

*The DESIGN  
of EVERYDAY*

THINGS

# Human-Centered Design



DON  
NORMAN

User Interface Development  
EECS 493 - Winter 2025



# Questions?



PalmPilot wooden model  
Joffrey

# Three pillars of EECS 493

- **User-centered research and design methods**
  - Interviews and observations
  - Methods to analyze qualitative data
  - Storyboarding
  - User-testing
- **Prototyping**
  - Low-fidelity wireframes
  - High-fidelity prototyping: Figma
  - Prototyping with AI (wizard-of-oz)
- **Web-programming**
  - HTML/CSS/Javascript
  - jQuery
  - MVC framework
  - Vue framework

Goals for today:

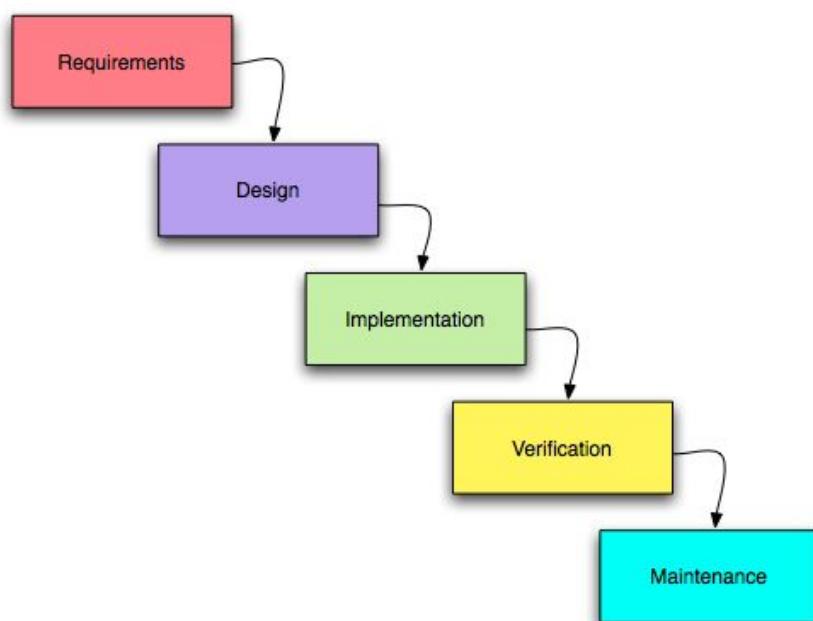
1. What are the processes of human-centered design?
2. Techniques to understand user needs

# Human-Centered Design

- Human-centered design is an approach to interactive systems development that aims to make systems **usable and useful** by focusing on the **users**, their **needs** and **requirements**, and by applying human factors/ergonomics, and usability knowledge and techniques.

– ISO 9241-210:2019(E)

