Introduction to HCI
Fall 2021

Prototyping
Low-Fidelity Prototypes

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Logistics

- Milestone 1 report due at Midnight
- Midterm on October 28th
- In-class
- 60 minutes
- Questions are similar with assignment and in-class activities

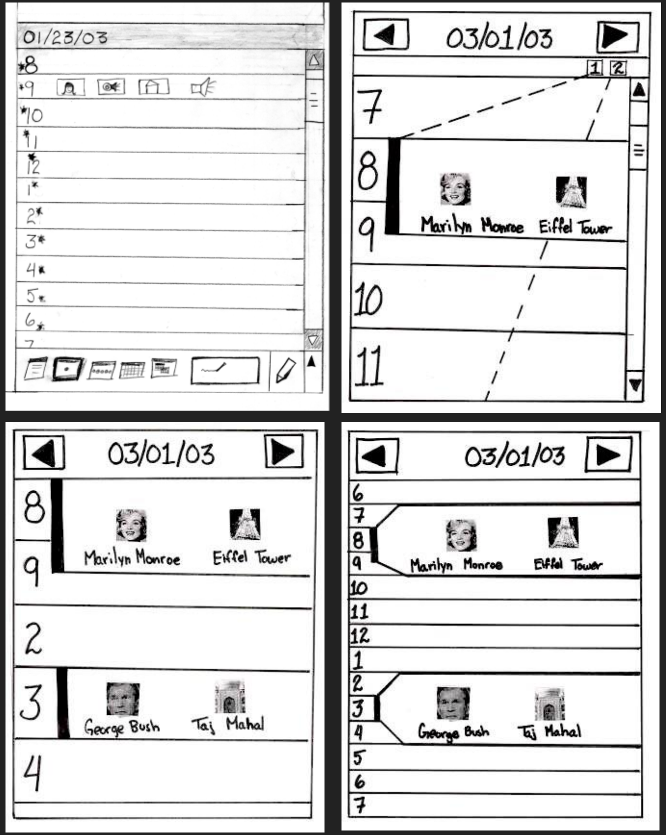
Learning Goals

- Understand different types of prototyping, purpose and characteristics of each.
- List dimensions of prototyping fidelity and explain how these dimensions may vary;
- Define and explain low-fidelity prototypes

What is a prototype?

Representation of conceptual design for users (and designers, and other stakeholders) to interact with

- Prototypes take many forms:
- Cardboard, foam, software, video, clay, paper, hidden people, website, sketches, scripts, index cards etc.



4 designs: image-enhanced planner

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Contact the house owner
About your stay
Check-in
Monday, 19th September
Check-out
Sunday 25th September
720 €
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Number of Guests (incl. you)
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Why prototype?

- Communication: discuss ideas with stakeholders
  - "Where's the ON button?"
- Develop requirements and/or specifications
  - "Uh-oh, here's something we forgot."
- Learning and problem solving
  - "Hey, that will work!"
- Evaluate interface effectiveness for communicating conceptual model
  - "Whoops, users didn't understand that."
- Further develop conceptual and physical design
  - "that's way too heavy"
- Save time and money
  - Don't waste time coding/building the wrong thing

Many different kinds of goals and questions possible

Questions that might need prototyping to answer:

- For example:
  - Screen too crowded? Actions clear, or lost in clutter?
  - Knob versus slider for controlling volume
    - Much more involved for innovative physical interface
  - Navigation: e.g.
    - Transparent menu versus solid menu
    - How many files to show in file selection box

Before you can prototype

- Before you build, identify:
  - Users and tasks to build your prototype around
  - Requirements
  - Goals: questions your prototype(s) need to answer

