



Accessibility

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Goals

To understand the needs of disabled people and the technologies and strategies they adopt to use a computer

To present an overview of web content accessibility guidelines

To reason about the requirements in preparing didactic material





Outline

- Introduction
- Definitions and Regulations
- Disability and Technical Aids
- Accessibility Guidelines
- Designing Accessible Content
- Some Final Thoughts...



Web Accessibility

The power of the Web is in its universality. Access by everyone regardless of disability is an essential aspect.

Tim Berners Lee, W3C director, 1997
(inventor of the world-wide-web)



Web Accessibility

Another important area of professionalism is accessibility awareness. Everyone should be accommodated, especially when around 20 per cent of the population have special requirements. In fact, Microsoft said recently that nearly 50 per cent of people need to make some sort of adjustment to their system to interact with it. Having turned 50, I'm very aware of receiving email with very small fonts - people don't want to use their spectacles to look at a Web page!

Tim Berners Lee, March 2006
addressing the British Computer Society



...instead...

Web sites and web resources conceived and designed for “normally able” users, equipped with specific communication technologies



Accessibility problems for some categories of users



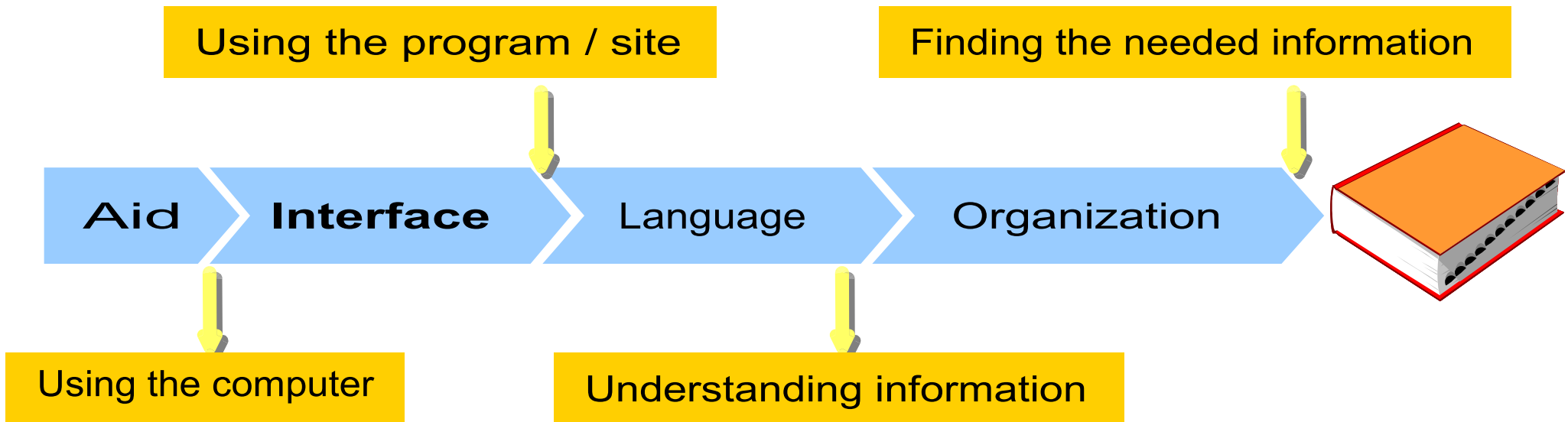
Accessibility is an Opportunity

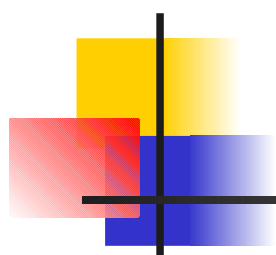
Web accessibility

- Information accessible to the greatest possible number of people,
- independently from psycho-physical disabilities, and
- independently from the hardware and software configuration available to the user

In other words... maximizing the number of users

The Accessibility Chain





Definitions and regulations



Definitions

Web accessibility means that people with disabilities can perceive, understand, navigate, and interact with the Web, and that they can contribute to the Web.

Web accessibility encompasses all disabilities that affect access to the Web, including visual, auditory, physical, speech, cognitive, and neurological disabilities.

Web accessibility also benefits others, including older people with changing abilities due to aging.



Accessibility and Usability

Strongly related fields

Accessibility increases Usability

- Making an interface compatible with disabled users makes it easier to use by any users

Accessibility requires Usability

- Only easily usable websites can be made really accessible, otherwise you may have an accessible interface on an impossible-to-browse website

Both are particular cases of the Design For All strategy



Design for all (I)

«Design for All» *a.k.a.* «Inclusive Design» *a.k.a.*
«Universal Design»

Is an approach to the design of products, services and environments to be usable by as many people as possible regardless of age, ability or circumstance

Based on 7 main principles



Design for All Principles

1. Equitable use
2. Flexibility in use
3. Simple and intuitive
4. Perceptible information
5. Tolerance for error
6. Low physical effort
7. Size and space for approach and use



Examples of Design for All (I)

Smooth ground surfaces of entranceways, without stairs

Wide interior doors and hallways

Lever handles for opening doors rather than twisting knobs

Light switches with large flat panels rather than small toggle switches

Buttons on control panels that can be distinguished by touch



Examples of Design for All (II)

Bright and appropriate lighting, particularly task lighting

Auditory output redundant with information on visual displays

Visual output redundant with information in auditory output

Contrast controls on visual output

Use of meaningful icons as well as text labels



Examples of Design for All (III)

Clear lines of sight (to reduce dependence on sound)

Volume controls on auditory output

Speed controls on auditory output

Choice of language on speech output

Ramp access in swimming pools

Closed captioning on television networks

...



