

COMMONWEALTH OF AUSTRALIA

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Designing for Accessibility

COMP3511/9511 Human Computer Interaction
Dr Nadine Marcus

Modified from slides created by Dr Daniel Woo

Readings/Reference

- Shneiderman and Plaisant (2005), Designing the User Interface, "Universal Usability" Section 1.5, pp24-39.
- Box 10.3, Interaction Design (2007) p483
- <http://www.w3.org/WAI/EO/Drafts/PWD-Use-Web/> OR <http://www.w3.org/WAI/intro/people-use-web/Overview.html>

Overview

- Universal access
- Personas vs Scenarios as design tools
- Assistive Technologies
- Accessibility Interaction Design Considerations
- Evaluation techniques
 - Automatic validation tools
 - Human review methods
 - Usability testing with disabled users

universal access

- "The power of the web is in its universality. Access by everyone, regardless of disability, is an essential part."
- Tim Berners-Lee
- Director of the World Wide Web Consortium (W3C)

Universal Access

- **Universal access** refers to the ability of all people to have equal opportunity to access a service or product regardless of their social class, ethnicity, background or physical disabilities
- Another user experience goal
 - Support universal access for all

Accessibility for all

- Disabilities
 - Visual
 - Auditory
 - Physical
 - Cognitive/learning
 - Literacy

Accessibility for all

- Technology
 - Slow connection
 - No sound card
 - Older browser/technology
 - No plug-ins

Accessibility Support

- Relates to Universal Access and Accessibility for all
- *Accessibility* is making user interfaces perceivable, operable, and understandable for people with a wide range of abilities. This includes temporary conditions such as broken arms, to more permanent visual, physical, speech, and neurological disabilities.
- *Accessibility support* means that technologies, products, or services must be designed in a way that user agents including assistive technologies can access all the information they need to present the content to the user.

Personas

- Personas is used by Cooper, in About Face
- Capture user characteristics
- Not real people, but synthesised from real user characteristics
- Process to develop personas is based on user research
- Bring them to life with a name, characteristics, goals, personal background
- Can develop multiple personas

Scenarios vs. Personas

- Process to develop personas is based on user research while scenarios are just stories
- Persona describes attributes of a person and aspects of their personality while Scenario describes activities and context of use.

Context Scenarios

- A day in the life of a user
- Narrative form, story
- Explains goals and needs
- Not technology specific
 - Don't talk about clicking specific buttons or using a specific technology
 - No system behaviour

Context Scenario

- Demographic / Age
- Gender
- First Name
- Photo (stock photo)
- Describe their goals, what are they aiming to achieve
- Describe their feelings

Context Scenario

- High level description of the tasks that they are currently performing
- Don't be specific about interface details - they press the button labelled ...
- "Sequence of information exchange, actions and results" (Goodwin)
- User focused not system focused

- "Context scenarios should be compelling: they need to engage the imagination and help people see the possibilities, not bog them down in detail"
- Goodwin p318

scenarios

- Ms. Kaseem uses the Web to find new restaurants to go to with friends and classmates. She has low vision and is deaf . She uses a screen magnifier to enlarge the text on Web sites to a font size that she can read. When screen magnification is not sufficient, she also uses a screen reader to drive a refreshable braille display , which she reads slowly.

<http://www.w3.org/WAI/EO/Druby/PWD-Use-Web/>

- At home, Ms. Kaseem browses local Web sites for new and different restaurants. Within her Web browser, she uses a personal style sheet , which makes all Web pages display according to her preferences. Her preferences include having background patterns turned off so that there is enough contrast for her when she uses screen magnification. This is especially helpful when she reads on-line sample menus of appealing restaurants.

- A multimedia virtual tour of local entertainment options was recently added to the Web site of the city in which Ms. Kaseem lives. The tour is completely captioned and described , which allows her to access it using a combination of screen magnification and braille.

•She also checks the public transportation sites find subway or bus stops near the restaurants. The subway schedule is easy to use because the frames on that Web site are clearly labeled, and the schedules, which are laid out as long tables, have clearly identified row and column headers that she uses to orient herself even when she has magnified the screen display.

•The Web site for the bus schedule has unlabelled frames and tables without clear column or row headers, and she often gets lost on the site when trying to find the information she needs.

•She has also used her portable braille device, with an infrared connection, to get additional information and directions at a Web-based public information kiosk in a shopping mall downtown; and a few times she has downloaded sample menus into her braille device so that she has them in an accessible format once she was in a restaurant.

assistive technologies

- Screen readers
- Screen magnification software
- Variety of keyboard/mouse options
- Voice input/voice recognition software
- Head pointers
- Braille displays

Assistive Technologies

- Screen readers
 - Software used by individuals who are blind (or who have dyslexia) that interprets what is displayed on a screen and directs it either to speech synthesis for audio output, or to refreshable Braille for tactile output.

