Usability Testing

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CS 147
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Hall of Fame or Shame?

Captricity
forms used for public health/education data in under resourced regions
often slow to get data & data entry error prone

Hall of Fame!

Captricity
scan-in form data
machine learning to parse & humans to verify
faster & less error prone than existing methods

Hall of Shame!

Apple One Button Mouse

How to hold this?
- No tactile clue that you were holding the mouse in the correct orientation
- Later designs added a dimple in the button yet remained ergonomically difficult to use

Hall of Shame!

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Outline
- Review Conceptual Models
- Why do user testing?
- Choosing participants
- Ethical considerations
- Designing & conducting the test
- Using the results
- Team Break
- Experimental options & details

Review Conceptual Models
- Conceptual models:
  - mental representation of how the object works & how interface controls effect it
- Design model should equal customer’s model:
  - mismatches lead to errors
  - use customer’s likely conceptual model to design
- Design guides:
  - make things visible
  - map interface controls to customer’s model
  - provide feedback

Why do User Testing?
- Can’t tell how good UI is until?
  - people use it!
- Expert review methods are based on evaluators who?
  - may know too much
  - may not know enough (about tasks, etc.)
- Hard to predict what real users will do

Choosing Participants
- Representative of target users?
  - job-specific vocab / knowledge
  - tasks
- Approximate if needed
  - system intended for doctors?
    - get medical students or nurses
  - system intended for engineers?
    - get engineering students
- Use incentives to get participants
  - T-shirt, mug, free coffee/pizza

Ethical Considerations
- Usability tests can be distressing
  - users have left in tears
- Testing/fielwork can be coercive if there is a power imbalance (e.g., in under resourced communities)

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People may feel no option but to speak to you or give you their time even though they may not get anything of value in return.
Ethical Considerations

- Usability tests can be distressing – users have left in tears
- Testing/fieldwork can be coercive if there is a power imbalance (e.g., in under resourced communities)
  
  "When the interviewer is a foreign researcher requiring a translator, the bias towards the interviewer’s artifact increases to 5x."

- You have a responsibility to alleviate these issues – make voluntary with informed consent (form)
- Avoid pressure to participate
- Let them know they can stop at any time
- Stress that you are testing the system, not them
- Make collected data as anonymous as possible
- Often must get human subjects approval (IRB)

User Test Proposal

- A report that contains
  - objective
  - description of system being testing
  - task environment & materials
  - participants
  - methodology
  - tasks
  - test measures
  
  - Get approved & then reuse for final report
  - Seems tedious, but writing this will help "debug" your test

Selecting Tasks

- Tasks from analysis & design can be used
  - May need to shorten if
    - They take too long
    - Require background that test user won’t have
  
  - Try not to train unless that will happen in real deployment
  - Avoid bending tasks in direction of what your design best supports
  - Don’t choose tasks that are too fragmented?
    - Fragmented = Do not represent a complete goal someone would try to accomplish with your application
      - E.g., phone-in bank test

Two Types of Data to Collect

- Process data
  - Observations of what users are doing & thinking
    - Qualitative
  
- Bottom-line data
  - Summary of what happened
    - Time, errors, success
    - I.e., the dependent variables
    - Quantitative

Which Type of Data to Collect?

- Focus on process data first
  - Gives good overview of where problems are

"It’s hard to see things when you’re too close. Take a step back and look." – Bob Ross
Which Type of Data to Collect?

- Focus on process data first
- Gives good overview of where problems are
- Bottom-line doesn’t tell you
- Where to fix
- Just says: “too slow”, “too many errors”, etc.
- Hard to get reliable bottom-line results
- Need many users for statistical significance

The “Thinking Aloud” Method

- Need to know what users are thinking, not just what they are doing
- Ask users to talk while performing tasks
  - Tell us what they are thinking
  - Tell us what they are trying to do
  - Tell us questions that arise as they work
  - Tell us things they read
- Make a recording or take good notes
  - Make sure you can tell what they were doing

Thinking Aloud (cont.)

- Prompt the user to keep talking
  - “tell me what you are thinking”
- Only help on things you have pre-decided
  - Keep track of anything you do give help on
- Recording
  - Use a digital watch/clock
  - Take notes, plus if possible
  - Record audio & video (or even event logs)

Will thinking out loud give the right answers?

- Not always
- If you ask, people will always give an answer, even if it has nothing to do with facts
  - Panty hose example
  - Try to avoid specific questions

Using the Test Results

- Summarize the data
  - Make a list of all critical incidents (CI)
    - Positive & negative
  - Include references back to original data
  - Try to judge why each difficulty occurred

- What does data tell you?
  - UI work the way you thought it would?
    - Users take approaches you expected?
    - Something missing?
Using the Results (cont.)

