

Project Themes

□ Facilitate Learning or Teaching Process using Technology

- Identify consistency and inconsistency among reviewers in the peer review process of academic papers
- Analysis of the intent of literature citation
- Online course distraction analysis
- Promoting video editing experience
- Facilitating UI design process, e.g., teaching material evaluations
- ...

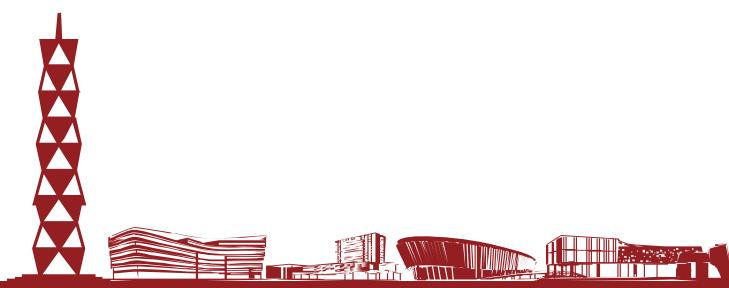
□ Promoting Personal and Community Well-Being

- Improve the experience of Danmu and comments comprehension in bilibili videos or TikTok
- HRI in self-isolation/self-quarantine, e.g., identifying potential needs of people during self-isolation/quarantine and problems with existing solutions, and building an agent/chatbot to meet the proposed needs
- Support emotion exploration within online forums, e.g., NetEase Music, QQ Music commenting sections

□ Specific Application Domains and User Groups

- Understand and improve the transparency or credibility of ML/DL models among specific groups, such as physicians
- Support technology use and communication for specific groups in the digital era
- Enhance the communication experience between humans and AI agents, such as ChatGPT
- ...

Other topics, should be confirmed by instructor





CS160 Human Computer Interaction

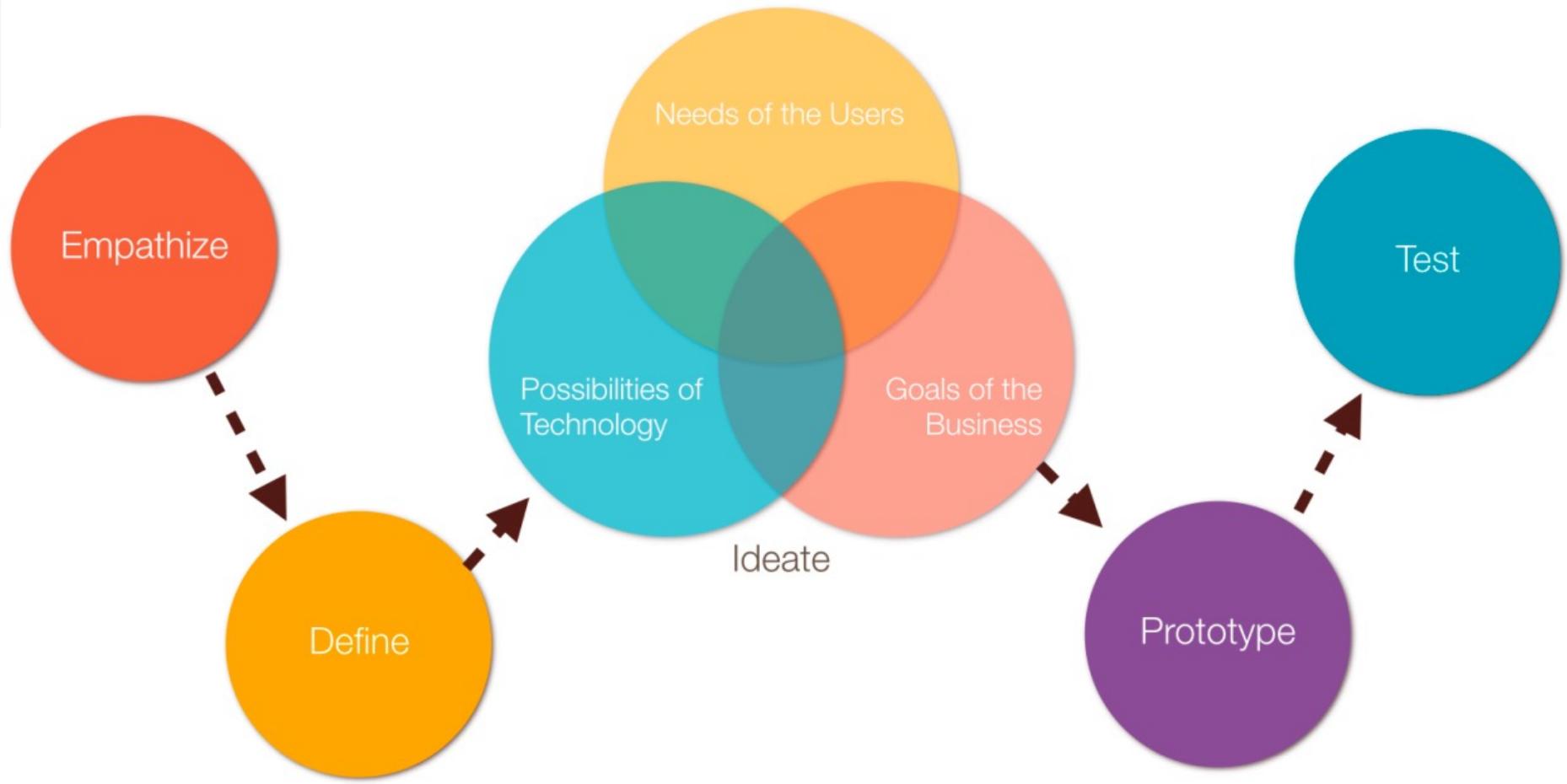
Lecture 7

Prototyping Methods and Practices

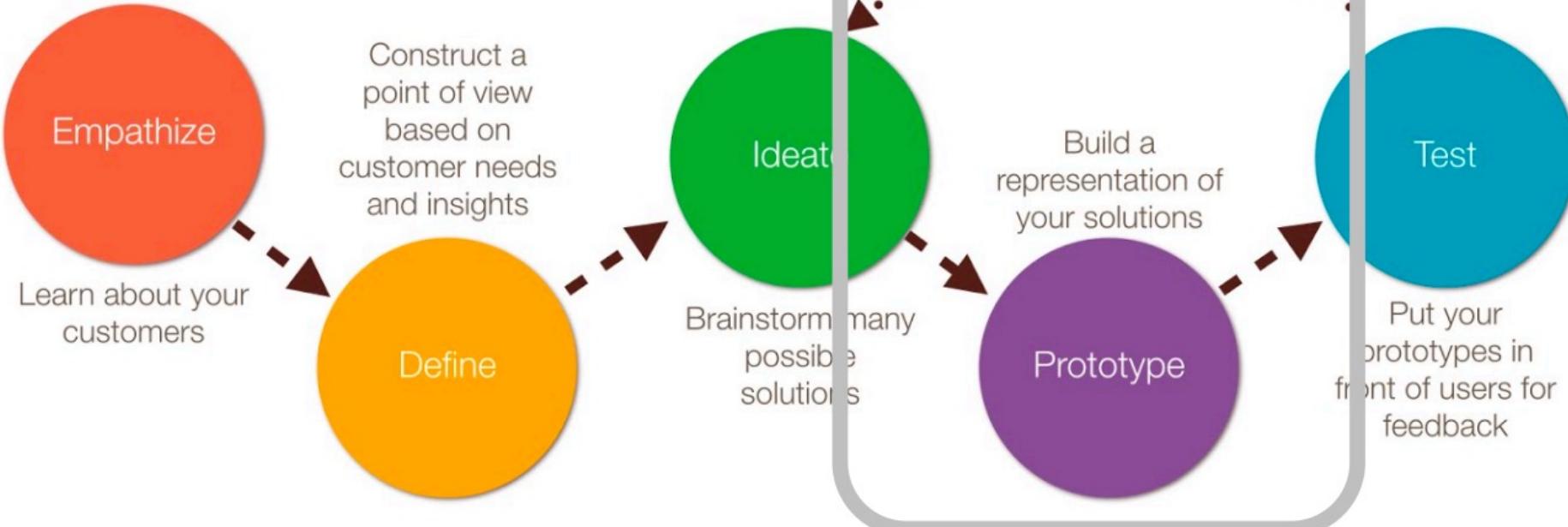
Quan Li
Spring 2023
2023.02.27



Recap: From Mindset to Process



Human-Centered Design (Recap)



Why Prototyping?

- Prototypes can help you
 - Express and realize a design concept
 - Communicate design ideas
 - Evaluate design ideas

What is a Prototype?



Fast
Focused
Expressive

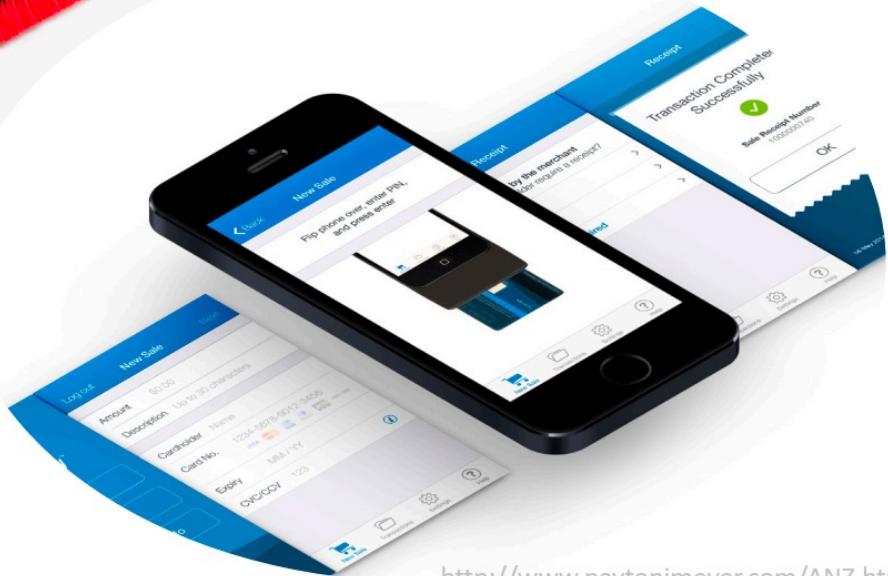


Evolutionary
Modular
Disposable

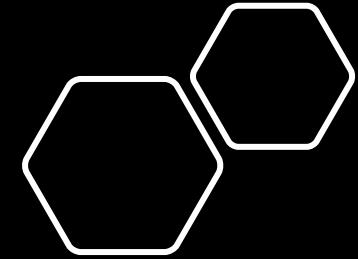


Encourage user feedback
Assess usability
Test User experience
Communicate and persuade

Produce something tangible
Identify challenges
Uncover subtleties



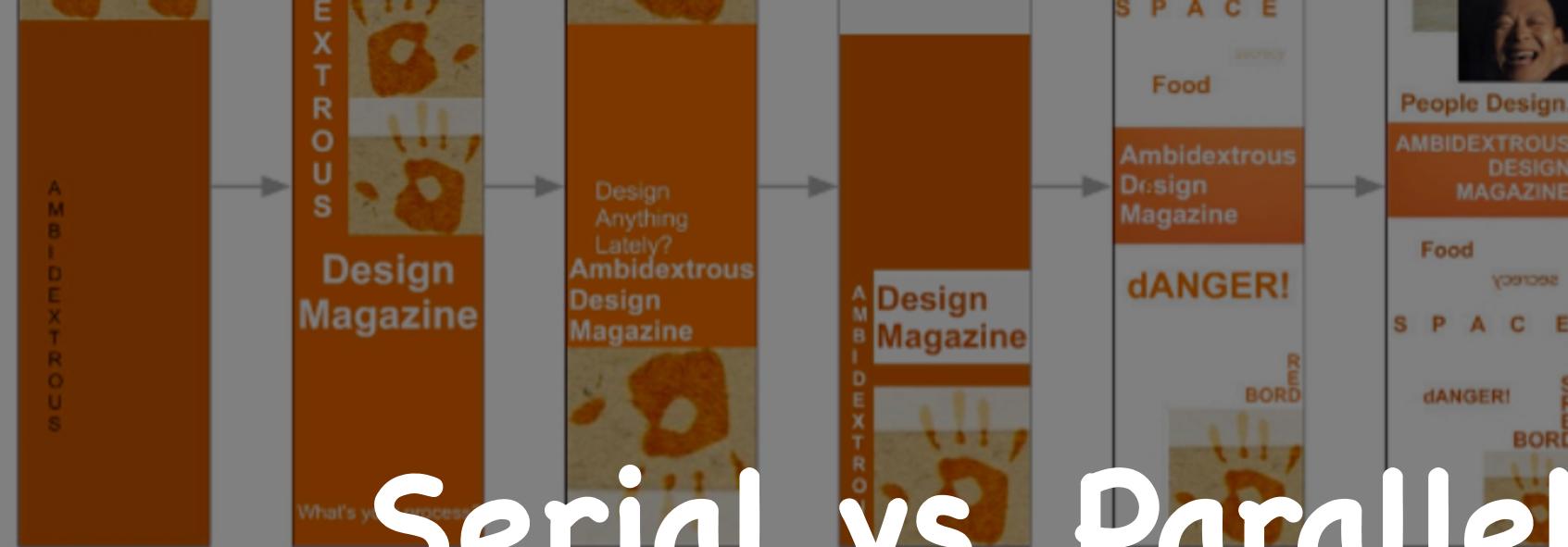
<http://www.paytonimeyer.com/ANZ.html>





Prototyping Process

- Serial vs. Parallel Prototyping
 - Across iterations of designs
 - Serial: depth-first
 - Parallel: breadth/diversity-first
- Horizontal vs. Vertical Prototyping
 - Range of capabilities of a single design
 - Horizontal: wide range of features without full “implementation” of any
 - Vertical: select features are “implemented” all the way through



