Week 5: Study Design

Monday lecture

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Slides inspired by previous HCI lecturers: Nicole Meng-Schneider, Kami Vaniea, John Vines

mid-semester feedback

- Please fill out the quick survey by **Oct. 17**

- What should we start doing?
- What should we stop doing?
- What should we continue doing?

- https://forms.office.com/e/6ijiRaRBh9

today

- Assignment 2: (Re)Design & Evaluation Design
- Study design re-cap & examples

Assignment 02: (Re)design & evaluation design [group work; due Nov. 28]

what's involved

1. Redesign the interactive system from assignment 1, based on
   - Your heuristic evaluation results and/or
   - Any additional ideas you may have

   → A design mock-up created in Figma

2. Design a user study of your redesign

   → A description of your study design

Redesign the interactive system from Assignment 1

1. Re-visit the results of your heuristic evaluation
   - What usability issues would you like to address as part of your re-design cycle, and why?
   - Do you want to re-design specific features, or do you have bigger ideas to re-design the whole system or larger parts of the system?
   - How can you transfer usability issues into possible design goals?
   - What are the interests of individual group members for this assignment?

   → Discuss these questions in your group

Redesign the interactive system from Assignment 1

1. Re-visit the results of your heuristic evaluation
2. Develop a persona in order to
   - Ground design goals in concrete considerations of the people you are re-designing the system for, and
   - Explore your design goals and the current problems of the system you aim at addressing

   → Re-visit videos & lectures from Week 3

Redesign the interactive system from Assignment 1

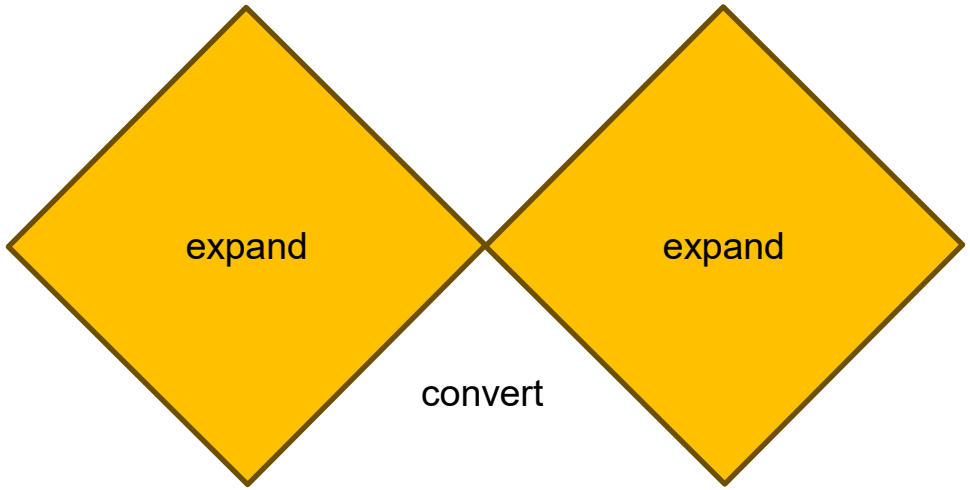
1. Re-visit the results of your heuristic evaluation
2. Develop a persona
3. Define the design goal(s) of your re-design
   - 1 design goal can be fine; more than 3 is probably too much
   - A design goal should cover the right level of detail
   - “Improve the usability of the system” – **too broad**!
   - “Re-design button X to better communicate its functionality – **too low-level**!
   - **Better:** “Improve the process by experts of creating a new mindmap”

Redesign the interactive system from Assignment 1

1. Re-visit the results of your heuristic evaluation
2. Develop a persona
3. Define the design goal(s) of your re-design
4. Define the tasks you would like to address as part of your re-design
   - Might be the same that they system is already trying to support
     - They may need to be adapted, based on your findings or the challenges you have identified
     - Related workflows may need to be improved
   - Might be new tasks that you think would improve the system
   - Tasks should link to design goals

Redesign the interactive system from Assignment 1

1. Re-visit the results of your heuristic evaluation
2. Develop a persona
3. Define the design goal(s) of your re-design
4. Define the tasks you would like to address as part of your re-design
5. Ideation & design iteration
   - Brainstorm and sketch multiple ideas that might help address your design goals
   - Iteratively merge and revise ideas to develop these further



