HCI Application: Inspection and Testing

Organizational & Social Issues

Task

Design

Technology

Evaluation Process

1. Developing a test plan ("blueprint" for the test)
   - General intention and individual checks
     - MUST BE PRECISE
     - MUST BE CLEAR
     - MUST BE MEASURABLE/OBSERVABLE
   - Specifies the resources needed to carry out test
   - Governs conclusions that can be made
2. Developing test materials
3. Recruiting participants
4. Carrying out the test
5. Debriefing participants
6. Findings and recommendations

Test plan

1. Purpose of test
2. Problem statements/test objectives
3. Participant profile (inclusion/exclusion criteria)
4. Method/technique to be used
5. List of tasks to be used
6. Test environment (field vs. lab) and material (HW/SW, resources → recorder and batteries, report forms, questionnaires)
7. Experimenter’s role (monitor, coach etc.)
8. Evaluation measures to be taken (qualitative vs. quantitative, subjective vs. objective)
9. Contents of report to be produced and how the report is going to be presented → focus group, informal meeting, big bosses are going to be there

Evaluation measures

<table>
<thead>
<tr>
<th></th>
<th>Quantitative</th>
<th>Qualitative</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Subjective</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How many errors do you think you made during the test?</td>
<td>Do you believe you did well or poorly, overall?</td>
<td></td>
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<tr>
<td>Did you feel stressed during the test?</td>
<td></td>
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<tr>
<td><strong>Objective</strong></td>
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<tr>
<td>How many errors were made during the test?</td>
<td>Was the participant's performance:</td>
<td></td>
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<tr>
<td></td>
<td>• Poor</td>
<td></td>
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<tr>
<td></td>
<td>• Adequate</td>
<td></td>
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<tr>
<td></td>
<td>• Good</td>
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<tr>
<td></td>
<td>• Excellent</td>
<td></td>
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<tr>
<td>Did the participant shake or sweat during the test?</td>
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How Do We Choose A Method?

- **Subject selection**: how many do I need, who are they, and can I get them?
- **Scope of subjects**: is it good for analyzing individuals? small groups? organizations?
- **Control**: do I need to control for certain factors to see what effects they have?
- **Cross-sectional vs. longitudinal**: is it important that changes over time are measured?
- **Support**: are there tools for supporting the method and analyzing the data?
- **Comparative**: can I use it to compare different things?
- **Reliability**: does the test measure things of relevance to usability of real products in real use outside of lab?

Usability Evaluation Inquiry

- **Involving real users but not in a usability laboratory**: “ecological validity” of evaluation
- **Proactive Field Study**: Before starting the design, the usability expert talks to users.
- **Field Observation**: The usability expert observes users in their workplaces (field visit).
  - The expert needs to observe as many artefacts and outcroppings as possible.
- **Focus Groups**: Several users are brought together to discuss.
  - Usability expert acts as a moderator
  - Capture group dynamics and spontaneous idea.
- **Interviews, questionnaires**
- **Logging Actual Use**
Predictive/Expert Evaluation/Inspection

► Usability experts make judgements
  ▪ Based on experience
  ▪ Guided by ‘rules of thumb’

► Rationale
  ▪ Observing users can be time-consuming and expensive
  ▪ Try to predict usability rather than observing it directly
  ▪ Conserve resources (quick & low cost)

► Expert reviewers often used
  ▪ HCI experts interact with system and try to find potential problems and give prescriptive feedback
  ▪ Best if they
    ► Haven’t used earlier prototype
    ► Familiar with domain or task
    ► Understand user perspectives

Predictive/Expert Evaluation/Inspection

► Heuristic Evaluation
  ▪ Most famous: Nielsen’s heuristics by Jakob Nielsen & Rolf Molich
  ▪ Several expert usability evaluators assess system based on simple and general heuristics (principles or rules of thumb) independently
  ▪ Famous quote: 5 is more than enough

  http://www.useit.com/
  http://www.dialogdesign.dk/inenglish.html

Nielsen’s Heuristics

► Recognition rather than recall
  ► Flexibility and efficiency of use
  ▪ Shortcut keys

► Aesthetic and minimalist design

► Help users recognize, diagnose, and recover from errors

► Help and documentation

Nielsen’s Heuristics

► Visibility of system status

► Match between system and the real world

► User control and freedom

► Consistency and standards

► Error prevention

Nielsen’s Heuristics

Visibility

Consistency

Help

Flexibility

Match

Recognition

Procedure

1. Gather inputs
   ▪ Who are evaluators?
     ► Need to learn about domain, its practices
   ▪ Get the prototype to be studied
     ► May vary from mock-ups and storyboards to a working system

2. Evaluate system

3. Debriefing and collection

4. Severity rating

2: Evaluate System

► Reviewers evaluate system based on high-level heuristics.
   ► Perform two or more passes through system inspecting
     ▪ Each screen
     ▪ Flow from screen to screen
   ► Evaluate against heuristics
     ► Find “problems”
       ▪ Subjective (if you think it is, it is)
       ▪ Don’t dwell on whether it is or isn’t

