

Announcements 10/28

- Today
 - Feedback: research questions, solution approach
 - Info re: proposal presentations
 - Users studies
- Monday
 - Reading: Bodily orientations around mobiles
- Wednesday (11/2): Project proposals due
 - Written proposal (~3 pages)
 - In-class presentation (~5 minutes)

Feedback: Research question(s) and solution approach

- Research question(s)
 - Phrase as question(s)
- Solution approach
 - What are you going to do?
 - How are you going to do it?
 - Specify methods (design/impl, eval), tools (SW, HW)
- Research questions and solution approach should correspond
 - Incremental milestones
 - Always deliverable

Proposal presentations

- 5 minutes per group + questions
- Template is online
 - Presentation format is flexible (ppt, keynote, prezi)
 - Modify template as appropriate
- Bring your laptops, connectors

User studies

Source: AJ Brush, Tutorial on Pervasive Computing User Studies, Pervasive 2010

<http://www.cs.helsinki.fi/en/video/pervasive-tutorial-aj-brush-pervasive-computing-user-studies>

Why?

- Understand current behavior
- Understand how people use a new technology
 - Proof of concept
 - Short term usage
 - Validate effectiveness, usability
 - Technology intervention
 - Long term usage
 - Understand impact on behavior

Data collection

- Ethnography
- Direct observation (recorded)
- Diaries
- Surveys
- Experience sampling
- Interviews (structured / semi-structured, recorded)
- Focus groups
- Logging

Evaluation

- Types
 - Formative (Iterative testing and design)
 - Summative (Outcomes)
- Methods
 - Heuristic (checklist)
 - Lab (Controlled environment)
 - Field (Uncontrolled environment)

Surveys

- Can get large n easily
- Questions/answers should be clear, unambiguous
- Answers should cover all possibilities
- Focus on essential questions

Lab studies

- Participants come to lab
- Controlled environment (minimize variability)
- Perform set of tasks across varying conditions
 - Change independent variable(s)
 - Measure dependent variable(s)
- Compare results in diff. conditions

Field studies

- Observe usage in situ
 - Realistic or long-term
 - Trade control for realism
- More effort
- System needs to work well
 - Monitor usage
 - Handle failure

Study design

(Depends on research question)

- What kind of study?
 - Lab, field, etc.
- What type of participants to recruit?
 - Skills, practices, demographics, location, etc.
- How many participants?
- What will participants do?
- How long will study be?
- What data will you collect? When?

Between / Within subjects

- Between subjects
 - Distinct groups do each condition
(Group A does condition 1, group B does condition 2)
 - Look at differences between groups
 - Need high n , participant uniformity
- Within subjects
 - All participants do all conditions
 - Can handles participant variability, lower n
 - Need to avoid repetition bias (counterbalance order)
(Group A does condition 1 then 2, Group B does condition 2 then 1)

Avoid problems

- Do pilot studies
 - Of everything: interviews, surveys, lab / in situ
 - As realistic as possible
- “Discount usability” [Nielsen]
 - Lo fi prototyping (paper, wOz)
 - Small n
- Avoid bias
 - Participant bias
 - Researcher bias

Ethics

- Treat participants with respect
 - Tell them what they'll be doing, can stop any time
 - Minimize stress
 - Don't be judgmental
- Consent
- Privacy
- Compensation (avoid coercion, bias)

Qualitative / quantitative data

- Quantitative
 - Numeric (quantity)
 - E.g. task completion time
- Qualitative
 - Non-numeric (quality)
 - E.g. participant's experience of task
- Use multiple data sources, types
 - Validate data
 - Explain data

Analyzing quantitative data

- Descriptive statistics
 - Count, mean, intervals, etc.
 - Consider outliers (error bars, std dev)
- Inferential / predictive statistics
 - Statistical significance (result is unlikely to have occurred by chance)
 - *p-value* < *threshold*
 - Anova, t-test, Mann-Whitney U

Analyzing qualitative data

- Top down v. bottom up
- Affinity diagramming (bottom up)
 - Group comments by similarity
 - Themes/categories emerge from data
- Coding (top down)
 - Code comments by category