Design for All standards

ISO/IEC Guide 71:2001

- Guidelines for standards developers to address the needs of older persons and persons with disabilities

ISO 20282-1:2006

- Ease of operation of everyday products -- Part 1: Design requirements for context of use and user characteristics

ISO/TS 20282-2:2006

- Ease of operation of everyday products -- Part 2: Test method for walk-up-and-use products



Motivation

A website or a software application should be designed in an accessible way for various reasons:

- Ethical
- Economical
- Legal
- Opportunity



Mainstreaming (I)

Accessible Web design contributes to better design for other users:

- Multi-modality (support for visual, auditory, tactile access) benefits users of:
 - mobile phones with small display screens, Web-TV, kiosks
- Multi-modality increases usability of Web sites in different situations:
 - low bandwidth (images are slow to download)
 - noisy environments (difficult to hear the audio)
 - screen-glare (difficult to see the screen)
 - driving (eyes and hands are "busy")



Mainstreaming (II)

- Redundant text/audio/video can support:
 - different learning styles; low literacy levels; second-language access
- Style sheets can support:
 - more efficient page transmission and site maintenance
- Captioning of audio files supports:
 - better machine indexing of content; faster searching of content

Regulations



Section 508

www.section508.gov



PubblAccesso.gov.it

W3C® Web Accessibility initiative

W3C WAI-A WCAG 1.0

W3C WAI-AA WCAG 1.0

W3C WAI-AAA WCAG 1.0

W3C XHTML 1.0 ✓

W3C CSS ✓

W3C QUICK TIPS TO MAKE ACCESSIBLE WEB SITES Web Accessibility initiative

For Complete Guidelines & Checklist: www.w3.org/WAI

- **Images & animations.** Use the alt attribute to describe the function of each visual.
- **Image maps.** Use client-side MAP and text for hotspots.
- **Multimedia.** Provide captioning and transcripts of audio, and descriptions of video.
- **Hypertext links.** Use text that makes sense when read out of context. For example, avoid "click here." →

- **Page organization.** Use headings, lists, and consistent structure. Use CSS for layout and style where possible.
- **Graphs & charts.** Summarize or use the longdesc attribute.
- **Scripts, applets, & plug-ins.** Provide alternative content in case active features are inaccessible or unsupported.
- **Frames.** Use NOFRAMES and meaningful titles.
- **Tables.** Make line-by-line reading sensible. Summarize.
- **Check your work.** Validate. Use tools, checklist, and guidelines at www.w3.org/TR/WAI-WEBCONTENT.

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International Regulations

Onu – 1993: UN Standard Rules on the Equalization of Opportunities for Person with Disabilities

European Commission – 1999:

- eEurope Initiative
- i2010 initiative
- e-Inclusion, e-Accessibility

http://ec.europa.eu/information_society/policy/accessibility/eincl/index_en.htm



Current Status

Europe: all member countries participate in the eEurope initiative, that set out the end of 2004 as a limit date for applying to public websites the WAI guidelines.

USA: Article number 508 (Section 508) or the law «Workforce Rehabilitation Act (1973)» instituted a technical body, The Access Board, which is delegated to concretely identify the accessibility standards.

- <http://www.section508.gov/>

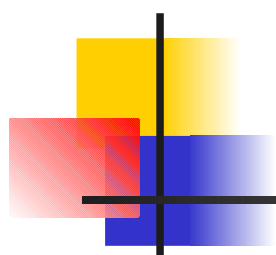


Current Status

Italy: law n.4/2004 “Provisions to support the access to information technologies for the disabled”, followed by DPR 1 marzo 2005, n.75 and DM 8 luglio 2005

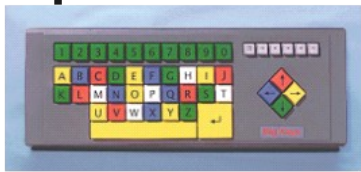
- In Annex A of DM 8 luglio 2005, set of 22 requirements, with links to WCAG 1.0 and Sec.508
- <http://www.pubbliaccesso.gov.it/>

Other countries: see <http://www.w3.org/WAI/Policy/>



Disability and Technical Aids

Overview...



