Predictive Evaluation

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Agenda

• Evaluation
  – Overview

• Predictive evaluation
  – Heuristic evaluation
  – Discount usability testing
  – Cognitive walkthrough
Evaluation

- Gathering data about usability of a design by a specified group of users for a particular activity within a specified environment.

Goals

- 1. Assess extent of system’s functionality
- 2. Assess effect of interface on user
- 3. Identify specific problems with system
Forms

- **Formative**
  - As project is forming. All through the lifecycle. Early, continuous. iterative.
  - “Evaluating the design”

- **Summative**
  - After a system has been finished. Make judgments about final item.
  - “Evaluating the implementation”

Approaches

- **Experimental (Lab studies, quantitative)**
  - Typically in a closed, lab setting
    Manipulate independent variables to see effect on dependent variables

- **Naturalistic (Field studies, qualitative)**
  - Observation occurs in “real life” setting
    Watch process over time
## Tradeoffs

<table>
<thead>
<tr>
<th>Experimental</th>
<th>Naturalistic</th>
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</thead>
<tbody>
<tr>
<td>+ Replicable</td>
<td>+ &quot;Ecologically valid&quot;</td>
</tr>
<tr>
<td>+ More &quot;objective&quot;</td>
<td>+ Cheap, quick</td>
</tr>
<tr>
<td>- Expensive, requires real users &amp; lab</td>
<td>- Not reproducible, user-specific results</td>
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<tr>
<td>- Realistic?</td>
<td>- Not quantitative (how much better?)</td>
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## Evaluation Methods

1. Experimental/Observational Evaluation
   - Typically with users
   - Experiments (usability specifications)

2. Predictive Evaluation (without users)
Predictive Evaluation

• Basis:
  – Observing users can be time-consuming and expensive
  – Try to predict usage rather than observing it directly
  – Conserve resources (quick & low cost)

Approach

• Expert reviews (often used)
  – HCI experts (not real users) interact with system, try to find potential problems, and give prescriptive feedback

• Best if
  – Haven’t used earlier prototype
  – Familiar with domain or task
  – Understand user perspectives
Predictive Eval. Methods

- 1. Heuristic Evaluation
- 2. Discount usability testing
- 3. Cognitive Walkthrough

1. Heuristic Evaluation

- Developed by Jakob Nielsen
  
  (www.useit.com)

- Several expert usability evaluators assess system based on simple and general heuristics (principles or rules of thumb)

Procedure

- 1. Gather inputs
- 2. Evaluate system
- 3. Debriefing and collection
- 4. Severity rating

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
Evaluation Method

• Reviewers evaluate system based on high-level heuristics (i.e., usability principles):

  • use simple and natural dialog
  • speak user’s language
  • minimize memory load
  • be consistent
  • provide feedback

  • provide clearly marked exits
  • provide shortcuts
  • provide good error messages
  • prevent errors

Updated Heuristics

• Stresses

  • visibility of system status
  • aesthetic and minimalist design
  • user control and freedom
  • consistency and standards
  • error prevention

  • recognition rather than recall
  • flexibility and efficiency of use
  • recognition, diagnosis and recovery from errors
  • help and documentation
  • match between system and real world
Process

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

Debriefing

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

- 0-4 rating scale
  - 4 is the most severe
- Based on
  - frequency
  - impact
  - persistence
  - market impact

Advantages

- Cheap, good for small companies who can’t afford more
- Getting someone practiced in method is valuable
Application

- Nielsen found that about 5 evaluations found 75% of the problems

- Above that you get more, but at decreasing efficiency

Somewhat Controversial

- Very subjective assessment of problems
  - Depends on expertise of reviewers

- Why are these the right heuristics?
  - Others have been suggested

- How to determine what is a true usability problem
  - Some recent papers suggest that many identified “problems” really aren’t
2. Discount Usability Testing

- Hybrid of empirical usability testing and heuristic evaluation

- Have 2 or 3 think-aloud user sessions with paper or prototype-produced mock-ups

Discount Usability in Action

- Mockups are not supposed to be perfect!

- A variety of approaches for mockups:
  - Must be quick to create; economical in use of resources
  - Sketches most common
  - Paper has its limitations; tends to focus on the visual elements
  - Sometimes awkward to use in usability testing
3. Cognitive Walkthrough

- Assess learnability and usability through simulation of way users explore and become familiar with interactive system
- A usability “thought experiment”
- Like code walkthrough in s/w engineering
- From Polson, Lewis, et al at UC Boulder

CW 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
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
Methodology

- Step through action sequence
  - Action 1
  - Response A, B, ..
  - Action 2
  - Response A
  - ...
- For each one, ask four questions and try to construct a believability story

CW Questions

- 1. Will users be trying to produce whatever effect action has?
- 2. Will users be able to notice that correct action is available?
- 3. Once found, will they know it’s the right action for desired effect?
- 4. Will users understand feedback after action?
Answering the Questions

1. Will user be trying to produce effect?
   - Typical supporting Evidence
     • It is part of their original task
     • They have experience using the system
     • The system tells them to do it
   - No evidence?
     • Construct a failure scenario
     • Explain, back up opinion

Next Question

2. Will user notice action is available?
   - Typical supporting evidence
     • Experience
     • Visible device, such as a button
     • Perceivable representation of an action such as a menu item
Next Question

• 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

Next Question

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

- Program VCR
  - List actions
  - Ask questions

IRB

- Need to move ahead for project now
- Prepare human subjects submission by next Tuesday
  - Sample consent forms available
  - Do best job with survey instruments
  - Must be forwarded to me
  - Can be amended later
Administratia

- Missing survey forms

Upcoming

- Requirements gathering & Understanding users
  - Contextual inquiry
  - Ethnography
- Task Analysis & User requirements