Introduction to Accessibility

Universal Usability and Internationalization of Interfaces
Aims of Lecture

• By the end of the session, you should be aware:
  – Issues experienced by disabled users when interacting with graphical interfaces
  – Legislation governing accessible software

• Why are we doing this?
  – Required in certain organizations
  – Matter of good practice to include all users
  – Consultancies require these skills
Universal Usability (UU)

• Products and software are not always accessible for all users

• Why?

• Universal usability refers to design of information and communications products and services that are both accessible and usable by all
Users are diverse!

• **Individual Differences**
  – Physical abilities
    • *Difficulties interacting with hardware*
  – Cognitive and perceptual abilities
    • *Differences in memory, learning, making decisions*
  – Personality differences
    • *Interested/disinterested in software*
Discuss

• Which groups should designers cater for in addition to mainstream users?

• What small changes could we make to software to improve access for them?

• Can we find certain environments constraining?
What problems are faced by older adults when using technology?

From: www.smh.com.au
Older Adults

• More than 32 million older people (55+) have a computer compared to 64 million aged 34-54
• Use of Internet is increasing
• May not all realize benefits of technology
• Can help them access healthcare, maintain communication
  – 7 million Americans are long-distance caregivers for older relatives (Family Caregiving Alliance, 2005)
Older Adults

- Continuing education
  - Stolz-Lokie et al. (2005)
    - Customized E-learning tool for elderly
    - Found E-learning can be an effective tool for teaching older adults technology and business skills
  - Generally, elderly at disadvantage
    - Lack of sophisticated knowledge of technology
    - Familiarity with e-learning environments
Older Adults

• Healthcare
  – El Attar et al. (2005)
    • Older adults trust health information on the Internet and find it to be a valuable source of information
    • However, difficult to use web sites
    • Worries
      – Non-specialists interpreting the wealth of information
      – Keeping sites up to date
Older Adults

• **Eye sight**
  – Difficult to see small icons on toolbars

• **Motor skill abilities**
    • Tested basic mouse clicking and drag-and-drop abilities
    • Older participants found more difficulty performing tasks than younger participants
    • Tasks such as double-clicking problematic
Older Adults

• Cognitive abilities
  – Component behaviors comprising cognition decline with age
  – Component abilities such as speed and attention are predictors of data entry, menu-based tasks
  – Therefore, Word Processing would be difficult
  – Searching on the Web also requires cognitive skills such as memory, reasoning, attention, learning and problem solving
Assistive Technologies for the Blind

- Screen readers to access software or the Web
- A synthetic voice reads the text present

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Screen reader reading out form

*From: http://www.webaim.org/techniques/forms/screen_reader.php*
Assistive Technologies for the Blind

- Understanding diagrams can be a challenge unless there is some alternative text.

How would you describe this through text?

From: http://www.howstuffworks.com
Screen Readers

- Can be cumbersome reading a long page of text
- Also difficult to understand images and tables
- Braille output but not all blind people can read it!
- Can lead to social and technical isolation
**Assistive Technologies**

- Partially sighted (including some elderly users) can use screen magnifiers
  - Enlarges the information on the screen
  - Create a large, scrolling virtual screen or magnify area close to the mouse
Assistive Technologies

• For blind community
  – Graphs which allow you perceive all information through audio (Brewster et al., 2008)
  – Audio games
  – We will cover these in more detail in future lectures
Children

• Dexterity
  – Motor control is not equal to adults
  – May have problems double clicking or using 3 button mouse (Bederson et al. 1996)
  – Difficulty dragging a mouse (Strommen, 1994)

• Speech
  – O’Hare and McTear (1999) found that 12 year olds could generate text more quickly and accurately through dictation
  – Speech recognition developed for adults doesn’t work so well with young children (Nix et al., 1988)
Children

• Reading
  – Different reading abilities
  – What can be used to substitute?

• Background knowledge
  – Jones (1992) – Children are less familiar with office concepts like file folders and in/out boxes

• Interaction style
  – Playful, spontaneous interactions with technology
  – Hanna et al. (1997) found kids repeatedly generating errors to hear funny noises!

