Course Project Preview

CSE333: Introduction to Human-Computer Interaction

Jaeyeon Lee

Spring 2023

First Week Survey!

- https://forms.gle/SY6yiFvpPJ1Au5tXA

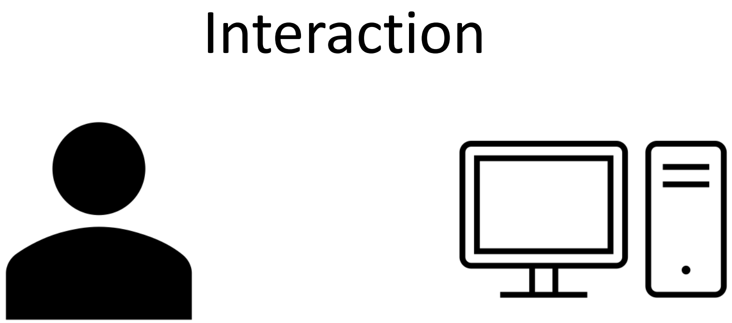
2 out of 8 questions were about teammates

- I do not have teammate, and I dont think I can make teammate. should I drop this course?

Human-Computer Interaction
is about making computers that are ...

Usable
Useful

HCI accomplishes the goal by designing and building better ...

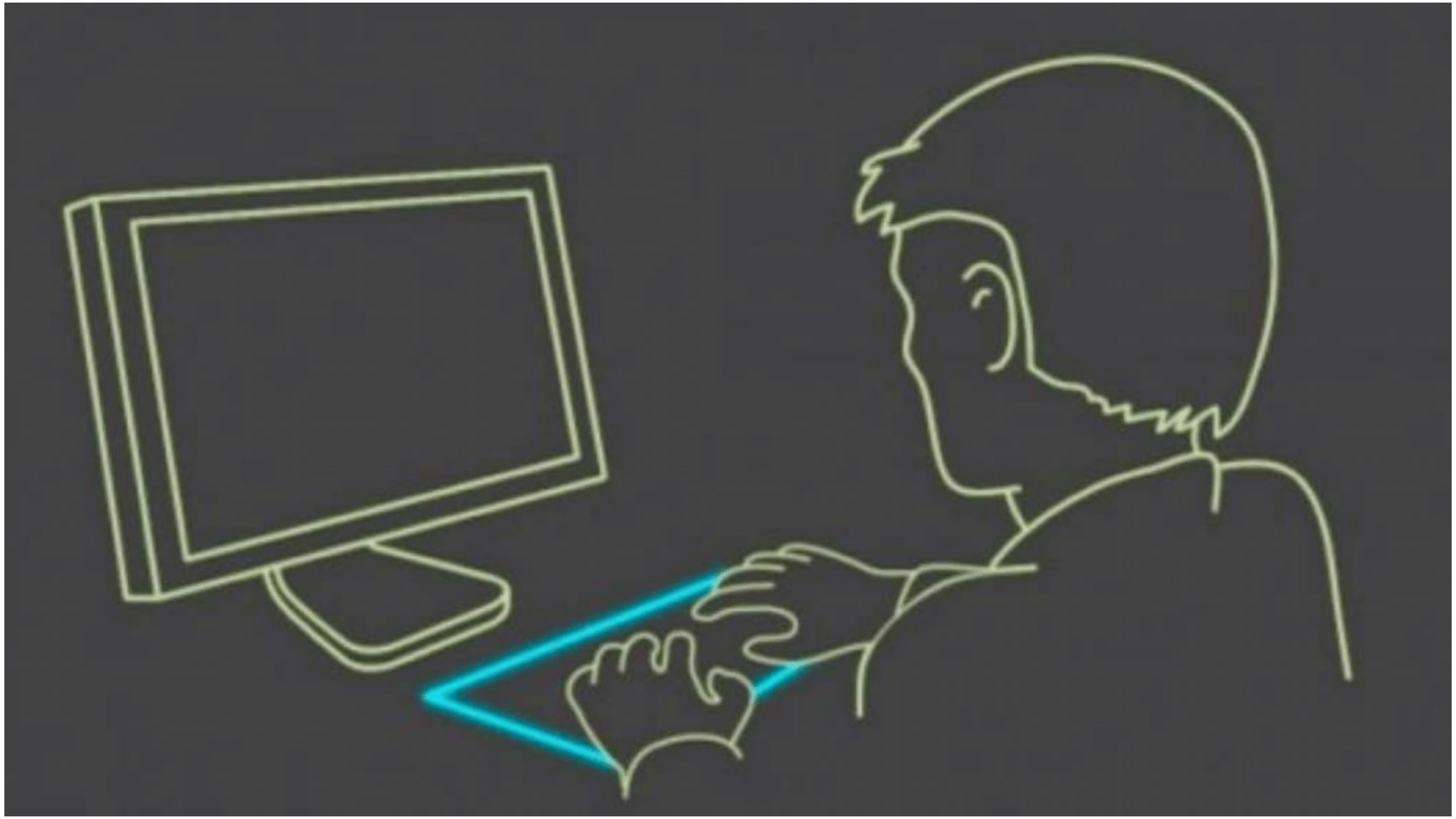


Interaction

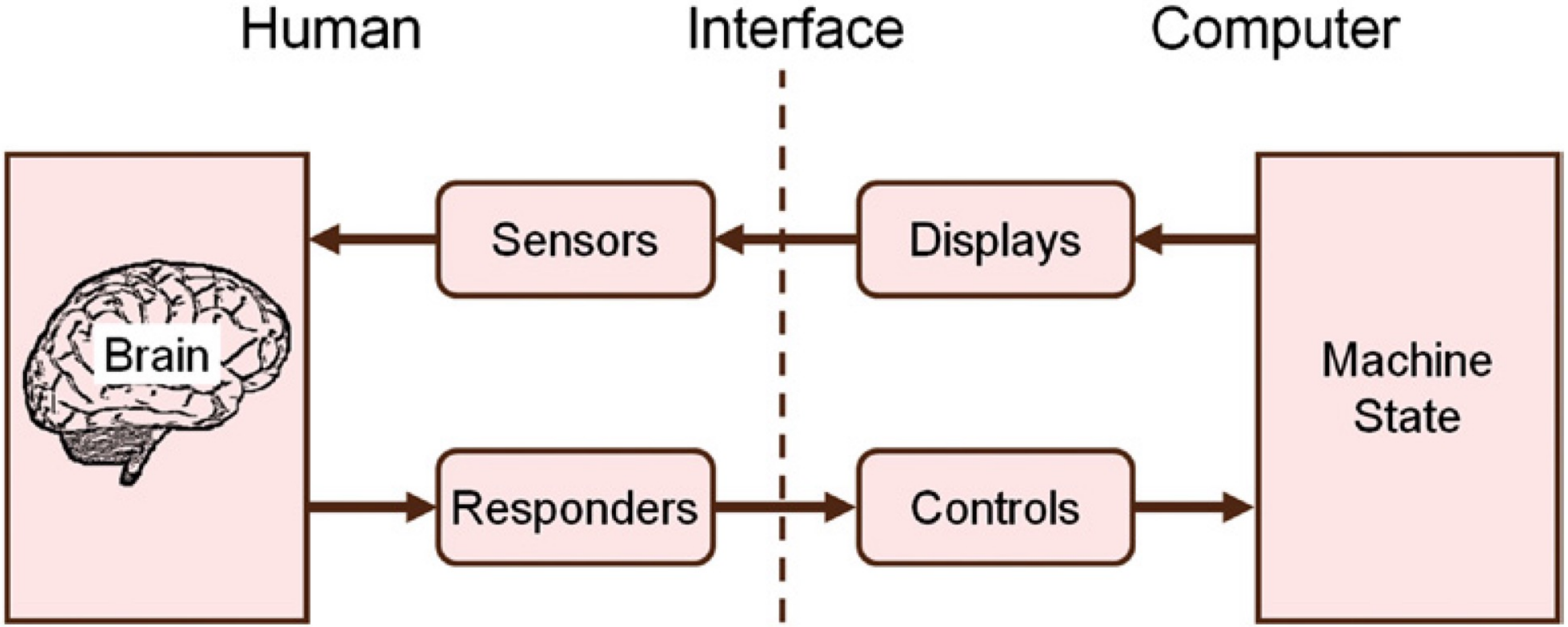
Computer System

Interaction Interface

Human User



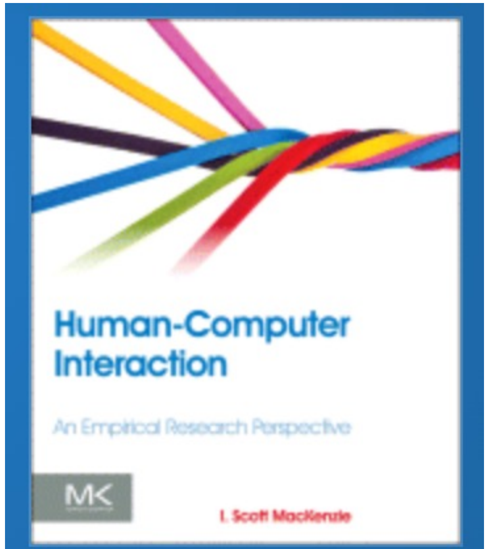
What is Human-Computer Interaction?



