



# 02- Intro to HCI Methods and the Design of Studies

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*Usable Privacy and Security*

# Who you are?

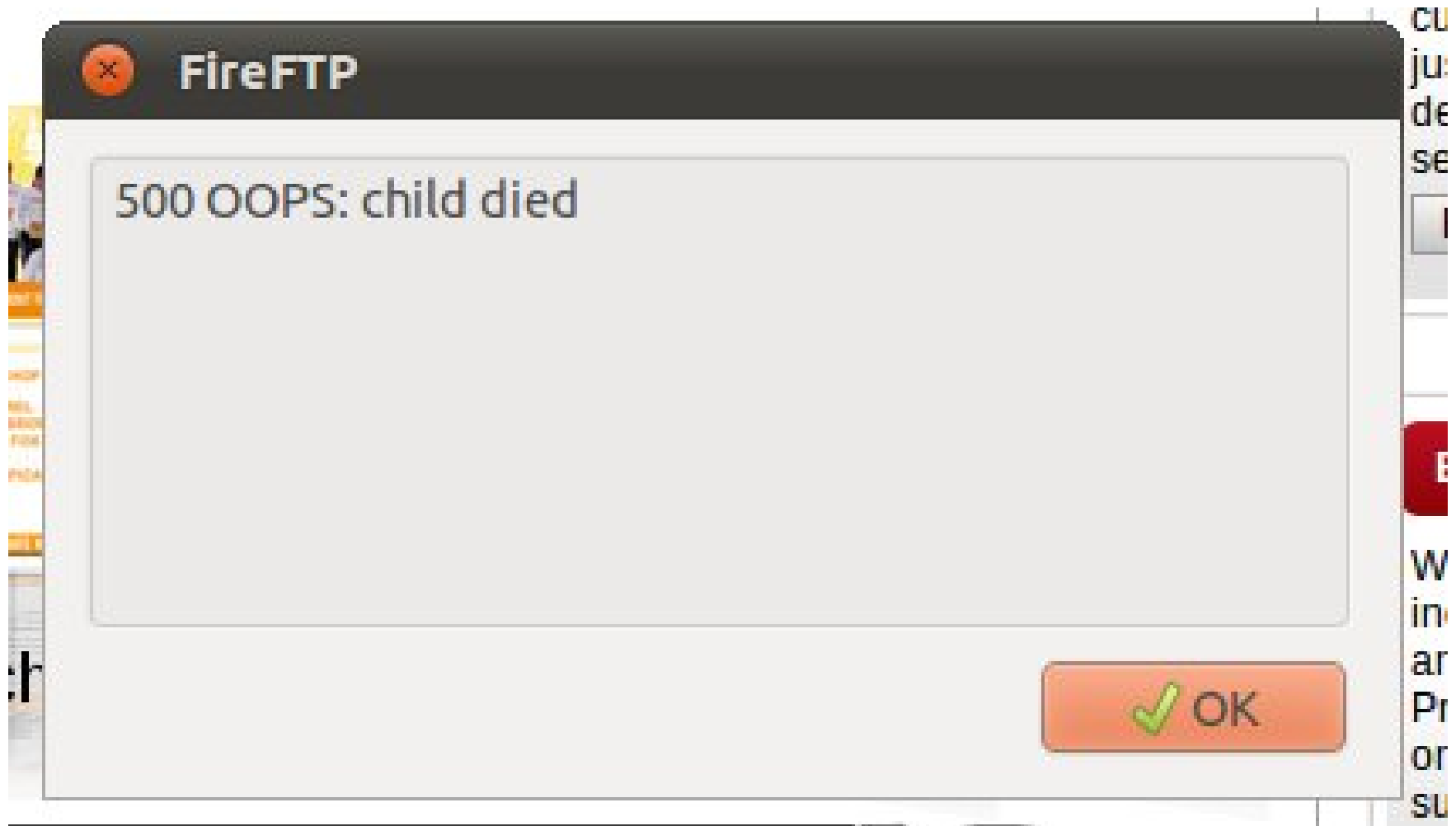
- Your preferred name
- Program at CMU (e.g., Privacy Engineering, COS, ECE, Master's in HCI)
- Why did you sign up for this course?

