Building User Interfaces

# Prototyping

# User Interfaces

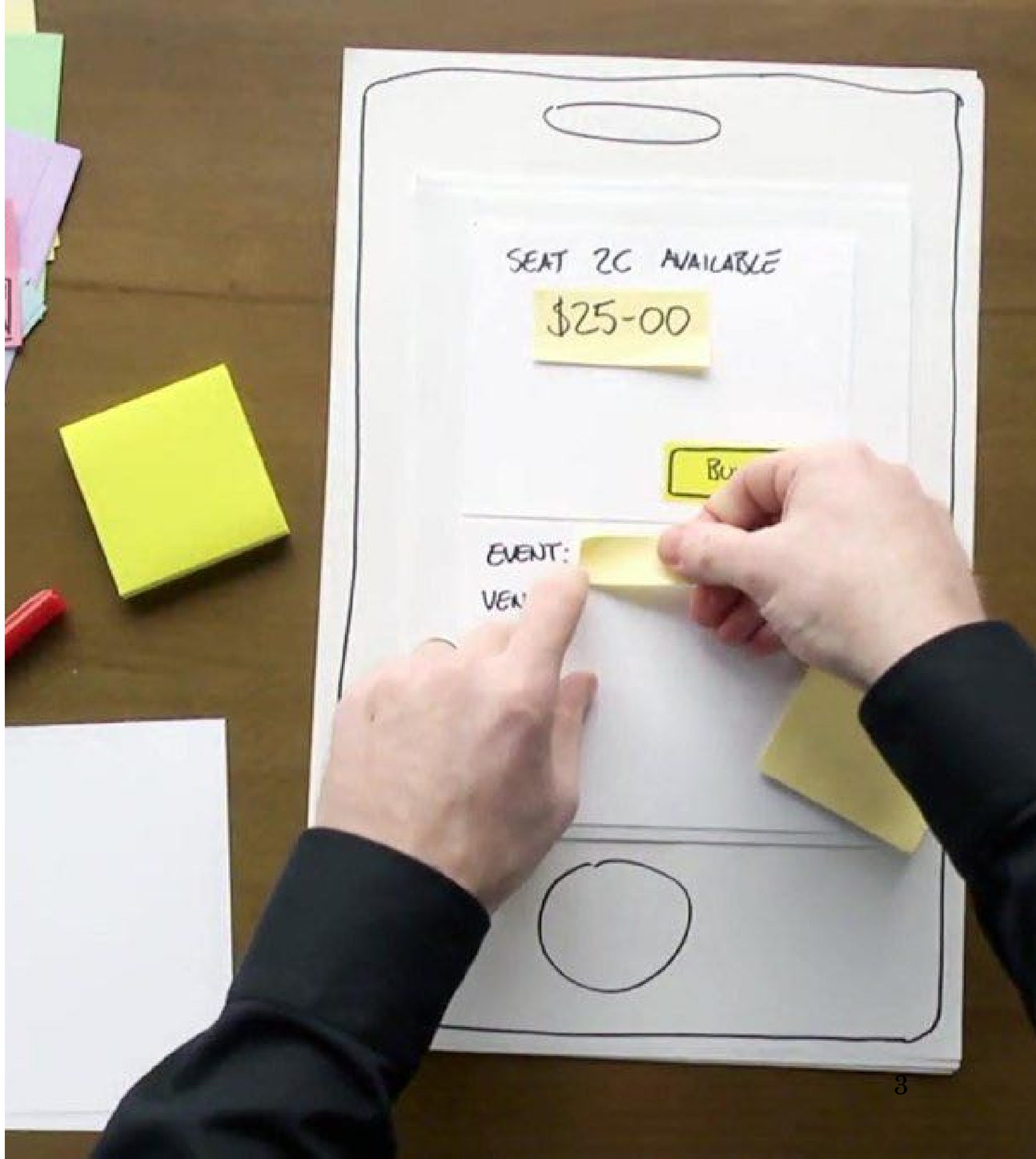
Professor Bilge Mutlu

# What we will learn today?

— Prototyping methods
— Prototyping theory
— Choosing the right method
— Hands-on activity

# Prototyping[1]

**Definition:** Building a draft or an early version of a product or system in order to explore, demonstrate, and test design ideas for a part or the entirety of the product or system.



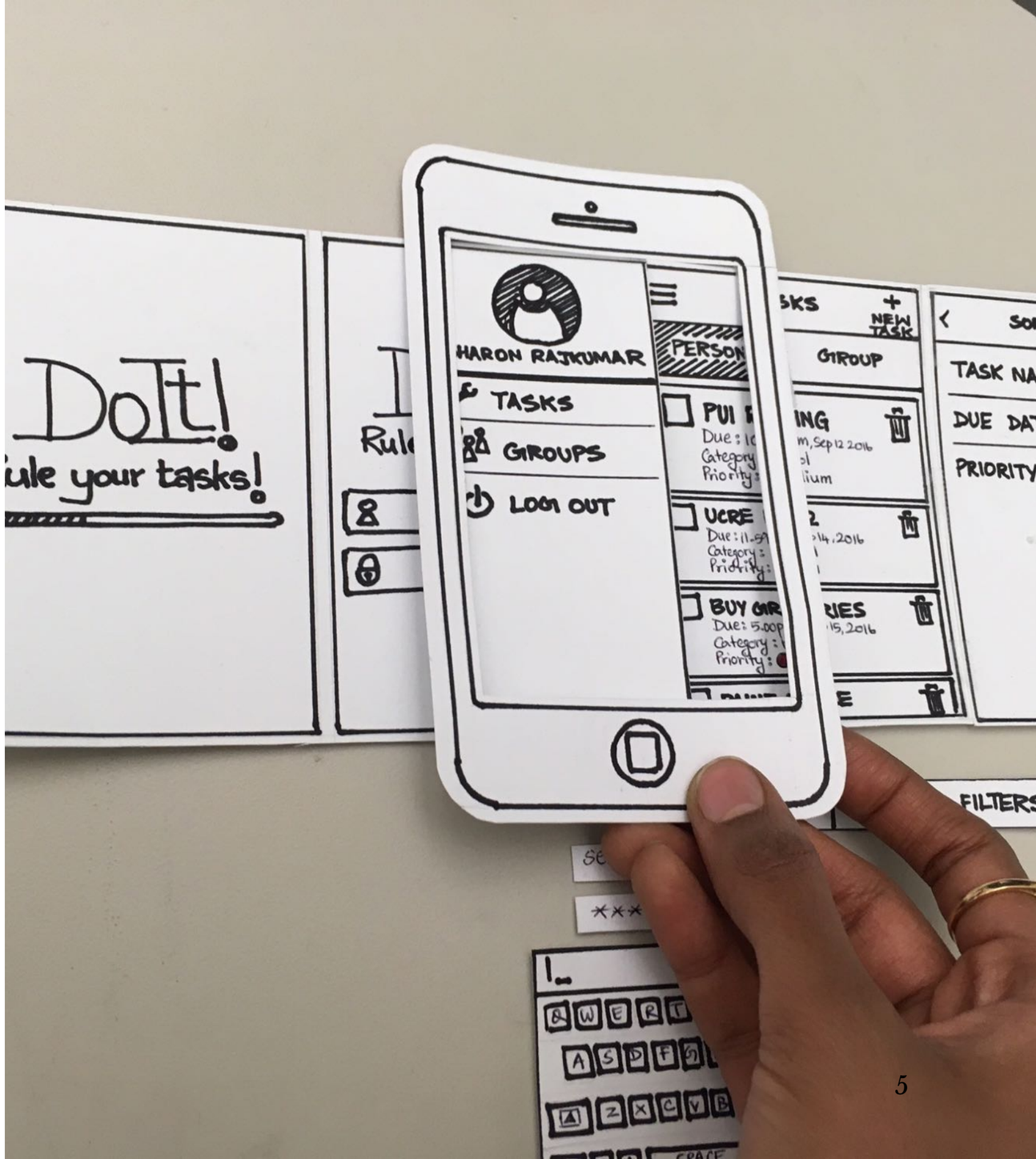

[1] Image source

## Prototyping Methods

- Paper prototyping
- Wireframes
- Annotations
- Interactive prototyping
- Native prototyping

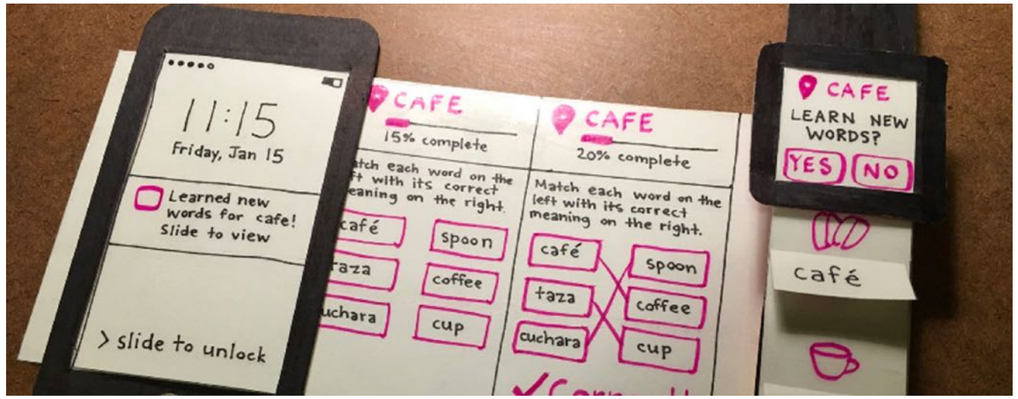
# Paper Prototyping[2]

**Definition:** Mocking up design ideas by sketching pages/screens with design elements using design supplies (e.g., paper, pencils, markers, scissors, glue, tape) and simulating how the envisioned system would respond to user input by swapping different pages/ screens and moving/changing design elements.




