Lecture 6

Usability Evaluation with Users
(Chapter 4.3)

Usability Evaluation Summary

- **Purpose:** Evaluation for usability
- **Methods**
  - Without Users (analytic)
    - Guidelines (Chapter 2.2)
    - Interface Walkthrough
    - Expert Review (Chapter 4.2)
    - Model-Based analysis (Keystroke Model)
  - With Users (empirical)
    - Usability testing (Chapter 4.3)
    - Experiments (Chapter 4.7)
    - Field Studies (Chapter 4.5)
    - Surveys (Chapter 4.4)

Testing Goals vs. Method

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Guidelines</th>
<th>Walkthrough</th>
<th>Expert</th>
<th>Keystroke Model</th>
<th>Usability Testing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detailed Usability</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
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<tr>
<td>Completeness</td>
<td>✔</td>
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<td>Correctness</td>
<td>✔</td>
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<tr>
<td>Consistency</td>
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<td>✔</td>
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<td>Performance</td>
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<tr>
<td>Time</td>
<td>✔</td>
<td>✔</td>
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Usability Testing

• Definition
  – Usability testing is an empirical method which puts typical users in a laboratory, gives them a prototype and a set of tasks, and records their interactions, usually on videotape.

Usability Testing

• What can you get from usability testing?
  – Testing against usability requirements: Does the system meet the usability design goals? Usability testing allows measurement of performance time.
  – Design improvements: What changes should be made to the system?
  – Conceptual problems: What misconceptions exist?
  – Repair strategies: What did the person do to recover from failure?
  – Problem solving strategies: What strategies did the person use that could promote a more supportive design?

Usability Testing

• Benefits
  – Focus on first-time users
  – Detects most serious problems
  – Uses real tasks and real users

• Problems
  – Only tests learning for first-time users
  – Finds problems but doesn’t always suggest how to fix them!
  – Expensive and time-consuming
How to do it

• Plan: Before the testing
  – Determine goals of usability testing
    • Usability problems
    • Usability specifications
  – Choose pairs of users
    • Real users, not actors or other developers
    • Typical users and note relationships
      – Select users (Background Survey Form)
      – Get informed consent (Consent Form)
  – Choose tasks to test
    • Develop testing materials
      – Working prototype
      • Instructions to participants (Instructions Form)
      • Qualitative assessment of testing (User Reaction Form)
    – Setup video equipment and test

Usability Specifications
Virtual Science Fair Example

<table>
<thead>
<tr>
<th>Session num</th>
<th>Session Type</th>
<th>Final Time</th>
<th>Final Date</th>
<th>Final Room</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pre-activity</td>
<td>3:00 pm</td>
<td>3/1/2023</td>
<td>Room 101</td>
</tr>
<tr>
<td>2</td>
<td>Activity 1</td>
<td>4:00 pm</td>
<td>3/1/2023</td>
<td>Room 102</td>
</tr>
<tr>
<td>3</td>
<td>Activity 2</td>
<td>5:00 pm</td>
<td>3/1/2023</td>
<td>Room 103</td>
</tr>
<tr>
<td>4</td>
<td>Post-activity</td>
<td>6:00 pm</td>
<td>3/1/2023</td>
<td>Room 104</td>
</tr>
</tbody>
</table>
Forms

- User background survey
  - Only ask for what you need!

Forms

- Informed Consent
  - What they are going to do
  - How you will evaluate the data
  - Anonymity
  - Can quit at any time
  - Contact information for person doing study
  - Signature
How to do it

- Plan: Before the testing
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Prototype Implementation

- Software Storyboard
- Software Prototype with GUI Builder or Prototyping language
- Partial Target Software Implementation
- Completed Target Software Implementation
Forms (cont.)

• General instructions
  – Do the tasks as described
  – Ask for help only when you give up
  – Explain purpose; evaluating system, not participants
  – Can leave at any time

Forms (cont.)

• Task instructions
  – Don’t give away the interface!
Forms (cont.)

- User Reactions Survey
  - Ask only for what you need
  - Pilot test it to be sure you’re asking the right questions
How to do it (cont.)

• Data Collection: Videotaping Method
• Analysis of Data
• Generating solutions to the usability problems

Videotaping

• Number of participants
  – Thinking aloud (one person)
  – Constructive interaction (two or more people)
• Number of cameras
  – One camera
  – Two cameras
• Don’t watch what they are doing.
  – Set up camera and leave
  – Put camera on tripod over their heads aimed at display
• Don’t answer their questions unless they are very stuck

Usability Testing
Single Camera Videotaping
Method
Usability Testing
Two Camera Videotaping
Method

Analysis of Videotape

- Review tape, noting where participants have problems
- Try to understand reasons for problems
- Prioritize problems by severity
- Summarize findings in terms of overall interface characteristics
  - Were the usability requirements met?
  - Overall impression of the software

Analysis Worksheet

<table>
<thead>
<tr>
<th>Interface Name, Date, Time, Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location of problem on tape</td>
</tr>
<tr>
<td>Task attempting to do</td>
</tr>
<tr>
<td>What were the users’ stated or assumed goal?</td>
</tr>
<tr>
<td>What were the users’ actions?</td>
</tr>
<tr>
<td>What did the users think happened? (perceived effect)</td>
</tr>
<tr>
<td>Priority of the problem</td>
</tr>
<tr>
<td>Analysis and recommendation</td>
</tr>
</tbody>
</table>
Integrating Usability Testing back into the Design

- Overall Usability
  - Overall usability requirements achieved?
  - Identify and prioritize usability problems
  - Explain causes
- Generate design alternatives to solve most important problems
  - Justify advantages/disadvantages/tradeoffs of each solution
- Choose one solution for each problem
- Implement in prototype and test again