# Human-Computer Interaction (HCI)

- You are not the user! You know too much!
- Think about the user throughout design
- Involve the user



# Human-Computer Interaction (HCI)



# Human-Computer Interaction (HCI)



# What is usable?

- Intuitive / obvious
- Efficient
- Learnable
- Memorable
- Few errors
- Not annoying
- Status transparent



THE AUTHOR OF THE WINDOWS FILE COPY DIALOG VISITS SOME FRIENDS.

Image from <http://www.xkcd.com>

# Difficulties

- Many systems and platforms
- Users are different from one another
- Required standards (or no standards)
- Documentation won't necessarily be read
- Performance
- Legal / time pressures
- Social and external factors

# Determine use cases and goals

- What are the concrete tasks users should be able to accomplish?
  - Based on understanding of users!
- Set realistic metrics



# Personas (example)



**Name:** Patricia

**Age:** 31

**Occupation:** Sales Manager, IKEA Store

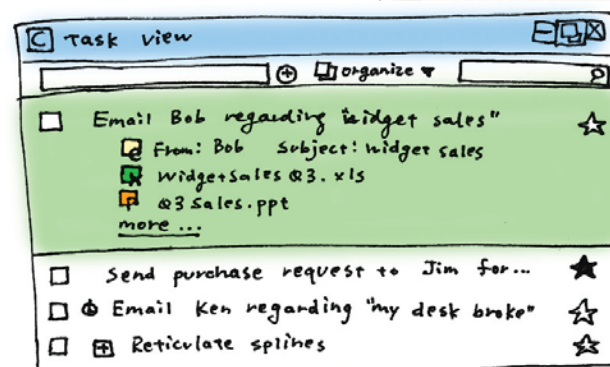
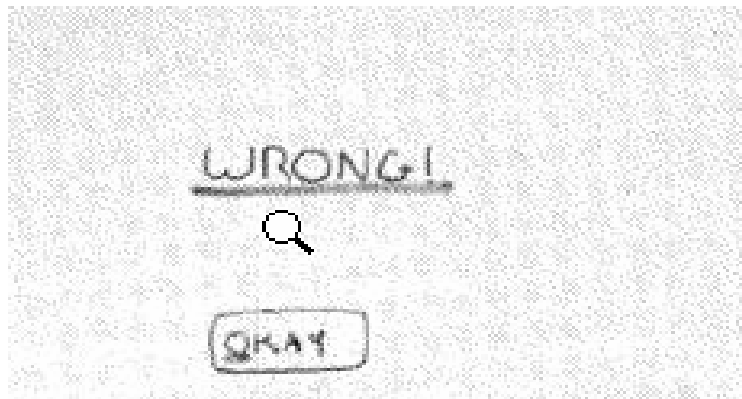
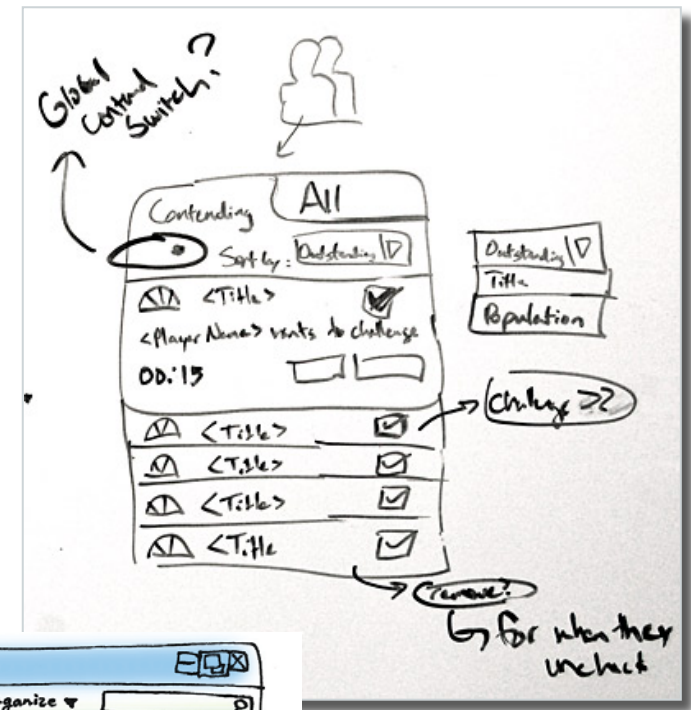
**Hobbies:** Painting  
Fitness/biking  
Taking son Devon to the park

