First, the news...
Outline

- Qualitative data analysis, continued...
- Discount usability methods
- Think aloud
Quantitative vs Qualitative analysis

Quantitative
- Typically using numbers or clearly defined categories
- Examples: surveys, time measurements, activity order.
- Easies version is counting things
- Harder version involves statistics

Qualitative
- Data that cannot be trivially measured in a way that produces a number
- Interviews, focus groups, natural language
- Easy version is identifying themes or topics
- Harder version is grounded theory or qualitative coding
Qualitative Analysis
Qualitative Analysis

• Basic version (use for coursework)
  • Identify the main themes
  • Identify critical issues

• Professional version
  • Affinity Diagrams
  • AEIOU
  • Qualitative Coding
  • Thematic Analysis
  • Critical Incident Analysis
  • And many more...
Basic Qualitative Analysis

- Go back through the data (audio, video, notes, etc.) and look for patterns
  - Best to do this with raw data if possible, you often miss important things during the session itself
- What you are looking for depends on your research question
  - Opinions
  - Tasks
  - Past experiences
  - Times when things went wrong
- Identify themes
  - Write down the good and the bad things
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Affinity diagram

- Allow to use microphone
- Apps like Skype would need to use your microphone
- Recording audio in background
- Recording with microphone
- Need to record voice
- Voice
- Microphone turned on without a button push
- Doing something in background without explicit intent
- Click button
- Use voice chat
- Chatting loudly in class
- Talking
- Anything that makes noise
Affinity diagram
AEIOU

AEIOU is an organizational framework which gives the researcher a set of concepts to step through when analyzing data

- **Activities** – goal directed sets of actions
- **Environments** – areas in which activities take place, atmosphere and function of the context
- **Interactions** – between a person and someone or something else
- **Objects** – items commonly found in the environment
- **Users** – People who are present and what their roles and relationships might be
Qualitative Coding

“Coding” is a social science term in which sections of qualitative data are labeled with “codes” which are similar to tags or categories.

Codes are either decided up-front or generated out of the data itself.

Pros
- Grounded, strongly based on the data
- Good way to see information in ways you don’t expect

Cons
- Properly doing qualitative coding takes a long time
- Requires multiple people to do the coding
Research Question:
What factors do users consider when deciding to install updates or not?
Online survey

Respondents were asked to:

1. Relate a story
2. Is the story positive/negative/neither
3. Follow-up questions about the story
4. Relate a contrasting second story
Online survey

- 307 responses
- 592 usable stories
- First stories were:
  - 49% Negative
  - 29% Neutral
  - 21% Positive
- 133 Women, 174 Men
- Mean age 35
How did the experience make you feel?

Frustrated

Satisfied

Negative Story

Positive Story

Neither

Extremely
Slightly
Not at all
Not Applicable
Content coding

- Prior state
- Initiation
- Installer
- Expected installer
- Post state
- Expected post state
- Behavior
- Impact

- Installer
  - Time
  - Cost
  - Resources
  - Problems
  - Failure
  - Restart
  - Bundled software
Content coding

“I decided that I wasn’t going to install the update because I have heard all the reviews online about how it generally makes your phone slower in every respect.”
### Content coding

<table>
<thead>
<tr>
<th>I decided that I wasn’t going to install the update</th>
<th>Behavior: did not update</th>
</tr>
</thead>
<tbody>
<tr>
<td>because I have heard all the reviews online</td>
<td>Behavior: research</td>
</tr>
<tr>
<td>about how it generally makes your phone slower in every respect</td>
<td>Expected post state: performance: worse</td>
</tr>
</tbody>
</table>
Thematic analysis

- Prior-state
- Initiation
- Installer
- Expected-Installer
- Post
- Expected-Post
- Behavior
- Impact

1. Awareness
2. Deciding
3. Preparation
4. Installation
5. Troubleshooting
6. Post state
Discount Usability Methodologies
Discount Usability Methodologies

• In 1989 Jacob Nielsen wrote a paper entitled “Usability Engineering at a Discount“
• At the time, “correct” usability required an equipped lab and a large number of participants
• The idea: You can learn quiet a bit from small simple studies.
  • Simplified user testing – small number of participants
  • Narrowed-down prototypes – everything doesn’t need to work, just the important bits
  • Heuristic evaluation – inspect user interfaces based on established guild lines, no subjects needed
We are learning discount usability methods because:

- Most students in this class:
  - will not go on to become usability experts
  - will go on to design software used by humans
  - will be given very small budgets by their bosses to do usability work
  - if you do become usability specialists, odds are high you will not have a proper large team

- Discount usability methods are often based on more rigorous professional methods
  - Understanding them helps you learn more complex methodologies
Usability testing

- Involves recording performance of typical users doing typical tasks.
- Controlled settings.
- Users are observed and timed.
- Data is recorded on video & key presses are logged.
- The data is used to calculate performance times, and to identify & explain errors.
- User satisfaction is evaluated using questionnaires & interviews.
- Field observations may be used to provide contextual understanding.
Usability testing & research

<table>
<thead>
<tr>
<th>Usability testing</th>
<th>Experiments for research</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Improve products</td>
<td>• Discover knowledge</td>
</tr>
<tr>
<td>• Few participants</td>
<td>• Many participants</td>
</tr>
<tr>
<td>• Results inform design</td>
<td>• Results validated statistically</td>
</tr>
<tr>
<td>• Usually not completely replicable</td>
<td>• Must be replicable</td>
</tr>
<tr>
<td>• Conditions controlled as much as possible</td>
<td>• Strongly controlled conditions</td>
</tr>
<tr>
<td>• Procedure planned</td>
<td>• Experimental design</td>
</tr>
<tr>
<td>• Results reported to developers</td>
<td>• Scientific report to scientific community</td>
</tr>
</tbody>
</table>
Usability testing

• Goals & questions focus on how well users perform tasks with the product.

