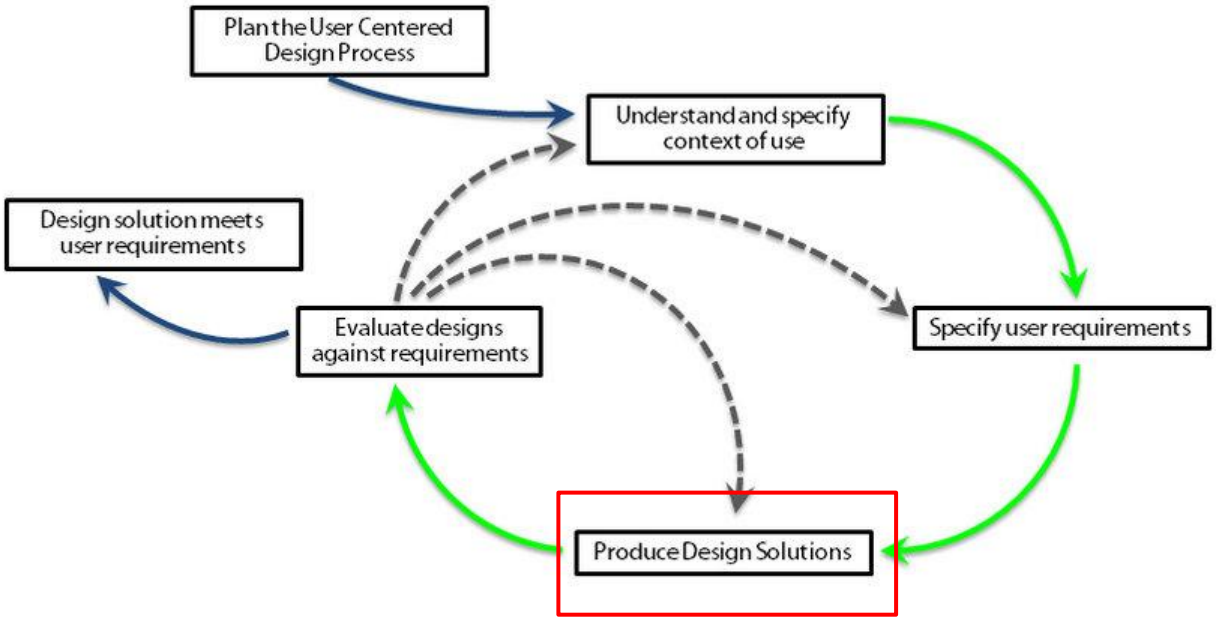
SENG 310
Lecture 10 - June 8th, 2023

Slide credits: Prof. Sowmya Somanath and Prof. Charles Perin

RECAP - PROTOTYPING

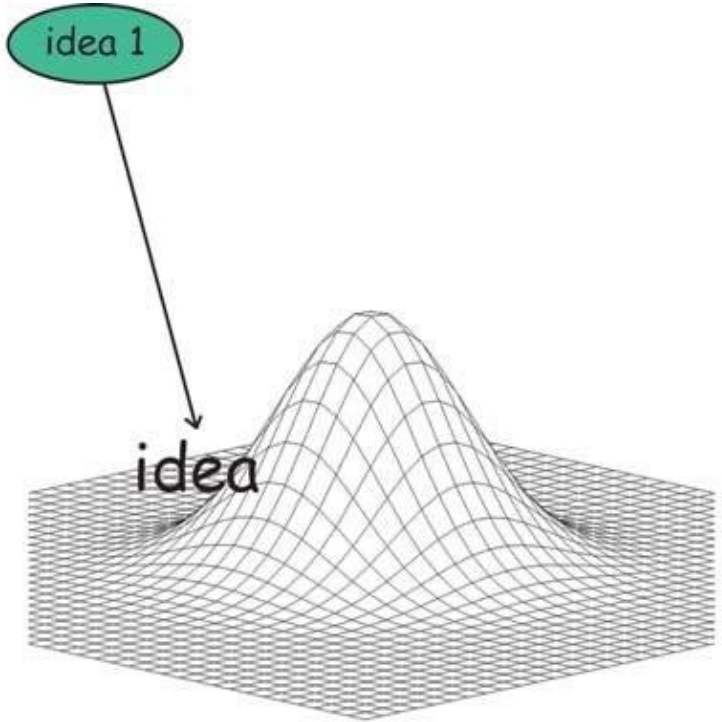
HUMAN-CENTERED DESIGN PROCESS



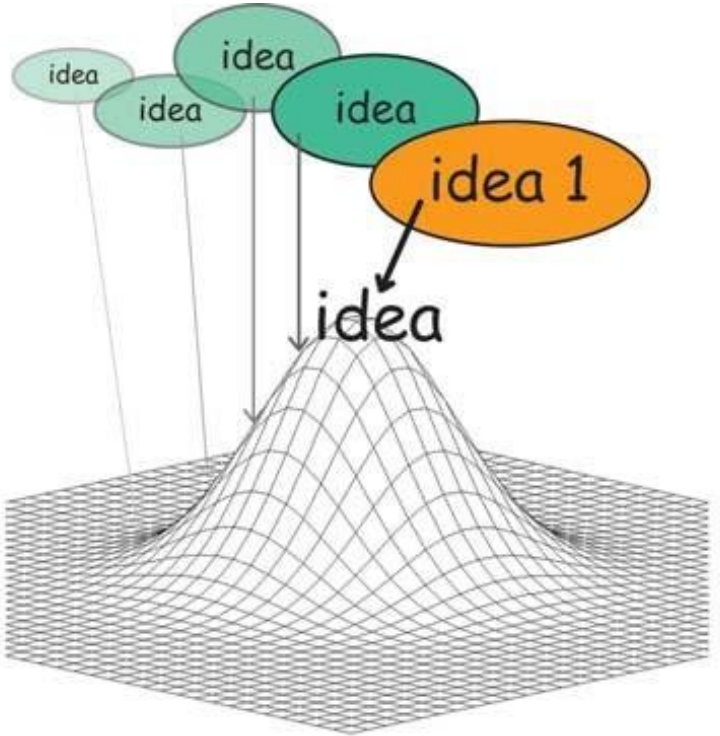
https://www.researchgate.net/publication/283963125/figure/fig1/AS:671513787248651@1537112771357/The-User-Centered-Design-Process-according-to-DIN-EN-ISO-9241-210-8.jpg