Serial vs. Parallel Prototyping

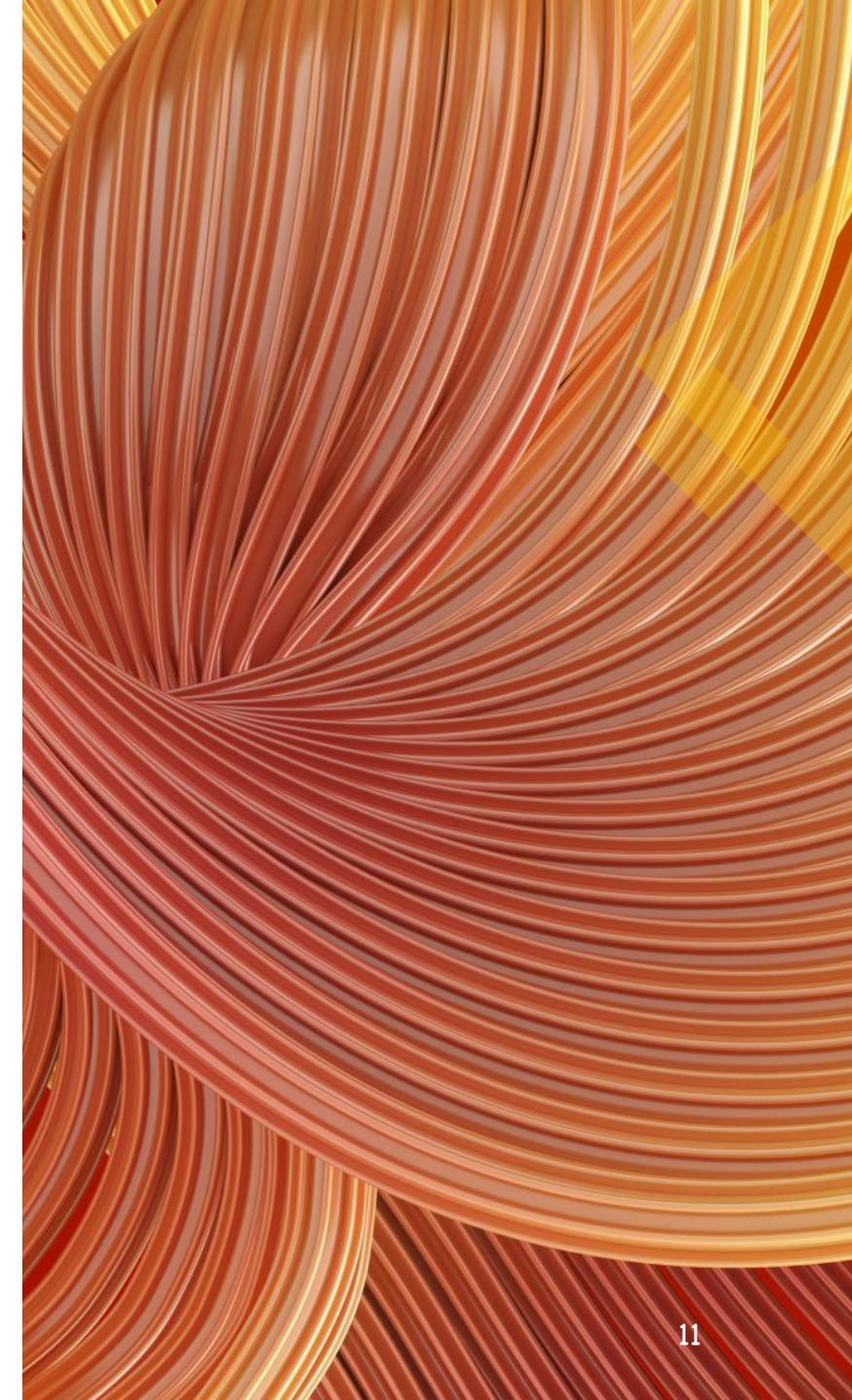


Parallel Prototyping

Parallel vs. Serial

Two different ways of parallel prototyping

- Several designers each create one or more designs, then the entire group considers all concepts. The best ideas are picked to create one or more improved designs.
- One designer creates multiple designs, then all designs are critiqued and the designer creates revised designs.



Prototyping Process

- Serial vs. Parallel Prototyping
 - Across iterations of designs
 - Serial: depth-first
 - Parallel: breadth/diversity-first
- Horizontal or vs. Vertical Prototyping
 - Range of capabilities of a single design
 - Horizontal: wide range of features without full “implementation” of any
 - Vertical: select features are “implemented” all the way through



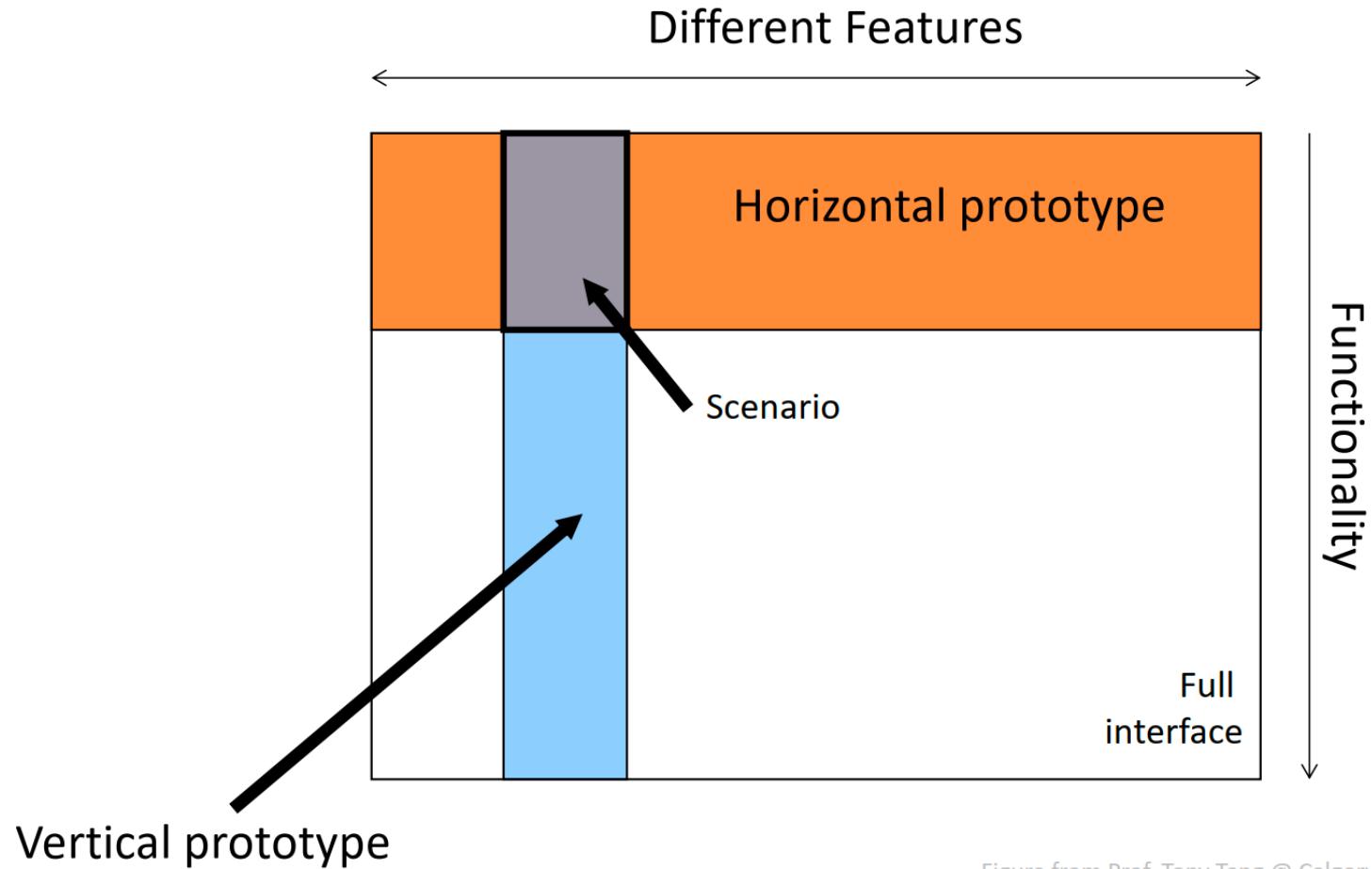


Figure from Prof. Tony Tang @ Calgary Univ.

Horizontal vs. Vertical Prototyping

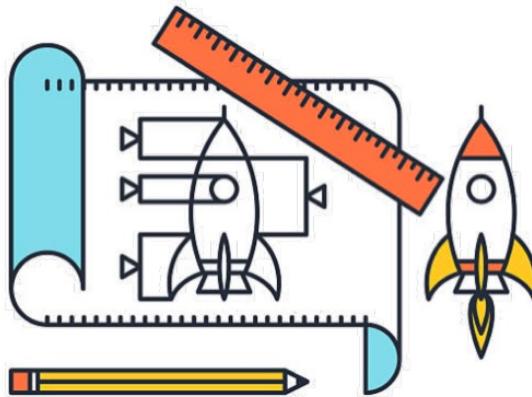
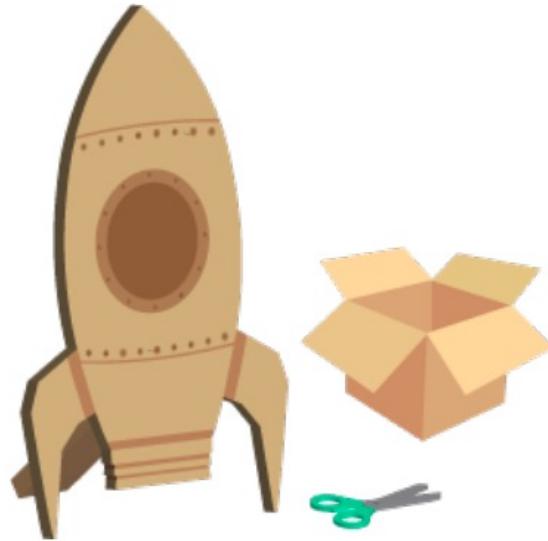
What to be Prototyped (in HCI)?

- Task Design and User Flow
 - Based on expected tasks, what will the users see and what will they do?
- Layouts and Content
 - How should information be laid out to serve users as they need it?
How can this be optimized?
- Look and Feel
 - E.g., size, style
- Technical Aspects
 - Can we actually make this go?!
- Controversial and Critical Areas
 - E.g., Security and privacy

Birthday: Month: Day: Year:

Birthday Day - Select Month - Year

* Date of birth
(dd/mm/yyyy)



Different Types of Prototypes

- Storyboards
- PowerPoint slideshow
- Video prototype
- Paper prototype
- Physical model
- Software with limited functionality
- ...

Which Prototyping Method to Use?

- Strategy 1: Based on Pragmatics
 - User flow >> storyboard
 - Layouts/page flow >> paper prototypes
 - Overall experience >> video prototype
 - Look and Feel >> PowerPoint or PSD
 - Functionality >> software ...
- Strategy 2: Based on Stage



