



Accessibility

Guidelines for Accessible Interfaces and Universal Design

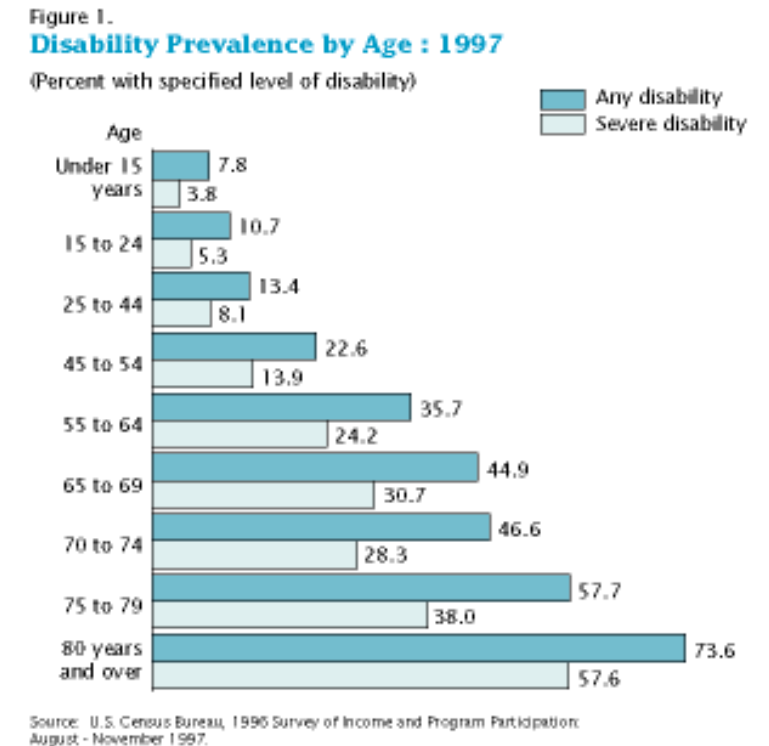
Slides adapted from A. Schmidt, Image from: <https://pxhere.com/de/photo/700394>

Learning Goals

- Understand ...
 - › Why accessibility is important in HCI
 - › That there are legal and usability requirements
 - › Different types of disabilities
 - › Principles of universal design
- Be able to explain ...
 - › Universal design principles
 - › Soft- and hardware for people with disabilities

Why Accessibility?

- In 1997, 52.6 million people (19.7 percent of the population) had some level of disability
- 33.0 million (12.3 percent of the population) had a severe disability.
- About 10.1 million individuals (3.8 percent of the population) needed personal assistance
- 2.2 million used a wheelchair.
- Another 6.4 million used some other ambulatory aid such as a cane, crutches, or a walker. A
- About 7.7 million individuals and letters in ordinary newspaper print; of them, 1.8 million were unable to see.



Why Accessibility?

■ Numbers from Germany

- › 155.000 blind people, 500.000 visually impaired
- › 1,1 Million have motor deficiencies (movement and control of body parts)
- › 236.000 are hard of hearing or deaf

■ Assistive technologies

- › Usage of associative technologies is widespread in these groups (~30%)
- › Large screens and magnified presentation
- › Braille Displays
- › Text to speech (screen readers)
- › Speech input and speech control
- › Special keyboards and input devices (if motor control for standard mouse and keyboard is not sufficient)

Legal Requirements

- In Germany:
 - › Behindertengleichstellungsgesetz
<http://www.behindertenbeauftragter.de/gesetzgebung/behindertengleichstellungsgesetz>
 - › Verordnung zur Schaffung barrierefreier Informationstechnik nach dem Behindertengleichstellungsgesetz
<http://www.behindertenbeauftragter.de/gesetzgebung/behindertengleichstellungsgesetz/rechtsverordnung/rvo11bgg>
- It is required by law (Germany)
 - › Since 31. December 2005 for general information
 - › Since 31. December 2003 for information that is targeted at people with disabilities
- In USA
 - › Section 508: <http://www.section508.gov/>

Types of Disabilities

■ Physical Disabilities

- › **Motor impairments**
- › **Visual impairments**
 - › Blindness (users cannot see visual content)
 - › Low vision (Poor vision quality, Very common in seniors)
 - › Color blindness (10% of all males – red green)
- › **Hearing impairments**
- › ...

■ Cognitive/Mental Disabilities

- › Reading/Learning disorders
- › Attention disorders
- › Memory impairments
- › ...