(a)



(b)



(c)



(a)



(b)



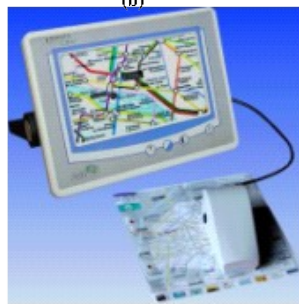
(a)



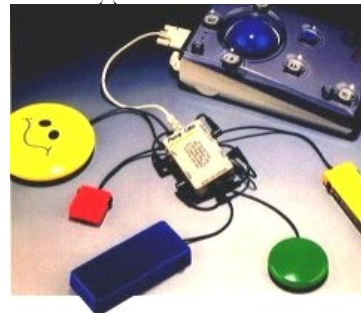
(b)



(a)



(b)



(a)



(b)

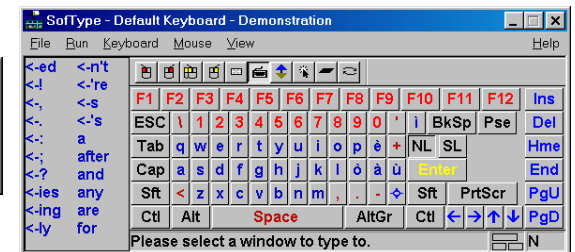
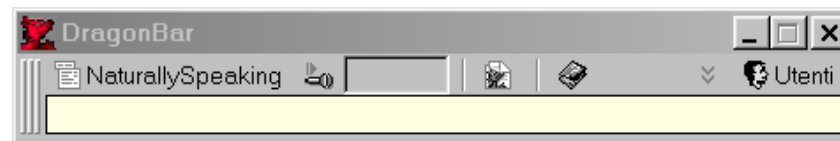


(c)



(a)

(b)





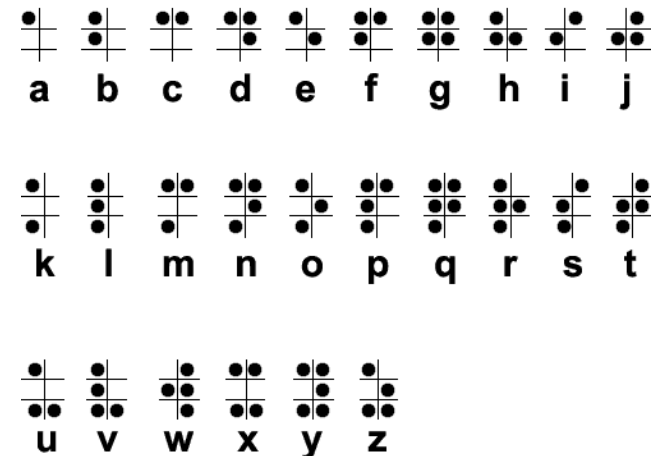
Aids for Different Disabilities (I)

Aids (“assistive devices” according to ISO 9999 standard) aim at replacing, improving and increasing the abilities and capacities of a disabled users, allowing him or her to increase and empower his or her autonomy.

Aids for Different Disabilities (II)

Aids for blind users:

- Braille bar
- Braille keyboard
- Braille printer
- Scanner and OCR (Optical Character Recognition)
- Speech synthesis
- Screen reader
- Optacon.



Aids for Different Disabilities (III)

Aids for low-vision users:

- Video magnifiers
- Magnifiers for computer screens



(a)



(b)



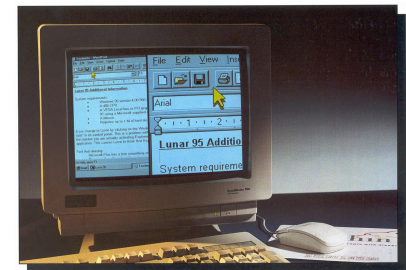
(c)

Aids for hearing impaired users:

- Automatic speech recognition

Aids for mental disabilities:

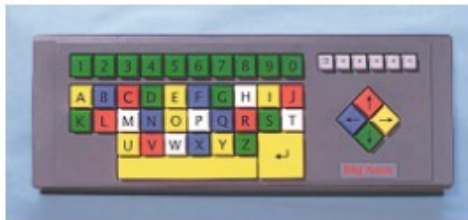
- Software for rehabilitation support and didactic interactions



Aids for Different Disabilities (IV)

Aids for motor disabilities:

- Keyboard covers
- Special keyboards (expanded or reduced)
- Configurable keyboards



(a)



(b)



(c)

Aids for Different Disabilities (V)

- Scanning systems
- Speech command systems
- Special Access features of the Operating System
- Sensors
- Tactile screen
- Special mice (joystick, trackball or sensors)



(a)



(b)



(a)



(b)



(c)



Examples

To better understand the characteristics of different aids, and how they may be used in different disability categories, we present 5 “profiles” of users

- Such profiles are taken from real situations (simplified)

See also:

- "How People With Disabilities Use the Web", J. Brewer, editor, 4 January 2001. Latest version: <http://www.w3.org/WAI/EO/Drafts/PWD-Use-Web/>

Profile #1 - Roberto

Pathology:

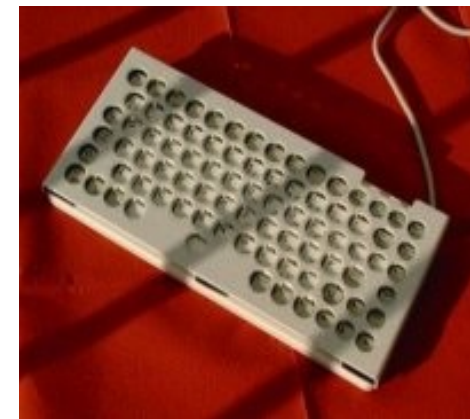
- Spastic tetraplegia

Problems:

- Oral communication impossible
- Impossible to use a standard mouse
- Difficulty in using a standard keyboard

Aids:

- Special Access in Windows
- Compact keyboard: Cherry model 4100



Profilo #2 - Giuseppe

Pathology:

