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

- Experimental
  + Replicable
  + More “objective”
  - Expensive, requires real users & lab
  - Realistic?

- Naturalistic
  + “Ecologically valid”
  + Cheap, quick
  - Not reproducible, user-specific results
  - Not quantitative (how much better?)

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 of 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
Administrative

- Missing survey forms

Upcoming

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