Assistive Technologies

- Screen magnification software
 - Software used primarily by individuals with low vision that magnifies a portion of the screen for easier viewing. Ranges of 1- to 16-times magnification are common. The greater the magnification the smaller the proportion of the original screen content can be viewed, so users will tend to use the lowest magnification they can manage.
 - For more information on screen magnifiers: http://en.wikipedia.org/wiki/Screen_magnifier
 - See <http://www.w3.org/WAI/EO/Drafts/PWD-Use-Web/#tools>

Assistive Technologies

- Variety of keyboard/mouse options
 - Alternate keyboards or switches are hardware or software devices used by people with physical disabilities, that provide an alternate way of creating keystrokes that appear to come from the standard keyboard. Examples include keyboard with extra-small or extra-large key spacing, keyguards that only allow pressing one key at a time, on-screen keyboards, eyegaze keyboards, and sip-and-puff switches.
 - See <http://www.w3.org/WAI/EO/Drafts/PWD-Use-Web/#tools>

Assistive Technologies



Example of sip-and puff instrument
www.jouse.com/assets/images/jouse2_cyn01_800.JPG

Assistive Technologies



Big Keys keyboard <http://www.presentationmedia.co.uk/acatalog/kidskeys.jpg>

Assistive Technologies

- Voice input/voice recognition software
- Speech (or voice) recognition is used by people with some physical disabilities or temporary injuries to hands and forearms as an input method in some voice browsers..
- Speech synthesis or speech output can be generated by screen readers or voice browsers, and involves production of digitized speech from text.
 - See <http://www.w3.org/WAI/EO/Drafts/PWD-Use-Web/#tools>

Assistive Technologies

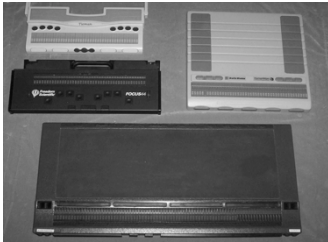
- Head pointers
- Braille displays
 - Braille is a system using six to eight raised dots in various patterns to represent letters and numbers that can be read by the fingertips. Refreshable or dynamic Braille involves the use of a mechanical display where dots (pins) can be raised and lowered dynamically to allow any Braille characters to be displayed.
 - See <http://www.w3.org/WAI/EO/Drafts/PWD-Use-Web/#tools>

Assistive Technologies



Head Pointer
<http://www.frs-solutions.com/>

Assistive Technologies



Refreshable Braille Display
<http://www.wcbvi.k12.wi.us/assets/Photos/technology/refreshablebrailledevices.jpg>

why accessibility is important

- Over 18% (3.6 million) Australians have a disability (ABS, 1998)
- Between 10-20% in most countries
- Potential customers of online services
- Disabilities increase with age
- Accessible sites are more usable for all users
- Reputation - good corporate citizen
- Legislation mandating accessibility

Australian legislation

- Accessibility for Commonwealth sites
- All Commonwealth departments and agencies are to evaluate their sites for compliance with the W3C accessibility standards from 1 June 2000
- All new contracted site work to include accessibility benchmarks from 1 June 2000
- All Commonwealth sites to pass accessibility testing by reference to W3C standards by 1 December 2000

anti-discrimination laws

- American with Disabilities Act of 1990
 - 'full and equal enjoyment of goods, services, facilities, privileges, advantages, or accommodations of any place of public accommodation'
- Australian Disability Discrimination Act of 1992
 - currently websites have to be accessible under this act (subject to some exceptions and a test of reasonableness), but action will only be taken if there is a complaint

SOCOG case study

- Complaint by an individual about the olympics.com site was that SOCOG should have provided:
 - Access to the results tables on the website during the games
 - ALT text on all images and imagemap links on the site
 - Access from the schedule page to the index of sports

[http://ezinearticles.com/?Bruce-Maguire-Versus-Sydney-Organising-Committee-for-the-Olympic-Games-\(SOCOG\)&id=92115](http://ezinearticles.com/?Bruce-Maguire-Versus-Sydney-Organising-Committee-for-the-Olympic-Games-(SOCOG)&id=92115)

the reality of the site

- The home page and index of sports had no ALT tags (so inaccessible for people using screen readers)
 - SOCOG claimed index was available via a different route (by entering the URL for each sport directly)
- The Human Rights Commission agreed with complaint that having to remember and type a lengthy URL didn't constitute equal treatment
- A simple solution would have been to add ALT tags to each sport on the image map