<http://raghavanand.com/bank-of-america-cmu-capstone-project>

Spectrum of Prototyping



Low-Fidelity

- Sketch & paper

Medium-Fidelity

- Interactive page

High-Fidelity

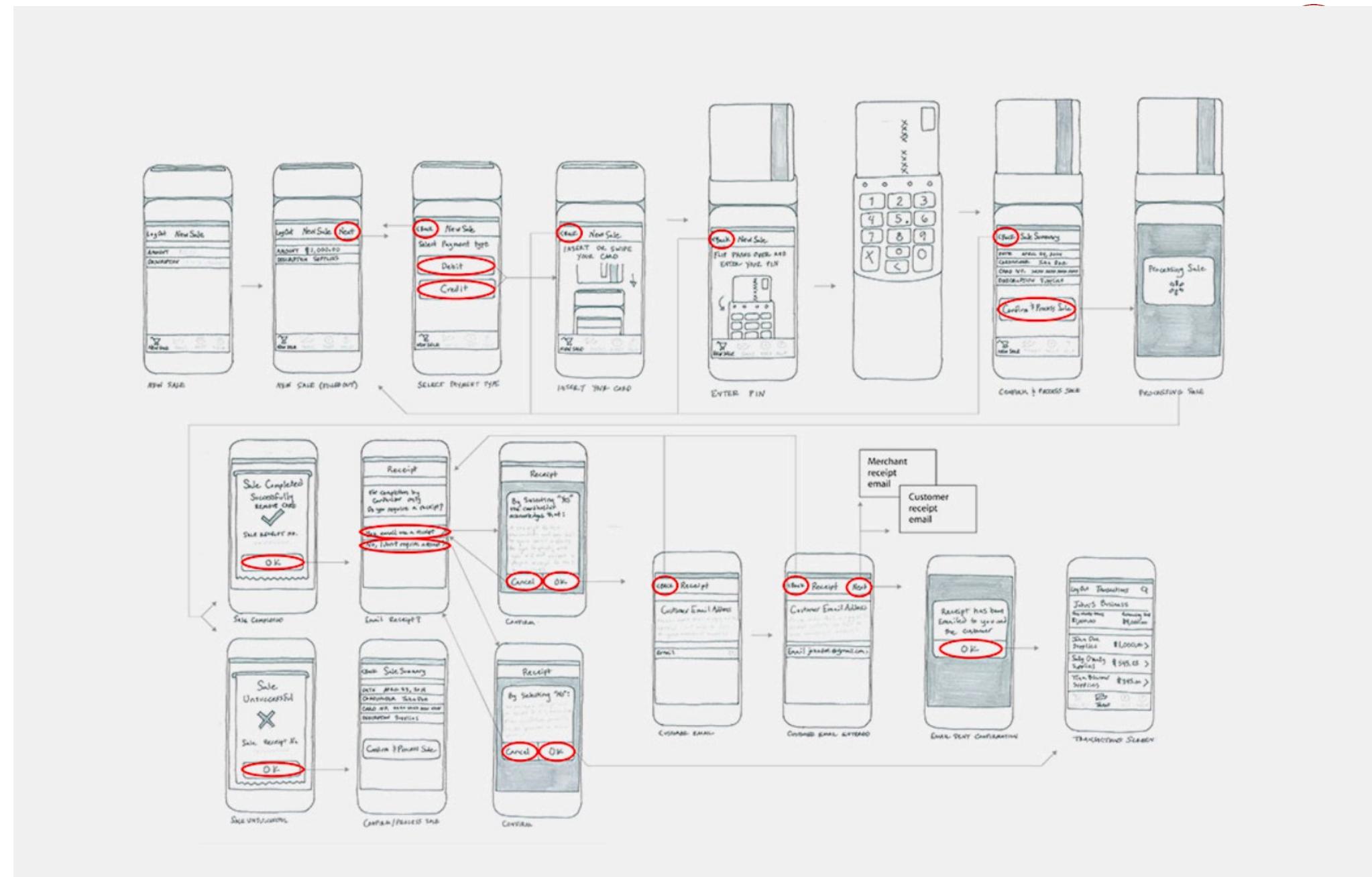
- Partial functions





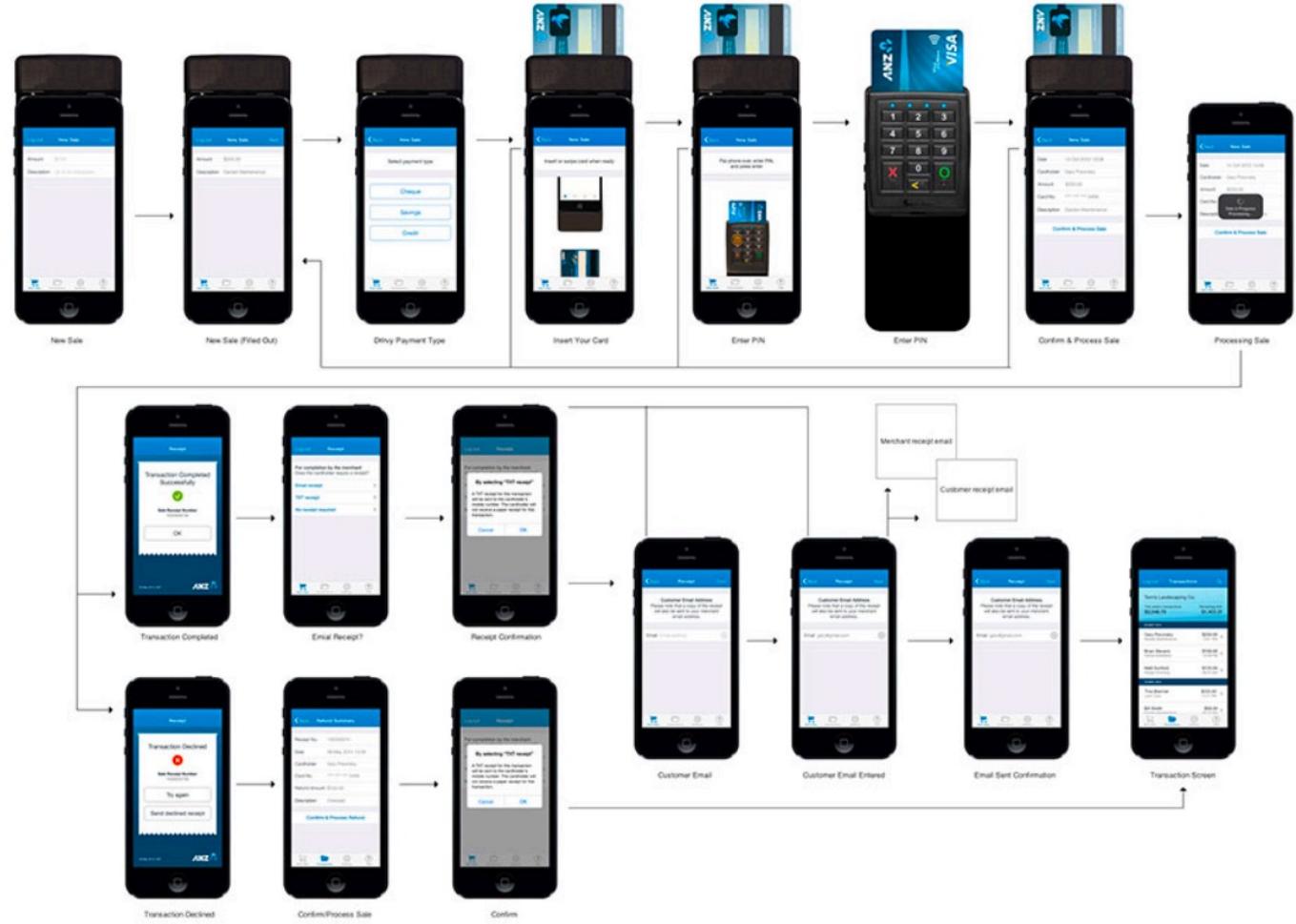
Low-Fidelity Prototypes

- A.k.a. “wireframes”
- Goals
 - Connect information architecture to visual design
 - Determine functionality of each UI
 - Prioritize space for content
 - Establish consistency and patterns
- Cautions
 - Avoid colors, images, multiple fonts
 - Be careful about showing these outside your team
- UX Book recommends paper for lo-fi prototypes



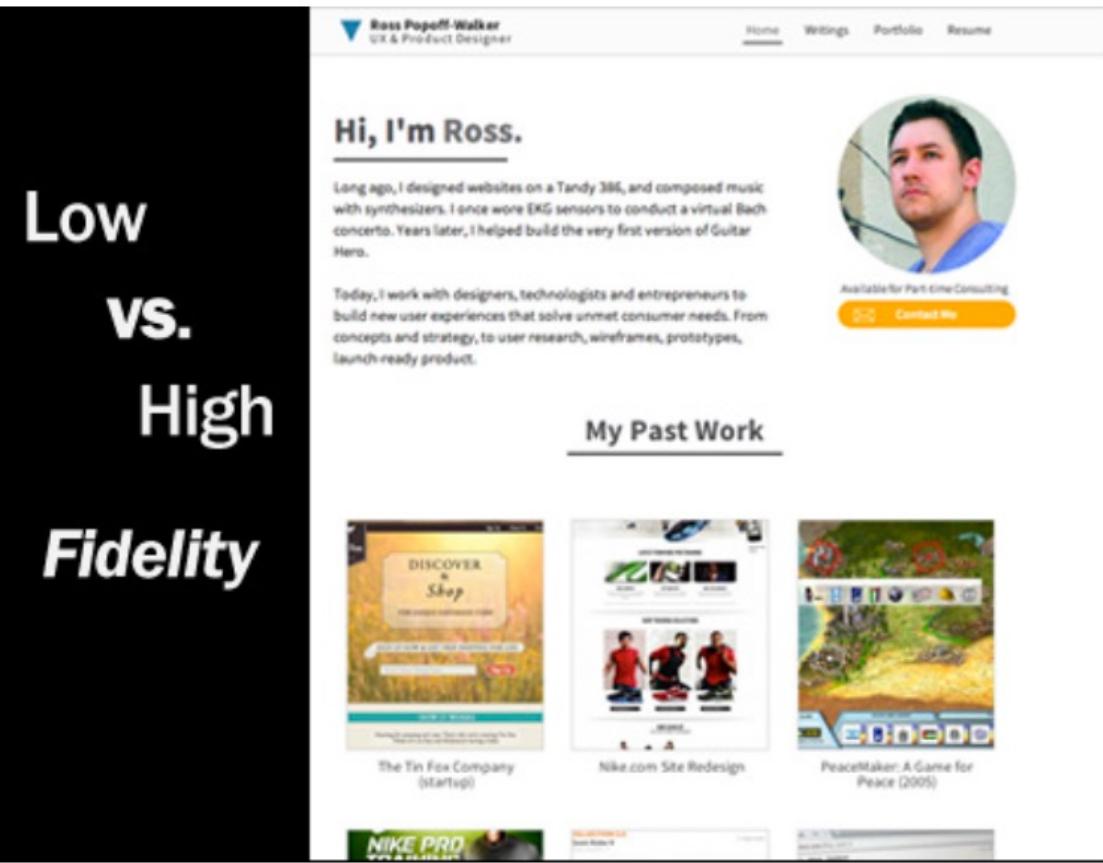
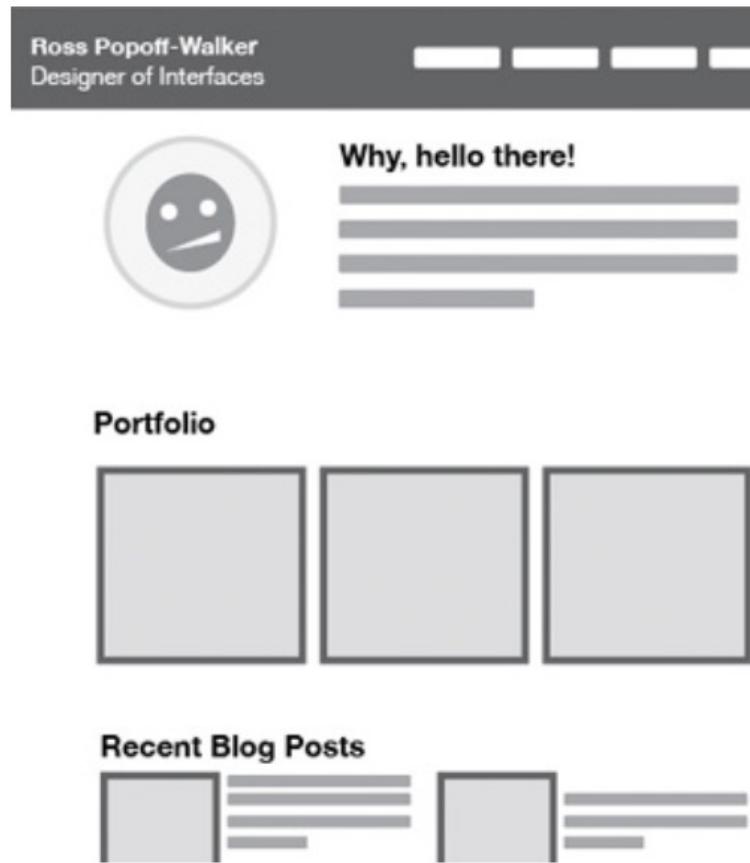
High-Fidelity Prototypes

- A.k.a. “mockups”
- Goals
 - Provide a representative (if limited) user experience
 - Develop visual design
 - Enable interaction and navigation
 - Allow for more realistic testing/feedback
 - Materials (code, graphics, etc.) can often be reused during implementation
- Caution
 - Can mislead users/testers if too “perfect”



Pros and Cons

- Low-Fidelity (Right Design)
 - Fast and cheap
 - Concept and consensus
- High-Fidelity (Design Right)
 - Interactive
 - Evaluation and marketing



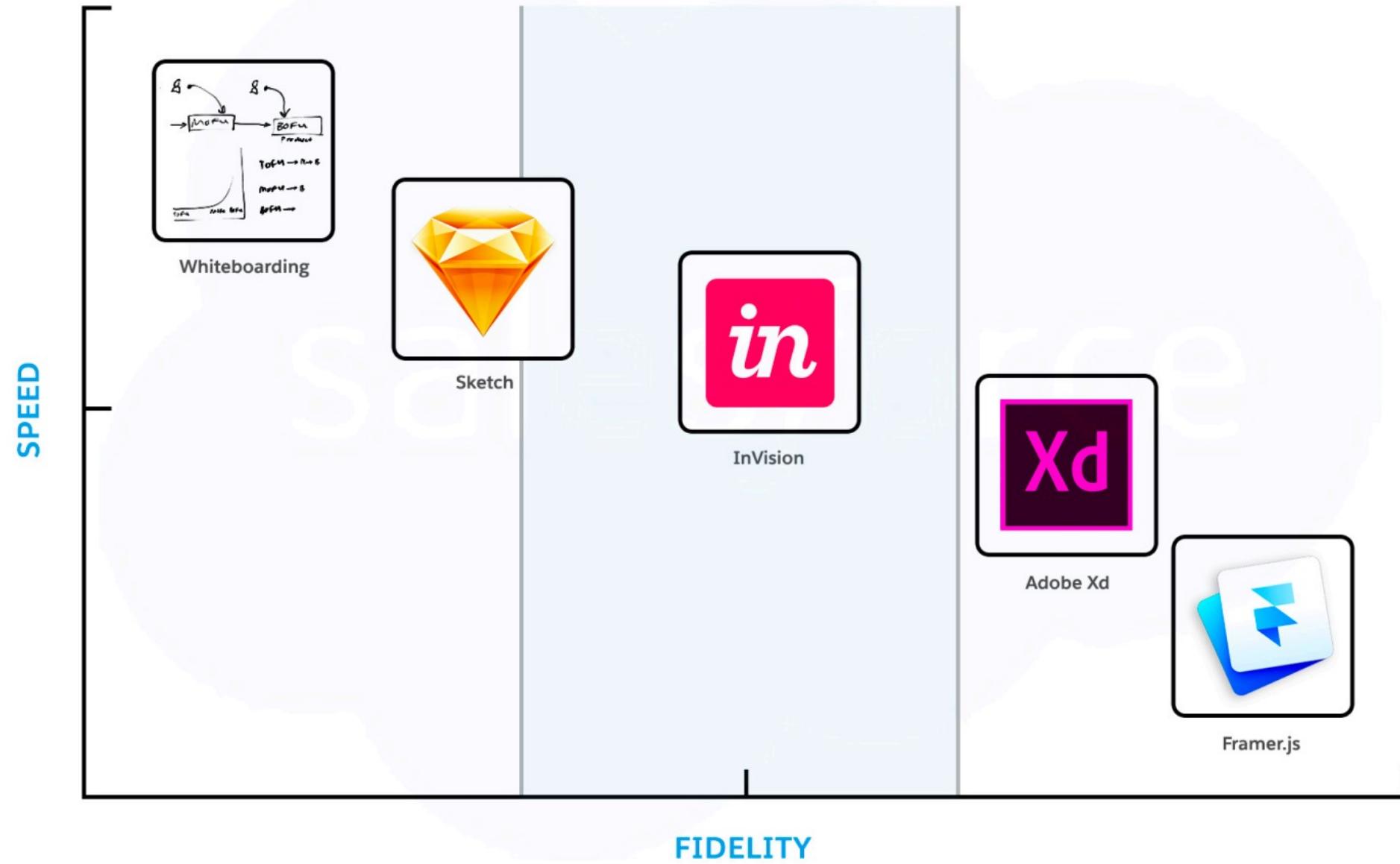
A comparison diagram illustrating the difference between Low Fidelity and High Fidelity design. The word "Low" is on the left and "High" is on the right, separated by the word "vs.". Below "Low" is the low-fidelity wireframe from the previous slide. Below "High" is a screenshot of a professional website for "Ross Popoff-Walker, UX & Product Designer". The website includes a header with the designer's name and title, a bio, a photo, a "Contact Me" button, and a "My Past Work" section featuring three projects: "The Tin Fox Company (startup)", "Nike.com Site Redesign", and "PeaceMaker: A Game for Peace (2005)".



