

# Introduction to User-Centered Design

Lecture 2

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# Goals of This Lecture

Goals Lecture 1

## Part 1: Introduction to course concepts

- What is design? Why should you care?
- Good and bad design
- The process of HCD

## Part 2: Understanding phase (part 1)

- Types of research
- Desk research (Academic, Applied)
- Competitive Analysis

# Question

Goals Lecture 1

## Question:

What do you think is the most important factor that determines friendships?

- Why are you friends with your friends?
- What are the reasons you are close with your friends

# Question

Goals Lecture 1

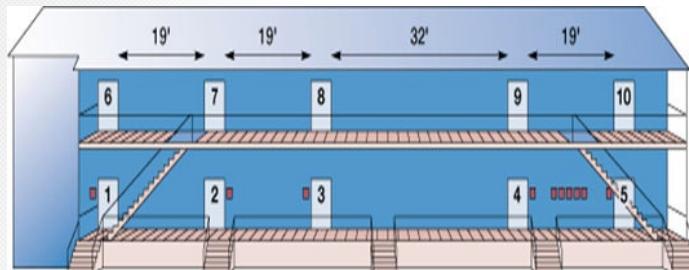
## Possible Answer:

- Proximity
- Frequency

## Social pressures in informal groups; a study of human factors in housing.

Festinger, Schachter, Back, 1950

- 2/3 Came from the same building
- 2/3 of those from the same floor
- Most frequent chosen person = Next door neighbor

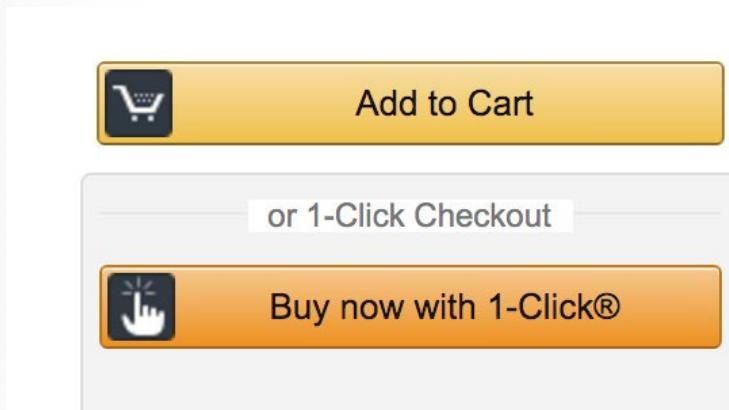


# Question

Goals Lecture 1

## Takeaway:

Removing Friction can be a powerful tool to support the desired behaviour



Why am I talking about this?

Part 1

# 1 Introduction to course concepts

# What is Design?

Do or plan (something) with a specific purpose or intention in mind.

*Oxford Dictionaries*

Design is what a designer does to design a design

It is a process

It is way of thinking

It is problem solving

# What is Design?



Engineering or Art?



# What is Design?



Craft or Science?

**Craft:** is a profession that requires particular skills and knowledge of skilled work (e.g. wood, jewelry, leather, pottery).

Usually small scale production of goods and their maintenance. Todays artisan.

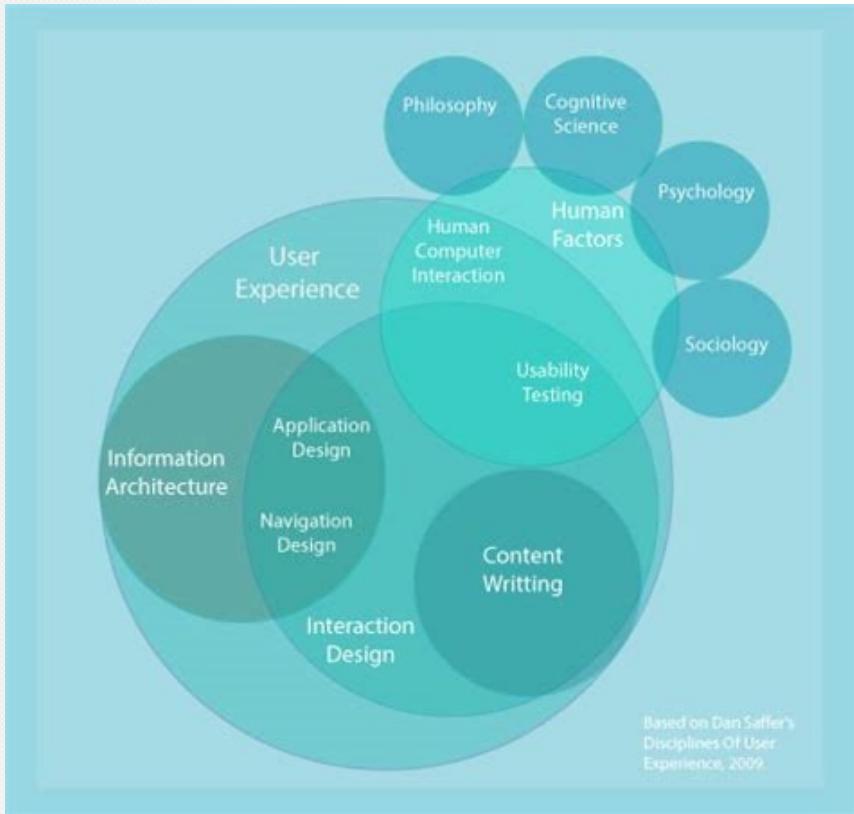


**Scientific method:**

1. Make an observation
2. Conduct research
3. Create a hypothesis
4. Test your hypothesis (experiment)
5. Analyze data
6. Replicate
7. Share results

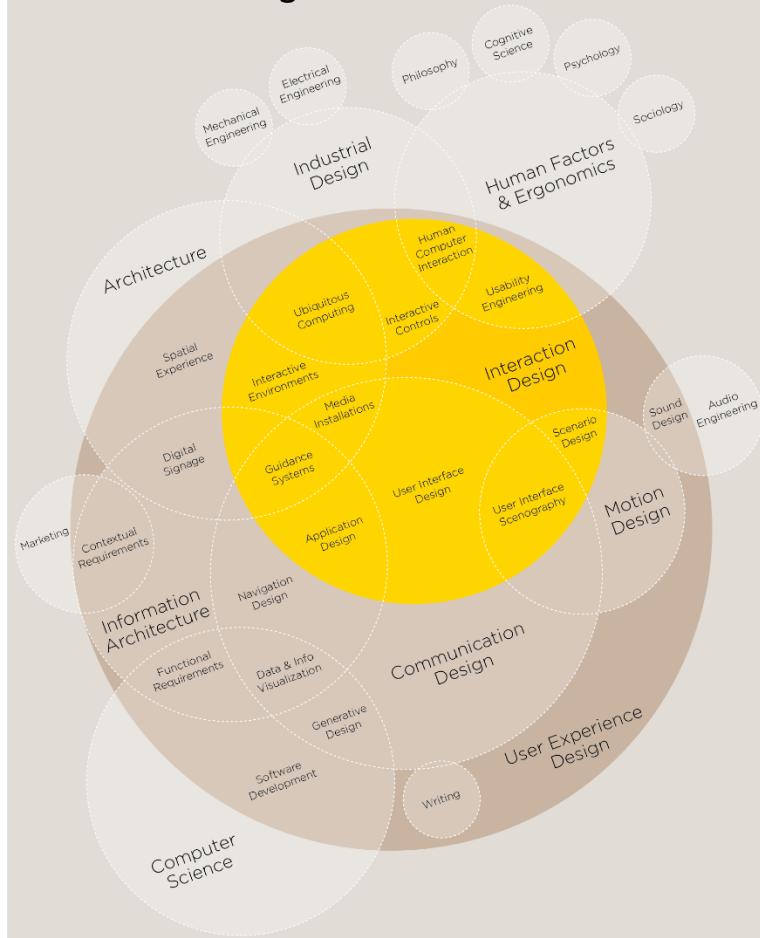
# Roots of HCD

General introduction



<https://digital.gov/2015/03/17/at-last-user-experience-performance-descriptions/>