Blindness / Low Vision / Color Blindness

■ Blindness

- › Provide structure to text for easy navigation
- › Add text or audio descriptions to images/video
- › Follow standards for maximum compatibility with **screen readers**

■ Low Vision

- › Allow font resizing
- › Allow color schemes to be changed
- › Add text or audio descriptions to images/video

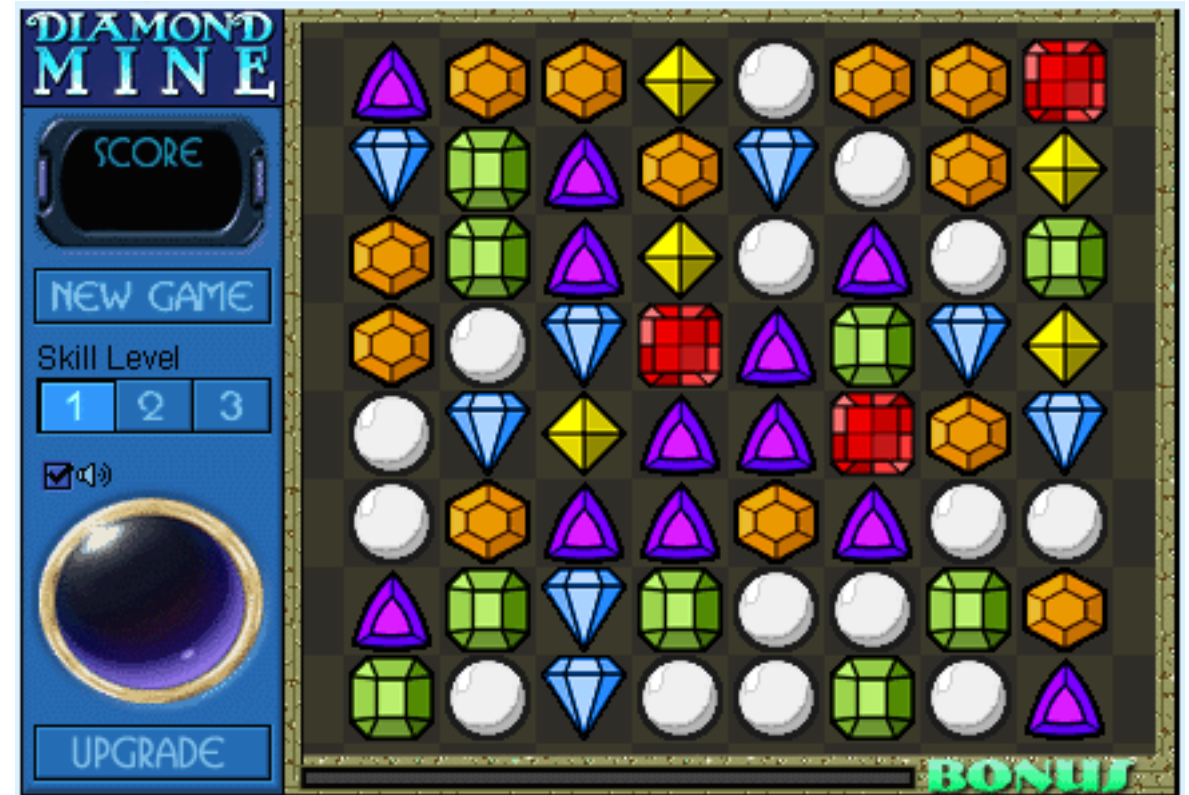
■ Color Blindness

- › Allow color schemes to be changed
- › Don't differentiate on hue alone: include saturation, value, shape



From:
http://portal.cs.umass.edu/fundamentals/Usability_05_Accessibility.pdf Brandon Goldsworthy,
Shaun Kane, Tony Sindelar

Provide more cues!



From: http://portal.cs.umass.edu/fundamentals/Usability_05_Accessibility.pdf Brandon Goldsworthy, Shaun Kane, Tony Sindelar

Screenreader

- **Software that reads what is on the screen**
- **Provides navigation**
- **Integrates with application software**
- **Example: JAWS**
 - › Includes a software speech synthesizer
 - › Can output to Braille display
 - › Demo: http://www.freedomscientific.com/fs_downloads/jaws.asp
- **Example: IBM Home page reader**
 - › Especially designed for web browsing
 - › Reads text, table, frames, forms, ALT-tags
 - › Works with selected JavaScript code and Plug-Ins
 - › Demo: <http://www-5.ibm.com/de/accessibility/hpr.html>