GETTING THE DESIGN RIGHT

Generate an

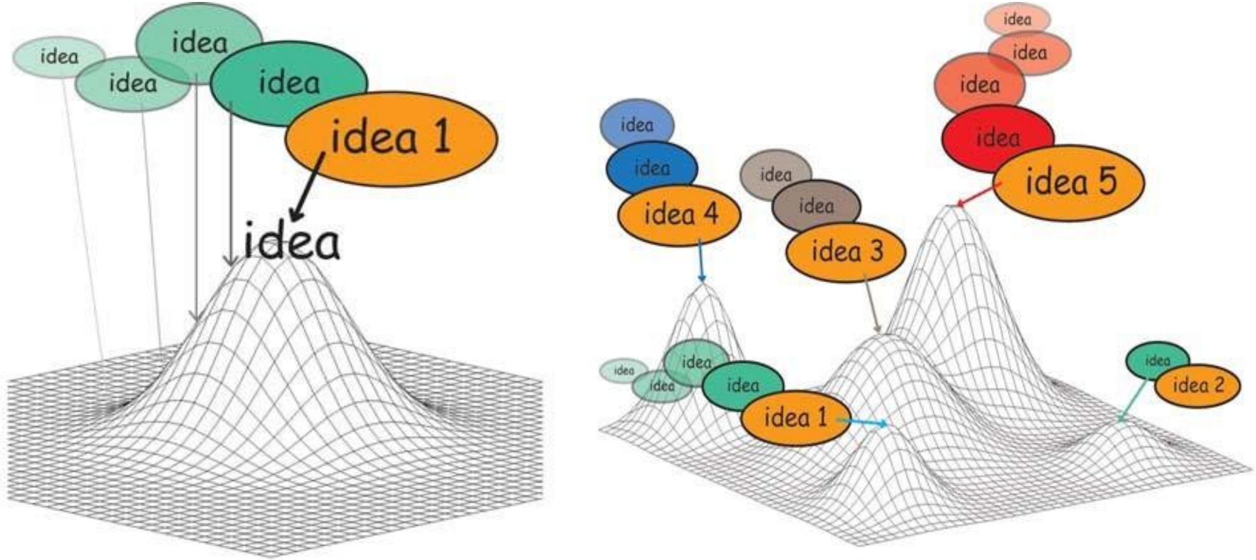


Iterate on the



GET THE RIGHT DESIGN FIRST!

Is it the best idea?
Issue: We often fixate on the first idea. Local maximum: hill climbing issue



PROTOTYPE

A prototype is a manifestation of design **that people can interact with and explore suitability**

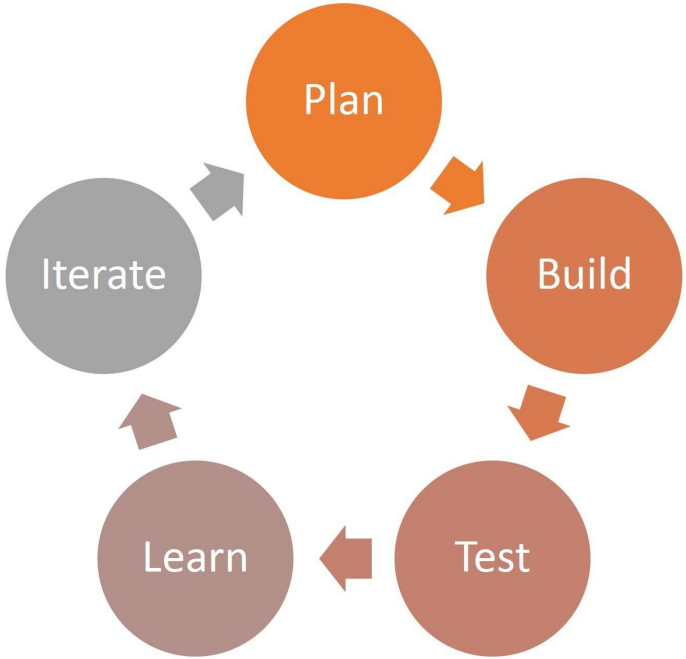
There is a bit more effort involved in producing prototypes and they are less disposable

WHY PROTOTYPE?

Encourage reflection, The Reflective Practitioner

Answer research questions e.g., test requirements, user testing, test design aesthetics

Support designers in choosing between alternatives



PERSONAS

Persona is a user archetype you can use to help guide decisions about product features, navigation, interactions, and visual design

Is a practical interaction tool and was proposed by Alan Cooper in 1998

PERSONA CONSTRUCTION

In most cases, personas are synthesized from a series interviews or other primary research methods involving real people

Then captured in descriptions that include behavior patterns, goals, skills, attitudes, and environment, with a few fictional personal details to bring the persona to life.

For each UI you design you will usually have a small set of personas, and one of whom is the primary focus for the design.

Adlin, T., & Pruitt, J. (2010). *The essential persona lifecycle: Your guide to building and using personas*. Morgan Kaufmann.

PERSONA CHARACTERISTICS

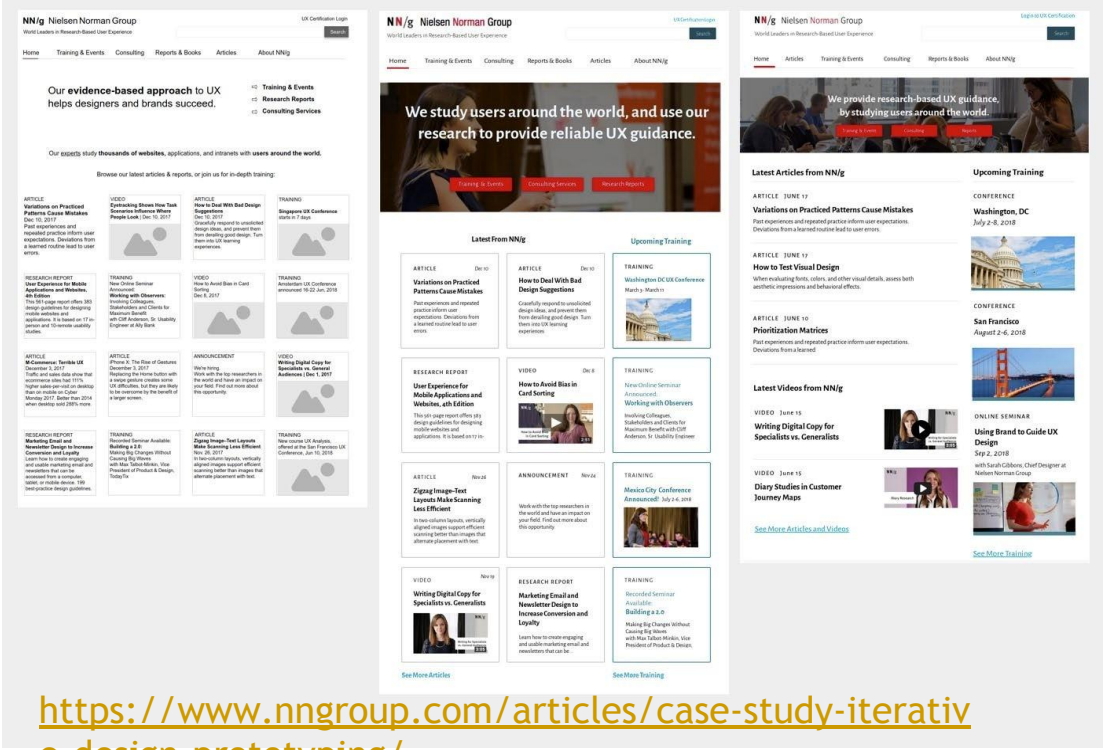
- Composite archetype – each persona represents a group
- When you prioritize your groups using requirements analysis, persona can represent each of those groups

PRODUCT PROTOTYPES

Product prototypes test how people interact with tangible and/or digital objects or products. These prototypes may focus on testing the form, function or in further evolved iterations, both.