[2] Image source

# Most useful at the earliest stages of the design process.[3]

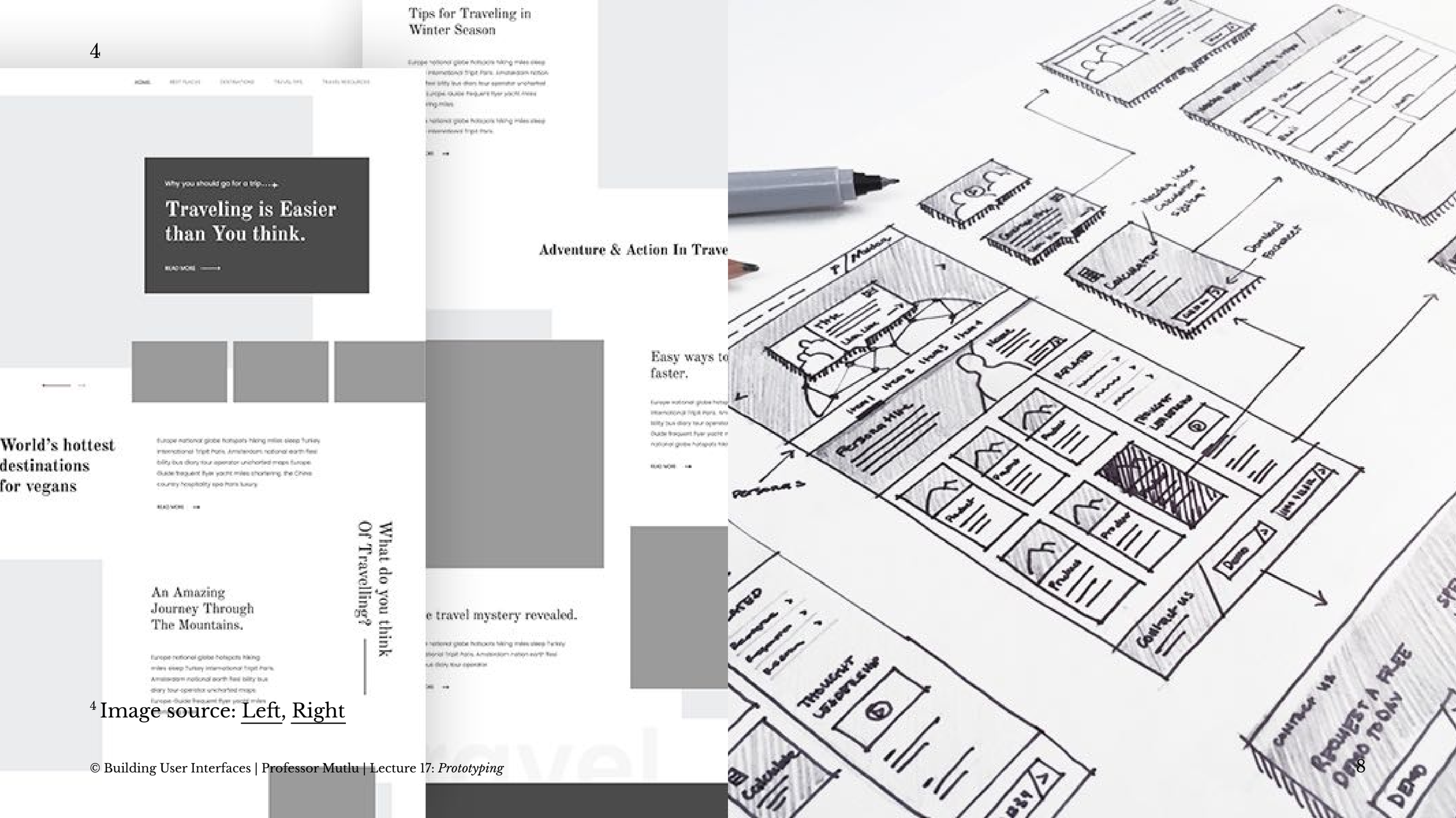


[3] Image source: Left top, Left bottom, Right

## Wireframes

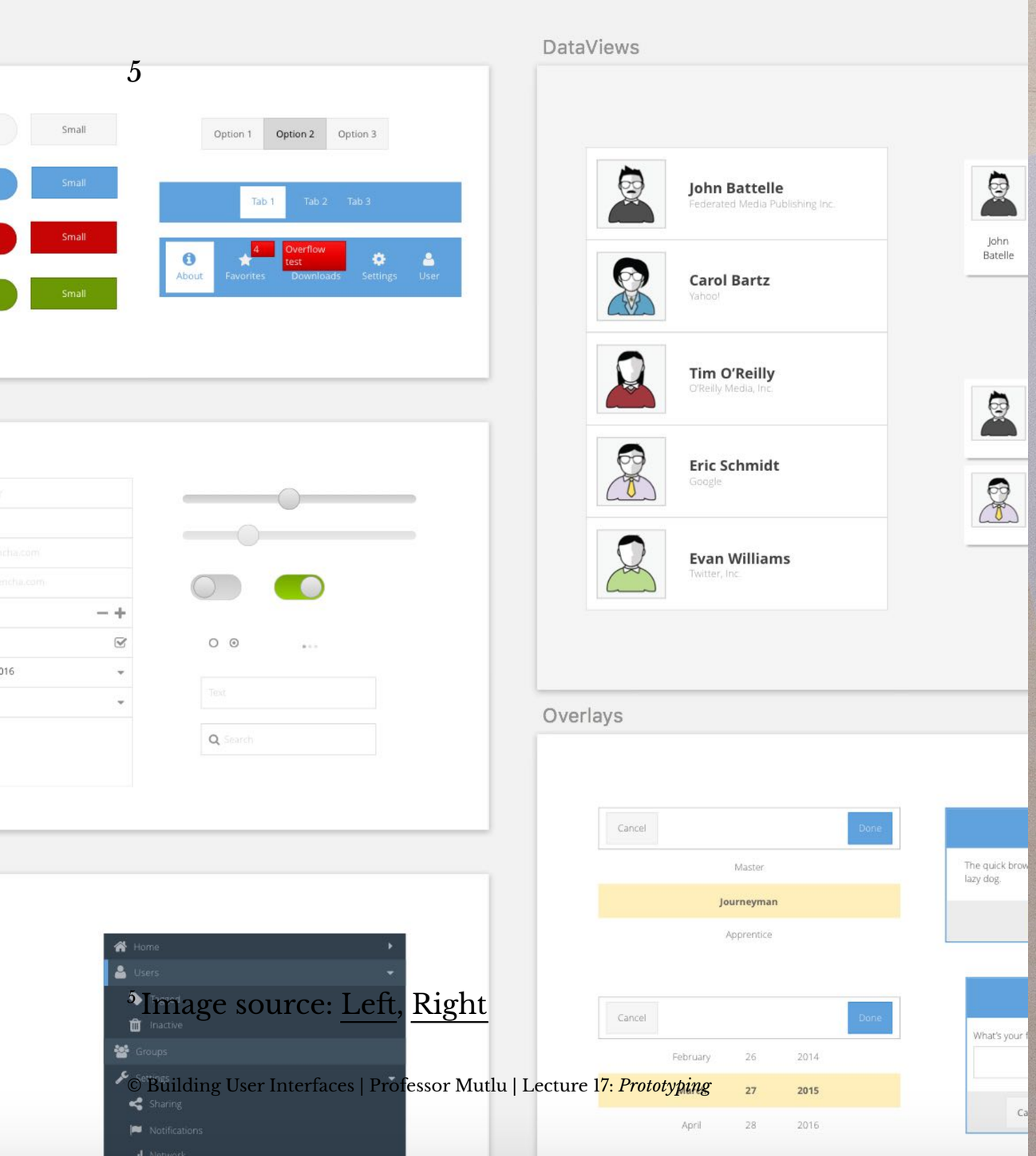
**Definition:** Lo-fi prototypes of the makeup of a design in terms of its structural components. Wireframes can be hand-drawn or digitally created.