## The Disciplines of Interaction Design



[www.envis-precisely.com](http://www.envis-precisely.com)

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# Design process

lecture overview

- Ideation



- Iteration



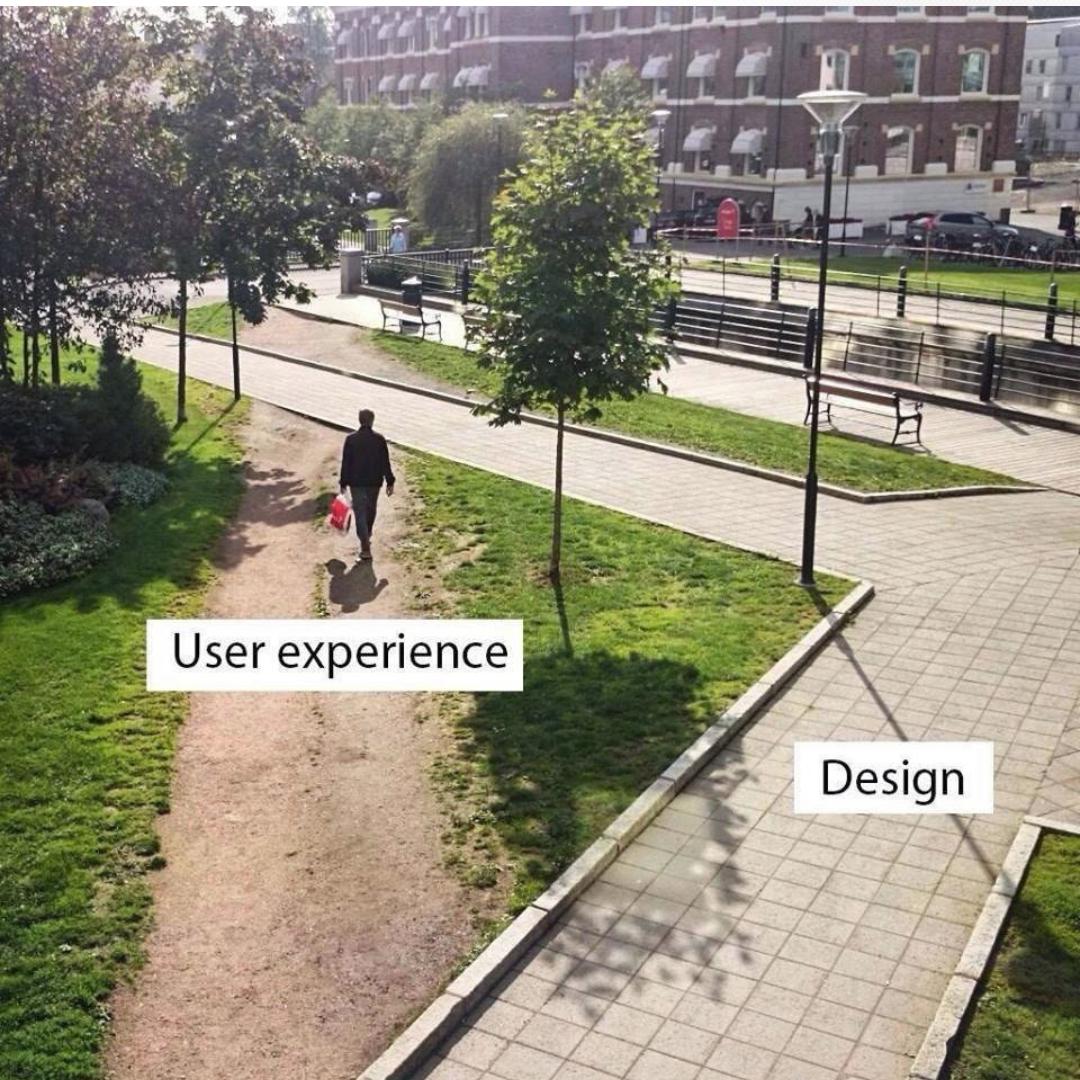
- Prototyping

# Design process

lecture overview

HCD is about designing products from the perspective of how they will be understood and used by end-users rather than making them adapt their behaviours to use our product.

Products should support their users' existing beliefs, values, attitudes, and habits.



# Why should you care about design ?

General introduction

## Good design can bring Joy

- Can help us do things we care about
- Can help us engage and connect with people

## Bad design can cost time, money and even lives

### Examples.

- Nuclear disasters, airplane accidents can be caused by bad design
- Medical devices, cars etc. must be well designed do not lead to injury

# Why should you care about design ?

General introduction

Technology is not neutral



Netflix documentary

# Why should you care about design ?

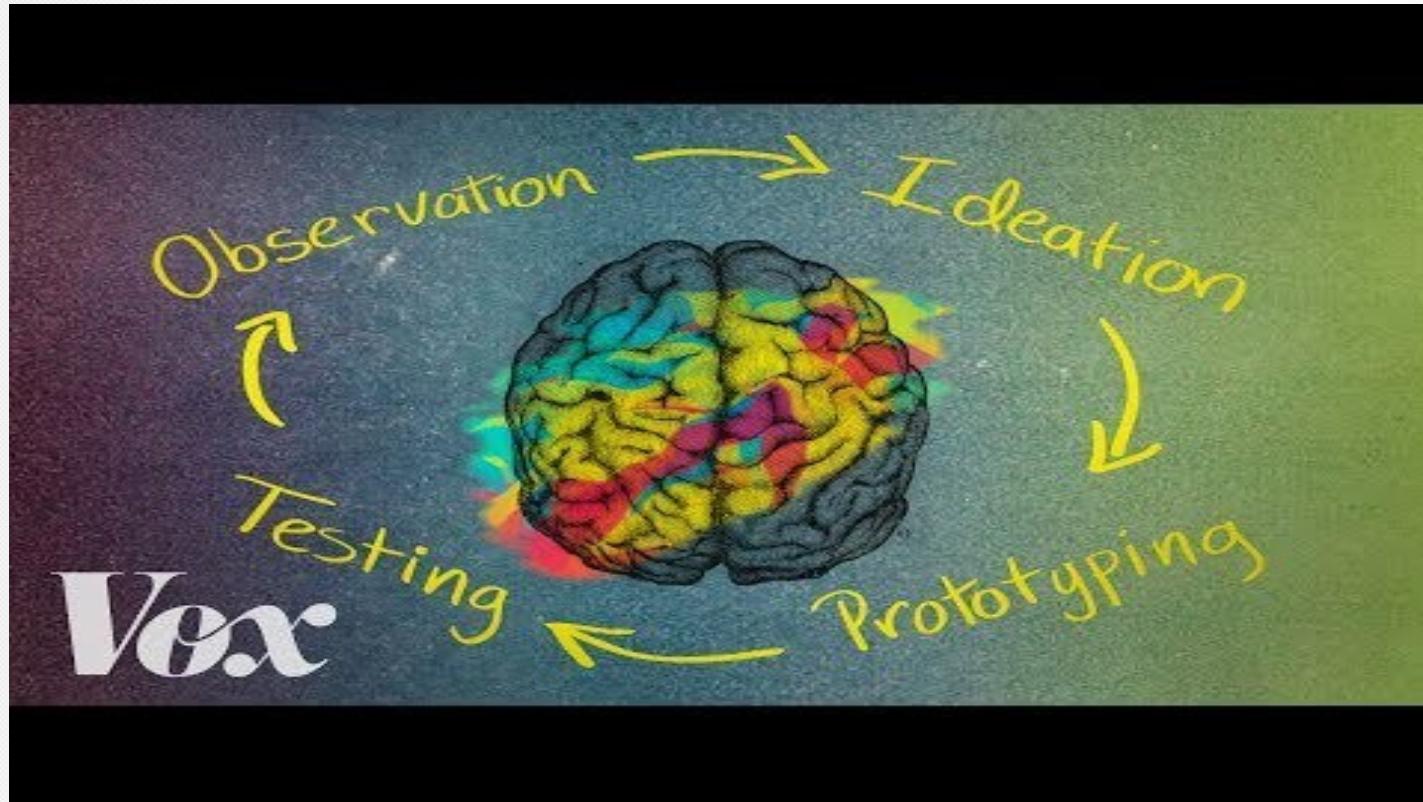
General introduction

I am not an Interaction Designer. Why should I care?