DIGITAL PROTOTYPES

These prototypes may focus on testing layouts, visual appearances, organizing content, platform compatibility etc.



https://www.nngroup.com/articles/case-study-iterative-design-prototyping/

SERVICE PROTOTYPES

Service prototyping explores the underlying roles, processes, and tools/props. Some services involve more person-to-person interactions while others leverage more digital or even remote interactions.

ENVIRONMENT PROTOTYPES

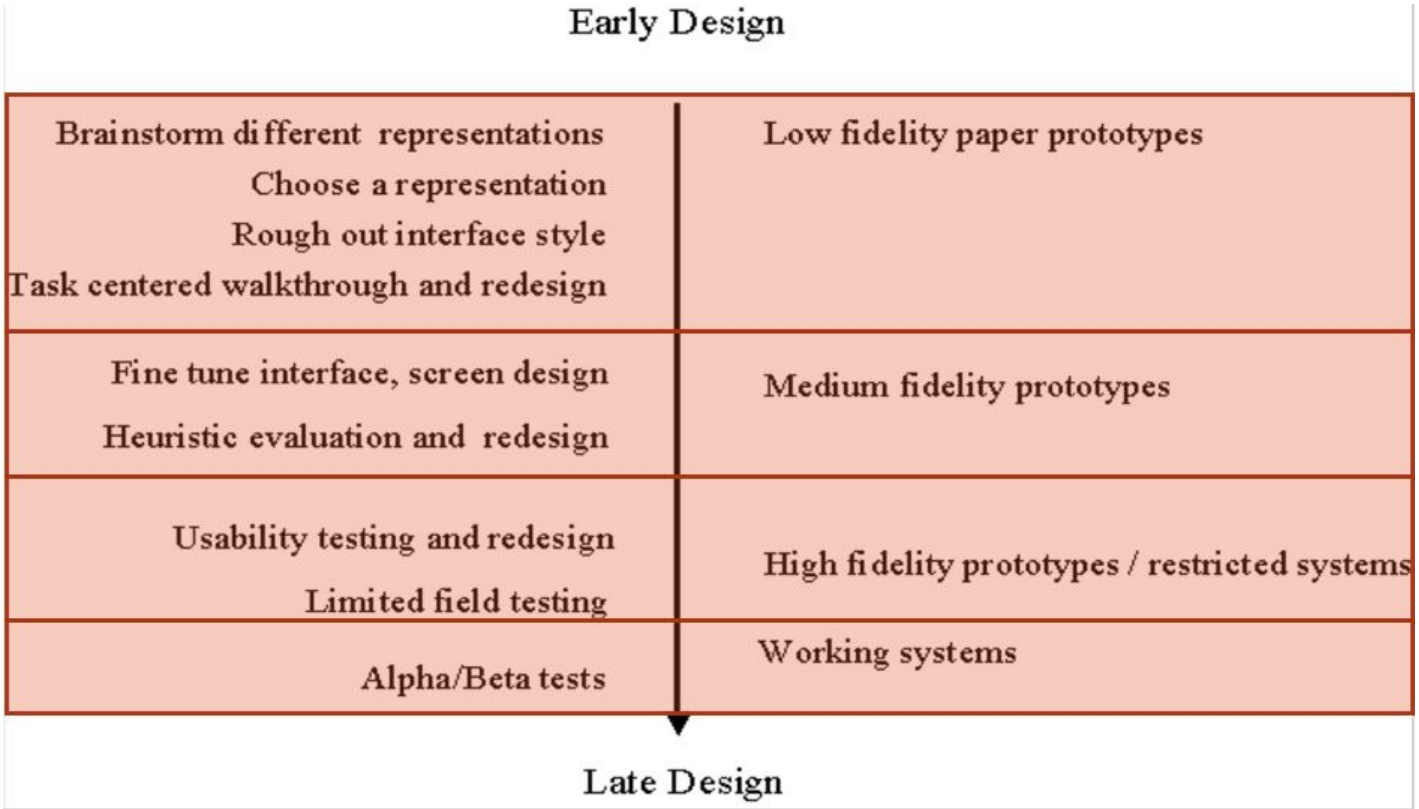
Prototyping a space simulates the experience of being in and interacting with a surrounding environment, like a building or outdoor space.

CONSIDERATIONS

- Appearance – e.g., size, color scheme, shape, margins, form, weight, texture, transparency, gradation, sound, haptic
- Data – data size, data type, data use, privacy
- Functionality – system functions, system features
- Interactivity – input, output, feedback, information behavior, user flow
- Spatial structure – arrangement of information, relationship among interface elements, relationship among physical parts

Lim, Youn-Kyung, Erik Stolterman, and Josh Tenenberg. "The anatomy of prototypes: Prototypes as filters, prototypes as manifestations of design ideas." *ACM Transactions on Computer-Human Interaction (TOCHI)* 15.2 (2008): 1-27.

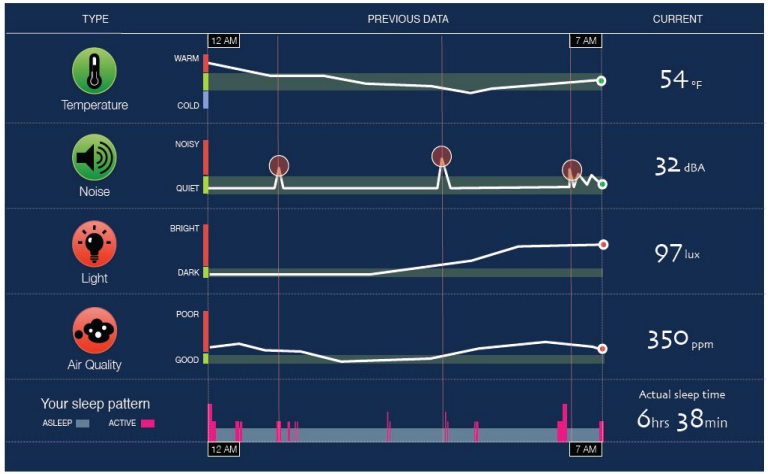
FIDELITY OF PROTOTYPES



http://grouplab.cpsc.ucalgary. ca/saul/681/1998/prototypin g/survey.html

LOW VERSUS HIGH

Distinction: is the choice of medium close or far from that of final design? (e.g., low = paper prototype, high = software)



LOW-FIDELITY

ADVANTAGES

- Quick revision possible
- Takes relatively less time to produce multiple design alternatives compared to programming all the features
- Useful as a proof-of-concept
- People are more willing to critique it since it looks unfinished

