

05- Methods and Experiments

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Usable Privacy and Security

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Today's class

- General HCI design methods
- Types of research studies
- Overview of research methods
- Study logistics and validity
- Participant recruitment
- Deception and ethics

HCI Design Methods

Human-Computer Interaction (HCI)

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



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 competing against usability

- 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

Example: personas



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

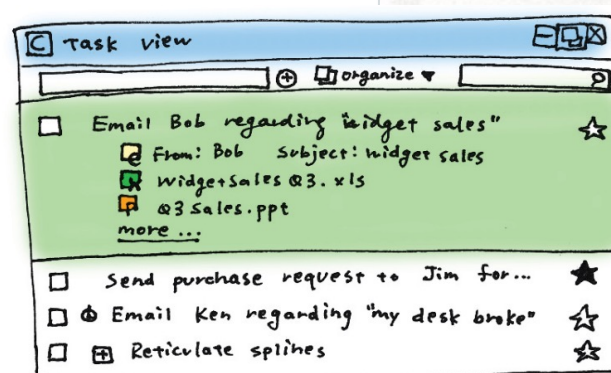
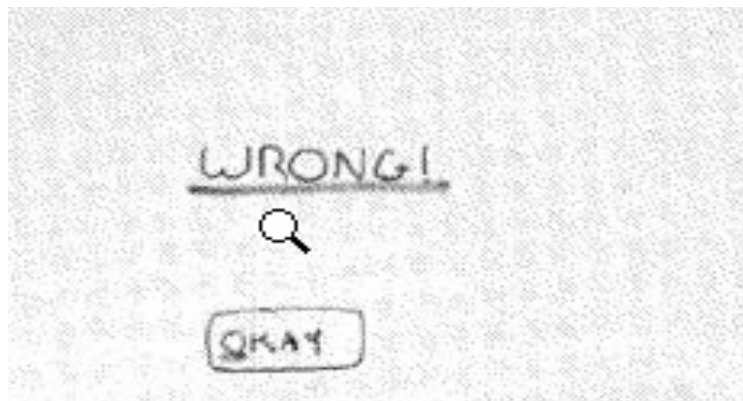
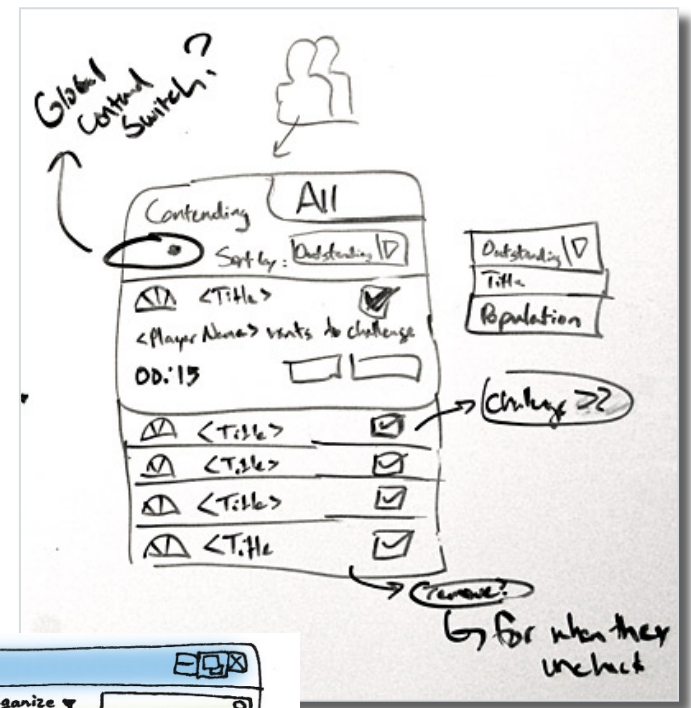
Dislikes: Slow service at checkout lines
Smokers

Example: paper prototypes

- Don't over think. 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”

Iterative prototyping is crucial!

