# Week 9-3
# **Intro to Design and Prototyping**

SFWRENG 4HC3/6HC3 Human Computer Interfaces

** Slides adapted from previous instructors of COMPSCI/SFWRENG 4HC3/6HC3 and the COMPSCI 5115 course from University of Minnesota*

McMaster University

# Week 9 Overview

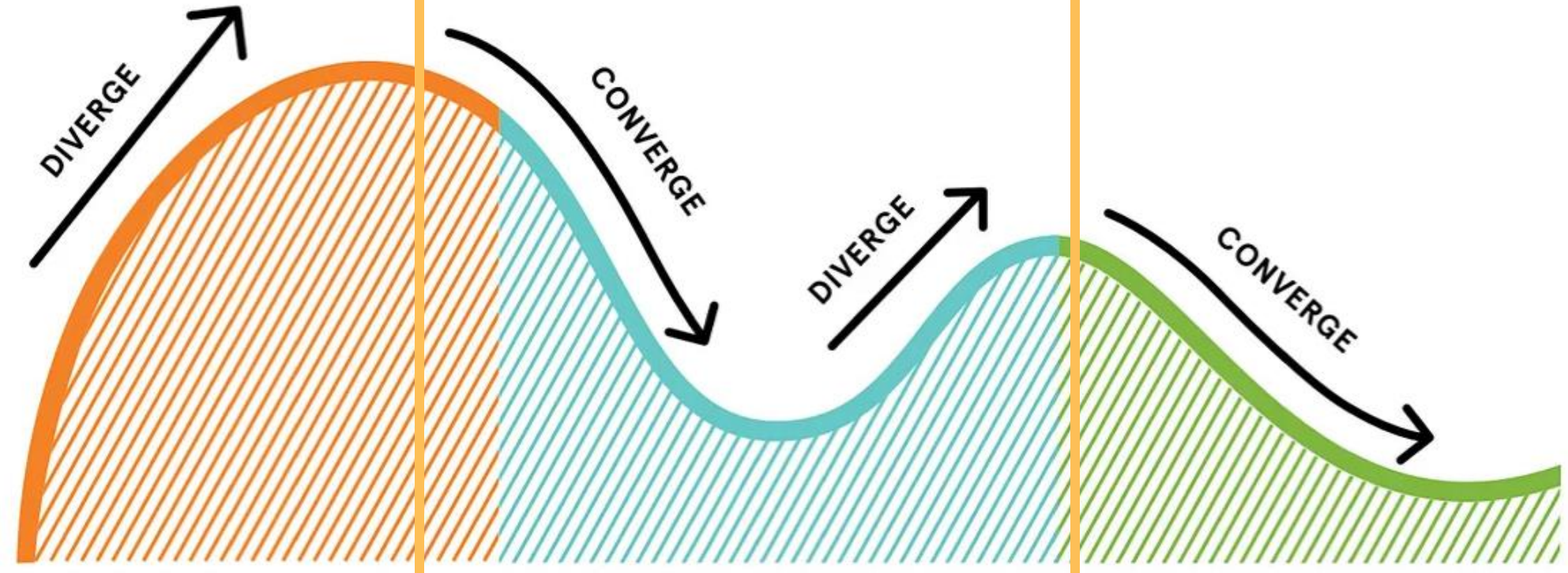
- ~~Monday~~
  - ~~Designing for Various Abilities~~
- ~~Wednesday~~
  - ~~Designing for Various Populations~~
- **Friday**
  - **Intro to Design and Prototyping**

# A Design Process in Cycle

**Inspiration:**
Explore the problem space

**Ideation:**
Generate and Test Ideas

**Implementations:**
Learn and Iterate Solution

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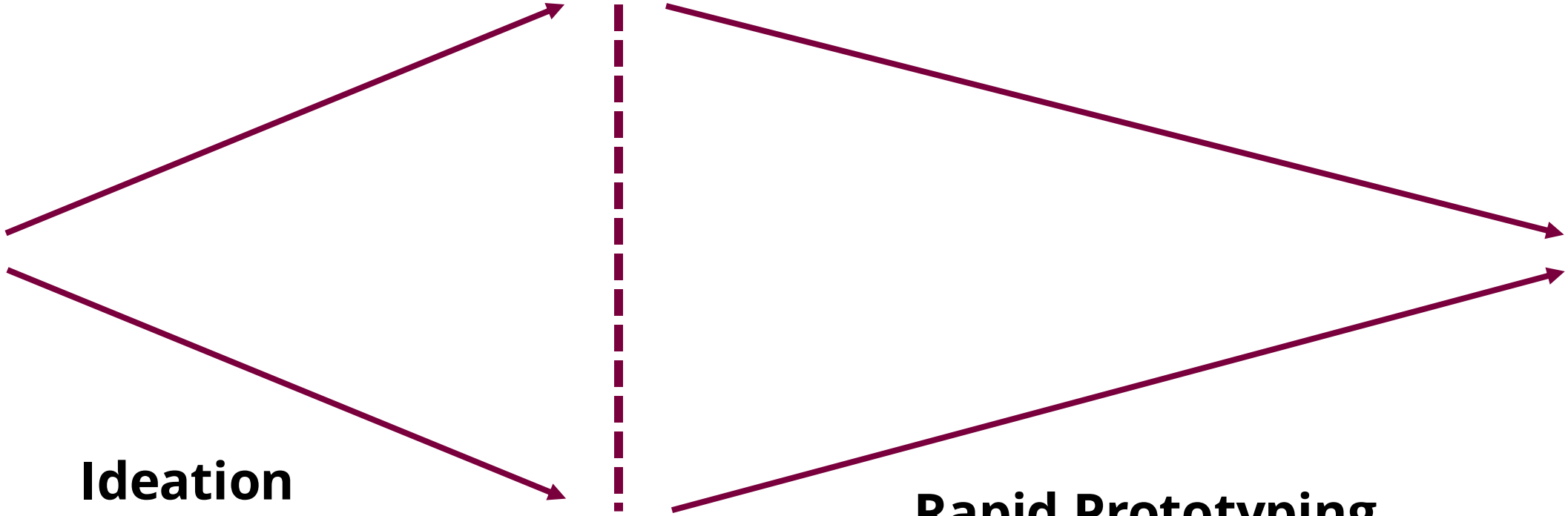
# Design and Prototyping



**Ideation**

Sketching

**Rapid Prototyping**

Low-Medium-High Fidelity

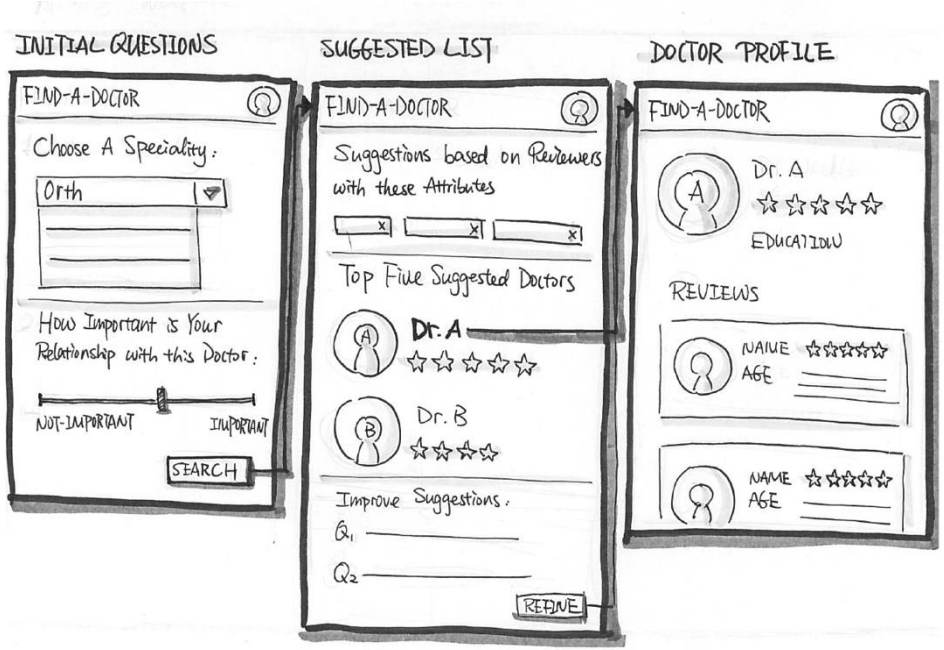
(Paper, Wireframing, Interactive)

# Design and Prototyping: Why

- Manage **your risk**
- Consider **special cases**

# Managing Your Risk

1. Starting with **low fidelity, cheap-and-quick** paper prototypes
2. Adding **some functionality** with tool-based prototyping
3. Getting down to the **real "nitty-gritty"** by thinking about the details: layout, color, etc.
4. Being explicit and thoughtful in your **design decisions**



# Considering Special Cases

Focusing on the “most common,” misses important cases:

**Users:**

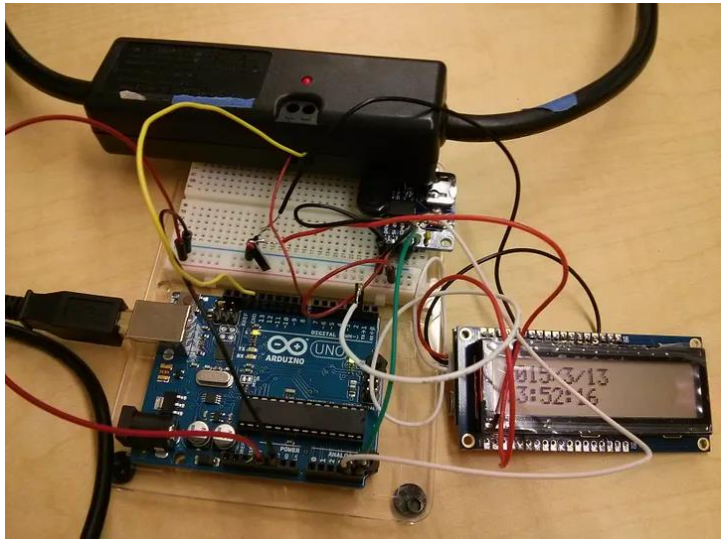
- Age-specific considerations
- Accessibility-specific considerations
- Ability-specific considerations