DISADVANTAGES

- Limited ability to error check
- Limited specification to begin implementation
- Facilitator driven

https://www.nngroup.com/articles/ux-prototype-hi-lo-fidelity

HIGH-FIDELITY

ADVANTAGES

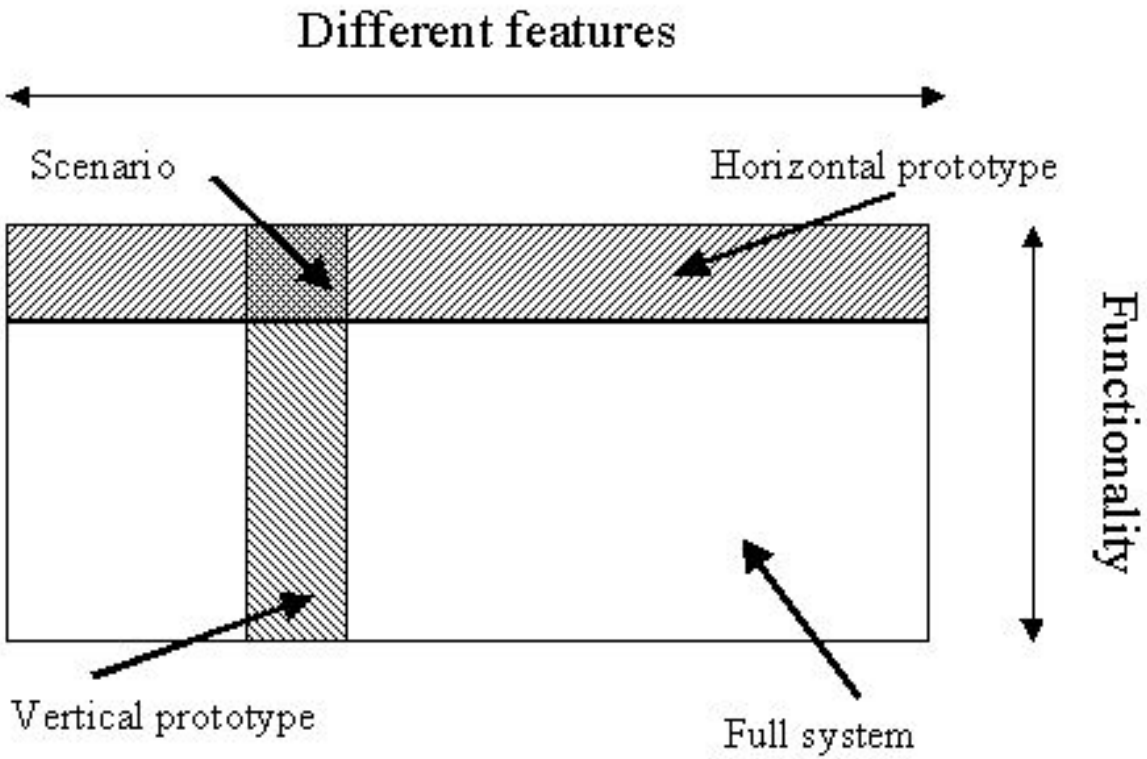
- User-driven testing
- Can demonstrate navigational scheme
- Serves as a evolving specification

DISADVANTAGES

- More resource-intensive to develop and modify
- Potential to be mistaken as the final product

https://www.nngroup.com/articles/ux-prototype-hi-lo-fidelity/

HORIZONTAL AND VERTICAL PROTOTYPES



http://grouplab.cpsc.ucalgary.ca/saul/681/1998/prototyping/survey.html

DESIGN IS ABOUT COMPROMISES

- The compromises made when developing low-fidelity prototypes are more evident compared to higher-fidelity prototypes. Under time pressure higher fidelity prototypes can end up implementing many features with bugs and go over budget.
- On the other hand, if the idea is novel and we need to publish results or put a product out there in the market, then a “good enough” higher fidelity prototype could be a good option
- Horizontal prototypes enable us to showcase a wide range of functions (breadth) whereas vertical help us show fewer detailed implementations (depth)

HOW TO PROTOTYPE

PROTOTYPING TECHNIQUES

Storyboard
PICTIVE
Wizard-of-Oz
Video Prototyping
Role-Playing
Prototyping Toolkits