Kantowitz, B. H., & Sorkin, R. D. (1983).
Human factors: Understanding People-System Relationships

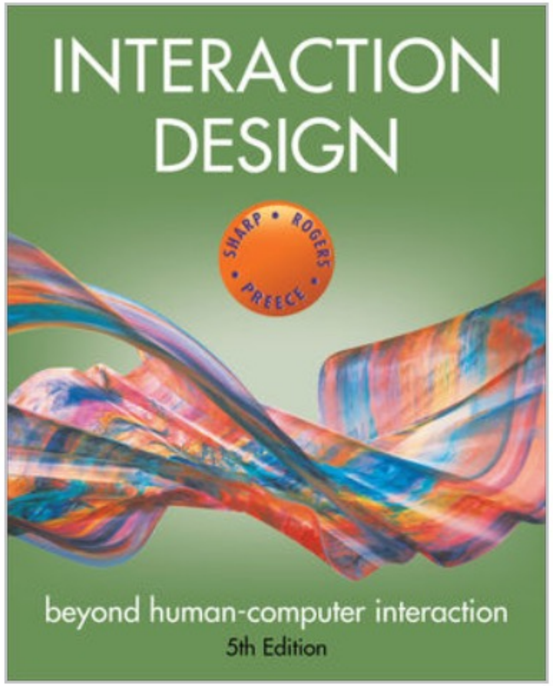
What You'll learn in CSE333

- Basic concepts of interaction design and basic models in HCI
- Basic design methodologies for HCI



Authors:

I. Scott MacKenzie



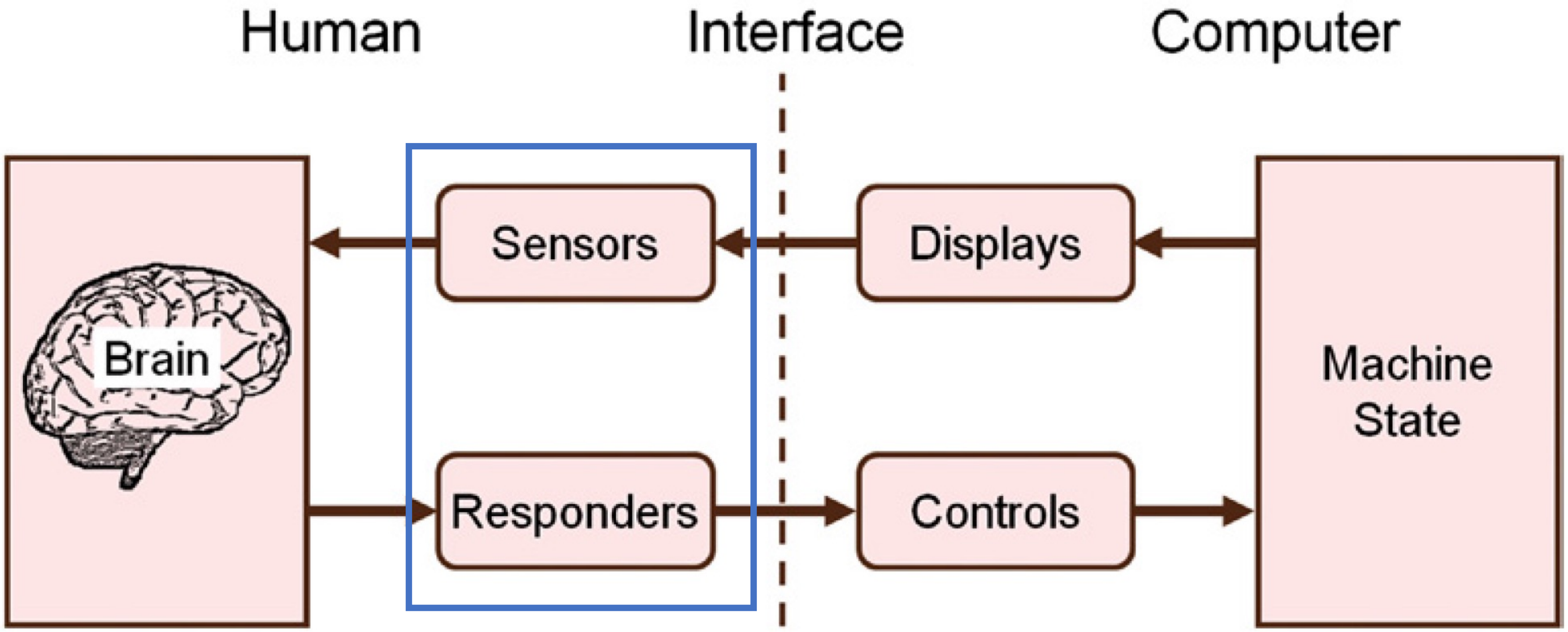
RESEARCH METHODS IN HUMAN-COMPUTER INTERACTION
Second Edition
MK
Jonathan Lazar | Jinjuan Heidi Feng | Harry Hochheiser

Authors:

Jonathan Lazar, Jinjuan Heidi Feng and Harry Hochheiser

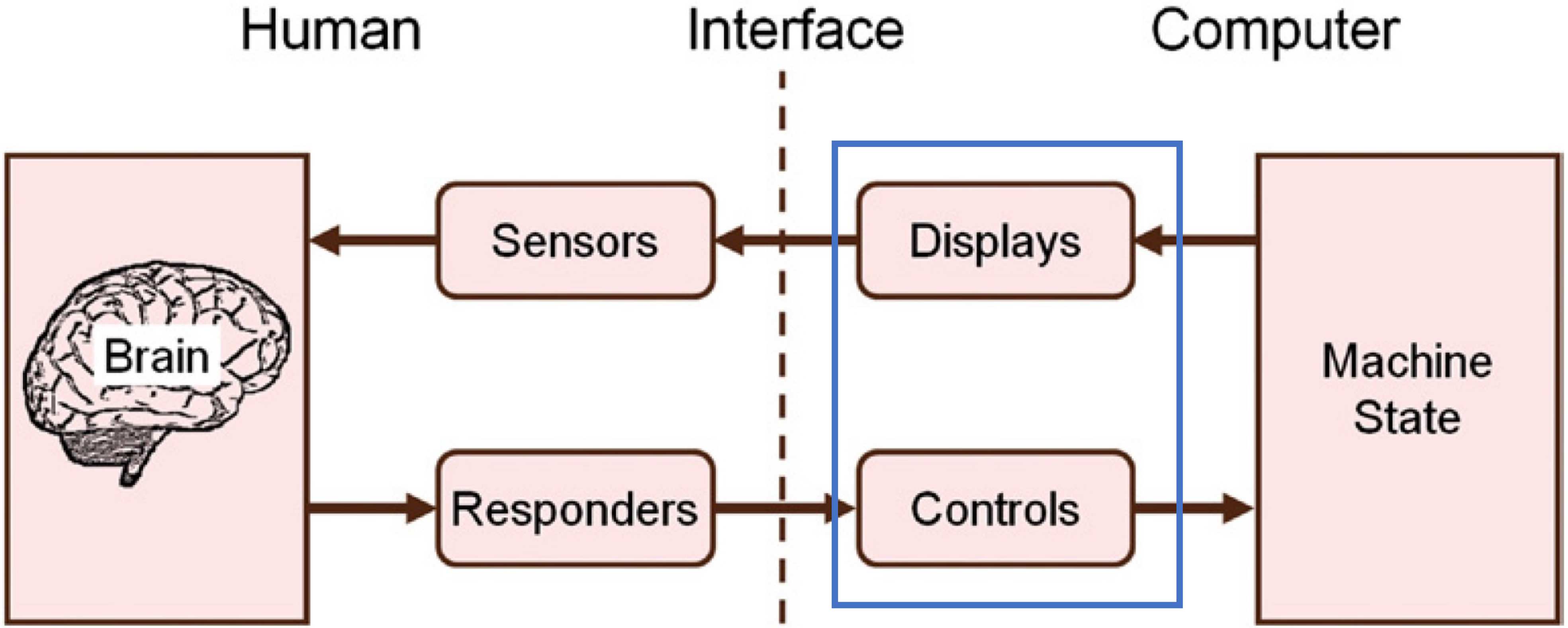
+ Selected papers at top-tier HCI venues including CHI and UIST

1. How do *humans* perceive and control things?



Human Factors

2. *Computer* input and output modalities



3. How to evaluate the interface?

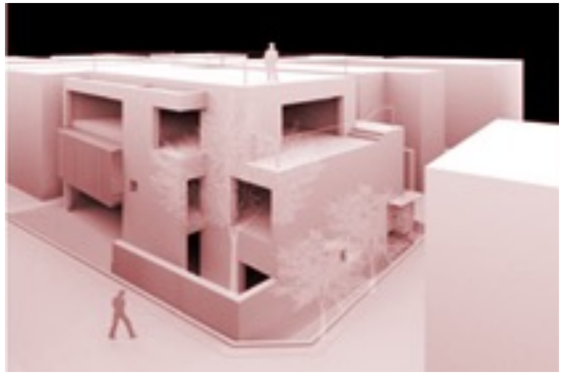
- Quantitative methods
- Qualitative methods

- How to prepare user study?
- What and how to ask?
- What and how to gather data from users?

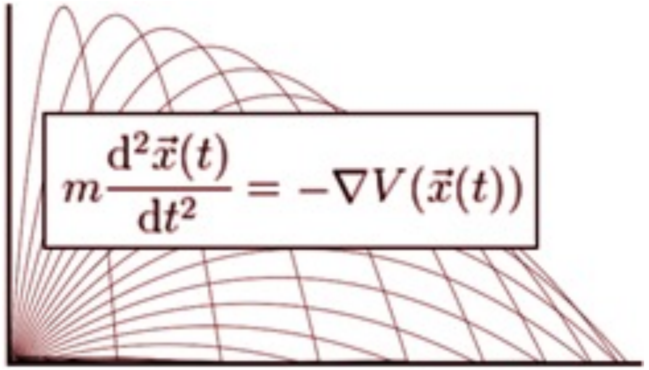
Silicon Valley, HBO TV series (2014-2019)

