CS3724 Human-computer Interaction

Usability Specifications

Copyright © 2004 H. Rex Hartson and Deborah Hix.

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

- Quantitative usability goals against which user interaction design is measured
- Target levels for usability attributes
  - Operationally defined metric for a usable interaction design
  - Management control for usability engineering life cycle
  - Indication that development process is converging toward a successful 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***, observable user performance
  - ***Subjective***, user opinion and satisfaction
    - Subjective preferences may reflect users desire to return to your Web site, but flash and trash soon bores and irritates
- Objective and subjective usability specifications can both be *quantitative*

Usability Specification Table

Credit to: [Whiteside, Bennett, & Holtzblatt, 1

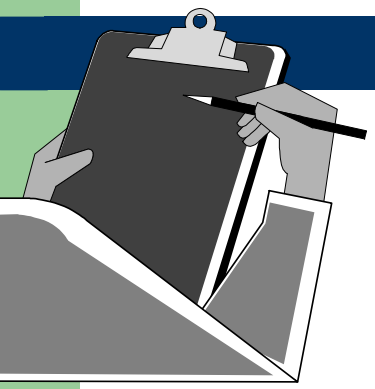
Usability attribute	Measuring instrument	Value to be measured	Current level	Target leve

- Usability attribute – what general usability characteristic is to be measured
  - May need separate usability attributes for each user class

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-us performance w/o training or manuals

Usability attribute	Measuring instrument	Value to be measured	Current level	Target level
Initial performance				

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
    - *Questionnaire* generates subjective preference data

Sample questions from QUIS satisfaction questionnaire

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 us 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 t other, add recurring appointments
- Avoid large amounts of typing if typing skill is n being evaluated
- Tasks should include navigation
  - Not: look at today's appointments

Benchmark Task Descriptions

- Tasks wording should be unambiguous
  - 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)

Usability Specification Table

Usability attribute	Measuring instrument	Value to be measured	Current level	Target leve
Initial performance	BT1: Add appt			

Usability Specification Table

Usability attribute	Measuring instrument	Value to be measured	Current level	Target leve
Initial performance	BT1: Add appt			

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

Usability Specification Table

- *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)

Usability Specification Table

Usability attribute	Measuring instrument	Value to be measured	Current level	Target leve
Initial performance	BT1: Add appt	Time on task		

Usability Specification Table

Usability attribute	Measuring instrument	Value to be measured	Current level	Target leve
Initial performance	BT1: Add appt	Time on task		

- *Current level* – present value of usability attribute to be measured

Usability Specification Table

- 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

Usability Specification Table

Usability attribute	Measuring instrument	Value to be measured	Current level	Target leve
Initial performance	BT1: Add appt	Time on task	20 secs (competitor system)	

Usability Specification Table

Usability attribute	Measuring instrument	Value to be measured	Current level	Target leve
Initial performance	BT1: Add appt	Time on task	20 secs (competitor system)	

- Target level – value indicating unquestioned usability success for present version

Usability Specification Table

- Target level
  - Minimum acceptable level of user performance
  - Determining target level values
    - Usually acceptable improvement over current level

Usability Specification Table

Usability attribute	Measuring instrument	Value to be measured	Current level	Target leve
Initial performance	BT1: Add appt	Time on task	20 secs (competitor system)	15 secs

Usability Specification Table

- More example usability specifications

Usability attribute	Measuring instrument	Value to be measured	Current level	Target leve
Initial performance	BT1: Add appt	Time on task	20 secs (competitor system)	15 secs
Initial performance	BT1: Add appt	Nbr of errors	2	1
Initial satisfaction	Q 1, 2, 7 from questionnaire	Avg score over questions, users / 10	7	8.5

User Errors in Usability Specs.

- 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
  - Do not count “oops” errors, doing wrong thing when knew it was wrong

User Errors in Usability Specs.

- 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
  - Operating on the wrong interaction object (when user thought it was the right one)
  - Usually not typing errors

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: 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”)

Creating Usability Specifications

- What are constraints in user or work context?
- Design for ecological validity
  - 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 performance power for experienced users

Usability Specifications – Connecting Back to UE Process

- Usability Specifications help manage the usability engineering process
- This is the control of usability engineering life cycle
  - Quantifiable end to process
  - Accountability
  - 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!

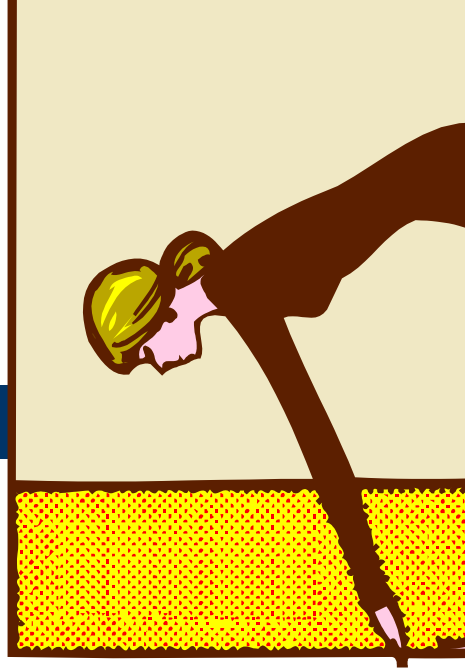
Usability Specifications

- 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”
- 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*:
  - Produce three usability specifications, two based on objective measures, one based on subjective measures
  - For the objective measures, write brief but specific benchmark task descriptions (at least two different benchmark task descriptions), each on a separate sheet of paper. Have them be a little complicated, include some navigation.

Team Exercise – Usability Specifications



- Specifications with objective measures should be evaluatable, via benchmark tasks, in a later class exercise, on formative evaluation.
- Develop tasks that you can “implement” in your next exercise, to build a rapid prototype.
- The specification for subjective measure should be based on the questionnaire supplied. Select 3 or 4 items from questionnaire.

Team Exercise – Usability Specifications

- *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.
    - 3 usability specifications, in the form on a transparency
    - Questionnaire question numbers included in subjective specification
    - Benchmark task descriptions, each on a separate sheet of paper
    - Complete in about 30-40 minutes max.