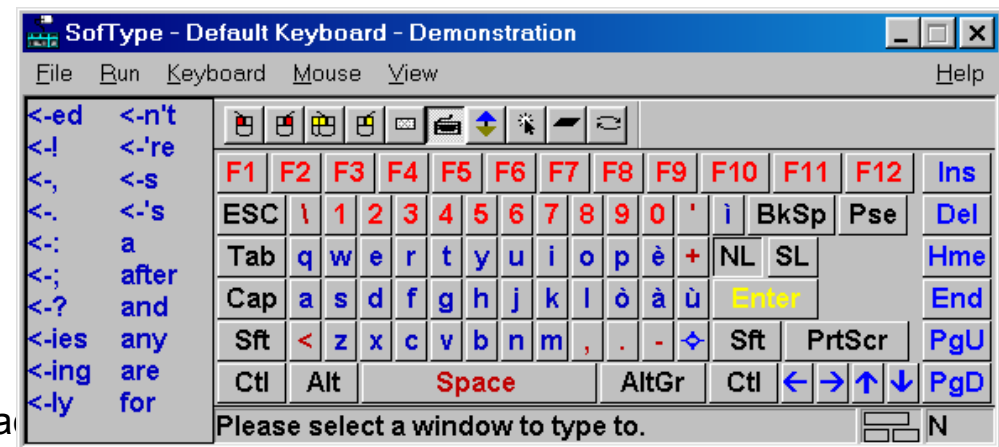
- Spastic tetraplegia

Problems:

- Oral communication impossible
- Impossible to use a standard mouse
- Nearly impossible to use a standard keyboard

Aids:

- Special Mouse Roller II Joystick
- Software keyboard emulator SofType 4.5



Profile #3 - Paolo

Pathology:

- Tetraplegia

Problems:

- Impossible to use a standard mouse or keyboard
- No control over upper and lower limbs

Aids:

- Speech recognition software Dragon NaturallySpeaking 5



Profile #4 - Mario

Pathology:

- Tetraplegia

Problems:

- Impossible to use a standard keyboard
- Difficulty in using a standard mouse

Aids:

- Special Mouse Roller Plus Trackball
- Software mouse assistant
- Software keyboard emulator SofType 4.5



Profile #5 - Maurizio

Pathology:

- Blindness

Problems:

- Total blindness

Aids:

- Screen reader Jaws 4.50.1





General Comment

In the field of disability, it's impossible to define “a priori” any categories

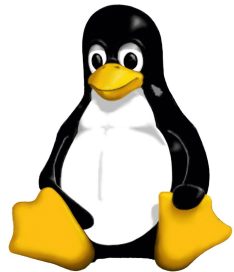
Each user is a unique case

Computer aids must be able to exploit the best of the residual abilities of each user

Interoperability

Personalization

Not just disabled users...





Fighting negative myths

Accessible = text-only

Accessible = ugly

Accessible = alternate version

Accessible = for blind users

Accessible = compatibility problems

Accessible = for a minority of users

Accessible = I don't care



Why is it difficult

- High technical skills
- Competence over web standards and languages (XHTML, CSS, DOM, JavaScript, ...)
- Limitations and quirks in the browser implementations
- Matching technical rigor with aesthetic communication needs



Challenges

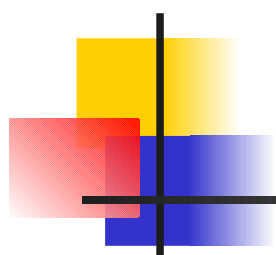
Spreading awareness

Training designers and programmers

Developing tools

- Editors, Validators, Generators

Making accessibility accessible



Accessibility Guidelines



Web Accessibility Initiative (WAI)

One of the work groups of W3C, founded in 1997.

Objectives:

- ensuring that Web technologies support accessibility
- developing guidelines for accessibility
- improving tools to evaluate and repair Web accessibility
- developing materials for education and outreach
- coordinating with research and development

<http://www.w3.org/WAI/>



WAI Guidelines (I)

Web Content Accessibility Guidelines (WCAG 1.0): for web authors, they explain how to create accessible web contents. All regulations refer to this document. W3C Recommendation since 1999-05-05.

Authoring Tool Accessibility Guidelines (ATAG 1.0): for developers of programs and web site generators. W3C Recommendation since 2000-02-03.



WAI Guidelines (II)

User Agent Accessibility Guidelines (UAAG 1.0): for developers of Internet browsers (user agents), they explain how to create and more accessible browsers and plug-ins. W3C Recommendation since 2002-12-17.

Further, more specific, guidelines (**Techniques**) applicable to specific languages or to some categories of browsers.

WCAG 1.0: Structure

14 guidelines

Checkpoints associated to each guideline

Arranged in **priorities**

- 1: MUST (level A)
- 2: SHOULD (level AA)
- 3: MAY (level AAA)

W3C	WAI - A WCAG 1.0
W3C	WAI-AA WCAG 1.0
W3C	WAI-AAA WCAG 1.0



WCAG 1.0 (I)

1. Provide **equivalent alternatives** to auditory and visual content.
2. Don't rely on **color** alone.
3. Use markup and style sheets and do so properly.
4. Clarify **natural language** usage
5. Create **tables** that transform gracefully.
6. Ensure that pages featuring new technologies transform gracefully.