- The term Design does not belong to the field of IxD
- The approach applies to most problems
- You will have to collaborate with IxD, or Graphic designers in the future
- Design affects us all, and it is not neutral

# Design process

General introduction



# First step in HCD

General introduction

## Coming up with interesting questions

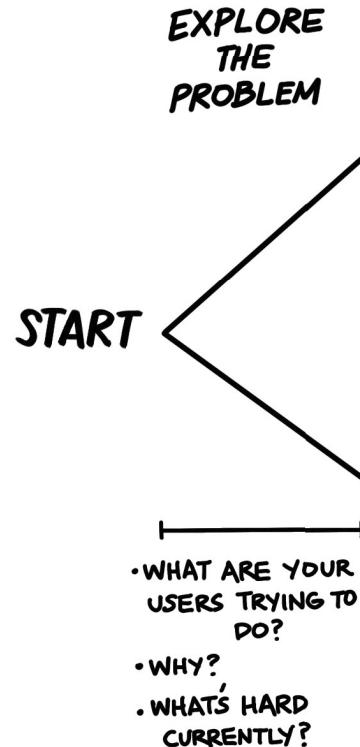
- Why is ... this a problem
- Why do people do this ... instead of this...
- How do people experience this ... in their live

## How?

- By observing the world and how people live their lives,
- By focusing on specific aspects of their lives
- By conducting Research

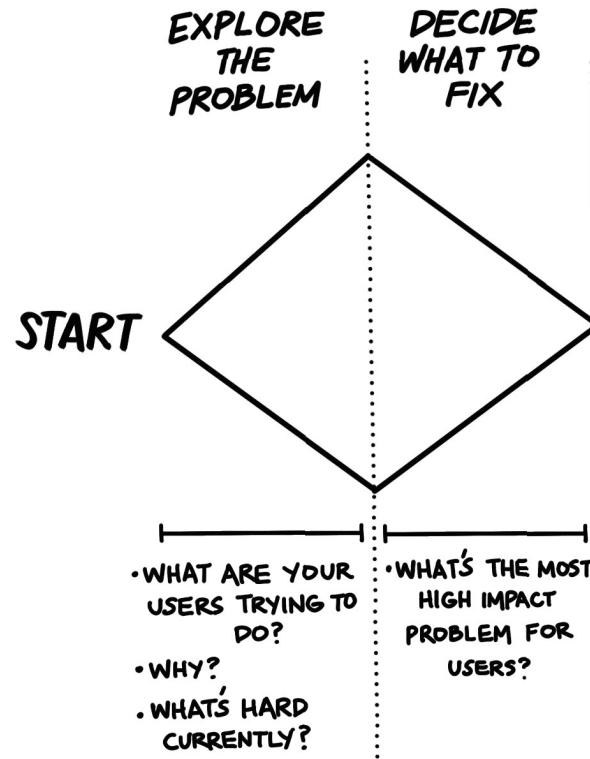
# Design process (Double Diamond)

General introduction



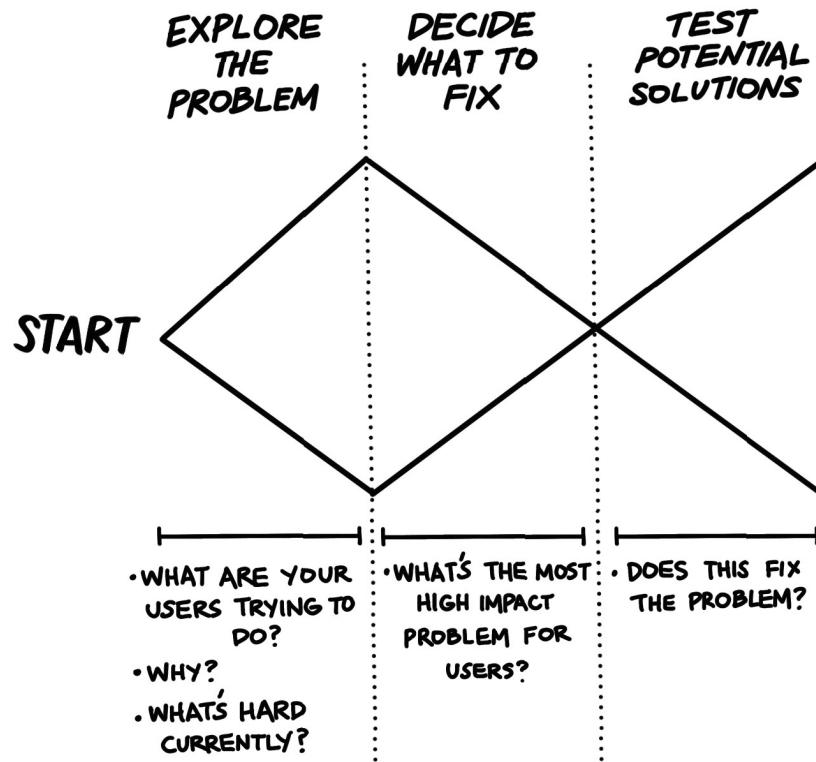
# Design process (Double Diamond)