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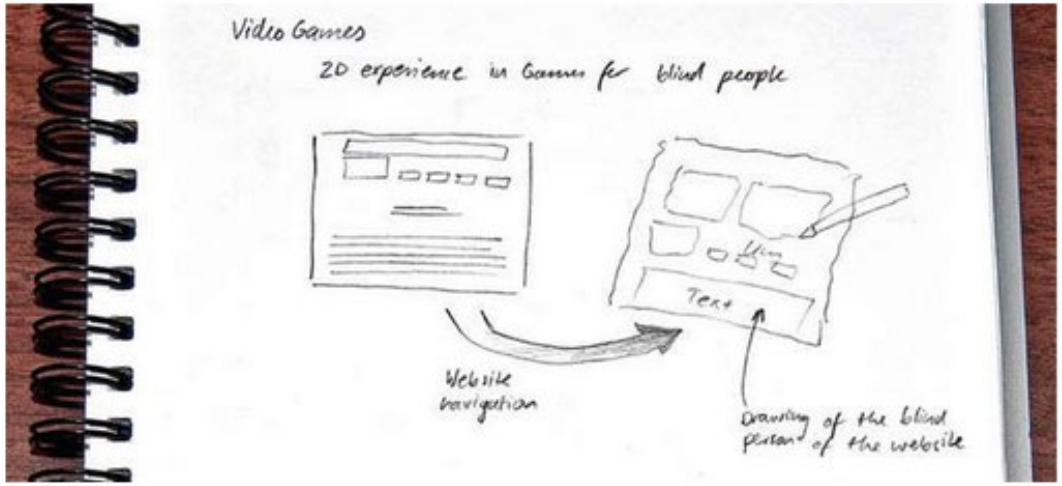


on generating ideas

10x10 method

- State your design challenge, for example, the usability issue you would like to solve
- Generate 10 or more different design concepts of a feature that addresses this challenge
  - Be as creative and diverse as possible
  - Don’t judge the merit of these concepts
  - Quickly generate as many concepts as possible; quantity over quality
- Reduce the number of design concepts
- Choose the most promising concepts as a starting point
- Produce 10 details and/or variations of a particular design concept
- Present & discuss

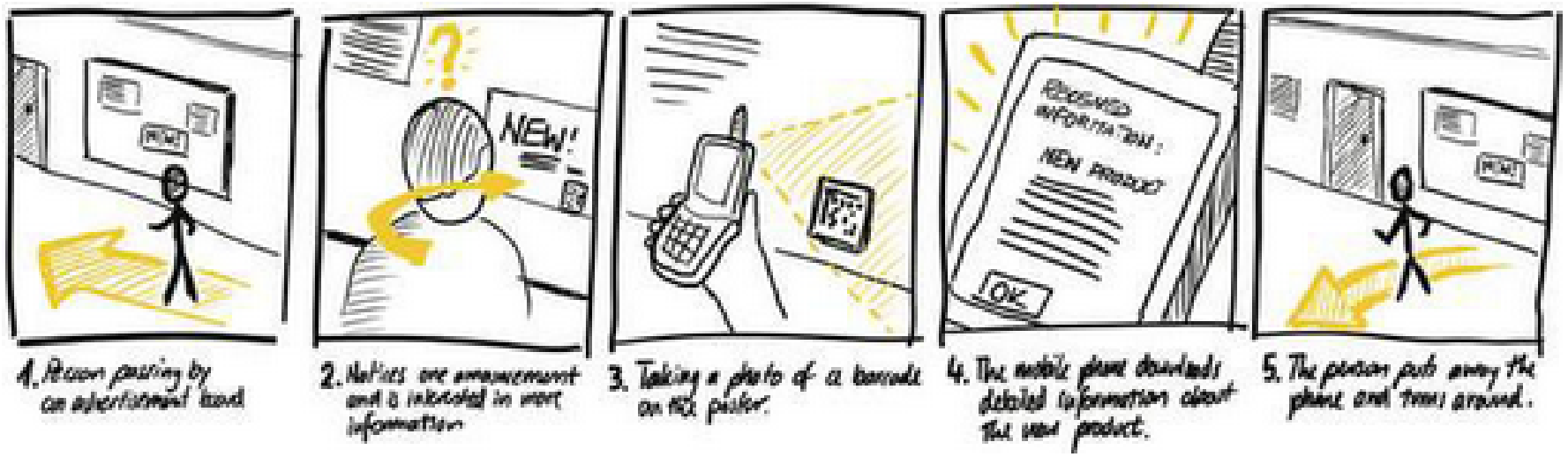
Sketching User Experiences. The Workbook. Greenberg, Carpendale, Buxton, Marquard. Chapter 5: 10 Plus 10. pp. 29 - 31