Design, planning and early iterations

Clickable, mid-fidelity, visually conceptualized

Final stage interactions, presentation-ready

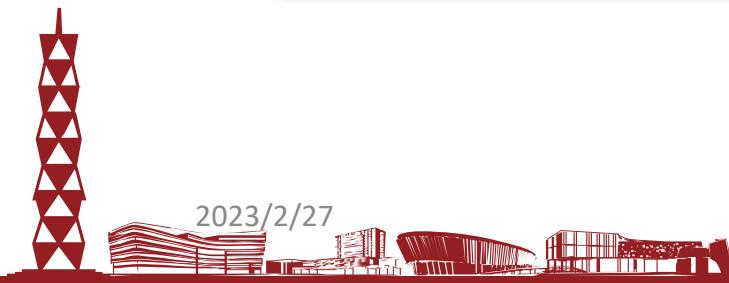


Low-Fidelity

Medium-Fidelity

High-Fidelity

Prototyping Process



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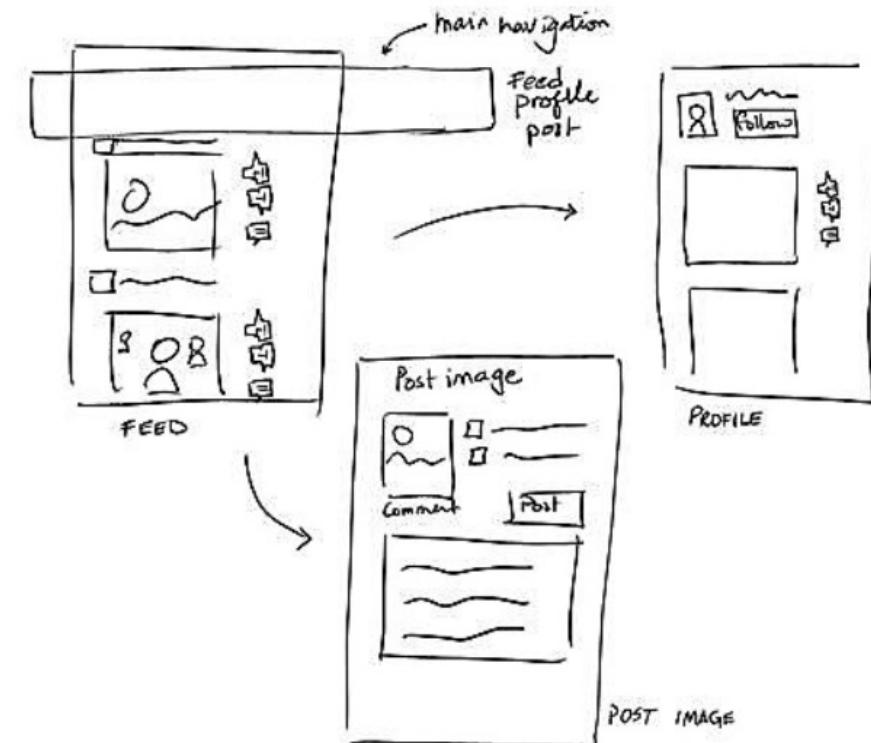
(Low) Sketch Prototype

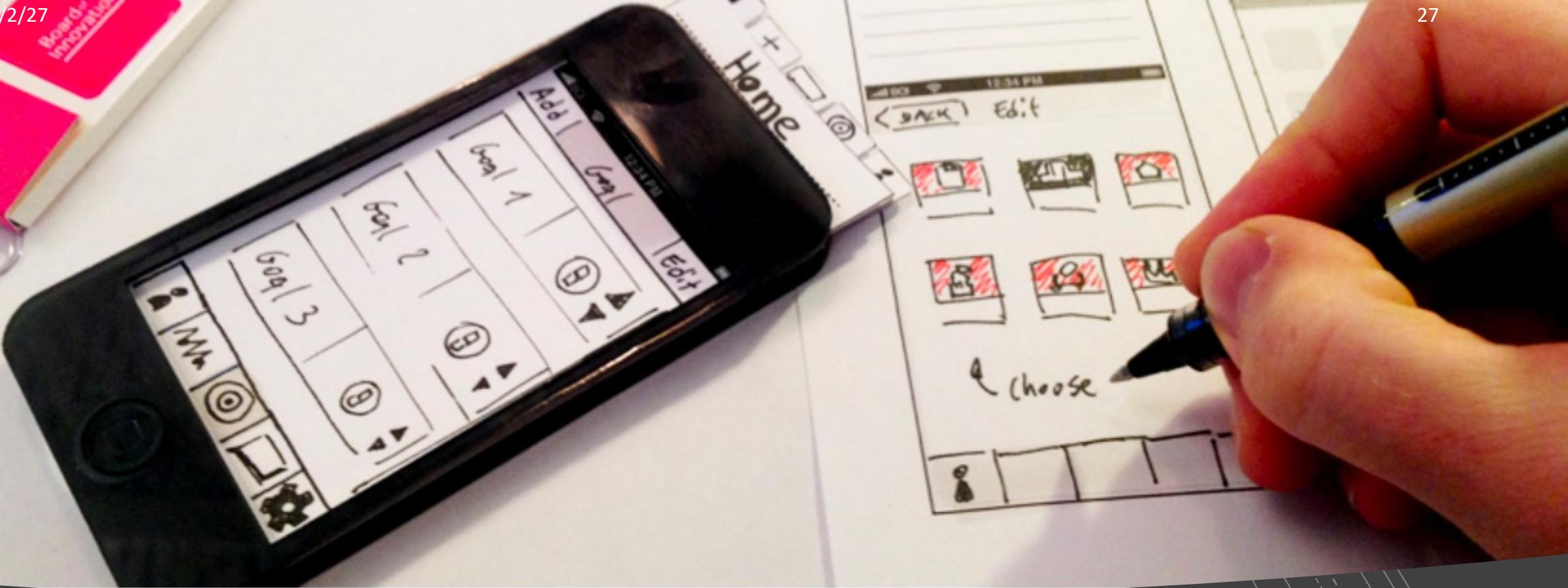


- Quick and Dirty (First Round)
 - Paper and pen only
 - <3 mins

(Low) Sketch Prototype

- Content
 - Pages of functionalities
 - Interaction flow via arrows
 - Text labels and descriptions, whenever necessary
 - Usage scenario, if any





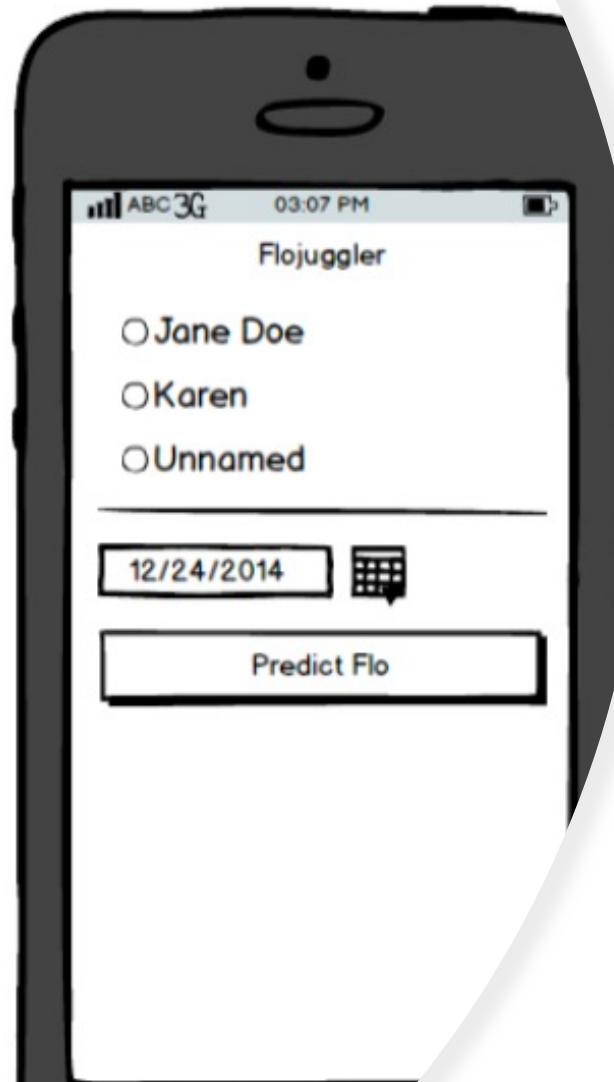
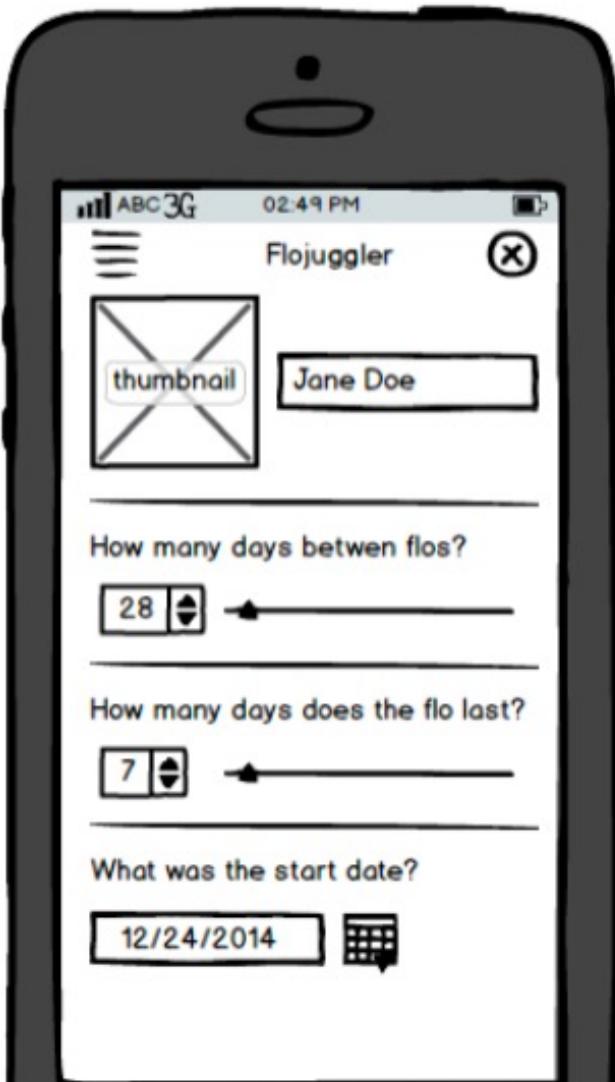
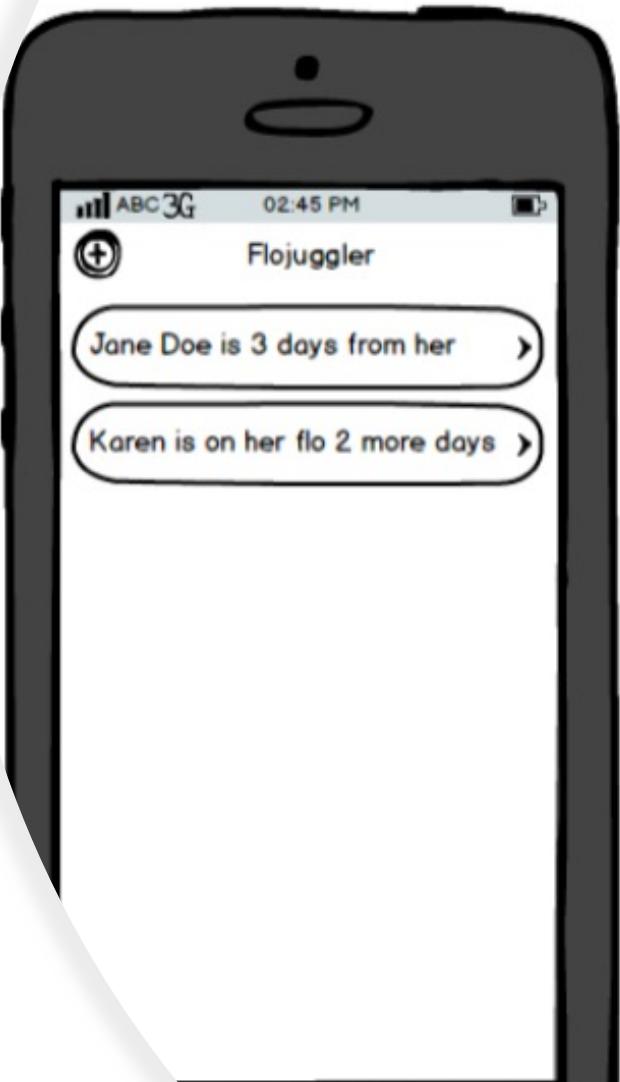
(Low) Paper Prototyping

- Some Interactivity
 - Interface evaluation
 - User feedback

(Low) Paper Prototyping

- Content
 - Form factors
 - UI components
 - Functions
 - Work flow
 - ...





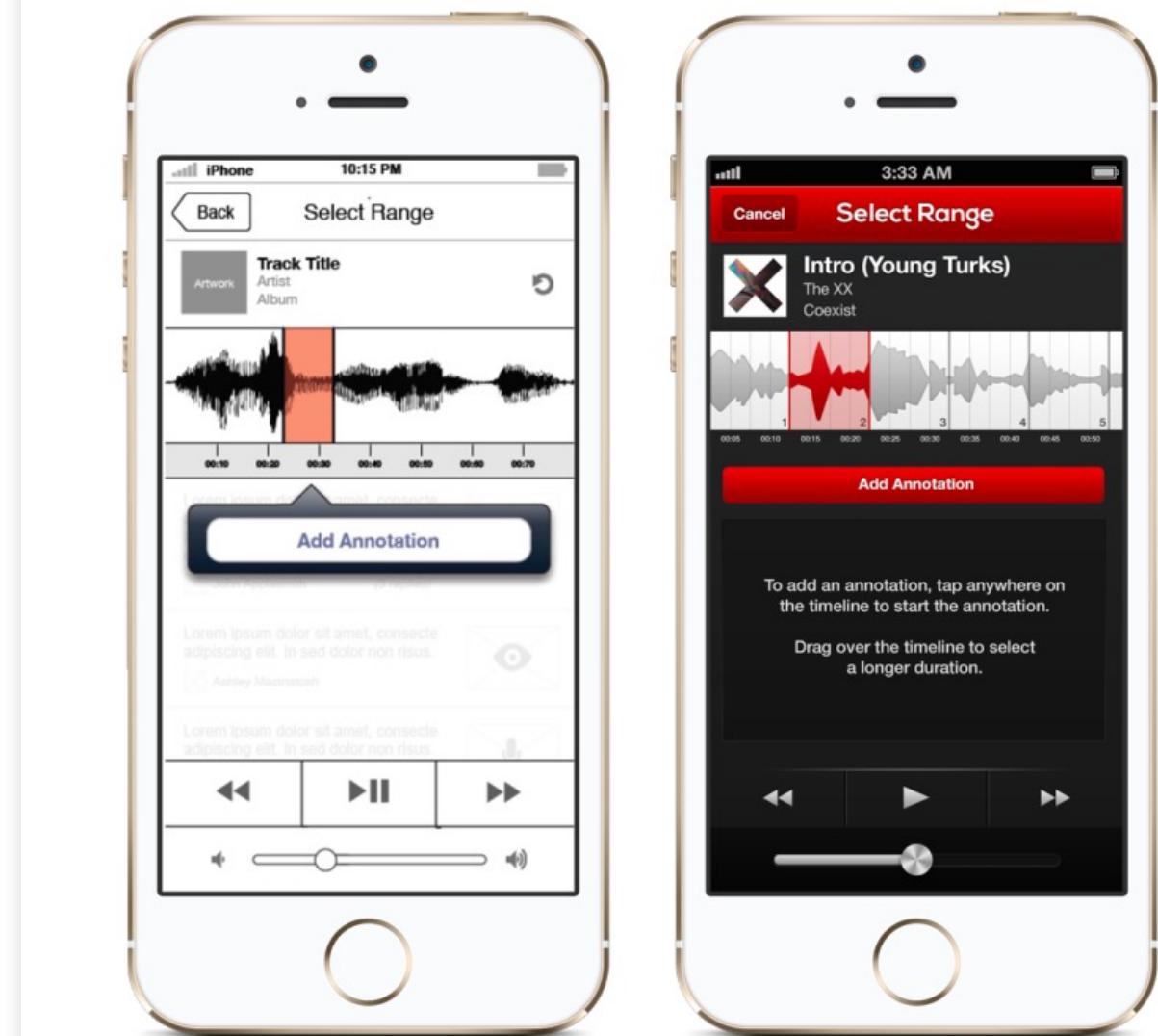


Prototyping Process



(Medium) On-Screen Interactive Wireframe

- Simulate “Real” Experiences
 - Look and feel
 - User testing



(Medium) On-Screen Interactive Wireframe

- Content
 - Form factor
 - UI components
 - Functions via hyperlinks
 - Interaction via hyperlinks