General introduction



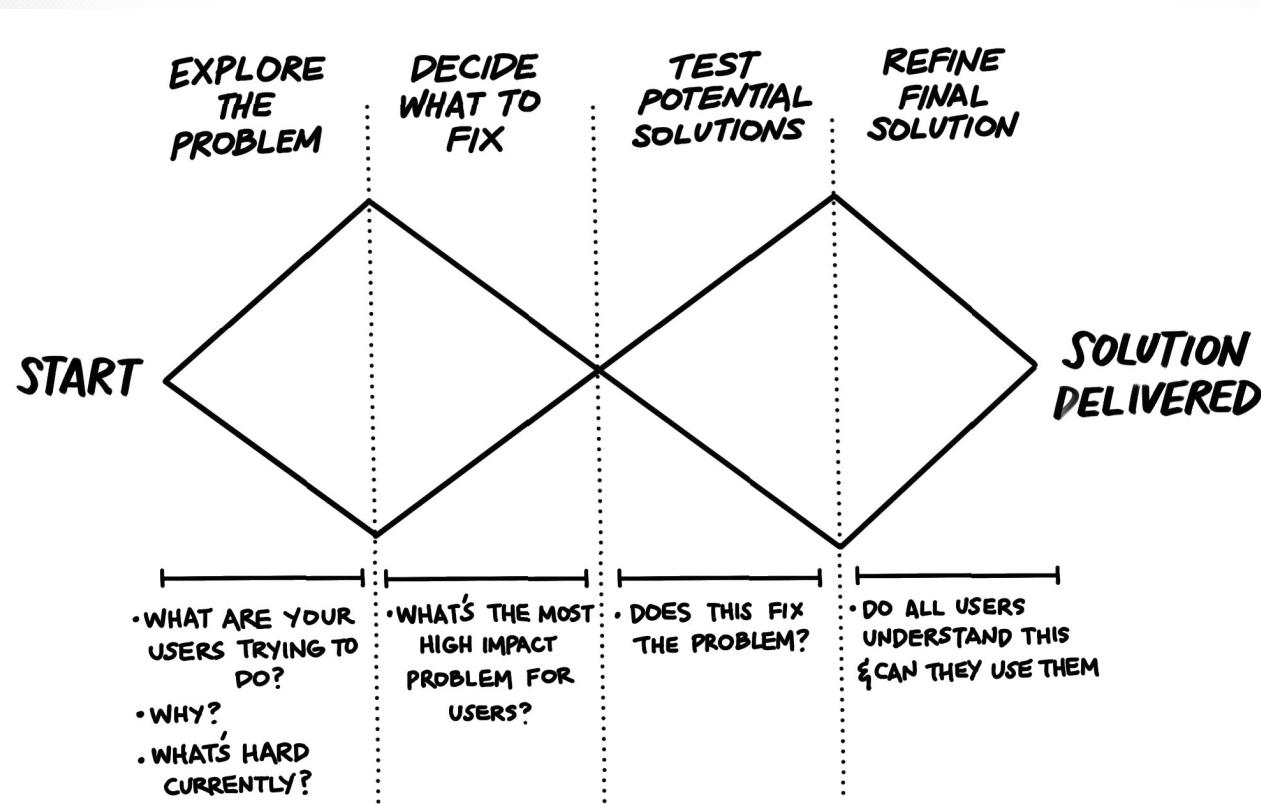
# Design process (Double Diamond)

General introduction



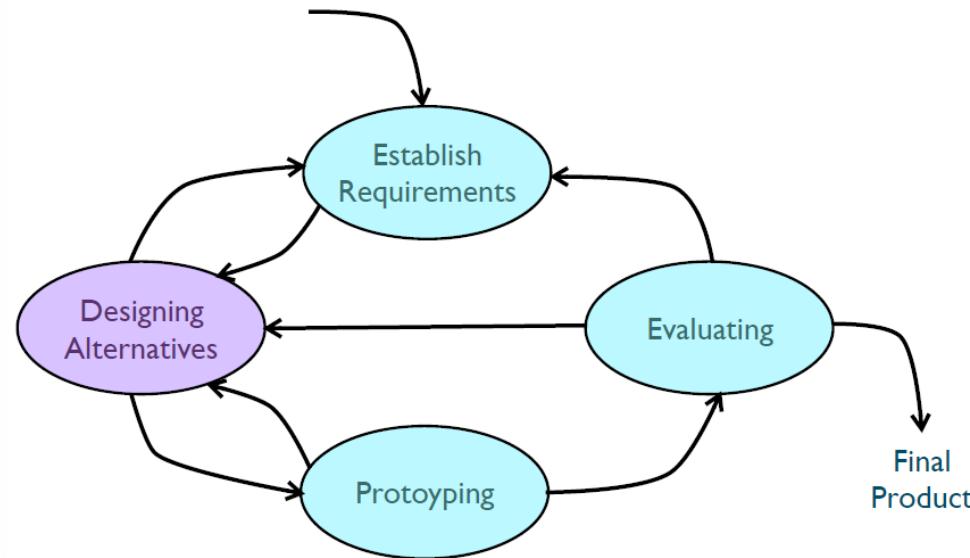
# Design process (Double Diamond)

General introduction



# Process of Design

Interaction design lifecycle

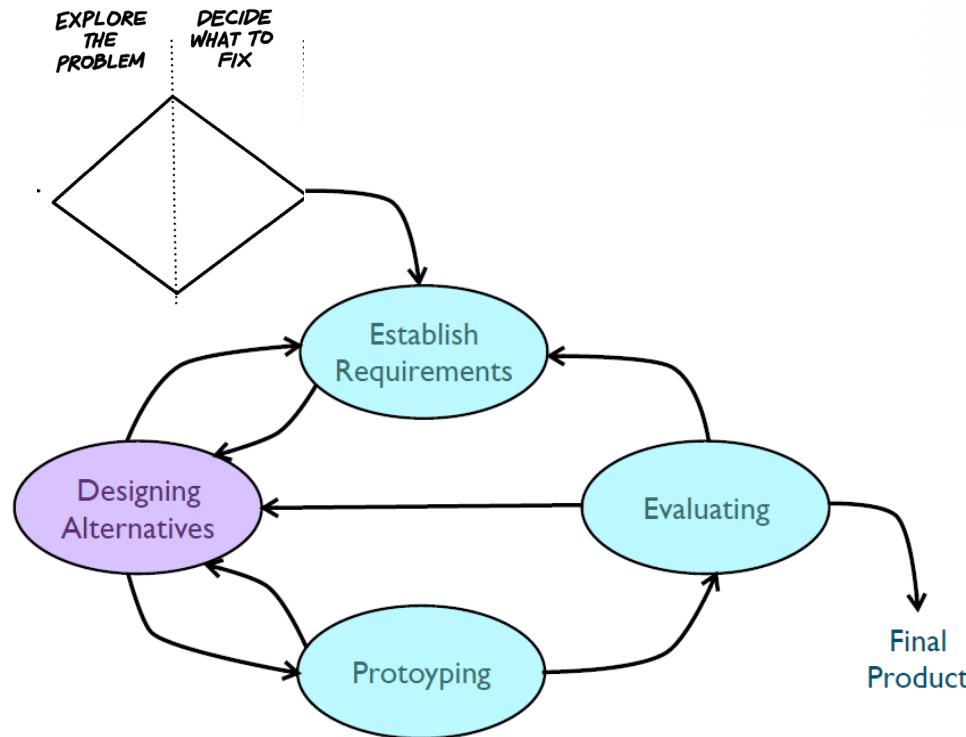


Simple interaction design lifecycle model

Rogers, Y., Sharp, H., Preece, J. (2015). Interaction design: beyond human-computer interaction. Wiley

