Learning Outcomes

• At the end of this lecture, you should be able to:
  – Define the term “Usability and Usability Engineering”,
  – Discuss some Usability goals,
  – Describe the various steps involved in Usability Engineering Lifecycle,
  – Apply Usability Engineering Lifecycle in designing any system or application,
  – Explain typical ways of measuring usability,
  – Discuss some Usability Attributes
Usability

Usability: “the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use.”

Usability is the measure of the quality of a user’s experience when interacting with a product or system — whether a Web site, a software application, mobile technology, or any user-operated device.

- What is usability
- Easy to use?
- User Friendly?
- A system with a Graphical User Interface (GUI)?
What is Usability?

- **Spectrum**
  - Not “Is your site usable”, but “How usable is your site?”
  - Can set minimum standards to meet (time, error rate, user satisfaction)

What is Usability? (cont.)

- **Not just about colors**
  - Right functionality
  - Right task flow
  - “Look and feel”

- **Not “Rocket Science”**
  - Taking the user’s perspective
  - Knowing what users need, not just what they say they want
  - No one solution for all situations, but some general guidelines available (“It Depends!”)
Usability

- Usability usually refers to software but is relevant to any product. Some ways to improve usability include:
  - shortening the time to accomplish tasks,
  - reducing the number of mistakes made,
  - reducing learning time,
  - and improving people’s satisfaction with a system.

Usability

- Why is usability important?
  - It makes the difference between performing a task accurately and completely or not, and enjoying the process or being frustrated.
  - Determine the success or failure of a system
- Poor usability...
  - Reduce productivity
  - Increase cost time and effort
Why Should You Care?

Jakob Nielsen reports:

"Studies of user behavior on the Web find a low tolerance for difficult designs or slow sites. People don't want to wait. And they don't want to learn how to use a home page. There's no such thing as a training class or a manual for a Web site. People have to be able to grasp the functioning of the site immediately after scanning the home page — for a few seconds at most."

Usability

According to Jakob Nielsen (2003), usability is defined by 5 quality components:

• Learnability: ease of learning for novice users.
• Efficiency: steady-state performance of expert users.
• Memorability: ease of using system intermittently for casual users.
• Errors: error rate for minor and catastrophic errors.
• Subjective Satisfaction: how pleasant the system is to use.
Learning Curves

- Some systems are designed to focus on learnability.
- Others emphasize efficiency for proficient users.
- Some support a combination of ease of learning and an "expert mode" (for example rich menus and dialogues plus a command/scripting language)

Usability Problem Example: Poor Organization/Layout
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Types of Usability Problems

- Product doesn’t match job or task
- Poor organization/layout
- Unexpected occurrence of events
- Product not self-evident
- Requires recall rather than recognition
- Inconsistent screens, messages, terminology
- Design is inefficient
- Cluttered or unattractive design
- No feedback or poor feedback about status or errors
- No exit or undo
- Help or documentation is not helpful

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Domain & Expertise

- Minimal Computer Experience
- Novice User of the System
- Ignorant About the Domain
- Knowledgeable About the Domain
- Extensive Computer Experience
- Expert Use of System
Usability goals

- Effective to use
- Efficient to use
- Safe to use
- Have good utility
- Easy to learn
- Easy to remember how to use

Relationship between Usability Goals and User Types

- Novice Users:
  - No or limited knowledge of the occupational task to be performed, and of computers and interface concepts or
  - Knowledge of the occupational task to be performed, and of computers and interface concepts
Relationship between Usability Goals and User Types

• Knowledgeable Intermittent Users:
  - Understanding of the task concepts
  - Broad knowledge of computers and interface concepts.
  - Intermittently use the system and may therefore have problems with retention

• Expert Frequent (Power) Users:
  - Thoroughly familiar with both task and interface concepts. They are likely to use the system often and appreciate short cuts to speed their work.

Typical Ways of Measuring Usability

**Learnability**: pick novice users of system, measure time to perform certain tasks.

Distinguish between the various timings taken for some general computer experience.

**Efficiency**: decide definition of expertise, get sample expert users (which tends to be difficult), measure time taken to perform typical tasks.
Typical Ways of Measuring Usability

**Memorability** : get sample casual users (who are usually away from system for certain time/duration) and measure time to perform typical tasks.

**Errors** : count minor and catastrophic errors made by users while performing some specified task.

**Satisfaction** : ask users subjective opinion (questionnaire, interview), after trying system for real task.

Usability Engineering

- The term usability engineering describes a process of user interface development, sometimes referred to as user centred design.
- It is a lifecycle process that puts an early emphasis on user and task analysis and actual user involvement in the design and testing of a product.
- A product developed with such a user centred process is likely to be a more usable product than one that is developed independent of user considerations and involvement.
Usability Attributes

- Attributes should be measurable
- Example Attributes include
  - Time to complete a task
  - % of task completed
  - Number or % of errors made
  - % of users who like the design
  - No of times user asks for help/gets lost
1. Identify user requirements and problems
   - Profile Users
   - Task Analysis
2. Identify usability goals based on user requirements
3. Checkout similar products
4. Design and prototype a solution (involve users)
5. Evaluate prototype
   - Usability testing (real users and real tasks)
6. Reiterate steps 4-5 …until users are satisfied
Identify user requirements and problems:

- Typical Profile:
  - 40% Novice Users
  - 57% Knowledgeable/Intermittent Users
  - 3% Expert Users
- Other Important Information:
  - 10% of user population colour blind
  - 15% are the elderly

Task analysis allows a designer to identify the goals and purposes of the intended user group.