## Waterfall Approach - bad idea

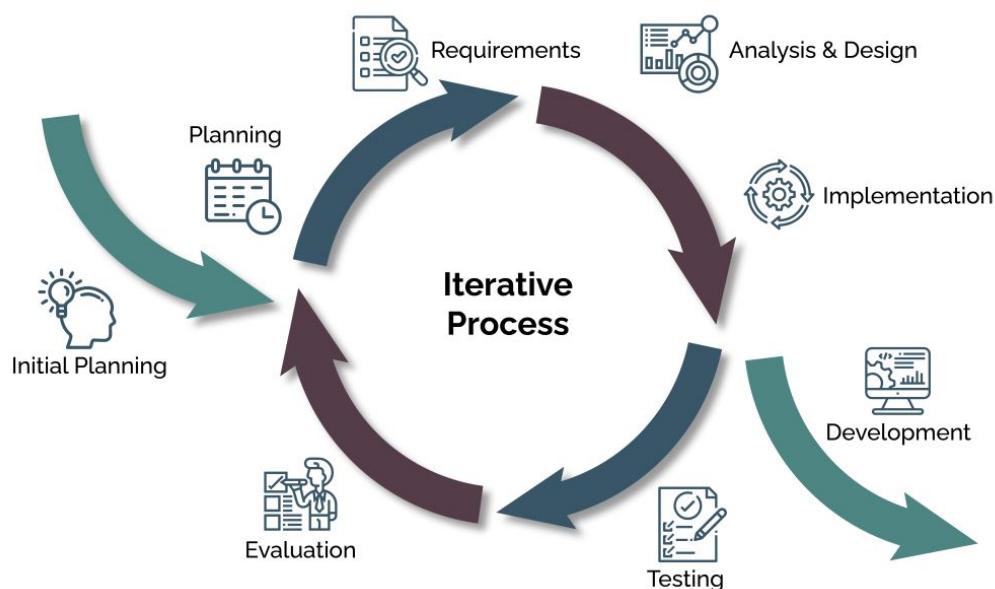


# Iterative Approach - good idea

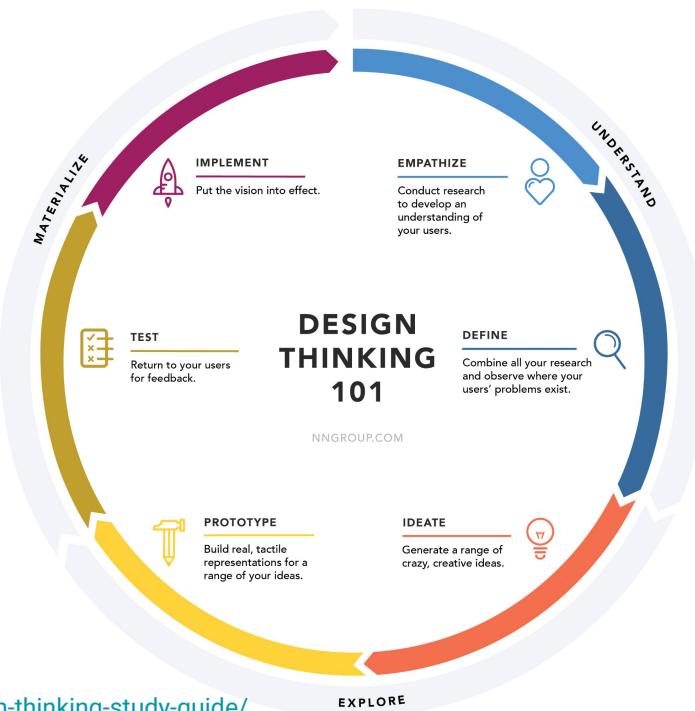


# Iterative Approach - good idea

**Iterative Process Model**

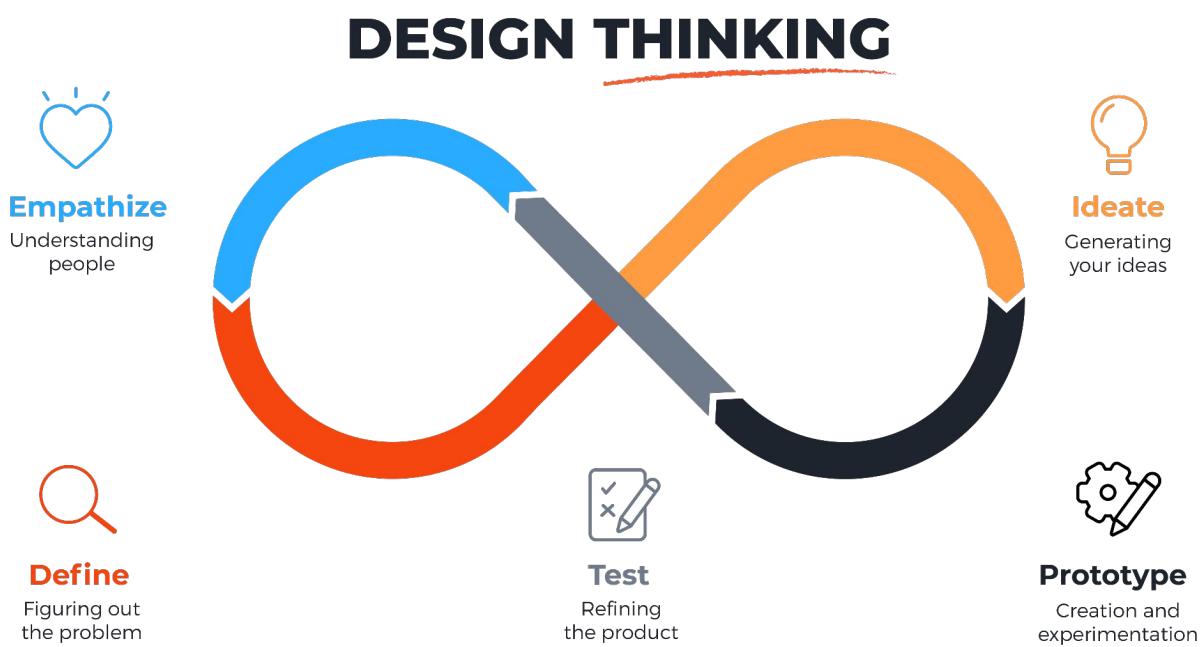


# Iterative Approach - good idea



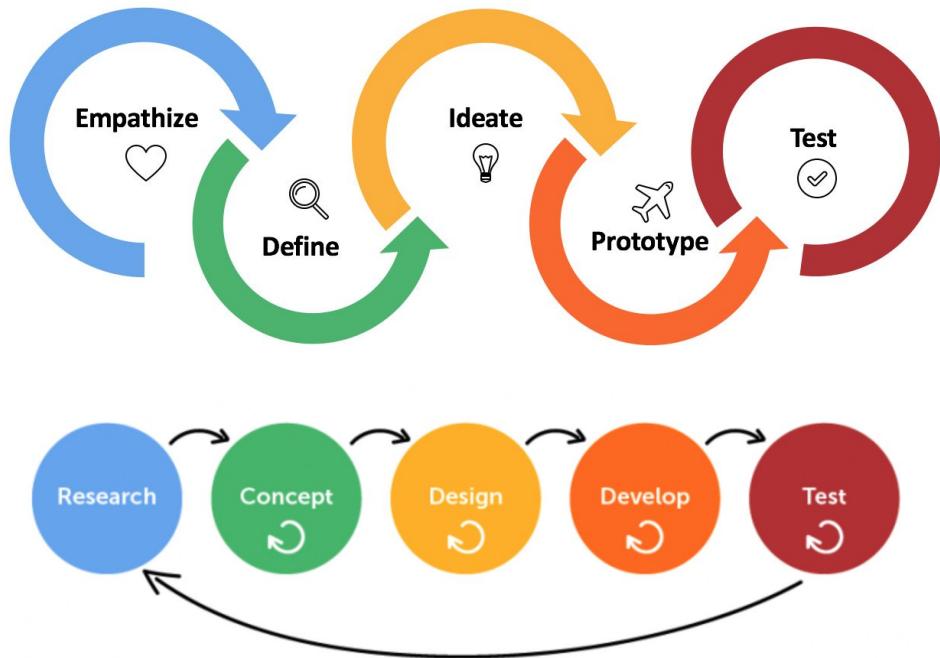
<https://www.nngroup.com/articles/design-thinking-study-guide/>

# Iterative Approach - good idea



<https://www.mage.com/insight/the-design-thinking-process-how-does-it-work/>

# Iterative Approach - good idea



<https://spring2innovation.com/design-thinking-vs-user-centred-design/>

**There are different research and design processes, yet they are all essentially the same!**

# Arguments against Human-Centered Design

- I'm a user, and I can use it
- This thing is so new and different there is no way users can evaluate it
- This technology is so awesome that people will be willing to learn it
  - Our users are experts so they will want to learn it
- We'll just release it and fix any problems in the next release
- Users just want features, so we need to devote all resources to implementation
  - We have to ship now, or we'll die

## Video – Think about these questions

- Who did IDEO interview in the video?
- What are the tasks that the IDEO team observed?
- Who did IDEO observe in the video?