Most useful in the early-to-mid stages of the design process.




[4] Image source: Left, Right

5

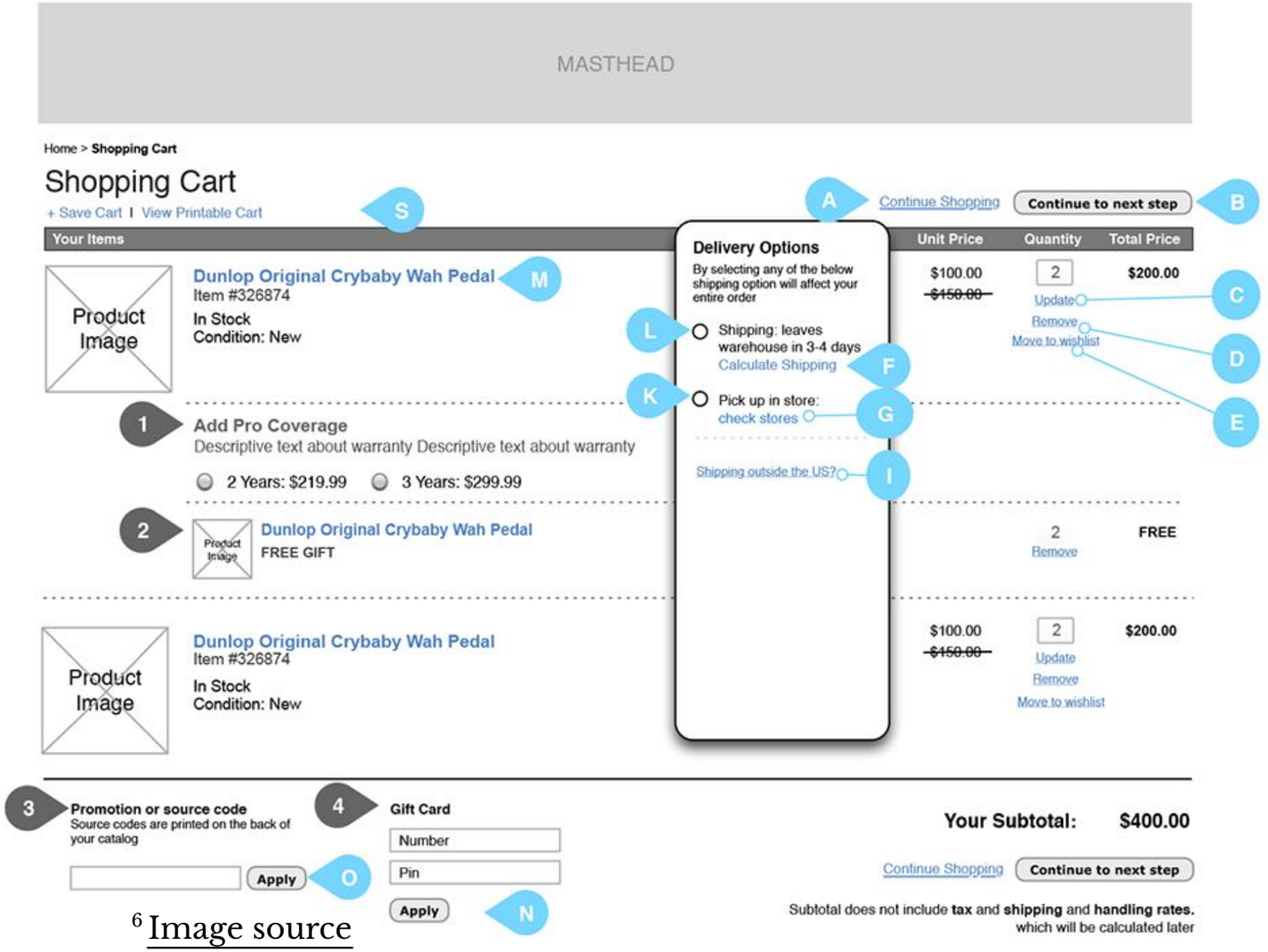


5 Image source: Left, Right

## Annotations

**Definition:** Labels, explanations, and notes that provide further information on the goals, content, and functioning of the design elements illustrated on wireframes.

Key in addressing the problem of interpretability of simplified designs for all stakeholders.



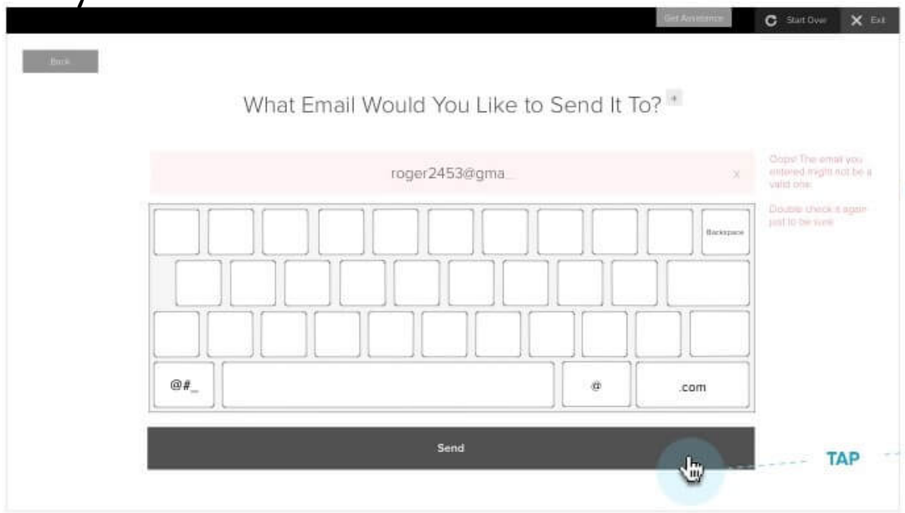

[6] Image source

## Requirements & Description Blocks

| Item | Title | Description |
|---|---|---|
| 1 | Add Pro Coverage | When the user selects a specific pro coverage option, it will automatically be added to the cart and the line will collapse – See Page 7 |
| 2 | Free Gift | The associated product should visually look as part of the parent product. |
| 3 | Promo or Source Code | Please refer to **Page 7** |
| 4 | Gift Card | Please refer to **Page 7** |

| Field Label | Field Name | Type | Description | Field Length | Read Only (Y/N) |
|---|---|---|---|---|---|
| A | Continue Shopping | Text Link | Back to previously viewed page | n/a | N |
| B | Continue to next step | Button | Go to Checkout Page. After checkout redesign, got to sign In page | n/a | N |
| C | Update | Text Link | Updates line item quantity. | n/a | N |
| D | Remove | Text Link | Remove line item from cart | n/a | N |
| E | Move to wishlist | Text Link | Removes the item from the cart and adds the item to wish list. No changes to the current wish list process | n/a | N |
| F | Calculate Shipping | Text Link | As is today – No Change | n/a | N |
| G | Check Stores | Text Link | Direct users to Pick up in store page (Page 3)<br><br>For public site, use the users location determined by Geo IP to show the stores in the order of proximity. If from SPO, use the store's actual location by default<br><br>User can input a zip code in the search bar above to change location<br><br>Please sync up this overlay and the one used on Product detail so that they are identical<br><br>Page functionality is the same as the one on Product Detail, except we have made the following changes | n/a | N |

## Email Validation & Confirmation




Email Errors
**Required**
*"Oops! You didn't enter an email address"*

**Invalid**
*"Oops! The email you entered might not be a valid one. Double check it again just to be sure*

Email Errors
**Required**
*"Oops! You didn't enter an email address"*

**Invalid**
*"Oops! The email you entered might not be a valid one. Double check it again just to be sure*

### Success State

Successfully Sent!