Create



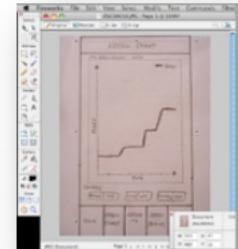
Sketch



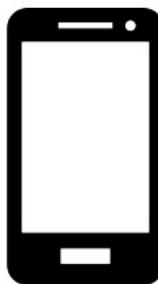
Digitize



<https://balsamiq.com/>



<http://www.photoshop.com/>



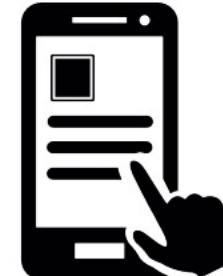
Edit



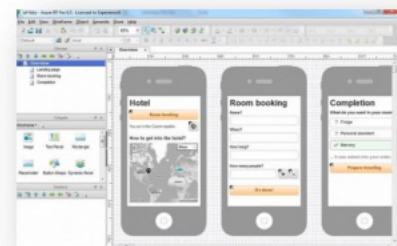
<https://popapp.in/>



Test

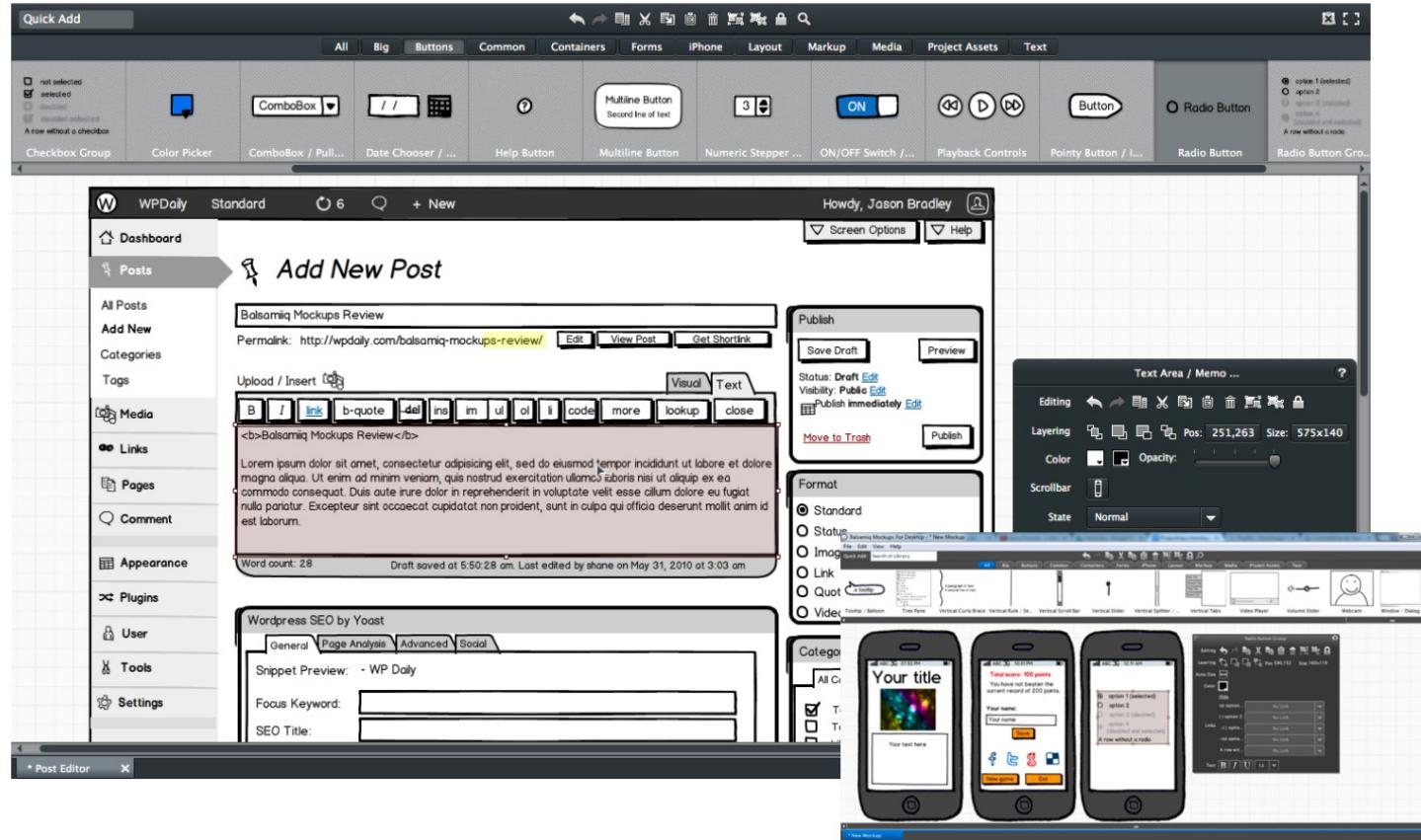


Compose



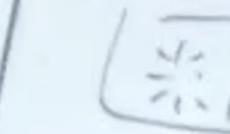
<http://pencil.evolus.vn/>

Digital Mockup / Wireframe Tools



<https://balsamiq.com/products/mockups/>

You can now drag picking or multiple picking at a time



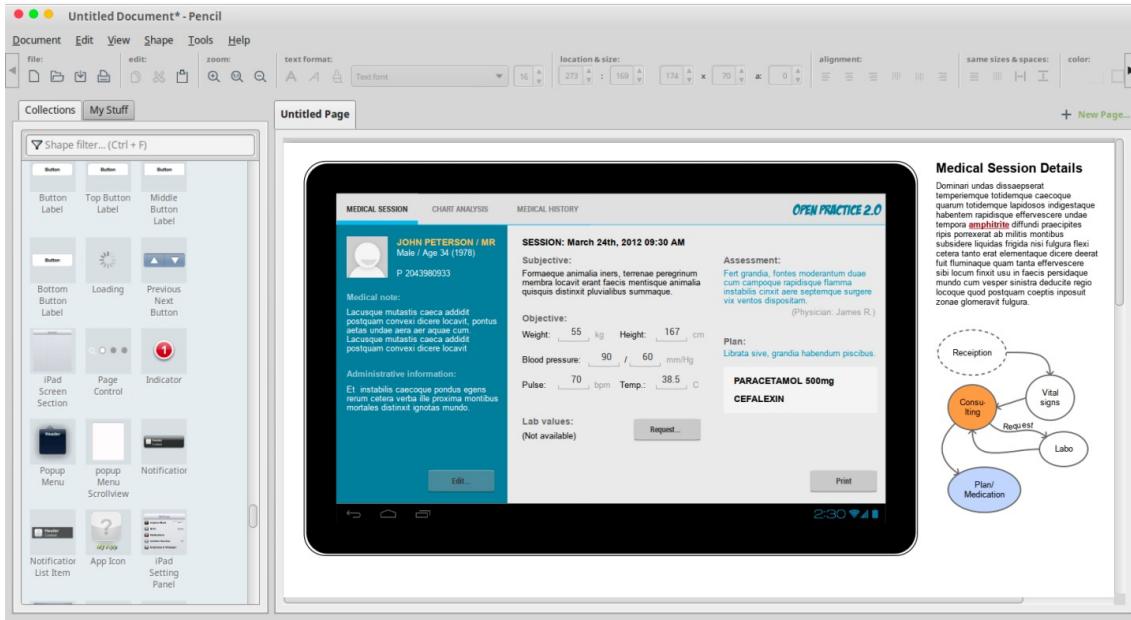
DOP

X

500
startups

Cancel

Digital Mockup / Wireframe Tools



- An open-source GUI prototyping tool that's available for ALL platforms.
- Pencil is built for the purpose of providing a free and open-source GUI prototyping tool that people can easily install and use to create mockups in popular desktop platforms.

Digital Mockup / Wireframe Tools

Bingo Card Collections:
All Bingo Cards are collect and combined. The Player can win prizes by spelling words or crea their completed bingo

Bingo Ball:
In our Bingo example, the collect Bingo Balls and all

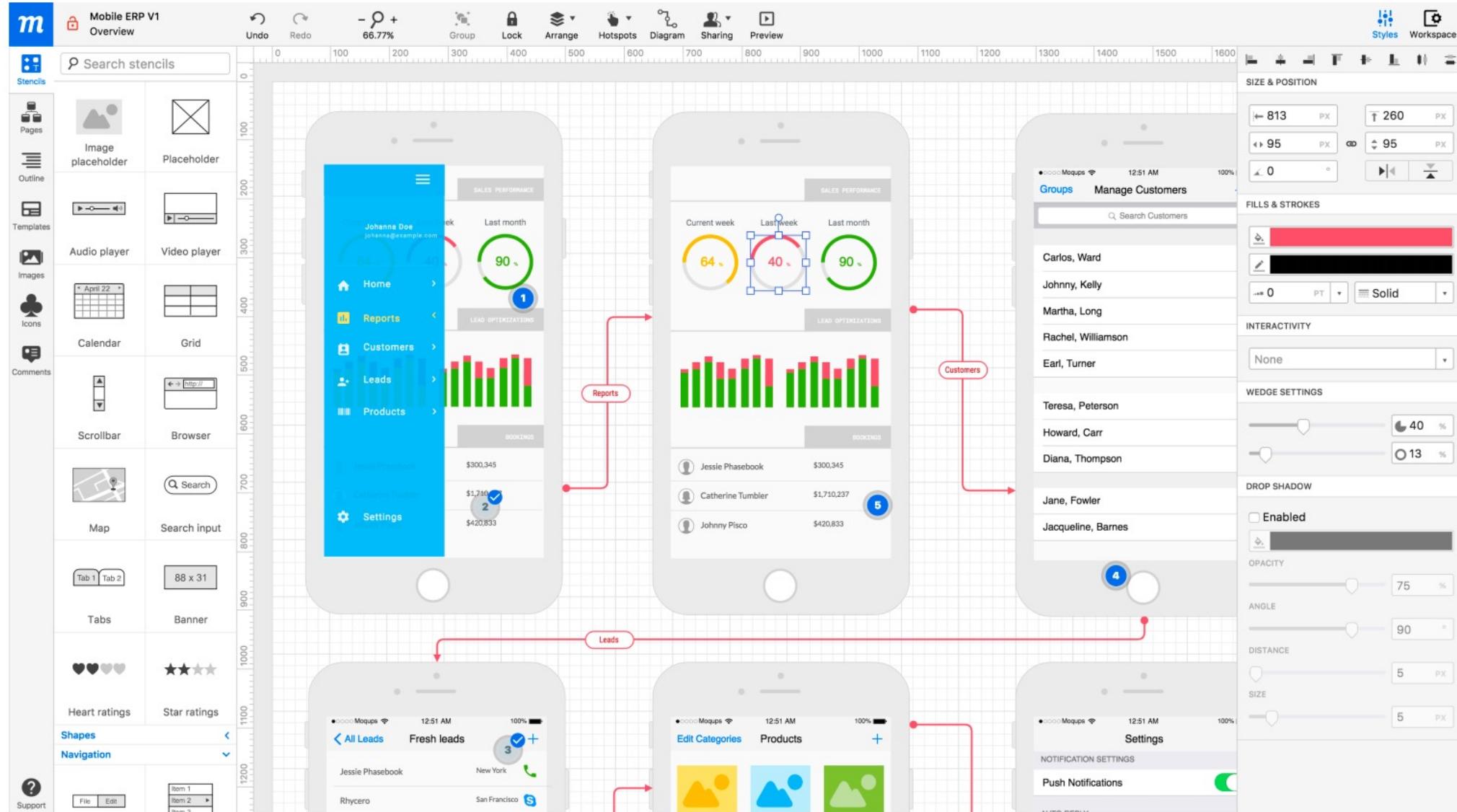
Drag & Drop Flow

Android
Axure RP Widget library

Digital Mockup / Wireframe Tools



上海科技大学
ShanghaiTech University



2023/2/27

<https://moqups.com>

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Prototyping the hardware

- Physical Prototypes
 - Essential for designing systems with hardware components (mobile, kiosks, wearable ...)
- Low Fidelity
 - Use cheap, flexible materials: cardboard, foamcore, wood, plastic
- Higher Fidelity
 - Use techniques like 3D printing
 - More tangible, emotional, powerful experience