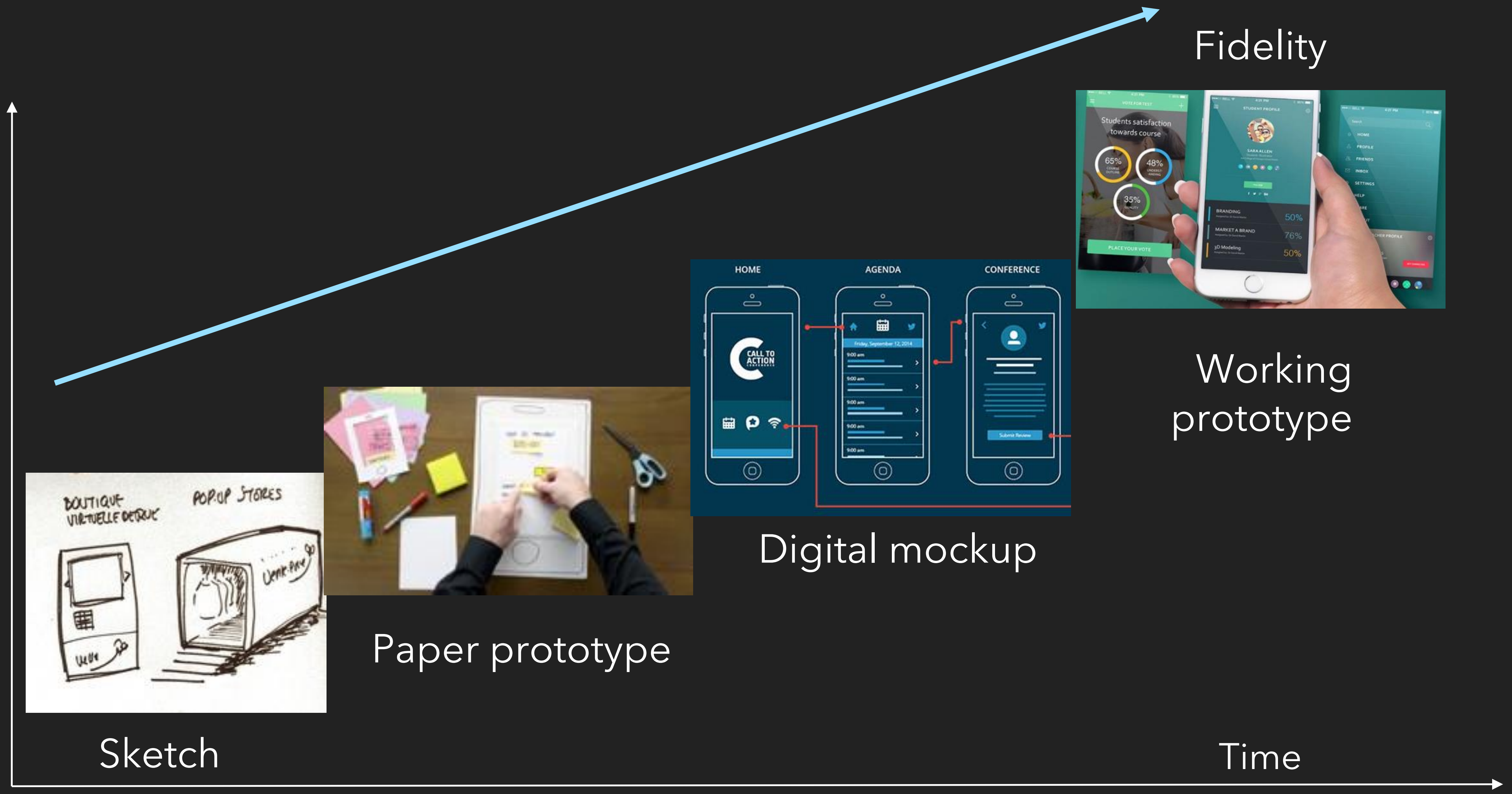
Types of prototypes

- Think of prototyping techniques as tools in your bag of tricks
  - Have lots so that you have appropriate one
  - Just like evaluation methods
  - Should be fast, effective and targeted to the issues

- Don’t waste time implementing something that won’t teach you anything!