PROTOTYPING TECHNIQUES

Storyboard

PICTIVE

Wizard-of-Oz

Video Prototyping

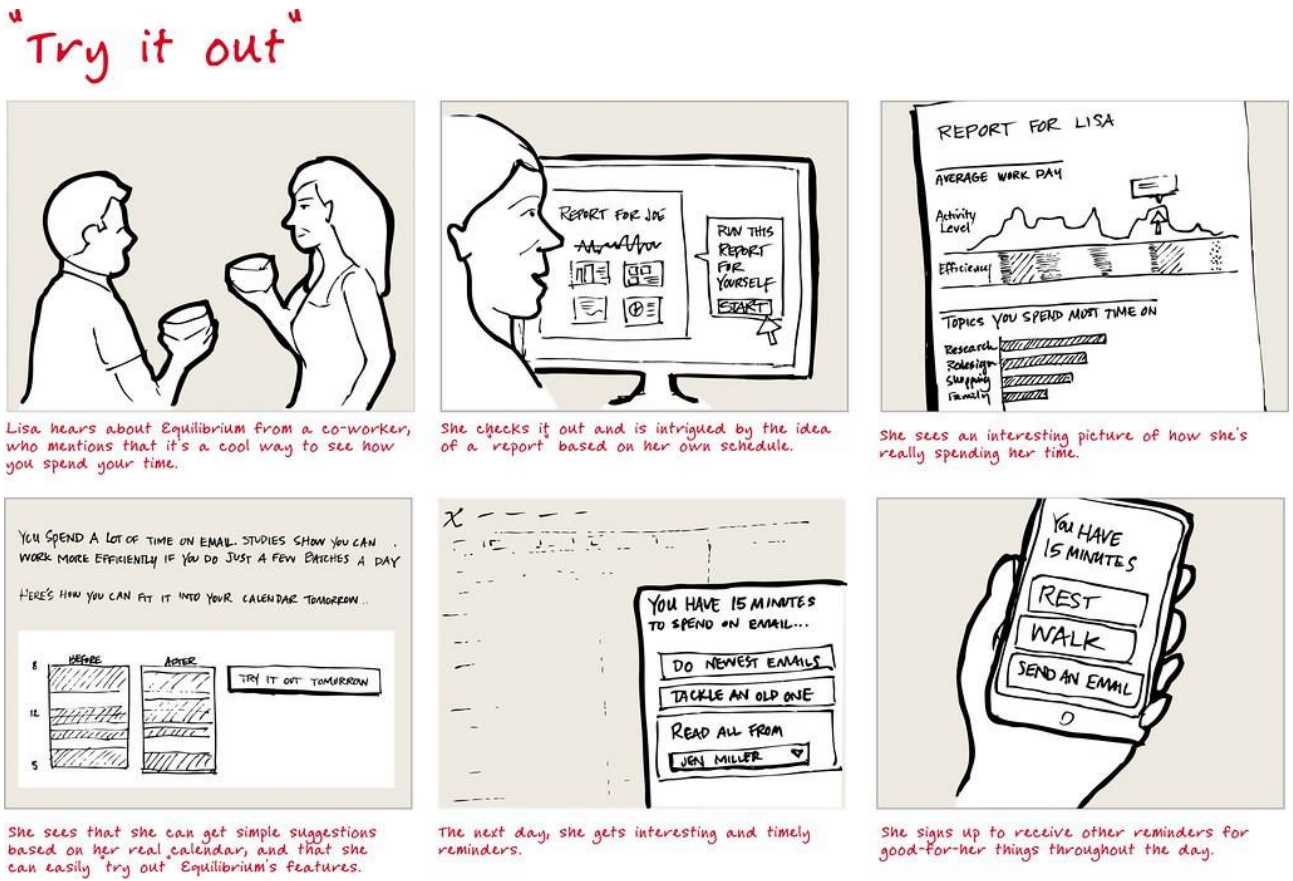
Role-Playing

Prototyping Toolkits

STORYBOARDS

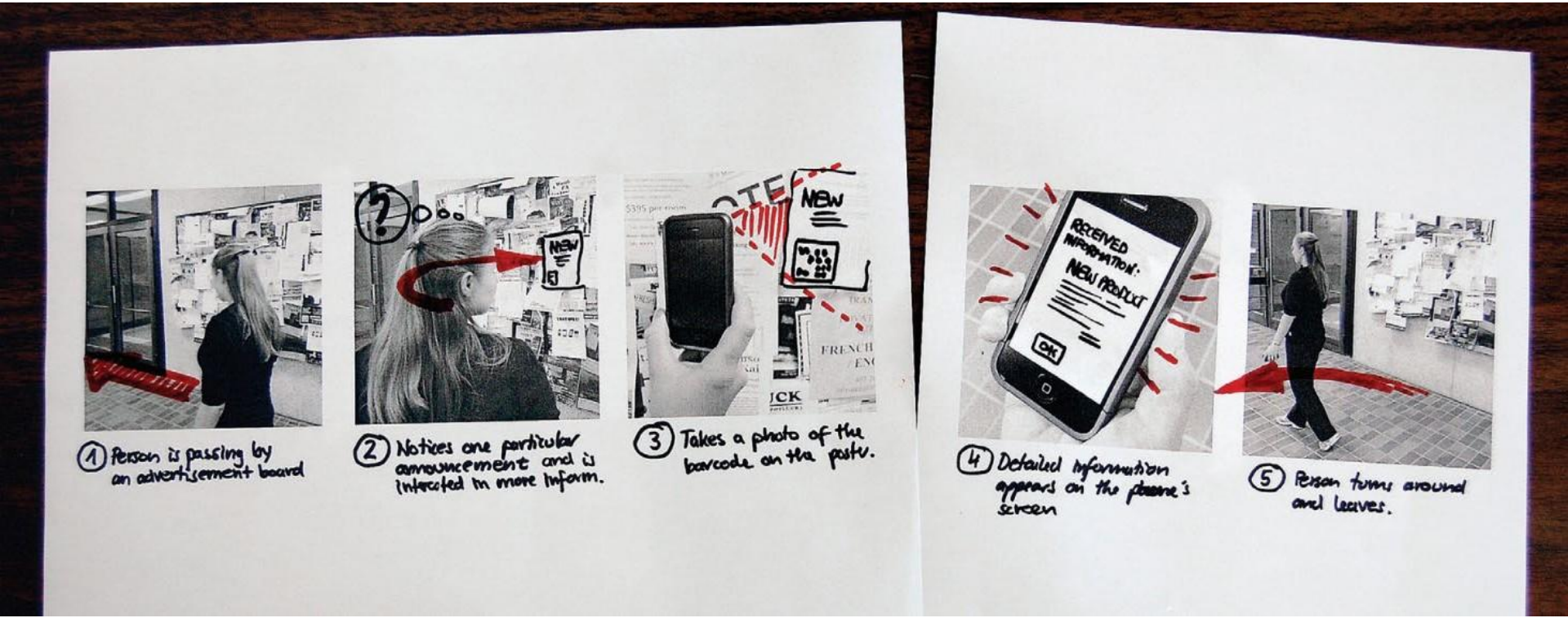
Storyboard uses a sequence of images to tell the story of how character(s) interacts with an interface.

The concept comes from films.



https://live.staticflickr.com/7454/9200995303_5053c78890_b.jpg

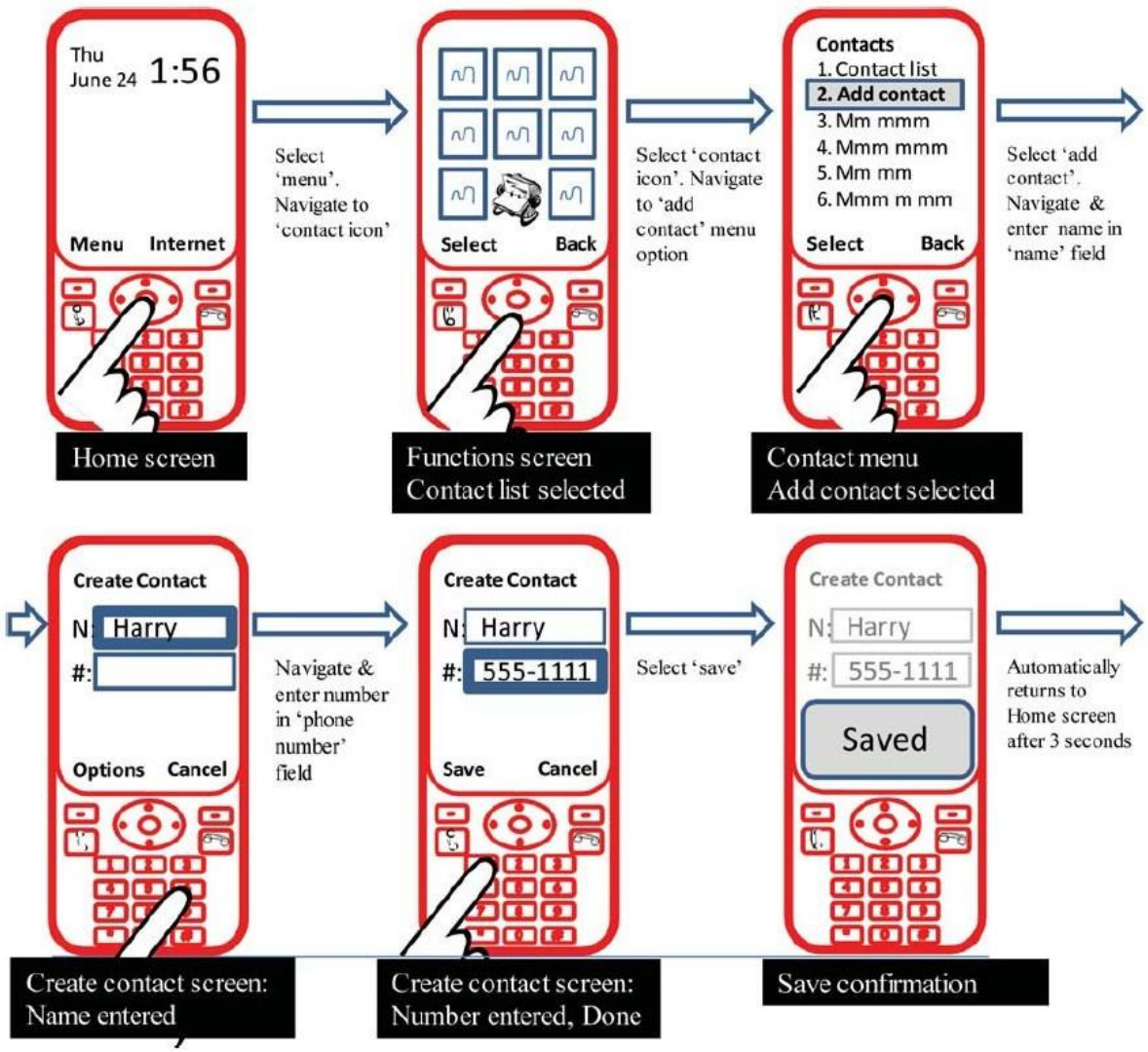
Can also be created by augmenting real photos of a person in action.



