Privacy, Security and Usability

Usability Design Details: Surveys, Team Work and Participant Recruitment

Topics for today

- Understanding User Motivation
- Surveys
- Interviews
- Focus groups
- Diary studies
- Interview demo

Usability Design

- Understanding User Motivation

The Hawthorne Effect

- The Hawthorne Effect was the product of productivity studies
  - conducted at Hawthorne Works plant of Western Electric in the 1920s by Elton Mayo
- Following parameters were altered during the study:
  - frequency and duration of rest periods
  - the length of a workday
  - employee compensation
  - temperature settings
  - Lighting, etc.

The Hawthorne Effect

- Hypotheses included:
  - increasing the frequency of meal periods would increase productivity
  - decreasing lighting levels would decrease productivity.
- Results showed that these changes and many others resulted in increased worker productivity
- So why did this happen?

The Hawthorne Effect

- Results showed that these changes and many others resulted in increased worker productivity
- Independent variables considered: temperature, lighting, rest periods length, etc.
- Dependent variable: productivity
- Researchers failed to consider another important independent variable at work:
  - attention

The Hawthorne Effect

- Researchers failed to consider another important independent variable at work: attention.
- Employees being studied were responding to increased attention they were receiving during study
  - And not the changed physical conditions
- This increased attention appeared to have caused employees to feel as if they were special
  - for being singled out during the observation period.

Understanding Users

- The Hawthorne Effect

Contextual Inquiry

- a semi-structured interview method to obtain information about the context of use
- Includes two steps:
  - users are first asked a set of standard questions
  - users are observed and questioned while they work in their own environments

Contextual Inquiry Principles

- **Focus:**
  - Plan for the inquiry, based on a clear understanding of your purpose
    - You can’t focus on every detail; need a focus to filter out the irrelevant details
      - The Where, How, and What expose the Why
- **Context:**
  - Way of understanding users’ needs and work practices
    - Go to the customer's workplace and watch them do their own work

Contextual Inquiry Principles

- **Partnership:**
  - Talk to customers about their work and engage them in uncovering unarticulated aspects of work
    - Investigator is a humble observer, participant is the knowledgeable informant.
    - master does the work & talks about it while working
    - we interrupt to ask questions as they go
- **Interpretation:**
  - Develop a shared understanding with the customer about the aspects of work that matter
  - Convert raw information into interpretation

Contextual Inquiry

- The results of contextual inquiry can be used to
  - define requirements
  - improve a process
  - learn what is important to users and customers
  - learn more about a new domain to inform future projects

Observations

- How?
  - Spending time in the vicinity of the subjects
  - Assume the role of subject
  - Ask for a tour from an insider
  - Observe and photograph anonymously
  - Other
    - Security cameras, youtube videos, etc.

Contextual Inquiry

- Contextual Inquiry

STUDY TOOLS

SURVEYS

Why learn how to survey?

- Questionnaires are everywhere
  - Measure customer experience or satisfaction
  - Also, used and standardized by government agencies
    - Measure economic effects, health of populations, etc.
- Designing good surveys is more complex than it seems

Survey Process [Foddy 1993]

- Survey is a complex communication process:
  - Agreement has to be reached as to what to ask
    - within a framework or model encompassing the research questions and hypotheses to be addressed
  - Researchers or interviewers encode their request for information in a carefully standardized stimulus
  - Respondents subsequently decode this stimulus and encode an answer
    - usually expressed in terms of a standardized format previously encoded by the researcher.
  -

https://www.researchgate.net/publication/265285941_Questionnaire_Design_in_Attitude_and_Opinion_Research_Current_State_of_an_Art
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Survey Process [Foddy 1993]

- Survey is a complex communication process (cont.):
  - The researchers or interviewers decode this response and proceed to analyzing the information
    - drawing some form of conclusion from the analyses

https://www.researchgate.net/publication/265285941_Questionnaire_Design_in_Attitude_and_Opinion_Research_Current_State_of_an_Art
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Surveys