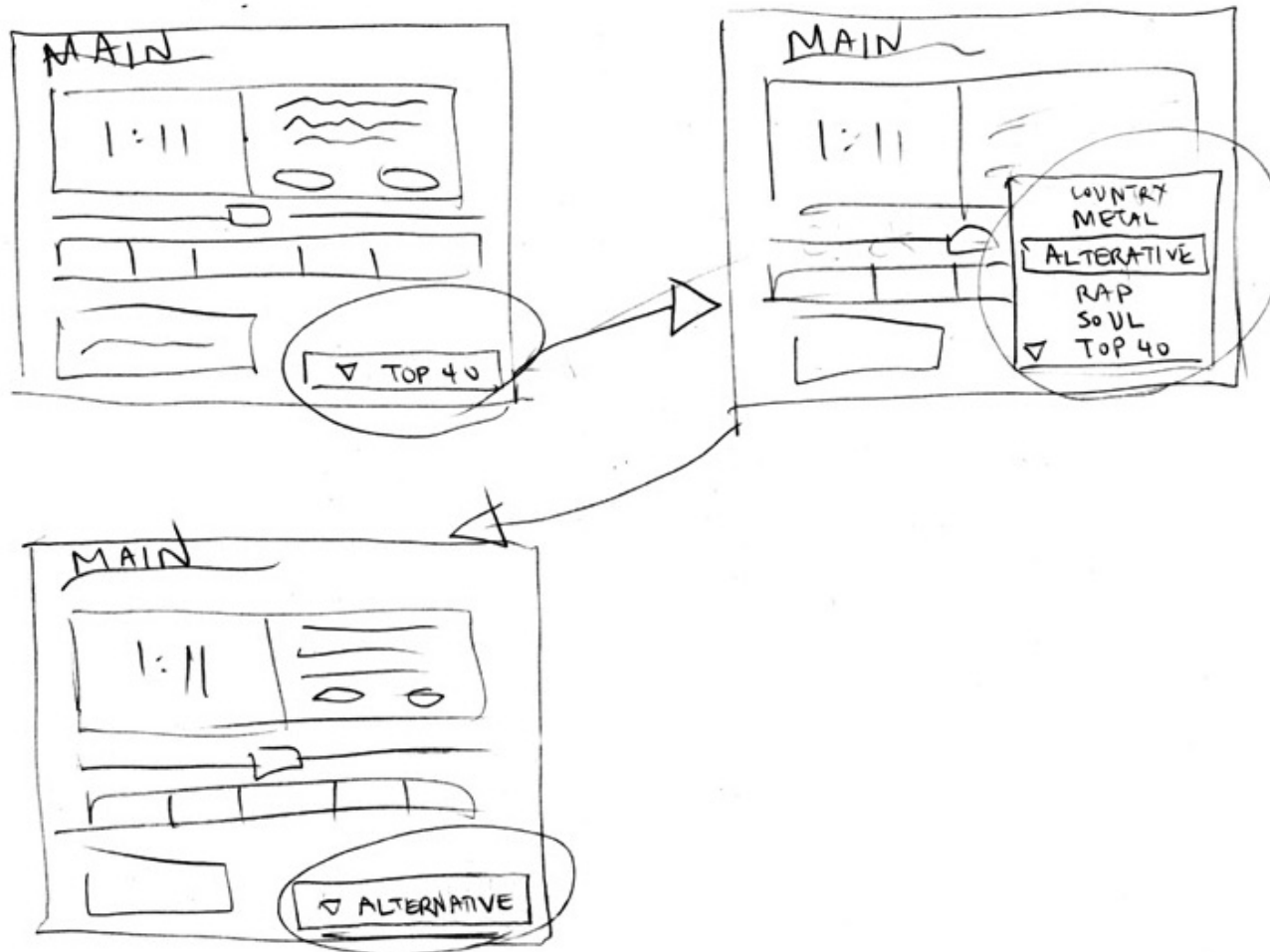
High-fidelity, "Wizard of Oz," low-fidelity