**Likes:** Emailing friends & family  
Surprises for her husband  
Talking on cell phone with friends  
Top 40 radio stations  
Eating Thai food  
Going to sleep late

**Dislikes:** Slow service at checkout lines  
Smokers

# Iterative prototyping is crucial!

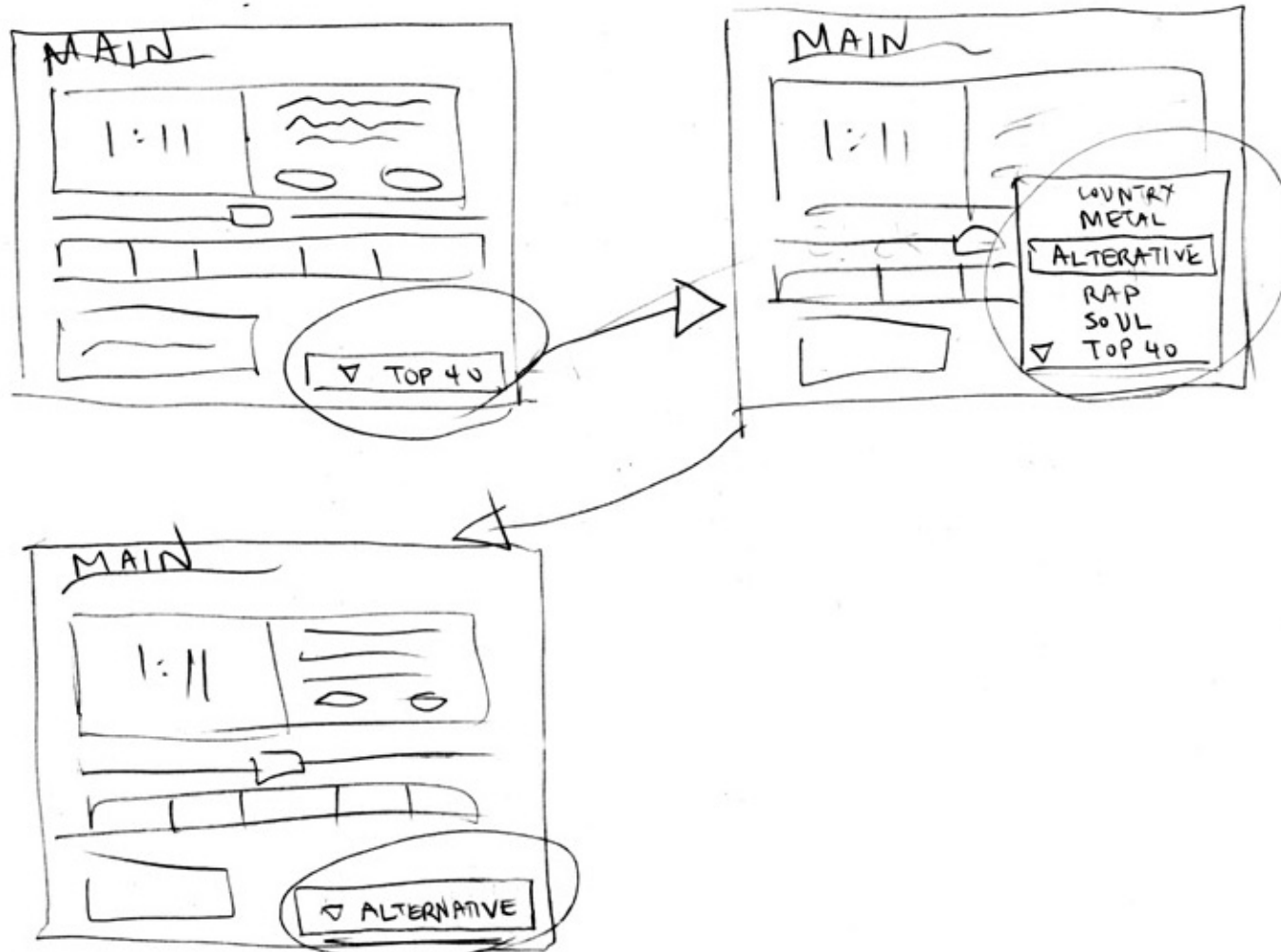
High-fidelity, "Wizard of Oz," low-fidelity