Braille Displays / Printer

■ Displays

- › Used with a JAWS screen reader
- › refreshable Braille cells act as a tactile monitor (e.g. 44-, 70- and 84-cells)
- › Unidirectional advance bars and Whiz Wheels for navigation
- › buttons are individually (Navigation controls are on the display)
- › >5000 €

■ Printer

- › 150 PPH (pages per hour) or 39 CPS (characters per second).
- › 6 High quality hardened hammers forming against hardened steel anvils



Images from: <http://www.sightandsound.co.uk>,
<http://www.accesstech.ch/>, <http://www.sightandsound.co.uk/>

Hearing Impairments

- **User cannot hear audio content**
 - › Easy to test for (turn off your speakers)
- **Solution**
 - › Provide labeling captioning for all audio content
 - › Use automatic labeling whenever possible
 - › Recheck
 - › Hearing aids

Impaired Motor Skills

- **Difficulty using physical input devices** e.g., mouse and keyboard
 - › Inaccuracy while clicking
 - › Slow input
 - › May use specialized input device
- **Solutions**
 - › Do not require precise clicking
 - › Allow alternate input methods
 - › Keyboard
 - › Mouse
 - › Voice

Cognitive Disabilities

- **Many types**

- › Learning disabilities
- › Attention deficit disorder
- › Memory impairments
- › Impairments of intelligence

- May have **difficulty** focusing **on processing information**

- **Solutions**

- › Clear, simple design
- › Simple navigation
- › Avoid distracting elements (video, navigation)

Universal Design Principles

- **Tolerance for Error**

- The design minimizes hazards and the adverse consequences of accidental or unintended actions

- **Low Physical Effort**

- The design can be used efficiently and comfortably and with a minimum of fatigue

- **Size and Space for Approach and Use**

- Appropriate size and space is provided for approach, reach, manipulation, and use regardless of user's body size, posture, or mobility

Universal Design Principles

- **Equitable Use**

- › The design is useful and marketable to people with diverse abilities

- **Flexibility in Use**

- › The design accommodates a wide range of individual preferences and abilities

- **Simple and Intuitive Use**

- › Use of the design is easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level.

- **Perceptible Information**

- › The design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities.

Web Accessibility Evaluation

- Guidelines are divided into three categories of success criteria:
 - › **Level 1 success criteria:**
 - › do not specify how information is presented
 - › are reasonably applicable to all Web sites
 - › some are machine-testable. Others require human judgment. Success criteria that require human testing yield consistent results among multiple testers.
 - › **Level 2 success criteria:**
 - › may require an author to present content in particular ways
 - › are reasonably applicable to all Web sites
 - › some are machine-testable. Others require human judgment. Success criteria that require human testing yield consistent results among multiple testers.
 - › **Level 3 success criteria:**
 - › are additional criteria that go beyond Level 1 and 2 that may be applied to make sites accessible to more people with all or particular types of disability

Quick Tips to make Accessible Web Site

- **For Complete Guidelines & Checklist:** www.w3.org/WAI
- **Images & animations:** Use the alt attribute to describe the function of each visual.
- **Image maps** : Use the 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. E.g., avoid "click here."
- **Page organization** Use headings, lists, and consistent structure, use HTML5/CSS
- **Graphs & charts** : Summarize or use the longdesc attribute.
- **Scripts, applets, & plug-ins**: Provide alternative content in case active features are inaccessible
- **Frames**: Use the no-frames element and meaningful titles.
- **Tables**: Make line-by-line reading sensible. Summarize.
- **Check your work**: Validate. Use tools, checklist, and guidelines at <http://www.w3.org/TR/WCAG>

Guideline Checker

- **Bobby:** <http://bobby.watchfire.com/bobby/html/en/index.jsp>
“This free service will allow you to test web pages and help expose and repair barriers to accessibility and encourage compliance with existing accessibility guidelines, such as Section 508 and the W3C's WCAG. To learn about products to test websites of all sizes for accessibility issues, please visit the [accessibility section on www.watchfire.com](http://www.watchfire.com).”
- **A-prompt:** <http://aprompt.snow.utoronto.ca/>
“Web authors can use A-Prompt to make their Web pages accessible to people with disabilities. The A-Prompt software tool examines Web pages for barriers to accessibility, performs automatic repairs when possible, and assists the author in manual repairs when necessary. These enhanced Web pages are available to a larger Internet audience. “
- <http://www.anybrowser.com/>
- <http://www.barrierekompass.de/>
- <http://validator.w3.org/>