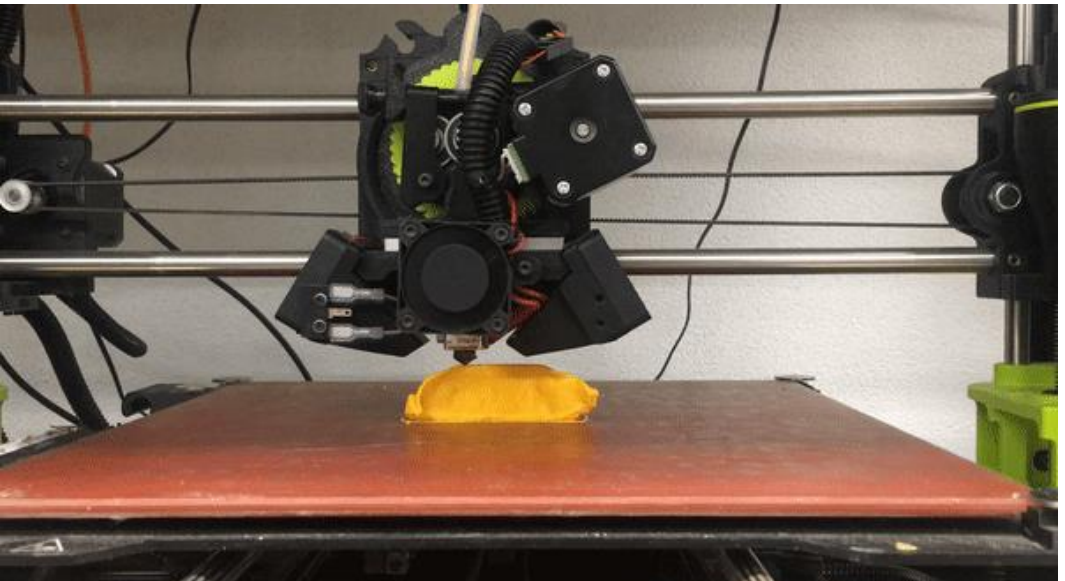
**Contexts:**

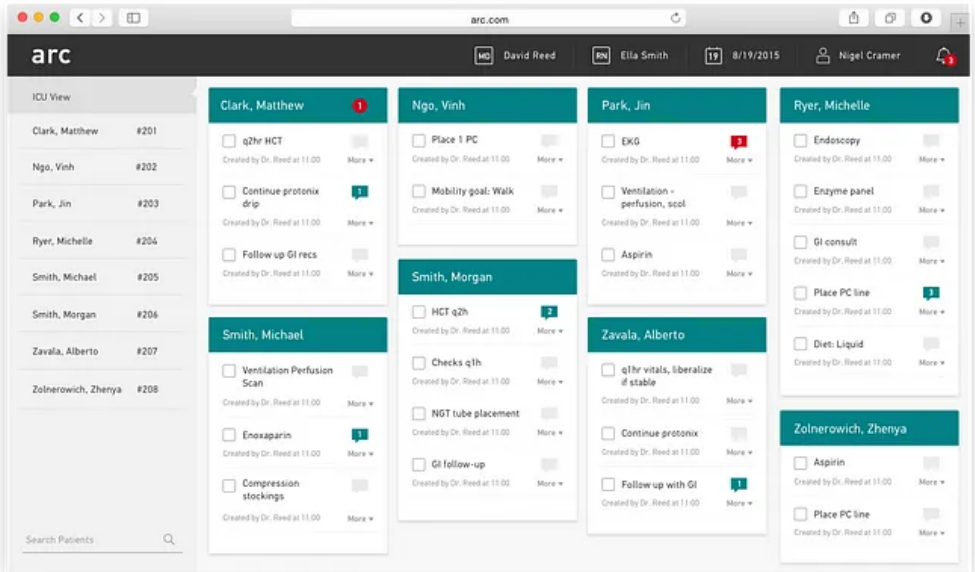
- Mobile
- Wearable
- Automotive
- IoT & Physical Computing