# Example - IDEO designs a shopping cart



## Survey 1: IDEO design

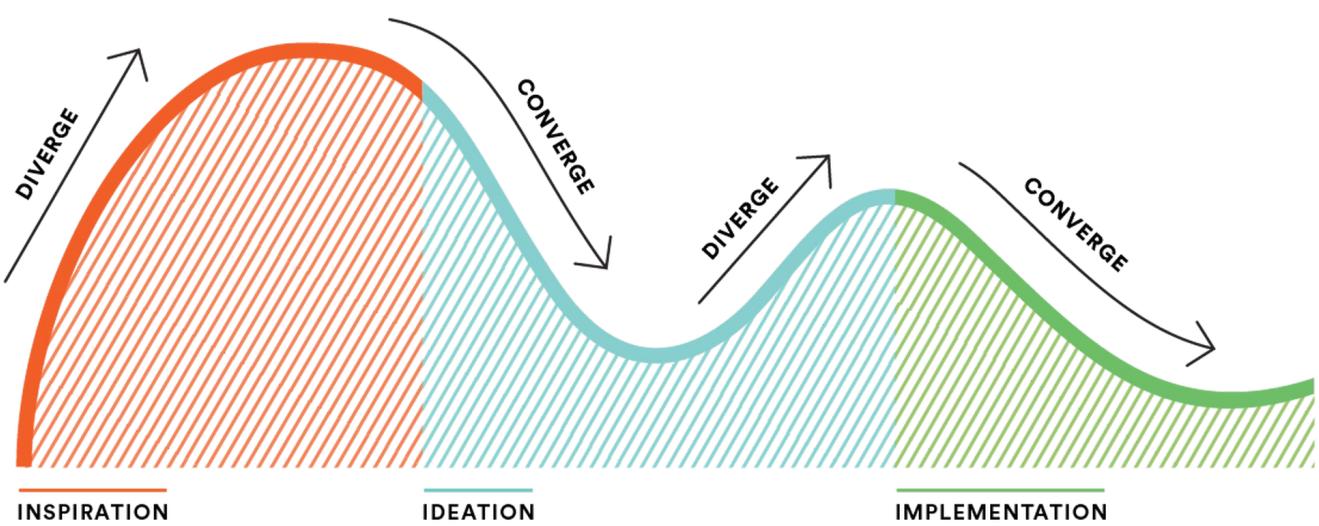


[www.yellkey.com/line ⇒ https://forms.gle/dVpy3CSjB2M3fjVW7](https://forms.gle/dVpy3CSjB2M3fjVW7)

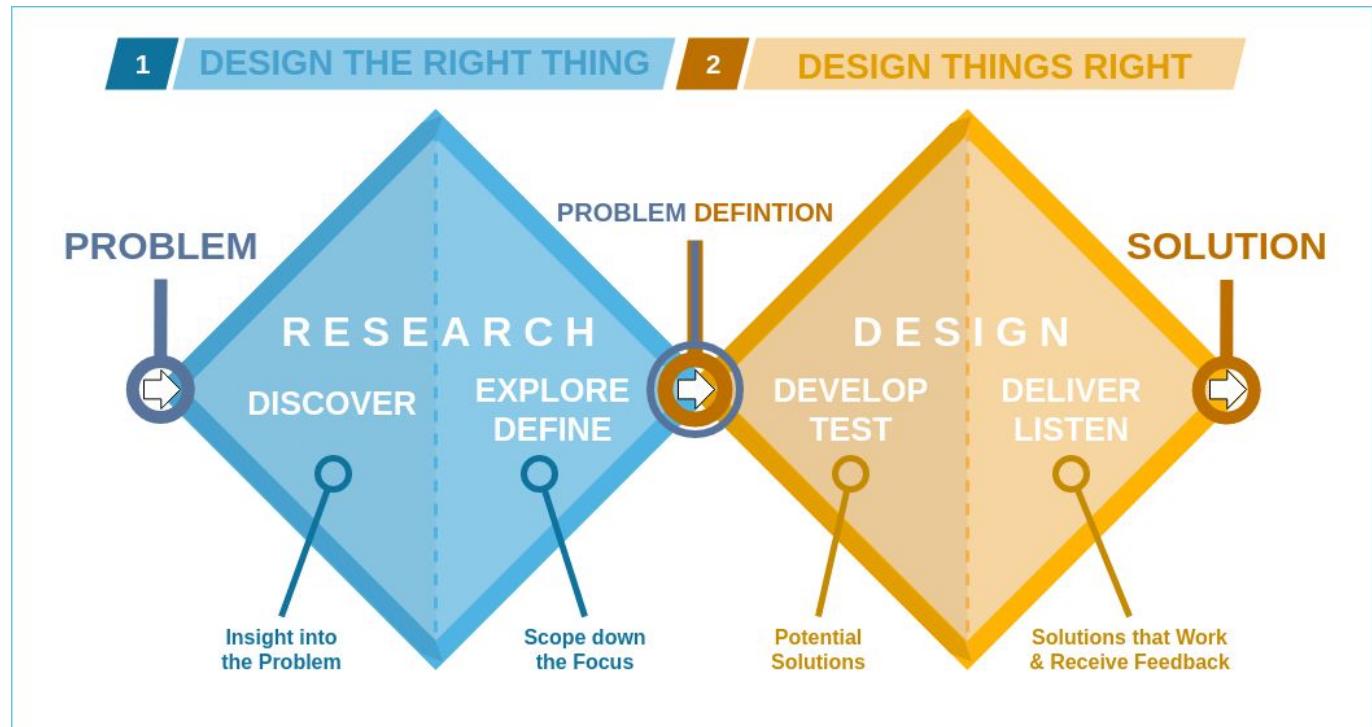
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IDEO



