CHAPTER 2:
Universal Usability

Designing the User Interface:

Strategies for Effective Human-Computer Interaction

Sixth Edition

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Universal Usability

Topics

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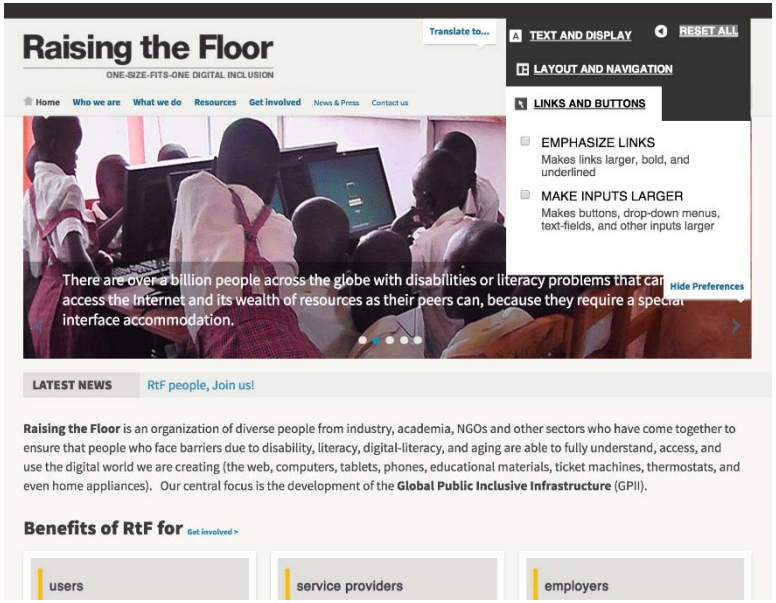
Introduction to Universal Usability

- As a profession, we will be remembered for how well we meet our users' needs.
- That is the ultimate goal: *addressing the needs of all users*.
- The huge international consumer market in mobile devices has raised the pressure for designs that are universally usable.

Introduction to Universal Usability (concluded)

- The website of “Raising the Floor” includes universal accessibility features such as options for emphasizing the links or making buttons larger, offering several font sizes, contrast, text descriptions of photos, translation services, etc. (www.raisingthefloor.net).



Variations in physical abilities and physical workplaces

- Basic data about human dimensions comes from research in *anthropometry*
- There is no average user, either compromises must be made or multiple versions of a system must be created
- Physical measurement of human dimensions are not enough, take into account dynamic measures such as reach, strength or speed

Variations in physical abilities and physical workplaces (continued)

- Screen-brightness preferences vary substantially, designers customarily provide a knob to enable user control
- Account for variances of the user population's sense perception
  - Vision: depth, contrast, color blindness, and motion sensitivity
  - Touch: keyboard and touchscreen sensitivity
  - Hearing: audio clues must be distinct
- Workplace design can both help and hinder work performance

Variations in physical abilities and physical workplaces (concluded)

- The standard *ANSI/HFES 100-2007 Human Factors Engineering of Computer Workstations* (2007) lists these concerns:
  - Work-surface and display-support height
  - Clearance under work surface for legs
  - Work-surface width and depth
  - Adjustability of heights and angles for chairs and work surfaces
  - Posture – seating depth and angle; back-rest height and lumbar support
  - Availability of armrests, footrests, and palmrests

Diverse cognitive and perceptual abilities

- The human ability to interpret sensory input rapidly and to initiate complex actions makes modern computer systems possible
- The journal *Ergonomics Abstracts* offers this classification of human cognitive processes:
  - Long-term and semantic memory
  - Short-term and working memory
  - Problem solving and reasoning
  - Decision making and risk assessment
  - Language communication and comprehension
  - Search, imagery, and sensory memory
  - Learning, skill development, knowledge acquisition, and concept attainment

Diverse cognitive and perceptual abilities (concluded)

- They also suggest this set of factors affecting perceptual and motor performance:
  - Arousal and vigilance
  - Fatigue and sleep deprivation
  - Perceptual (mental) load
  - Knowledge of results and feedback
  - Monotony and boredom
  - Sensory deprivation
  - Nutrition and diet
  - Fear, anxiety, mood, and emotion
  - Drugs, smoking, and alcohol
  - Physiological rhythms
- But note, in any application, background experience and knowledge in the task domain and the interface domain play key roles in learning and performance

Personality differences

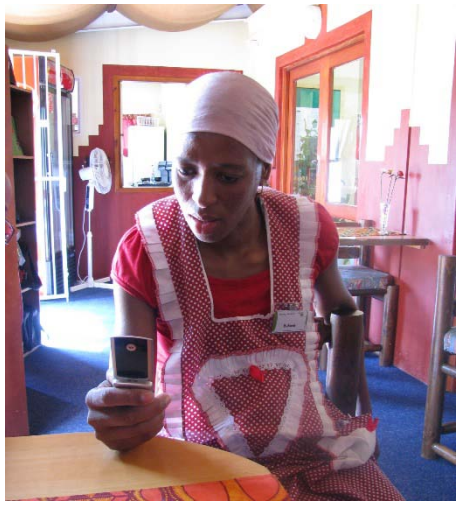
- There is no set taxonomy for identifying user personality types
- Designers must be aware that populations are subdivided and that these subdivisions have various responses to different stimuli
- Myers-Briggs Type Indicator (MBTI)
  - extroversion vs. introversion
  - sensing vs. intuition
  - perceptive vs. judging
  - feeling vs. thinking