sketching

- Sketches are there to communicate ideas quickly
- Sketches are not drawings!
- Sketches do not have to be pretty!
- Sketches can be done using pen and paper, or whatever tool gets the job done quickly

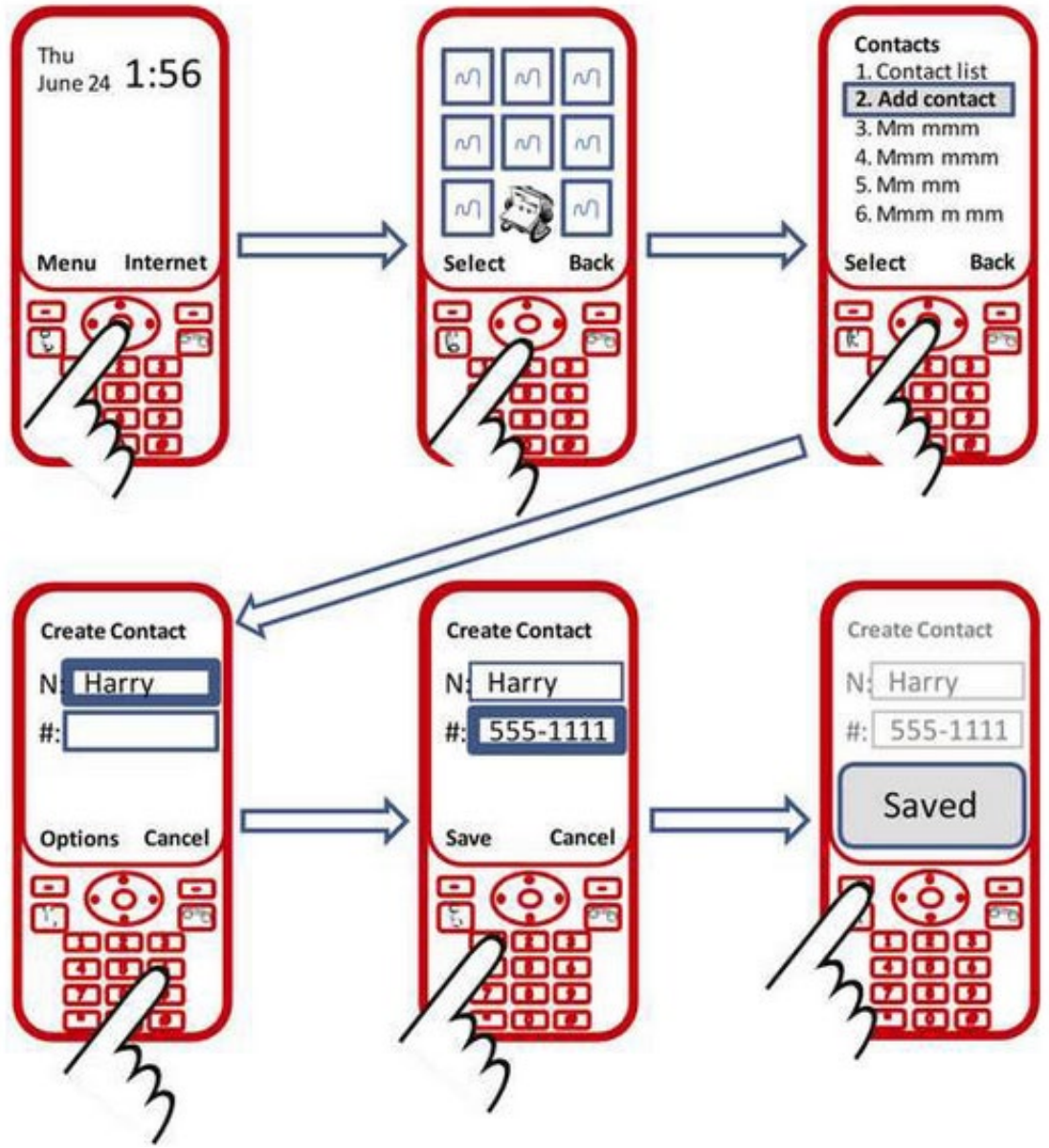
Sketching User Experiences. The Workbook. Greenberg, Carpendale, Buxton, Marquard. Chapters 13 – 15.