WCAG 1.0 (II)

7. Ensure user control of **time-sensitive content** changes.
8. Ensure direct accessibility of embedded user interfaces.
9. Design for device-independence.
10. Use interim solutions.
11. Use W3C technologies and guidelines.



WCAG 1.0 (III)

- 12. Provide **context and orientation** information.
- 13. Provide **clear navigation** mechanisms.
- 14. Ensure that documents are **clear and simple**.



Checkpoints

Each guideline has several checkpoints

- <http://www.w3.org/TR/WAI-WEBCONTENT/>
- <http://www.w3.org/TR/WAI-WEBCONTENT/full-checklist.html>



Quick tips



QUICK TIPS TO MAKE
ACCESSIBLE WEB SITES

Web Accessibility
Initiative

For Complete Guidelines & Checklist: www.w3.org/WAI

- **Images & animations.** Use the alt attribute to describe the function of each visual.
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- **Frames.** Use NOFRAMES and meaningful titles.
- **Tables.** Make line-by-line reading sensible. Summarize.
- **Check your work.** Validate. Use tools, checklist, and guidelines at www.w3.org/TR/WAI-WEBCONTENT.

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1999/08



Techniques documents

More specific documents with practical information for implementing WCAG 1.0

- Core Techniques for Web Content Accessibility Guidelines 1.0
- HTML Techniques for Web Content Accessibility Guidelines 1.0
- CSS Techniques for Web Content Accessibility Guidelines 1.0



WCAG 2.0

Still a Draft document

- <http://www.w3.org/WAI/intro/wcag20>

Organized in 3 layers:

- 1 - Top layer - Overview of Design Principles, Guidelines, Success Criteria (WCAG 2.0)
- 2 - Technology-specific Checklists
- 3 - Bottom layer - Technology-specific application information
 - General Techniques, HTML/ XHTML, CSS, Server-side scripting, Client-side scripting, SVG, SMIL, XML



WCAG 2.0: Main Principles

Content must be **perceivable**.

Interface elements in the content must be **operable**.

Content and controls must be **understandable**.

Content must be **robust** enough to work with current and future technologies.

POUR



1. Perceivable (I)

1.1 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

1.2 Provide synchronized alternatives for multimedia

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



1. Perceivable (II)

1.4 Make it easier for people with disabilities to see and hear content including separating foreground from background



2. Operable

- 2.1 Make all functionality available from a keyboard
- 2.2 Provide users with disabilities enough time to read and use content
- 2.3 Do not create content that is known to cause seizures
- 2.4 Provide ways to help users with disabilities navigate, find content and determine where they are



3. Understandable

- 3.1 Make text content readable and understandable
- 3.2 Make Web pages appear and operate in predictable ways
- 3.3 Help users avoid and correct mistakes that do occur