• Comparison of products or prototypes is common.

• Focus is on time to complete task & number & type of errors.

• Data collected by video & interaction logging.
  • Testing is central.

• User satisfaction questionnaires & interviews provide data about users’ opinions.
Testing conditions

• Usability lab or other controlled space.
• Emphasis on:
  – selecting representative users;
  – developing representative tasks.
• 5-10 users typically selected.
• Tasks usually around 30 minutes
• Test conditions are the same for every participant.
• Informed consent form explains procedures and deals with ethical issues.
Types of data

- Time to complete a task.
- Time to complete a task after a specified time away from the product.
- Number and type of errors per task.
- Number of errors per unit of time.
- Number of times online help and manuals accessed.
- Number of users making an error.
- Number of users successfully completing a task.
How many participants is enough for user testing?

• The number is a practical issue.
• Depends on:
  – schedule for testing;
  – availability of participants;
  – cost of running tests.
• Typically 5-10 participants.
• Some experts argue that testing should continue until no new insights are gained.
Portable equipment for use in the field

Figure 14.4 The Tracksys system being used with a mobile device camera that attaches to a flexible arm, which mounts on a mobile device, and is tethered to the lab

Source: Courtesy of Harry Brignull.
Mobile head-mounted eye tracker

Figure 14.5 The mobile head-mounted eye-tracker

Source: Picture courtesy of SensoMotoric Instruments (SMI), copyright 2010.
Think Aloud
Think aloud

• Basic idea: Have a participant use the interface and speak aloud while they do so

• Think aloud is a very versatile, can be long or short, detailed or minimal, planned or ad-hoc

• Pros
  • Get a sense of what the user is trying to do and why they click on some things
  • Testing with 5 users will find the majority of major issues

• Cons
  • Small sample sizes
  • Talking aloud changes how long a user spends on tasks so this method cannot be combined with timing
Think aloud

• Think aloud sessions are typically scripted, that is, you write down everything you will say in advance.
• Everything you say to the participant will change their behavior so you have to be very careful.

• Typical session
  1. Tell the participant what the session will involve including things like how long it will be and what kind of data recording you will be doing.
  2. Train them in thinking aloud.
  3. Ask them to accomplish several tasks which have been previously written down, reading aloud each task before starting it.
  4. End by thanking them and offering to answer any questions they may have.
Usability testing the iPad

- 7 participants with 3+ months experience with iPhones
- Signed an informed consent form explaining:
  - what the participant would be asked to do;
  - the length of time needed for the study;
  - the compensation that would be offered for participating;
  - participants’ right to withdraw from the study at any time;
  - a promise that the person’s identity would not be disclosed; and
  - an agreement that the data collected would be confidential and would be available to only the evaluators
- Then they were asked to explore the iPad
- Next they were asked to perform randomly assigned specified tasks

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Think aloud training

In this observation, we are interested in what you think about as you perform the tasks we are asking you to do. In order to do this, I am going to ask you to think aloud as you work on the task. What I mean by “think aloud” is that I want you to tell me everything you are thinking from the first time you see the statement of the task until you finish the task. I would like you to talk aloud constantly from the time I give you the task until you have completed it. I don’t want you to try to plan out what you say or try to explain to me what you are saying. Just act as if you were alone, speaking to yourself. It is most important that you keep talking. If you are silent for any long period of time, I will ask you to talk. Do you understand what I want you to do?
Examples of the tasks

<table>
<thead>
<tr>
<th>App or website</th>
<th>Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>iBook</td>
<td>Download a free copy of <em>Alice’s Adventures in Wonderland</em> and read through the first few pages.</td>
</tr>
<tr>
<td>Craigslist</td>
<td>Find some free mulch for your garden.</td>
</tr>
<tr>
<td>eBay</td>
<td>You want to buy a new iPad on eBay. Find one that you could buy from a reputable seller.</td>
</tr>
<tr>
<td><em>Time</em> Magazine</td>
<td>Browse through the magazine and find the best pictures of the week.</td>
</tr>
<tr>
<td>Epicurious</td>
<td>You want to make an apple pie for tonight. Find a recipe and see what you need to buy in order to prepare it.</td>
</tr>
<tr>
<td>Kayak</td>
<td>You are planning a trip to Death Valley in May this year. Find a hotel located in the park or close to the park.</td>
</tr>
</tbody>
</table>

Table 14.1 Examples of some of the tests used in the iPad evaluation (adapted from Budiu and Nielsen, 2010).

*Source: Copyright Nielsen Norman Group, from report available at http://www.nngroup.com/reports/*.
Questions?