storyboarding



Sketching User Experiences. The Workbook. Greenberg, Carpendale, Buxton, Marquard. Chapter 28: The narrative storyboard. pp. 132 - 135

sketching interactions

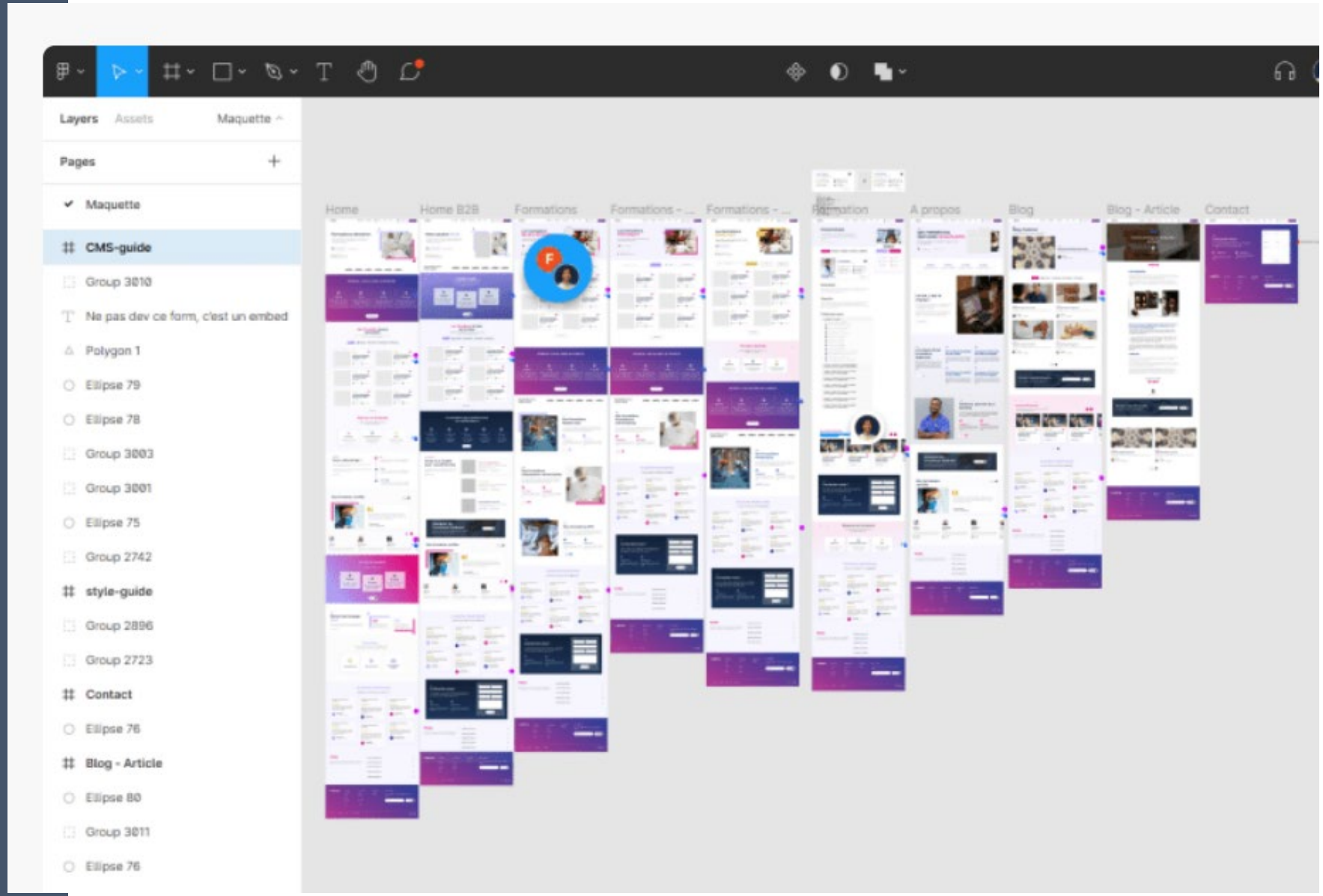


Sketching User Experiences. The Workbook. Greenberg, Carpendale, Buxton, Marquard. p. 122

Redesign the interactive system from Assignment 1

1. Re-visit the results of your heuristic evaluation
2. Develop a persona
3. Define the design goal(s) of your re-design
4. Define the tasks you would like to address as part of your re-design
5. Ideation & design iteration
6. Design Mock-up
   - The design concept: the design idea and how someone could interact with it
   - We do NOT expect and implemented prototype!
   - The mock-up should include those parts (pages, features, interactive elements) of the interactive system you choose to redesign
   - Not every single element has to be interactive, but your mock-up should be able to represent interactive features that are key for your redesign

final mock-up



https://help.figma.com/hc/en-us/articles/360040314193-Guide-to-prototyping-in-Figma

getting started with Figma

- Sign up for Figma for Education (free for students)
  - https://www.figma.com/education/
- Figma Learn contains many useful guides
  - https://help.figma.com/hc/en-us/categories/360002042553
- Getting started
  - https://help.figma.com/hc/en-us/categories/360002051613-Get-started
- Guide to prototyping in Figma
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what's involved

1. Redesign the interactive system from assignment 1, based on
   - Your heuristic evaluation results and/or
   - Any additional ideas you may have

   → A design mock-up created in Figma
2. Design a user study of your redesign

   → A description of your study design

Design a user study of your re-designed system

- **Study question(s)**
  - A definition of the question(s) you aim to answer with your user study.
- **Study method**