This used to involve further analysis of user requirements or investigation/observation of customers

Used to guide user interface design
Usability Engineering Lifecycle

- Identify usability goals based
  - Learnability, Efficiency, Memorability, Error, Subjective Satisfaction
  - Decide in advance on usability metrics and desired level of measured usability
  - E.g.

<table>
<thead>
<tr>
<th>Errors Per Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optimal</td>
</tr>
<tr>
<td>0</td>
</tr>
</tbody>
</table>

- Check out similar products (Competitive Analysis)
  - Competitive analysis of software components
  - Competitive analysis of competing systems
Usability Engineering Lifecycle

• Parallel Design (Explore design alternatives)
  – designers should work independently, then compare draft designs

Card Sorting

• Put one piece of information for your site on each index card.
• Have each person (user) sort them into groups.
  – They work independently and in silence.
  – They can duplicate a card if they think it belongs in more than one group.
  – They can add cards if they think information is missing.
  – There are no “wrong” answers.
• Have them name the groups.
Usability Engineering Lifecycle

- Participatory Design
  - Have access to pool of representative users.
  - Guided discussion of prototypes, paper mock-ups, screen designs with representative users.
  - E.g. Card Sorting

Card Sorting - 1

- Card sorting is a technique for exploring how people group items, so that you can develop structures that maximize the probability of users being able to find items
  - Is easy and cheap to conduct
  - Enables you to understand how “real people” are likely to group items
  - Identifies terminology that is likely to be misunderstood.
Card Sorting - 1

- E.g. How would you group these tasks into 3 groups? (File, Edit, View)

  open, cut, normal view, close, copy, zoom in, save, paste, zoom out, save, select, toolbar, print

Card Sorting - 2

- Card sorting is also a technique for allowing users actual selections out of several options to determine final design decisions
  - Is easy and cheap to conduct
  - Enables you to determine ‘actual’ preferences versus what users ‘think’ they prefer
  - Allows for more accurate understanding by user since actual examples are seen
Card Sorting - 2

A

B

C

D

E

F

G

H

Usability Engineering Lifecycle

- Applying Guidelines
  - Guidelines . . . general principles and advice about usability characteristics of interfaces
  - Can be intimidating – often hundreds or thousands of specific recommendations.
Usability Engineering Lifecycle

Prototyping & Testing
- Perform usability evaluation as early as possible in the design cycle by building and evaluating prototypes

Usability Related Web Sites

http://usability.gsfc.nasa.gov
  Goddard Usability Engineering Center
http://www.usability.gov
  Usability resources by National Cancer Institute
http://www.ue.com
  User Interface Engineering (Jared Spool)
http://www.UPAssoc.org
  The Usability Professionals' Association
http://www.useit.com/alertbox
  The Alert box: Current Issues in Web Usability (Jakob Nielsen)
http://nasa-wbp.larc.nasa.gov/
  NASA World Wide Web Best Practices
Online Web Design Style Guides and Guidelines

On-line web usability checklist
  - www.useit.com

Yale C/AIM Web Style Guide

IBM Web Design Guidelines

Books on Usability

- The Design of Everyday Things by Donald Norman
- Usability Engineering by Jakob Nielsen
- The Usability Engineering Lifecycle by Deborah J. Mayhew
- Handbook of Usability Testing by Jeffrey Rubin
- Cost-Justifying Usability by Randolph Bias and Deborah Mayhew
Summary

Usability is a combination of factors that affect the user’s experience with the product or system, including:

– Ease of learning
  • How fast can a user who has never seen the user interface before learn it sufficiently well to accomplish basic tasks?

– Efficiency of use
  • Once an experienced user has learned to use the system, how fast can he or she accomplish tasks?

Summary (1)

• Memorability
  – If a user has used the system before, can he or she remember enough to use it effectively the next time or does the user have to start over again learning everything?

• Error frequency and severity
  – How often do users make errors while using the system, how serious are these errors, and how do users recover from these errors?

• Subjective satisfaction
  – How much does the user like using the system?
Usability is the measure of the quality of a user's experience when interacting with a product or system — whether a Web site, a software application, mobile technology, or any user-operated device.

Usability Engineering is a methodical "engineering" approach to user interface design and evaluation involving practical, systematic approaches to developing requirements, analyzing a usability problem, developing proposed solutions, and testing those solutions.