- What are the benefits of surveys?
  - Can obtain data from many participants
  - Relatively quick, easy, unobtrusive, inexpensive
    - Finding diversified group of participants may be challenging, expansive
  - Useful for validating hypotheses
    - using a smaller study with a larger population
      - Can be used as motivation for a follow-up expanded study
  - Can use both quantitative and qualitative questions
  - Quantitative questions may use Likert scale

Survey Limitations

- Self reported data
- Participants response may not be accurate

Survey Limitations

- Participants response may not be accurate:
  - May rush to finish survey, not consider question thoroughly
  - Participants may not appreciate correctly their real-time response
  - May be embarrassed to tell the truth
  - May deceive self regarding real-time response to events

Survey Limitations

- Participants response may not be accurate (cont.):
  - Not remember correctly past reactions
  - May be concerned with privacy
  - Want to appear average/normal
    - Choose neutral responses
  - May not understand the questions

Ways to deploy a survey

- Online
  - Users can fill at home
  - May prevent participants collaboration
- Handout/mail paper survey
- Provide tablet with questionnaire
- Phone survey

Types of survey questions

- Multiple choice
  - Likert scale
- Ranking
- Open-ended responses
  - Short response
  - Long response

Likert Scale

https://en.wikipedia.org/wiki/Likert_scale

Likert scale

- May use an odd or even number of responses
  - Odd Likert typically uses 5 to 7 questions
- Offers a range of answer options from one extreme attitude to another:
  - like “extremely likely” to “not at all likely
- If number of odd responses, they include a moderate or neutral midpoint.
  - Easy to normalize, run statistical tools

Likert Scale

- Length of scale should be meaningful to respondents
  - Do you want to know how strongly people feel about a certain issue?
    - In this case, a 7-point scale will provide more granularity

Likert Scale Considerations

- Likert scales are arbitrary
  - The value assigned to a Likert item has no objective numerical basis
    - either in terms of measure theory or scale
  - The value assigned to each Likert item is simply determined by the researcher designing the survey
    - who makes the decision based on a desired level of detail.
  - each successive Likert item is treated as indicating a ‘better’ response than the preceding value

Likert Scale Considerations

- The ‘distance’ between each successive item category is assumed to be equivalent
  - => In a five-point Likert item, the ‘distance’ between category 1 and 2 is inferred to be the same as between category 3 and 4
    - equidistant presentation by the researcher is important
      - otherwise a bias in the analysis may result.

- http://en.wikipedia.org/wiki/Likert_scale

Likert Scale Considerations

- The ‘distance’ between each successive item category is assumed to be equivalent
  - For example, a four-point Likert item with categories "Poor", "Average", "Good", and "Very Good" is unlikely to have all equidistant categories
    - since there is only one category that can receive a below average rating
      - This would arguably bias any result in favor of a positive outcome.

Designing good survey questions

- Word questions clearly, without jargon or undefined abbreviations
- Avoid leading questions, ambiguous terms, or emotionally-loaded terms
- Design questions to evoke truthful responses
  - Non-threatening, don't bias participants to provide what they think you want, protect confidentiality
- Probe one dimension at a time
- Design questions such that respondents are likely to provide a range of answers

Clear questions

- Word questions clearly, without jargon, ambiguous terms, or undefined abbreviations
- Exercise - Improve these questions:
  - Does your company use a VPN?
  - Do you make passwords with leet?

Avoid bias

- Avoid leading questions or emotionally-loaded terms
- Exercise - improve these questions:
  - Do you do insecure things like not using anti-virus?
  - Do you think privacy-invasive companies like Facebook should be allowed to post children images?