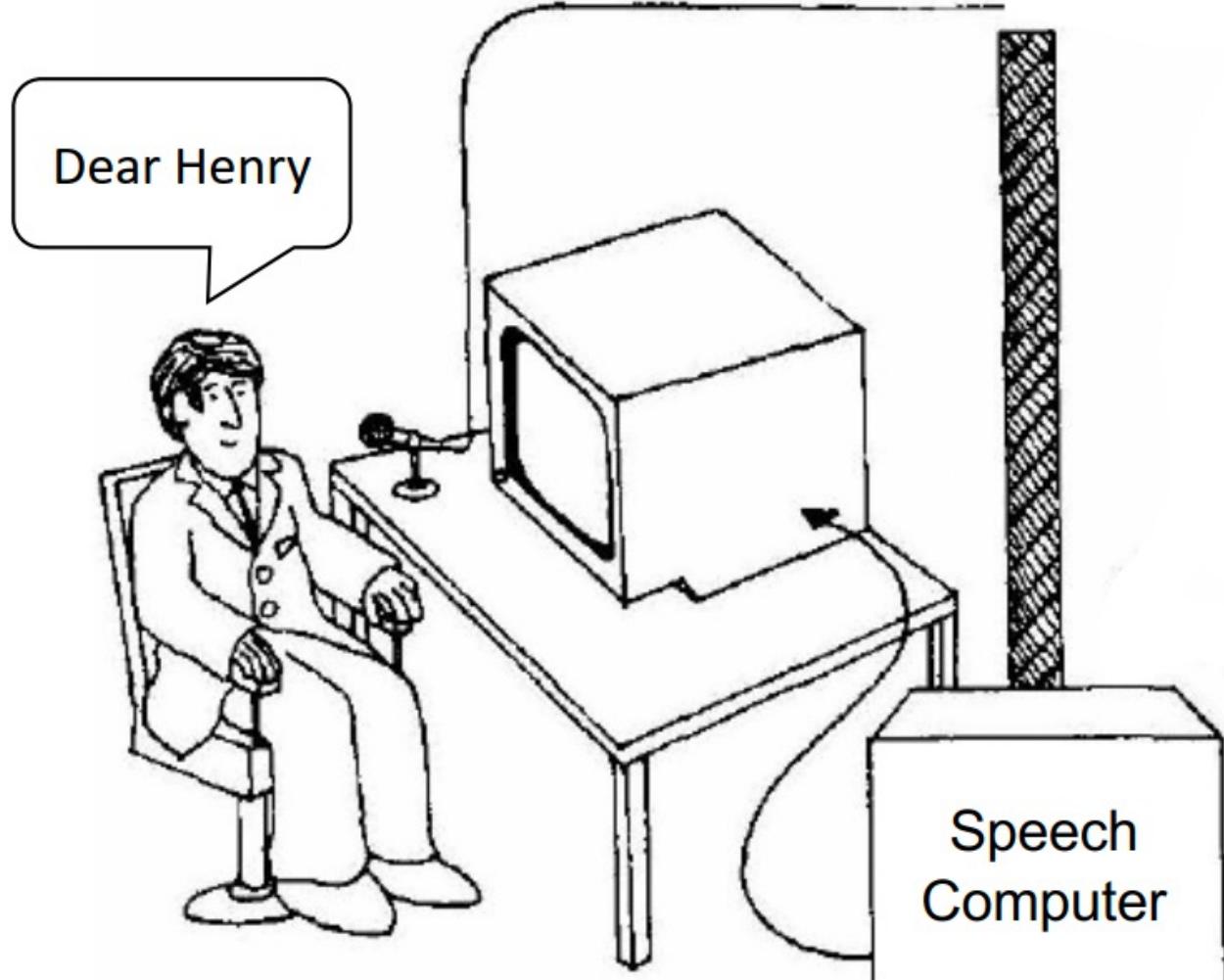


Prototyping the Functionalities

"The Voice Editor" (speech-to-text)

2/27/23

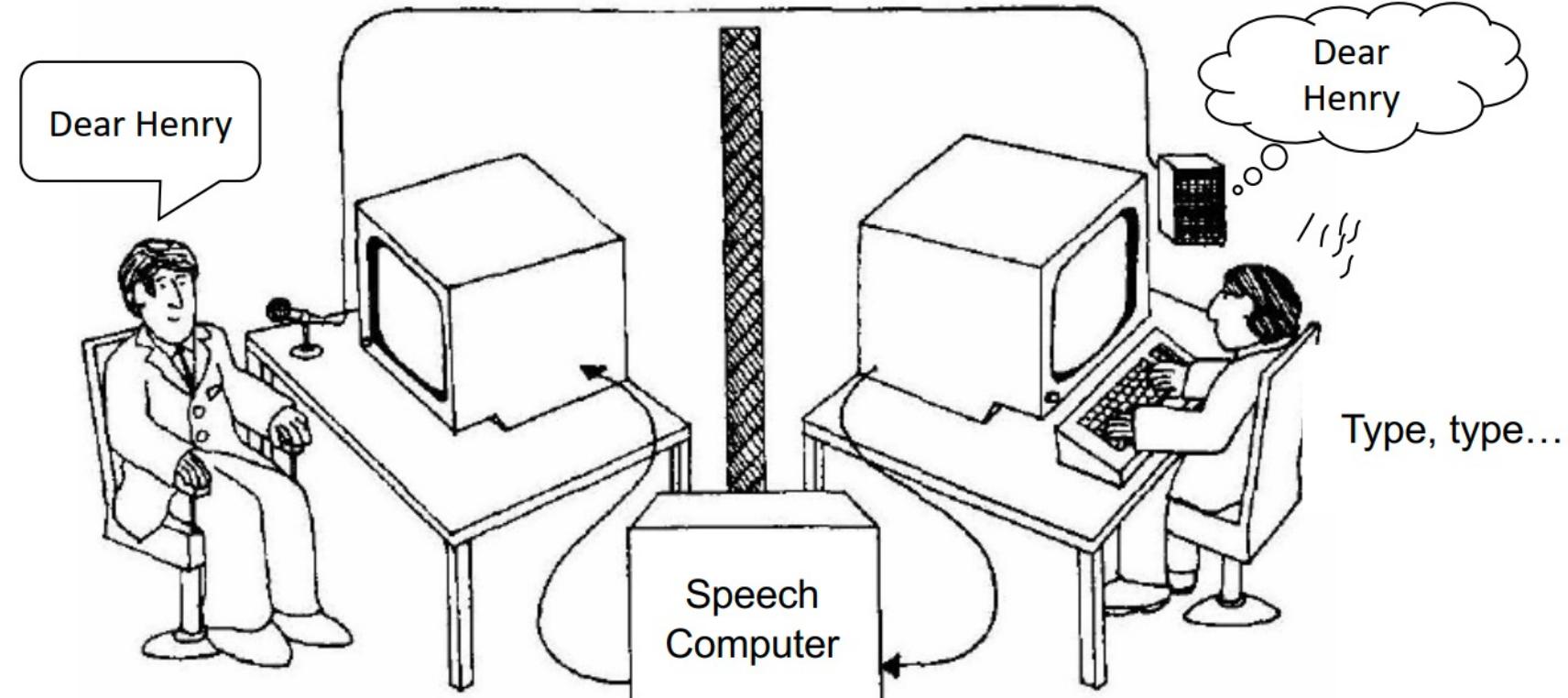
What the user sees



Prototyping the Functionalitie s

What the user sees

The wizard



“The Voice Editor” (speech-to-text), IBM 1984

Wizard of Oz

- Use (hidden) humans to imitate complex automated process
- Allows for testing and iterating on user experience before investing effort in technical innovation
- “Would people actually want this?” before “Can we do this?”
- Useful for hardware UIs, social software UIs, AI, etc.



Wizard of Oz

- Up until the point the wizard is discovered, the thoughts, feelings, the actions of Dorothy and the others were all genuine
- They were genuinely experiencing what it would be like to talk to a powerful and terrible wizard



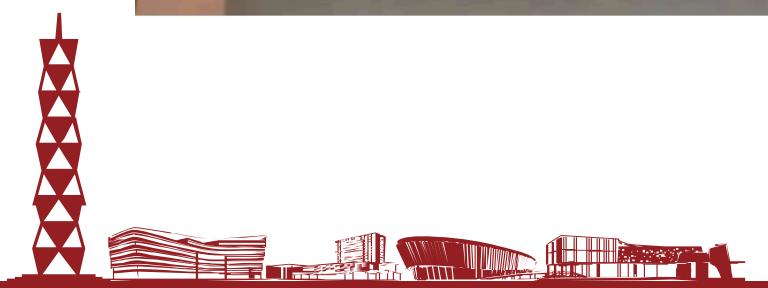
Prototyping Technique

- Wizard of Oz – Person simulates and controls system from “behind the scenes”
 - Use mock interface and interact with users
 - Good for simulating system that would be difficult to build
 - Method
 - Behavior should be algorithmic
 - Good for voice recognition systems
 - Advantages
 - Allows designers to immerse oneself in situation
 - See how people respond, how specify tasks

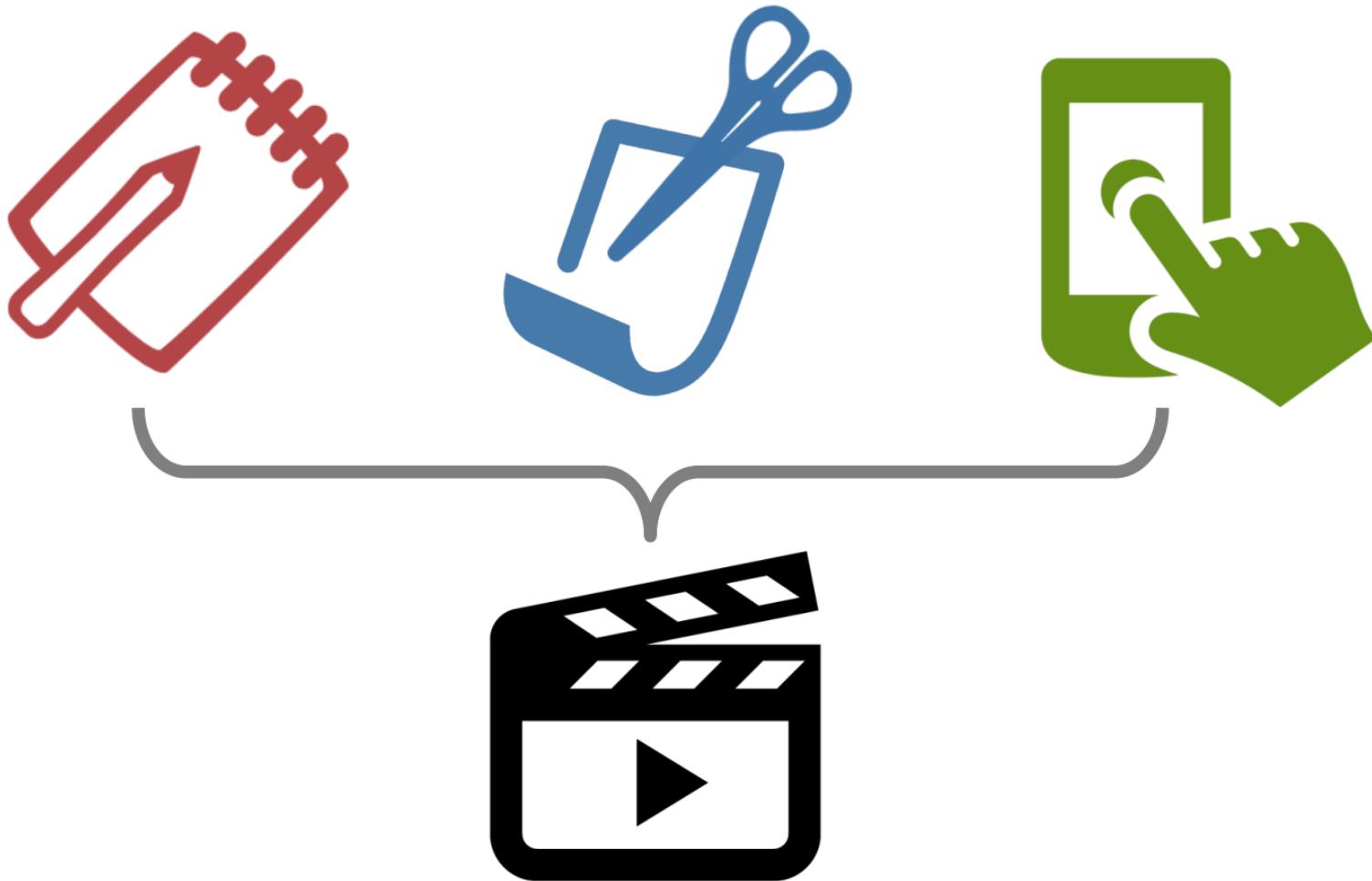




“Artificial” Intelligence



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Prototyping the Experience

Task. The structured set of activities or high-level actions required to achieve a high-level user goal.

what a user wants to do

Task-based Design & Evaluation

- Real tasks customers have faced / will face
 - collect any necessary materials
- Do your tasks support the problem you are solving?
- Mixture of simple & complex tasks
 - simple task (common or introductory)
 - moderate task
 - complex task (infrequent or for power customers)

What Should Tasks Look Like?

- Say what customer **wants** to do, but **not how**
 - allows comparing different design alternatives

Good (Task)



Tony is visiting London and wants to find the pub that his friend told him about. He is walking down the street using his phone to navigate to the place that he has previously looked up.

What Should Tasks Look Like?

- Say what customer **wants** to do, but **not how**
 - allows comparing different design alternatives

Bad (this is a *Task flow*)



Tony clicks on the Charing Cross Pub icon and selects “directions to” as he walks down the street.

What Should Tasks Look Like?

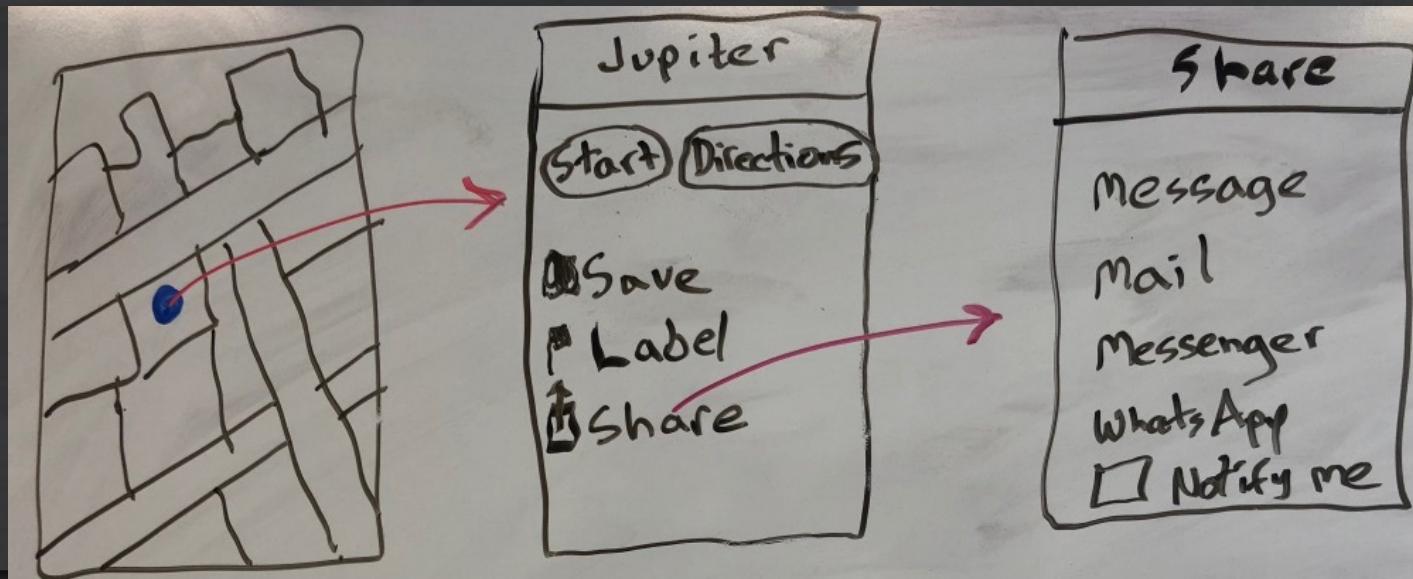
- Say what customer **wants** to do, but **not how**
 - allows comparing different design alternatives
- Be specific – stories **based on facts!**
 - say who customers are (use POVs or personas or profiles)
 - design can really differ depending on who
 - name names (allows getting more info later)
 - characteristics of customers (job, expertise, etc.)
 - forces us to fill out description w/ relevant details
- Tasks should usually describe a **complete goal**
 - forces us to consider how features work together
 - example: phone-in bank functions

Using Tasks in Design

- Write up a description of tasks
 - formally or informally
 - run by customers and rest of the design team
 - get more information where needed
- Rough out an interface design
 - discard features that don't support your tasks
 - or add a real task that exercises that feature
 - major screens & functions (not too detailed)
 - hand sketched
- Produce **task flows** for each task
 - what customer has to do & what they would see
 - step-by-step performance of task
 - illustrate using storyboards (AKA wireframes)
 - sequences of sketches showing screens & transitions

Task Flows Show How to Do the Task

- Task Flows are *design specific*, tasks aren't
- Task Flows force us to
 - show how various features will work together
 - settle design arguments by seeing examples
- Show users task flows to get feedback



Recap

HMW: *How might we make the wait the most exciting part of the trip?*

Solution: An app that leads kids on a scavenger hunt adventure around the airport.