4. Robust

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



Other 2.0 documents

WCAG 2 FAQ

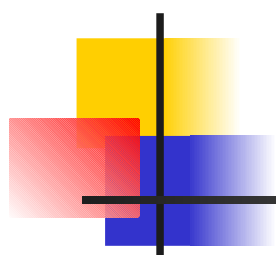
WCAG 2.0 Quick Reference

WCAG 2.0 - technical report

Understanding 2.0 - technical report

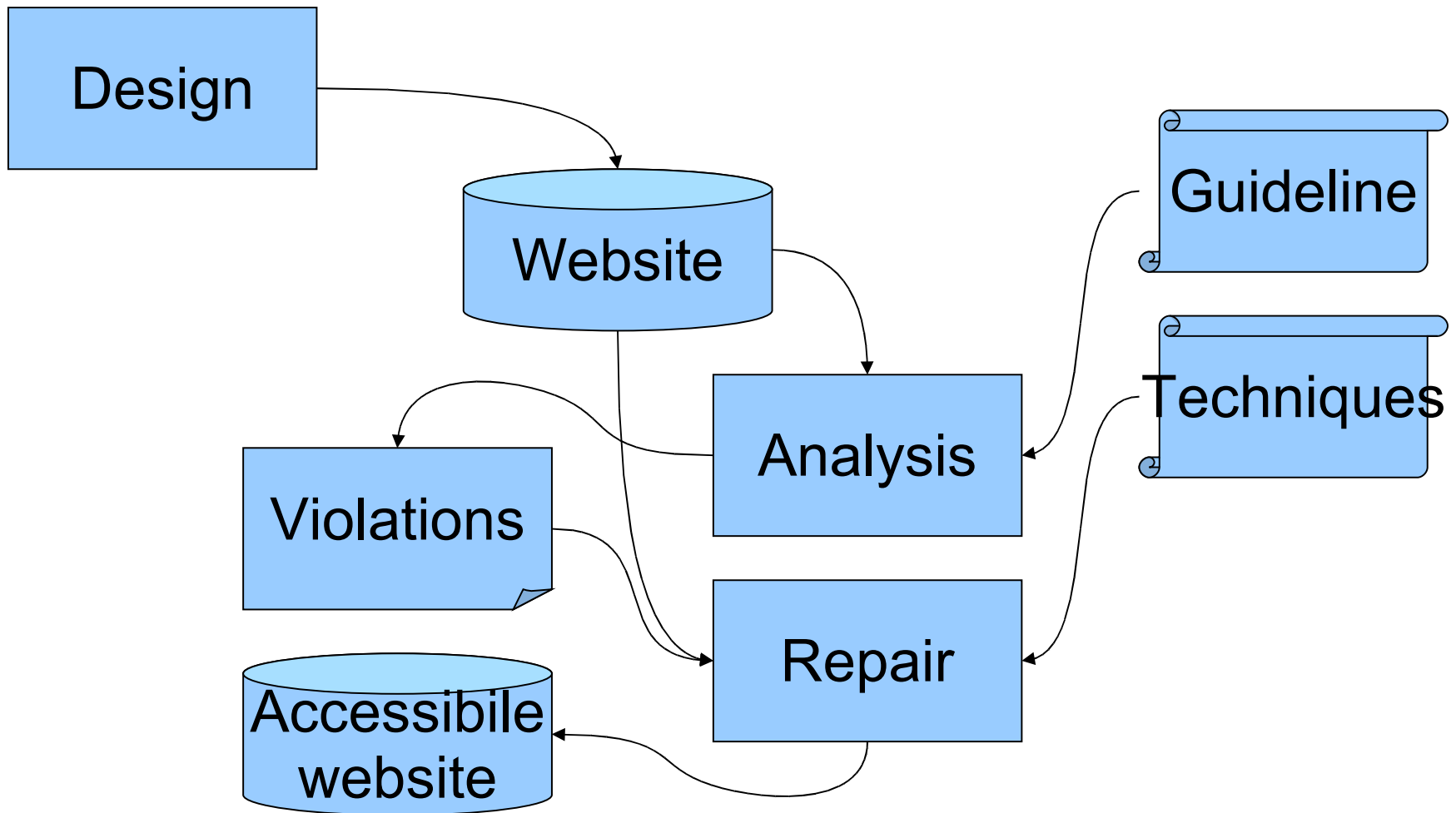
Techniques 2.0 - technical report

Requirements 2.0 - technical report

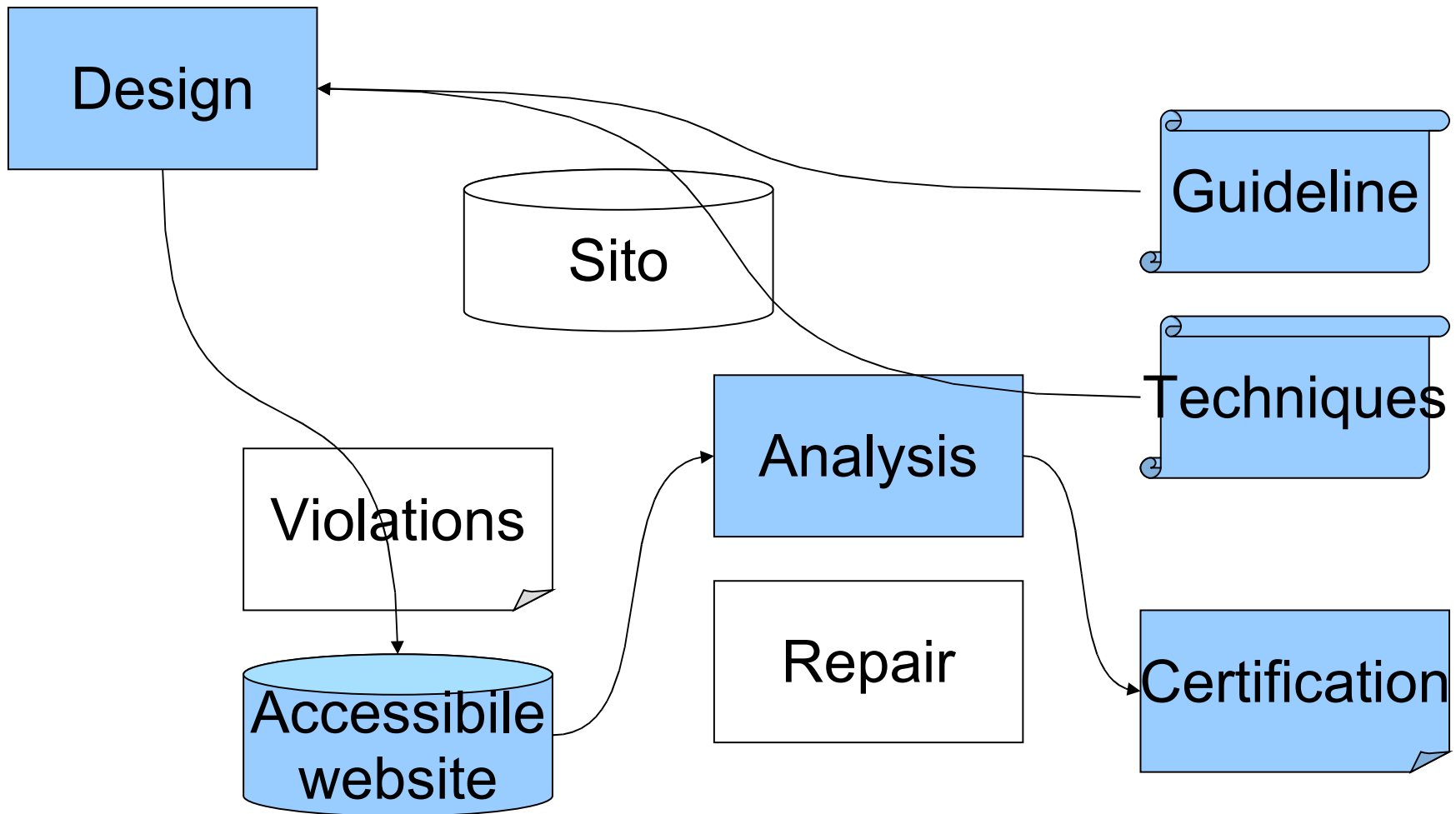


Designing Accessible Content

Option I: Adapt



Option II: Create anew





Some suggestions...