4. How to analyze and understand the data?

Architect’s scale model of a building



Physicist’s model for the trajectory of a tossed ball



$$m\frac{\mathrm{d}^2\vec{x}(t)}{\mathrm{d}t^2} = -\nabla V(\vec{x}(t))$$

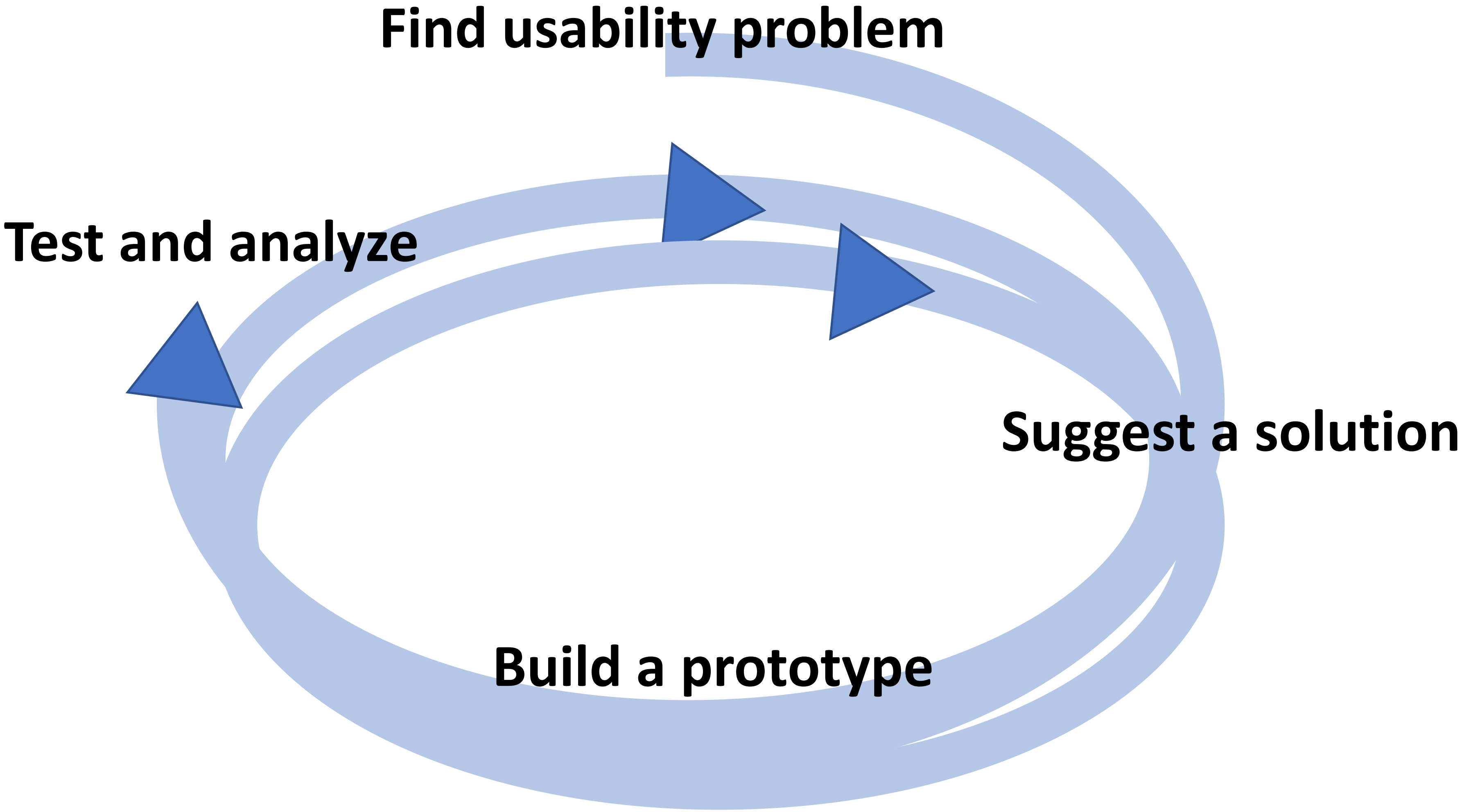
description

→ provides insight into space usage, movement of people, light, etc.