What is a task?

SIMPLE: hunt for treasure

MODERATE: set up a custom scavenger hunt for your kids

COMPLEX: compete against other kids/families

What ← → How

Task ← → Task
Flow

Concept ← → Video
Video
Prototype



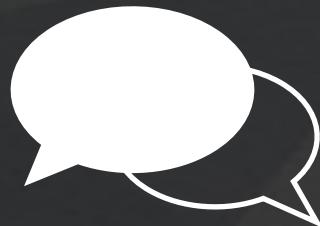
Video Prototyping

- Video prototyping allows you to prototype functionality without needing to be physically present
- Paper prototypes and wizard-of-oz require you to be around to simulate functionality
- A video prototype frees you from that, but constrains you to a limited scenario
- You can also simulate this through a stitched together set of images (slow-motion)

Video Prototype Characteristics



Paper Prototypes, Existing Software or Projected Images as a background



Optional Narration, Conversation preferred
narrator explains events & others move images/illustrate interaction while actors
perform movements – viewer expected to understand w/o voice-over



Usually fixed prototypes, but also used in open prototypes
e.g., live video as Wizard of Oz tool & 2nd camera to capture



With **good storyboards**, a good short film can be shot in 1-2 hours

Design method toolkit



Enrich your design process. Plan and execute research and creation.

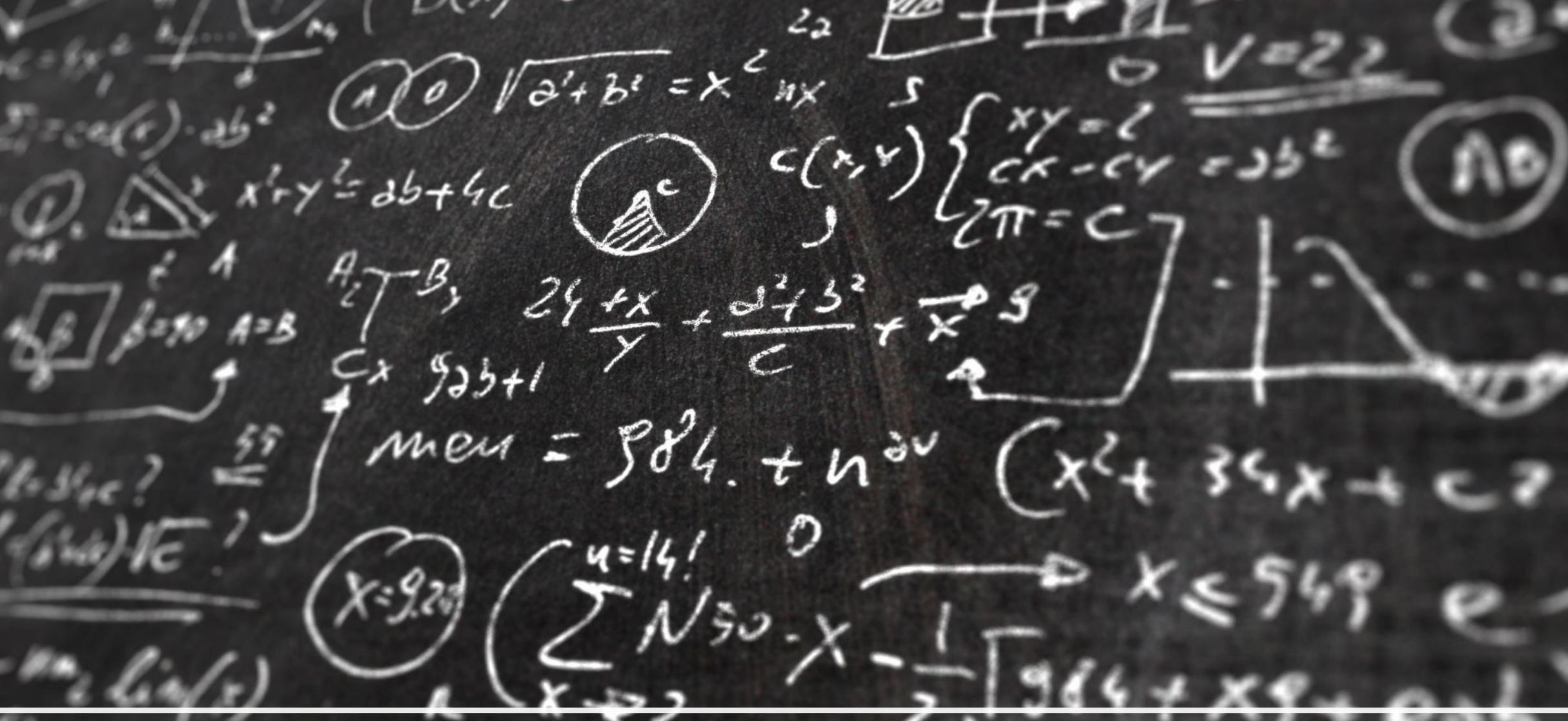


Get to know the user and the context. Prototype and test your design within short iterations.

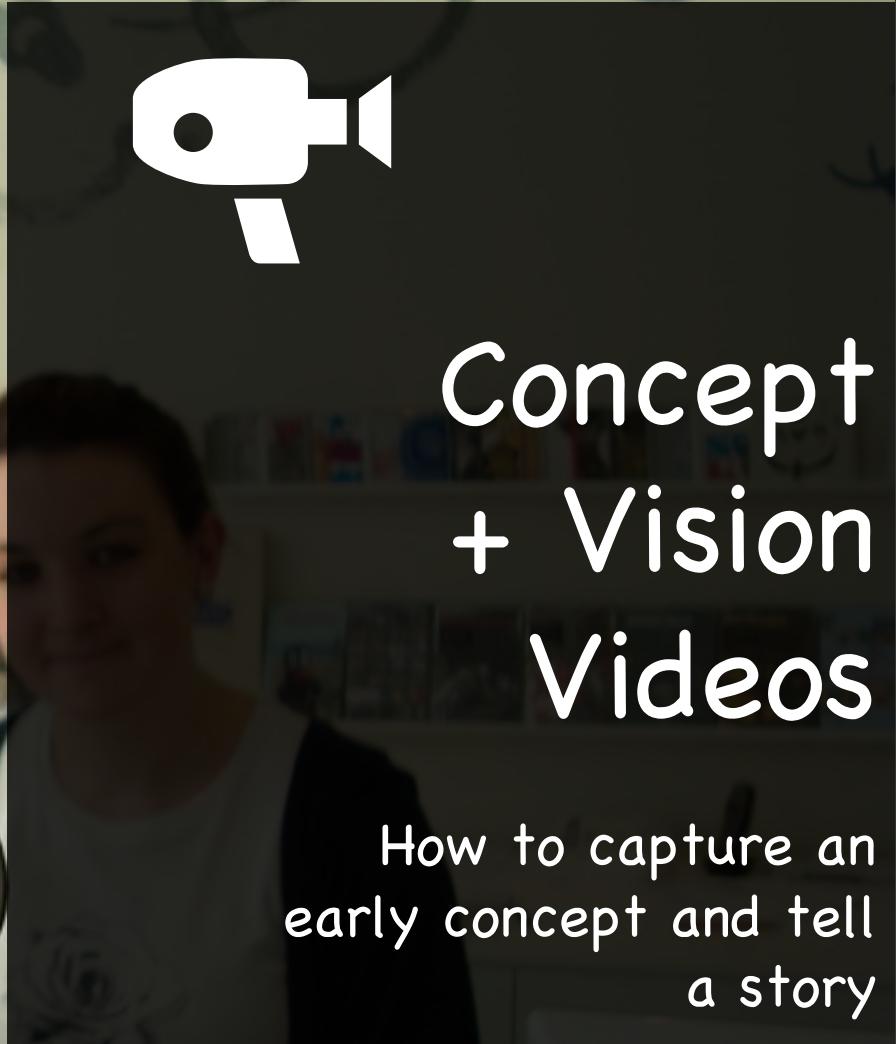


The design method cards are perfect for lean, agile environments and multidisciplinary teams.





Video Prototype Examples



Concept
+ Vision
Videos

How to capture an
early concept and tell
a story



It's About Details

Key Pieces of Successful Concept Videos



People
(roles)

Kid & parents



Context
(scene)

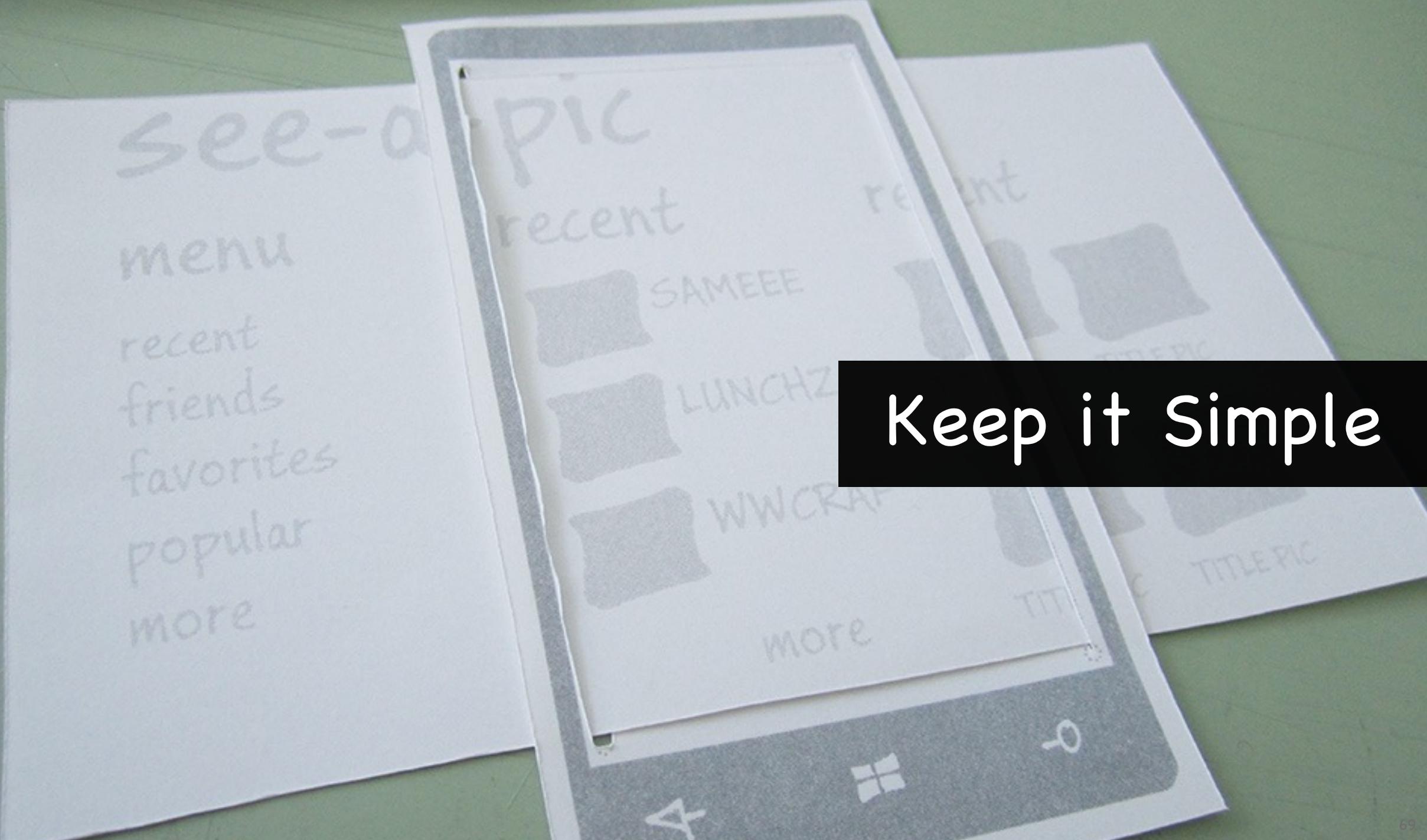
Wants to use force, but failing
Upper middle class - VW land



The Solution
(props)

Dad's car lets you remotely
turn it on. The force is alive!

Keep it Simple





Use what you **know** and what you **have**

10) $\sqrt{a^2 + b^2} = x$ 2.2 ~~P.H.P.H.~~ $V=22$
 11) $x^2 + y^2 = ab + bc$ No
 12) $c(x, y) \left\{ \begin{array}{l} xy = c \\ cx - cy = ab \\ 2\pi = c \end{array} \right.$
 13) $\frac{2x}{y} + \frac{y^2 + 3^2}{c} + \frac{x}{a} = g$
 14) $\text{men} = 584. + n^{30} (x^2 + 34x + c)$
 15) $x = 920$ $\sum_{n=1}^{u=14!} N_{30} \cdot x - \frac{1}{2} \sqrt{964 + x^2} = 0$ $\Rightarrow x \leq 549$

Concept Video Examples



To Do LIST



WAKE UP EARL



Making a Concept Video



Define

What is the **message** of the film?

What is the **value proposition** you offer?

Can you describe it in a few lines?

Make a basic **plot**

Discuss plot ideas until you get a few that really make sense, decide characters

Storyboard

Turn these into multiple storyboards of scenes to plan how you will film it

* note: **not** UI storyboards!