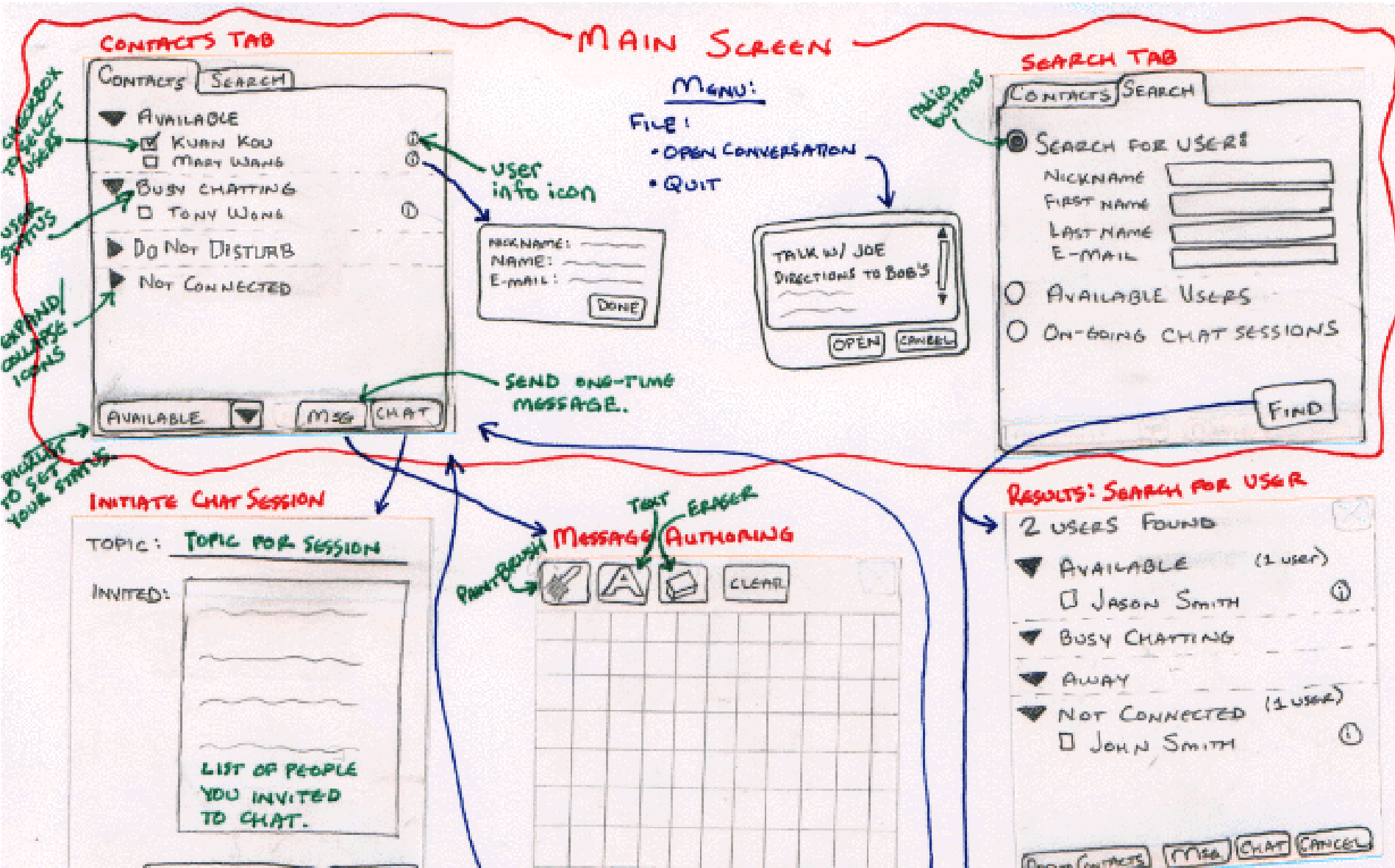
# Iterative prototyping is crucial!

