Data Analysis, Interpretation, & Presentation: Lies, Damn Lies, and Statistics

CS352

User-Centered Design Process

1. Identify users
2. Identify activities/context
3. Identify needs
4. Derive requirements
5. Derive design alternatives
6. Build prototypes
7. Evaluate prototypes
8. Iterate (rinse and repeat)
9. Ship, validate, maintain
Where we left off Wednesday

Data collection techniques
• Surveys
• Interviews
• Focus groups
• Observational studies
• Talk-aloud protocols
• Will get to more qualitative methods like experiments

How to synthesize/represent data (mostly qualitatively)
• Task outlines
• Use-cases/scenarios
• Hierarchical Task Analysis
• Personas
• Etc.

Task Outline

Using a lawnmower to cut grass

Step 1. Examine lawn
  • Make sure grass is dry
  • Look for objects laying in the grass

Step 2. Inspect lawnmower
  • Check components for tightness
    – Check that grass bag handle is securely fastened to the grass bag support
    – Make sure grass bag connector is securely fastened to bag adaptor
    – Make sure that deck cover is in place
    – Check for any loose parts (such as oil caps)
    – Check to make sure blade is attached securely
  • Check engine oil level
    – Remove oil fill cap and dipstick
    – Wipe dipstick
    – Replace dipstick completely in lawnmower
    – Remove dipstick
    – Check that oil is past the level line on dipstick
    – ...

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Task Outlines

- Use expanding/collapsing outline tool
- Add detail progressively
- Know in advance how much detail is enough
- Can add linked outlines for specific subtasks

- Good for sequential tasks
- Does not support parallel tasks well
- Does not support branching well

Scenarios & Use Cases

- Describe tasks in sentences
- More effective for communicating general idea of task

- Scenarios: “informal narrative description”
  - Focus on tasks / activities, not system (technology) use

- Use Cases
  - Focus on user-system interaction, not tasks

- Not generally effective for details
- Not effective for branching tasks
- Not effective for parallel tasks
0. Conduct accident investigation

Plan 0: On instruction from supervisor do 1:
When all evidence is collected do 2 through 5.

1. Collect evidence
2. Analyze facts
3. Integrate facts and draw conclusions
4. Validate conclusions
5. Make recommendations

Plan 1: First do 1 and 2,
then 3 and 4, then 5;
Repeat 3 and 4 if necessary.

1. Walk the accident site
2. Identify and preserve evidence
3. Identify witnesses
4. Interview witnesses
5. Review records

Plan 1.4: Do 1, 2, 3;
Do 4 if insufficient data from 3;
Then do 5;
Repeat 3 and 4 to meet conditions of 5.

1. Establish meeting room
2. State purpose of interview
3. Let witness describe what happened
4. Ask open-ended questions
5. Ensure that what, where, when, who, how, why is covered

Personas
Qualitative vs. Quantitative Data

We talked about the pro’s and con’s of different data gathering techniques, but what about the advantages or disadvantages of qualitative or quantitative data?

Overarching goal is **detecting patterns**

Dealing with Qualitative Data

Properties
- Noisy
- Verbose
- Detailed
- Rich
- Informative
- Difficult to generalize
- Expensive to collect
- Time consuming to process
- Great source for ideas

Ways of dealing with it
- Use-cases/scenarios
- Hierarchical Task Analysis
- Personas
- Etc.
- Turn it into quantitative data!
- Average/Common experience
- Selective sampling

When do we have enough data?
Dealing with Qualitative Data

Affinity diagrams – Organizing data into common themes

Dealing with Quantitative Data

**Properties**
- Easy to gather
- Easy to synthesize/combine
- Statistical tests available
- Can be difficult to interpret
- Can be misleading
- Can be difficult to pick the right measure & test
- Don’t necessarily tell us a whole lot
- Mean, median, standard deviation test of significance, meaningfulness

**Key Concepts**
- Mean
- Median
- Standard deviation
- Statistical significance
- Significance threshold
Interpreting Statistical Results

• What does statistical significance mean?

Are **significant** results **meaningful** results?

Common Problems

• Problematic sample assumptions
  – Representativeness
  – Distribution (normal vs. other)

• Bias
  – Data collection (how q’s are formulated, what is looked for, etc.)
  – How data is interpreted (easy to see what you want to see, dismiss what you consider unlikely)

• Experimental effects
  – Hawthorne effect
Deceptive data practices

- Mean US household income in 2006 was $60,528
- Median US household income in 2006 was $48,201
- Depending on which you present, this may sound like a lot or little.

- How does this relate to other countries/poverty level?
- Data taken out of context?

Importance of Data Visualization
Edward Tufte & Other Classes

CS 419/519

Review