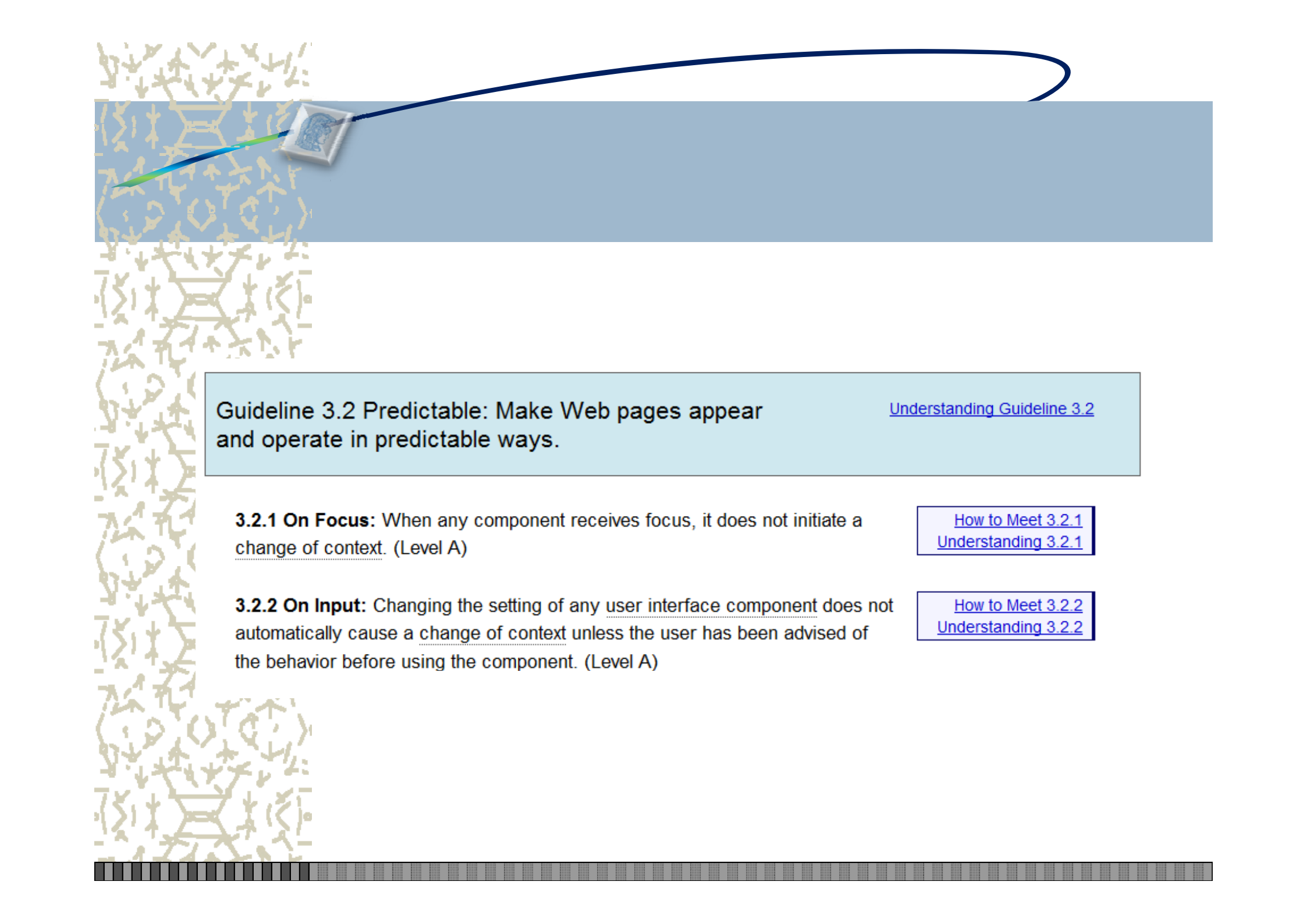
3.1.1 Language of Page: The default human language of each Web page can be programmatically determined. (Level A)

[How to Meet 3.1.1](#)
[Understanding 3.1.1](#)

3.1.2 Language of Parts: 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. (Level AA)

[How to Meet 3.1.2](#)
[Understanding 3.1.2](#)