Evoke truth

- Design questions to evoke truthful responses
  - Non-threatening
  - Don’t bias participants to provide what they think you want
  - Protect confidentiality (and tell participants that you will)
  - Don’t allow participants to finish much faster by selecting certain answers

Evoke truth

- Design questions to evoke truthful responses (cont.)
  - Keep surveys at proper length, to avoid rushing responses
    - If using Mturk, pay amount appropriate to survey length
    - Avoid using “wide net” to pick potential findings
    - Consider using an initial survey to created focused study hypotheses
      - This will allow shorter and more meaningful surveys

Probe one dimension at a time

- If you ask about multiple dimensions in one question, answers tend to be ambiguous
- Improve these questions:
  - Do you delete cookies or use an ad blocker to protect your privacy?
  - Are you concerned about your identity being stolen, making it difficult for you to get credit in the future?

Make sure all responses are available

- For example, let people respond that they don’t know…
- Similarly, where appropriate, allow respondents to indicate they don’t remember, don’t have an opinion, or the question is not applicable to them (N/A)

Make sure all responses are available

- Consider this question:
  - When was the last time you changed your email password?
    - This week
    - Last week
    - Last month
    - Last year
    - More than 1 year ago
  - What is the problem with this question? How can you improve it?

Appropriate answer choices

- Answer choices should be clear, mutually exclusive, cover entire space of possible answers
  - Allow multiple answers if choices are not mutually exclusive
  - Include “Other” if answers may not cover entire space

Appropriate answer choices

- Answer choices should be clear, mutually exclusive, cover entire space of possible answers
  - Improve this question:
    - What technique did you use last time you created a password (choose 1)?
      - I used a name
      - I used a dictionary word
      - I used a random number
      - I added digits and symbols

Varied answers

- Design questions such that respondents are likely to provide a range of answers
- If you bucket answers, use appropriate level of granularity, keeping in mind your population
- Improve this question:
  - How old are you?
    - 20-39
    - 40-69
    - 70-89

Include sufficiently wide quantitative ranges

- Be aware that the rating scale can skew responses
  - People like to think they are normal and will choose responses that don’t look like outliers
- Make sure you are covering an appropriate range

Include sufficiently wide quantitative ranges

- Improve this question:
  - How often do you look at Facebook?
    - Once per week
    - A few times per week
    - Once per day
    - A few times per day

Designing good survey questions

- Word questions clearly, without jargon or undefined abbreviations
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- Probe one dimension at a time
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Rating Scales

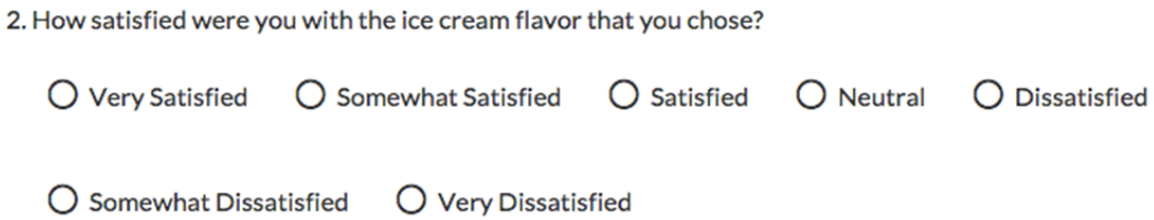
- If you are asking multiple Likert scale questions, try to use the same size scale throughout
  - 5, 7, etc.
- For opinion (concern, fun, difficulty, etc.) scales or agreement scales, put neutral in the middle
  - E.g.: Strongly agree, agree, neither agree nor disagree, disagree, strongly disagree

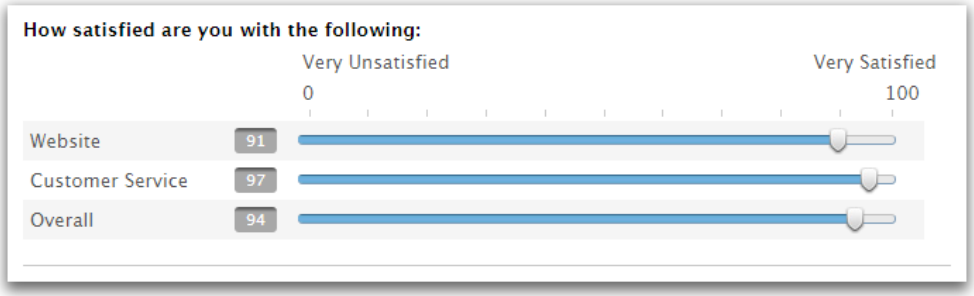
Rating Scales

- Agreement scales can allow for more consistency
  - I find changing my password annoying
    - Strongly agree, agree, neither agree nor disagree, disagree, strongly disagree