- Fidelity ranges from low to high

Evolution of prototypes



Fidelity

Sketch

Paper prototype

Digital mockup

Working prototype

Time

When to use different types of prototypes?

early design

- Choose a representation
- Rough out interface style
- Task walkthrough & redesign
- Fine tune interface, screen design
- Heuristic evaluation and redesign
- Usability testing and redesign
- Limited field testing

- Alpha/beta tests

late design

- Low fidelity prototypes
- Medium fidelity prototypes
- High fidelity prototypes
- Working systems

Low fidelity prototypes

- Meant to be rough, quick to build, easy to throw away
- Proof of concept(s)
- Rough (but flexible) interface design
- Facilitate communication with users early on
  - Can be useful for generating and narrowing requirements

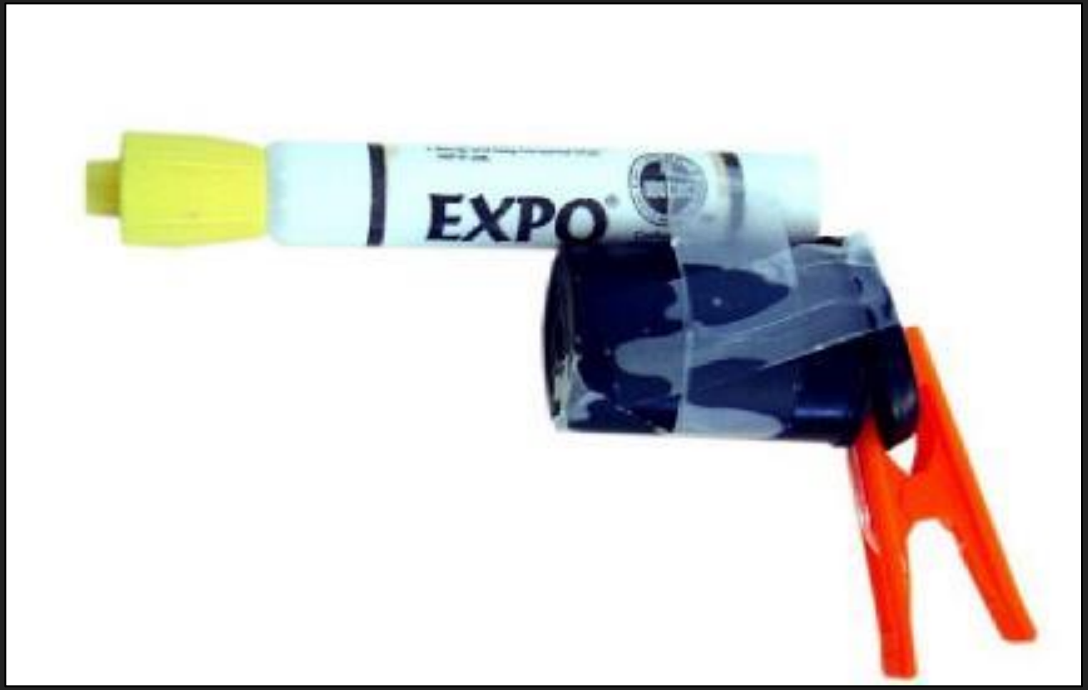
Benefits of low fidelity prototypes

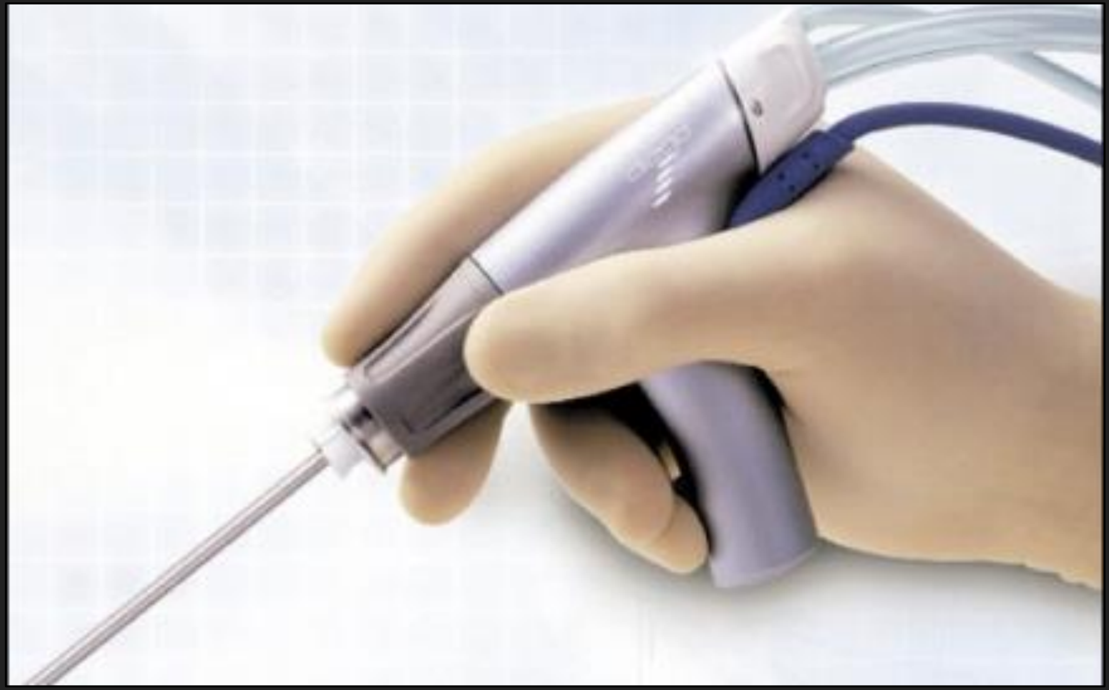
- Cheap/easy to make
- Try out and explore multiple conceptual models

- Lack of polish less intimidating to users
  this is surprisingly important!
  - More willingness to criticize
  - Inspires more creative feedback
  - Avoids nitpicky feedback

- Reduces effort invested by design team
- So easier to make changes, start over

IDEO surgical tool prototype





Approaches to prototype/product integration

- Throw-away
  - Prototype only serves to elicit user reaction
  - Creating prototype must be rapid, otherwise too expensive
- Incremental
  - Product built as separate components (modules)
  - Each component prototyped and tested, then added to the final system
- Evolutionary
  - Prototype altered to incorporate design changes
  - Eventually becomes the final product

Approaches to ‘scoping’ prototype functionality

- Vertical prototype
  - Includes in-depth functionality for only a few selected features
  - Key design ideas can be tested in depth

- Horizontal prototype
  - Surface layers only: includes the entire user interface with no underlying functionality
  - A simulation; no real work can be performed

- Prototype scenario
  - Scripts of particular fixed uses of the system; no deviation supported
  - See whole thing (fake)

Paper prototyping

- Common low fidelity technique
  - Popular in industry . . .
  - Despite prevalence of ‘mockup’ software tools
- Because: easy to
  - Build
  - Alter on the fly
  - Show
  - Stick on wall & compare
  - Discuss