### Failure State

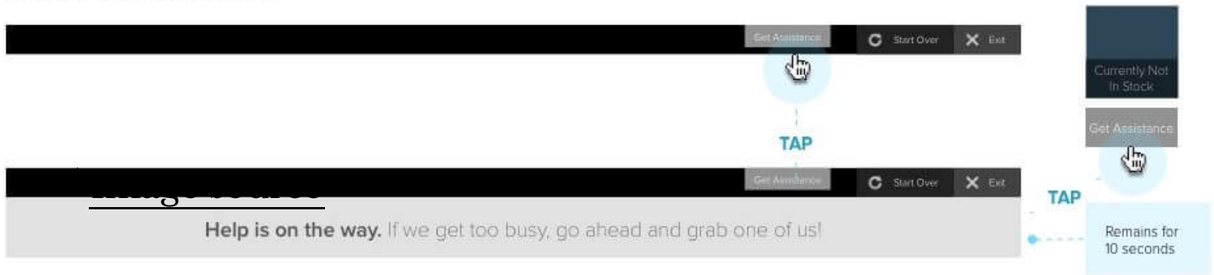
Re-Send

Something went wrong

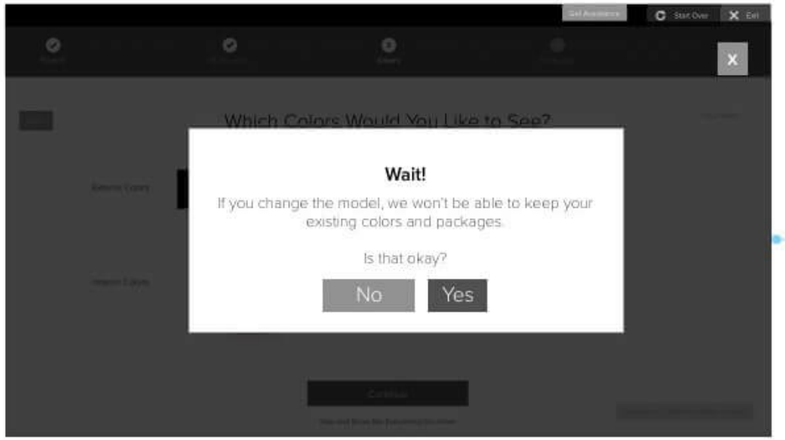
### Sending State

Sending...

## Get Assistance




## Warning Modals




Other Modals

**Wizard AND Filter Change Model Event**

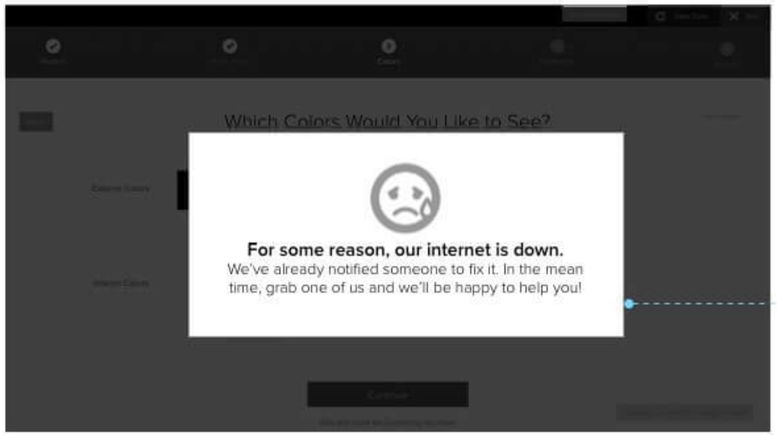
- When user tries to change the model toggle on results screen (selecting an actual model button, not the expand down button)

*"If you change the model, we won't be able to keep your existing colors, packages, or model year. Is that okay?"*

**Start Over Event**
*"If you start over, you'll lose any work you've done so far. Is that okay?"*

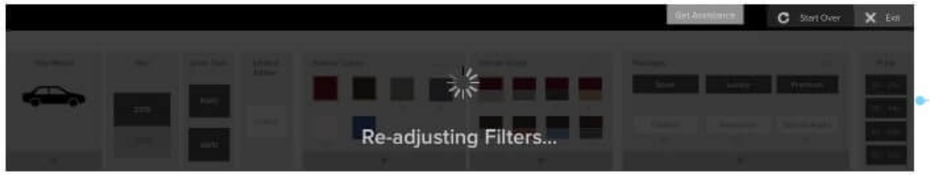
**Exit Event**
*"You're about to exit the inventory search and will lose any work you've done so far. Is that okay?"*

## Internet Down




Send an email (primary email address the dealership provides) stating the kiosk is not receiving internet

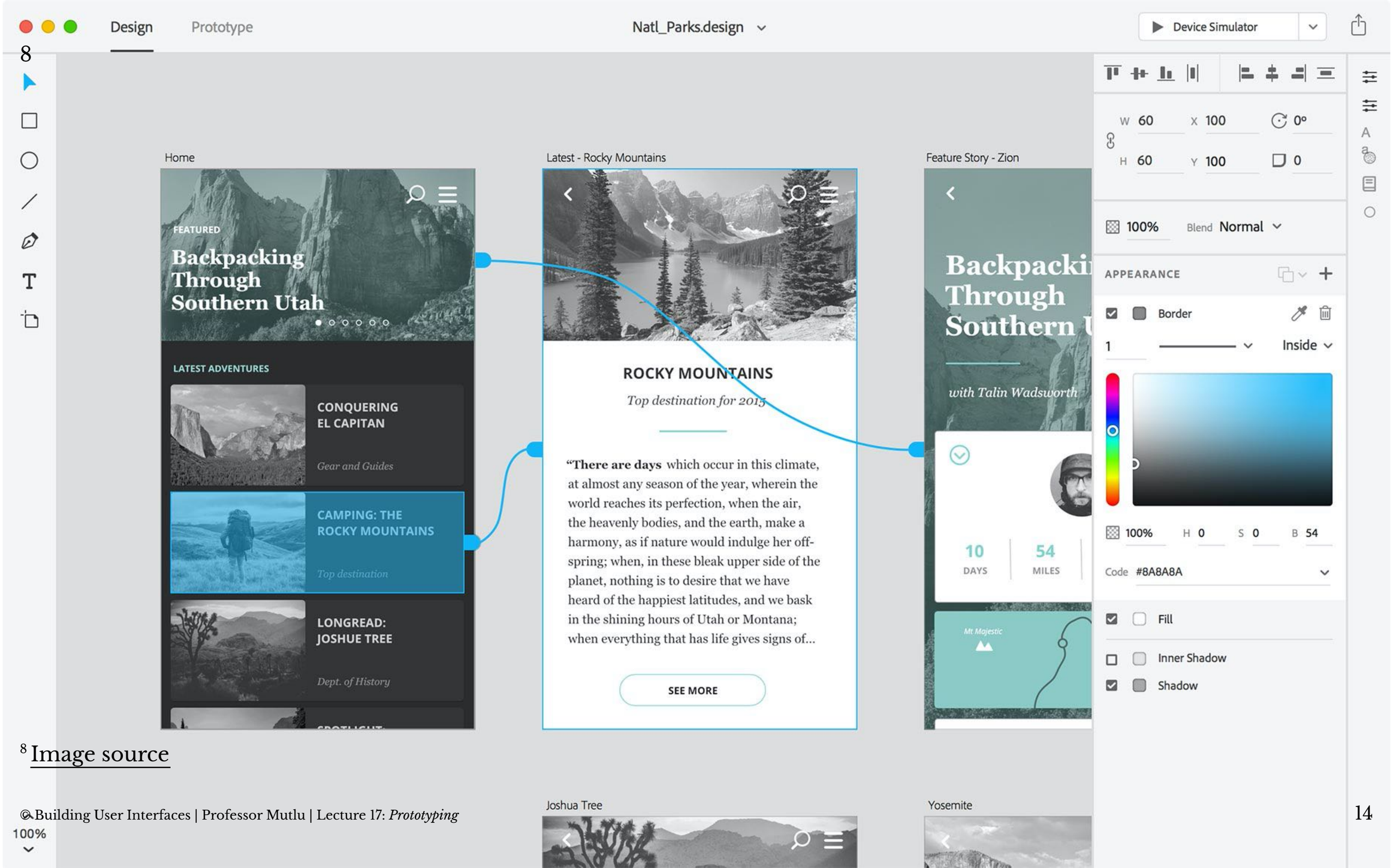
## Filter Changes




Occurs when model or year is changed

## Interactive prototyping

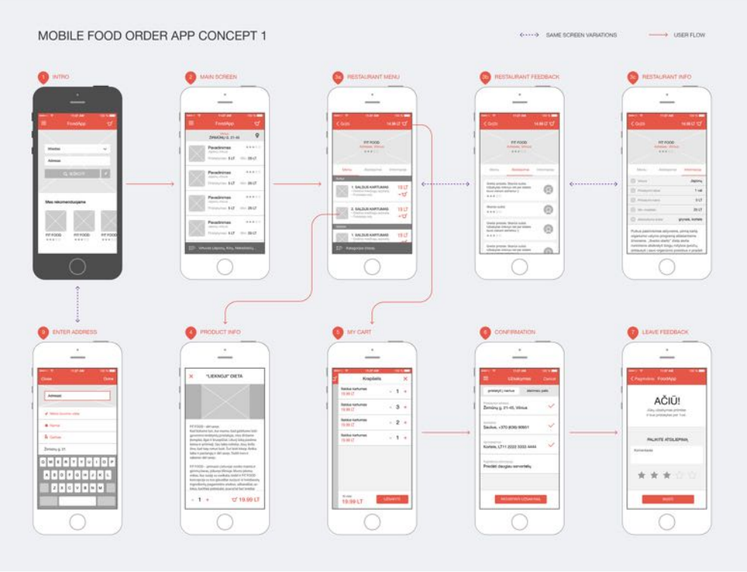
**Definition:** Creating realistic prototypes of the navigation or structural components (or both) of the design idea by creating a series of screens/pages with design elements, linking these screens/pages for navigation, and simulating the transitions between screens/pages.