- Layout criteria
- Background colors
- Limit information in colors
- Choice and usage of fonts
- Handling non-text elements and multimedia files



Some suggestions...

- Logical organization of the contents
- Correct markup (if in HTML) and explicit language identification
- Using summaries, maps, directories, ...
- Handling forms for user input
- Clarity of the contents



Validating Web Sites

- **Manual analysis:** helps in ensuring language clarity and ease of navigation
- **Automatic methods:** allow a quick analysis of syntactical elements in the web page(s).



Some automatic validators

Main on-line validators:

- W3C Validation Service, W3C CSS Validation Service, W3C Link Checker
- Dr. Watson, Bobby, Torquemada, Wave, A-Prompt

Validation software for off-line analysis:

- HTML Tidy
- TagCheck
- Bradsoft TopStyle.



Some links

A-Prompt (Accessibility Prompt) - offline

- <http://aprompt.snow.utoronto.ca/index.html>

WAVE 3.0 Accessibility Validator

- <http://wave.webaim.org/>

WebXact (ex: Bobby)

- <http://webxact.watchfire.com/>

HiSoftware AccessibilityWatch (not free)

- <http://www.accessibilitywatch.com/>

Torquemada

- <http://www.webxtutti.it/testa.htm>

Example: WAVE validation

The screenshot displays a Mozilla Firefox browser window with the WAVE [3.0] accessibility tool active. The browser's address bar shows the URL `http://wave.webaim.org/wave/Output.jsp`. The page being analyzed is the institutional portal of the Politecnico di Torino. The WAVE interface overlays the page content with various annotations:

- Annotations:** Small icons (arrows, flags, and symbols) are placed over specific elements on the page. Text labels, such as `*4*`, `*3*`, `*8*`, and `*29*`, are positioned near these icons to identify specific accessibility issues or elements.
- Page Content:** The main content includes the Politecnico di Torino logo, a search bar with the text "CERCA", a navigation menu with links like "STUDENTI", "DOCENTI", "PERSONALE", and "STRUTTURE", and several main content blocks with titles like "SCOPRIRE L'ATENEO", "SERVIZI PER LA DIDATTICA", "IL MONDO DELLA RICERCA", and "IL POLITECNICO & LE IMPRESE".
- Annotations Summary:** The annotations cover various parts of the page, including the logo, navigation menu, search bar, and main content blocks. Some annotations include icons like a flag or a symbol, indicating specific accessibility issues or elements.

Example: WebXact validation

Watchfire WebXACT - Mozilla Firefox
 http://webxact2.watchfire.com/report.asp?t=2

	Status	Errors	Instances	Status	Warnings	Instances
Priority 1	⊗	2	23	⚠	12	219
Priority 2	⊗	5	188	⚠	20	223
Priority 3	⊗	4	39	⚠	12	12

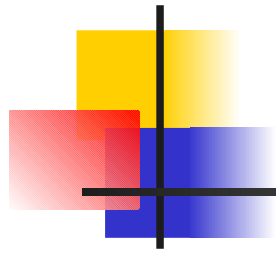
Priority 1 Checkpoints

⊗ **Errors**
2 tests, 23 instances on page

Guideline	Instances	Line Numbers
1.1 Provide alternative text for all images.	21	35, 40, 45, 50, 64, 117, 123, 130, 132, 155, 164, 176, 177, 178, 184, 189, 190, 191, 193, 194, 199
12.1 Give each frame a title.	2	154, 156

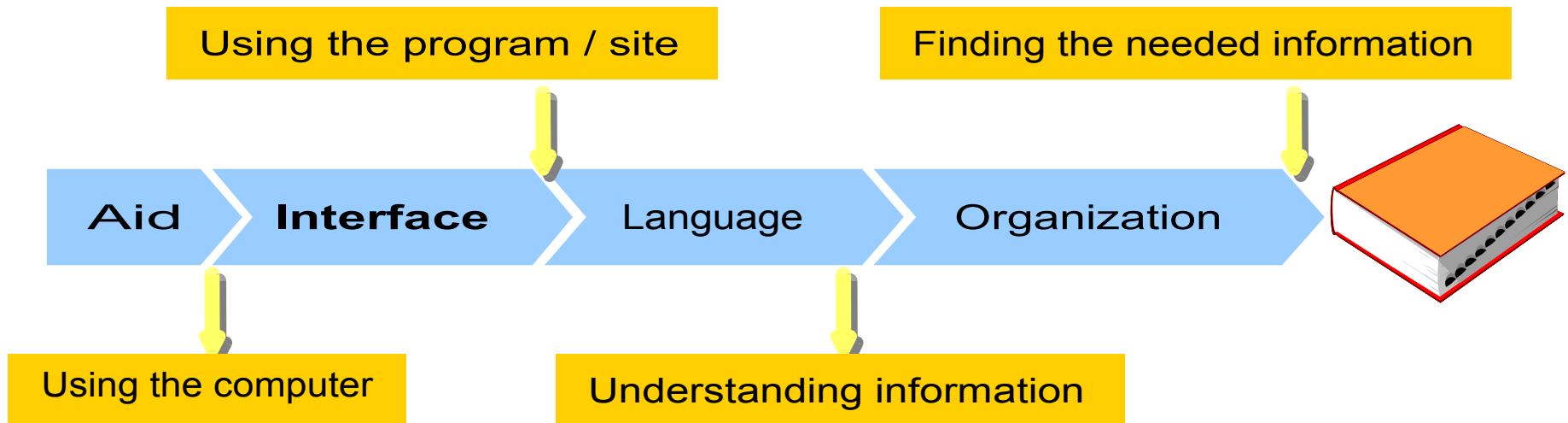
⚠ **Warnings**
12 tests, 219 instances on page