prediction

→ gives the ball’s position as a function of time

5. User-centered Design Process



Find usability problem

Test and analyze

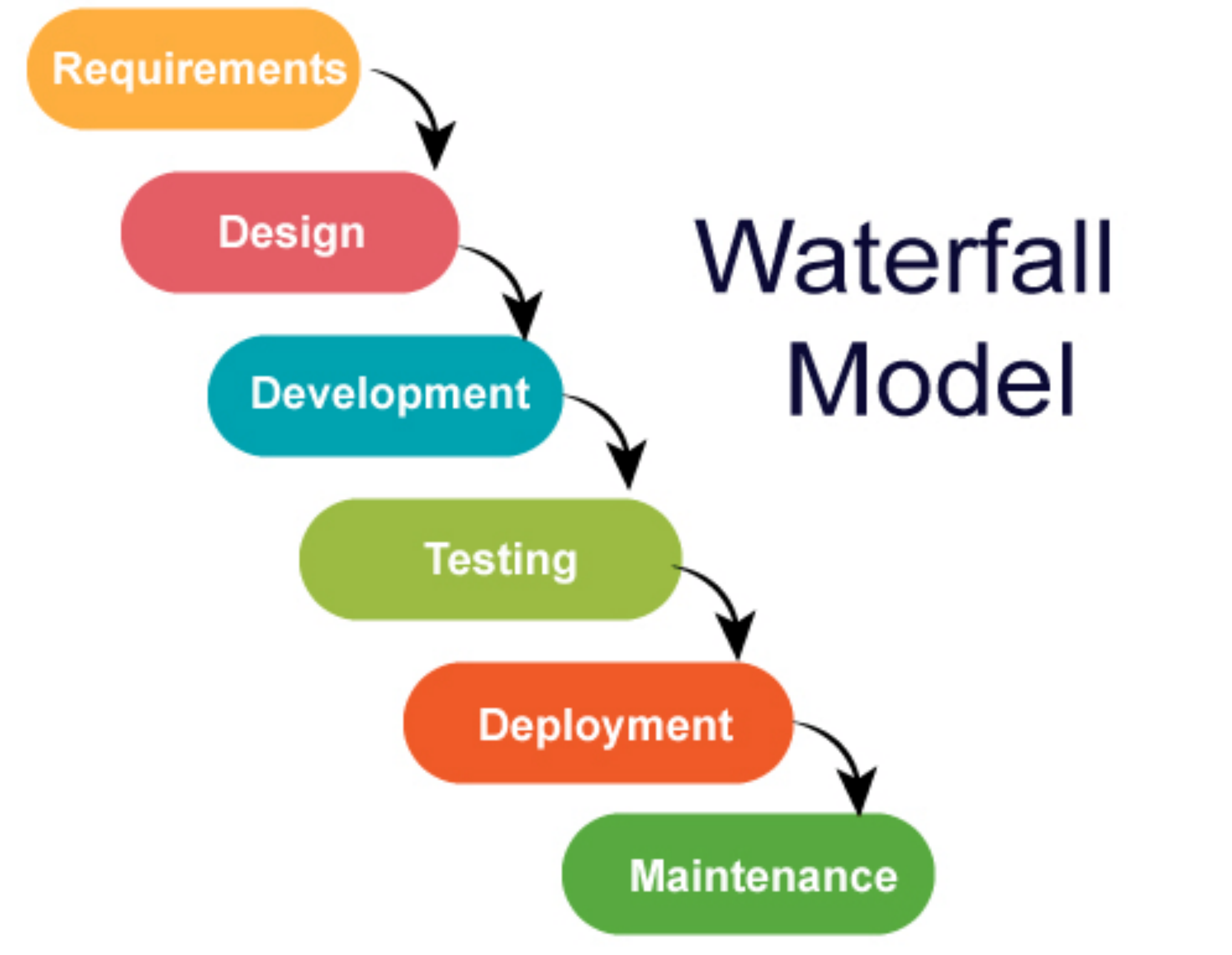
Suggest a solution

Build a prototype

Design Process Preview

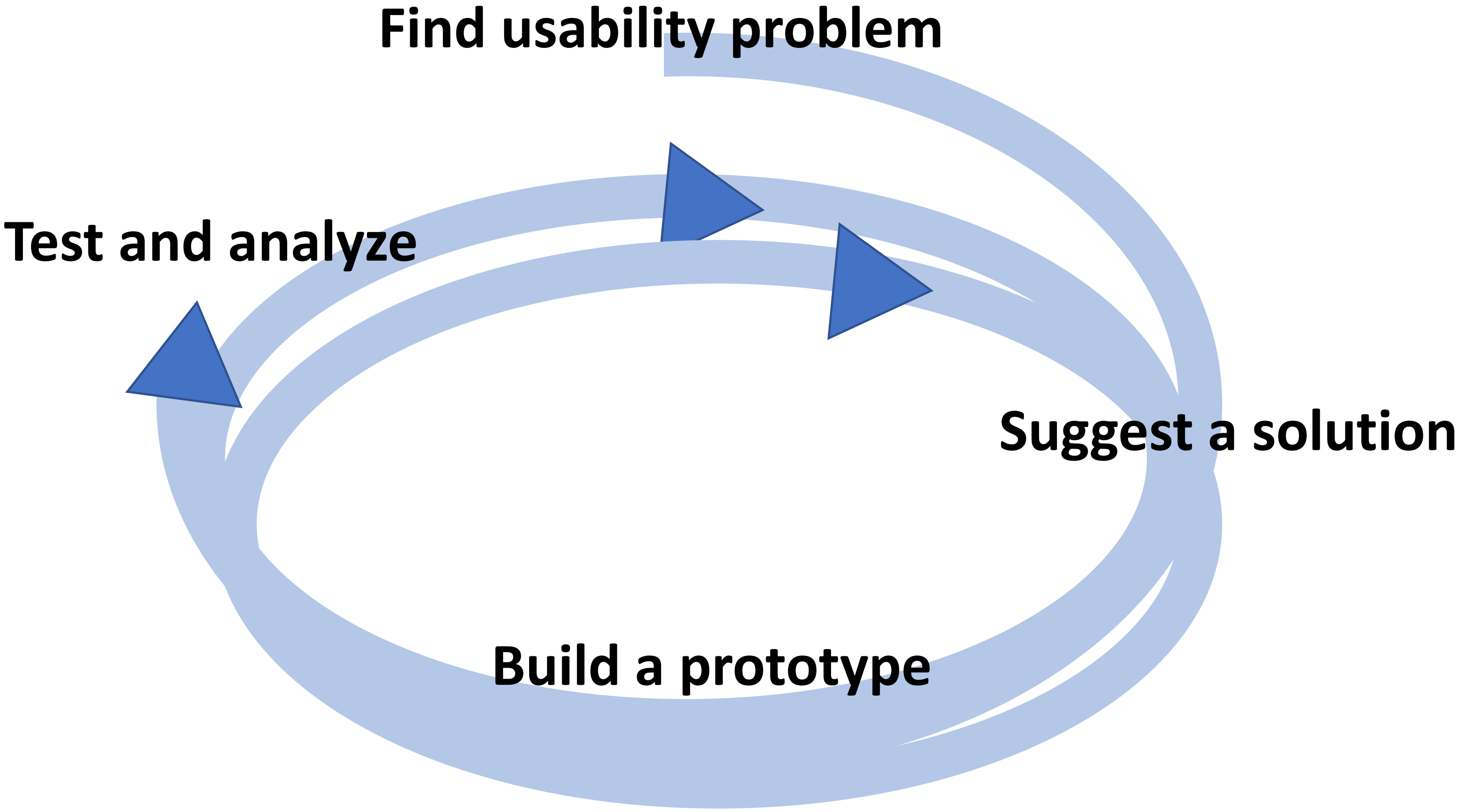
Principles of a user centered approach

(Gould and Lewis, 1

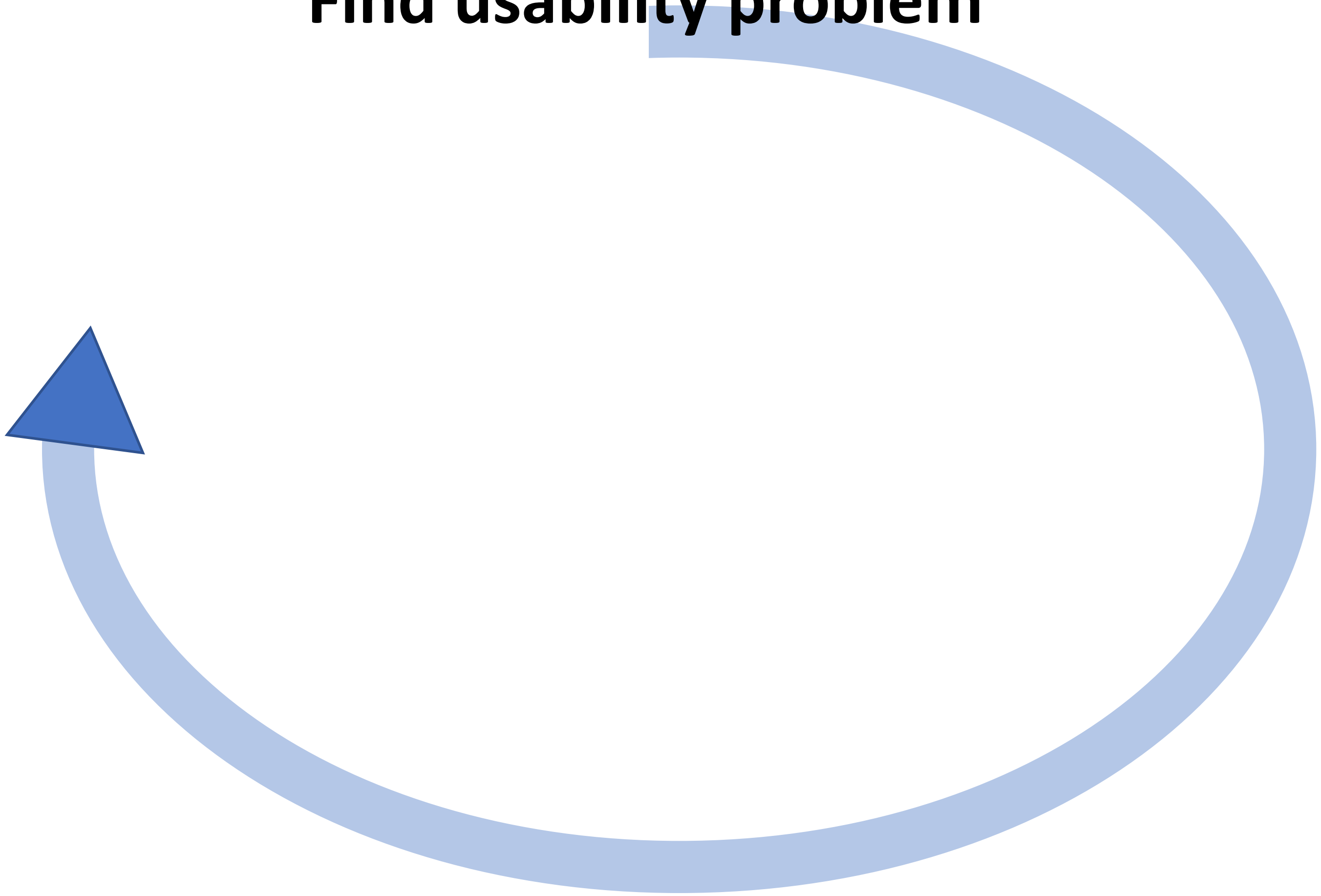


- **Early focus** o
  - Observing u se tasks, and then involvi
- **Empirical** me
  - Users' react e observed, recorded ar
  - **Base more**
- **Iterative** desi
  - When probl re tests
  - Do not assu

User-centered Design Process



User-centered Design Process



Problem space

- Problem space
  - Find users and their needs
- Design space (solution space)
  - Set requirements
  - Design products
- Ex) Smart TV user interface
  - Problem space
    - Q: What do the users want to do?
  - Design space
    - Q: What functions should the remote provide?

Start in the problem space

- **Resists the *temptation*** to begin at the “nuts and bolts” level of design.
    - Multitouch?
    - Speech interface?
    - Gesture interface?

- **Articulate** the nature of the problem space first.
    - Understand what is currently the user experience and the product
    - How this is going to be improved and changed

Articulating the problem space

- Helpful questions:
  - What is the **current solution**?
  - What is the **problem** with the solution?
  - What are your **assumptions** (what do you believe about users)?
  - What are your **claims** (what you insist on without supporting evidence for a solution)?

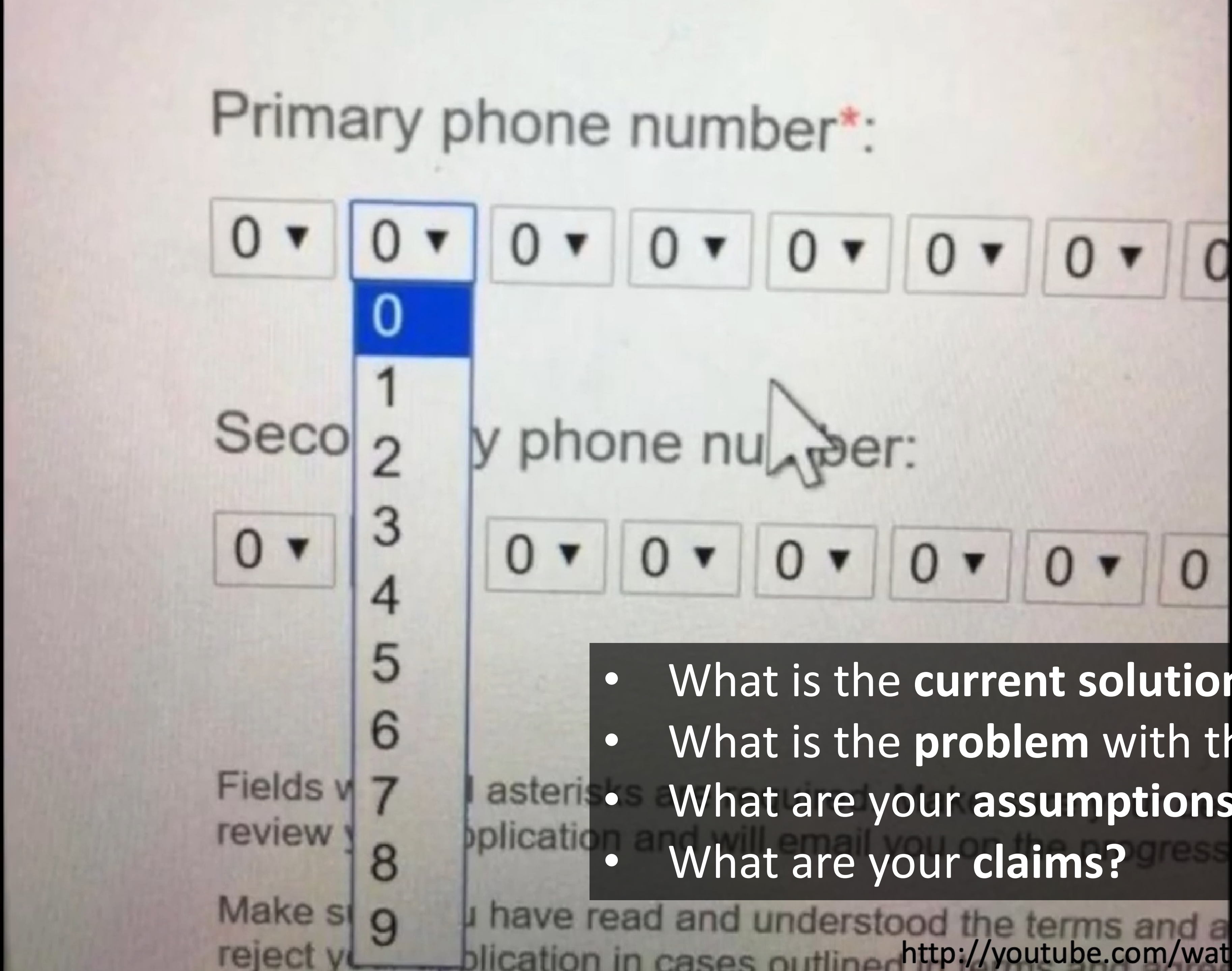
Example: Smart TV user interface

Current solution? ... Remote control
Problem? ... Difficult to enter text
Assumption? .... **The users** will be willing to use speech
Claims? ... speech interfaces will be **the best solution**

Typically done as a team effort

- Members with **differing perspective** can help identify false assumptions and claims.

