



CSE 593 - HCI

# Principles of Human-Centered Computing

Farnaz Jahanbakhsh

Course content adapted with modification from original materials by Nikola Banovic

# Logistics

- Assignment 0 assigned.
  - Assignment 0 (Individual) **due next Wednesday (9/4) at 5PM.**
  - Assignment 0 (Group) due in two weeks, Wednesday (9/11) at 5PM.
- **Quiz 1 assigned today! Due tomorrow at 5PM!**
- **If you plan to drop the course, please do it ASAP so that others can enroll from the waitlist.**

# Goals

Define Human-Centered Computing

Learn the principles of Human-Centered Computing

What is interaction (in HCI)?

# What is interaction in HCI?

- Who are the authors?
- Where was it published? Who were they targeting?
- What was the “Promise”?
- What were the “Obstacles”?
- What was their “Solution”?
- Reflection/ connections/ application

# What is interaction in HCI?

- What was the “Promise”?
  - HCI research and practice informs the design of interactions that could benefit end-users.

# What is interaction in HCI?

- What was the “Promise”?
  - HCI research and practice informs the design of interactions that could benefit end-users.
- What were the “Obstacles”?
  - Term “interaction” is ill-defined, fragmented, and often underspecified. This hurts the field and impedes progress.

# What is interaction in HCI?

- What was the “Promise”?
  - HCI research and practice informs the design of interactions that could benefit end-users.
- What were the “Obstacles”?
  - Term “interaction” is ill-defined, fragmented, and often underspecified. This hurts the field and impedes progress.
- What was their “Solution”?
  - Analyze existing HCI literature to come up with a holistic definition(s) of the term.



What is interaction (in HCI)?

“Many things!”

-- Hornbæk

The main principle of HCI

HCI research and practice is **Human-Centered**

# What is Human-Centered Computing?

Please answer this question in Canvas.

What is Human-Centered Computing (HCC)? Select **all** that apply.

- ☐ A design process.
- ☐ A design method.
- ☐ An approach to creating computational technology.
- ☐ A way to use humans to perform quick computational tasks.

You have 120 seconds...

DONE!

# What is Human-Centered Computing?

“Creating computational technology with focus on the humans and their goals and needs”

# Principles of Human-Centered Computing

## Usability & Equity

# What is usability?

What is usability?

“The extent to which an artifact enables the human to **effectively** and **efficiently** complete a task or accomplish a goal with **satisfaction**.”



# Usability

Making technology more efficient (e.g., accomplish tasks faster and with fewer errors)

Making technology easier to learn (e.g., transition from novice to expert performance)

Making technology that satisfies needs and is pleasant to interact with (e.g., an input device that does not hurt the users hands)

# What is equity?

What is equity?

“The extent to which the design of an artifact treats all humans fairly, with honesty and benevolence.”

**The Era of “Move Fast and Break Things” Is Over**

# How My Boss Monitors Me While I Work From Home

As we shelter in place in the pandemic, more employers are using software to track our work — and us.

Last month, I downloaded employee-monitoring software made by Hubstaff, an Indianapolis company. Every few minutes, it snapped a screenshot of the websites I browsed, the documents I was writing and the social media sites I visited. From my phone, it mapped where I went, including a two-hour bike ride that I took around Battersea Park with my kids in the middle of one workday. (Whoops.)

# These artists found out their work was used to train AI. Now they're furious

## AI-generated ads using Taylor Swift's likeness dupe fans with fake Le Creuset giveaway



**Generative AI's environmental costs are soaring – and mostly secret**

Does usability imply  
equity?

Does usability imply equity?