# Double Diamond (design process)



## 4 Phases of Human-Centered Design

- **Need finding** → Conduct research about customers who will use the product being developed/improved
- **Ideation** → Generate potential solutions
- **Prototyping** → Build a mockup of each potential solution
- **Testing** → Have sample of individuals from target population use prototype in order to test design suitability

# Milestones

- **Milestone 0:** Team formation (*by Feb 2*)
- **Milestone 1:** Need identification (Feb 16)
- **Milestone 2:** Ideation & speed dating
  - *Storyboard Bake-off (Feb 27)*
- **Milestone 3:** Prototype & evaluation
- **Milestone 4:** Iterate on the prototype & evaluate again
  - *Prototype Bake-off April 8*
- **Milestone 5:** Final presentation
  - *Presentation April 17 & April 22*

## Milestone 1: Need identification

- **Milestone 1:** Need identification
  - User need + break point
    - Design interview questions and recruit participants
    - Conduct your own interviews with a minimum of 4 participants (i.e. each team member needs to conduct at least 1 interview), each lasting 20-30 minutes;
    - Transcribe, clean your interview transcripts;
    - Identify user needs and break points - using *affinity diagram*

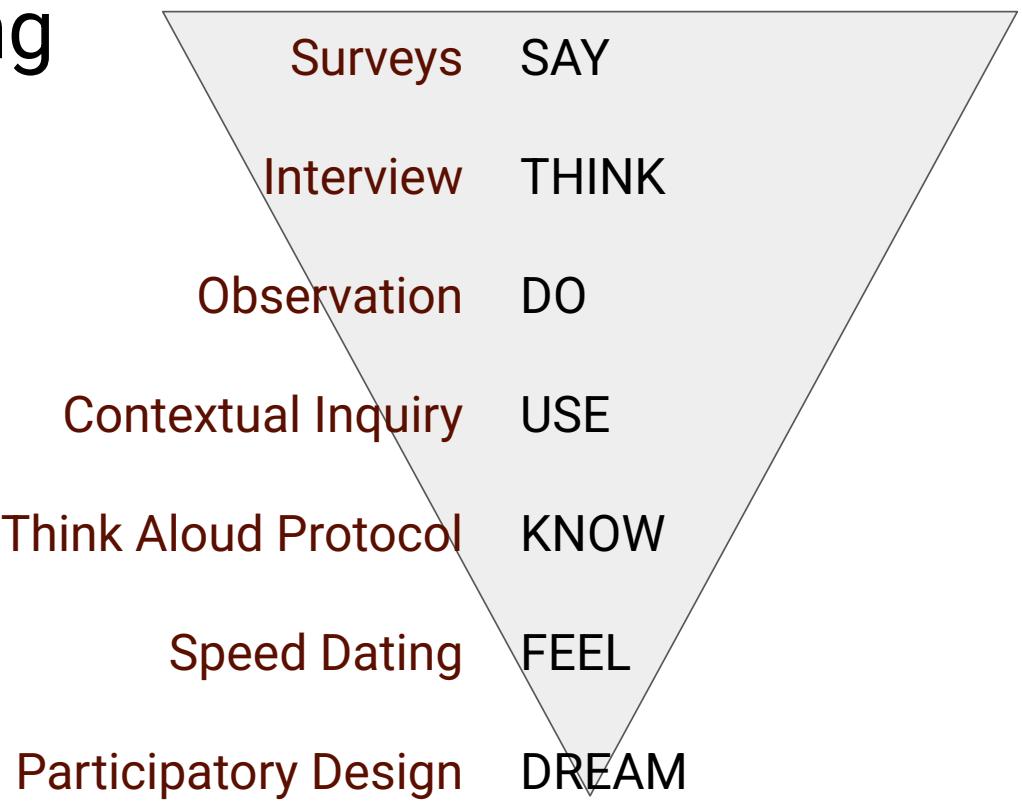
# Understanding Users



## The User is Not You!

- To study humans you need to suppress natural instincts.
- The user is not like me.
- Users lie.
- Users omit details.
- You can't improve what you don't understand.