- UX specialists
  - May consider what users want
- Interface engineers
  - May know the constraint of interface technology
- Software engineers
  - May tell implementation limitations



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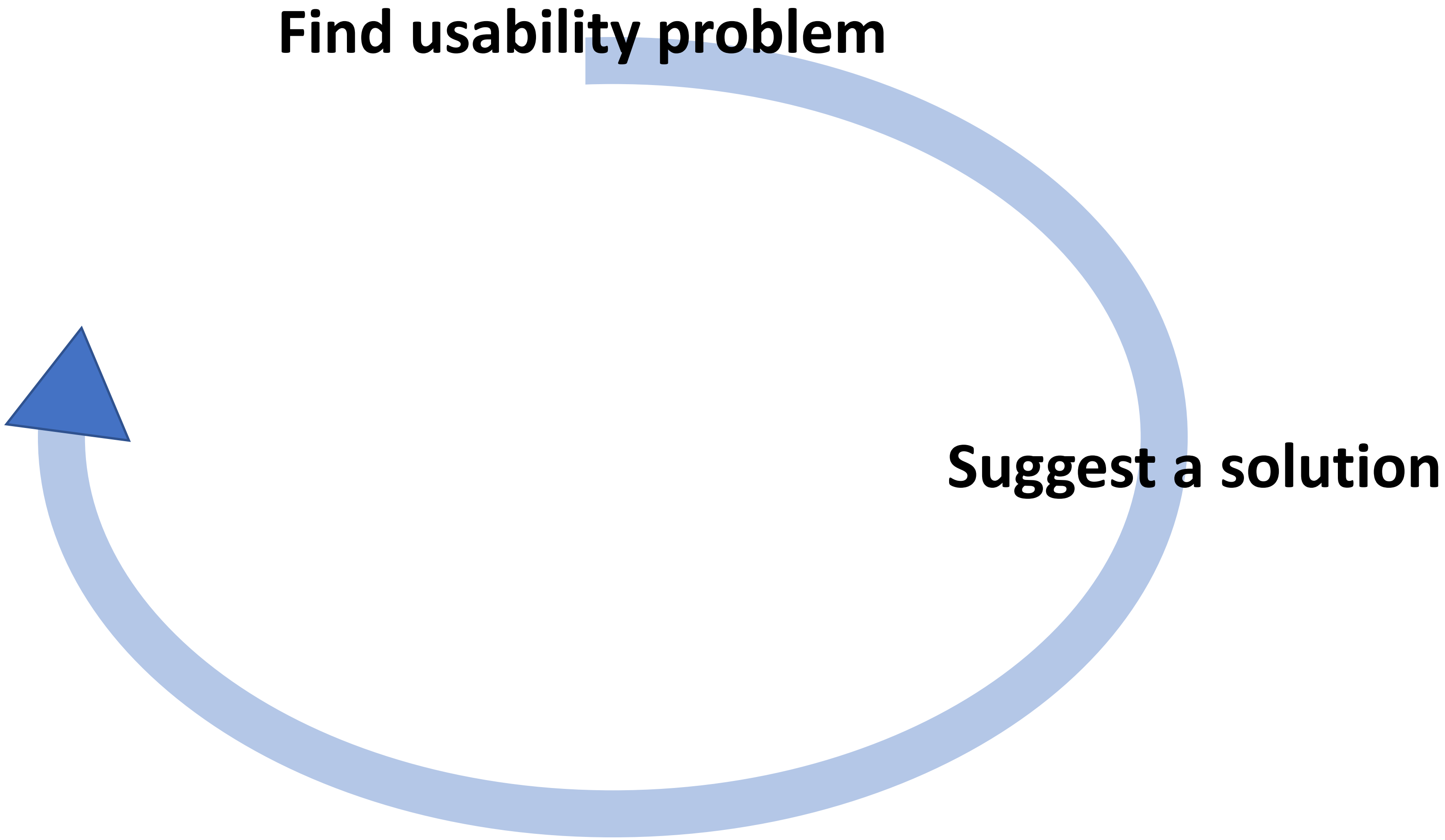
Fields w l asterisks a
review y plication and will email you on the progress

Make s u have read and understood the terms and a
reject y plication in cases outlined

- What is the **current solution**?
- What is the **problem** with the solution?
- What are your **assumptions**?
- What are your **claims?**

http://youtube.com/wat

User-centered Design Process



Find usability problem

Suggest a solution

How to generate alternative designs?

- They come from the individual designer’s creativity.
  - “Genius design” (Saffer, 2010)

- But, innovations arise through...
  - Cross-fertilization of ideas from different domains
    - Boiling kettle → Steam engine
  - Evolution of an existing product through use and observation
    - Typewriter → word processor

- Ways to enhance creativity?
  - Browsing a collection of designs
  - Invite talks from different domains

* 7 secrets of better brainstorming

- Sharpen the focus
  - Start with a clear statement of the problem
- Playful rules
  - Don’t critique or debate. Encourage wild ideas
- Number your ideas
  - Go for quantity – 100 ideas per hour is good!
- Build and jump
  - Facilitator should build on an idea and take a jump
- The space remembers
  - Capture the ideas in a medium visible to the whole group
- Stretch your mental muscles
  - Warm up. Prep for a session. (e.g., a field trip to a toy store)
- Get physical
  - Encourage diagrams, stick figures, mock-ups and models

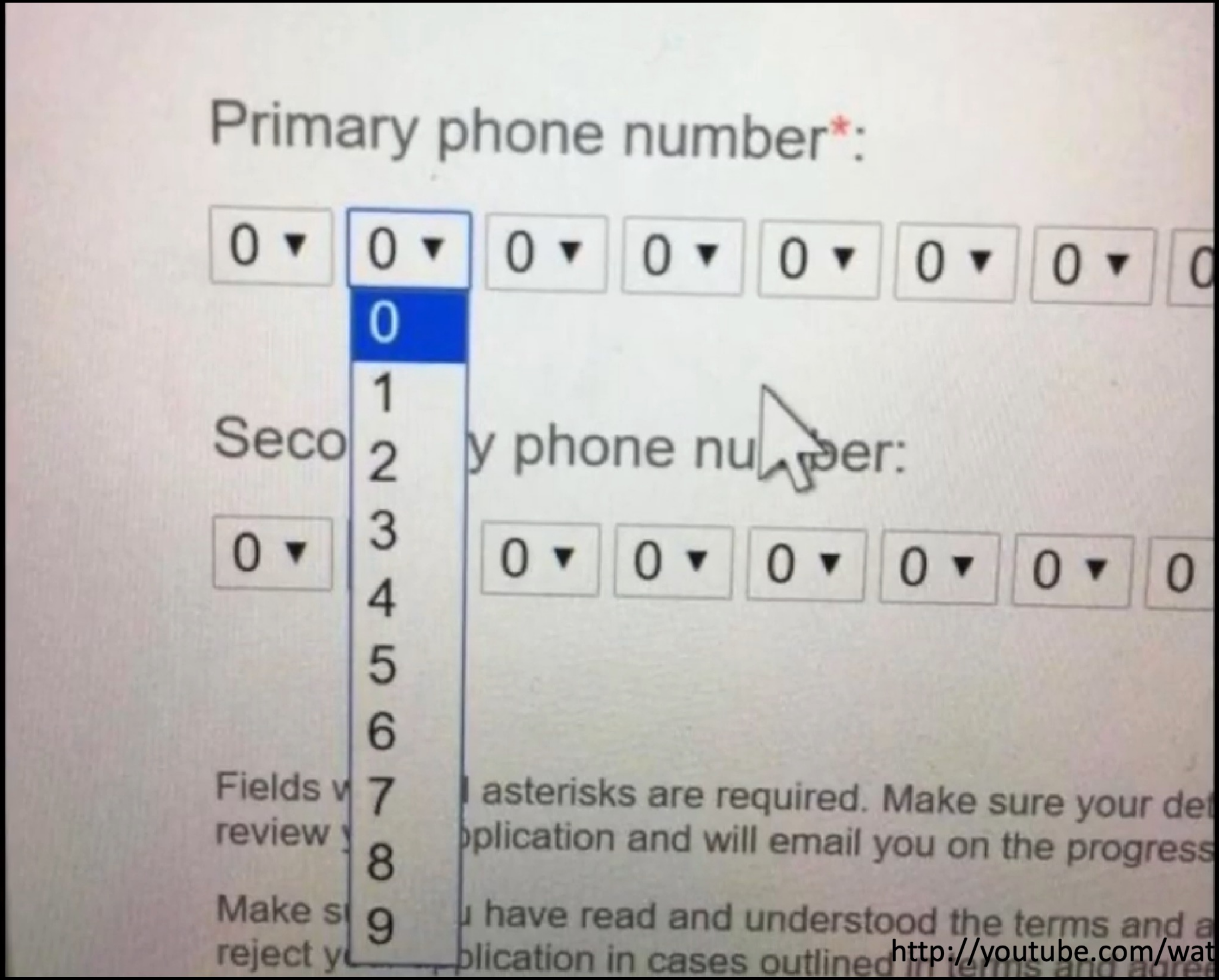
From “The Art of Innovation” by Tom Kelly

* 6 ways to kill a brainstorm

- Let the boss speak first.
  - Send him out for doughnuts.
- Give everybody a turn.
  - It is democratic, but is painful and pointless.
- Ask the experts only.
  - In a brainstorm, we're looking for breadth, …
- Go off-site.
  - Great ideas only come on the beach or at high altitudes?
- No silly stuff.
  - Silly is important. Wild ideas are welcome. Brainstorming should be fun.
- Write down everything.
  - Each session should have an assigned scribe who records suggestions.

From “The Art of Innovation” by Tom Kelly

Any alternative design ideas?