  - A description of the study methods you will apply to answer your question(s).
- **Study participants**
  - A brief characterization of your participants, and how might you recruit them. This may also include considerations of how many participants you may need.
- **Example study tasks**
  - A description of study tasks you will ask participants to complete as part of your study.
- **Data collection**
  - A description of what data you are planning to collect and how.
- **Data analysis**
  - An outline of how you are planning to analyse your study data.
- **Potential limitations**
  - A brief reflection on the potential limitations of your study method

deliverables

- Report (one submission per group)
  - Description of the system in focus
  - Design goals of your re-design
  - Design process
  - Description & illustration of your re-design
  - Link to Figma prototype
  - Description of your study design
  - Reflection on the collaborative process
- Grading of your fellow group members (individual submission; separate on Gradescope)
  - Average grade will influence 5% of the overall assignment grade

some notes

- It makes sense to keep focusing on the system you evaluated as part of Assignment 1. However, if there is a problem with this, do let us know.
- We do not expect you to program a fully functioning prototype! We are looking for a mock-up!
- Do not run the study you have designed! We don’t have Ethics for this!
- Please reach out to us, if you are worried about the group work aspect.

re-cap study design

expert evaluation: pros & cons

(Heuristic evaluation & Cognitive Walkthrough)

- Pros
  - No need to apply for ethics, recruit study participants
  - Finding potentially expensive problems at minimal expense
- Cons
  - Heuristics, in particular, represent “rules of thumb”, but they may not apply to all systems and contexts and all problems that may occur
  - Experts are not the same as real-world users; some issues may be missed

Usability in itself is not a design requirement!