the upshot of the complaint

- SOCOG was ordered to fix each of the three complaints, but refused
- SOCOG was later ordered to pay individual making the complaint \$20,000 for this refusal

some interaction design considerations

- Labels and controls
 - ensure that they are properly placed
 - ensure that place-holding characters explain what is to be entered (e.g., in data entry fields)

some interaction design considerations

- Dynamic content
 - ensure that equivalents for dynamic content are updated when dynamic content changes

some interaction design considerations

- Tables
 - be sure to identify row and column headers
 - don't use tables for layout unless it makes sense when linearised

some additional design considerations

- Screen flickering
 - Allow users to control flickering, or more importantly don't cause flicker
 - Avoid using blinking text or scrolling text (difficult to understand, and not necessarily readable by screen readers)
- Frames
 - Title each frame to facilitate frame identification and navigation

information design considerations

- Provide keyboard shortcuts to important links
- Provide mechanism to allow users to skip repetitive navigation links
- Use the clearest and simplest language appropriate for a site's content
- Provide summaries for tables
- Appropriate to use flash, PDFs, javascript, pop-up windows?

presentation considerations

- Text equivalents for every non-text element
- Consider ALT tag written style
- For multimedia presentations, synchronise equivalent alternatives (e.g., captions)
- A long text description tag is available longdesc that could be used to describe graphics
- Provide auditory descriptions of important information of the visual track of a multimedia presentation
- Provide redundant text links for each active region of an image map

additional presentation considerations

- Provide alternatives to colour coding (e.g., for meaning within the context of the application as well as common things like visited links)
- Clearly identify target of each link (not just 'click here')

evaluation techniques

- Automatic validation tools
 - verifying that the syntax of the pages are correct (as a start to accessibility, but not the complete answer)
- Human review methods
- Usability testing with disabled users

some automatic validation tools

- automatically checks document for access barriers and identifies problems and suggests advice on potential fixes
- <http://www.section508.info/>

some automatic validation tools

- WAVE
 - visual tool displaying the reading order of a page
 - <http://www.wave.webaim.org>

some automatic validation tools

- W3C validators
 - checks for conformance to W3C HTML standards (<http://validator.w3.org>) and CSS standards (<http://jigsaw.w3.org/css-validator>)

W3C

- What is W3C?
 - The World Wide Web Consortium (W3C) develops interoperable technologies (specifications, guidelines, software, and tools) to lead the Web to its full potential.
 - The main standards organisation for the World Wide Web
- <http://www.w3.org/>

human review methods

- Run on different browsers (old and new including text-only browsers such as Lynx), on different hardware and operating systems
- Turn off graphics (reveals ALT tags)
- Turn off sound
- Turn off style sheets (older browser issues)
- Turn off frames, scripts and other programmable objects

more human review methods

- Check colour contrast by viewing in grayscale
- Increase font size to the largest allowed by your browsers
- Try using assistive technologies (such as screen readers or magnification software)
- Try keyboard-only navigation
- Review against WC3 guidelines & checklist (www.w3.org/WAI)

current w3c guidelines

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

cascading style sheets

- Cascading style sheets are used on the web to create a visual appearance (presentation) that is independent of the content
- The web “client” can apply a style sheet to the content to customise the way the user wishes to view the page
- The user may have specific colour preferences (eg. Colour blindness) and text size preferences (eg. Vision impairment)

cascading style sheets

- “cascading” means that styles can be provided by the content author or by the user, the user style sheet can override the authors original settings

usability testing

- Consider and involve a range of user types
- Get different types of users involved at different stages
 - for cognitive impairments, it's important to consider their needs earlier
 - for use of assistive technology, often it's necessary to wait until a prototype is built
- Remember that a more accessible site is more usable for all...

usability testing

- Same usability testing principles apply
- You may need to use electronic prototypes to establish the appropriate amount of interactivity
- Eg. Blind user with a screen reader is difficult to conduct a paper based walkthrough unless the mock up is annotated with braille

Solutions in Education



www.donjohnston.com



Operating System Vendors

- Both Microsoft and Apple provide accessibility infrastructure to support use by disabled and others requiring accessibility solutions
- <http://www.microsoft.com/enable>
- <http://www.apple.com/accessibility/>

Video Example

- JAWS used by a blind user
 - JAWS (an acronym for Job Access With Speech) is a screen reader, a software program for visually impaired users.
- Using Microsoft Word
 - Typing with letter or word feedback
- Print dialog
 - Speaks which control is in focus
- Fast text to speech
 - Default speech rate is fast
- Browsing the web
 - Speaking links

Demonstrations

- Universal Access
 - Sticky Keys
 - Screen Magnification
 - Greyscale
 - Speech Feedback
 - VoiceOver
 - Speech Recognition (command and control)
 - eg. Dragon