Cultural and international diversity

- Characters, numerals, special characters, and diacriticals
- Left-to-right versus right-to-left versus vertical input and reading
- Date and time formats
- Numeric and currency formats
- Weights and measures
- Telephone numbers and addresses
- Names and titles (Mr., Ms., Mme.)
- Social-security, national identification, and passport numbers
- Capitalization and punctuation
- Sorting sequences
- Icons, buttons, colors
- Pluralization, grammar, spelling
- Etiquette, policies, tone, formality, metaphors

Cultural and international diversity (concluded)

- Designing for cell phones can open the door to a wider audience, e.g. in developing countries where:
  - feature phones often are the only way to access the internet
  - literacy may be an issue
  - users have very low monthly limits on the data volume they can use



Users with Disabilities

- Designers must plan early to accommodate users with disabilities
- Early planning is more cost efficient than adding on later
- Businesses must comply with the "Americans With Disabilities Act" for some applications
- Growing world-wide support, for example:
  - European Union Mandate 376 will require procurement and development of accessible technologies by EU governments (http://www.mandate376.eu/)
  - United Nations Convention on the Rights of Persons with Disabilities (CRPD), an international human rights agreement (http://www.un.org/disabilities/convention/conventionfull.shtml)

Users with Disabilities (concluded)

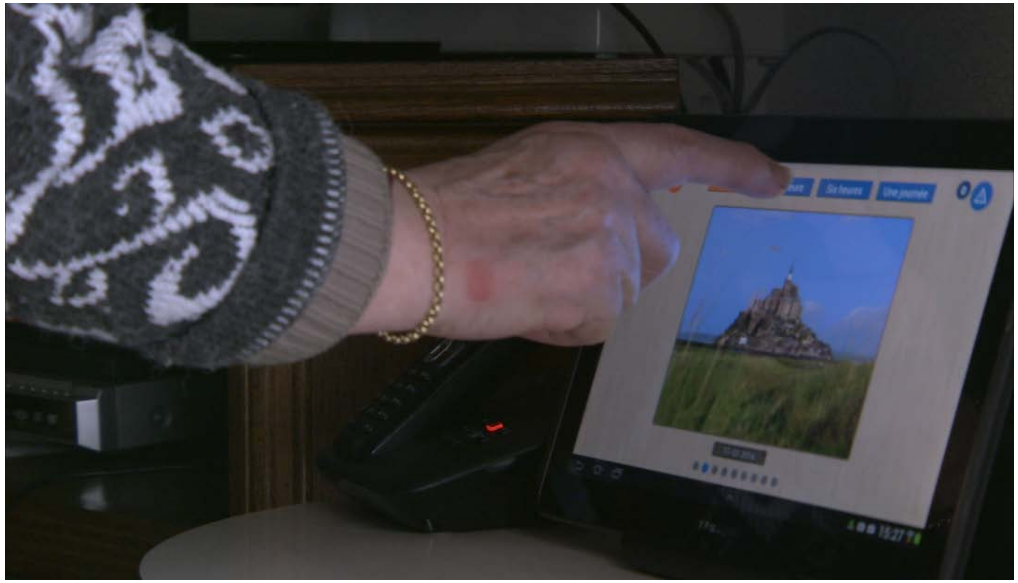
- A user with disability is using a television with the help of assistive technology

Older adult users

- Including the elderly is fairly easy
- As the world's population ages, designers in many fields are adapting their work to serve older adults, which can benefit all users
- Designers should allow for variability within their applications via settings for sound, color, brightness, font sizes, etc. with less distracting animation

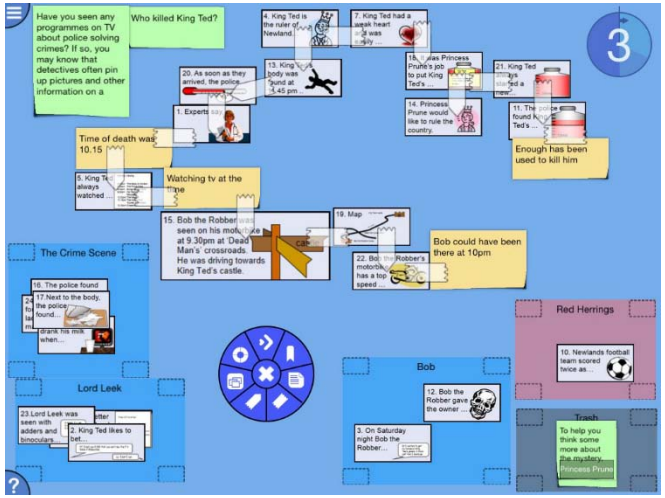
Older adult users (concluded)

- HomeAssist is an assisted living platform for older adults, installed in homes in Bordeaux, France
- The tablet is used to show alerts (e.g. when the front door was left opened) and reminders, but also to run a slide show of photographs when not in use (http://phoenix.inria.fr/research-projects/homeassist)



Children

- Using Digital Mysteries on a tablet, two elementary school children work together to read information slips, group them and create a sequence to create an answer to the question “Who killed King Ted?”
  - The blue pop-up pie menu allows the selection of tools.
  - A larger tabletop version allows larger groups to collaborate. (www.reflectivethinking.com)



Accommodating hardware and software diversity

- Three of the main technical challenges will be:
  1. Producing satisfying and effective Internet interaction on high-speed (broadband) and slower (dial-up and some wireless) connections
  2. Responsive design enabling access to web services from large displays (3200 × 2400 pixels or larger) and smaller mobile devices (1024 × 768 pixels and smaller)
  3. Supporting easy maintenance of or automatic conversion to multiple languages