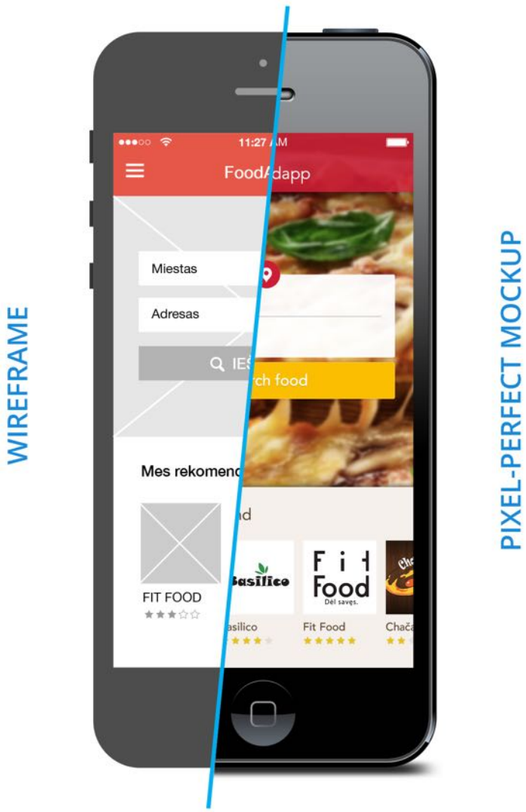


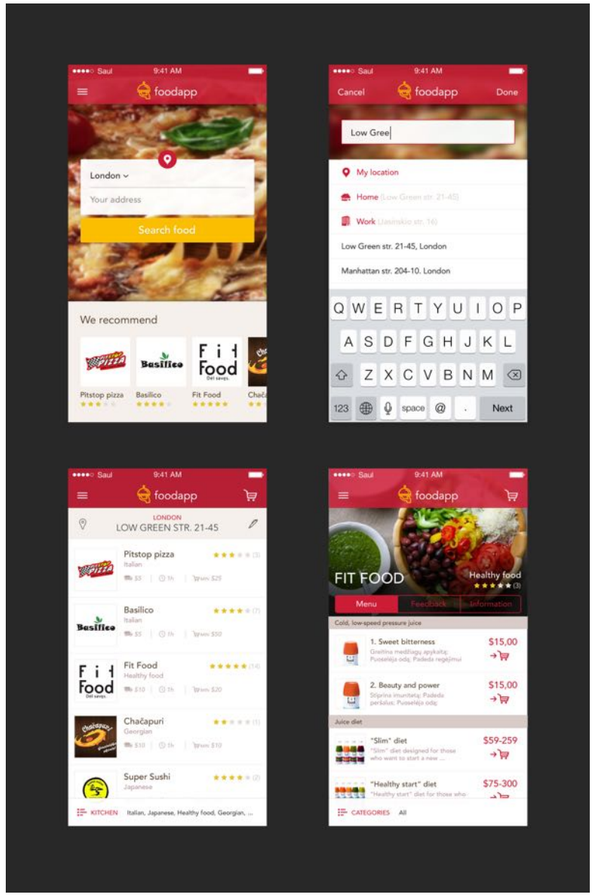

8

[8] Image source

# Interactive prototypes can use *lo-fi* or *hi-fi* components.[9]



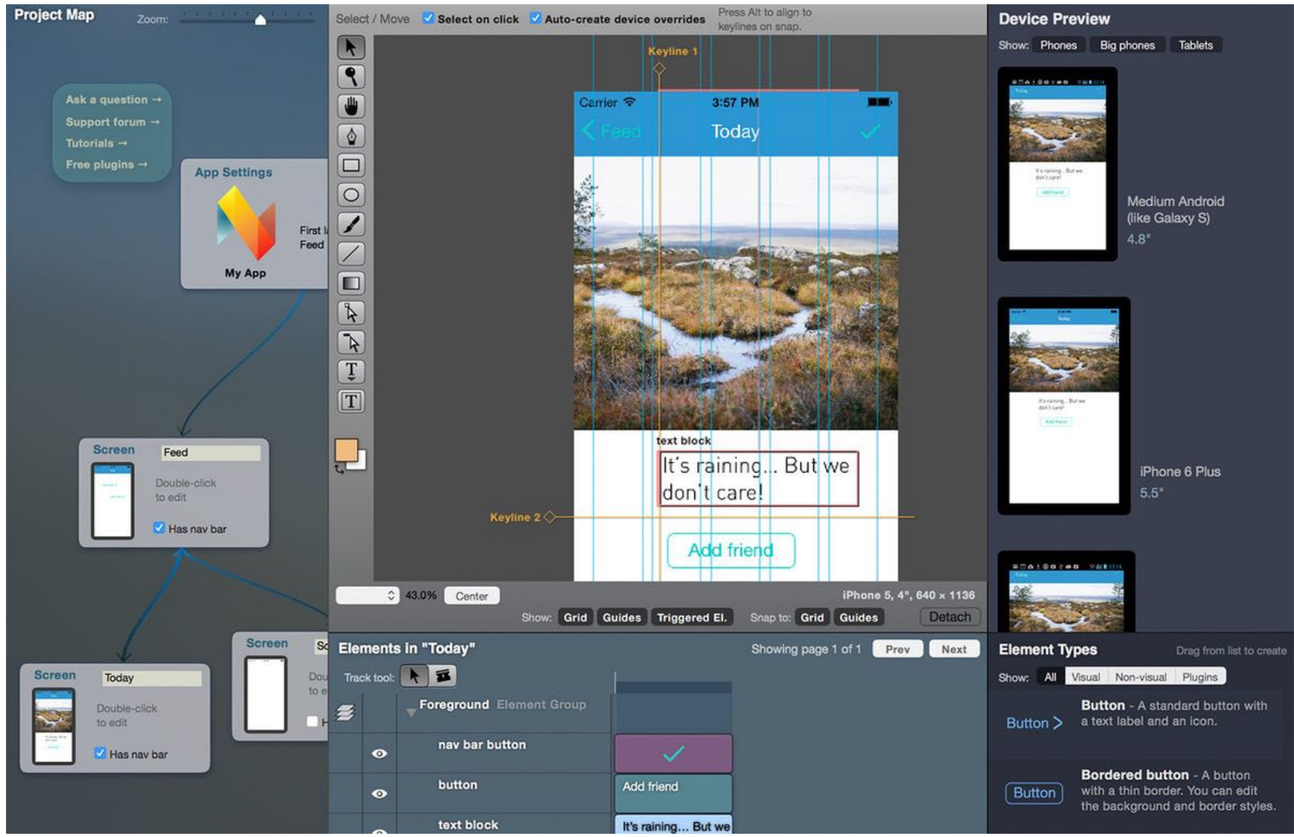

[9] Images source

# Native prototyping[10]

**Definition:** Implementing and testing design ideas on the target technology platform of the design.

Examples:

— Neonto React Studio
— Bootstrap Studio

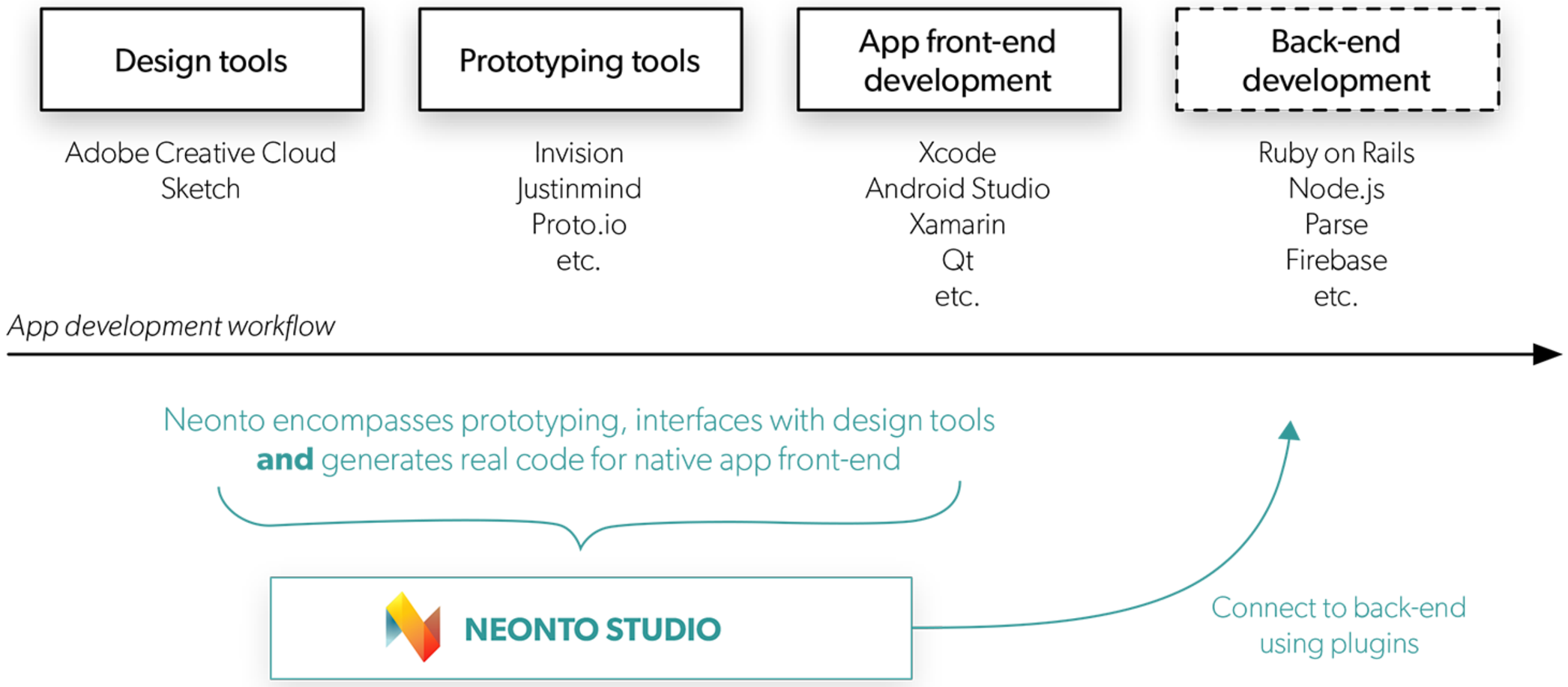



[10] Image source

Layers remain editable and can
be turned into real UI elements

ource

12




[12] Image source

# Quiz 1

Complete the Canvas quiz.

# Prototyping Theory

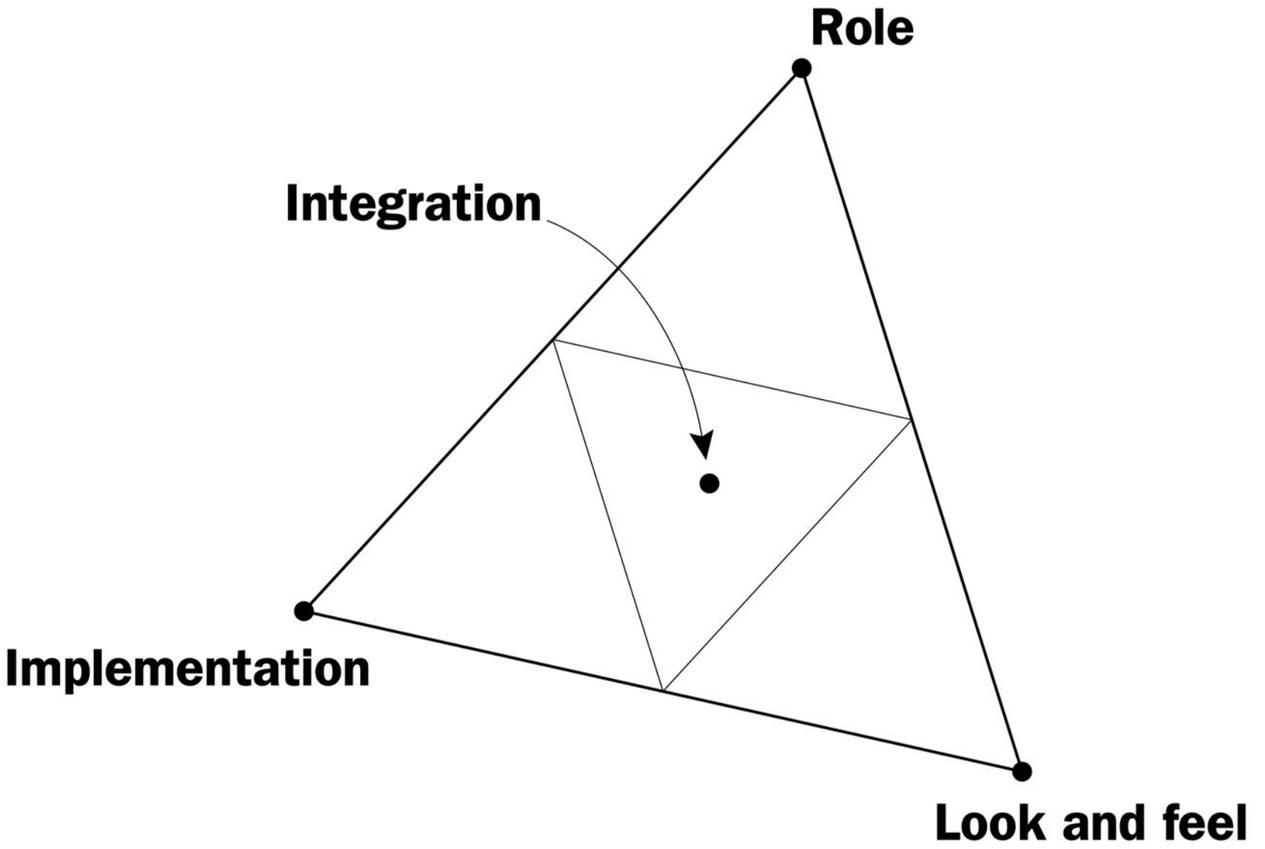
## Prototyping Models & Strategies

— Three-dimensional model of prototyping
— Prototyping scope
— Prototyping strategies
— Prototyping fidelity

# Three-dimensional Model of Prototyping[13]

Prototypes represent three dimensions of a design idea:

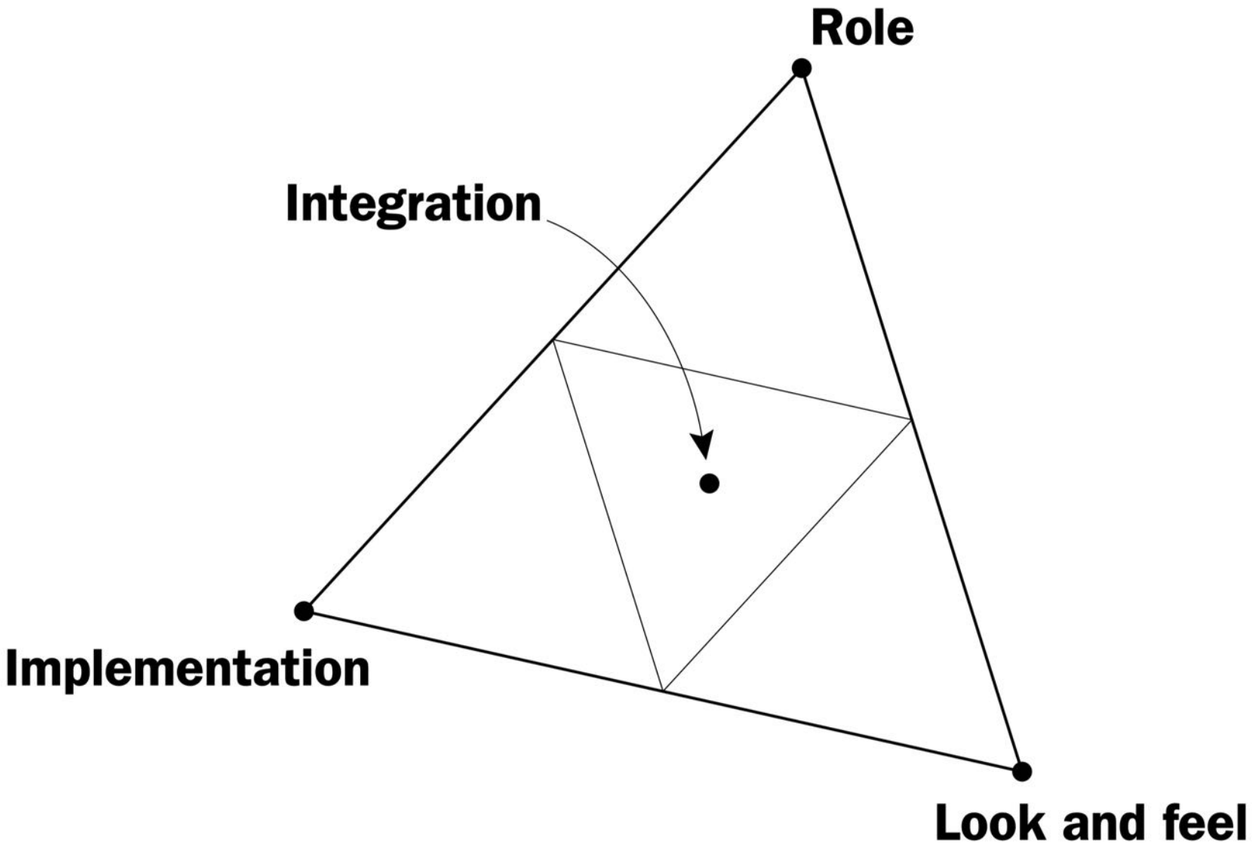
1. Role
2. Look and feel
3. Implementation




[13] Houde & Hill, 1999. What do prototypes prototype?

