Rigorous Evaluation

Usability Testing
To Review - What is Usability?

- A measure of the quality of the user’s experience when interacting with a product or system
- How usable is the interface?
Usability Measures

• Ease of learning (learnability)—how fast can a user learn to accomplish basic tasks?
• Ease of remembering (memorability)—can a user remember enough to be effective the next time?
• Efficiency of use—how fast can an experienced user accomplish tasks?
• Error frequency and severity (understandability/comprehensibility) - how often do users make errors, how serious are they, and how do users recover from them?
• Subjective satisfaction—how much does the user like using the system? Emotional impact
What is Usability Testing?

- Formal and rigorous testing using a structured process
- Validate adherence to interaction requirements
- “Actual” users who perform realistic and representative tasks
- Utilize a functional prototype
- Quantitative and qualitative usability measures
Constraints on Usability Testing

- **Time** to ...
  - Design, prepare, and administer the test
  - Analyze the results
- **Financial**
  - Equipment and software
  - Laboratory time
  - Recording media
  - [Participant compensation ]
- **Space**—to perform the usability test
  - A dedicated laboratory or room is recommended.
Awareness of Regulations

• Human Subjects Protocols
  • You must be fully aware of the regulations imposed by the various institutions and regulatory bodies that pertain to your experimental design
    • Health and well being of subjects
  • The U.S. Department of Health and Human Services Web site
    • http://www.hhs.gov/ohrp/
• Informed consent form – all participant users should read and sign
Usability testing - Ethics

- Pressures on a user – being observed, perhaps videoed
  - Performance anxiety
  - May feel like it is an intelligence test, feeling stupid in front of observers
  - Compare self with other subjects, compete
- Treat the user with respect
  - Don’t waste the users time – eliminate unnecessary tasks
  - Make the user comfortable – one task at a time, first task easy, breaks, relaxed atmosphere
  - Protect user’s privacy
  - User can stop at any time
Advantages and Limitations of Usability Testing

• **Advantages**
  • Discover usability issues before deployment
  • Particularly important for a market driven product
  • Begin to build user loyalty
  • Gain knowledge for future releases

• **Disadvantages**
  • Artificial context
  • No guarantee of product acceptance
  • Result skew if true user demographic missed
  • May not be the most efficient and cost effective method for usability evaluation
Results from Usability Tests

- **Quantitative data:**
  - Performance data - times, error rates, etc.
  - Subjective ratings, from post test surveys

- **Qualitative data:**
  - Participant comments from notes, surveys, etc.
  - Test team comments, notes, logs
  - Background participant data from user profiles, recruiting survey, pretest questionnaire
  - Any video or audio recordings, etc.

- **List of problems (known and/or suspected)**
What About Beta Testing?

- Beta testing – give real users pre-release products to do real tasks in real environments
- Why not do beta testing instead of expensive usability testing?
  - Late in the process when rework is most expensive
  - Beta testers don’t have to use the product
  - Feedback is unsystematic, spotty problem reporting
  - No direct observation of user interaction
  - Users choose the tasks – sufficient coverage?
  - Undesirable side effects for customer satisfaction and product reputation
Test Plan – Design the Test (5W+H)

• Business case – why, the purpose; value justifies cost, concerns, goals
• UX design goals and concerns
• Relevant user tasks by role
  • Critical, new, problematic, frequent (80/20 rule), typical
• Task scenarios – how will tasks be used in the user environment?
Test Plan – Design the Test

- Schedule
- Resources – people and equipment
- Location
Test Plan - Design the Test

• Who: Select Participants, Testers, and Observers
• Whenever possible, participants should be real users
• You don’t need a large sample (8-15 or so) to get good feedback
• Recruit users with the following characteristics:
  • Availability
  • Responsiveness
  • Objectivity
  • Diversity – background, experience, responsibility, …
  • Represent primary user roles
Test Plan - Design the Test

• Who (cont): Tester roles
  • Test project leader, expert
  • Moderator – interacts with the participant during the test
  • Data logger / Note taker
  • [Technician] – operational responsibility

• Optional observers:
  • Other development team members not involved in the test
  • Other stakeholders
Test Plan – Design the Test