# Universal Design

# What is Universal Design?



# What is Universal Design?

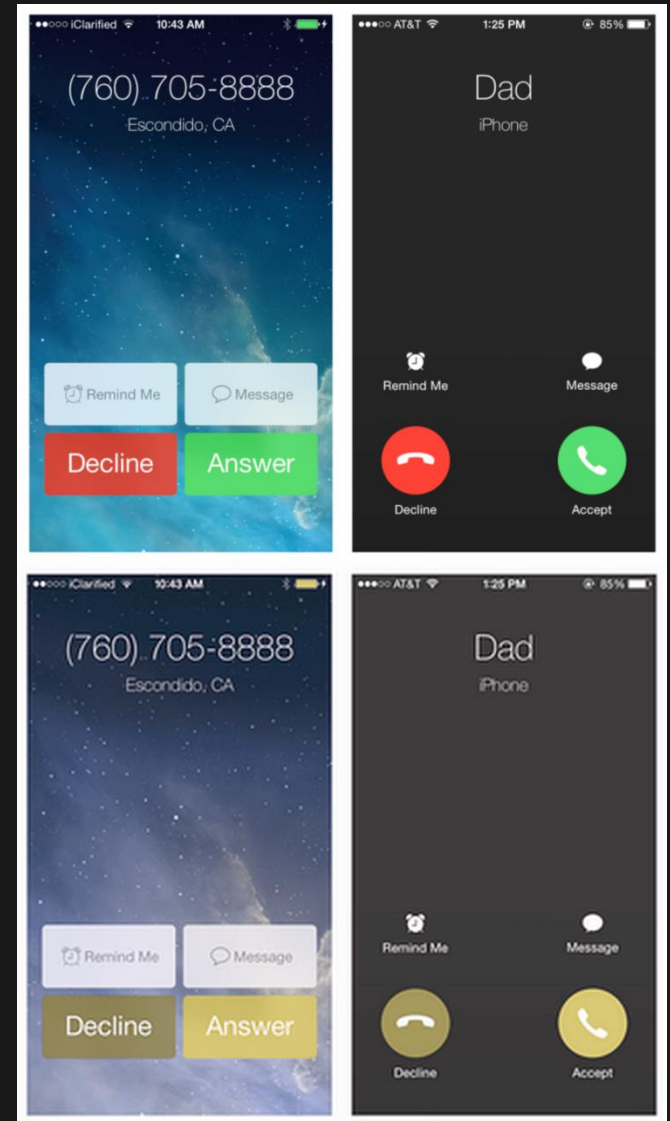
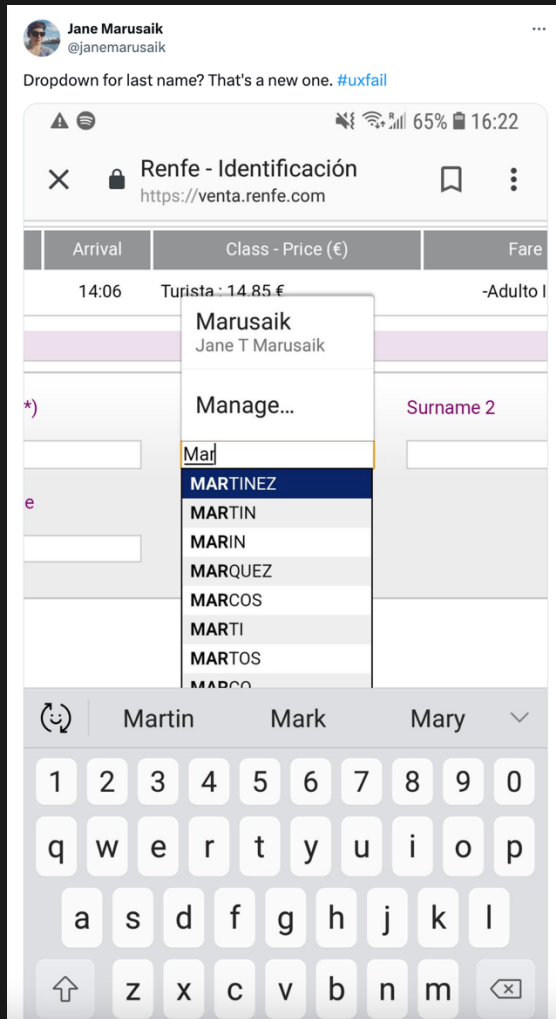
"Universal Design is the design of all products and environments to be usable by people of all ages and abilities, to the greatest extent possible."