3: Debriefing

► Organize all problems found by different reviewers
  ▪ At this point, decide what are and aren’t problems
  ▪ Group, structure
  ▪ Document and record them

4: Severity Rating

► 0-4 rating scale
► Based on
  ◦ Frequency
  ◦ Impact
  ◦ Persistence
  ◦ Market impact

Heuristics for Virtual Environment

1. Natural engagement: user should be unaware that the reality is virtual
2. Realistic feedback: the effect of the user’s actions on virtual world objects should be immediately visible and conform to the laws of physics
3. Clear entry and exit points: clear indication on how to enter and exit from a virtual world
4. Clear turn-taking: where system initiative is used it should be clearly signaled and follow conventions
5. Navigation and orientation support: the users should always be able to find where they are in the VE and return to known, preset positions
6. Faithful viewpoints: the visual representation of the virtual world should map to the user’s normal perception
7. Support for learning: active objects should be cued and if necessary explain themselves to promote learning of VEs

Games Heuristics

► Minimize flashing
► Avoid large blocks of text
► Display only relevant info
► Don’t bury frequently used info
► Don’t rely on player’s memory
  ▪ Don’t use acronyms/abbreviations
  ▪ Don’t ask players to count resources
  ▪ Don’t ask players to remember level design

► Make critical information stand out
► Players should understand goals, failures, game elements (enemies, avatars, obstacles)
► Provide control (room for errors, moving to the next level)
► Provide contextual information (e.g. where they are in mini-map)
Heuristics for Ambient Display

► Useful and relevant information
► “Peripherality” of display
  ▪ Unobtrusive but easily monitor-able
► Match between design of ambient display and environments
  ▪ Display should be noticed for its data change rather than clash with environment
► Sufficient information design
► Consistent and intuitive mapping
► Easy transition to more in-depth information
► For multi-level information, ease of switching between focus and context
► Visibility of state
► Aesthetic and pleasing design

Cognitive Walkthrough

► Walkthrough the interface based on a cognitive model
► Evaluation of actions and cues of the interface in comparison to the goals and the background of the typical users
► Like code walkthrough (s/w engineering)
► Pluralistic walkthrough – like CW but done by a pair
► Process:
  ▪ Construct carefully designed tasks from system spec or screen mock-up
  ▪ Walk through (cognitive & operational) activities required to go from one screen to another
  ▪ Review actions needed for task, attempt to predict how users would behave and what problems they’ll encounter

Methodology

► Preparation: describing user profile, choosing tasks, breaking down tasks
► Evaluation: answering 4 questions by creating success story or failure story:
  ▪ Will the user try to achieve right effect? (user thought at the beginning of the action)
  ▪ Will the user notice that the correct action is available? (user ability to locate the order)
  ▪ Will the user associate the correct action with the effect that user is trying to achieve? (user ability to identify the control)
  ▪ If the correct action is performed, will the user see that progress is being made toward solution of the task? (user ability to interpret the information feedback)

Heuristics Trade-offs

► Advantages
  ▪ Few ethical issues to consider
  ▪ Inexpensive, quick
  ▪ Getting someone practiced in method and knowledgeable of domain is valuable
  ▪ Talking the same language
► Challenges
  ▪ Very subjective assessment of problems - depends of expertise of reviewers
  ▪ Which heuristics?
  ▪ How to determine what is a true usability problem

Requirements and Assumptions

► Requirements:
  ▪ Description of users and their backgrounds
  ▪ Description of task user is to perform
  ▪ Complete list of the actions required to complete task
  ▪ Prototype or description of system
► Assumptions
  ▪ User has rough plan
  ▪ User explores system, looking for actions to contribute to performance of action
  ▪ User selects action seems best for desired goal
  ▪ User interprets response and assesses whether progress has been made toward completing task

CW: Answering the Questions

1. Will user be trying to produce right effect?
   ► Typical supporting evidence
     ▪ It is part of their original task
     ▪ They have experience using the system
     ▪ The system tells them to do it

2. Will user notice that correct action is available?
   ► Typical supporting evidence
     ▪ Experience
     ▪ Visible device, such as a button
     ▪ Perceivable representation of an action such as a menu item
3. Will user know it’s the right one for the effect?
   - Typical supporting evidence
     - Experience
     - Interface provides a visual item (such as prompt) to connect action to result effect
     - All other actions look wrong

4. Will user understand the feedback?
   - Typical supporting evidence
     - Experience
     - Recognize a connection between a system response and what user was trying to do

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**Task:** buying RT ticket to Dragon Plaza

**Q1:** Does user know how many tickets are produced?

**Q2:** Does user know the sequence?

**Q3:** Does user know how to select?

**Q4:** Does user know that s/he has chosen Dragon Plaza RT? Does user know whether the right amount of money had been put in?