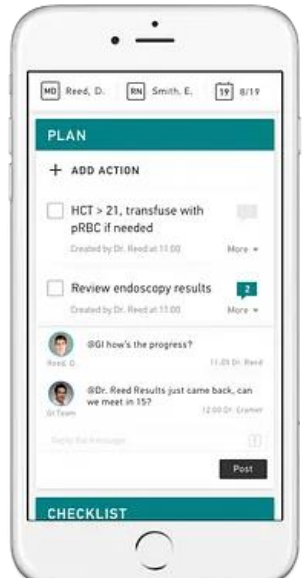
# Design and Prototyping





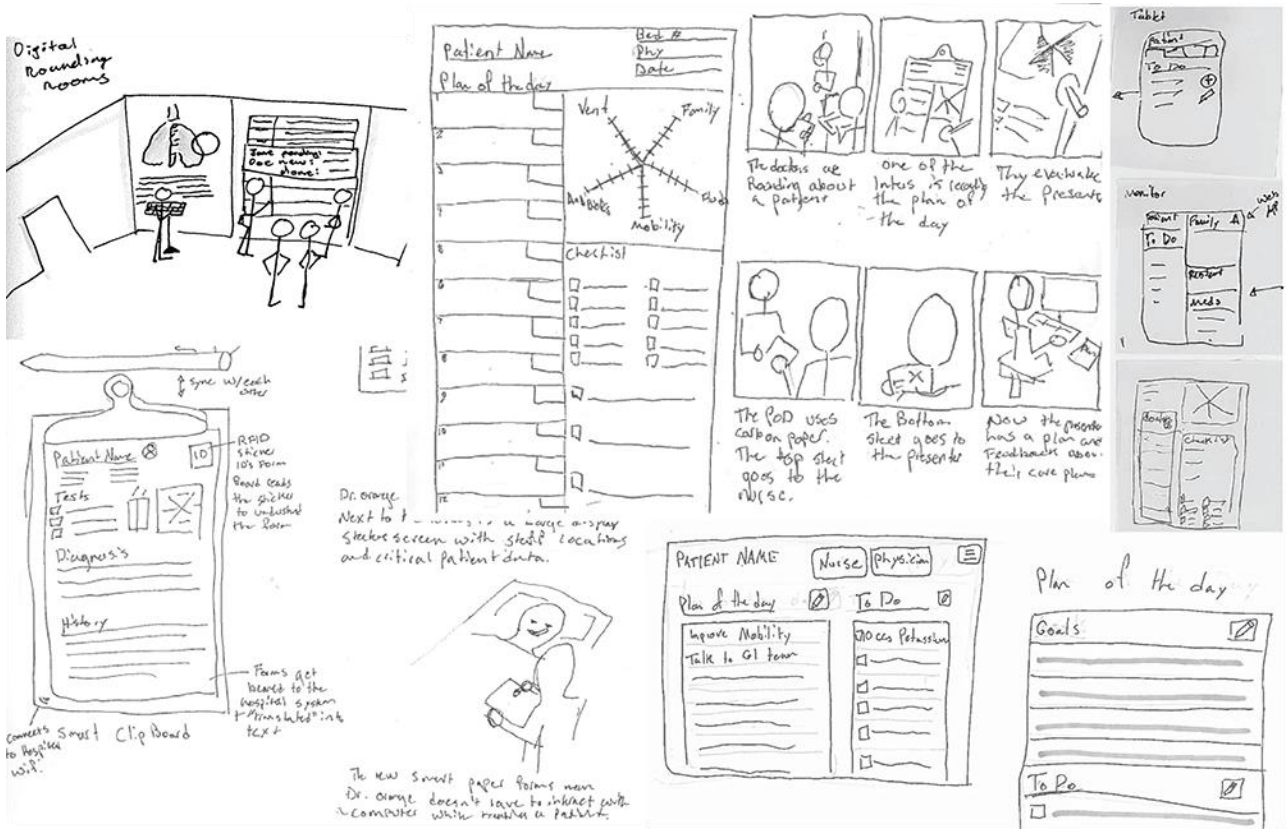





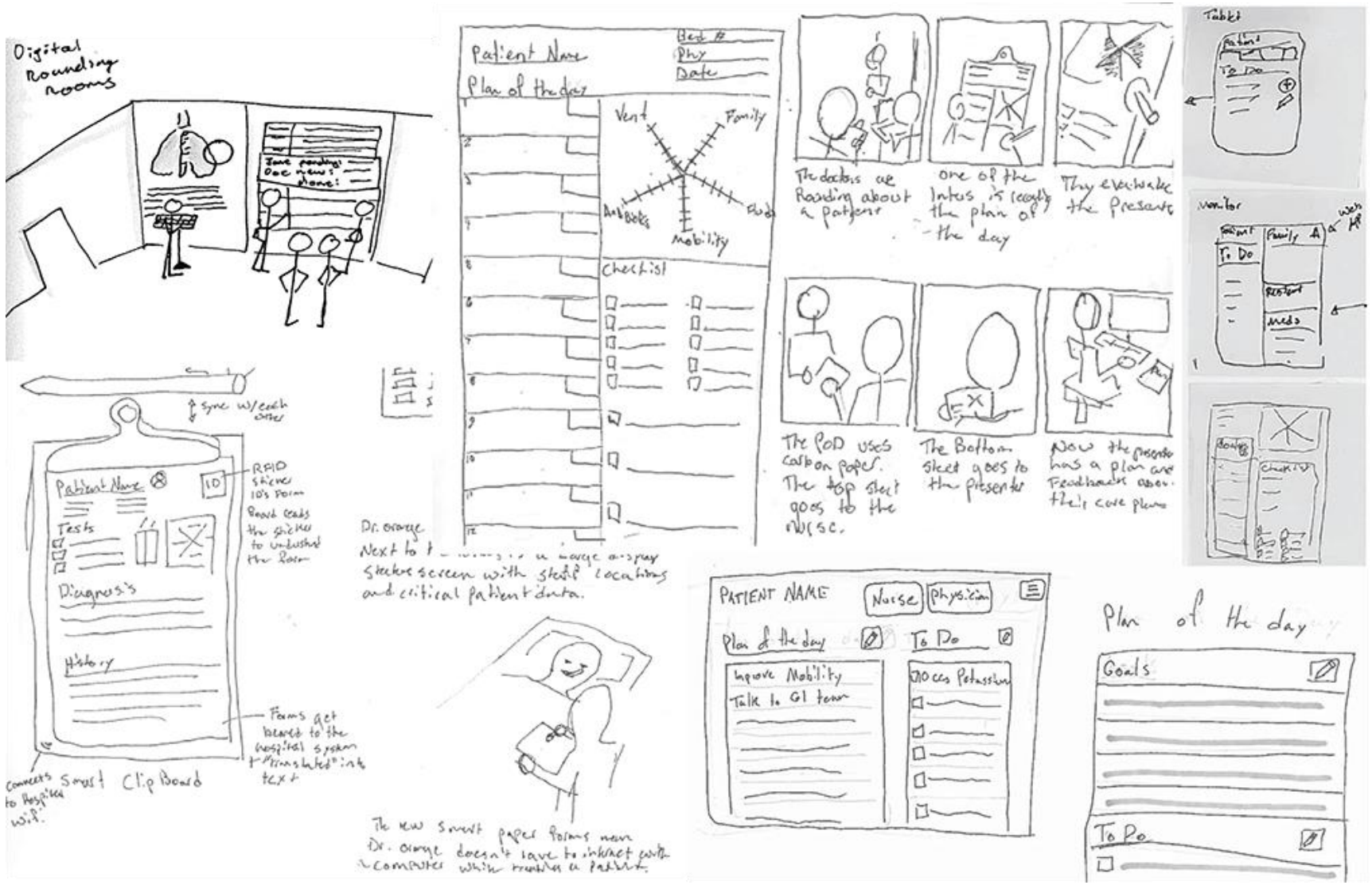



# IDEO Brainstorming Rules

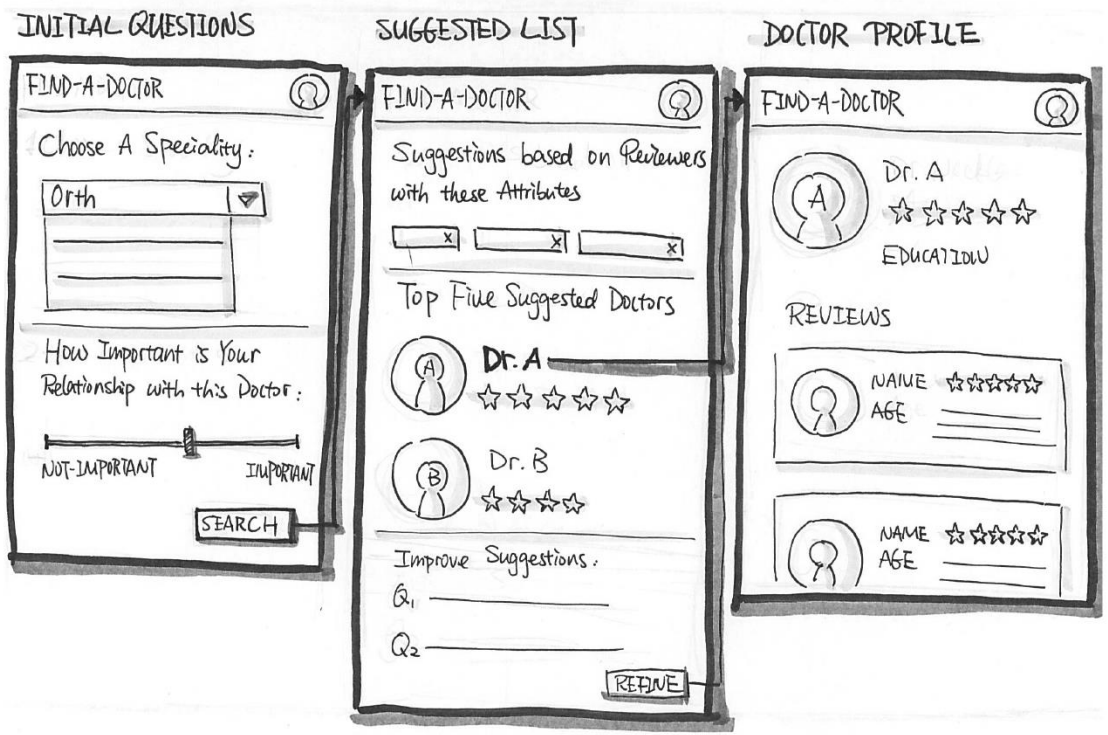
1. Defer Judgment
2. Encourage Wild Ideas
3. Build on the Ideas of Others
4. Stay Focused on the Topic
5. One Conversation at a Time
6. Be Visual
7. Go for Quantity

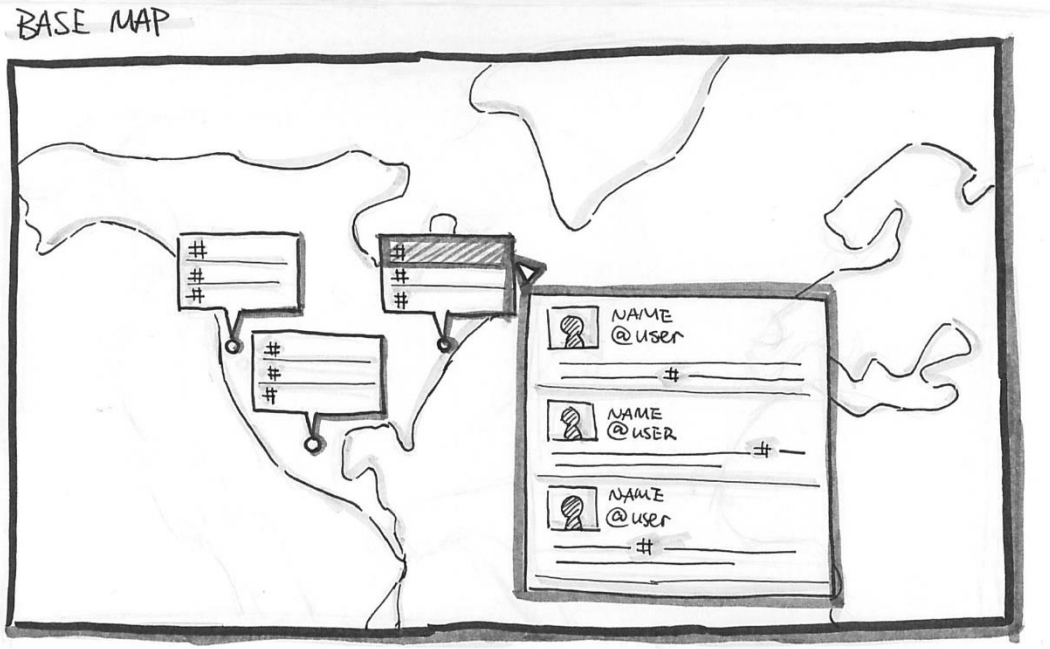


# Sketching


Digital Rounding Rooms
Patient Name
Plan of the day
Vent
Family
Mobility
Checklist
The doctors are Reading about a patient
one of the Interns is reading the plan of the day
They exchange the Presents
Tablet
To Do
Monitor
Family A
To Do
Meds
sync w/each other
Patient Name
ID
RFID stickers ID's Form
Tests
Diagnosis
History
Forms get synced to the hospital system
Connects smart Clip Board
The POD uses carbon paper. The top sheet goes to the nurse.
The Bottom sheet goes to the presenter
Now the presenter has a plan and Feedback about their care plans
Dr. orange
PATIENT NAME
Nurse
Physician
Plan of the day
To Do
Improve Mobility
Talk to GI team
Plan of the day
Goals
To Do

# Sketching

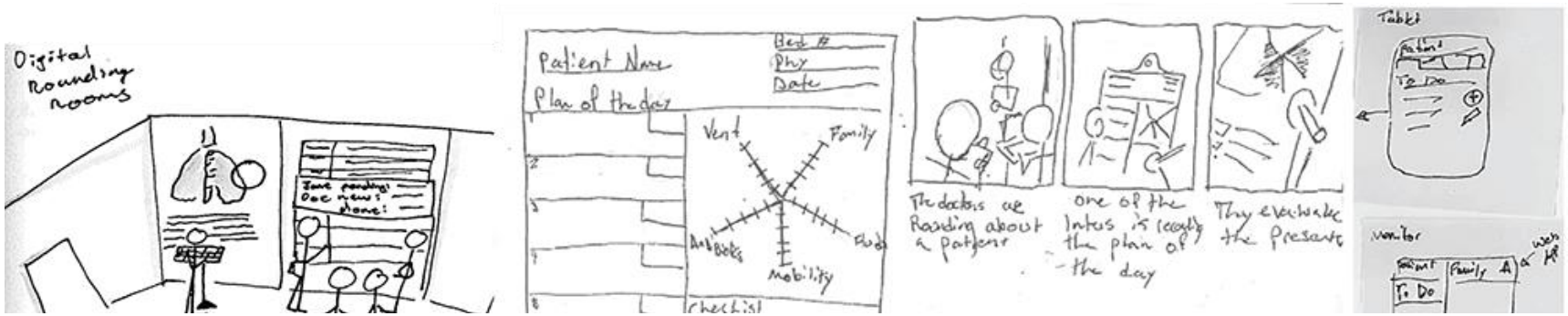

INITIAL QUESTIONS
FIND-A-DOCTOR
Choose A Speciality:
Orth
How Important is Your Relationship with this Doctor:
NOT-IMPORTANT
IMPORTANT
SEARCH
SUGGESTED LIST
FIND-A-DOCTOR
Suggestions based on Reviewers with these Attributes
Top Five Suggested Doctors
Dr. A
Dr. B
Improve Suggestions:
Q1
Q2
REFINE
DOCTOR PROFILE
FIND-A-DOCTOR
Dr. A
EDUCATION
REVIEWS
NAME
AGE
NAME
AGE


BASE MAP
NAME
@user
NAME
@user
NAME
@user

# Sketching: Why

- Sketching is the fastest instance of design iteration (an entire design-implement-evaluate cycle in as little as a few minutes!)
- We are still in the tightest part of the spiral in **the spiral model**
- Because it's so cheap, we can also **parallel prototype** (which you've learned is better for design)
- • All these things help us **boost creativity**! •
- As our ideas get more in-depth (moving towards higher fidelity prototypes), we narrow and switch **to serial prototyping**

# Sketching




Sketching is a process that enables you to think through ideas and convey design ideas to others very early in the design phase

slido

Please download and install the Slido app on all computers you use

# What is your comfort level with sketching?

ⓘ Start presenting to display the poll results on this slide.