• More information in Chapter 40 (Sears and Jacko)
Children

• Computer acts as a tutor
  – Animated tutors teaching kids

• Computer acts as a tool
  – KidPix is a drawing tool for kids
  – Several ways to erase screen (e.g. drawing explodes or sucked down a drain)
  – It is designed well for kids interests and needs

• More information in Chapter 40 (Sears and Jacko)
Legislation

- Economic impact of individuals with disabilities

- Section 508 - Americans with Disabilities Act
  - Eliminate barriers in IT
  - Make new opportunities for disabled
  - Encourage development of technologies that will help achieve these goals
Legislation

- Section 508 - Americans with Disabilities Act
  - Law applies to all Federal agencies
  - Good practice for private companies
Litigation

- Sydney Olympics case (1999)
- Target (2009)
Design Guidelines for Inclusiveness

• Section 508
  – Have a text equivalent to diagrams (e.g. alt text, longdesc)
  – Equivalent alternatives for any multimedia
  – Information conveyed with color is also available without color
Design Guidelines for Inclusiveness

- Section 508
  - Pages should be readable without style sheet
  - Row and column headers should be identified for data tables.
  - Avoid causing the screen to flicker with a frequency greater than 2 Hz and lower than 55 Hz
Design Guidelines for Inclusiveness

• Section 508
  – Scripting should be identified by assistive technologies
  – Permits users to skip repetitive navigation links
Design Guidelines for Inclusiveness

• Section 508
  – Further info and sample HTML code at:
    http://www.access-board.gov/sec508/guide/1194.22.htm
Other Design Guidelines

- Global - Web Content Accessibility Guidelines
  - Priority Ratings (1, 2 or 3)
  
  Similar to Section 508. Up to you to look those up and understand them.
Design Guidelines for Inclusiveness

• However, when WCAG validator is used
  – Validator.w3.org (entered: www.wikipedia.org)
Design Guidelines for Inclusiveness

- Wikipedia is not completely accessible – well according to the W3C WCAG guidelines!

- Note: that there are automated tools for checking web sites:
  - WAVE - http://wave.webaim.org/

- May only find up to a certain percentage of problems

- Manual testing is needed
What Basic Changes Can Designers Make To Improve Interface Access?

- Blind
- Low vision & Elderly
- Color blind
- Deaf & Hard of hearing
- Print disabilities
- Younger community
- Others
Cultural and International Diversity

- Users from many countries can access web-based content to purchase goods and services

- Aside from language based issues, there are also cultural differences between users
Cultural and International Diversity

• Symbols have different meanings
  – Ticks and crosses can mean positive and negative, but are interchangeable in some cultures
Cultural and International Diversity

- Terminology and metaphors
  (e.g. Shopping trolley vs shopping cart)
Considerations for UI Designers

• Impact of cultural differences on design of web sites (Marcus & Gould, 2000)
  – Some cultures prefer to highlight work of groups/individuals
  – Some cultures may have separate sites for males/females, others will be more integrated
Considerations for UI Designers

• Shneiderman and Plaisant (2004) have suggested gaining an understanding of the following:
  – Character sets
  – Directions that characters are read/written
Considerations for UI Designers

• Shneiderman and Plaisant (2004) have suggested gaining an understanding of the following (cont):
  – Date/time formats
  – Naming conventions
  – Icons and buttons
  – Etiquette
  – Grammar and spelling

• Should ideally find these out before development
• Testing is crucial!
The Sad Reality

- Trade-off between designing for disabilities
- Designers often prioritize aesthetics over usability and accessibility
- Trade-off between usability and accessibility
- Needs of disabled communities can be dismissed
Other Challenges
What can designers do?

• Designers must plan early to accommodate users with disabilities
• Follow design guidance (Section 508, WCAG)
• Simple design can be more effective than complex design
• Use validators and do manual testing too
• Testing with target users is essential!
Summary

- Graphical interfaces look nice, but they can cause barriers to certain communities.
- Ensure that disabled users are accommodated within design cycle.
- Take into account the need of international users.
- Many devices originally intended for disabled communities are used by everybody.