Guideline	Instances	Line Numbers
1.1 If the submit button is used as an image map, use separate buttons for each active region.	1	188
1.1 If an image conveys important information beyond what is in its alternative text, provide an extended description.	77	11, 15, 16, 21, 26, 35, 40, 45, 50, 57, 64, 67, 68, 70, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 90, 92, 94, 96, 98, 101, 102, 105, 107, 109, 112, 113, 115, 116, 117, 118, 123, 130, 132, 135, 136, 137, 138, 139, 140, 141, 142, 143, 155, 164, 167, 176, 177, 178, 182, 184, 189, 190, 191, 192, 193, 194, 195, 196, 199, 206, 207
2.1 If you use color to convey information, make sure the information is also represented another way.	96	11, 15, 16, 21, 26, 34, 35, 39, 40, 44, 45, 49, 50, 57, 58, 64, 67, 68, 68, 69, 70, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 90, 92, 94, 96, 98, 101, 102, 103, 105, 107, 109, 112, 113, 115, 116, 117, 118, 123, 130, 132, 135, 136, 137, 138, 139, 140, 141, 142, 143, 155, 164, 167, 176, 176, 177, 178, 178, 182, 184, 185, 186, 187, 188, 189, 190, 191, 192, 192, 193, 193, 194, 195, 196, 199, 206, 207
4.1 Identify any changes in the document's language.		
5.1 If this is a data table (not used for layout only), identify headers for the table rows and columns.	11	53, 56, 59, 100, 111, 119, 144, 159, 161, 197, 211
5.2 If a table has two or more rows or columns that serve as headers, use structural markup to identify their hierarchy and relationship.	23	23, 36, 41, 46, 51, 53, 54, 55, 56, 59, 100, 111, 119, 133, 144, 150, 156, 159, 161, 183, 197, 203, 211
6.1 If style sheets are ignored or unsupported, ensure that pages are still readable and usable.		
6.3 Provide alternative content for each SCRIPT that conveys information or functionality.		
6.3 Make sure pages are still usable if programmatic objects do not function.	3	28, 212, 213
7.1 Make sure that the page does not cause the screen to flicker rapidly.		



Some final thoughts

The Accessibility Chain





Current status

Aids: excellent tools

- Cost?
- Software support?



Aid

Using the computer

Current status



Interfaces: “standard” friendly Web

- Compatibility with aids?
- Authors’ awareness?
- Standard support?

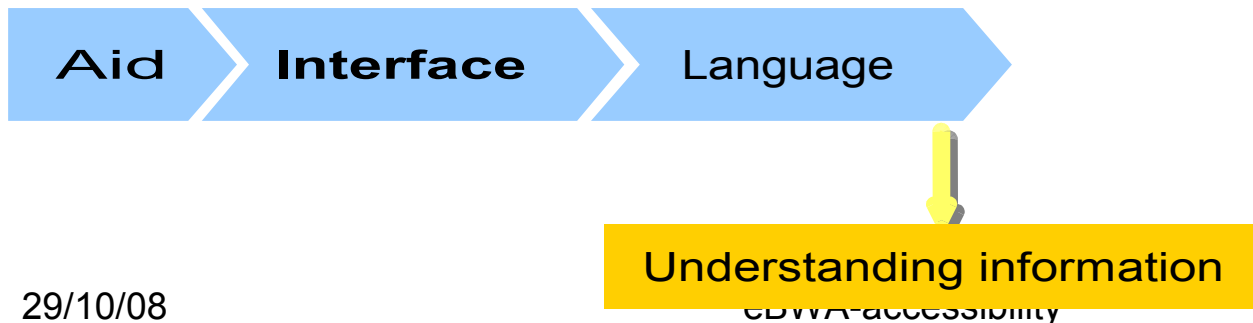
Using the program / site



Current status

Language

- Start from users' language
- Clarify the meaning of terms
- Coherent usage of the terms in the chosen glossary
- Use simple sentences
- Prepare different levels of difficulty
- Integrate different communication forms and styles



Current status

Organization

- Let conceptualizations show through
- Identify relationships among concepts
- Differentiated between internal 'service' organization and content organization
- Align classification criteria with search criteria