- Ronald L. Mace

# What is Universal Design?



# Universal Design (online edition)



# Universal Design (online edition)

An official website of the United States Government

IRS

Help | News | English | Charities & Nonprofits | Tax Pros

File | Pay | Refunds | Credits & Deductions | Forms & Instructions

Search

Home / Publications / Publication 15-A (2024), Employer's Supplemental Tax Guide

- Publication 15-A - Introductory Material
  - Future Developments
  - What's New
  - Reminders
  - Introduction
    - Comments and suggestions.
    - Getting answers to your tax questions.
    - Getting tax forms, instructions, and publications.
    - Ordering tax forms, instructions, and publications.
  - Useful Items - You may want to see:
- Publication 15-A - Main Contents
  - 1. Who Are Employees?
    - Independent Contractors
    - Common-Law Employees
      - Additional information.
    - Statutory Employees
      - Social security and Medicare taxes.
      - Federal unemployment (FUTA) tax.
      - Income tax.
      - Reporting payments to statutory employees.
      - H-2A agricultural workers.
    - Statutory Nonemployees
      - Direct sellers.

## Publication 15-A (2024), Employer's Supplemental Tax Guide

(Supplement to Pub. 15, Employer's Tax Guide)

For use in 2024

### Publication 15-A - Introductory Material

### Future Developments

For the latest information about developments related to Pub. 15-A, such as legislation enacted after it was published, go to [IRS.gov/Pub15A](https://www.irs.gov/pub15a).

### What's New

**Social security and Medicare tax for 2024.** The social security tax rate is 6.2% each for the employee and employer. The social security wage base limit is \$168,600. The Medicare tax rate is 1.45% each for the employee and employer, unchanged from 2023. There is no wage base limit for Medicare tax. Social security and Medicare taxes apply to the wages of household workers you pay \$2,700 or more in cash wages in 2024. Social security and Medicare taxes apply to election workers who are paid \$2,300 or more in cash or an equivalent form of compensation in 2024.

### Reminders

**Form W-4P and Form W-4R.** Form W-4P, Withholding Certificate for Periodic Pension or Annuity Payments,

IRS

SEARCH | HELP | MENU

- Publication 15-A - Introductory Material
  - Future Developments
  - What's New
  - Reminders
  - Introduction
    - Comments and suggestions.
    - Getting answers to your tax questions.
    - Getting tax forms, instructions, and publications.
    - Ordering tax forms, instructions, and publications.
  - Useful Items - You may want to see:
- Publication 15-A - Main Contents
  - 1. Who Are Employees?
    - Independent Contractors
    - Common-Law Employees
      - Additional information.
    - Statutory Employees
      - Social security and Medicare taxes.
      - Federal unemployment (FUTA) tax.
      - Income tax.
      - Reporting payments to statutory employees.
      - H-2A agricultural workers.
    - Statutory Nonemployees
      - Direct sellers.
      - Licensed real estate agents.

# Human-Centered Computing

- Isn't "Human-centered Computing" just "User-Centered Design" with a few words changed?

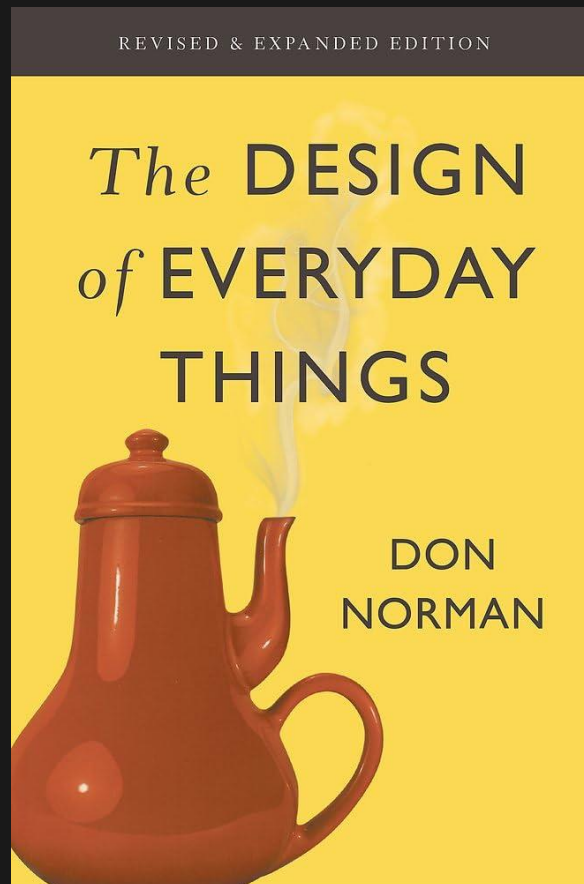
# Human-Centered Computing

- Isn't "Human-centered Computing" just "User-Centered Design" with a few words changed?
- Not exactly!
- HCC has a more holistic view
- HCC's methods are more research-oriented