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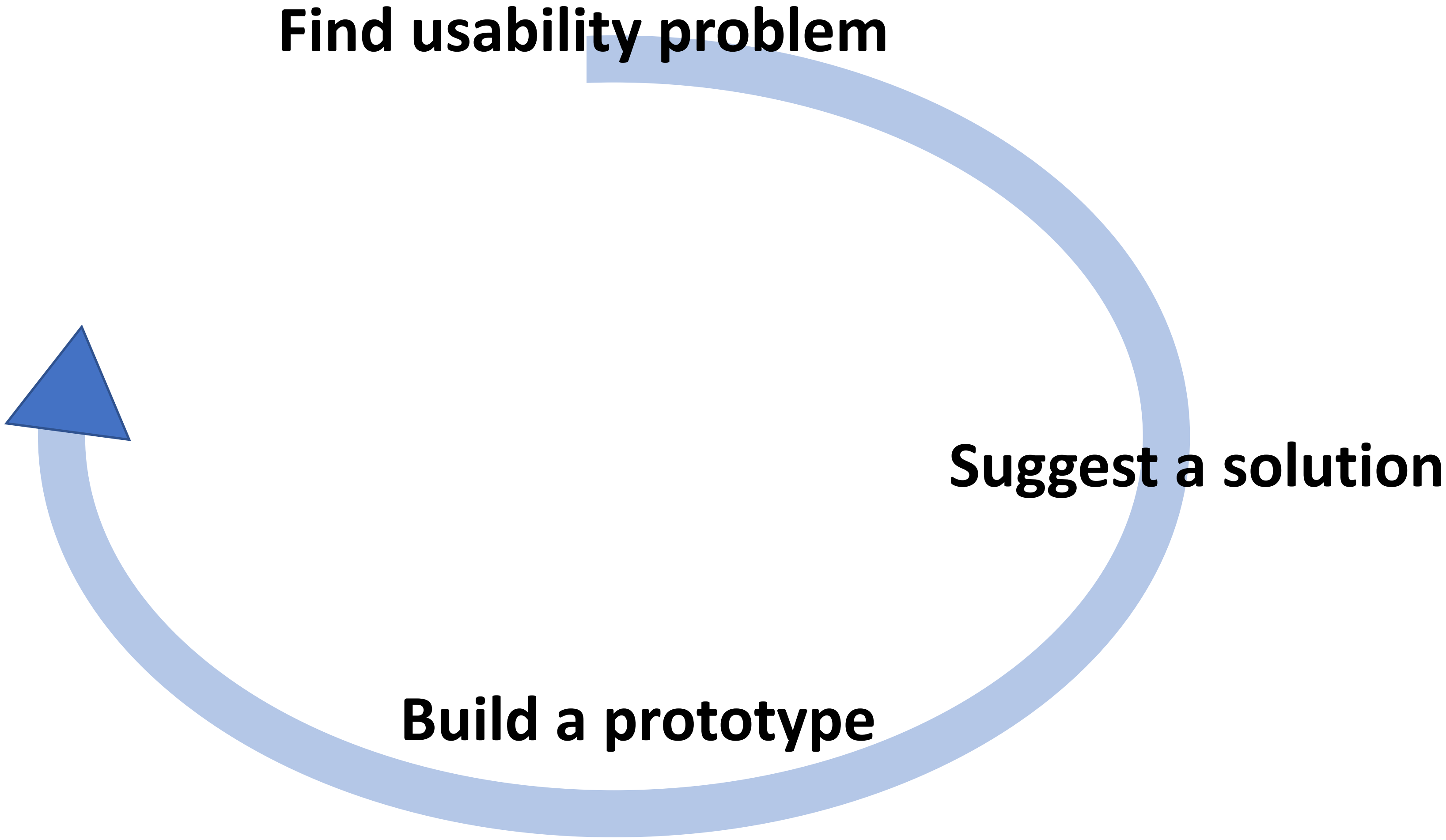
User-centered Design Process



Find usability problem

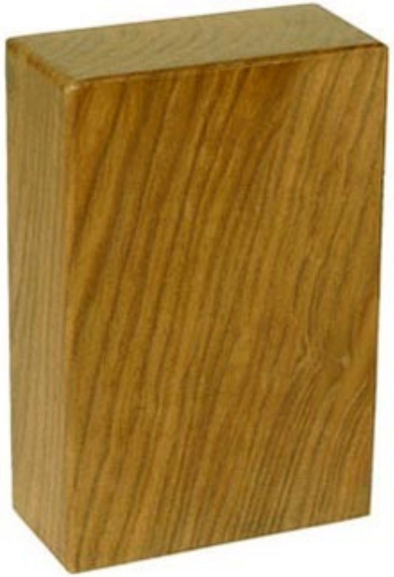
Suggest a solution

Build a prototype

What is a prototype?

- In interaction design, it can be ...
  - a series of screen **sketches**
  - a **storyboard**, i.e. a cartoon-like series of scenes
  - a **cardboard** mock-up
  - a Powerpoint **slide show**
  - a **video** simulating the use of a system
  - a ***lump of wood***
  - a **piece of software with limited functionality** written in the target language or in another language

Lump of wood?



- Jeff Hawkin (founder of PalmPilot) used to carry this piece of wood around with him and pretended to enter information into it, just **to see what it would be like to own such a device**.
- It served its purpose of simulating scenarios of use.

http://www.wired.com/science/discoveries/news/1999/10/32010

Why prototype?

- Stakeholders can see, hold, interact with a prototype more easily than a document or a drawing
- Team members can communicate effectively
- You can test out ideas for yourself
- The activity of building one encourages reflection.

Video Break (8:08)

https://www.youtube.com/watch?v=d5_h1VuwD6g

Technology > TED-Ed

Google Glass: prototyped using binder clips and clay

Posted by: Shirin Samimi-Moore February 1, 2013 at 4:00 pm EST

TED Ed
Rapid prototyping Google Glass - Tom Chi
나중에 시청...
공유
Finally: How would you think about the general shape/si

Low-fidelity prototyping

Paper and Computer Prototypes

Low-fidelity prototyping

- Uses materials that are very different from the final version.
  - e.g. paper, cardboard, lump of wood, clays …
- **Cheap** and **quick** to produce and modify
  - Should **encourage exploration** of alternative designs
  - Never intended to be kept; for exploration only!
- Paper prototype → (iterations) → Computer prototype

Paper prototype

- Interactive paper mockup
    - Sketches of screen appearance
    - Paper pieces show windows, menus, dialog boxes
- Interaction is natural
    - Pointing with a finger instead of mouse click
    - Writing instead of typing
- A person simulates the computer’s operation
    - Putting down & picking up pieces
    - Writing responses on the “screen”
    - Describing effects that are hard to show on paper

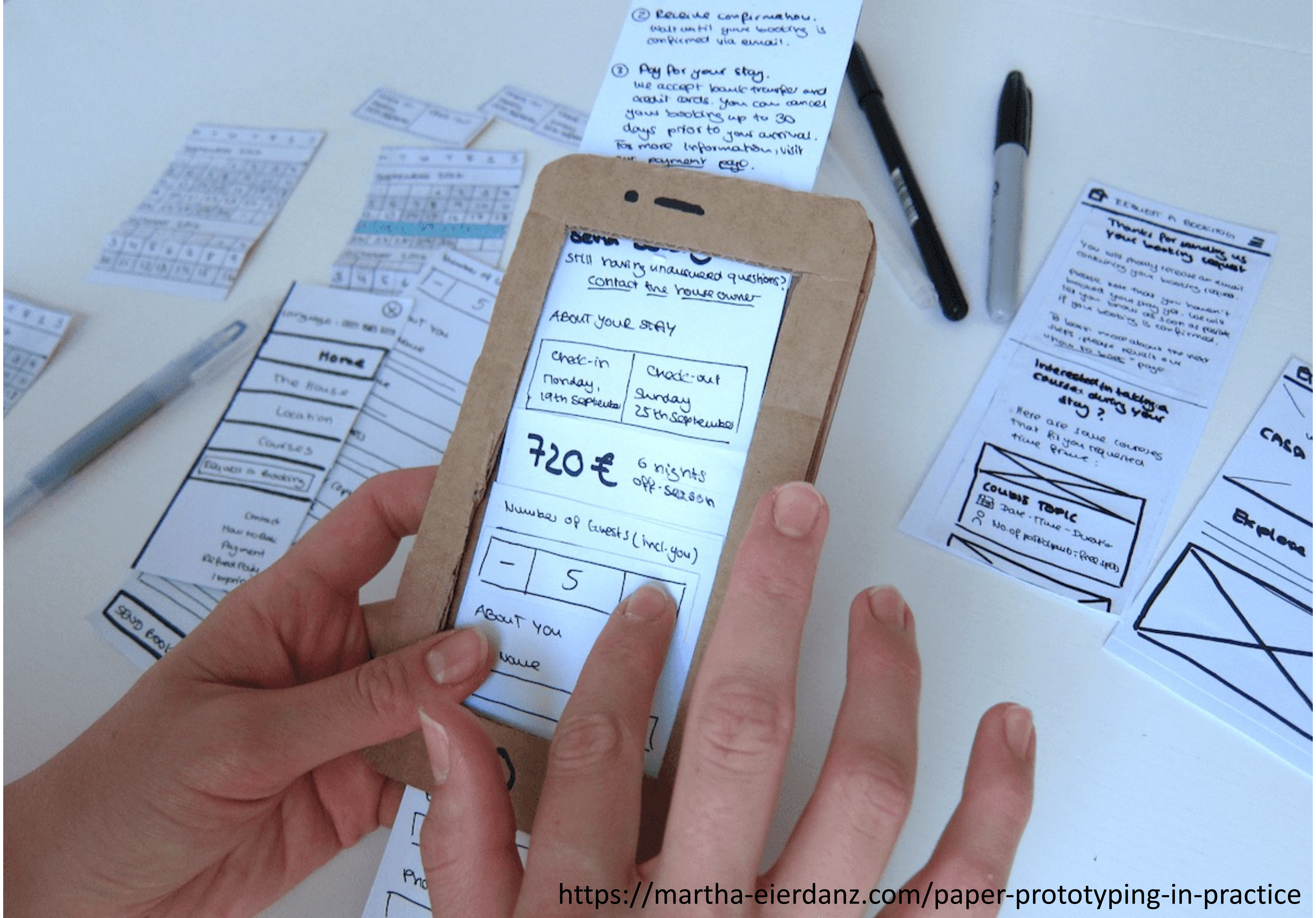
https://twitter.com/RyeonQ_kemo/status/1229040968021639169/photo/3

Why Paper Prototyping?

- Faster to build
  - Sketching is faster than programming
- Easier to change
  - Easy to make changes between user tests, or even *during* a user test
  - No code investment - everything will be thrown away (except the design)
- Focuses attention on big picture
  - Designer doesn’t waste time on details
  - Customer makes more creative suggestions, not nitpicking
- Nonprogrammers can help
  - Only kindergarten skills are required