Each dimension can be represented at various levels of fidelity.[13]

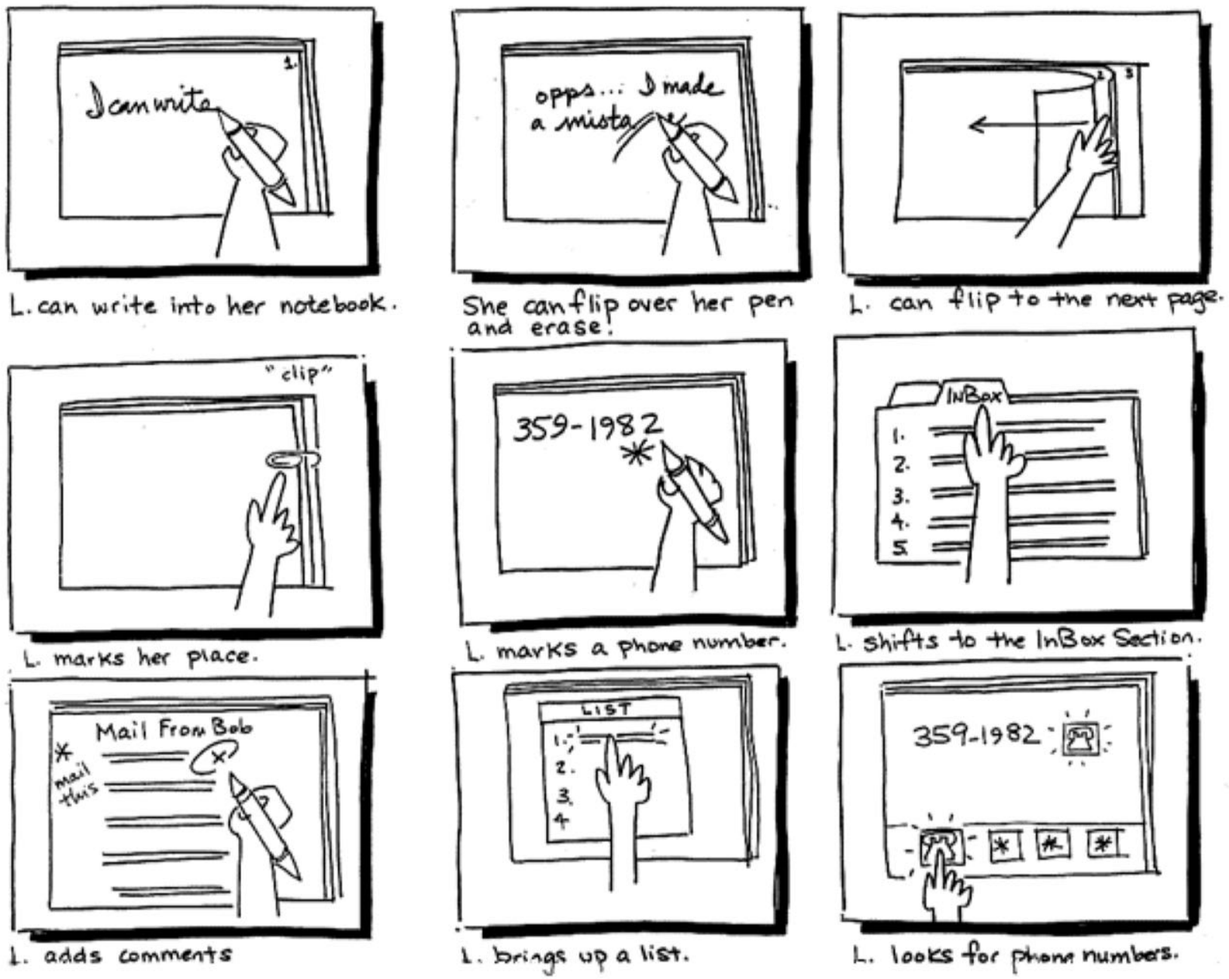
Their integration makes a working prototype or a pre-alpha product.




[13] Houde & Hill, 1999. What do prototypes prototype?

# Dimension 1: *Role*[13]

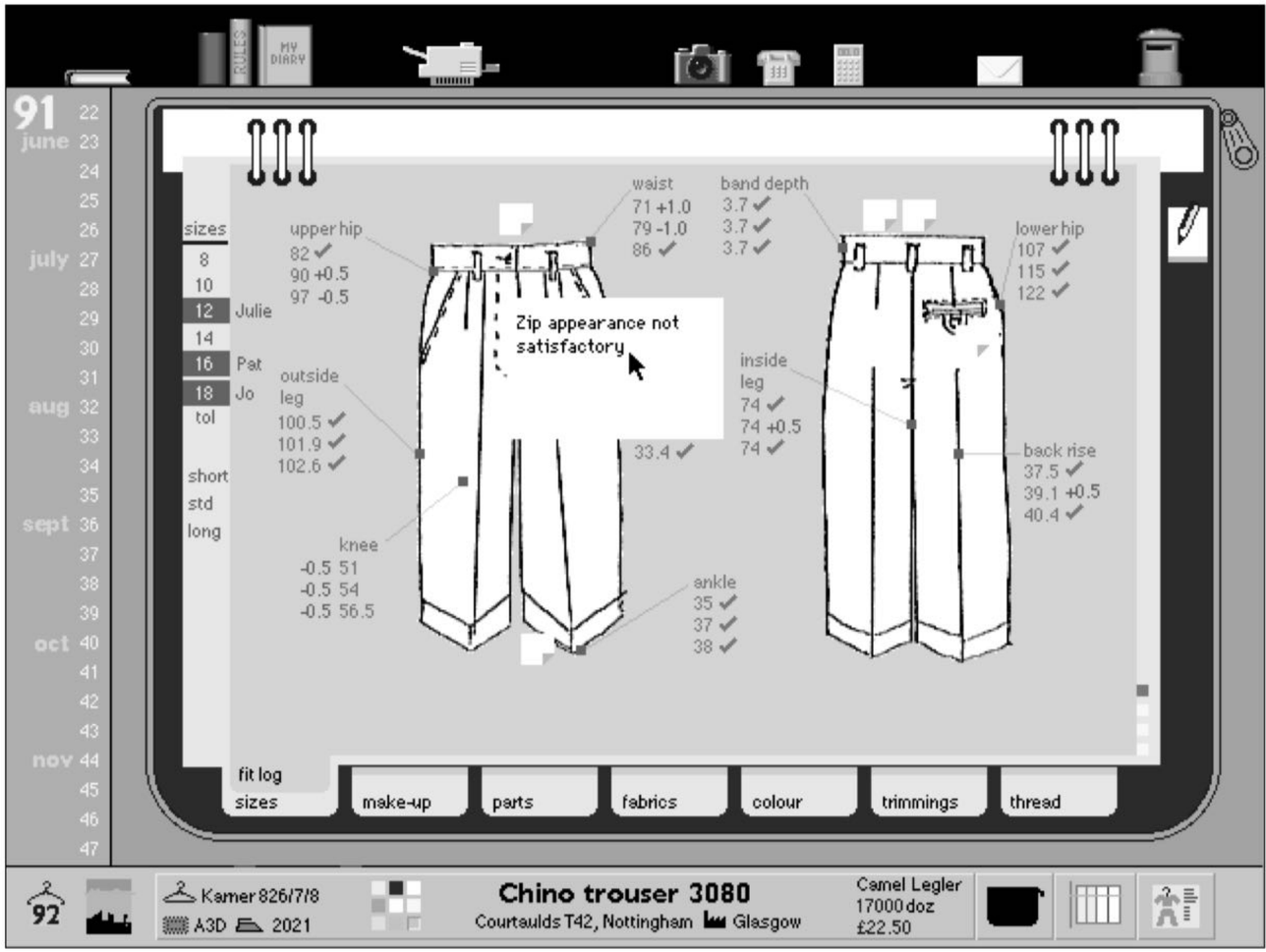
**Definition:** Represents the functions that the system serves in the user's life, i.e., how the system is useful to them.




[13] Houde & Hill, 1999. What do prototypes prototype?