1 2
3 4

Storyboarding

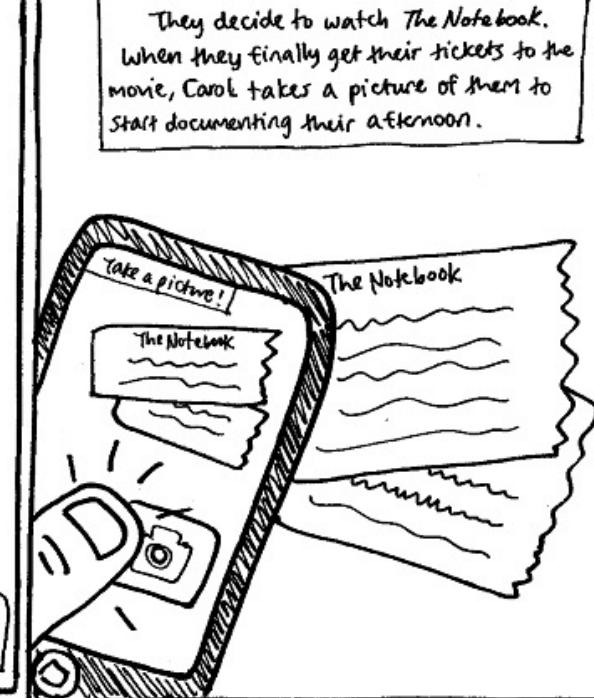
Use sticky notes so scenes can be moved

Include lines to be spoken if necessary

Use appropriate angles

1 2
3 4

Storyboarding





Storyboarding

SCENE 4

Words On Screen: Investigate

Voiceover: The mitochondria are the powerhouse of the cell

SHOT 1

beautiful flower, child's eyes are wide looking at it head is cocked to the side, inquisitive

SHOT 2

tablet pans into view, image on screen shows the cellular structure of the plant





Shoot your Film

Get as many shots (angles, close ups, distance...) as you can! you never know what might be useful later.



If you choose to use music

Now is a good time to pick some songs. Music can be very powerful if chosen well. (see Vimeo for music you can use free)



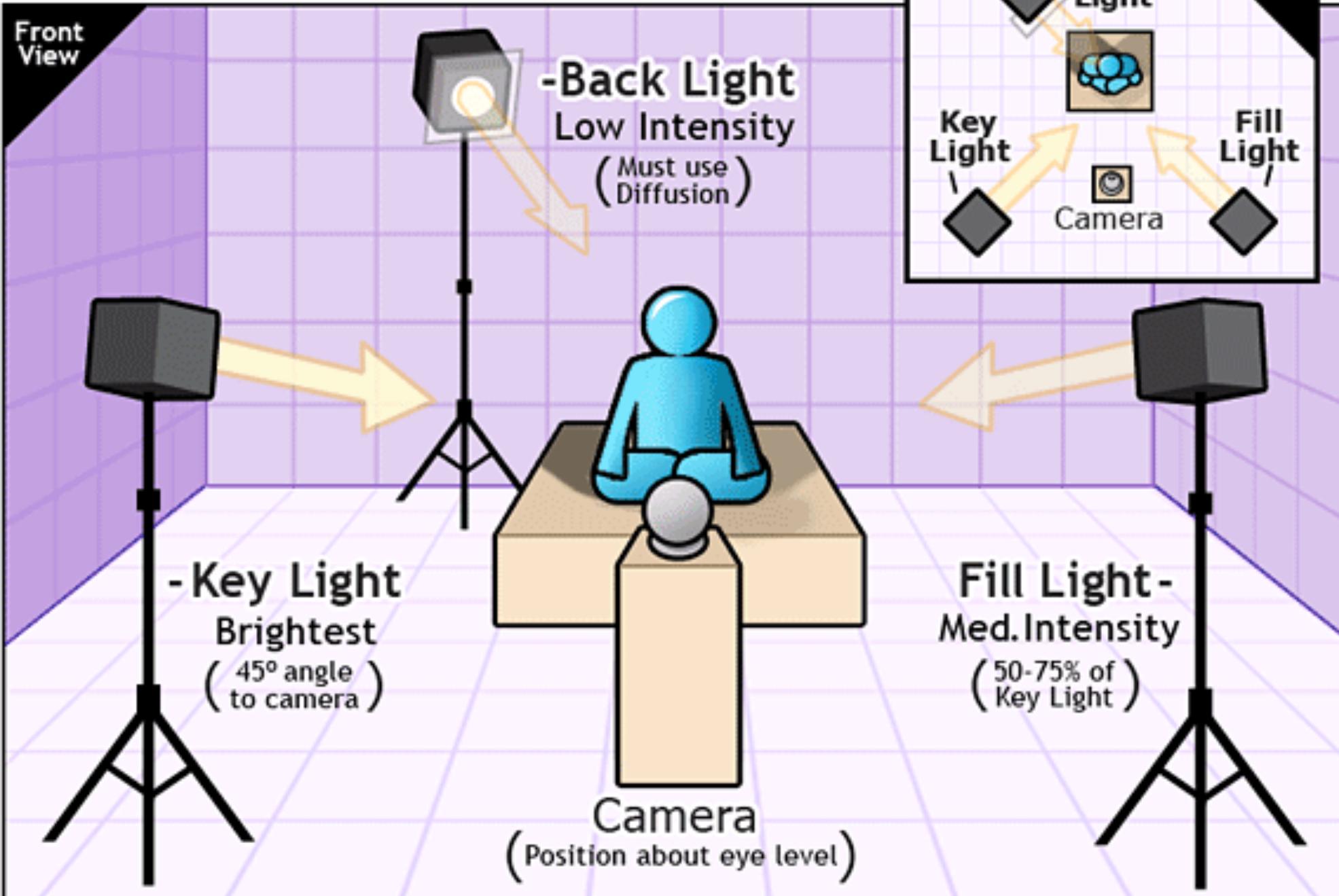
Edit your Film

Use your storyboard! This part should be simple if you have storyboarded correctly.

Lighting

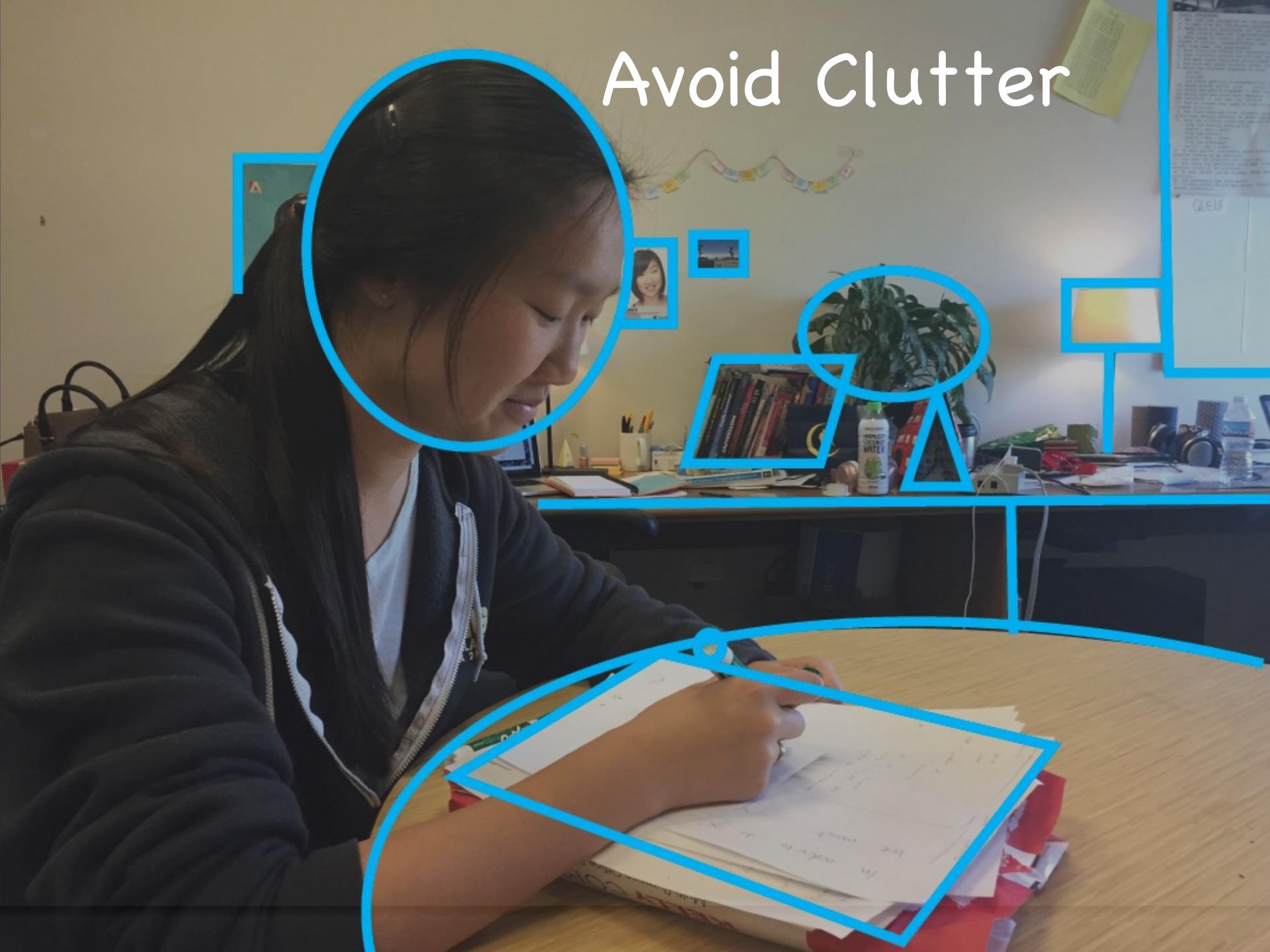


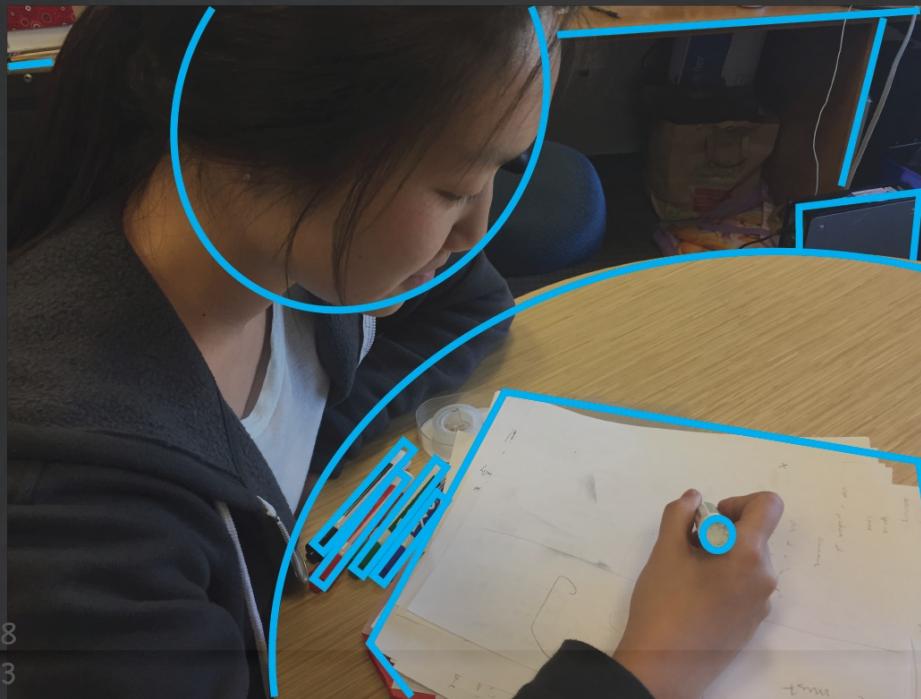
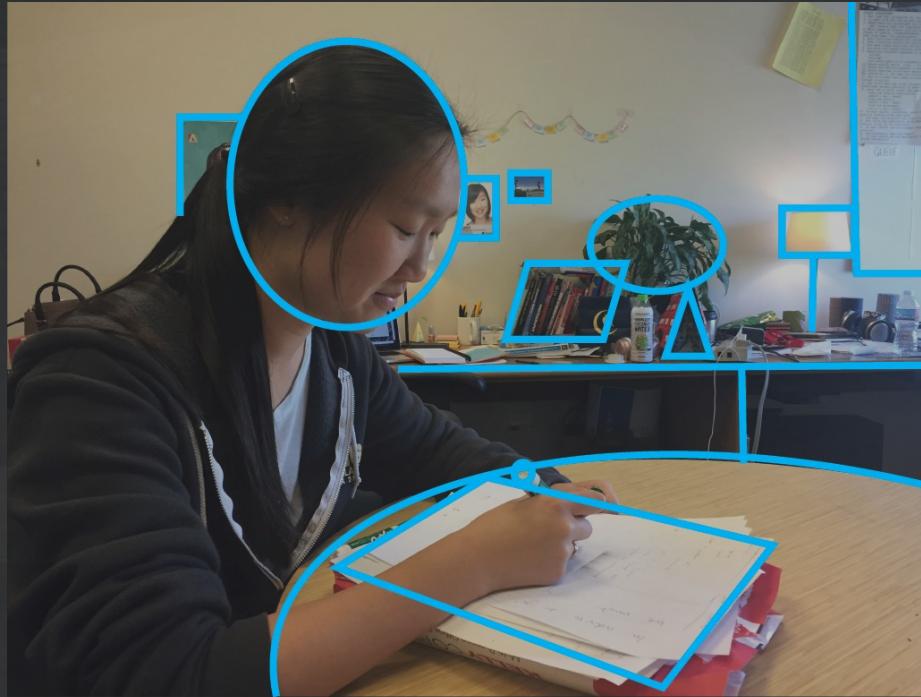
Basic 3 Point Lighting Setup





Avoid Clutter







People

Use Close-Up shots

Capture emotion

Avoid conversation
(This is the hardest to get right and ends up distracting)

Use the right person for the role-ask friends



Plan your story –
Storyboard it.

Is the story believable?

Film multiple angles

Film longer than the
shot needs (you can
always cut down)

A photograph showing the back of a person with long, reddish-brown hair. They are wearing a dark jacket and are looking down at a large, metallic, angular structure that looks like a piece of industrial equipment or art. The lighting is dramatic, with strong highlights and shadows.

The Solution

Wow Effect

Show your solution at it's best, save the best for last

Subtlety

Show how the solution makes the user feel – subtly

Don't 'Sell' it

Don't tell people to use your solution, show them why

Summary

- Video prototypes allow us to quickly communicate how a user will **use** a design
- Concept videos set up more of **the story** of use



Low-Fidelity

- Sketch & paper

Medium-Fidelity

- Interactive page

High-Fidelity

- Partial functions

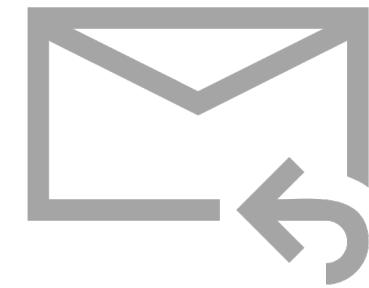
Recap





Quan Li

Questions?
Thank you 😊



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