# Understanding the User



## Pulling out that which cannot be fully imagined

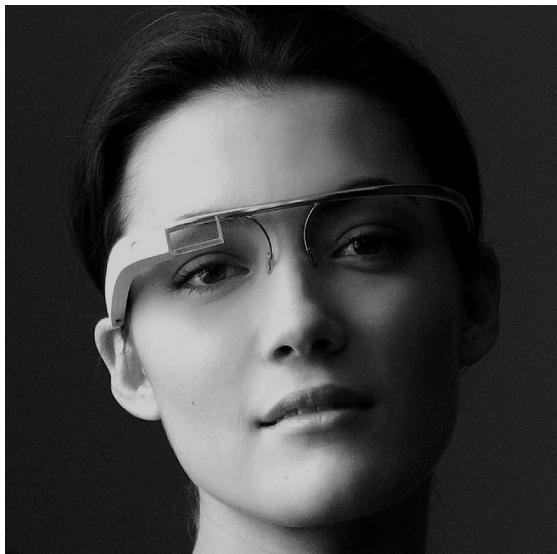
"... service is not about helping people create what they already know they want. The success of the design process can best be determined when those being served experience **the surprise of self-recognition**. This comes when that which emerges from a design process meets and exceeds the client's original expression of that which they (usually only dimly) perceived as desirable in the beginning. This original expression of what is desired is known as the client's **desiderata**. The designer's role is to **midwife that desiderata**, which **could not have been imagined fully** from the beginning, by either the client or designer and to provide end results in the form of an expected unexpected outcome."

— Nelson, H. G., & Stoltzman, E. (2012). *The Design Way: Intentional Change in an Unpredictable World*. MIT Press.

# Observing is Hard



# Understanding / Reflecting is Hard



How you think it looks



How others think it looks

# To understand your users...

- You need to get out of your comfort zone
- It's uncomfortable and awkward

**Go to the user, watch them do the activities you care about, and talk with them about what they're doing right then.**

- Holtzblatt, Karen, and Hugh Beyer  
Contextual Design: Defining Customer-Centered Systems, Elsevier Science & Technology, 2016.

# Why is the Context important?



Photo by Toa Heftiba on [Unsplash](#)

# Why is the Context important?



Photo by Adrian Williams on [Unsplash](#)