• Define the measurements – reflect usability goals
• Quantitative - objective, measurable
  • Performance data - times, error rates, etc.
  • Subjective ratings, from post test surveys
• Qualitative: subjective
  • Participant comments, survey answers
  • Test team comments, observations
  • Background participant data from user profiles, surveys, questionnaires
### Usability Specification Table

<table>
<thead>
<tr>
<th>User Role</th>
<th>UX Goal</th>
<th>Measuring Instrument</th>
<th>UX Metric</th>
<th>Baseline Level</th>
<th>Target Level</th>
<th>Observed Results</th>
</tr>
</thead>
</table>

- **User role** – user category
- **UX goal** – quality measure, e.g., learnability
- **Measuring instrument** – the benchmark task(s) or survey to generate test data
- **UX Metric** – test measurement values to be collected; e.g., response times
- **Baseline level** – performance of current system if relevant
- **Target level** – minimum value for success
- **Observed results** – measured values

Prepare for the Test

• Write test scripts – to avoid bias due to inconsistent moderator-participant interaction
  • Greet the participant – introductions, set the stage
  • Preliminary interview – warm-up questions
  • Provide instructions
  • Monitor the test – record observations, capture participant’s impressions and comments
  • Debrief the participant – wrap-up discussion
Prepare for the Test

• Script test and task execution details
  • Length and order
  • Breaks to minimize user fatigue
  • Intervals between tests
  • Flexibility for the unexpected

• Run a pilot test to rehearse
  • Be organized
  • Be presentable for a good first impression
Perform the Test

• Pre-Test
  • Greet the participant
  • Have the participant sign the informed consent form
  • Have the participant fill out any pre-test questionnaire
  • Proceed with scripts

• During the test
  • Maintain a log or observation check list for each task
  • Create a problem list to capture anything that is not covered by the check list
  • Note any ideas or theories that occur to you about the problems
Perform the Test

• During the test (cont.)
  • Usability measurements
  • Critical incident observation – emotional impact

• Post-Test
  • Debrief the participant
  • post-test questionnaire
  • verbal interview
  • Thank the participant and [provide compensation]
  • Process test data
  • Prepare for the next participant
Process the Data

• Activities performed on the day of the test
  • Collect data
  • Summarize data
  • Organize the material

• Follow-up activities
  • Categorize data – top-down, bottom-up (harder)
  • Analyze data
  • Quantitative data – statistical analysis
  • Qualitative data – summarize, consolidate, correlate to quantitative data
Process the Data

- Identify problems (known and/or suspected)
  - Severity
  - Frequency
  - Errors of omission
  - Errors of commission
- Prioritize problems
- Theorize reasons and solutions
- Identify successes and areas of uncertainty
So Let’s Practice

Test Plan

• Why: Evaluate the usability of an on-line technology tutorial site to teach a web related technology
• Who: Class activity pairs
• What: Complete several tutorial chapters for a web technology of your choice
  • Qualitative measures - learnability, memorability, efficiency, understandability, satisfaction,
  • Quantitative measures - number of errors, time to complete tasks
• How: use http://www.w3schools.com/
• When and where – here and now!
• Be prepared to report your findings
Test Plan Strawman

- Using the 5W+H heuristic, outline a first version of your project test plan
  - Why - purpose
  - What
    - Concerns and goals
    - Tasks
    - Scenarios
    - Measurements
  - Who
  - When
  - Where
  - How

<table>
<thead>
<tr>
<th>Work Role: User Class</th>
<th>UX Goal</th>
<th>UX Measure</th>
<th>Measuring Instrument</th>
<th>UX Metric</th>
<th>Baseline Level</th>
<th>Target Level</th>
<th>Observed Results</th>
<th>Meet Target?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ticket buyer: Casual new user, for occasional personal use</td>
<td>Walk-up ease of use for new user</td>
<td>Initial user performance</td>
<td>BT2: Buy movie ticket</td>
<td>Average number of errors</td>
<td>&lt;1</td>
<td>&lt;1</td>
<td>2</td>
<td>No</td>
</tr>
</tbody>
</table>