# Sketching: Properties

- Quick
- Timely
- Inexpensive
- Disposable
- Plentiful
- Clear Vocabulary

- Distinct Gesture
- Minimal Detail
- Appropriate Refinement
- Suggest and Explore
- Ambiguous

# Sketching: Properties

- **Quick**
- Timely
- Inexpensive
- Disposable
- Plentiful
- Clear Vocabulary

A sketch is **quick** to make, or at least gives that impression.

# Sketching: Properties

- Quick
- **Timely**
- Inexpensive
- Disposable
- Plentiful
- Clear Vocabulary

A sketch can be **provided when needed.**

# Sketching: Properties

- Quick
- Timely
- **Inexpensive**
- Disposable
- Plentiful
- Clear Vocabulary

Cost **must not** inhibit the ability to explore a concept, especially early in design.

# Sketching: Properties

- Quick
- Timely
- Inexpensive
- **Disposable**
- Plentiful
- Clear Vocabulary

**If you cannot afford to throw it away, then it is not a sketch;**
But they are not "worthless”.

# Sketching: Properties

- Quick
- Timely
- Inexpensive
- Disposable
- **Plentiful**
- Clear Vocabulary

Sketches do not exist in isolation;
Sketches are **made to be compared;**
Meaning and relevance is **in the context of a collection or series.**

# Sketching: Properties

- Quick
- Timely
- Inexpensive
- Disposable
- Plentiful
- **Clear Vocabulary**

The way it is rendered **makes it distinctive that it is a sketch** (e.g., style, form)

# Sketching: Properties

**Fluidity** of sketches gives them a sense of **openness and freedom**; **Opposite** of engineering drawing, which is **tight and precise.**

- **Distinct Gesture**
- Minimal Detail
- Appropriate Refinement
- Suggest and Explore
- Ambiguous

# Sketching: Properties

Include **only what is required** to render the intended purpose or concept.

- Distinct Gesture
- **Minimal Detail**
- Appropriate Refinement
- Suggest and Explore
- Ambiguous

# Sketching: Properties

Make the sketch as refined as the idea;
If you have a **solid** idea, make the sketch look **more defined;**
If you have a **hazy** idea, make the sketch look **rougher** and **less defined.**

- Distinct Gesture
- Minimal Detail
- **Appropriate Refinement**
- Suggest and Explore
- Ambiguous

# Sketching: Properties

Sketch should act as **a catalyst** to the **desired and appropriate** behaviors, conversations, and interactions with others (such as the people giving you feedback on your sketch)

- Distinct Gesture
- Minimal Detail
- Appropriate Refinement
- **Suggest and Explore**
- Ambiguous

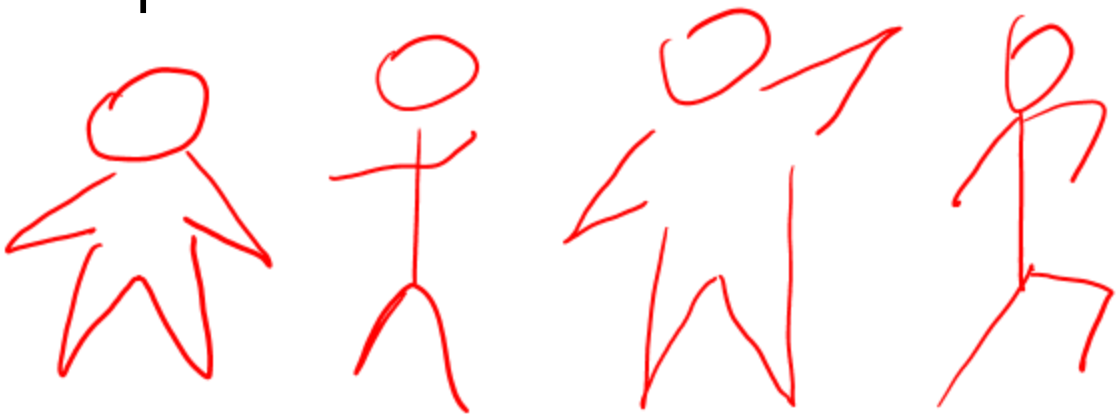
# Sketching: Properties

Intentionally **ambiguous;**
**Value** comes from being able to be interpreted **in different ways**, even by the person who created them;
Sketches have holes.

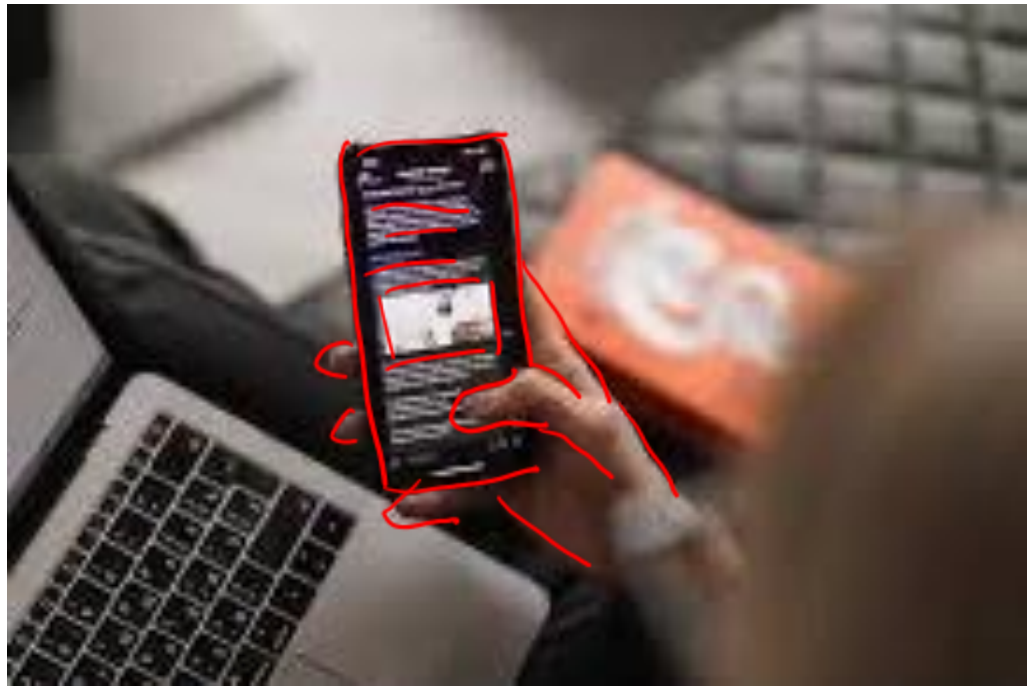
- Distinct Gesture
- Minimal Detail
- Appropriate Refinement
- Suggest and Explore
- **Ambiguous**

# Sketching: Techniques

Simple



Tracing



Annotation

# Storyboards: What, Why, How

**What are storyboards:**

- Visual representation of a sequence of events or interactions.
- Essential tool in the design and development process.

**Why use storyboards:**

- Clearly conveys the flow and user experience.
- Focuses on the user's perspective, needs, and interactions.

**How to create:**

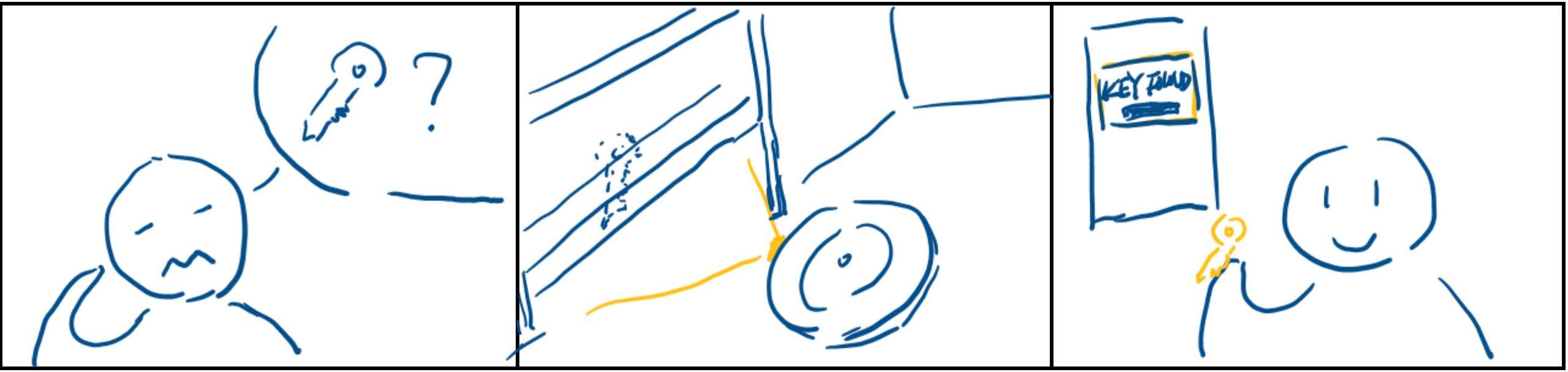
1. Define the scenario or user task.
2. Sketch or illustrate key frames.
3. Add annotations to describe actions and interactions.
4. Organize frames in a chronological order.