# User-Centered (Systems) Design

- Term coined by Don Norman



PULL



No dogs  
except guide dogs

PULL



# Affordance



# A better design of the door?

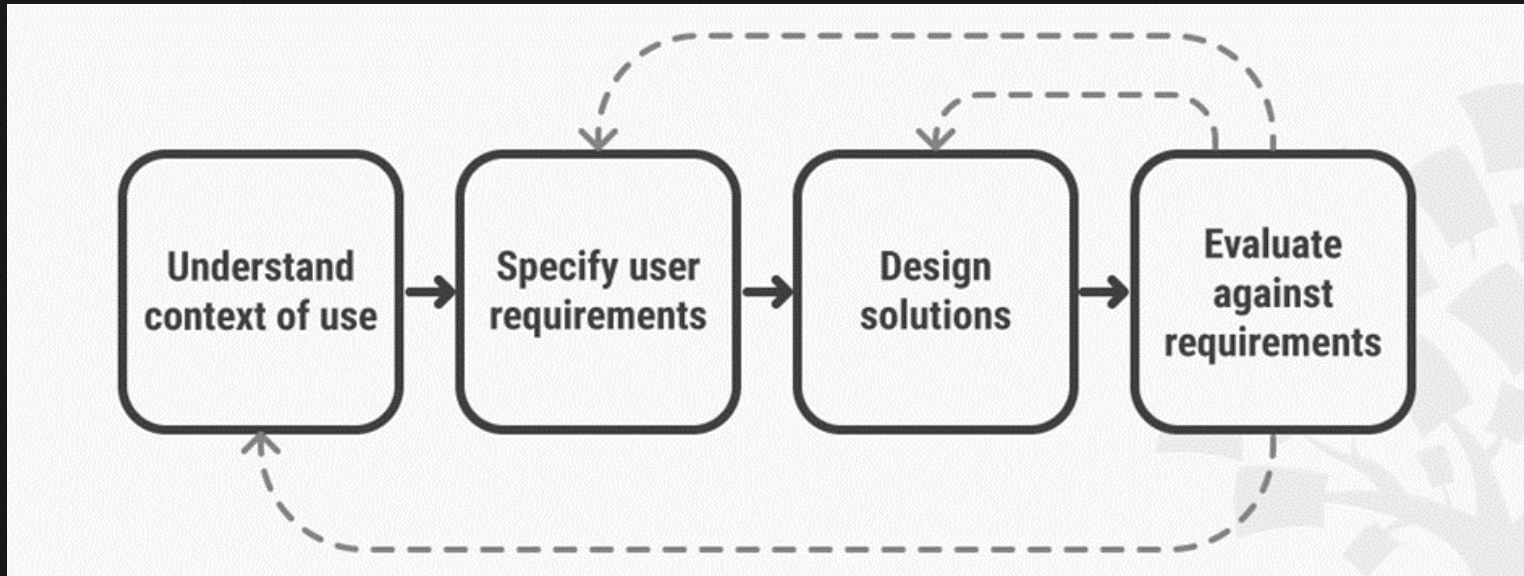


## A better design of the door?

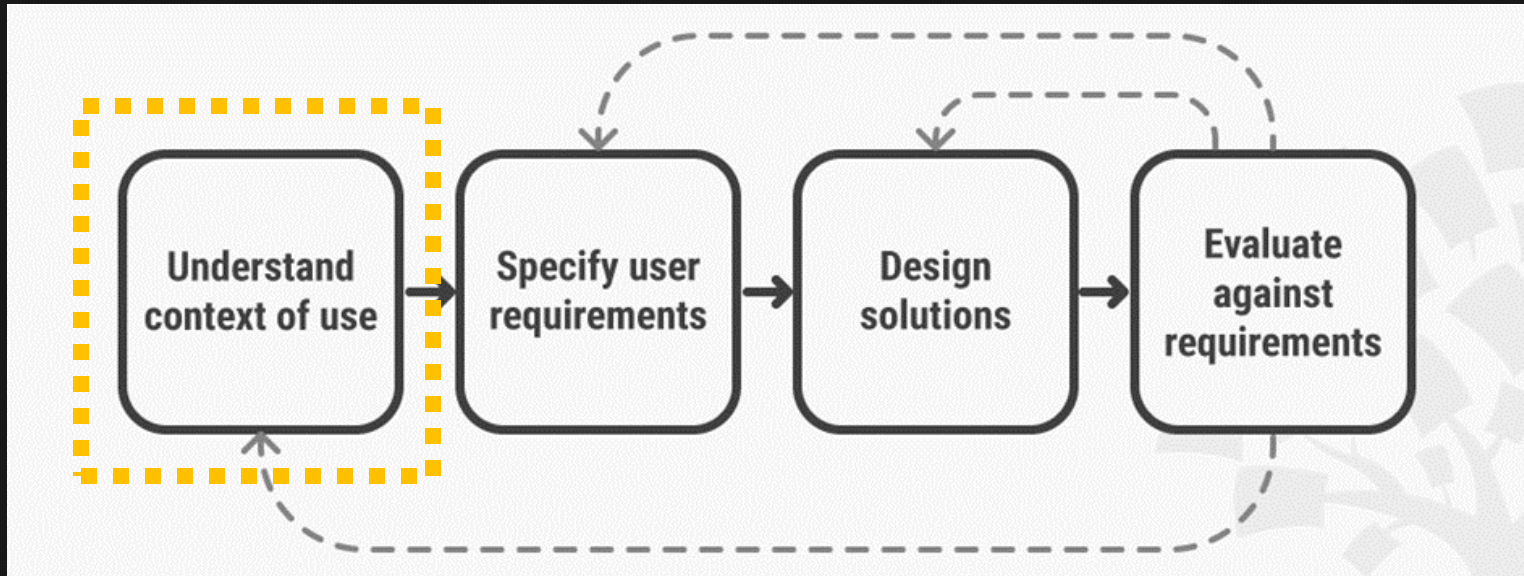
- Use clues that allow users to identify how to interact