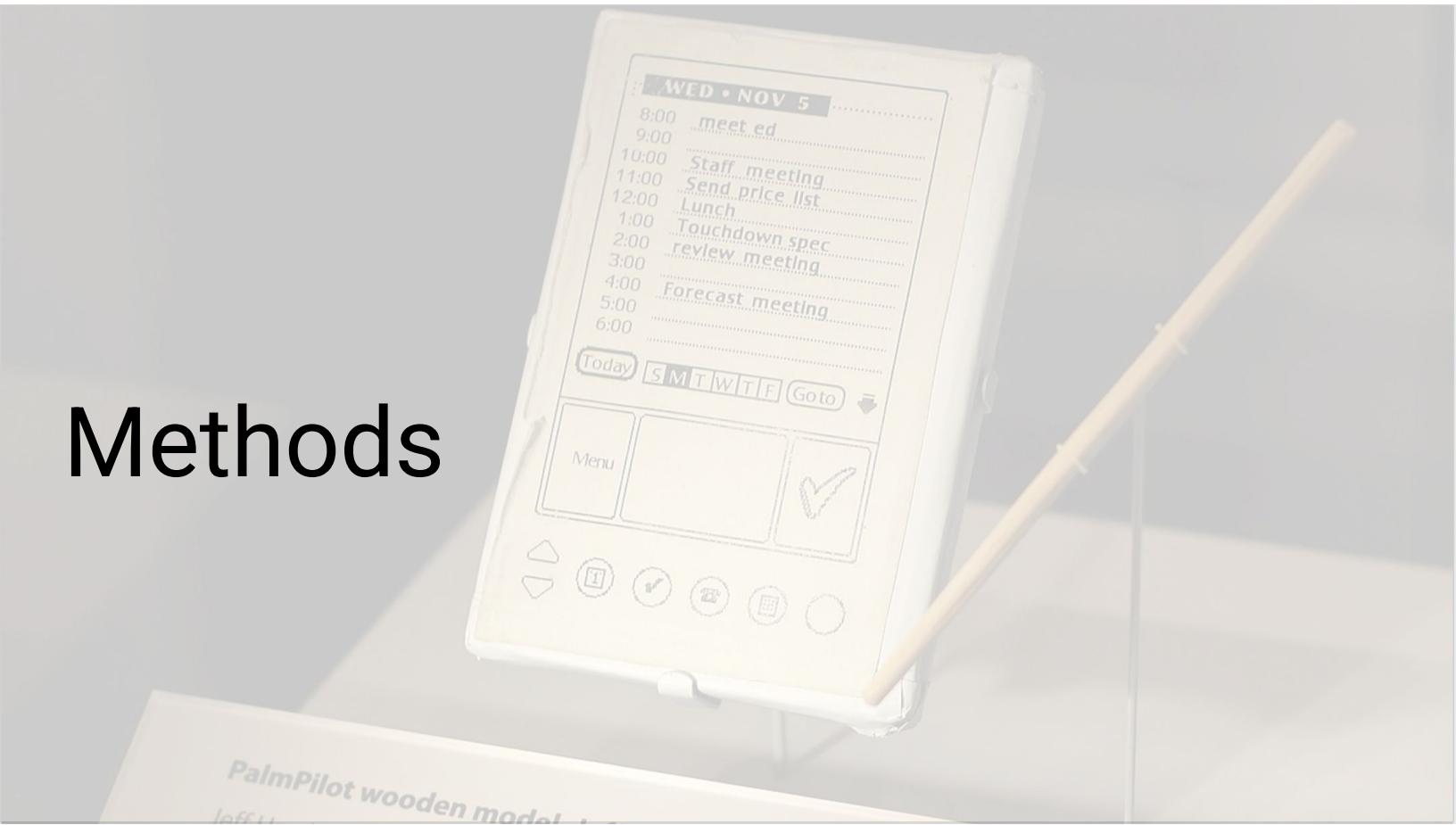
# Why is the Context important?

- Humans are notoriously unreliable observers of the world around them
  - Frequently engage in activities and work-arounds they might not even be aware of
  - Sometimes work-arounds are actively suppressed (for example: management doesn't know or approve)
  - Durations of activities is rarely remembered accurately
- Tasks / activities do not exist in a vacuum
  - External factors influence execution
  - Interruptions, other work, etc.

**Deep insight comes  
from the field.**

– Karen Holtzblatt

# Methods



PalmPilot wooden model  
loft44



LIFE+

# Contextual Inquiry

NN/g



Contextual  
Inquiry

## Contextual Inquiry

- Watch participant do activity wherever they occur naturally
- At appropriate times, engage in discussion of what they are doing and why
- Duration of the activity or until you understand and anticipate (90 minutes to 3 hours +)

**You are the apprentice and the participant is the master!**

# Interviews



NN/g

User Interviews

## Semi-Structured Interviews

- A method of asking questions & listening
- Uses a planned interview protocol with open-ended questions
- Ask about what you cannot observe
- Let people tell you what they know about themselves
  - What they do
  - How they do things
  - Their opinions on current activities
  - How much they like one thing compared to another

# Stakeholders are often interviewed using the Semi-Structured Method

- How does the system work (their perspective)?
- What is the goal of the system?
- What does a good experience look like?
- What are the constraints?
  - Time? Budget? Access?
- Who are the expected people who will use the system?
  - “Everyone!” cannot be the answer
  - If they don’t know, more research will be needed prior to interviewing others

# Intercepts (AKA Observe and Intercept)

- Catch people in the moment, as they are about to do, or are doing the activity
  - Ask if they’d like to participate in the study
  - Obtain consent for participation and recording
- Conduct a shortened version of a contextual inquiry
  - Observations
  - Discussions