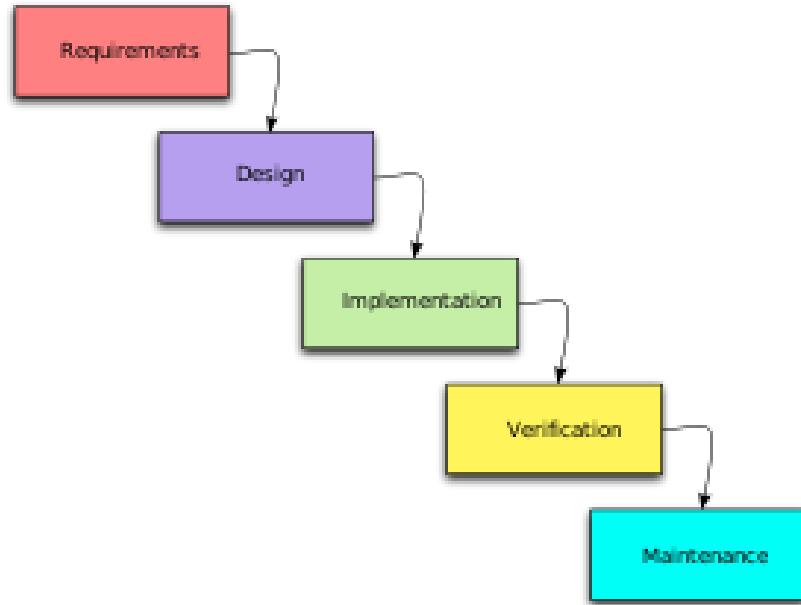
# Process of Design

The design process



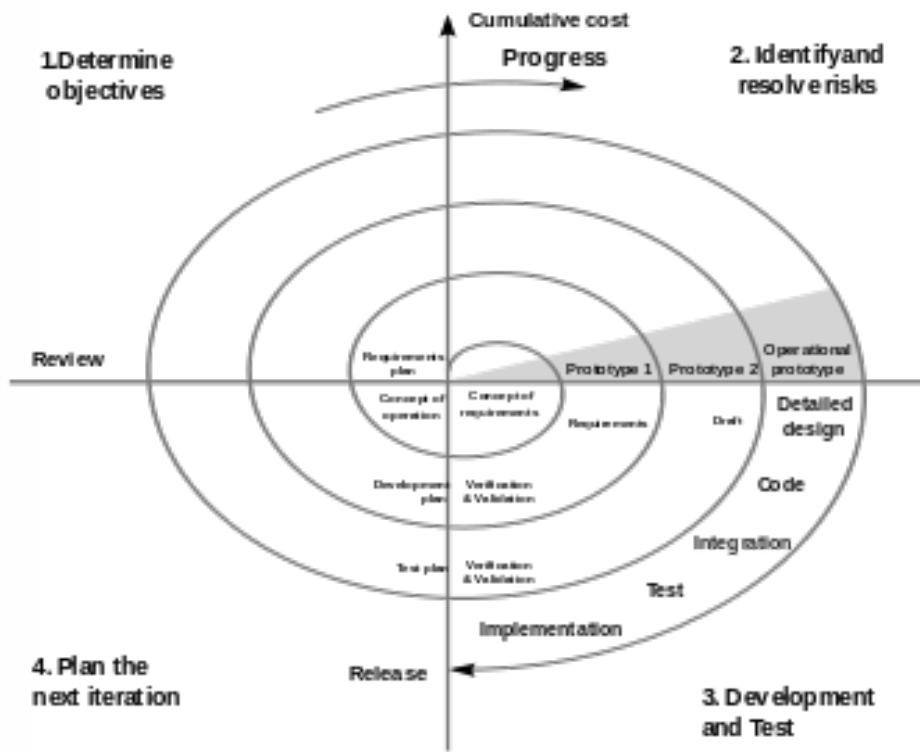
# Waterfall model

Other models



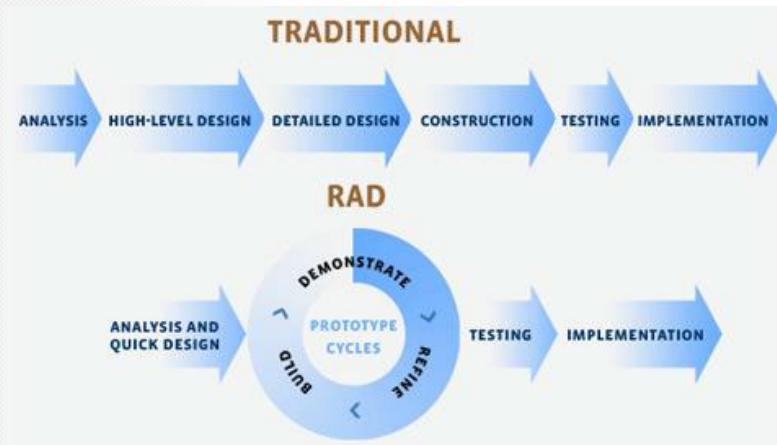
# Spiral model

Other models

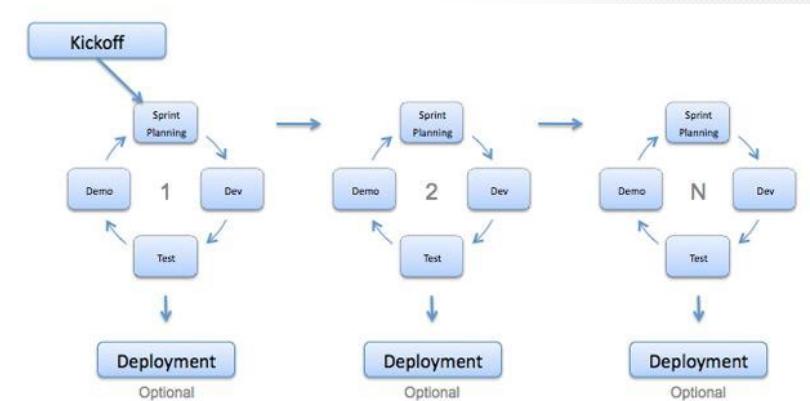


# RAD model

Other models



## Scrum - Sprints



2

## Part 2 Understanding phase

# Activities in the Understanding phase

Understanding phase

## Activities

- Exploration of the problem space (group activity)
- Desk research (secondary research)
  - Academic research
  - Applied research
  - Competitive analysis
- User research (primary research)
  - Observations
  - Contextual inquiry
  - Diary studies
  - Interviews /focus groups



**Part 1**  
Today's lecture



**Part 2**  
Next lecture

# Exploration of the problem space (Group activity)

Understanding phase

- articulate the problem as a team
- reflect on ideas in the early stages of the process
- view multiple perspectives on the problem space



# Exploration of the problem space (Group activity)

Understanding phase

One of my rules in consulting is simple: never solve the problem I am asked to solve.

...

Because, invariably, the problem I am asked to solve is not the real, fundamental, root problem. It is usually a symptom.



**Don Norman**

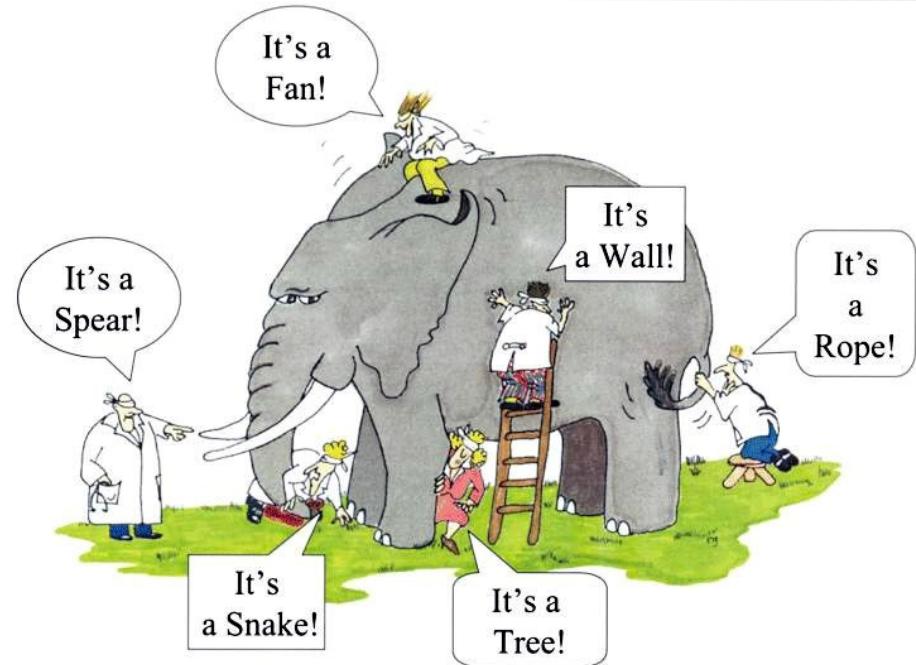
Try to identify root problems

# Exploration of the problem space (Group activity)

Understanding phase

- What?
- Who?
- Where?
- When?
- Why?

