Lecture 18

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>Testing Goals</th>
<th>Guidelines</th>
<th>Walkthrough</th>
<th>Expert</th>
<th>Keystroke Model</th>
<th>Usability Testing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Usability</td>
<td>V</td>
<td>V</td>
<td>V</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>Detailed Usability</td>
<td>V</td>
<td>V</td>
<td>V</td>
<td>V</td>
<td>V</td>
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<tr>
<td>Completeness</td>
<td>V</td>
<td>V</td>
<td>V</td>
<td>V</td>
<td>V</td>
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<tr>
<td>Correctness</td>
<td>V</td>
<td>V</td>
<td>V</td>
<td>V</td>
<td>V</td>
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<tr>
<td>Consistency</td>
<td>V</td>
<td>V</td>
<td>V</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>Performance</td>
<td>Time</td>
<td>V</td>
<td>V</td>
<td>V</td>
<td>V</td>
</tr>
</tbody>
</table>
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
  – 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>Activity/Scenario</th>
<th>User Test</th>
<th>Test Date</th>
<th>Pass/Fail</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Opening a container</td>
<td>2 months, 3 weeks</td>
<td>Week 1</td>
<td>Pass</td>
<td>Use caution, and note of user</td>
</tr>
<tr>
<td>2. Measuring a container contents</td>
<td>2 months, 3 weeks</td>
<td>Week 2</td>
<td>Pass</td>
<td>Use caution, and note of user</td>
</tr>
<tr>
<td>3. Specifying an activity scenario</td>
<td>2 months, 3 weeks</td>
<td>Week 3</td>
<td>Pass</td>
<td>Use caution, and note of user</td>
</tr>
<tr>
<td>4. Opening and manipulating a小镇</td>
<td>2 months, 3 weeks</td>
<td>Week 4</td>
<td>Pass</td>
<td>Use caution, and note of user</td>
</tr>
<tr>
<td>5. Creating and manipulating the air</td>
<td>2 months, 3 weeks</td>
<td>Week 5</td>
<td>Pass</td>
<td>Use caution, and note of user</td>
</tr>
<tr>
<td>6. Creating and manipulating the air</td>
<td>2 months, 3 weeks</td>
<td>Week 6</td>
<td>Pass</td>
<td>Use caution, and note of user</td>
</tr>
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How to do it

• Plan: Before the testing
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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

Forms (cont.)

- User background survey
  - Only ask for what you need!
How to do it

• Plan: Before the testing
  – Determine goals of usability testing
  – Usability problems
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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 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

[Diagram of computer, VCR, monitor, and camera setup]
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