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

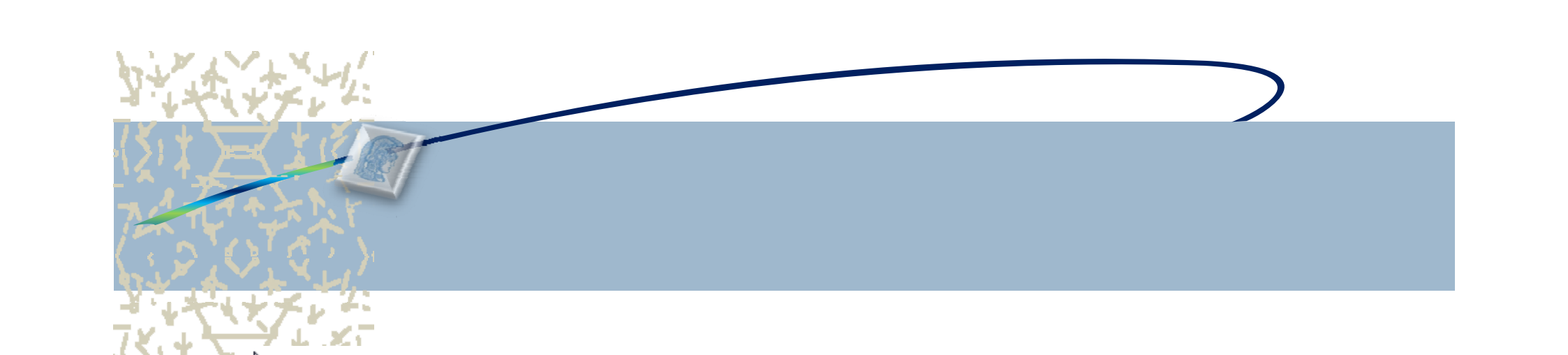
[Understanding Guideline 3.2](#)

3.2.1 On Focus: When any component receives focus, it does not initiate a change of context. (Level A)

[How to Meet 3.2.1](#)
[Understanding 3.2.1](#)

3.2.2 On Input: Changing the setting of any user interface component does not automatically cause a change of context unless the user has been advised of the behavior before using the component. (Level A)

[How to Meet 3.2.2](#)
[Understanding 3.2.2](#)



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

[Understanding Guideline 3.3](#)

3.3.1 Error Identification: 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. (Level A)

[How to Meet 3.3.1](#)
[Understanding 3.3.1](#)

3.3.2 Labels or Instructions: Labels or instructions are provided when content requires user input. (Level A)

[How to Meet 3.3.2](#)
[Understanding 3.3.2](#)

3.3.3 Error Suggestion: 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. (Level AA)

[How to Meet 3.3.3](#)
[Understanding 3.3.3](#)

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

[Understanding Guideline 4.1](#)

4.1.1 Parsing: 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. (Level A)

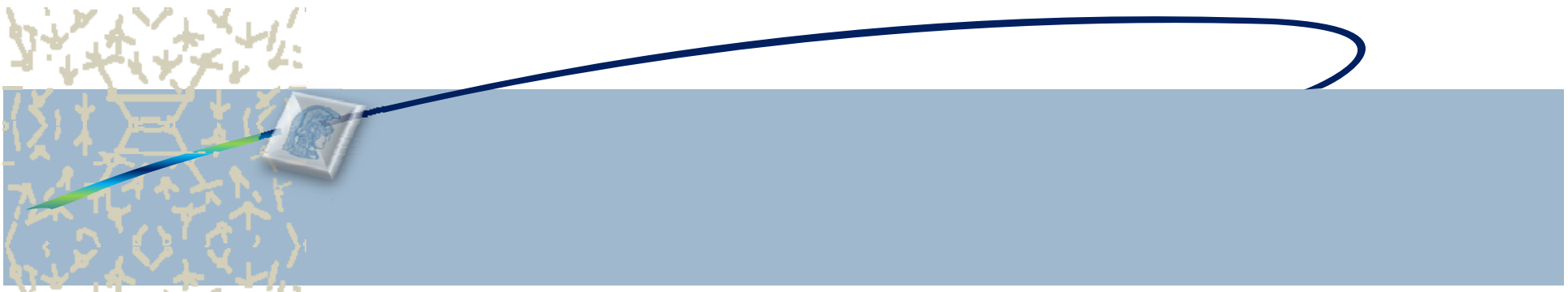
Note: Start and end tags that are missing a critical character in their formation, such as a closing angle bracket or a mismatched attribute value quotation mark are not complete.

[How to Meet 4.1.1](#)
[Understanding 4.1.1](#)

4.1.2 Name, Role, Value: 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. (Level A)

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.

[How to Meet 4.1.2](#)
[Understanding 4.1.2](#)



1. Conformance Level: One of the following levels of conformance is met in full.

- **Level A:** 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.
- **Level AA:** 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.
- **Level AAA:** 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 1: 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 2: 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.