Where is friction?  
Where are the problems?  
What are the opportunities?



# Challenge Test run

Explorations test run

- What?
- Who?
- Where?
- When?
- Why?

Connectedness	Recycling	Exercise

Where is friction?

Where are the problems?

What are the opportunities?

What are the interesting questions in this space?

# Challenge Test run

Explorations test run



# Exploration of the problem space (Group activity)

Understanding phase

What is the outcome of this activity?

List of interesting questions related to the problem space

- Unfiltered
- Divergent
- Aiming at roots of problems, not only symptoms

Now is not the time to evaluate/critique the feasibility

Preliminary problem statements

# Desk Research

(Secondary research)

# Desk research (Secondary research)

Understanding phase

## Already existing research

- Academic Research
- Applied Research

## For existing products (redesign)

- Customer Comments
- User support feedback
- Log files, web analytics
- Social media analysis

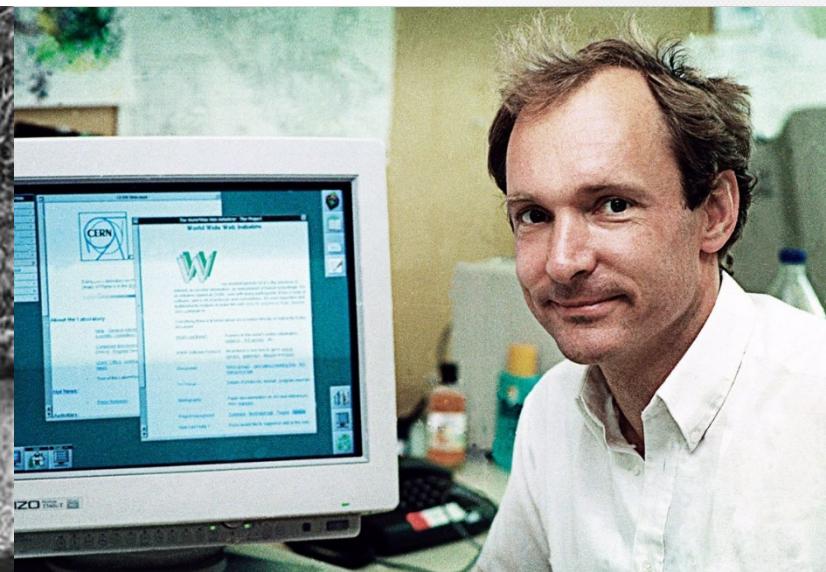
Be very vigilant about the validity of your sources

# Academic Research

# Academic research

Understanding phase

Many industry “Gurus” are accredited most the technological innovations



# Academic research

Understanding phase

Academic research often drives (indirectly) most innovation today

- It is relevant and freely accessible to you
- It may hold answers to your problem
- It reflects international interdisciplinary collaborations
- It has (mostly) no hidden motives

[Learn how to use academic research](#)

# How do we know if something is true?

## All research starts with a problem or question

How we try to answer this question can vary and  
depends on a lot of factors

Good research ends with an answer

Very good research ends with more questions

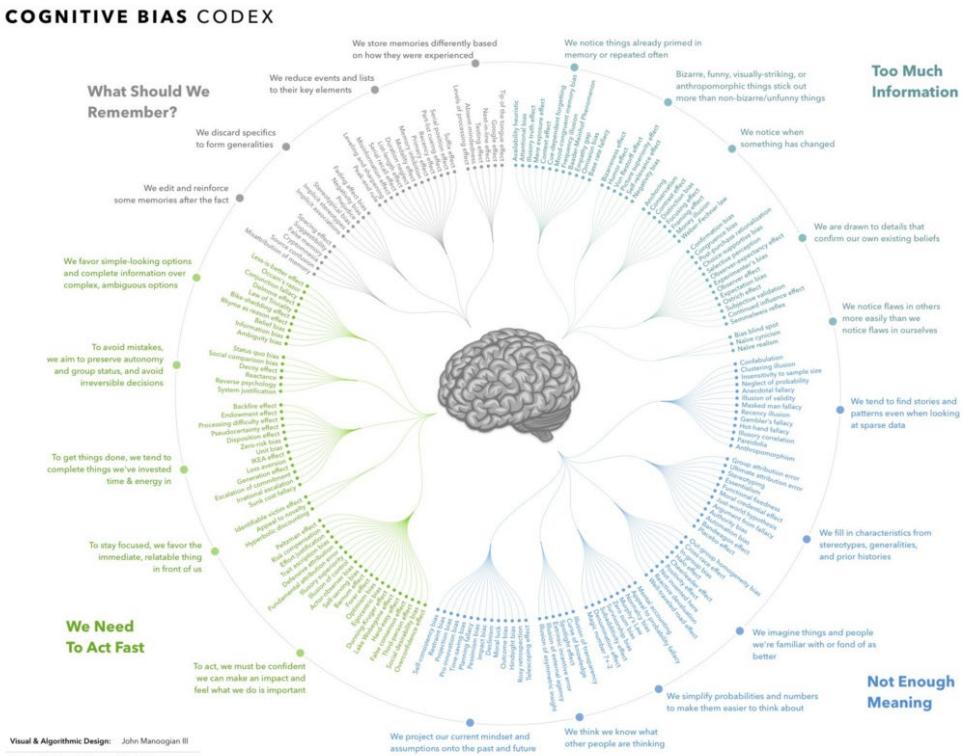
## What is Research?

A systematic attempt, using socially approved methods to extend our knowledge and understanding of the world

# Why systematic attempt?

## Research Definition

# Can we trust our intuition or rationality?



# Why systematic attempt?

Research Definition

Can we trust our intuition or rationality?

**Apophenia** is the tendency to mistakenly perceive connections and meaning between unrelated (e.g. streaks of luck for example coin flip, basketball)

**Hindsight bias** common tendency for people to perceive events that have already occurred as having been more predictable than they actually were before the events took place

knew-it-all-along phenomenon  
or creeping determinism



# Why systematic attempt?

Research Definition

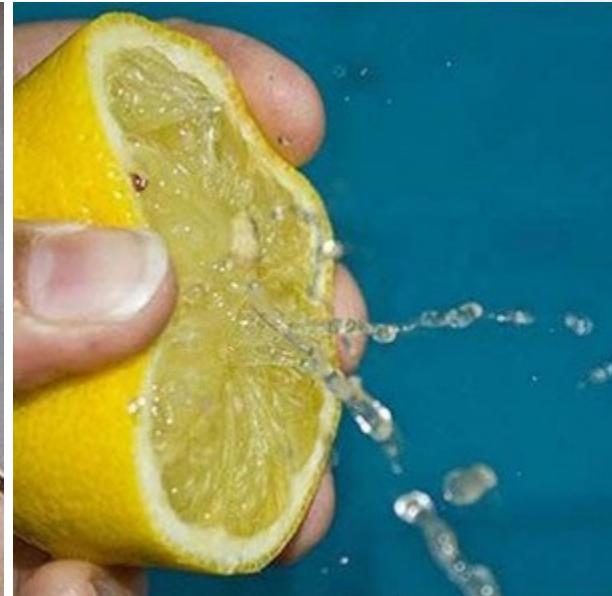
Can we trust our intuition or rationality?

## Dunning-Kruger effect

people assess their cognitive ability as greater than it is and comes from the inability of people to recognize their lack of ability.