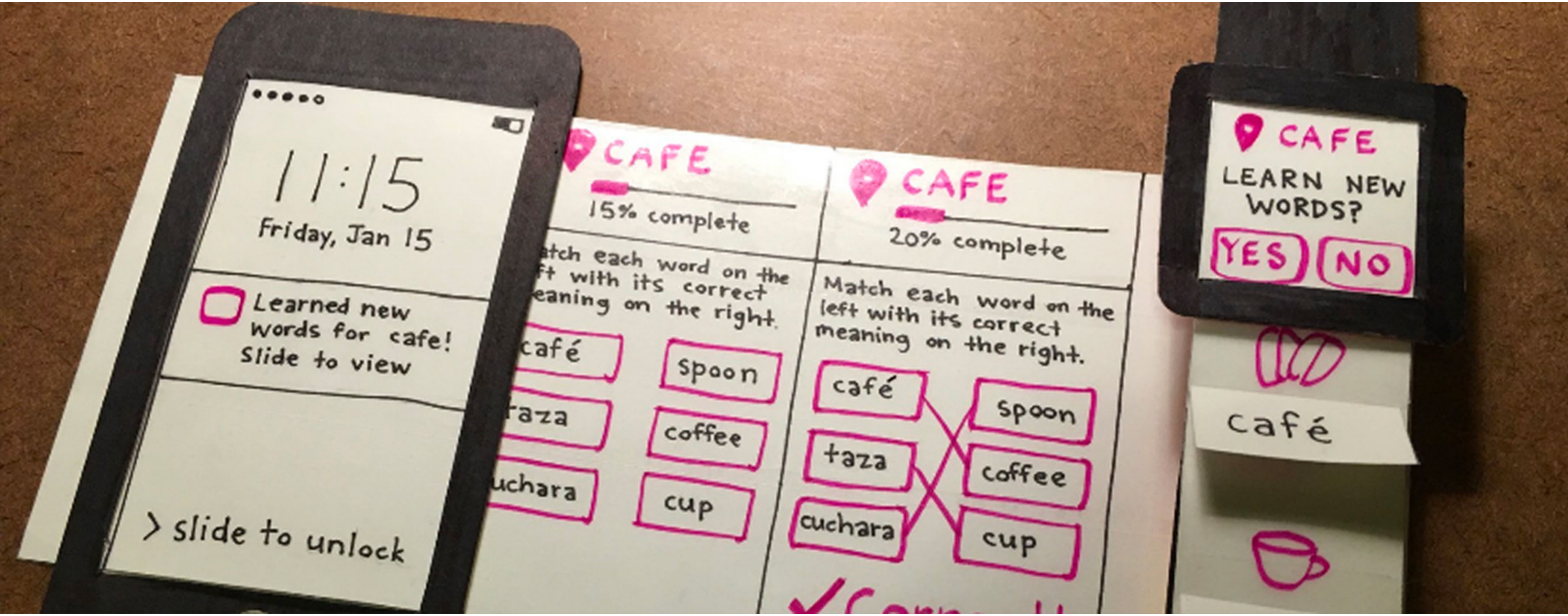
Tools for paper prototyping

- White poster board (11”x14”)
    - For background, window frame
- Big (unlined) index cards (4”x6”, 5”x8”)
    - For menus, window contents, and dialog boxes
- Restickable glue
    - For keeping pieces fixed
- White correction tape
    - For text fields, checkboxes, short messages
- Overhead transparencies
    - For highlighting, user “typing”
- Photocopier
    - For making multiple blanks
- Pens & markers, scissors, tape



② Receive confirmation.
Wait until your booking is confirmed via email.
③ Pay for your stay.
We accept bank transfer and credit cards. You can cancel your booking up to 30 days prior to your arrival.
For more information, visit our payment page.
Still having unanswered questions?
Contact the house owner
ABOUT YOUR STAY
Check-in
Monday, 19th September
Check-out
Sunday 25th September
720 €
6 nights off-season
Number of Guests (incl. you)
–
5
ABOUT YOU
Name
Home
The House
Location
Courses
Request a Booking
Contact
How to Book
Payment
Refund Policy
SEND BOOK
REQUEST A BOOKING
Thanks for sending us your booking request
Interested in taking a course during your stay?
Here are some courses that fit you requested time frame:
COURSE TOPIC
Date - Time - Duration
No. of participants - Free spots
CASA
Explore

https://martha-eierdanz.com/paper-prototyping-in-practice


11:15
Friday, Jan 15
□ Learned new words for cafe! Slide to view
> slide to unlock
CAFE
15% complete
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café
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raza
coffee
uchara
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CAFE
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Match each word on the left with its correct meaning on the right.
café
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taza
coffee
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cup
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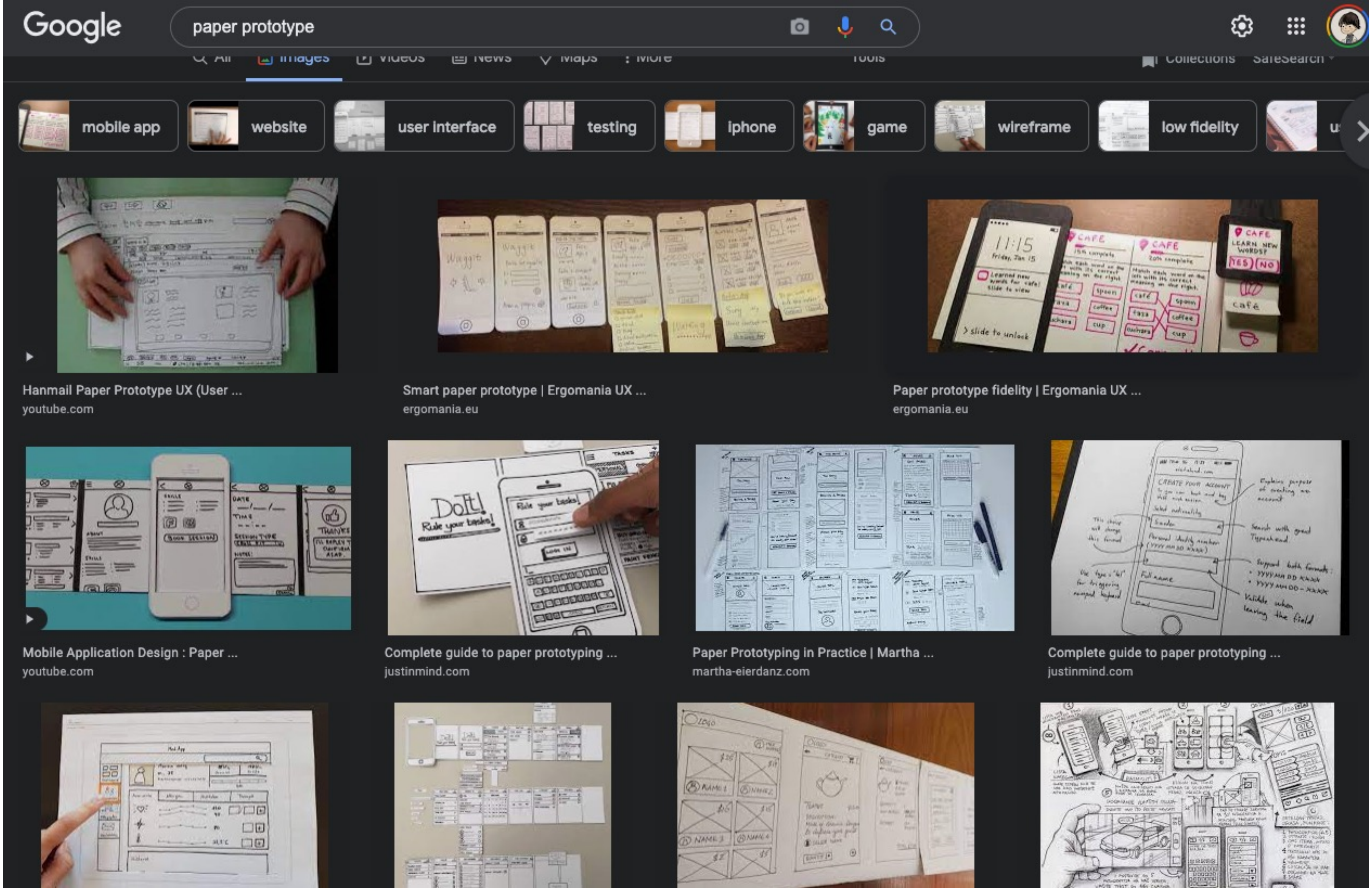
CAFE
LEARN NEW WORDS?
YES
NO
café

https://ergomania.eu/paper-prototype-fidelity/



Hanmail Paper Prototype UX (User ...
youtube.com

Smart paper prototype | Ergomania UX ...
ergomania.eu

Paper prototype fidelity | Ergomania UX ...
ergomania.eu

Mobile Application Design : Paper ...
youtube.com

Complete guide to paper prototyping ...
justinmind.com

Paper Prototyping in Practice | Martha ...
martha-eierdanz.com

Complete guide to paper prototyping ...
justinmind.com

What you can learn from a paper prototype

- Conceptual model
    - Do users understand it?
- Functionality
    - Does it do what’s needed? Missing features?
- Navigation & task flow
    - Can users find their way around?
    - Are information preconditions met?
- Terminology
    - Do users understand labels?
- Screen contents
    - What needs to go on the screen?

What you can’t learn

- Look: color, font, whitespace, etc
- Feel: efficiency issues
- Response time
- Are small changes noticed?
  - Even the tiniest change to a paper prototype is clearly visible to user
- Exploration vs. deliberation
  - Users are more deliberate with a paper prototype; they don’t explore or thrash as much

Computer Prototype

- Interactive software simulation
- High-fidelity in look & feel
- Low-fidelity in depth
    - Paper prototype had a human simulating the backend; computer prototype doesn’t
    - Computer prototype may be **horizontal**: covers most features, but no backend

What You Can Learn From Computer Prototypes

- Everything you learn from a paper prototype, plus:
- Screen layout
    - Is it clear, overwhelming, distracting, complicated?
    - Can users find important elements?
- Colors, fonts, icons, other elements
    - Well-chosen?
- Interactive feedback
    - Do users notice & respond to status bar messages, cursor changes, other feedback
- Efficiency issues
    - Controls big enough? Too close together? Scrolling list is too long?