# User-Centered Design Process

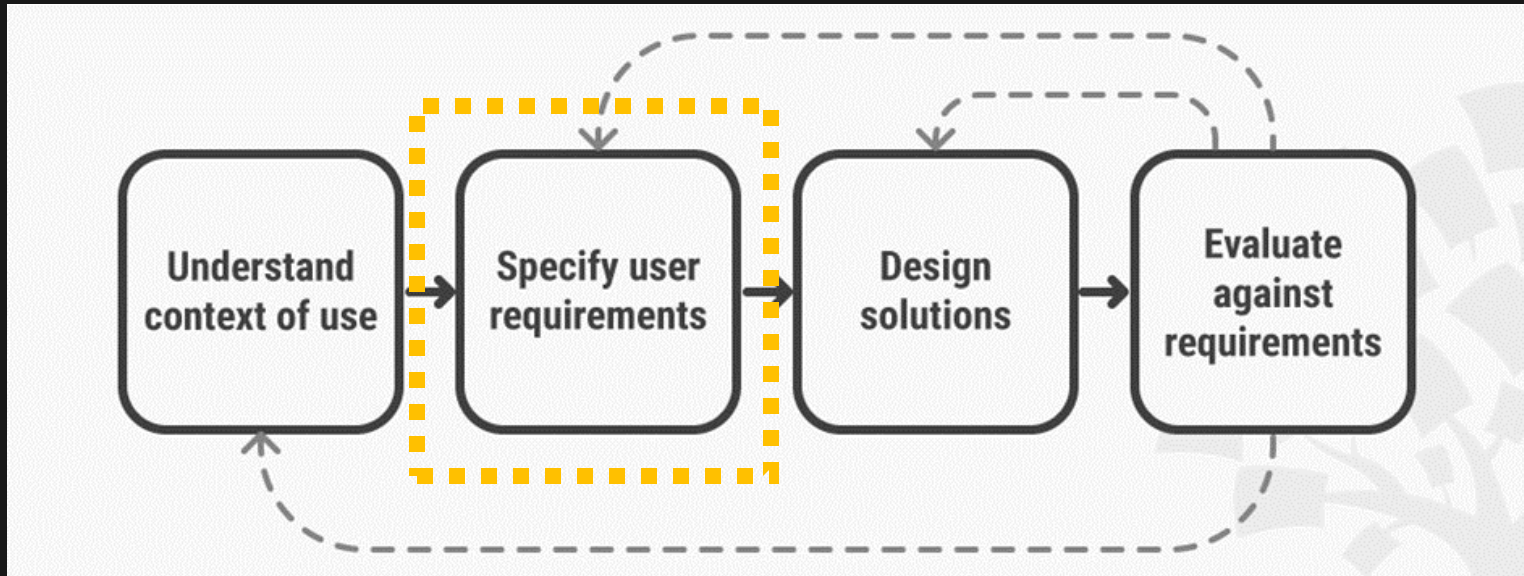


# User-Centered Design Process

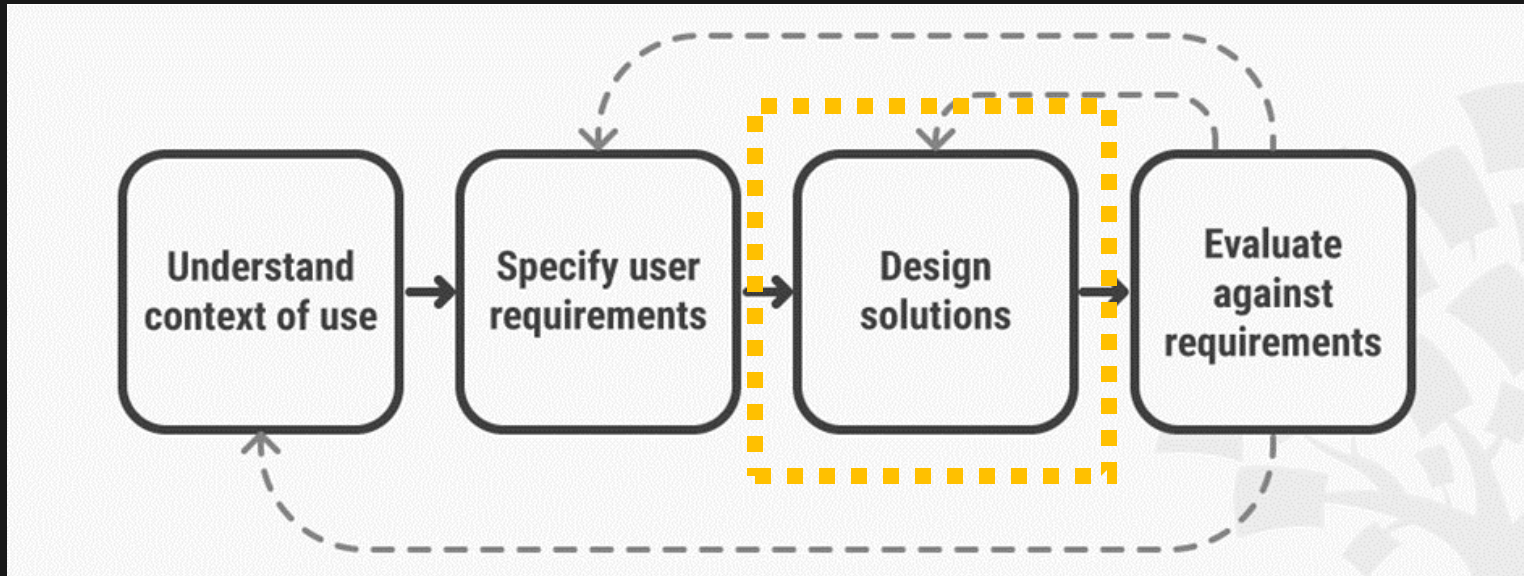




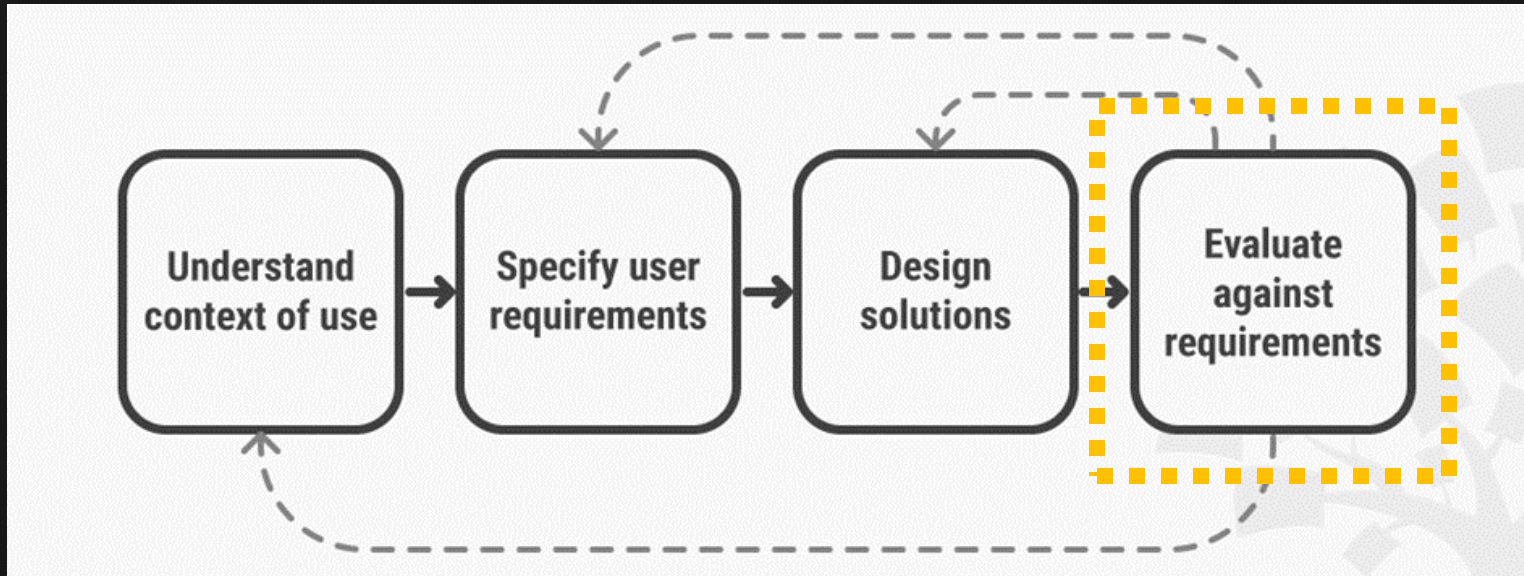
# User-Centered Design Process



# User-Centered Design Process



# User-Centered Design Process





# User-Centered Design Process

- Different methods  
(e.g., Deep Dive, Contextual Design)

# Example User-Centered Design Process

If your HCI class does not show  
the IDEO video,  
is it really an HCI class?

# Some characteristics of the deep dive method

- Immersion
- Rapid ideation
- Collaboration
- Prototyping
- Evaluation
- Iterative process

# Please answer this question in Canvas

What stages of the User-centered Systems Design did you see in the IDEO video? Select all that apply.

- ☐ Understanding of Context of Use
- ☐ Specifying User Requirements
- ☐ Designing Solutions
- ☐ Evaluating Designs

You have 120 seconds...

DONE!

# Please answer this question in Canvas

What is User-centered Systems Design Process? Select all that apply.

- ☐ A method.
- ☐ A methodology.
- ☐ A tag line.
- ☐ A process that enables end-users to design systems.

You have 120 seconds...

**DONE!**

# User-Centered Design Process

- Different methods  
(e.g., Deep Dive, Contextual Design)

# Why call it Human-Centered Computing?

# Why call it Human-Centered Computing?

Computational technology goes beyond the end-user, and affects various stakeholders  
**whether they are willing users or not**



# Class project and assignments

# Class project and assignments

Design and evaluate a novel text-entry method (“keyboard”) for mobile and/or wearable devices.