# Storyboards: Examples #1

User interacts with a smart home speaker to turn on the light

# Storyboards: Examples #2

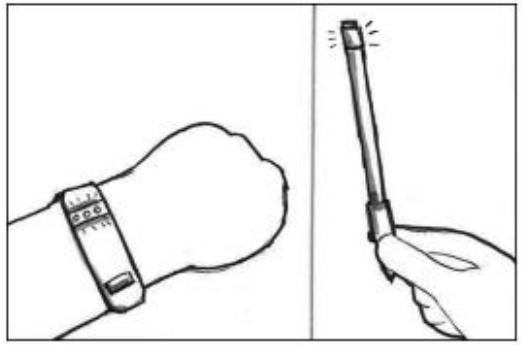
User interacts with Roomba robot to find the lost key



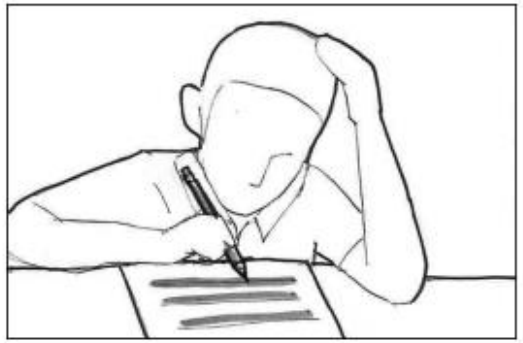
# Storyboards: Examples #3

User interacts with a mobile device to get recommendations

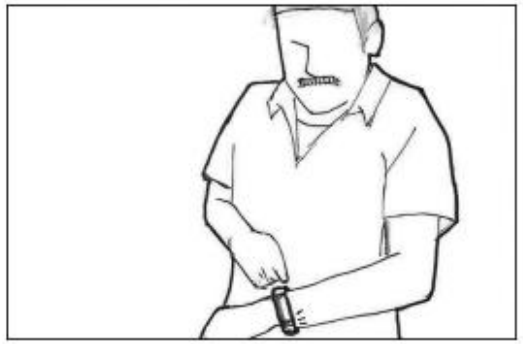
# Storyboards: in practice



*One day, Jeff gives Justin this smart pencil. The pencil notified notified Jeff's bracelet whenever Justin is using it.*



*Justin is using the smart pencil to work on a math test and feeling a bit stressed.*

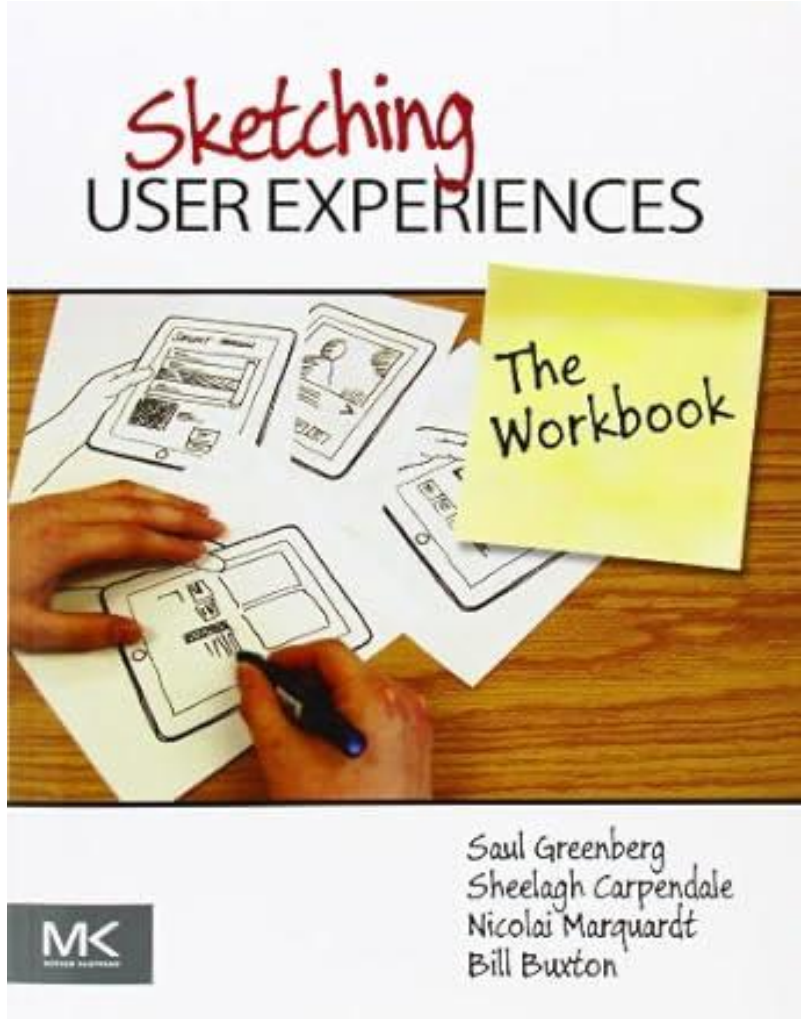


*Jeff sees the light pulsing on his bracelet and realizes that Justin is working on the math test. He wants Justin to feel supported and press the button on the bracelet to send his support.*

Storyboards used to ask users to help select idea

# Sketching User Experiences

The step-by-step process of the different sketching techniques.



# Introduction to Prototyping

# What is a Prototype?

**Definition (from m-w.com):**

- A first or early example that is used as a model for what comes later

A prototype is **any early example** used to help **evaluate or further design an idea**

# Why Prototype?

- **Exploration with lower investment or commitment**
  - In many cases, investment = commitment
- Prototypes are **easier to discard, to change, to replace**
- Prototypes also can **elicit more significant, constructive feedback**

# How to Prototype?

**Type of prototype** depends on the **questions you want the prototype to address**:

- Jeff Hawkins' block of wood
- Back of a napkin
- More detailed sketches, storyboards
- Wireframes
- Executable prototypes (level of function …)

# What to Prototype?

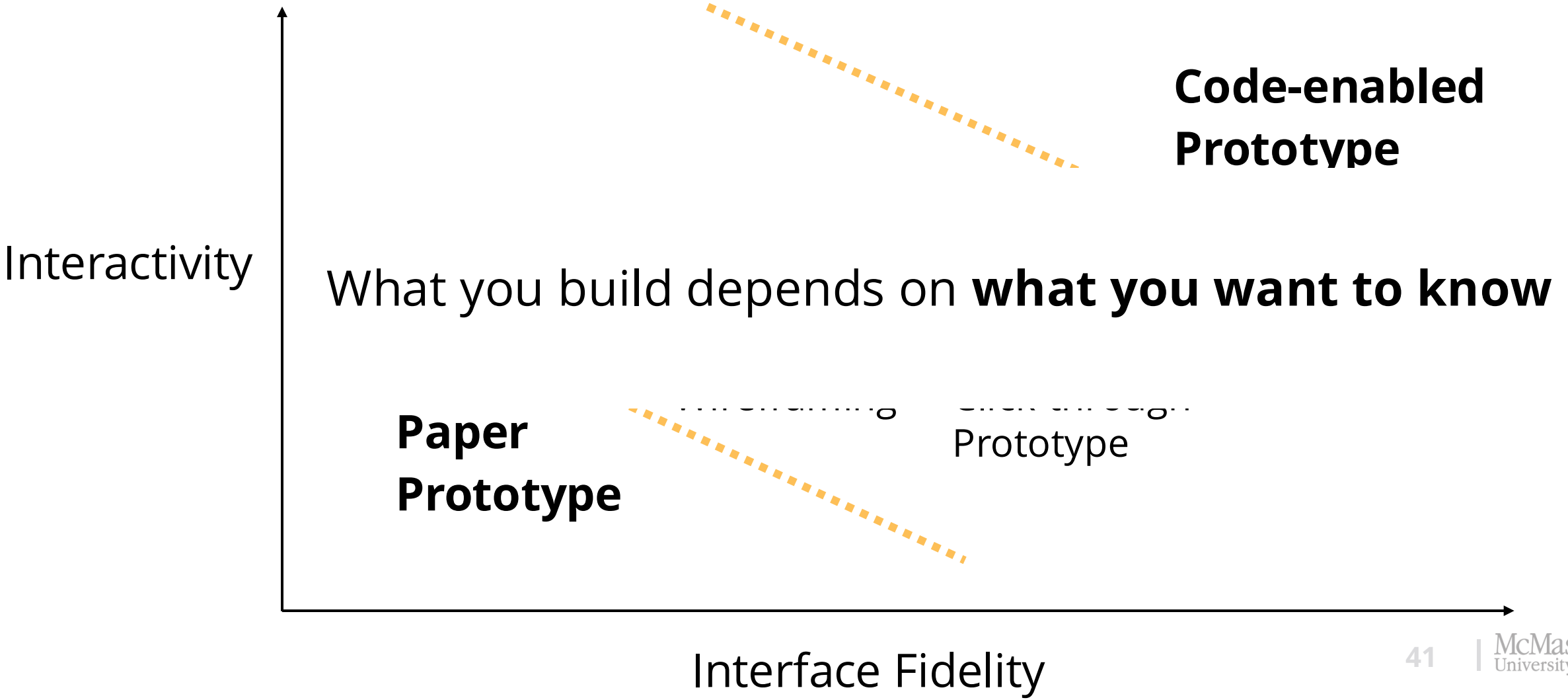
What you build depends on **what you want to know**:

- Is the concept useful?
- Is the tool appealing?
- Is the tool useful? Usable?
- A particularly tricky interaction?
- And what type of evaluation you'll be doing with that prototype

# Prototype: in practice

- **Background:** design a multi-platform digital tools to help doctors and nurse record and create patient daily plans in the ICU
- **Paper Prototype** (printed wireframe)
  - Understand the concept and information
- **Interactive Prototype (interactive text input)**
  - Understand whether it is useful and usable
  - Is the interaction feasible

# Low-High Fidelity Prototypes



# Limits of Prototyping

Some things **needs to be experienced**:

- Virtual and Augmented Reality
- Real Reality (e.g., Amusement Park Rides)
- Novel Interaction Techniques
- Novel Form Factors

# Limits of Prototyping

**Know the limits of prototyping:**

- The “block of wood” could test Palm Pilot’s **form factor**, but not the **effectiveness** of its input mechanisms.
- Non-functioning prototypes can help understand what it a VR headset feels like, but not what it is like to use it.
- Artistic drawing programs can’t be fully evaluated **without** having an artist attempt to create art with them.