• Update tasks & rethink design
  – rate severity & ease of fixing CIs
  – fix both severe problems & make the easy fixes

Measuring Bottom-Line Usability

• Situations in which numbers are useful
  – time requirements for task completion
  – successful task completion %
  – compare two designs on speed or # of errors

• Ease of measurement
  – time is easy to record
  – error or successful completion is harder
    • define in advance what these mean

• Do not combine with thinking-aloud. Why?
  – talking can affect speed & accuracy

Analyzing the Numbers

• Example: trying to get task time ≤ 30 min.
  – test gives: 20, 15, 40, 90, 10, 5
  – mean (average) = 30
  – median (middle) = 17.5
  – looks good!

• Did we achieve our goal?
  • Wrong answer, not certain of anything!

• Factors contributing to our uncertainty:
  – small number of test users (n = 6)
  – results are very variable (standard deviation = 32)

• std. dev. measures dispersal from the mean

Analyzing the Numbers (cont.)

• This is what statistics is for

• Crank through the procedures and you find
  – 95% certain that typical value is between 5 & 55
Analyzing the Numbers (cont.)

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• Crank through the procedures and you find
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• Usability test data is quite variable
  – need lots to get good estimates of typical values
  – 4x as many tests will only narrow range by 2x
    • breadth of range depends on sqrt of # of test users
  – this is when online methods become useful
    • easy to test w/ large numbers of users

Measuring User Preference

• How much users like or dislike the system
  – can ask them to rate on a scale of 1 to 10
  – or have them choose among statements
    • “best UI I’ve ever…”, “better than average”…
  – hard to be sure what data will mean
    • variety of UI, feelings, not realistic setting …
  – If many give you low ratings → trouble
    • Can get some useful data by asking
      – what they liked, disliked, where they had trouble,
        best part, worst part, etc.
      – redundant questions are OK

Comparing Two Alternatives

• Between groups experiment
  – two groups of test users
  – each group uses only 1 of the systems

• Within groups experiment
  – one group of test users
    • each person uses both systems
    – can’t use the same tasks or order (learning)
    – best for low-level interaction techniques
      • e.g., new mouse, new swipe interaction, …

Comparing Two Alternatives

• Between groups requires many more participants than within groups

• See if differences are statistically significant
  – assumes normal distribution & same std. dev.

• Online companies can do large AB tests
  – look at resulting behavior (e.g., buy?)

Instructions to Participants

• Describe the purpose of the evaluation
  – “I’m testing the product; I’m not testing you”

• Tell them they can quit at any time

• Demonstrate the equipment

• Explain how to think aloud

• Explain that you will not provide help

• Describe the task
  – give written instructions
  – one task at a time

Reporting the Results

• Report what you did & what happened

• Images & graphs help people get it!

• Video clips can be quite convincing
HE vs. User Testing

• HE is much faster
  – 1-2 hours each evaluator vs. days-weeks
• HE doesn’t require interpreting user’s actions
• User testing is far more accurate (by def.)
  – takes into account actual users and tasks
  – HE may miss problems & find “false positives”
• Good to alternate between HE & user testing
  – find different problems
  – don’t waste participants

Summary

• User testing is important, but takes time/effort
• Use ????? tasks & ????? participants
  – real tasks & representative participants
• Be ethical & treat your participants well
• Want to know what people are doing & why? collect
  – process data
• Bottom line data requires ???? to get statistically
  reliable results
  – more participants
• Difference between between & within groups?
  – between groups: everyone participates in one condition
  – within groups: everyone participates in multiple conditions

Further Reading on Ethical Issues With Community-based Research

• Children and Families ‘At Promise, Beth B. Swadener, Sally Lubec, editors, SUNY Press, 1996,
• “Yours is better!” Participant Response Bias in HCI, Proceedings of CHI 2012, by Nicola Dell, et al.,
• “Strangers at the Gate: Gaining Access, Building Rapport, and Co-Constructing Community-Based Research”,
  Proceedings of CSCW 2015, by Christopher A. Le Dantec & Srah Fox,
  http://dl.acm.org/citation.cfm?id=2675133.2675147&coll=DL&dl=ACM
• “Imperialist Tendencies” blog post by Jan Chipchase,
  http://janchipchase.com/content/essays/imperialist-tendencies/
• “To Hell with Good Intentions” by Ivan Illich, speech to the Conference on InterAmerican Student Projects (CIASP),
  April 20, 1968,
  http://www.swaraj.org/illich_hell.htm

Next Time

• Lecture
  – Midterm review
• Project
  – Work on it in class