Greenberg, Saul, et al. "The narrative storyboard: telling a story about use and context over time." *interactions* 19.1 (2012): 64-69.

1. Test interaction and design direction
2. Useful for simple usability testing

3. Erich journey maps



From Prof. Anthony Tang's slides.

PROTOTYPING TECHNIQUES

Storyboard

PICTIVE

Wizard-of-Oz

Video Prototyping

Role-Playing

Prototyping Toolkits

PICTIVE

Plastic **I**nterface for **C**ollaborative **T**echnology **I**nitiatives through **V**ideo **E**xploration

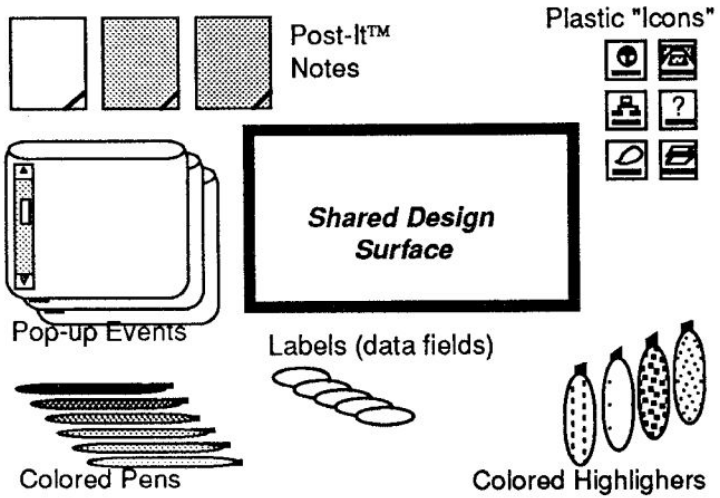


Figure 1. PICTIVE design objects.

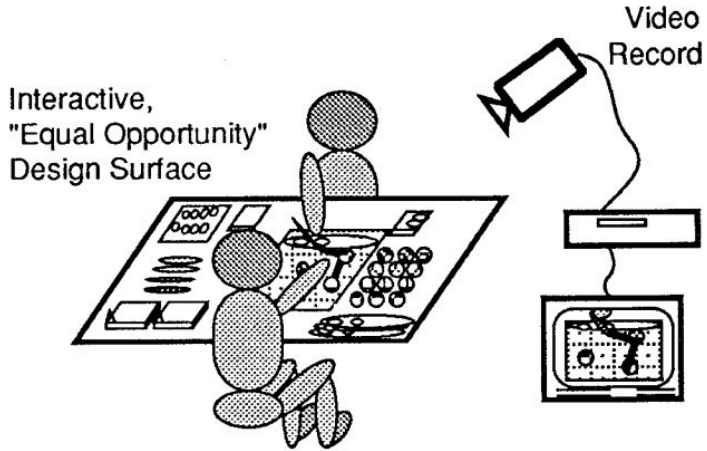


Figure 2. PICTIVE setting.

Muller, Michael J. "PICTIVE—an exploration in participatory design." *Proceedings of the SIGCHI conference on Human factors in computing systems*. 1991.

PROTOTYPING TECHNIQUES

Storyboard

PICTIVE

Wizard-of-Oz

Video Prototyping

Role-Playing

Prototyping Toolkits

WIZARD OF OZ

Common problem: it's difficult to prototype some piece of functionality

Need: test whether it is actually good

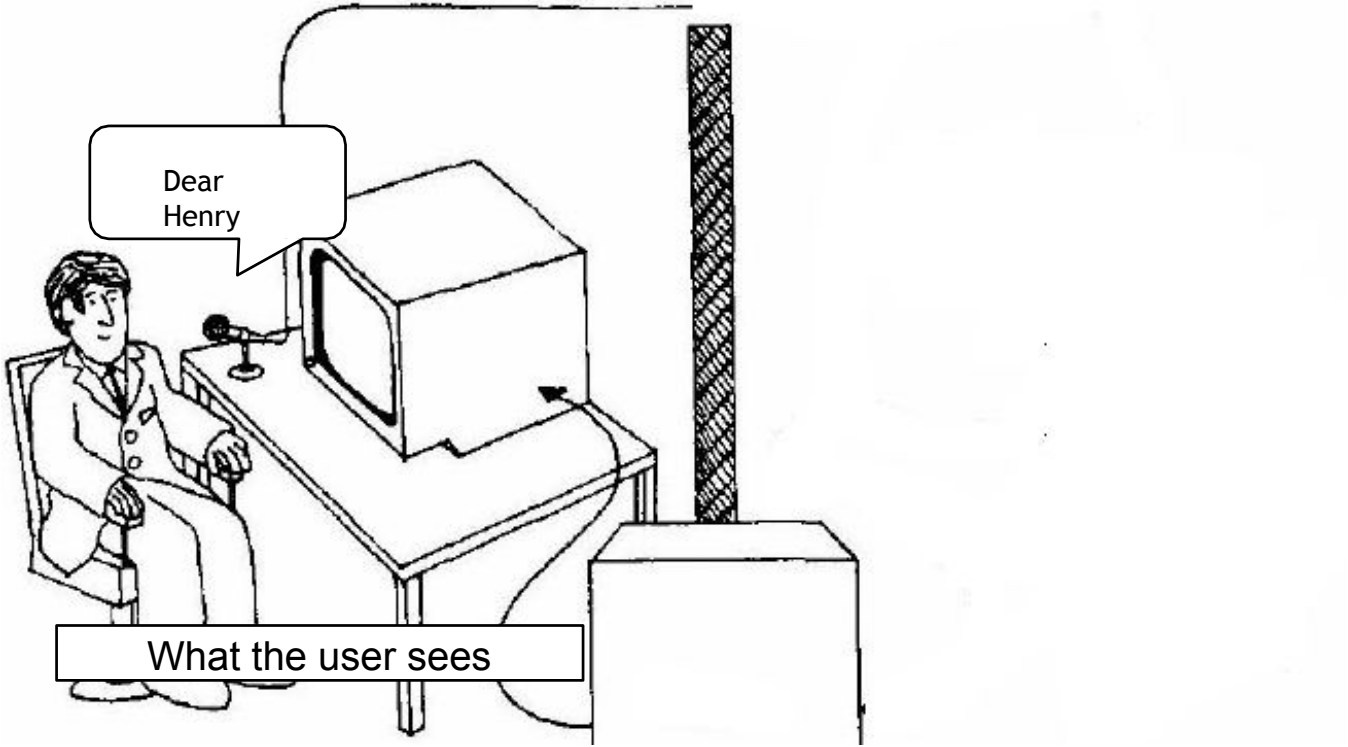
Solution: fake it with a person controlling the interface! Make the interaction as authentic as possible
Key: user has no idea that the interaction is being