Usability depends on

- The design of system features
- The people who will use the system
- The goals/tasks that people have/will want to accomplish
- The environment/context in which the system exists

→ When designing usability studies, we need to define what we mean by “usability”

Usability Testing

- Define design requirements
  - What problems should the system help solve?
- Define specific usability goals (define what “usability” means in our context)
  - What should the system enable people to do?
  - How should people feel after using the system
  - How is interaction with the system supported?

→ All requirements and goals need to be quite specific, so we can understand whether they have been fulfilled or not.

Usability Goals

- Task completion time
  - People can accomplish a task in X minutes
  - People accomplish a task faster using System A than System B
- Error rate
  - People can accomplish a task with no major errors
  - People can accomplish a task with less errors using System A compared to System B
- People can accomplish tasks using the system without instructions (→ walk-up-and-use)
- People can accomplish specific tasks and are satisfied with their results
- People use the system more frequently

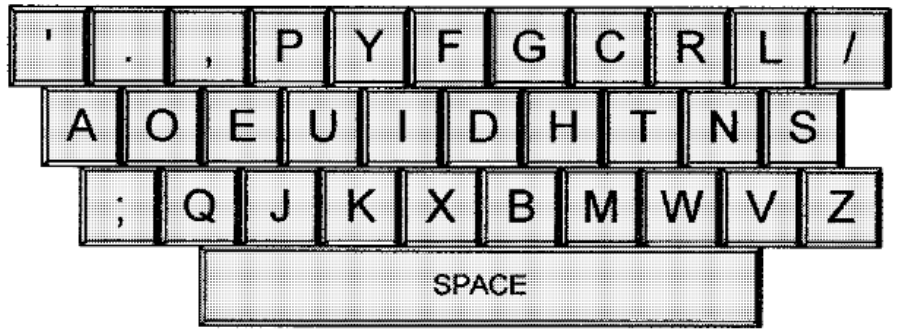
study types

Lab studies

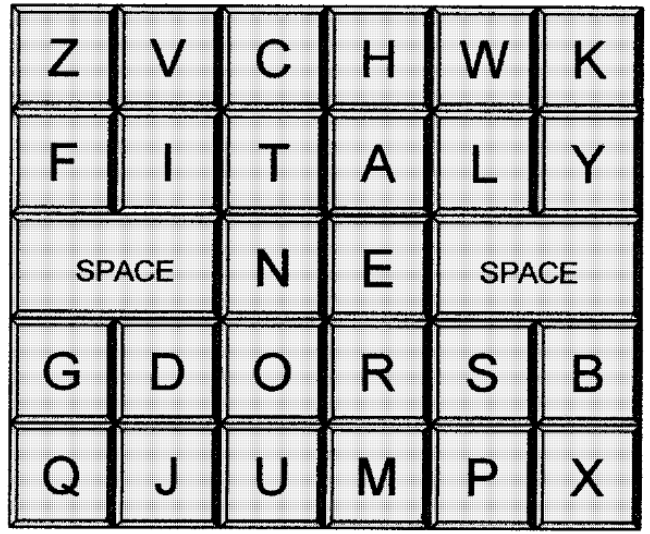
- Observation
- Think aloud
- Focus groups
- Interviews
- Quantitative testing (efficiency & error rate)
- Comparative studies (A/B testing)

Lab study: A/B testing

- Research question:
  - Which soft keyboard is quicker for text entry?
- Goal:
  - Make text entry on soft keyboards more efficient
- Study design
  - Within subjects: participants use both keywords
  - Typing speed and error rate are measured
- Why this method?
  - Control factors that may influence typing speed and error rate as much as possible, leading to generalizable results



Dvorak layout



Fitaly layout

Lab study: observation

- Research question:
  - How do small group collaborate on tabletop displays using dynamic interface elements?
- Goal:
  - Better understand collaborative dynamics around tabletop displays and how to support these.
- Study design
  - Groups of 2
  - Open-ended storytelling task
  - Video recording & interviews
- Why this method?
  - Be able to observe how collaboration unfolds in open-ended tasks

http://www.utahinrichs.de/Projects/InterfaceCurrents

Lab study: focus group

- Research question:
  - How can we make visitors and cohabitants aware of smart speaker without overstepping social boundaries?
- Goal:
  - Gain a better understanding of how smart speakers should be introduced (by whom, how and when)
- Study design
  - Share scenarios with participants
  - Let them sketch/act out (on paper) how they would introduce the smart speaker
  - Discuss their outcomes and what influenced these
- Why this method?
  - Get participants imagine and discuss different scenarios

Lab study: testing a museum exhibit prototype

- Research question:
  - How do potential museum visitors (families) interact with a novel museum exhibit?
- Goal:
  - Improve the design and usability of the exhibit
- Study design
  - Invite families to interact to freely interact with the exhibit in a lab environment
  - Interview them for feedback
- Why this method?

