Universal Design

(Some slides are adopted from the presentation of Prof. Ogawa - NIST)

Covered topics

- Universal usability
- 7 UD's principles
- UD for web applications

1. Universal usability

- Universal usability: design of products and environment with built-in flexibility enabling use by all people, regardless of age and ability
  - Built-in flexibility:
    - to the greatest extent possible
    - without the need for adaptation or specialized design
      - Ability
      - Device
      - Age
      - Preference
      - Task
      - Situation

→ Stop thinking about doing something for people who have the barrier

Everyone encounters barriers

- The function and the structure of the body are created in the mother's body.
- The activity is limited immediately after the birth.
- Participates in the social life of the home and the school
- The gradual decline of the function and the structure when aging.
- The restriction grows, and the routine activity is limited, and the travel and the movement cause the body the modulation.
- Approach death in home and the hospital.

Barriers and levels

- Physical barriers
  - Limb disabilities: House, street, road, traffic...
- Physiological barriers
  - Audiovisual and language disabilities : Newspaper, book, TV, PC, conversation...
- Psychological barriers
  - Intelligence and personality disabilities: Job, life, family, friends...
  - Thought and creed: Race, small settlement, power...
  - Social barriers are not called "disabilities."
- In body function and structure
  - Some losses or abnormalities of psychological, physiological, physical structure or function
- In activity
  - Some limitations and lacks of ability to act within method and the range considered to be normal as man
- In participation
  - Disadvantage in individuals. Limited and disturbed to play a normal role (age, sex, and society and cultural, etc.).

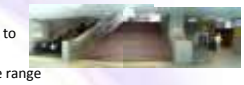
History of Universal Design

- 1990:
  - The Americans with Disabilities Act of 1990 (ADA) awakened widespread public awareness of the civil rights of people with disabilities. Discrimination in employment, access to places of public accommodation, services, programs, public transportation, and telecommunications is prohibited by this law.
- 1996:
  - The Telecommunications Act of 1996 mandates that telecommunications services and equipment and customer premises equipment be designed, developed, and fabricated to be accessible to and usable by individuals with disabilities

History of Universal Design

- 1998 :
  - The Rehabilitation Act requires Federal agencies to make their electronic and information technology accessible to people with disabilities. Section 508 was enacted to eliminate barriers in information technology, to make available new opportunities for people with disabilities, and to encourage development of technologies that will help achieve these goals.
- 1999 : Web Contents Accessibility Guideline
  - The guidelines explain how to make Web content accessible to people with disabilities. These guidelines do not discourage content developers from using images, video, etc., but rather explain how to make multimedia content more accessible to a wide audience.

2. 7 UD's 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.
- 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.

2.1. Equitable use

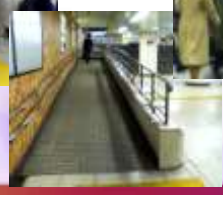
- Useful for everyone
  - Pay phone with different height and with a chair

2.1. Equitable use

- Another way to approach
  - Three alternatives: escalator, stairs, elevator.

2.2. Flexibility in use

- Individual preferences and abilities
  - Choose one: elevator, slope, escalator



2.3. Simple and intuitive use

- More knowledge in using everyday products
  - Reach to the switch slowly after reading labels

2.3. Simple and intuitive use

- Easy to understand regardless of the user's knowledge
  - Hesitate to choose switch for the burner you use

2.4. Perceptible information

- UD Started from Shampoo Bottle
  - Understand touching by the hand

2.4. Perceptible information

- Elevator's buttons for blind persons
  - Understand touching by the hand

2.4. Perceptible information

- Judge by ear

Escalator

Signal sound for pedestrian

2.5. Tolerance for error

- Many danger place around your daily life
  - Large initial investment makes safe and rational train systems

2.5. Tolerance for error

- Thought danger, but did not anything
  - Good design for a wheel chair and for air conditioning with low energy… but feel mental stress

2.6. Low physical effort

- Minimum physical load
  - The automatic faucet has spread



2.6. Low physical effort

- ToothpasteTube Opened by One Hand
  - With the toothbrush...It thinks well

2.6. Low physical effort

- Home appliance of UD appears
  - Easy to take out laundry even if sitting on the wheelchair

2. 7. Size and space for approach and use

- Appropriate size and space for approach
  - Space around pay phone and width of path for a wheelchair


2. 7. Size and space for approach and use

- Tactile paving-detectable warning surfaces
  - Consider appropriate space, the position of a utility pole, and a poor manner


3. Universal Design for Web applications

- Web Content Accessibility Guidelines 2.0
  - Includes recommendations for
    - making Web content more usable to users in general
    - making Web content more accessible to a wider range of people with disabilities, including
      - blindness and low vision,
      - deafness and hearing loss,
      - learning disabilities,
      - cognitive limitations,
      - limited movement,
      - speech disabilities,
      - photosensitivity
      - and combinations of these.

3. Universal Design for Web appications

- Web Content Accessibility Guidelines 2.0
  - provides 3 priorities or levels of conformance (the measure to which a web page follows the guidelines).
    - Priority 1 or Level A conformance was a basic requirement for some groups to be able to use web documents.
    - Priority 2 or Level AA conformance indicated better accessibility and removal of significant barriers to accessing the content.
    - Priority 3 or Level AAA checkpoints provided improvements to web content accessibility.

3. Universal Design for Web applications

- Web Content Accessibility Guidelines 2.0 (2008): provides 12 guidelines and numerous checkpoints that could be used to determine the accessibility of a web page.
  - Perceivable
    - 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.
    - Provide alternatives for time-based media.
    - Create content that can be presented in different ways (for example simpler layout) without losing information or structure.
    - Make it easier for users to see and hear content including separating foreground from background.
  - Operable
    - Make all functionality available from a keyboard.
    - Provide users enough time to read and use content.
    - Do not design content in a way that is known to cause seizures.
    - Provide ways to help users navigate, find content, and determine where they are.
  - Understandable
    - Make text content readable and understandable.
    - Make Web pages appear and operate in predictable ways.
    - Help users avoid and correct mistakes.
  - Robust
    - Maximize compatibility with current and future user agents, including assistive technologies.

3. Universal Design for Web applications

- Authoring Tool Accessibility Guidelines 1.0 (2000)
  - address authoring tools (software accessible to authors regardless of disability, used to build Web sites), including:
    - WYSIWYG editors;
    - conversion tools (word processors, presentation software);
    - tools that dynamically generate Web pages from databases;
    - image editors, site management tools;
  - address issues that support and encourage the author in creating accessible content, including:
    - creation of valid content;
    - strategies for prompting, alerting, help, validation;
    - accessibility of the user interface
  - The AUWG is currently working on an advanced version, ATAG 2.0 (2009)

3. Universal Design for Web applications

- User Agent Accessibility Guidelines 1.0 (2002)
  - address applications including:
    - browsers
    - multimedia players
    - their interoperability with assistive technologies
  - address issues including:
    - accessibility of the user interface
    - rendering of accessibility information
    - user control of the software
  - contain general guidelines
  - have three priority levels of normative checkpoints
  - have extensive supporting resources