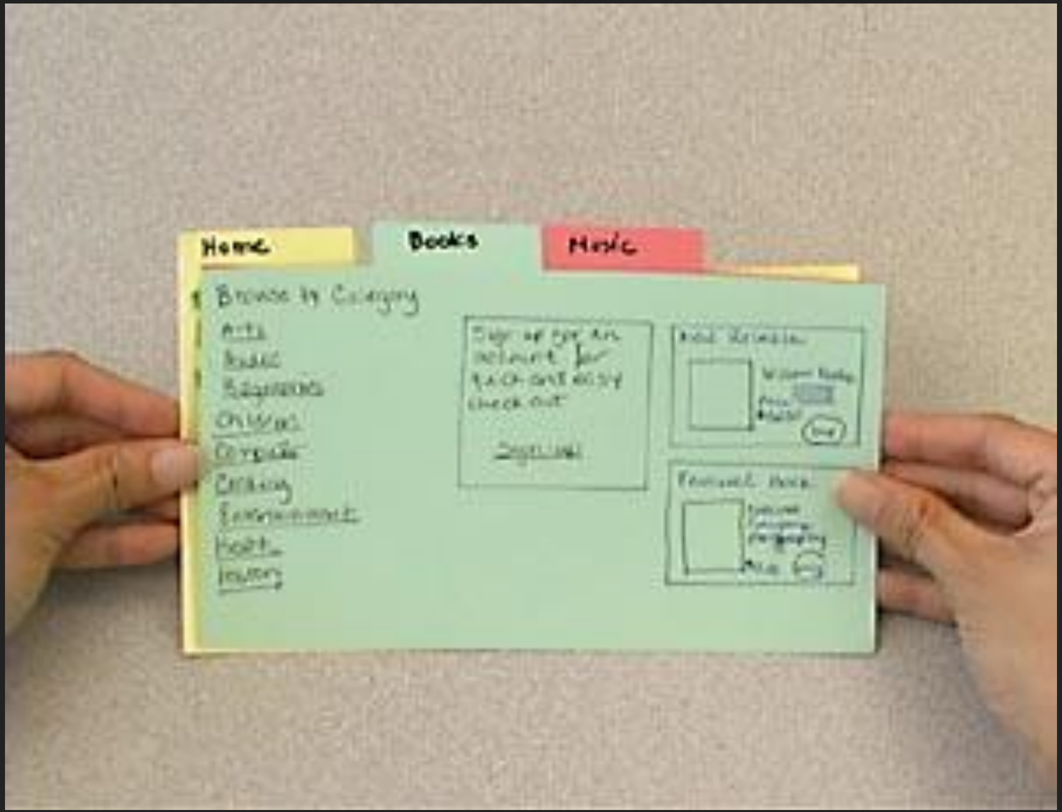


photo: http://hci.stanford.edu/courses/cs247/2009/handouts/paper-2009-exercise.html