## McArthur Wheeler

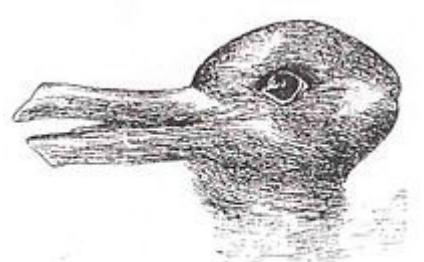


# Why systematic attempt?

Research Definition

Can we trust our own senses or experience ?

*The dress*



*The duck-rabbit*

Ludwig Wittgenstein Philosophical Investigations (1953)

# How do we get valid answers to our questions?

Scientific method

## Scientific Approach

- Intuition and/or authority are used to generate ideas about a phenomenon/behavior
- **Skepticism:** ideas must be evaluated on the basis of careful logic and results from scientific investigations
- **Empiricism:** knowledge is based on observations and the study of reality

## Example

- I believe application X is more usable than Z
- I need to run an experiment in order to observe representative user's and acquire proof
- Even if I prove I am wrong, this knowledge is useful (falsifiability)

# Positivism (Realism)

School of thought

## assumptions

- knowledge is out there waiting to be discovered
- knowledge does not change
- reality is external to us and can be measured (objectivism)

## purpose of research

- filling the knowledge gap

## methods/goals

- objective measurements and generalization
- hypothesis testing (statistical analysis)

mainly

**Quantitative research**

# Constructivism (Relativism)

School of thought

## assumptions

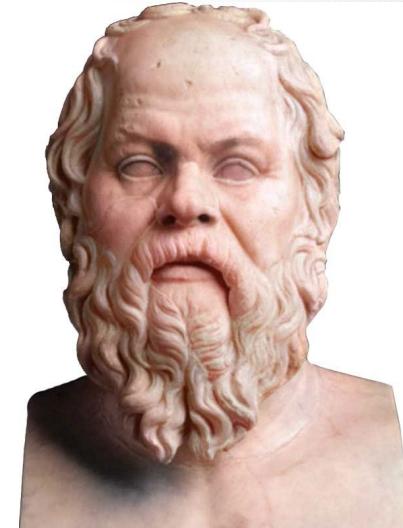
- people develop knowledge based on their perceptions and experiences
- knowledge is relative, a mere social construction.
- truth evolves, changes and is shaped by context

## purpose of research

- solving a problem

## methods/goals

- Interpretive
- qualitative or descriptive research



mainly

## Qualitative research

Ethnography, participant observation,  
case study, in depth interview

# A 'Soft' v. 'Hard' perspective on research

Qualitative vs Quantitative research



Tim Ingold. Photo by Billy Hancock.

# Qualitative research

Qualitative research



Kitchen Stories is a 2003 Norwegian film by Bent Hamer

# HCD research

What is research

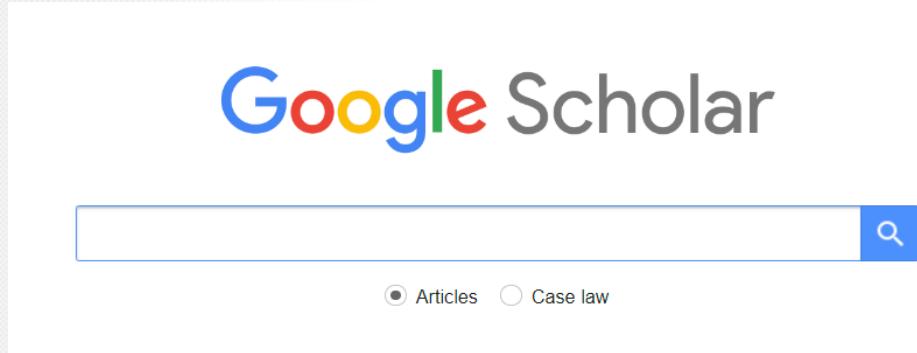
Both quantitative and qualitative research

Multidisciplinary field with researchers with different research backgrounds  
(Engineering, human factors, psychology, sociology)

You will find both types of academic research in your search and both are valid

# Academic research. How?

What is research



Research Gate, Academia.edu,

NTNU Library, Plain Google

- ACM TOCHI: Transactions on CHI
- Behaviour and Information Technology
- Interacting with Computers
- ACM interactions
- International Journal of Human-Computer Interaction
- International Journal of Human-Computer Studies
- Interact (IFIP),
- NordiCHI,
- CHI,
- DIS

# Academic research. How?

What is research

The screenshot shows the Google Scholar homepage. On the left is a sidebar with the following options:

- ≡ Google Scholar
- My profile
- My library
- Alerts
- Metrics
- Advanced search (selected)
- Settings

The main area features the Google Scholar logo and a search bar with a magnifying glass icon. Below the search bar are two radio buttons: "Articles" (selected) and "Case law". A message encourages users to add multiple names to their profile. The "Recommended articles" section displays a single article snippet:

Tools or peers? Impacts of anthropomorphism level and social role on emotional attachment and disclosure tendency

# Academic research. How?

What is research

X Advanced search 

**Find articles**

with **all** of the words   connectedness source:CHI 

with the **exact phrase**

with **at least one** of the words

without the words

where my words occur  anywhere in the article  in the title of the article

Return articles **authored** by

Return articles **published** in  e.g., "PJ Hayes" or McCarthy

Return articles **dated** between  —  e.g., 1996

**Articles** About 601 results (0.05 sec)

To asymmetry and beyond! Improving social **connectedness** by increasing designed interdependence in cooperative play  acm.org

J Harris, M Hancock - ... of the 2019 CHI Conference on Human Factors in ..., 2019 - dl.acm.org ... of mechanical means of enhancing social **connectedness**, knowing that we would not cover ... can lead to a predicted increase in social **connectedness**, behavioural engagement, interest, ...

☆ Save  Cite Cited by 32 Related articles All 3 versions

Biosignal sharing for affective **connectedness**  acm.org

HC Min, TJ Nam - CHI'14 Extended Abstracts on Human Factors in ..., 2014 - dl.acm.org We explore how sharing biosignals can support affective **connectedness** from the design and user study of two wearable systems called WearBEAT and WearBREATH: WearBEAT is a ...

☆ Save  Cite Cited by 32 Related articles All 2 versions

Interpersonal **connectedness**: conceptualization and directions for a measurement instrument  acm.org

DT Van Bel, WA IJsselsteijn, YAW de Kort - CHI'08 extended abstracts on ..., 2008 - dl.acm.org ... momentary **connectedness** and interpersonal **connectedness** ... of CMC tools on interpersonal **connectedness**. The construct should ... **connectedness** and interpersonal **connectedness** that ...

☆ Save  Cite Cited by 41 Related articles All 3 versions

Frontiers of Jurisdiction: From Isolation to **Connectedness**  heinonline.org

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# How to read a paper?

What is research

CHI 2019 Paper

CHI 2019, May 4–9, 2019, Glasgow, Scotland, UK

## To Asymmetry and Beyond!

Improving Social Connectedness by Increasing Designed Interdependence in Cooperative Play

John Harris  
University of Waterloo  
Waterloo, Canada  
john.harris@uwaterloo.ca

Mark Hancock  
University of Waterloo  
Waterloo, Canada  
mark.hancock@uwaterloo.ca



A screenshot showing Scotty's perspective, featuring a character with a circular health bar and a glowing blue effect. B screenshot showing Kirk's perspective, featuring a character attacking a wasp with a lightning bolt effect.

Figure 1: Simultaneous screenshots of (A) Scotty's interface and (B) Kirk's perspective during play. As Kirk attacks a wasp with her axe, Scotty uses the shock ability to stun it (white radius in A and blue lightning bolt effect in B) and the bomb ability on a distant enemy (yellow icon in A and red glow in B).

