CS5714 Usability Engineering

Usability Specifications

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Topics

- What are usability specifications?
- Usability specification tables
- Benchmark task descriptions
- User errors in usability specifications
- Usability specifications and managing the UE process
- Team exercises

Usability Specifications

- Introducing Envision
  - Video-clips to be used as examples of process activities
  - Envision: a digital library of computer science literature
  - Search results are presented in graphical scatterplot
  - Video-clip: Envision prototype
Usability Specifications

- Quantitative usability goals against which user interaction design is measured
- Target levels for usability attributes
  - Operationally defined metric for a usable interaction design
  - Establish as early in process as feasible

Usability Specifications

- Tie usability specifications to early usability goals
  - E.g., for early goal of walk-up-and-use usability, base usability specification on initial task performance time
- All project members should agree on usability specifications attribution and values

Usability Specification Data

- Usability specifications based on
  - Objective data, observable user performance
  - Subjective data, user opinion and satisfaction
- Objective and subjective usability specifications can both be quantitative
Usability Specification Table

<table>
<thead>
<tr>
<th>Usability attribute</th>
<th>Measuring instrument</th>
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- Usability attribute – what general usability characteristic is to be measured?
  - May need separate usability attributes to address each:
    - User class
    - Usability goal

Usability Specifications

- Some quantitative usability attributes
  - Objective
    - Initial performance (on benchmark tasks)
    - Longitudinal (experienced, steady state) performance
    - Learnability
    - Retainability
  - Subjective
    - Initial impression (questionnaire score)
    - Longitudinal satisfaction

Usability Specification Table

- Usability attribute for Calendar
  - Initial performance, since want good ‘walk-up-and-use’ performance without training or manuals

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Usability Specification Table

- **Measuring instrument**
  - Vehicle by which values are measured for usability attribute
  - The thing that generates the data
    - Benchmark task generates objective timing data (e.g., by stopwatch)
    - Questionnaire generates subjective preference data

Benchmark Tasks

- **What tasks should be included?**
  - Representative, frequently performed tasks
  - Common tasks – 20% that account for 80% of usage
  - Critical business tasks – not frequent, but if you get it wrong, heads can roll
- **Example:** Schedule a meeting with Dr. Ehrich for four weeks from today at 10 am in 133 McBryde, about the HCI research project

Benchmark Task Descriptions

- Clear, precise, repeatable instructions
- **IMPORTANT: What** task to do, not how to do it
- Clear start and end points for timing
  - Not: Display next week’s appointments (end with a user action confirming end of task)
- Adapt scenarios already developed for design
  - Clearly an important task to evaluate
  - Remove information about how to do it
Benchmark Task Descriptions

- Start with fairly simple tasks, then progressively increase difficulty
  - Add an appointment, then add appointment 60 days from now, then move appointment from one month to other, add recurring appointments
- Avoid large amounts of typing if typing skill is not being evaluated
- Tasks should include navigation
  - Not: look at today’s appointments

Benchmark Task Descriptions

- Tasks wording should be unambiguous
  - Unless you want to include ambiguity in part of task context
  - Why is this ambiguous? “Schedule a meeting with Mr. Jones for one month from today, at 8 AM.”
- Important: Don’t use words in benchmark tasks that appear specifically in interaction design
  - Not: “Find first appointment …” when there is a button labeled “Find”
  - Instead: use “search for”, “locate”

Benchmark Task Descriptions

- Use work context wording, not system-oriented wording
  - “Access information about xyz” is better than “submit query”
- To evaluate error recovery, benchmark task can begin in error state
Benchmark Task Descriptions

- Put each benchmark on a separate sheet of paper
- Typical number of benchmark tasks: Enough for reasonable, representative coverage
- Example for Calendar: Add an appointment with Dr. Kevorkian for 4 weeks from today at 9 AM concerning your flu shot (yeah, right)

Benchmark Task Descriptions

- Write a ‘task script’ for each benchmark task
  - Describe a representative or typical way to do task, so evaluator knows at least one way during evaluation
  - Not to give to users, but for evaluator to know what to look for in testing
  - Task script should stay with benchmark task description throughout evaluation

Creating Usability Specifications

- Usability evaluation design driven by usability goals
  - First determine usability goals
    - In terms of user class, task context, special tasks, marketing needs
    - Example: Performance time for new users
  - Then translation it into a quantitative specification
    - Example: Reduce amount of time for novice user to perform task X in Version 2.0
    - Be specific as possible
      - Example: currently 35 seconds to perform task X (“current level”); reduce to 25 seconds (“target level”)
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<td>BT1: Add appointment*</td>
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*Link to text of benchmark task, plus a way to print it