faked Origin: Wizard of Oz book. See:

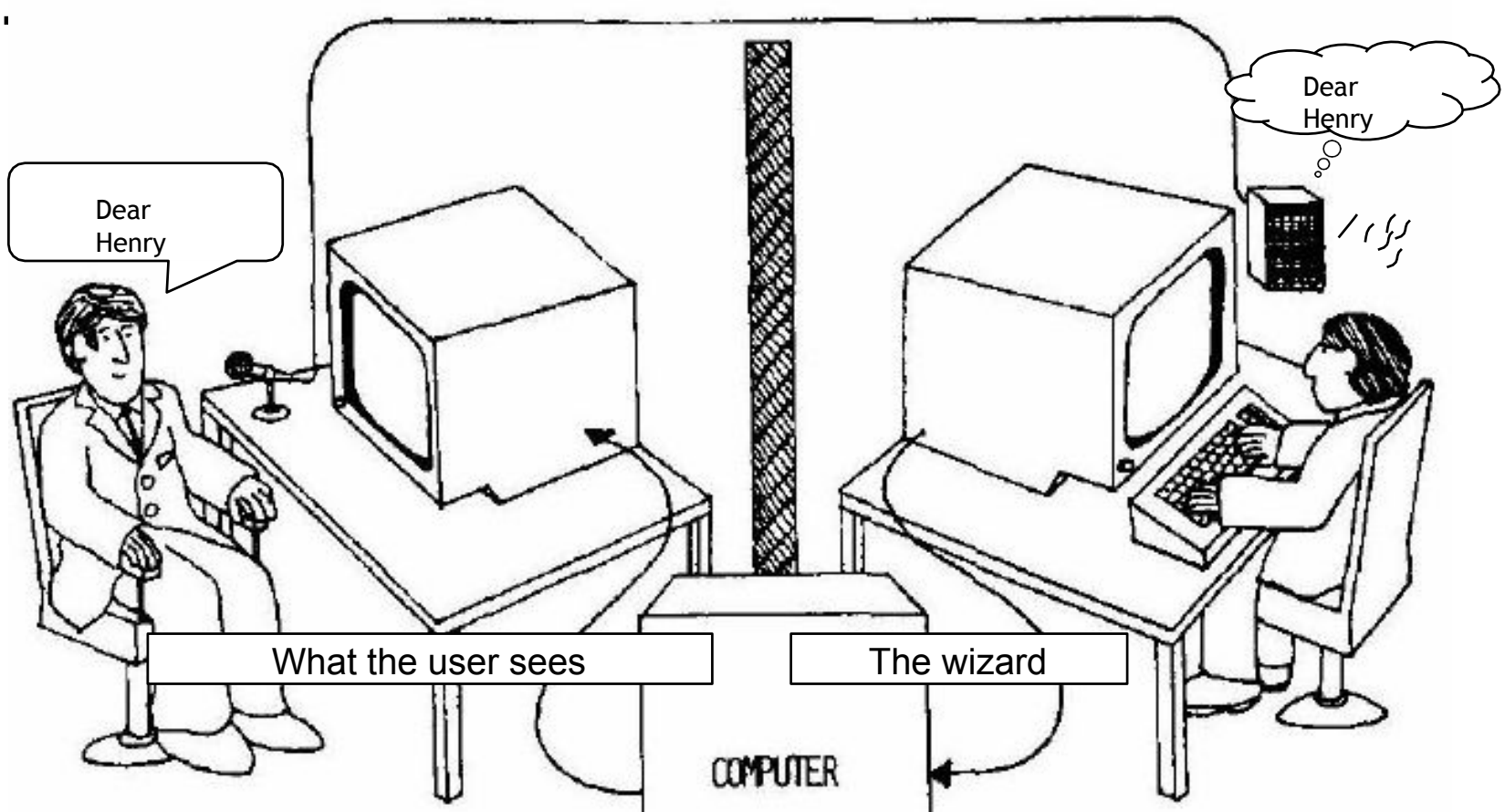
https://www.youtube.com/watch?time_continue=107&v=NZR64EF3OpA&feature=emb_logo

IBM LISTENING TYPEWRITER, 1984

Gould, John D., John Conti, and Todd Hovanyecz. "Composing letters with a simulated listening typewriter." *Communications of the ACM* 26.4 (1983): 295-308.



IBM LISTENING



EXAMPLE

YouTube is a good starting place to find more examples!

Also look for Human- Robot Interaction projects – several use Wizard of Oz techniques for research