Scale options

- Label every point on scale with words
  - Computing means can be problematic because it is not clear that scale is linear





- Label end points only
  - OK to compute means

https://www.surveygizmo.com/resources/blog/survey-question-scale-length/
https://www.questionpro.com/blog/4-measurement-scales-every-researcher-should-remember/

Be aware of cognitive load difficulties

- Do not ask respondents to perform cognitively difficult tasks
  - E.g., ranking more than 5 items
    - unless you are testing their ability to perform these tasks

Be aware of cognitive load difficulties

- Improve this question:
  - Rank the security of each password, placing a 1 next to the most secure, 2 next to the next most secure, etc.
    - ulovedogs25
    - urcatperson25
    - cat
    - dog
    - U<3dogs
    - Cats25

More survey design tips

- Cluster similar questions together
- Use a clear and attractive layout
- Pilot, pilot, pilot!

Survey length should be appropriate

- Prioritize and eliminate questions that are less important to your research
- Provide appropriate pay or other incentives for a long survey
  - Help avoid rushing Mturk users, etc.
- Consider dividing your sample randomly and giving different participants different questions
- Consider running multiple surveys or giving participants a break between survey parts

Include attention checks

- Make sure participants are paying attention
  - Ask same question more than once in slightly different ways
  - Ask question with obvious correct answer that is formatted similarly to other survey questions
  - Tell participants correct answer and see if they choose it
  - Check whether participants write meaningful answer to free response question

Include attention checks

- Make sure participants are paying attention (cont.)
  - Ask a factual question on the topic before asking an opinion question
  - Don’t make attention check questions to obvious

Run a pilot survey

- You won't get it 100% right the first time
  - Generate study in a few steps
- Take the survey yourself and see how long it takes
- Watch people complete survey and see if anything confuses them
- Give the survey to a small sample and check timing and look for unexpected results
- Come up with data analysis plan and use it to analyze pilot results

Online survey tools

- Many tools to choose from…
  - Google Forms – free and easy, not very sophisticated
  - Survey Monkey – free and paid versions
  - Survey Gizmo – free and paid versions
  - Qualtrics – powerful but requires subscription
  - Conditional questions, randomization, embed code, and more!

INTERVIEWS

Interviews

- Pros:
  - Obtain rich data from a few participants when you aren't sure what you'll find
    - Explore an area
    - If done properly, lets you identify themes
    - Come up with entirely new perspectives

Interviews

- Pros (cont.):
  - Allows you to probe mental models, what people think and why
  - Semi-structured interviews allow you to explore issues as they are raised
  - Allows you to clarify if people don’t understand a question

Interviews

- Cons:
  - Time consuming to conduct; large number of interviews may not be feasible
  - May not be able to quantitatively generalize frequencies of opinions
  - Time consuming to analyze
    - May require transcription and coding
  - Hard to completely avoid bias

How to design an interview

- Concentrate on open-ended questions
  - Maximize interview benefits
- Design follow-up questions, i.e.
  - “What files do you have on your computer that you consider valuable?”
  - Follow up with “Do you have valuable photos? Videos? School work?”

How to design an interview

- Go from general to more specific questions
  - So you first get unbiased responses
    - For example, ask about general computer-related behavior before asking about installing anti-virus, etc.
- Prepare script of planned interview
  - Including questions and follow-up probes

Role play and hypothetical scenarios

- Appropriate for some interview studies
- Give participant a role to play or put them in a hypothetical scenario
  - Imagine you just saw this message on your computer screen….
  - Imagine your friend called you and told you he saw this message and asked you what to do….