# Observation



## Observation (it's Contextual but not ~~Inquiry~~)

- Mostly done in public places, with public activities, but can be an industrial or office type setting.
- Participant
  - Doing relevant activities as would normally (NOT talking aloud)
  - Most likely not aware you are there
- Researcher
  - Watching, learning from a distance, usually silent
  - Participant may or may not know you are there

**May also be called Shadowing**

# Benefits of all types of observations

- Learn **real** process they use
  - Managers (and others) often mis-represent / mis-understand actual day-to-day work
- Understand how processes fits together
- Find out more about them as people to build empathy
- Discover “cheat sheets” and other artifacts
- Number and type of interruptions

# Why Contextual Inquiry vs. Observations

- What is your goal - what do you need to learn?
  - Better understand basis of work?
  - Deep understanding?
  - Looking for variations?



## Contextual Interview

- Some situations may be dangerous or inaccessible
- For example:
  - During surgery
  - Tight spaces, dangerous conditions
  - Clearance issues

# Contextual Interview - Retrospective

- Interview the participant, as close to the context and task as possible
- Immediately following activity
- In the space after the activity
- Bring tools or artifacts of activity
- Have the participant recollect specific events and circumstances
- Do not discuss generalities or other people

Sometimes also called Directed Storytelling!

## How many participants?

As many as you can:

- need before you stop finding new things out (data saturation)
- can afford (time, incentives, etc.)
- have time to analyze (2x+ per participant)

10 is a good number (minimum of five)

Make sure to choose representative users

# Methods Selection

Depends on Goals, Context, Resources/Timing

- **Goal** - What type of information do you need? About the project or about the topic?
- **Context** - What is the person's role? What do they do? How close can you get?
- **Resources & Timing** - What is your budget? How soon do you need the information? Can you afford to go onsite?

## Levels of Depth



# Survey 2: Methods Selection



[www.yellkey.com/product](http://www.yellkey.com/product) ⇒ <https://forms.gle/wzZHQAaMEAZeG2JGA>

## Methods Selection

Your team is considering building a social fitness app that encourages users to exercise with their friends and share fitness data among friends. Before building the app, your team wants to understand users' preferences and concerns around privacy e.g., why they want or don't want to share fitness data.

# Methods Selection

Your team wants to build cooking devices for blind people. Before you start, your team wants to understand blind people's natural cooking behaviors at home.

# Methods Selection

Your team designed a new feature in a social media app X\_Xchat. Your team found the feature was very well received by users in Michigan. However, users in California didn't use the new feature as much. Your team wants to know why users in California didn't use the new feature.

# Methods Selection

You are trying to improve the collaboration between resident and attending surgeons, specifically about what they look at during surgeries, and why there are mismatches.

## ACTIVITY: Final Project Discussion

- Consider the problem of getting to UMich daily
  - Who are your stakeholders?
  - What tasks might you observe?
  - How do you find out about how those tasks are happening now?
  - What questions might you ask?
  - Try grounding a question (or two)

# How to ask good questions?

## **Which one is a better interview question?**

Do you use or have you used any other transportation to travel between home and campus?

In this past week, tell me how you've gotten to school? Please explain why you selected that mode of transportation.

# How to ask good questions?

## **Which one is a better interview question?**

If you have never used the shuttle service, why not?

If you have never used the service, what modes of transportation have you used for the past week? What value does the alternative possess that shuttle does not have?

# How to ask good questions?

## **Which one is a better interview question?**

When do you need to go to a new destination via shuttle, how to do usually find the right route? By searching? Is searching working well for you?

Describe your experience when you took the shuttle in order to get somewhere else other than CMU campus.

# How to ask good questions?

## **Which one is a better interview question?**

What incentive would make you ride the shuttle / escort service?

What do you like about the mode of transportation that we are currently using?

# How to ask good questions?

**Which one is a better interview question?**

Do you always take the shuttle at the same time every day?

How is your daily schedule like for taking shuttles?

# How to ask good questions?

**Which one is a better interview question?**

You really enjoyed taking the school shuttle, didn't you?

How did you feel about your experience taking the school shuttle?

# Takeaways

- Human-Centered Design is highly iterative, with four phases:
  - Need finding, Ideation, Prototyping, Testing
- The user is not you! Understanding users is critical
- Various methods for understanding users
- Context is important

## Goals for today:

1. What are the processes of human-centered design?
2. Techniques to understand user needs