E. Hornecker and E. Nicols. Towards the Wild: Evaluating museum installations in semi-realistic situations. *Re-thinking Technology in Museums 2011 Conference*. 2011. http://www.ehornecker.de/Papers/HorneckerNicolFinal.pdf

context matters

E. Hornecker and E. Nicols. Towards the Wild: Evaluating museum installations in semi-realistic situations. *Re-thinking Technology in Museums 2011 Conference*. 2011. http://www.ehornecker.de/Papers/HorneckerNicolFinal.pdf

study types

Lab studies

- Observation
- Think aloud
- Focus groups
- Interviews
- Quantitative testing (efficiency & error rate)
- Comparative studies (A/B testing)

- Pros
  - Controlled environment
  - Less distractions
  - Participants more focused and attentive
  - Use of specialized equipment to gather data is possible (e.g., eye tracking, video and voice recording)
  - High generalizability (if the study is designed well)
- Cons
  - Relatively small participant numbers
  - Unrealistic setting
  - Results may not be “ecologically valid”; they may not apply to real-world settings

study types

Online study

- Survey
- Quantitative testing (efficiency & error rate)
- Comparative studies (A/B testing)
- Automatic logging of interactions

Online survey: data physicalization & sustainability

- Research question:
  - How do data physicalization designers and artist approach physicalization projects and reflect on sustainability?
- Goal:
  - Provide a comprehensive perspective on sustainability in Data Physicalization
- Study design:
  - Online survey targeting the community of data physicalization designers
  - Surevey included questions regarding the disposal, reuse, and material selection as part of designers' physicalization practice
- Why this method?
  - Expand the pool of participants

Moras et al. From Exploration to End of Life: Unpacking Sustainability in Physicalization Practices. CHI'24
https://arxiv.org/abs/2402.09860

study types

Online study

- Survey
- Quantitative testing (efficiency & error rate)
- Comparative studies (A/B testing)
- Automatic logging of interactions

- Pros
  - Time efficient (for the researcher)
  - Large and/or diverse participant sample
- Cons
  - No follow-up questions possible (typically)
  - Uncontrolled environment (we don’t know the conditions under which the tasks are accomplished)

study types

In-the-wild study (field study)

in the wild / field study

People’s home

Health environments

Airport control room

Museum spaces

study types

In-the-wild study (field study)

- Observation
- Think aloud
- Focus groups
- Interviews
- Comparative studies (A/B testing)

- Study is conducted in a real-world environment
- Participants are not provided tasks, but act and interact as they normally would
- Typically, participants are not recruited in advance
- Ethnographic approach

study types

In-the-wild study (field study)