# Limits of Prototyping

**Be thoughtful**

- As you're planning a design process, think about **the right level and use of prototypes.**
- Use prototypes to **reduce risk cheaply and early**.
- Recognize that even "full implementations" can still be **lower-cost partially functioning prototypes**.

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- ~~Tuesday~~
  - ~~Designing for Various Abilities~~
- ~~Thursday~~
  - ~~Designing for Various Populations~~
- **~~Friday~~**
  - **~~Intro to Design and Prototyping~~**

# Low-Fidelity Prototyping: What

**What** is lo-fi prototyping?

- A group of **techniques** used to **rapidly present a graphical concept of product**.
- **Sketchy and incomplete**, that has some characteristics of the target product but is otherwise simple.

# Low-Fidelity Prototyping

Paper prototyping
- Fastest, easiest and cheapest lo-fi prototyping technique

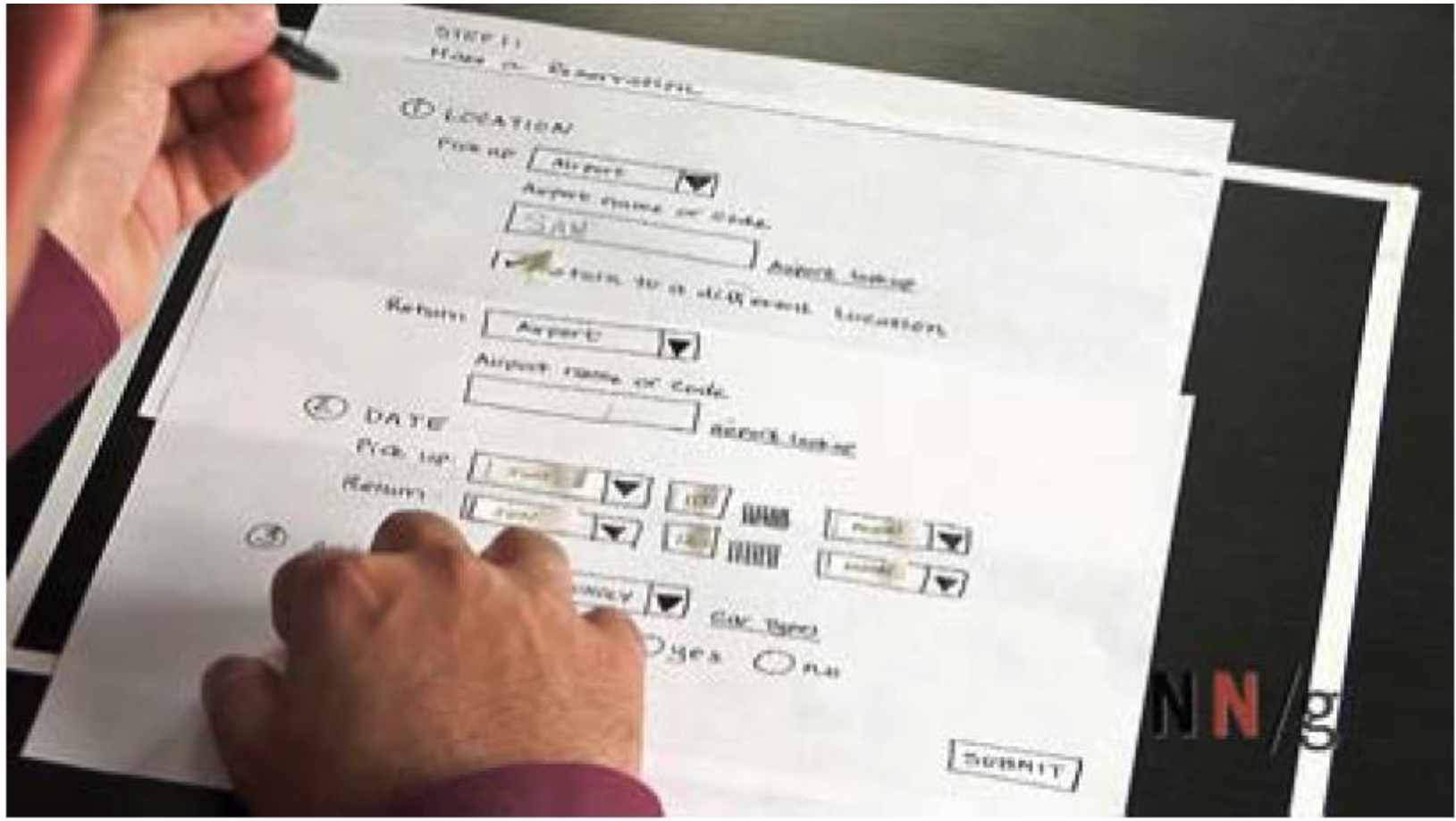



**Image from NN/G video*

# Low-Fidelity Prototyping: When

**When** to use lo-fi prototyping?

- You know **what your app will do**
- You know **what features** it should have
- But, you still need to figure out **how to structure functionality and features** and **want to quickly test the concepts**
- How? **Low-fidelity prototyping!**

# Low-Fidelity Prototyping: Why

**Why** lo-fi (paper) prototyping?

**Very cheap** to implement, test and change

- **Not get caught up** in details of the prototype
- **Enables the involvement of developers, designers, users and other stakeholders** very early in the design process

# Low-Fidelity Prototyping: Evaluate

Researchers use role playing to test how end users will interact with the product

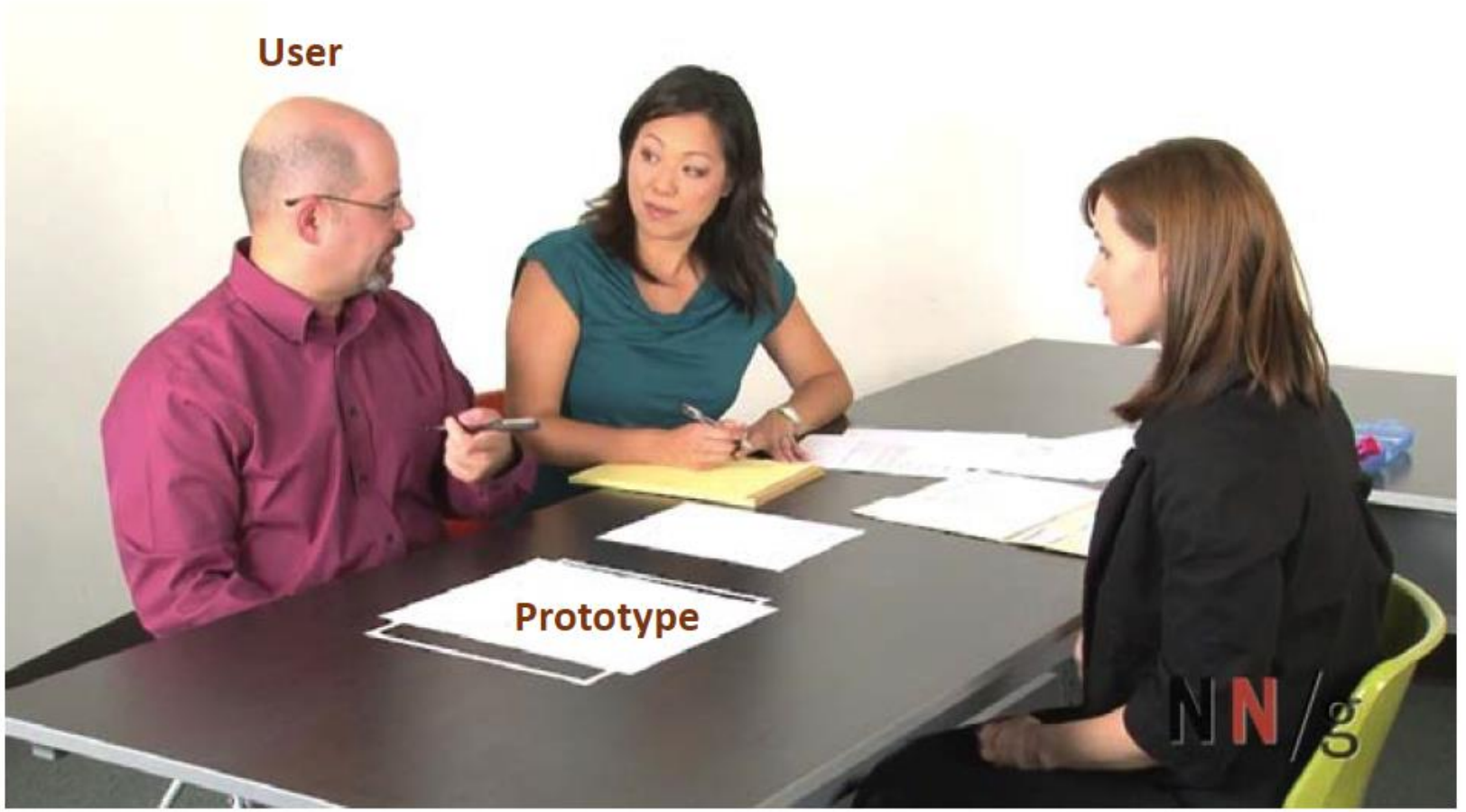



**Image from NN/G video*

# Low-Fidelity Prototyping: Evaluate

Researchers use role playing to test how end users will interact with the product


**Image from NN/G video*

# Low-Fidelity Prototyping: Evaluate

Researchers use role playing to test how end users will interact with the product