Interview Preparation

- Have a written copy of the interview script
  - With space to take notes, write down feedback
- Prepare and print the official consent form
- Prepare compensation plan and print information for participants
- Audio/video recording equipment
- Remind interviewer ahead of time the time/place of the interview

Conducting Interview

- Introduce yourself and any research assistants
- Explain purpose of study
  - unless you need to hide it to avoid biasing participant)
    - in which case prepare an ‘alternative purpose’ that the participants will be provided
- Ask participants to read and sign consent form
- Turn on all recording material (if used)
- Perform study, debrief the participants at end of study
- Provide participants with payment
  - Ask participants to sign payment sheet

Interview guidelines

- Make participants feel comfortable
  - Comfortable environment, refreshments for long interviews
  - Make room for silence
    - If you listen, interviewees will speak
- Avoid leading questions
  - Stay neutral
- Support whatever participants say
  - don’t make them feel like they’re incorrect or being judged
- Interview a broad range of people
- Know when to follow up

Interviews

- User Interviews
  - Explore current and future use of product
  - Make an ongoing engagement
    - Choose users to be beta testers
- Expert Interviews
  - Interviews with domain experts
    - Beyond traditional interview structure
    - Ask open ended questions
    - Try to understand their role in user's experience

Interviews

- Camera studies
  - Provide cameras to document subject's experience
  - Explain purpose of the study
  - Identify meaningful images
    - Get permissions to use images

FOCUS GROUPS

Focus groups

- More efficient than interviews; you can interview 5-10 people at once
- Good for getting a lot of opinions quickly or for topics that benefit from group discussion
- Less detail from any interviewee than you would get in an individual interview

Focus groups

- Not great for testing usability because you can't watch multiple people use software at the same time
- Sometimes an opinionated individual can dominate a focus group
- Hard to publish paper based only on one or two focus groups

Planning a focus group

- Develop very detailed script to guide you
- Pre-screen participants to get a good mix of people who meet your criteria
- Setup audio and video recorders, but don’t make people feel under surveillance

Planning a focus group

- Helpful to have at least 2 people: moderator + note taker
- Give people name tags with their first name only
- Plan to do multiple focus groups to mitigate effects of dominant participant steering conversation

Conducting a focus group

- Make the session fun, informal, relaxed feel
  - Provide drinks and snacks
- Promote a free flowing conversation that engages all participants
- Ask open ended questions
  - Show people multiple things and ask them to compare
  - Give demos or show videos to start-off discussion
  - Give people handouts and ask them to circle things they like/don't like, or jot down first impressions before group discussion

DIARY STUDIES

Benefits of a diary study

- Rich longitudinal data from a few participants in a natural environment
  - Explore natural reactions and occurrences
  - Examine over longer time periods
  - “Existence and quantity” of phenomena
  - Provide concrete examples to discuss during interview

Benefits of a diary study

- Examples
  - Record every time you self-censor a Facebook post
  - Record every time you authenticate
  - Record every time you share a file
  - Take a photo of anything you see that helps people protect privacy
  - Every evening, think about your day and write about the most frustrating thing that happened

Logistics

- Participants may record words on paper, on a computer, on a mobile device, with camera, with voice recorder
  - Unstructured and open ended, or filling out form
- Once per day diaries, quick entries throughout the day, or quick entries with detail added once per day
- Provide clear instructions and expectations
- A lot of work for participants, pay them well

Usability Design

- Understanding User Motivation

Study Positive Outcomes

- An implicit insight
- Finding a surprising or missing element
- Finding out why people do unusual things
- Detecting explanation to a contradiction
- Knowing what the subject will say next

Study Positive Outcomes

- You can tell a good story
- You want to make what you learned public
  - Tell your family, friends and even strangers
  - Write and publish

Caveats of User-Centered Design

- Users are not always right
  - cannot anticipate new technology accurately
  - job is to build system users will want
    - not system users *say* they want
    - if you can't get users interested in your hot idea, you're probably missing something
- Design/observe forever without prototyping
  - rapid prototyping, evaluation, & iteration is key

TEAMWORK

Topics for Today

- Writing a survey
- Project proposal
- Teamwork
- Team building exercise

What is a Survey/Literature Review?