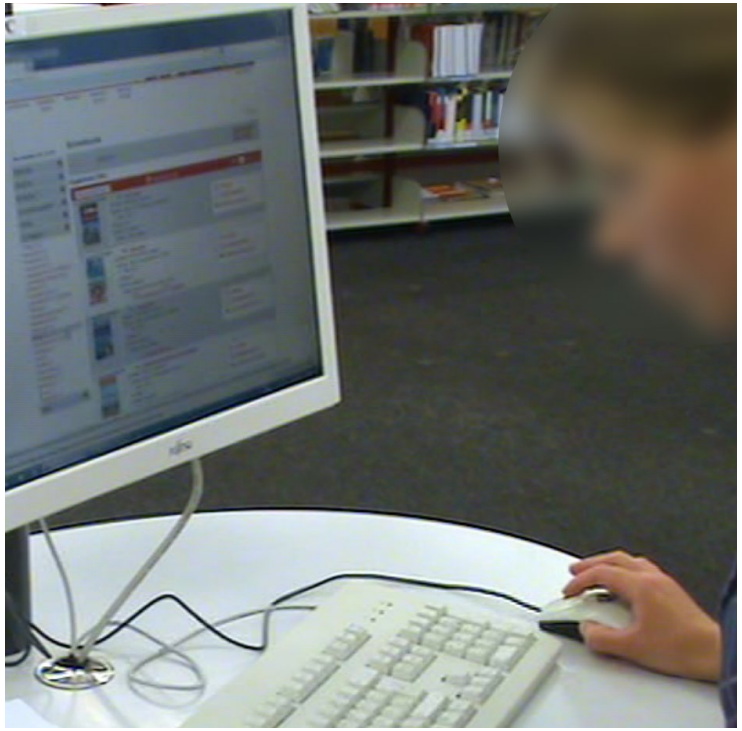
- Observation
- Think aloud
- Focus groups
- Interviews
- Comparative studies (A/B testing)

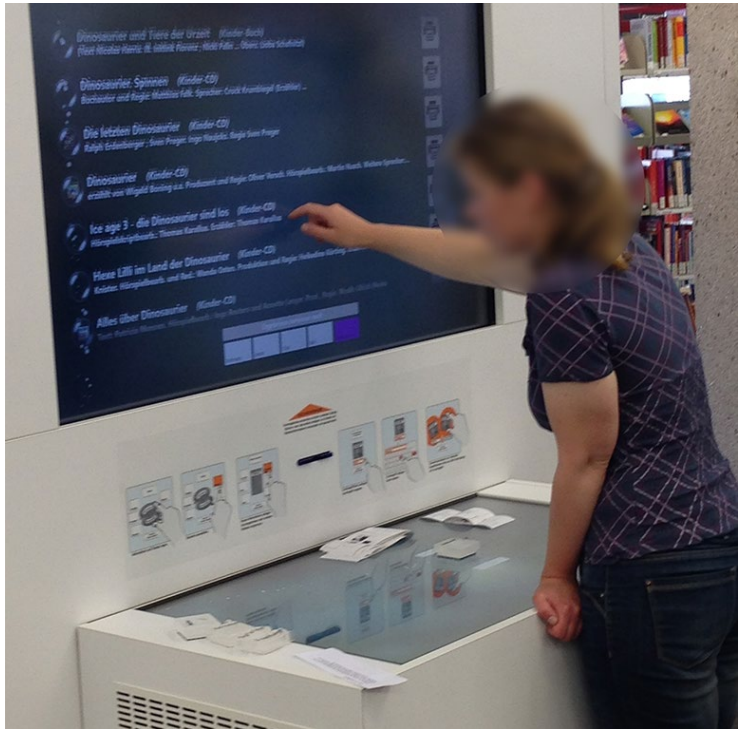
- Pros
  - Observation of real-world behaviours is possible
  - High ecological validity
- Cons
  - Uncontrolled environment (but we can see the conditions under which tasks are accomplished
  - You typically cannot give tasks to participants – they do what they want
  - Lots of “noise” in the collected data; messy data
  - Less generalizability

study types

Controlled in-the-wild study

- Recruiting participants into a study in a real-world environment
- Mix of lab study and in-the-wild study aspects





U. Hinrichs, S Butscher, J. Müller, H. Reiterer. **Diving in at the Deep End: The Value of Alternative In-Situ Approaches for Systematic Library Search**. In *Proc. of CHI*, pages 4634-4646, 2016

mixed-method approaches

- Mixing different methods of data collection
  - Quantitative
    - Task efficiency & error rate
    - Likert-scale questionnaires (ratings from 1-5)
  - Qualitative
    - Interviews
    - Observation
    - Focus group
    - Qualitative questionnaires
- Mixing different study methods
  - Observing people in the real world plus recruiting participants into the real-world environment of interest
  - Interviewing people plus conducting a survey
  - Running a lab experiment plus conducting an in-the-wild study

next steps

- Hands-on discussion of study design
- Wednesday 14:10 – 15:00;

G.07 Meadows Lecture Theatre - Doorway 4, MST