SCENARIO 1

"I want to listen to alternative music"

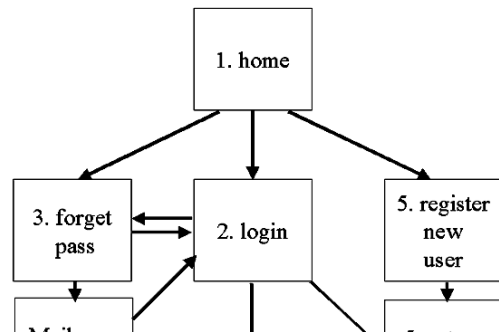


# Iterative prototyping is crucial!



# Usability prototyping for websites

## Site Maps



## Storyboards



## Schematics

| Sales Home       | (Site Branding)   |  |
|------------------|---|--|
| Acme, Inc.       | (What this site is about) Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed diam nonummy nibh euismod tincidunt ut laoreet dolore magna aliquam erat volutpat. | Contact email<br>Search: <input type="text" value="width = x char"/> |
| Kids             | News Topic  |  |
| Outdoors         | <ul style="list-style-type: none"> <li>This month's news release (date)</li> <li>This month's news release (date)</li> </ul>  |  |
| Catalogue        | News Topic  |  |
| Travel           | <ul style="list-style-type: none"> <li>This month's news release (date)</li> </ul>  |  |
| Features         | News Topic  |  |
| About This Site  | <ul style="list-style-type: none"> <li>This month's news release (date)</li> </ul>  |  |
| (global nav bar) | <ul style="list-style-type: none"> <li>This month's news release (date)</li> </ul>  |  |
|                  | <ul style="list-style-type: none"> <li>This month's news release (date)</li> </ul>  |  |
|                  | Acme, Inc. - sales home<br>section 1 - section 2 - section 3 - section 4 - section 5<br>section 6 - section 7 - section 8 - section 9                                     |  |

## Mock-ups

# Paper prototypes

- Don't overthink. Just make it.
- Draw a frame on a piece of paper
- Sketch anything that appears on a card
- Make all menus, etc.
- Redesign based on feedback
- “Think aloud”

# Think aloud example

- Download and install software that lets you encrypt your email
  - Verify that it is installed
- Things you can ask:
  - What are you thinking now?
  - What do you expect to happen if you do X?
  - How did you decide to do that?

# Paper prototype example (in groups)

- Draw a paper prototype of a tool to encrypt emails sent on Gmail
  - First step: Identify two tasks that you want to make sure are usable



# Research studies: purpose and goals

- What are you hoping to learn?
- What are your hypotheses?
  - Sometimes listed explicitly in a paper
- What are your metrics for success?
  - More secure, quicker to use, more fun, etc.
- What are you comparing to?
- What data might be helpful?

# Broad types of studies

- Field study
- Laboratory study
- Online study
- (Measurement study)

**STAND BACK**



**I'M GOING TO TRY  
SCIENCE**

# Quantitative vs. Qualitative

- Quantitative: you have numbers (timing data, ratings of awesomeness)
- Qualitative: you have non-numerical data (thoughts, opinions, types of errors)

# Types of studies

- Find out what people want:
  - Contextual inquiry
  - Interviews
  - Focus groups
  - Surveys
  - Diary study (prompt people)
- Find out what/how people think:
  - Interviews
  - Surveys

# Types of studies

- Expert evaluation of usability:
  - Cognitive walkthrough
  - Heuristic evaluation
- Usability test:
  - Laboratory (“think aloud”)
  - Online study
  - Log analysis

# Types of studies

- Controlled experiments to test causation:
  - e.g., A/B testing
    - Role-playing
    - Experiments in the field
- Varying different conditions
  - Full-factorial design or not

# Data to collect during experiments

- Independent vs. dependent variables
- Performance (time, success rate, errors)
- Opinions and attitudes
- Audio recording, screen capture, video, mouse movements, keystrokes
- Formative (initial) vs. summative (validate)

# Even more data to collect

- Demographics
  - Age, gender, technical background, income, education, occupation, location, disabilities, first language, privacy attitudes, etc.
- Open-ended questions
- Preferences and attitudes

*Please respond to the following statements:*

*\*This user interface was difficult to understand*

*1- Strongly disagree 2- Disagree 3- Neutral 4- Agree 5- Strongly agree*

*\*This tool was fun to use*

*1- Strongly disagree 2- Disagree 3- Neutral 4- Agree 5- Strongly agree*



# Logistics for a study

- How many participants?
  - Statistical power
  - Time, budget, participants' time
- What kind of participants?
  - Skills, background, interests
  - Their motivations
  - Often not a “representative sample”
- What do you need to build, if anything?
  - Prototype fidelity

# Study designs

- Between subjects
  - Each participant tests 1 version of the system
  - You compare these groups
  - Groups should be similar (verify!)
- Within subjects
  - Every participant tests everything
  - Very important to randomize order!
  - Fewer participants