CIS 443/543
User Interfaces

Lecture 2: What is Usability?

Goals of this Course

• Learn how to design useful, usable and safe interactive software
  – Human-centered software design & development
  – Evaluation of usability
• Understand why systems and people fail to work and play together
  – Basic issues of human psychology & sociology
  – Common design flaws and how to avoid them

• What can we learn about usability from simple everyday things?
Examples of Everyday Objects and their usability

• These are 35 mm slides which show
  – different types of doors and door handles
  • ordinary interior house door
  • refrigerator door
  • exterior and interior doors of public buildings
  – different types of scissors
  • ordinary paper scissors
  • sewing scissors
  • kitchen meat scissors
  • folding scissors
  – diskette
  – automobile driver’s console
  – answering machine

Design Lessons Learned

• Form follows function (use)
• Form follows human physical anatomy and behavior
• Form follows average or stereotyped person
• Form follows custom (culture)
• “Intuitive” interface just means the designer matched the design with what people expect!

Categories of Design for Usability

• FUNCTIONALITY PROBLEM
  – What are the functions this object can perform?
  – Will it do what I want?
• CONTROL PROBLEM
  – Which control or sequence of controls do I use to get what I want?
• FEEDBACK PROBLEM
  – How do I know I got what I wanted?
• CONTEXT PROBLEM
  – Am I using the right functions at the right time?
Key Concept: Usability

• What is usability?
  "Intuitive"?
  "Natural"?
  "User friendly"?
  "Easy to use"?
  "Idiot proof"?
• Problem
  Vague
  Subjective
  Can’t be measured or tested
  Can’t be used for design

What is usability?

• DEFINITION
  – Systematic process that develops usable systems for specific users in a specific context
  – Usability requirements + usability measures
Chapter 1.2 Usability requirements

- **DEFINITION Usability requirement**
  - Evolving detailed description of what the system should do and why with regards to human behavior
  - Does not describe how the system should do it such as the detailed system design
- Other requirements: functional, hardware, etc.
- **Usability requirements** formed early during requirements analysis phase of design

Example of a usability requirement

- Proposed system: Kiosk for rapid transit system
  - Sample Functional requirement
  - User must be able to buy a ticket
  - Sample Usability requirements
    - User must be able to buy typical trip ticket in 2 minutes
    - Blind user must be able to buy typical trip ticket unassisted in 4 minutes
  - Sample Hardware requirement
    - ATM type machine

Usability requirements analysis

- Ascertain the user’s functions
  - Determine what tasks and subtasks must be carried out (Task Analysis)
  - Task types
    - Core tasks performed frequently
    - Occasional tasks
  - Functionality must match need or else users will reject or underutilize the product
Usability requirements analysis

- Promote standardization, integration, consistency, and portability
  - Standardization: use pre-existing industry standards where they exist to aid learning and avoid errors (e.g., the W3C and ISO standards)
  - Integration: the product should be able to run within the system
  - Consistency:
    - compatibility across different product versions
    - compatibility with related paper and other non-computer based systems
    - use common action sequences, terms, units, colors, etc. within the program
  - Portability: allow user to convert data across multiple software and hardware environments

Chapter 1.3 Usability measures

- DEFINITION
  - Usability measure allows us to objectively assess the effectiveness of a usability requirement
  - Must define the target user community and class of tasks associated with the interface

Usability Measures

- 5 human factors central to evaluation:
  - Time to learn
    How long does it take for typical members of the community to learn relevant task?
  - Speed of performance
    How long does it take to perform relevant benchmarks?
  - Rate of errors by users
    How many and what kinds of errors are made during benchmark tasks?
  - Retention over time
    Frequency of use and ease of learning help make for better user retention
  - Subjective satisfaction
    User feedback via interviews, free-form comments and satisfaction scales
Usability Measures

- Other factors
  - Fatigue
  - Enjoyment
  - Safety

Usability measures (cont.)

- Usability measures are taken during UI evaluation
  - Using mockups or prototype system
    - Methods
      • Predictive methods such as average time to perform actions
      • Usability evaluation using real users
  - Trade-offs in design options frequently occur between usability requirements.
  - Changes to the interface in a new version may create consistency problems with the previous version, but the changes may improve the interface in other ways or introduce new needed functionality.