Paper prototyping materials

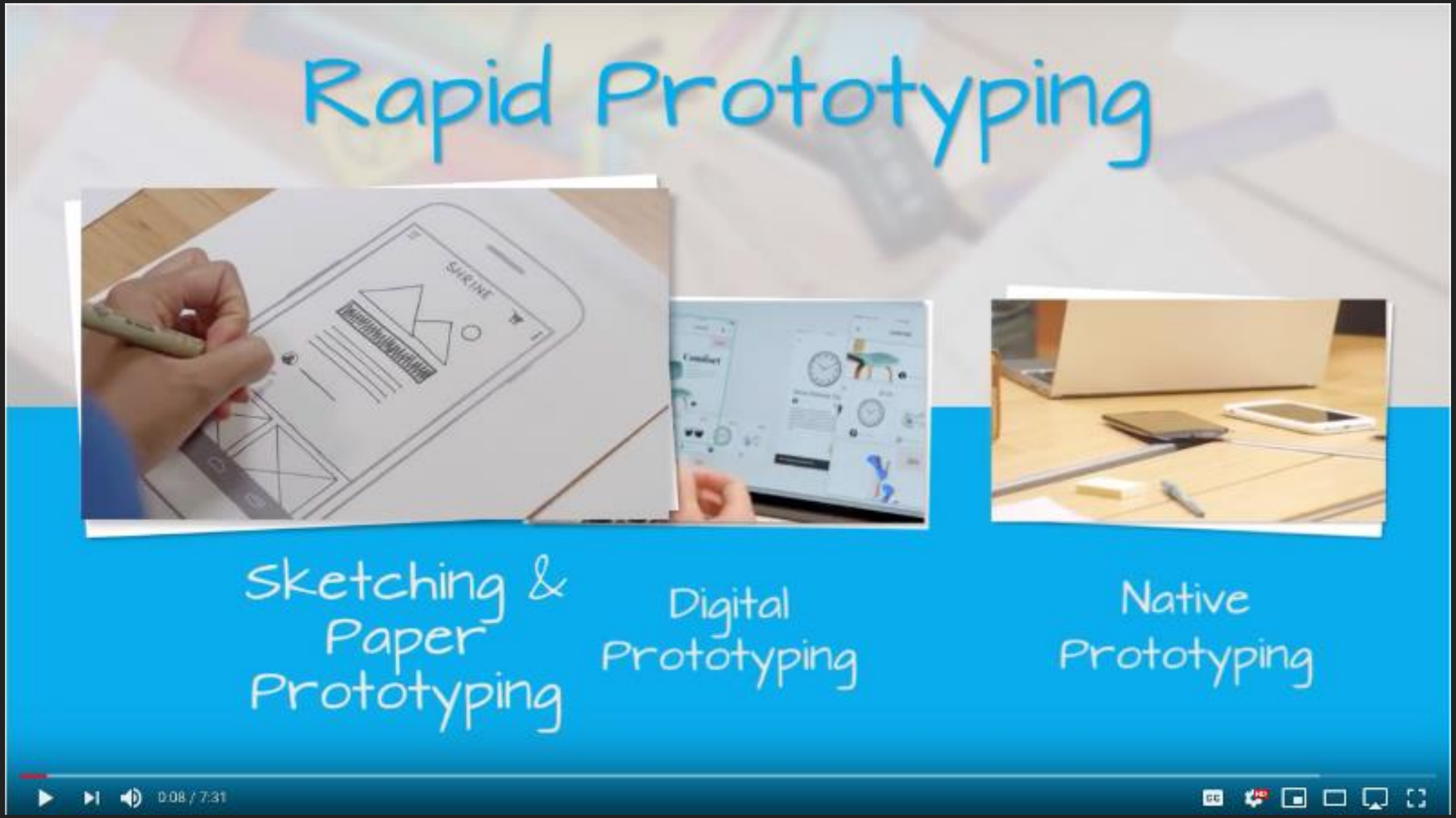
- Interface elements/screens created on paper
  - Or other ‘easy to throw away or modify’ materials, e.g.,
    - Whiteboard, magnetic taps, transparencies
  - Can incorporate other things that people interact with in completing their task, e.g.:
    - Other people
    - Hardware

Simulating interactions in paper prototyping

- Can simulate relatively sophisticated interactions
  - Complex/subtle interactions won’t be perfect
  - Requires some imagination on users' part
  - Forces you to stay in “early design” mode