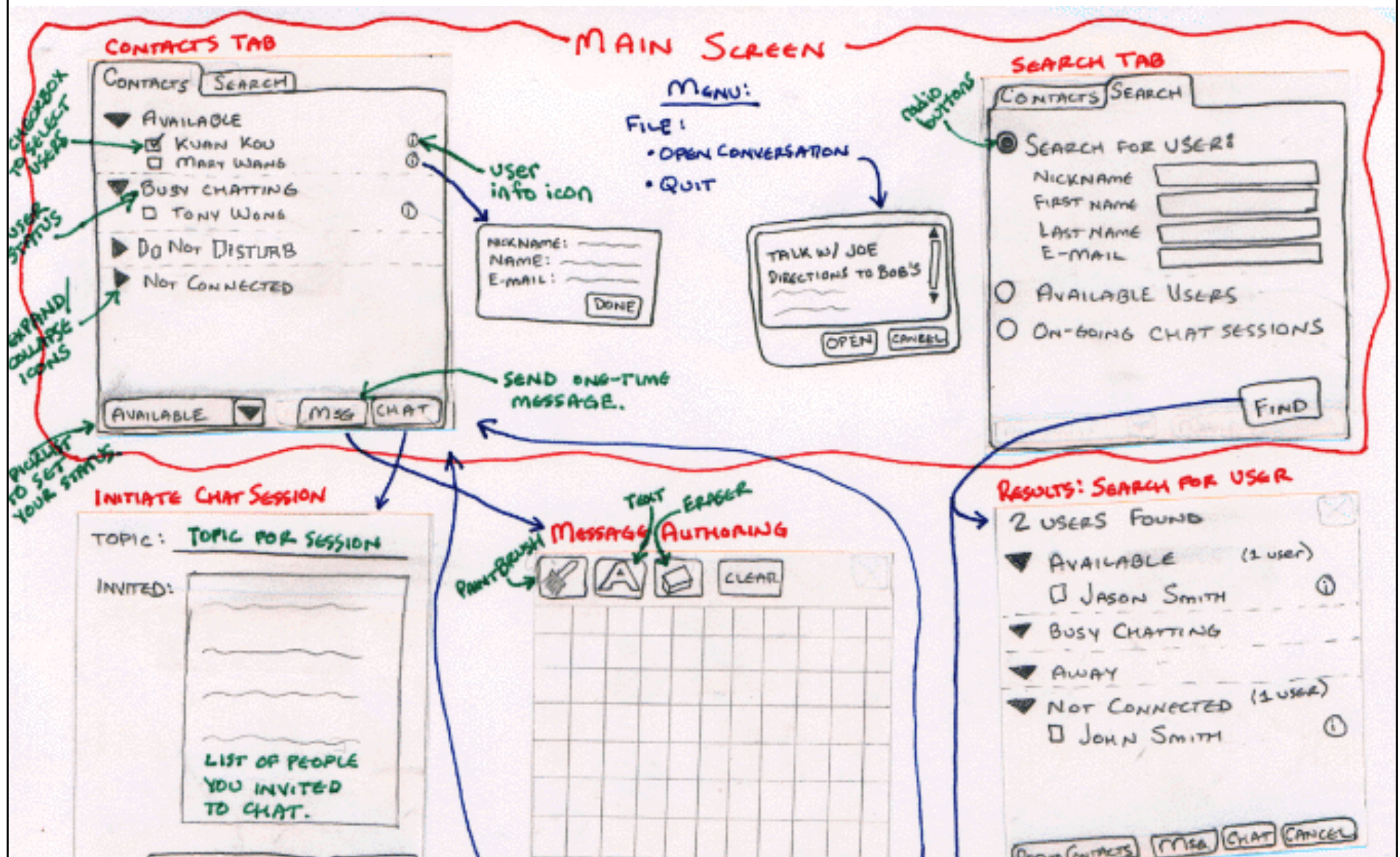
Example: low-fidelity paper prototype

SCENARIO 1

"I want to listen to alternative music"

