Announcements 11/4

• Today
  – Quantitative / qualitative evaluation
  – What reviewers look for
    (How to make a research contribution)

• Monday
  – Guest lecture by Steve Checkoway
  – Reading: Experimental Security Analysis of a Modern Automobile
Feedback: Proposals

• Great job on presentations!
• Will return written proposals ASAP
• Going forward...
  – Document process (design, evaluation)
  – Document problems encountered, how solved
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

• Use multiple analysis methods
Analyzing quantitative data

• **Descriptive statistics** *(summarize)*
  – Count, mean, intervals, etc.
  – Indicate distribution *(error bars, std dev)*

• **Inferential statistics** *(draw conclusions)*
  – **Statistical significance** *(Result unlikely to have occurred by chance)*
    • Assert null hypothesis
      – No relationship between phenomena
    • Test null hypothesis
      – \( p\text{-value} < \text{threshold} \) \( ? \text{false} : \text{true} \)
    • If null hypothesis rejected, results statistically significant
      – Relationship exists between phenomena
  – Examples: t-test, Anova, Mann-Whitney U
Analyzing qualitative data

• Top down v. bottom up
• Affinity diagramming (bottom up)
  – Group data by similarity
  – Themes/categories emerge from data
• Coding (top down)
  – Code data by category
What do reviewers look for?

• Novelty

• Significance
  – Problem
  – Solution
  – Results (findings, implications)

• Validity
  – Method (clearly defined, sufficient for purpose)
  – Correct execution (researcher did what was claimed, accurate)
  – Correct conclusions drawn from results

• Presentation (content, style)
  – Clarity (description, language, figures, layout)
  – Organization
  – Focus

Primary criterion: Contribution to field

• Contribution types
  – Interface artifacts or techniques
  – Systems, tools, architectures and infrastructure
  – Understanding users
  – Methodology (design, evaluation)
  – Theory (principles, concepts, models)
  – Innovation, creativity, and vision (thought pieces, PoC)
  – Argument (provocative essays)

Contribution:
Interface artifacts or techniques

Dev. of new artifacts/techniques or refinement of knowledge about existing approaches

• Provide context (what is known, not known)
• Motivate real problem worth solving
• Describe in sufficient detail to replicate
• Rigorous, convincing validation showing gains of practical significance
Contribution: Systems, Tools, Architectures and Infrastructure

Underlying software and technology
(Associated w/ app, UI design, UI feature, dev tool)

- Idea is original, of interest, broadly valuable
- Idea placed in context
  (situation, tasks, users)
- Can system work in practice?
- Clear about what was implemented or not
- Describe in sufficient detail to replicate
- Idea is validated by evidence
  (argument, experiences, empirical eval, user studies)
Contribution: Understanding users

Analysis of people, behaviors, situations, capabilities, interactions

• Clearly describe methodology (study, analysis)
• Clearly describe new understanding
• Show how new understanding is relevant
  – Understanding of human behavior, social org.
  – Insight into other contexts
  – Implications for design (inspiration, requirements)