- With some creativity, can mockup almost any kind of widget or interaction

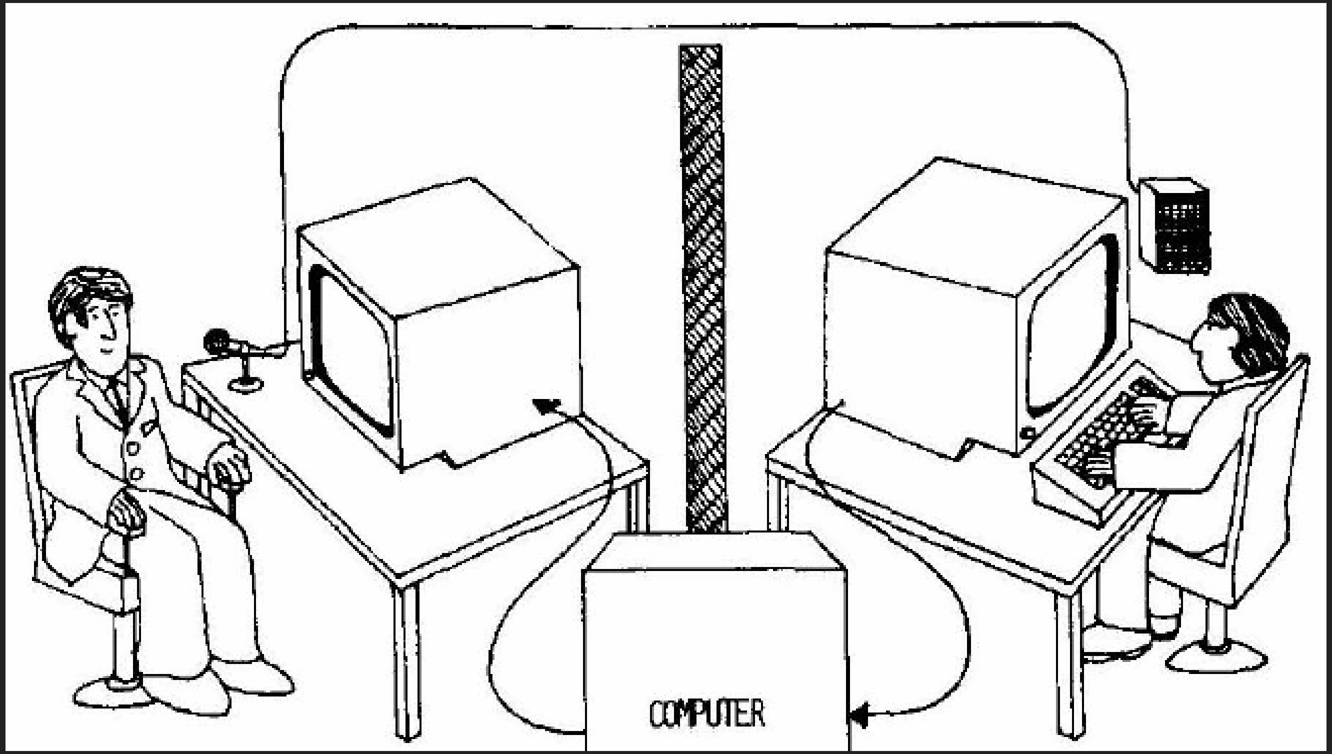
Rapid Prototyping 1 of 3: Sketching & Paper Prototyping



https://www.youtube.com/watch?v=JMjozqJS44M

Wizard of Oz (“WOZ”)

- A method of testing a system that does not exist
  - the voice editor, by IBM (1984)



What the user sees

The wizard

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

Wizard of Oz

- Human simulates system’s intelligence & interacts with user
    - “Pay no attention to the man behind the curtain!”

- User uses computer as expected

- “Wizard” (sometimes hidden):
    - Interprets subject’s input according to a preset algorithm
    - Makes computer/screen behave in appropriate manner

- Good for:
    - Adding simulated and complex vertical functionality
    - Testing futuristic ideas

Wizard of Oz examples

- IBM: an imperfect listening typewriter using continuous speech recognition
  - Secretary (i.e., Wizard) trained to:
    - Understand key words as “commands”
    - Type responses on screen as the system would
    - Manipulate graphic images through gesture and speech

- Intelligent agents / programming by demonstration
  - Person trained to mimic “learning agent”
    - User provides examples of task they are trying to do
    - Computer learns from them
  - Shows how people specify their tasks

In-class activity

- Work in groups
- Use sketching/storyboarding and start with the low-fidelity prototype for your project
- https://tinyurl.com/efy2suzn

Additional Information

Summary of Lo-FI

- Prototyping
  - Speeds up design and lowers overall cost
  - Allows users to react to the design and suggest changes
  - Prototypes and scenarios are used throughout design
  - Low-fi best for brainstorming and choosing a conceptual model
  - Med/hi-fi prototypes best for fine-tuning and detailed design
- Low-fi prototyping methods
  - Scope: vertical, horizontal prototyping
  - Paper
  - Sketching
  - Storyboarding
  - Scripted simulations
  - Wizard of oz

Optional reading

- Erickson, T., & McDonald, D. W. (2007). A Simulated Listening Typewriter: John Gould Plays Wizard of Oz.

- Sketching and Storyboarding
  - https://drive.google.com/file/d/1b2UK49O8SL48S28GffG0TUM5-6gXC6MN/view?usp=sharing