https://www.youtube.com/watch?v=DL9cAcQ-gKQ

PROTOTYPING TECHNIQUES

Storyboard

PICTIVE

Wizard-of-Oz

Video Prototyping

Role-Playing

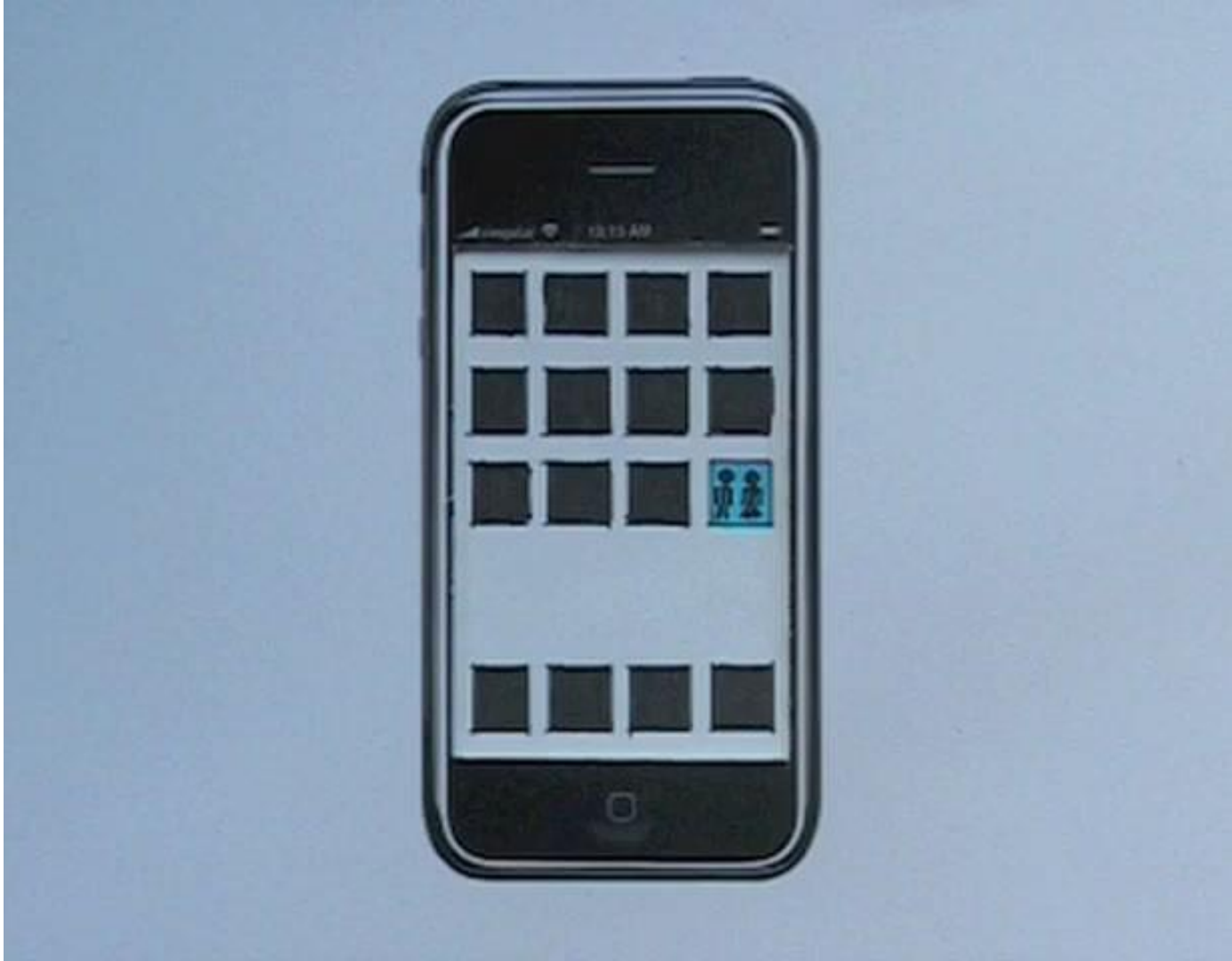
Prototyping Toolkits

VIDEO PROTOTYPING

- Video prototyping allows you to prototype functionality without needing to be physically present.
- Unlike wizard of oz prototypes which 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 (stop motion).

Mackay, Wendy E. "Video Prototyping: a technique for developing hypermedia systems." *CHI'88 Conference Companion Human Factors in Computing Systems*. Vol. 5. 1988.

EXAMPLE



https://www.youtube.com/watch?v=6TbyXq3XHSc

PROTOTYPING TECHNIQUES

Storyboard

PICTIVE

Wizard-of-Oz

Video Prototyping

Role-Playing

Prototyping Toolkits

ROLE-PLAYING

- It can help people learn more about how an interaction can play out and reveal any unconscious actions
- Researchers can learn about new interaction techniques that emerge in that moment; “natural” interactions
- You can include props and costumes but it’s not always necessary

https://www.youtube.com/watch?v=HFH59__Fkok

PROTOTYPING TECHNIQUES

Storyboard
PICTIVE
Wizard-of-Oz
Video Prototyping
Role-Playing

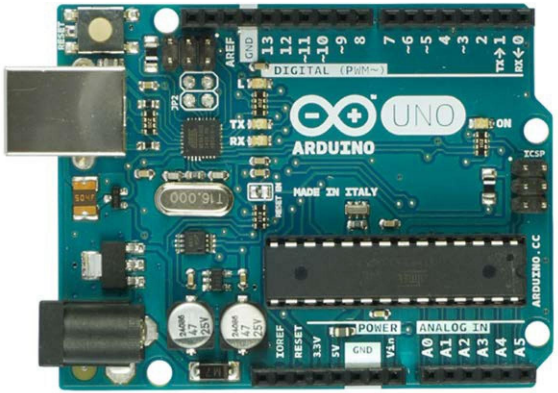
LOW-FIDELITY PROTOTYPES

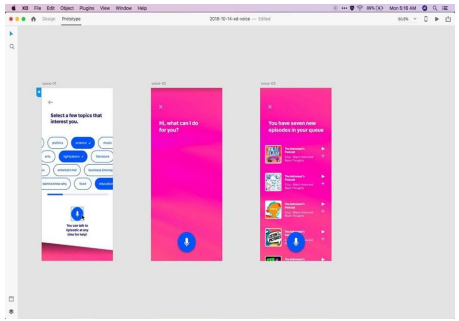
Prototyping Toolkits

PROTOTYPING TECHNIQUES

Storyboard PICTIVE Wizard-of-Oz Video Prototyping Role-Playing	**LOW-FIDELITY PROTOTYPES**
Prototyping Toolkits	**MEDIUM / HIGH-FIDELITY PROTOTYPES**

HIGHER FIDELITY PROTOTYPING





PROTOTYPING TECHNIQUES

Storyboard

PICTIVE

Wizard-of-Oz

Video Prototyping

Role-Playing

Prototyping Toolkits

PROTOTYPING TOOLS AND TOOLKITS

Toolkits are: “generative platforms designed to create new interactive artifacts, provide easy access to complex algorithms, enable fast prototyping of software and hardware interfaces, and/or enable creative exploration of design spaces.”

Ledo, David, et al. "Evaluation strategies for HCI toolkit research." *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems*. 2018.

BENEFITS

- Toolkits make it easier for users to author new interactive systems by encapsulating concepts to simplify expertise
- Toolkits define rules or pathways for users to create new solutions, leading them to right solutions and away from wrong ones
- Given that toolkits reduce the effort to build new interactive solutions, they can enable new audiences to author these solutions
- Toolkits can align their ideas to existing infrastructure and standards, enabling power in combination
- Toolkits allow for replication of ideas that explore a concept

Suggested Reading

Survey paper on evaluating HCI toolkits:

Ledo, David, et al. "Evaluation strategies for HCI toolkit research." *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems*. 2018.