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#### Value to be measured – metric for which usability data values are collected

- Time to complete task
- Number of errors
- Frequency of help and documentation use
- Time spent in errors and recovery
- Number of repetitions of failed commands
- Number of times user expresses frustration or satisfaction
- Number of commands, mouse-clicks, or other user actions to perform task(s)

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#### Value to be measured – examples

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<td>Time on task</td>
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- **Current level** – present value of usability attribute to be measured

- **Current level**
  - Level of performance for current version of system for measuring instrument (when available)
  - Baseline to help set target level, from:
    - Automated system (existing or prior version)
    - Competitor system
    - Developer performance (for expert, longitudinal use)
    - Try out some users on your early prototype
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- Target level – value indicating unquestioned usability success for present version

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- Target level – minimum acceptable level of user performance
- Determining target level values
  - Usually acceptable improvement over current level
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<td>Time on task</td>
<td>20 secs (competitor system)</td>
<td>15 secs</td>
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More example usability specifications

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<td>BT1: Add appt</td>
<td>Nbr of errors</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Initial satisfaction</td>
<td>Q 1, 2, 7 from questionnaire</td>
<td>Avg score over questions, users / 10</td>
<td>7</td>
<td>8.5</td>
</tr>
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User Errors in Usability Specifications

What constitutes a user error?
- Deviation from any correct path to accomplish task (except, for example, going to Help)
- Only situations that imply usability problems
- Not “oops” errors, doing wrong thing when knew it was wrong
- Usually not typing errors
Examples of errors

- Selecting wrong menu, button, icon, etc. when user thought it was the right one
  - E.g., working on wrong month of calendar because they couldn’t readily see month’s name
- Double clicking when a single click is needed, and vice versa
- Using wrong accelerator key
- Operating on the wrong interaction object (when user thought it was the right one)

Creating Usability Specifications

Design for ecological validity

- What are constraints in user or work context?
- How can setting be more realistic?
- Usability lab can be “sterile work environment”
- Does task require telephone or other physical props?

Creating Usability Specifications

Design for ecological validity

- Does task involve more than one person or role?
- Does task involve background noise?
- Does task involve interference, interruption?
Creating Usability Specifications

- Experimental design must take into account trade-offs among user groups
  - Watch out for potential trade-off between learnability for new users and getting in the way of power performance by experienced users

Usability Specifications – Connecting Back to UE Process

- Usability specifications help manage the usability engineering process
- Management control of usability engineering life cycle
  - Quantifiable end to process
  - Accountability
  - Indication that development process is converging toward successful design
  - Stop iterating when target level usability specifications are met

Usability Specifications

- It's expected that you will not meet all usability target levels on first iteration
  - If usability target levels are met on first iteration, they may have been too lenient
  - Point is to uncover usability problems
  - DO NOT design usability specifications with the goal of meeting them with your initial design!
Usability Specifications

- Bottom line: This is not an exact science
- Good engineering judgment is important
  - For setting levels (especially "target" level)
  - For knowing if specifications are "reasonable"
  - Video-clip: Setting usability specifications
- You get better at it with experience

Team Exercise – Usability Specifications

- Goal:
  - To gain experience in writing precise, measurable usability specifications using benchmark tasks
- Activities:
  - Write out, on three separate sheets of paper, three benchmark tasks for your kiosk
    - Increasing complexity
    - Include some navigation
    - Tasks that you can “implement” in your next exercise, to build a rapid prototype

Team Exercise – Usability Specifications

- Activities:
  - Produce four usability specifications, three based on objective measures, one based on a subjective measure
  - Cover at least two user classes and two usability goals
Team Exercise – Usability Specifications

- Specifications with objective measures should be evaluable, via each benchmark task, in a later class exercise, on formative evaluation.
- The specification for subjective measure should be based on the questionnaire supplied. Select 3 or 4 items from questionnaire.
- Include questionnaire question numbers in subjective specification

Cautions and hints:
- Don’t spend any time on design in this exercise; there will be time for detailed design in the next exercise.
- Don’t plan to give users any training.

Deliverables: Your usability specifications in table form on plastic transparency

Schedule: Complete in about 30-40 minutes max.