- Such simulation sometimes can also be facilitated by tools

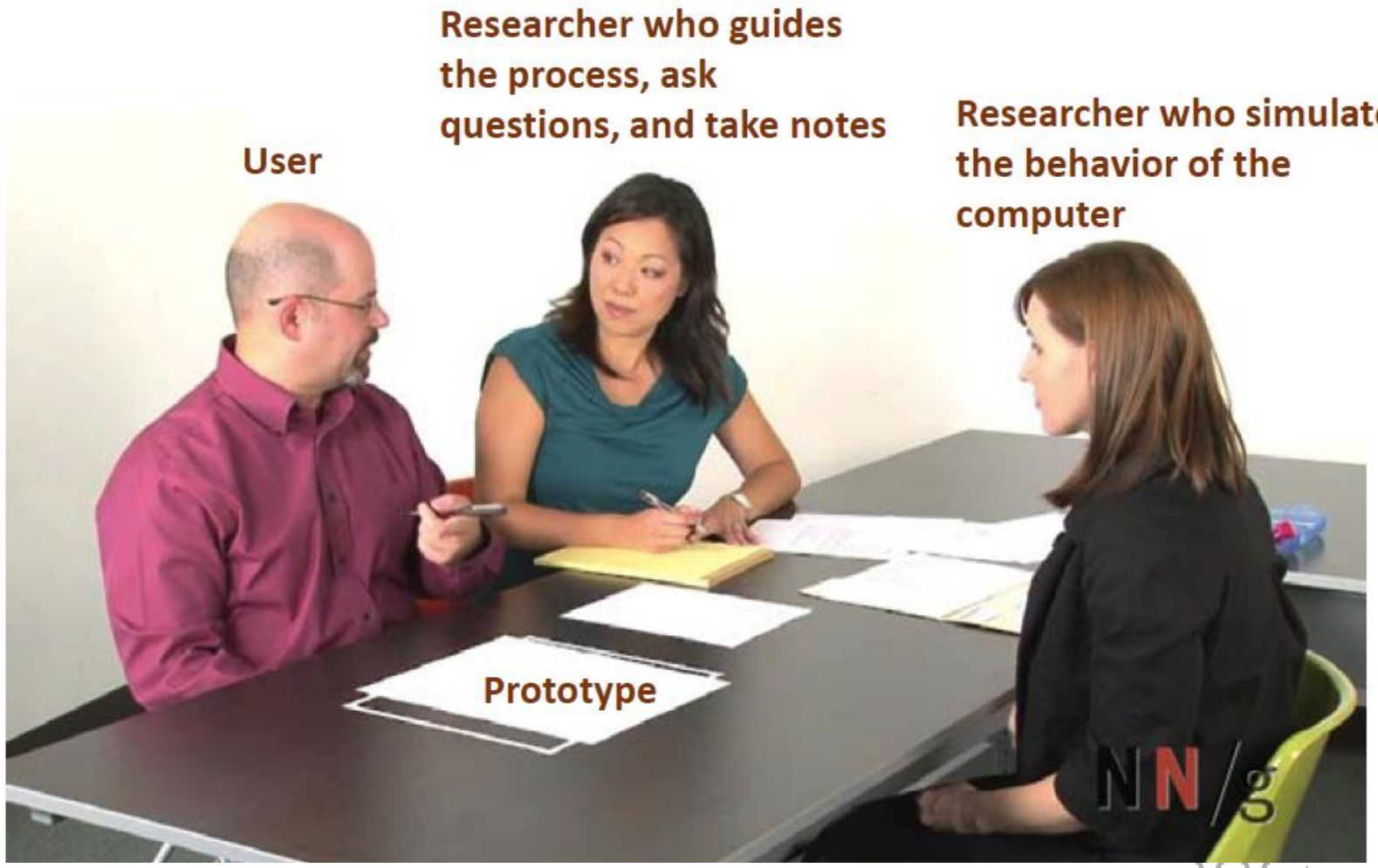


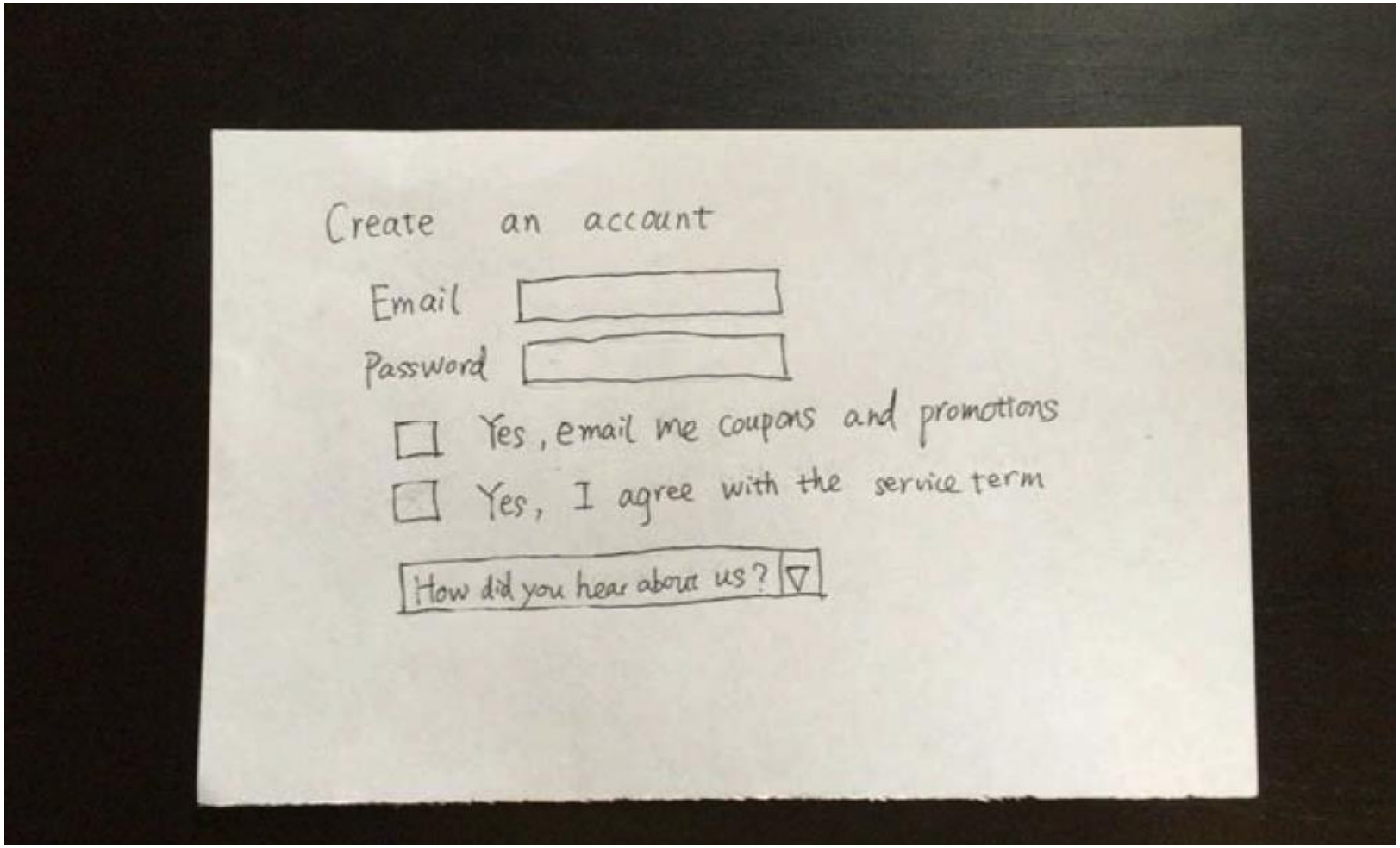

*Image from NN/G video

# Paper Prototyping: How

- **Materials** for creating paper prototypes
  - Pen and paper
  - Sticky notes and tapes
  - Scissors
  - Ruler (sometime)
- **Some examples** of paper prototypes
  - Examples in this video are drawn from “Paper Prototyping, How to Create Prototypes and Test with Paper” by NN/G
  - Photos taken from materials created by University of Minnesota’s course in interface design