- A critical summary of what has been published on a topic
  - What is already known about the topic
  - Strengths and weaknesses of previous studies
  - Often part of the introduction or a section of a research paper, proposal, or thesis
    - You will write one for your project

Properties of a good survey

- be organized around and related directly to your research question
- synthesize results into a summary of what is and is not known
- identify areas of controversy in the literature
- formulate questions that need further research

Creating a survey

- Don’t create a list of article summaries or quotes
- Do point out what is most relevant about each article to your paper
- Do compare and contrast the articles you review
- Do highlight controversies raised or questions left unanswered by the articles you review
- Do take a look at some examples of literature reviews or related work sections
  - in papers assigned for this class
    - before you try to create one yourself

Team work

- What are some effective strategies for working in teams?

Effective teamwork

- Good communication
- Timeline with deadlines
- Regular meetings
- Divide up responsibilities (but help teammates when they need it)

Team building exercise

- You have 30 minutes to work in your teams and produce the following deliverables:
  - A short name for your team
  - A team logo
  - A team slogan
  - A 1-minute advertisement for your project
    - Everyone on your team must say something
    - You may use slides and/or chart paper and anything you have with you as props
    - Display your team name, logo, and slogan

PARTICIPANT RECRUITMENT

Recruiting Participants

- Recruiters with clipboards (or booth/table) on campus, where you have permission, public place
- Facebook ads, Google Surveys
- Email to membership organizations (perhaps in exchange for donations)
- Panels, participant pools
- Flyers on bulletin boards, telephone polls, bus stops
- Crowdsoucing services

Flyers

- Big headline to grab attention,
- color and/or graphics to stand out
- Not too many words, use bullets
- Explain who qualifies, location, time commitment
- Make it easy to contact you
  - Tear-offs, URL, QR code

Requirements for ethical studies

- Minimize risk to participants throughout study
  - Exposure of personal information, physical and psychological harm
  - Is there a less risky approach?
- Obtain participant consent (or waiver from IRB)
- Debrief if necessary
- Treat participants fairly

Requirements for ethical studies

- Don’t coerce to participate, allow participants to quit
  - How can we make sure participation is voluntary?
- Monitor for problems, address them quickly, stop study if need be

Deception

- Do we mind if participants know precisely what is being studied?
  - Sometimes, it's crucial that we observe their responses in context
    - Making them aware of the study purpose will change its outcome
      - For example, studying a phishing response
- What "deception" or "distraction" task can we introduce?
- How can we introduce deception ethically?
  - IRB will generally require you to debrief participants
  - How do we debrief?

Social Phishing (Jagatic et al., 2007)

- How did they obtain consent?
- What ethical concerns are there?
  - What seemed to be done well?
  - What could have been done better?
- Who was potentially affected by the study?

- * Tom Jagatic, Nathaniel Johnson, Markus Jakobsson, and Filippo Menczer. Social phishing. In Communications of the ACM, Volume 50, Issue 10, pp. 94-100, October 2007.

Social Phishing (Jagatic et al., 2007)

- Paper states that:
  "The number of complaints made to the campus support center was also small (30 complaints, or 1.7% of the participants)."
  - Is there any cause for concern?

- * Tom Jagatic, Nathaniel Johnson, Markus Jakobsson, and Filippo Menczer. Social phishing. In Communications of the ACM, Volume 50, Issue 10, pp. 94-100, October 2007.

Summary

- Work in teams
  - Collaborate and exchange ideas
- Create a survey
  - Learn about existing research
- Recruit participants for your study
  - Using advertising,

Questions?