Computer prototyping techniques

- Storyboard
  - Sequence of painted screenshots
  - Sometimes connected by hyperlinks
- Form builder
  - Real windows assembled from a palette of widgets (buttons, text fields, labels, etc.)
- Wizard of Oz
  - *Computer* frontend, *human* backend – a hybrid of computer and paper prototype

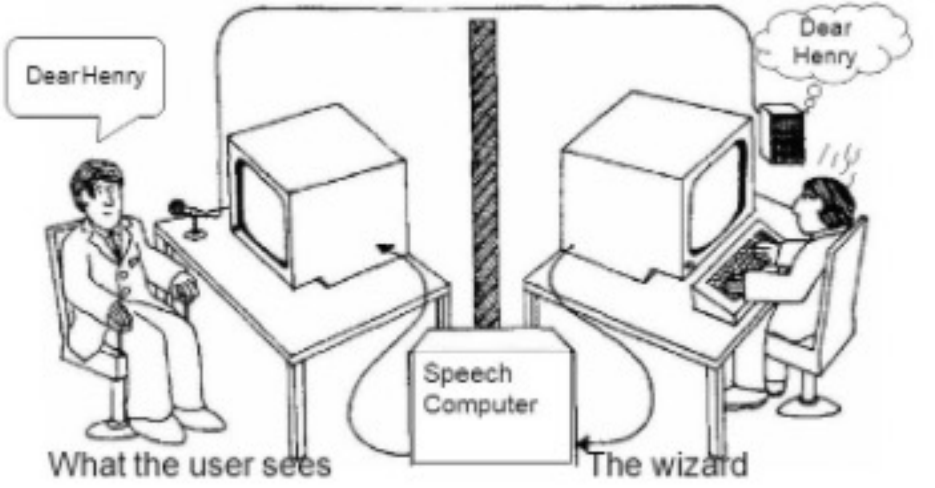
Storyboarding vs. Form builder

- Pros
  - You can draw anything
- Cons
  - No text entry
  - Widgets aren’t active
  - “Hunt for the hotspot”

- Pros
  - Actual controls, not just pictures of them
  - Can hook in some backend if you need it
    - But then you won’t want to throw it away
- Cons
  - Limits thinking to standard widgets
  - Less helpful for rich graphical interfaces

Wizard-of-Oz

- Software simulation with a human in the loop to help
- “Wizard of Oz” = “man behind the curtain”
  - Wizard is usually but not always hidden
- Often used to simulate future technology
  - Speech recognition
  - Learning
- Issues
  - Two UIs to worry about: user’s and wizard’s
  - Wizard has to be mechanical



Gould, Conti & Hovanvecz, Comm ACM 26(4) 1983

Some examples from Youtube
Navigation system of visual impaired people
https://www.youtube.com/watch?v=_aoo_N-7AYk

Mobile application
https://www.youtube.com/watch?v=YmcuN3NlnDU

High-fidelity prototyping

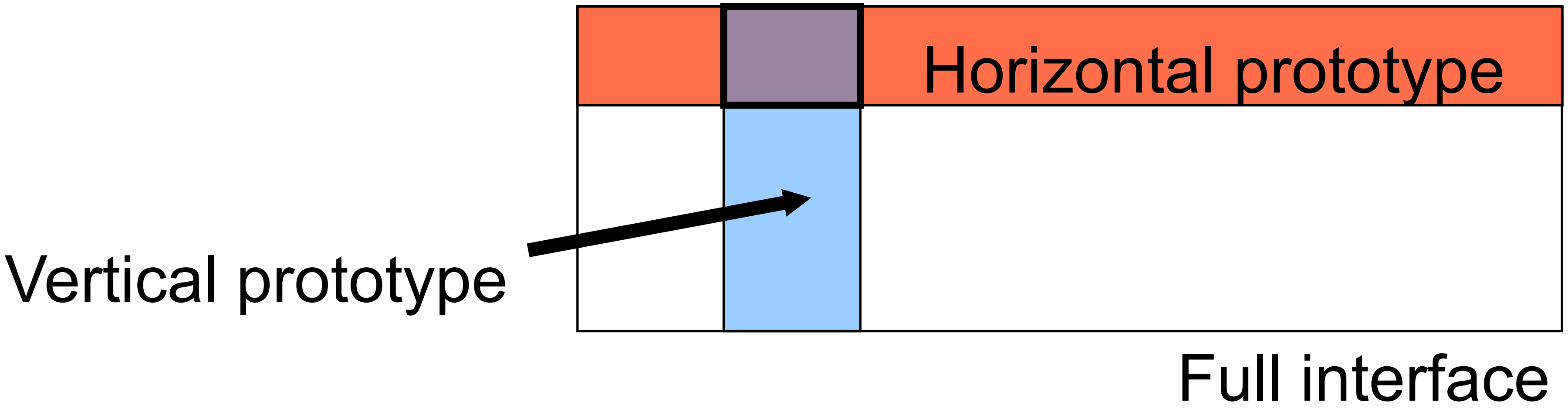
High-fidelity prototyping

- Uses materials that you would expect to be in the final product.
  - Looks **more like the final system** than a low-fidelity version.

- Problems of high-fidelity prototyping:
  - It takes too long to create
  - Reviewers and testers **tend to comment on superficial aspects** rather than content.
  - Developers are **reluctant to change** something they have crafted for hours.
  - A software prototype can set expectations too high.
  - Just one bug in a high-fidelity prototype can **bring the testing to a halt**.

Compromises in prototyping

- All prototypes need compromises.
  - For software-based prototyping, these may be a slow response, sketchy icons, limited functionality, and so on.
- Two common types of compromise
  - '**horizontal**': provide a wide range of functions, but with little detail
  - '**vertical**': provide a lot of detail for only a few functions



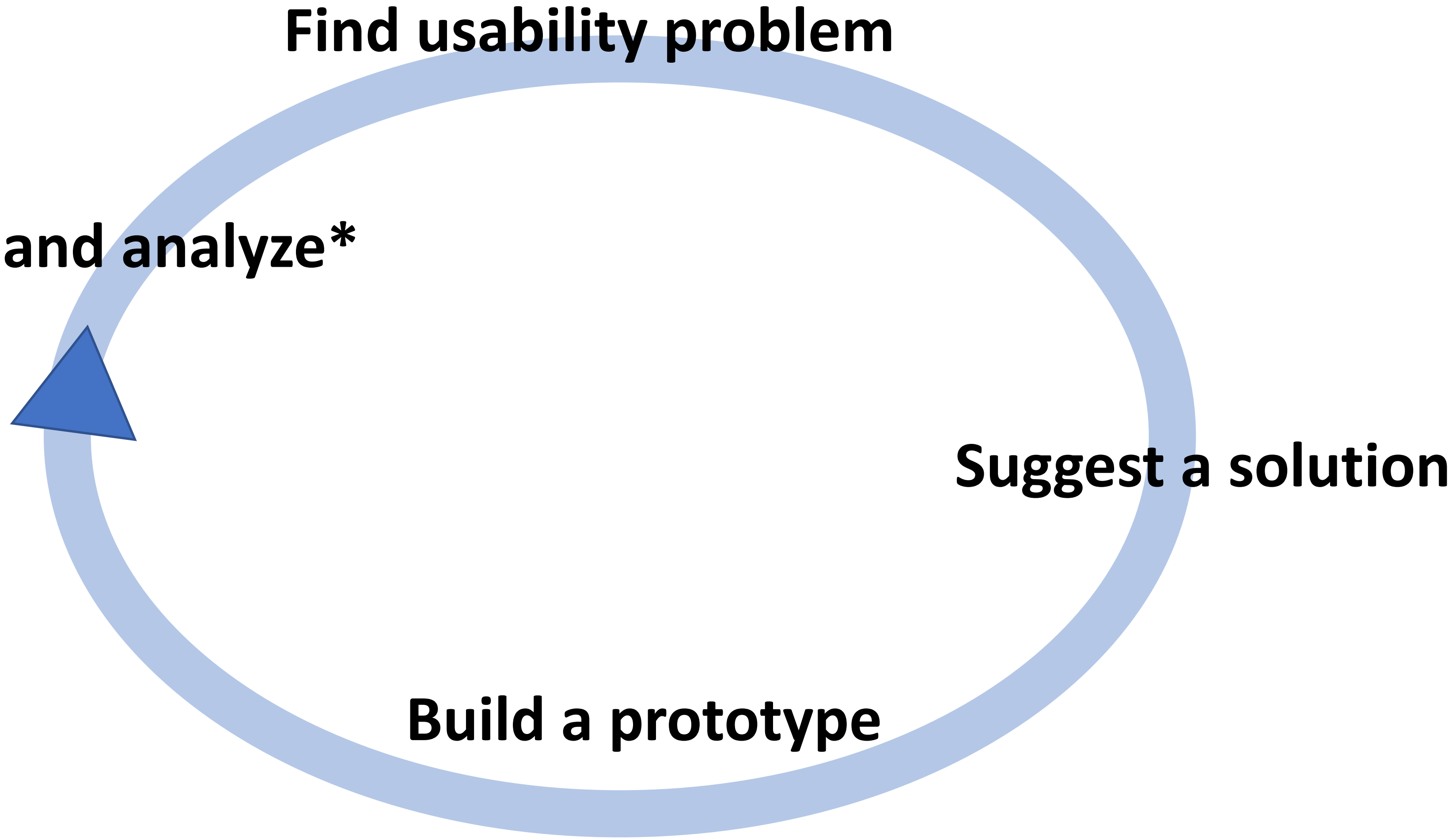
From design to implementation

- Two different philosophy
  - **Evolutionary** prototyping
    - A prototype evolves into a final product
  - **Throwaway** prototyping
    - Final product is built from scratch

- In principle, a prototype is to be thrown away

- In practice, we often do not have time to start again from scratch.

User-centered Design Process



Find usability problem

Suggest a solution

Build a prototype

Test and analyze*

Design Project

Design Project Goal

- To experience a full cycle of user-centered design process.
    - Find usability problem, suggest a solution, build a prototype, user testing, iteration, user testing, iteration, user tes..
- I expect *at least* one iteration with a paper prototype and another with a computer prototype.
- The more iterations and interesting insights from study results get higher score.

Extra points

- If a team conducted a user study with high-fi prototype in addition to two iterations with low-fi prototype, they get extra points.

- But, it will be very challenging...
  - Finalizing the project with one iteration with a low-fi, computer prototype is totally fine and already great!

Web/mobile/physical interfaces?

- It’s your choice!
- If you want to work on physical interfaces, make sure that you have all prototyping tools and devices with you.

Design Project Milestones (1)

- W2: Team-up
- W3-4: Finding usability problem, suggesting alternative solutions
- W4: Pre-proposal submission
  - usabilty problem to solve
  - alternative solutions
  - sketch of interfaces
- W5: Pre-proposal meeting with the instructor
- W5-6: Working on paper prototype (low-fi) and iterating once
  - it should be quick and cheap!

Design Project Milestones (2)

- W7: Proposal Presentation on..
  - Usability problem, proposed solution, prototyping plan
- W7-10: Working on computer (low-fi) prototype
- W10: Half Report
  - Prototyping progress, user study plan

Design Project Milestones (3)

- W10-15: Iterating computer prototype with user study, working on high-fi prototype and conducting user study with it (extra point)
- W15: Video Showcase
- W16: Final Video and Final Report on..
  - The whole design process from usability problem to final design
  - Re-use half report and extend it

Upcoming

- 3/7 (Tue)
  - Interaction Design
- 3/9 (Thu)
  - (Last minute) Team Formation, Team meetings
- 3/14 (Mon)
  - Quiz 1 on Interaction Design,
  - Lecture on Human Factors 1