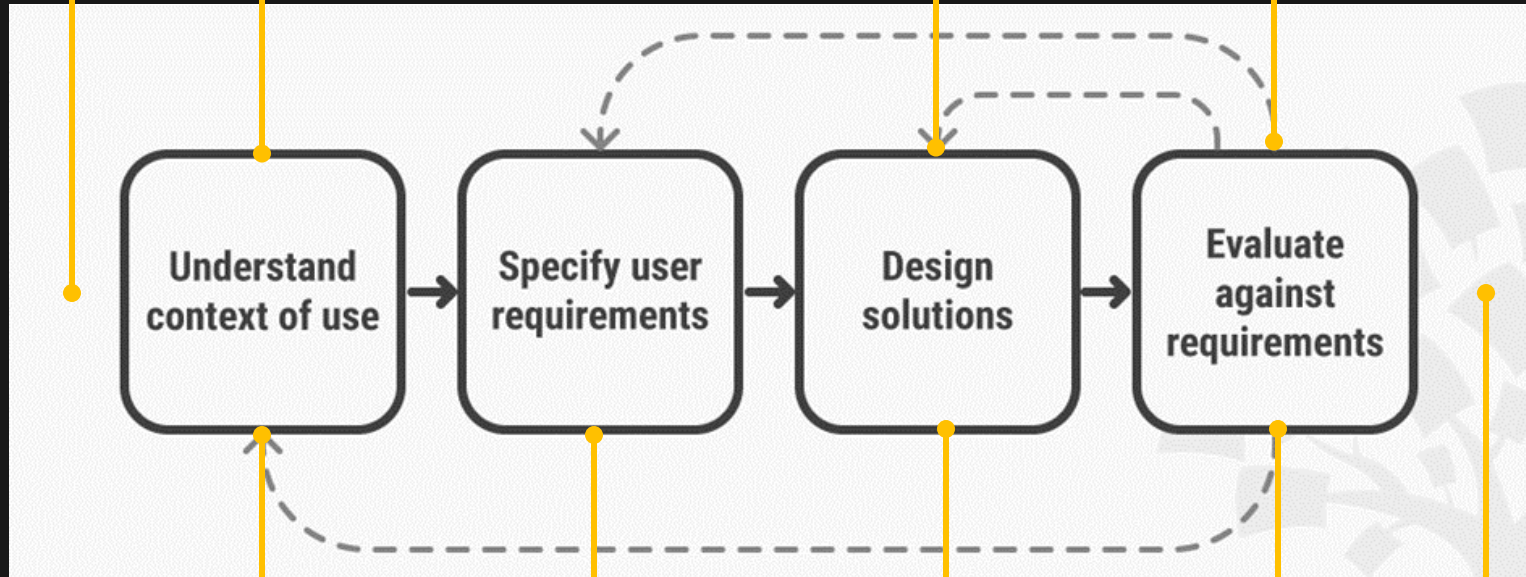
# Class project and assignments

Assignment 0

Assignment 1

Assignment 3

Assignment 4



Assignment 2

Assignment 5

Presentation

# Assignment 0 review

- Group component:
  - Finding a group
- Individual component:
  - Human subjects protections course
    - How to collect informed consent from participants
    - Ensure no harm comes to subjects

# Why?

**Nazi human experimentation** was a series of [medical experiments](#) on prisoners by [Nazi Germany](#) in its [concentration camps](#) mainly between 1942 and 1945. There were 15,754 documented victims, of various nationalities and age groups, although the true number is believed to be more extensive. Many survived, with a quarter of documented victims being killed. Survivors generally experienced [severe permanent injuries](#).<sup>[1]</sup>

## A Spoonful of Sugar Helps the Radioactive Oatmeal Go Down

When MIT and Quaker Oats paired up to conduct experiments on unsuspecting young boys

The **Tuskegee Study of Untreated Syphilis in the Negro Male**<sup>[1]</sup> (informally referred to as the **Tuskegee Experiment** or **Tuskegee Syphilis Study**) was a study conducted between 1932 and 1972 by the [United States Public Health Service](#) (PHS) and the [Centers for Disease Control and Prevention](#) (CDC) on a group of nearly 400 [African American](#) men with [syphilis](#).<sup>[2][3]</sup> The purpose of the study was to observe the effects of the disease when untreated, though by the end of the study medical advancements meant it was entirely treatable. The men were not informed of the nature of the experiment, and more than 100 died as a result.

## Facebook Manipulates Our Moods For Science And Commerce: A Roundup

JUNE 30, 2014 · 12:31 PM ET

Nina became one of more than 50 mentally disabled children, ages 5 to 10, under the care of Dr. Saul Krugman, a respected pediatrician from New York who wanted to determine if there were multiple strains of hepatitis, and whether a vaccine could be created to protect against the disease. Krugman and his partner, Dr. Joan Giles, used the Willowbrook residents to test a preliminary vaccine for this disease that had killed millions worldwide. From 1955 to 1970, the children were injected with the virus itself or made to drink chocolate milk mixed with feces from other infected children in order to study their immunity.

If you don't submit an individual assignment, you automatically get 0 on the group assignment



Questions, comments, and/or concerns?

Farnaz Jahanbakhsh

farnaz@umich.edu

<https://people.csail.mit.edu/farnazj/>