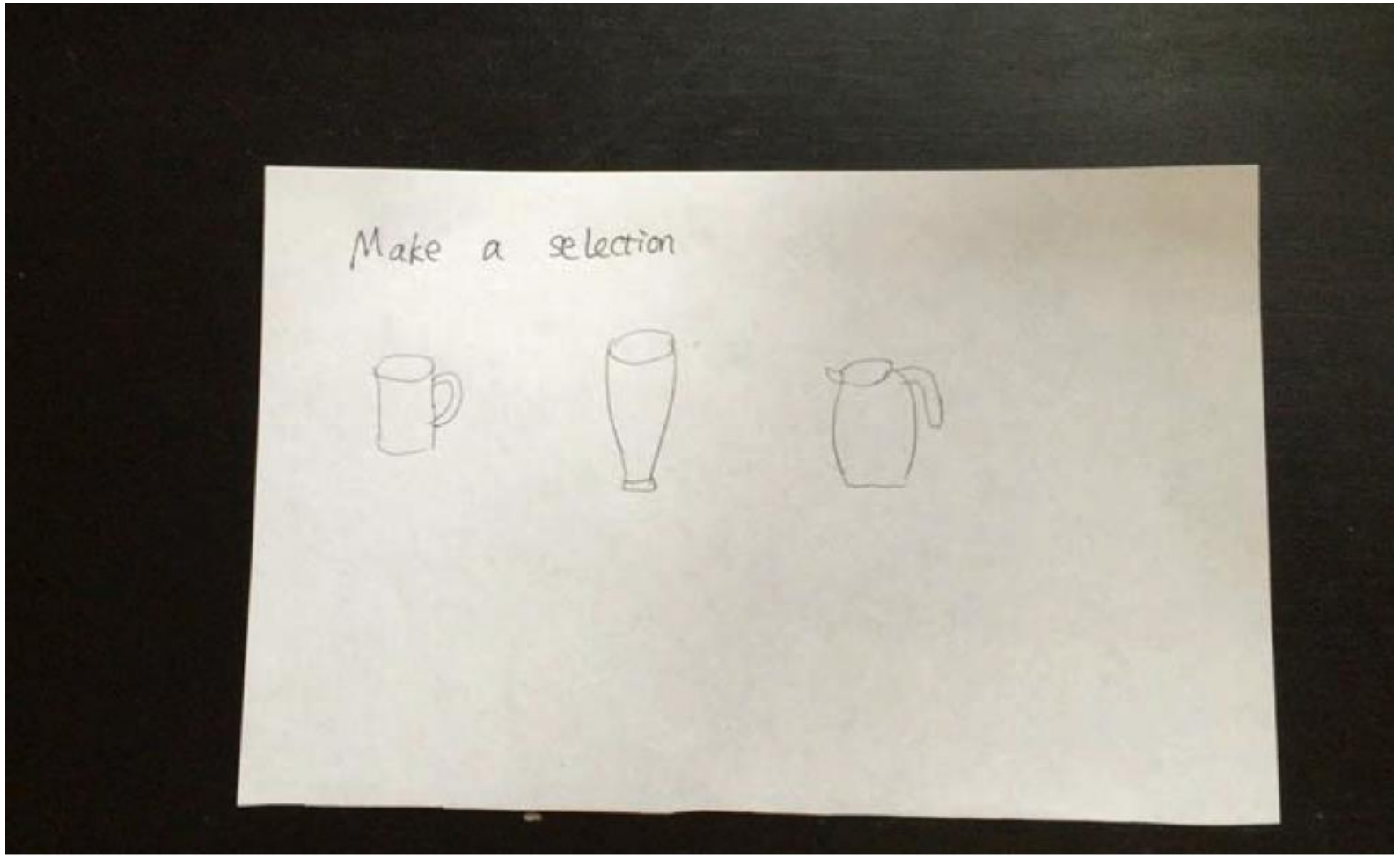
# Paper Prototyping: Example

Basic Interfaces
(account creation)



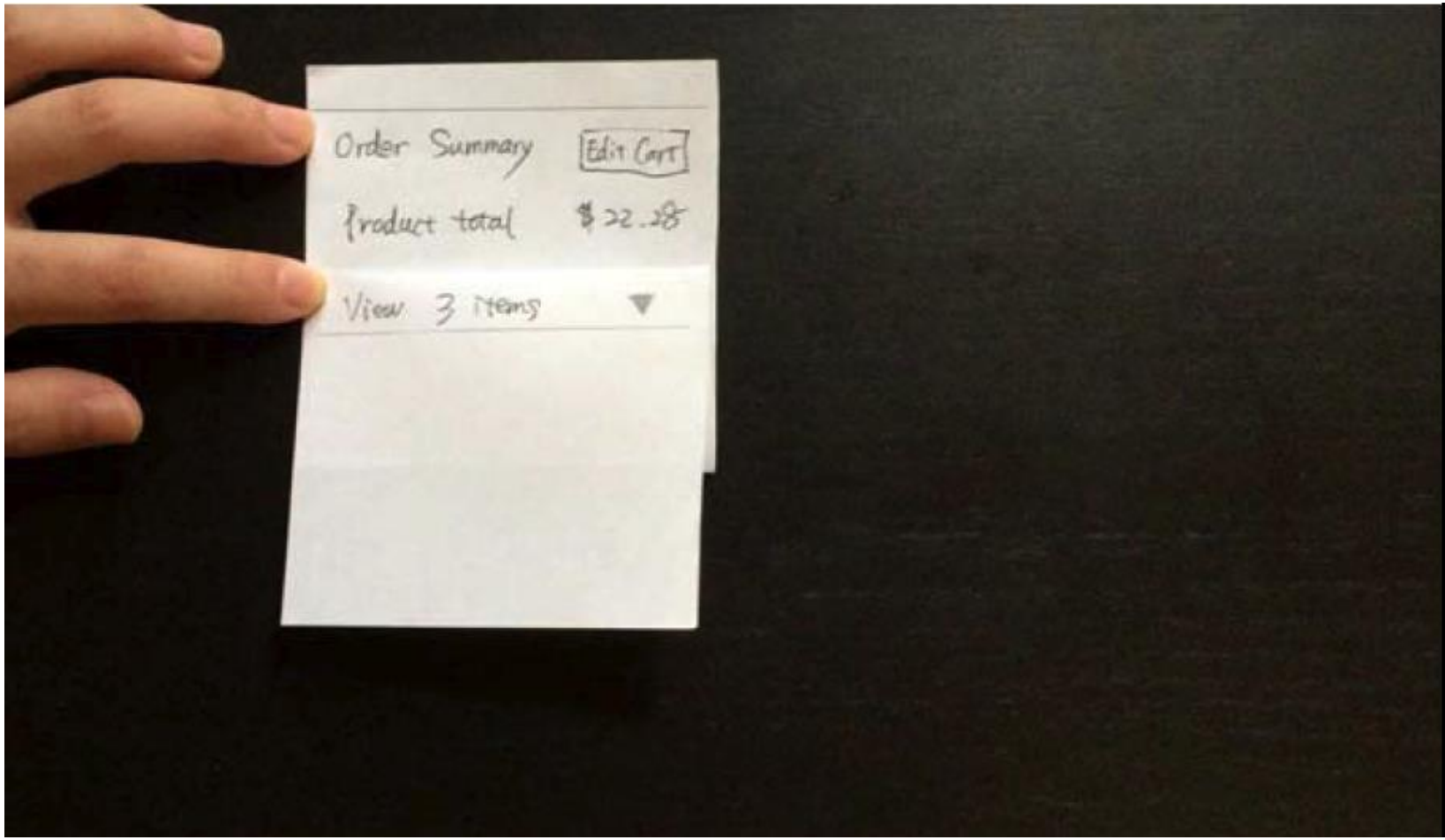
# Paper Prototyping: Example

Basic Interfaces
(make selection)



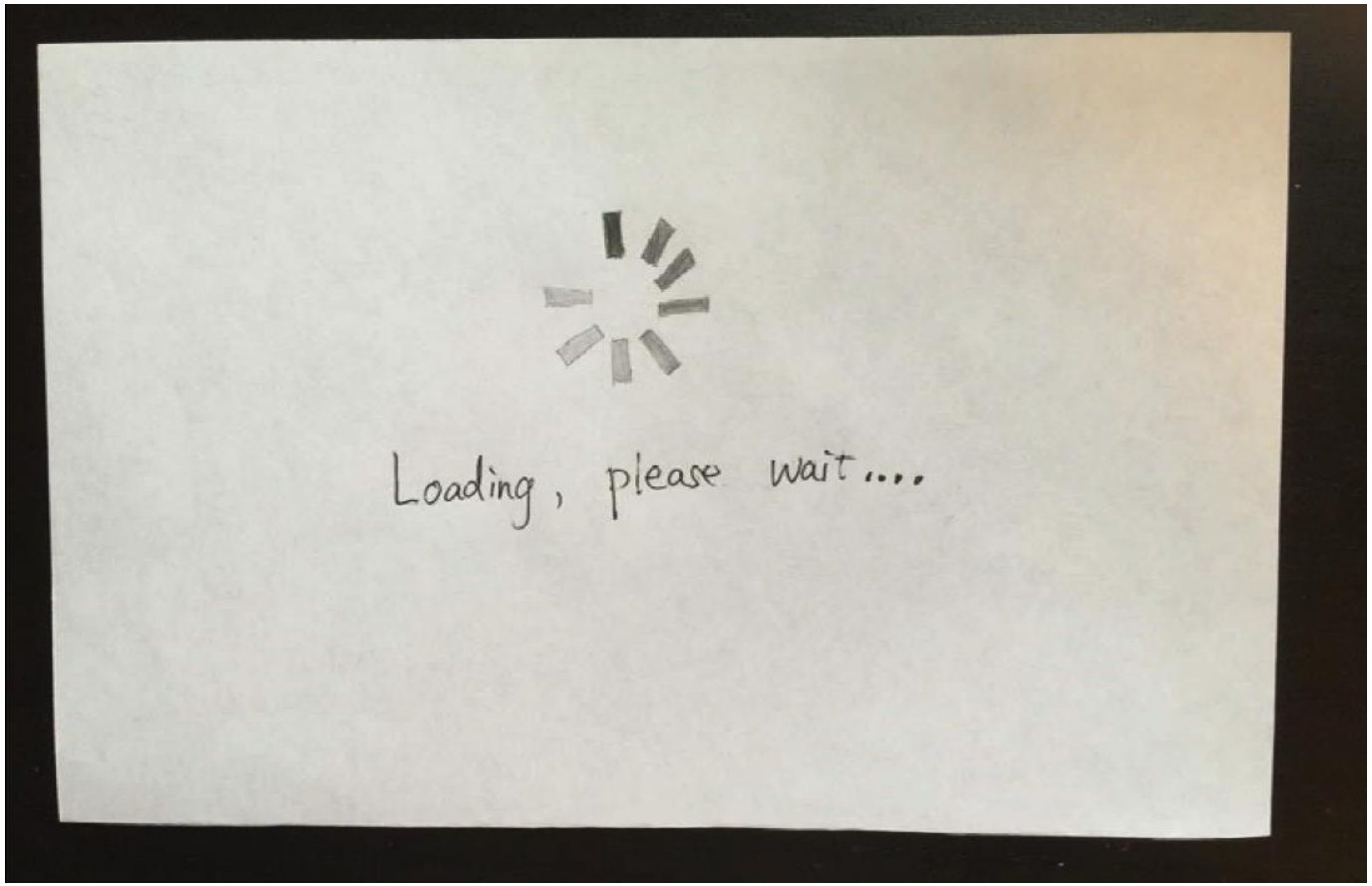
# Paper Prototyping: Example

Sticky notes for interactive components



# Paper Prototyping: Example

Drawing status



# Paper Prototyping: Example

Page scrolling