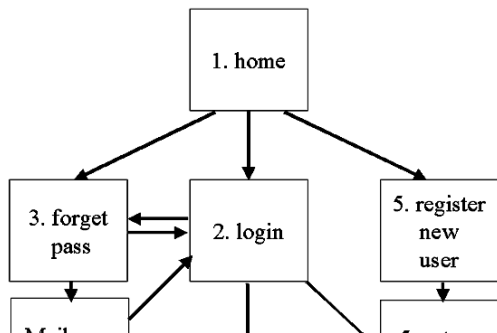


Example: high-fidelity paper prototype

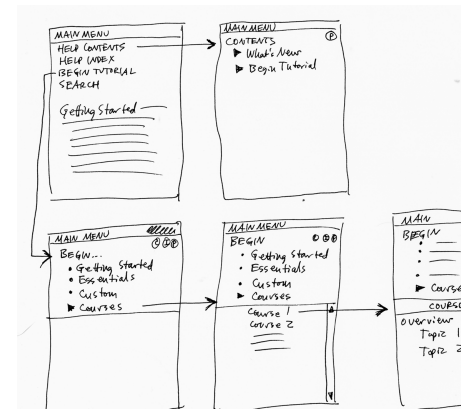


Example: usability prototyping for websites

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 Search: <input type="text" value="width = x char"/>
Kids	News Topic	
Outdoors	<ul style="list-style-type: none"> This month's news release (date) This month's news release (date) 	
Catalogue	News Topic	
Travel	<ul style="list-style-type: none"> This month's news release (date) 	
Features	News Topic	
About This Site	<ul style="list-style-type: none"> This month's news release (date) 	
(global nav bar)	<ul style="list-style-type: none"> This month's news release (date) 	
	Acme, Inc. - sales home section 1 - section 2 - section 3 - section 4 - section 5 section 6 - section 7 - section 8 - section 9	

Mock-ups

Example: think aloud

- Download and install software that lets you encrypt your email
 - “Think aloud” of whatever’s on your mind
 - Give them an example
- Additional 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?

Research Studies and Methods

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

- Descriptive study
- Relational study
- Experimental study
- Formative (initial) vs. summative (validate)

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 (1)

- What people want/think/do overall:
 - Surveys
 - Interviews
 - Focus groups
- What people want/think in context:
 - Contextual inquiry (interviews)
 - Diary study (prompt people)
 - Observations in the field

Types of studies (2)

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

Types of studies (3)

- Controlled experiments to test causation
- Varying different conditions
 - Full-factorial design or not
 - Independent and dependent variables
- Many methods apply (e.g., surveys can be designed to test causation)
 - Role-playing studies
 - Field studies

Study designs

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

Data to collect during experiments

- Performance (time, success rate, errors)
- Opinions and attitudes
- Actions and decisions
- Audio recording, screen capture, video, mouse movements, keystrokes

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

Validity

- Is this study **ecologically valid**?
 - Does it mirror real-life conditions and context?
- To what degree can we generalize about our results (**externally valid**)?
 - What biases does our sample introduce?

Participants, ethics, and deception

Participants (1)

- Recruit people to do something remotely (e.g., online)
- Recruit people to come to your lab
- Recruit people to let you into their “context”
- Observe people (if possible, get consent! If not possible, consider necessity of design)

Participants (2)

- What recruitment mechanisms?
 - Craigslist, flyers, participant pools, representative sample, standing on street
- How do you compensate them?
 - Ethics of paying \$0.00 vs. \$10.00 vs. \$100,000
- How do you get informed consent?
- What happens to their data?
- Prior knowledge / “what” are they?

Ethics

- How do we protect participants?
 - What risks do we introduce?
- Is there a less invasive method that would give equivalent insight?
- IRB is one arbiter of ethics; experimenters themselves are another crucial arbiter
- How do we make sure participation is voluntary throughout the experiment?

Deception

- Do we mind if participants know precisely what is being studied?
 - Sometimes, it's crucial that we observe their organic responses in context
- What “deception” or “distraction” task can we introduce?
- How do we maintain ethics?
- How do we debrief people at the end?

Institutional Review Board (IRB) Process

- Is it research? Are there human subjects?
- Full review vs. expedited vs. exempt
- Fill out and submit protocol
 - Include all study materials (e.g., surveys)
 - Include recruitment text and/or poster
 - Leave plenty of time

Social phishing (Jagatic et al., 2007)

- Use social networking sites to get information for targeted phishing
 - “In the study described here we simply harvested freely available acquaintance data by crawling social network Web sites.”
- “We launched an actual (but harmless) phishing attack targeting college students aged 18–24 years old.”

Social phishing (Jagatic et al., 2007)

- Control group: message from stranger
- Experimental group: message from a friend
- Used university's sign-on service to verify passwords phished

Ethics (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?
- “The number of complaints made to the campus support center was also small (30 complaints, or 1.7% of the participants).”