**ABSTRACT**

Social play can have numerous health benefits but research has shown that not all multiplayer games are effective at promoting social engagement. Asymmetric cooperative games have shown promise in this regard but the design and dynamics of this unique style of play is not yet well understood. To address this, we present the results of two player experience studies using our custom prototype game *Beam Me Round, Scotty! 2*: the first comparing symmetric cooperative play (e.g., where players have the same interface, goals, mechanics, etc.) to asymmetric cooperative play (e.g., where players have differing roles, abilities, interfaces, etc.) and the second comparing the effect of increasing degrees of interdependence

between play partners. Our results not only indicate that asymmetric cooperative games may enhance players' perceptions of connectedness, social engagement, immersion, and comfort with a game's controls, but also demonstrate how to further improve these outcomes via deliberate mechanical design changes, such as changes in cooperative action timing and direction of dependence.

**CCS CONCEPTS**

- Human-centered computing → Empirical studies in HCI; Applied computing → Computer games.

**KEYWORDS**

Game design; Symmetric vs asymmetric play; Asymmetric

Permission to make digital or hard copies of all or part of this work for

- Abstract
- Introduction
- Related work
- Method
- Study
- Results
- Discussion
- Conclusion

# Academic research

Understanding phase

What is the outcome of this activity?

List of ideas and refined concepts that can help in your project

Do not reinvent the wheel

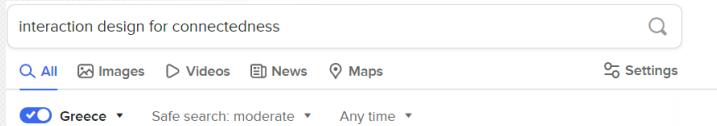
- Frameworks
- models
- Theories
- Designs

Be careful: The purpose of Academic research and applied HCD research can be different

# Applied research

# Applied research

## What is research



<https://medium.com/@allisonyhuang/designing-for-interactions-complexity-and-connectedness>  
**Designing for Interactions: Complexity and Connectedness**  
But for a more long-winded answer that can take up more space than a spotty Skype call across the Pacific Ocean, here's where I stand on what **interaction design** is to me. [Design for Interactions ...](#)

**Medium Article**  
Interesting but not necessarily valid

<https://www.interaction-design.org/literature/article/what-is-interaction-design>  
**What is Interaction Design?**  
The goal of **interaction design** is to create products that enable the user to achieve their objective (s) in the best way possible. If this definition sounds broad, that's because the field is rather broad: the **interaction** between a user and a product often involves elements like aesthetics, motion, sound, space, and many more.

**Not relevant**

[https://www.researchgate.net/publication/336870306\\_Design\\_for\\_Connectedness\\_interaction\\_design\\_explorations\\_for...](https://www.researchgate.net/publication/336870306_Design_for_Connectedness_interaction_design_explorations_for...)  
**(PDF) Design for Connectedness: interaction design explorations for ...**  
PDF | In the past decades, we have experienced a great rise in the expectancy of human life, meanwhile, the population ageing also becomes a world-wide... | Find, read and cite all the research ...

**Research paper**  
Interesting

[https://jesperorstrup.dk/portfolio/design\\_for\\_connectedness](https://jesperorstrup.dk/portfolio/design_for_connectedness)  
**Design for connectedness - Jesper Ørstrup Christensen**  
Design for connectedness During the third semester of my masters I was on exchange at University of Technology, Sydney in Australia. Here I attended the course "Interaction Studio" where my fellow students and I were presented the latest research in **Interaction Design**, while we simultaneously developed our own **Interaction Design** projects.

**Personal blog**  
Interesting. Describing process of design

<https://www.oreilly.com/library/view/designing-connected-products/9781449372682/ch0...>  
**8. Interface and Interaction Design - Designing Connected Products [...]**  
This is for two reasons. First, point-and-click and touchscreen interfaces dominate the majority of UX

# Applied research

What is research

## Other sources:

- Blogs, research blogs
- Company websites or blogs
- YouTube:  
Lectures, Conference presentations, Company product presentations
- TED talks,
- Government Websites
- Organisational Websites

ClickBait

# Applied research

Understanding phase

What is the outcome of this activity?

List of ideas and refined concepts that can help in your project

Do not reinvent the wheel

- Inspiration
- Examples of specific solutions
- Links to academic research

Be very careful:

Not everything out there is valid information. Be aware of clickbait, and be aware of personal opinions. Do not cite unpublished, anecdotal work.

# Applied research

Understanding phase

What is the outcome of this activity?

List of ideas and refined concepts that can help in your project

Do not reinvent the wheel

- Inspiration
- Examples of specific solutions
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# Competitive Analysis

# Competitive Analysis

General introduction

A competitive analysis lists the features, strengths, weaknesses, user base, and price points of your competitors. It should include not only first-hand experience with the product(s) but also user reviews and analysis from external experts or trade publications.

## When is it useful

- Particularly useful for re-design projects
- You can look into surrogate products (not direct competitors)

# Competitive Analysis

General introduction

What is the outcome of this activity?

Table 2.1: Grid comparing [TravelMyWay.com](#) against three competitors

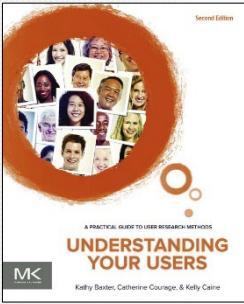
	<a href="#">TravelMyWay.com</a>	<a href="#">TravelTravel.com</a>	<a href="#">WillTravel.com</a>	Corner travel store
Unique features	Client recommendations Chat board	Customer loyalty program	Travel agent on call	Personalized service
Design strengths	Short three-step process Shows price comparison	Useful travel guides Customer and expert ratings	Shows price comparison Travel alerts and recommendations	Frequent customer program Phone access or in person
Design weaknesses	Must know three-letter airport code			
	Customer support/help is hidden	Cluttered display with too many options		
		Confusing search UI	Search results are inconsistent and not reliable	No web access
Customer base	2,500 users	500,000 users	150,000 users	Customer size unknown
Satisfaction score	68	72	Not available	Not applicable
Requirements	Section 508 compliant Accessible on all browser types	Internet Explorer only Flash required	Accessible on all browser types	No requirements
Core features				
Research locations	✗	✗	✗	✓
Air travel	✓	✓	✓	✓
Rental car	✓	✓	✓	✓
Hotel reservations	✓	✗	✓	✓
Train tickets	✓	✓	✗	✓

- identify a set of core tasks that are relevant to your future design
- Identify strengths and weaknesses of the current solutions
- Think of what is working and what needs improvement
- Get inspiration
- Do not extract design solutions from this yet

# Reading material for this Lecture

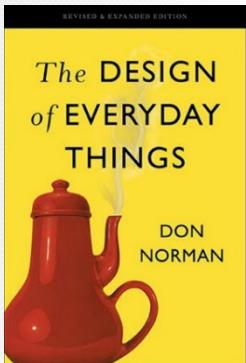
exercise

## Reading



Baxter, Courage, Caine **Understanding your Users**

- **Chapter 1 and 2**



Norman, **The design of everyday things**

- **Chapter 6**

# For the Lab session

project

Meet up in the Lab rooms and conduct Desk Research (secondary research)

- **First, explore the problem space** (Use the questions from the challenge)
- **Identify and write down interesting research questions** (Create a shared document for your group)
- **Identify 3-4 research papers and 3-4 sources of applied research** (Add them to the shared document)
- **Discuss what is interesting about those sources and how they could help refine your problem statement**



# Thank you

Lefteris Papachristos  
Associate Professor, NTNU