# Dimension 2: *Look and Feel*[13]

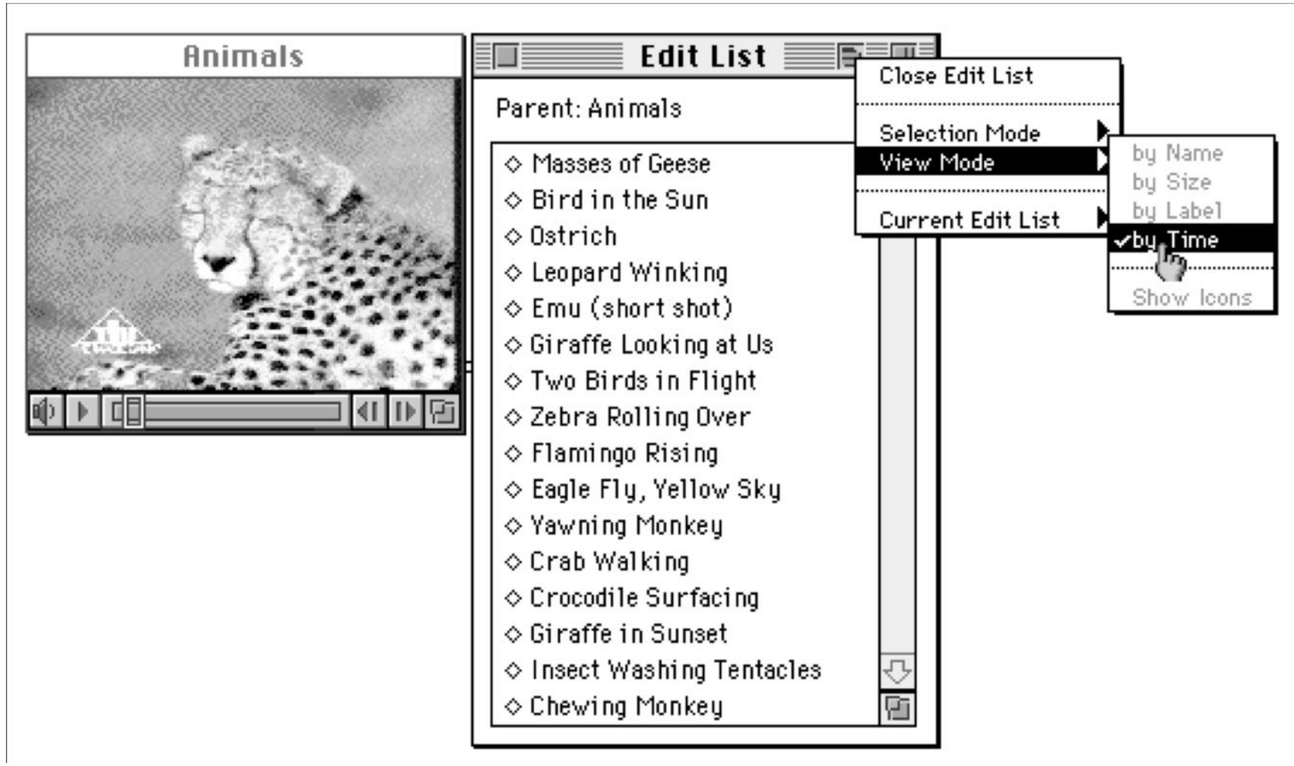
**Definition:** Simulates the sensory experience of the user while using the system, i.e., what the user sees, hears, and feels during use.




[13] Houde & Hill, 1999. What do prototypes prototype?

# Dimension 3: *Implementation*[13]

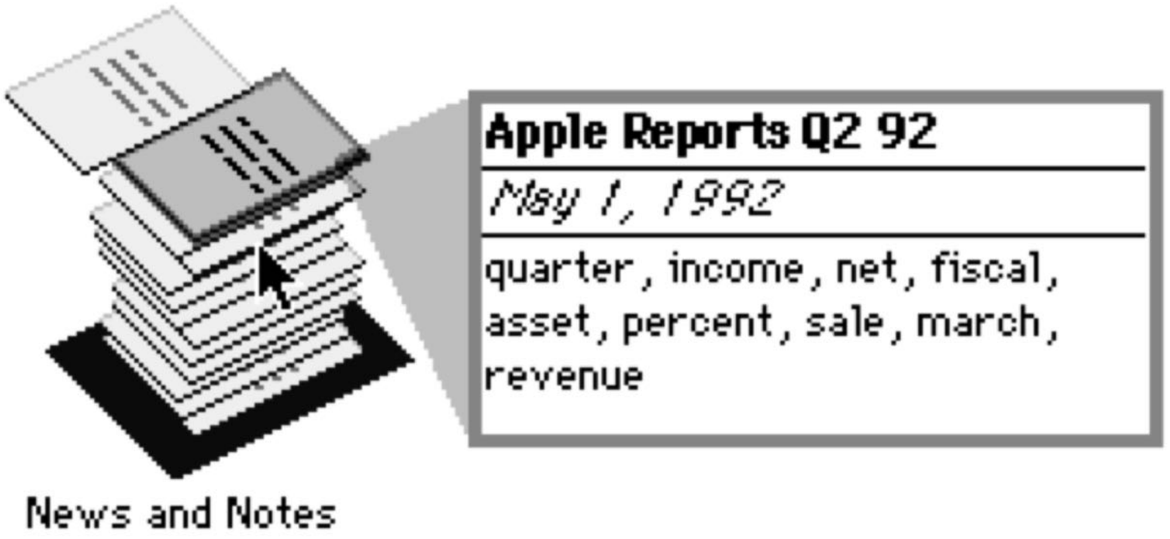
**Definition:** Includes the technical capabilities that enable the system to perform its function, i.e., the low-level details of how the system works.




[13] Houde & Hill, 1999. What do prototypes prototype?

## Dimensions Combined: *Integration*[13]

**Definition:** Represents the complete user experience with the system as envisioned in the conceptual design.




[13] Houde & Hill, 1999. What do prototypes prototype?

# Quiz 2

Complete the Canvas quiz.

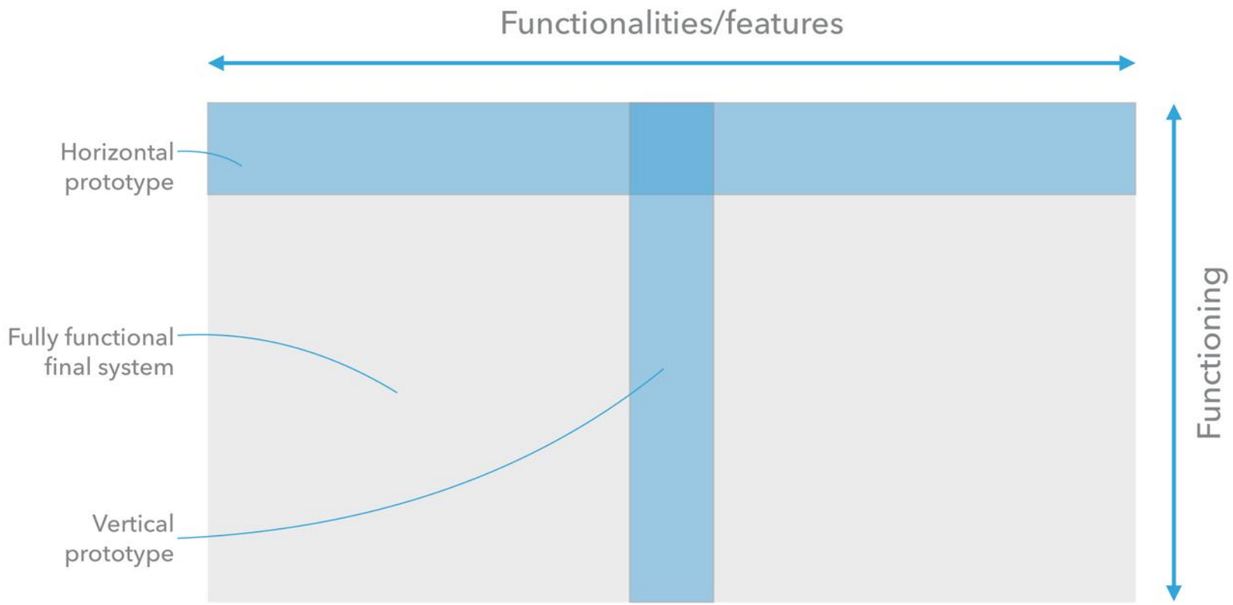
# Prototyping Scope

Consider the space of *features* and *functioning* as everything that a system does.

# Prototyping Scope, *Continued*

**Horizontal Prototype:** Provides a broad view of the entire system and focus on the user interaction rather than the functionality.

**Vertical Prototype:** Focuses on a single feature/functionality and provides the full functioning of that feature.



## Prototyping Strategies

— Throwaway prototyping
— Evolutionary prototyping
— Incremental prototyping
— Extreme prototyping

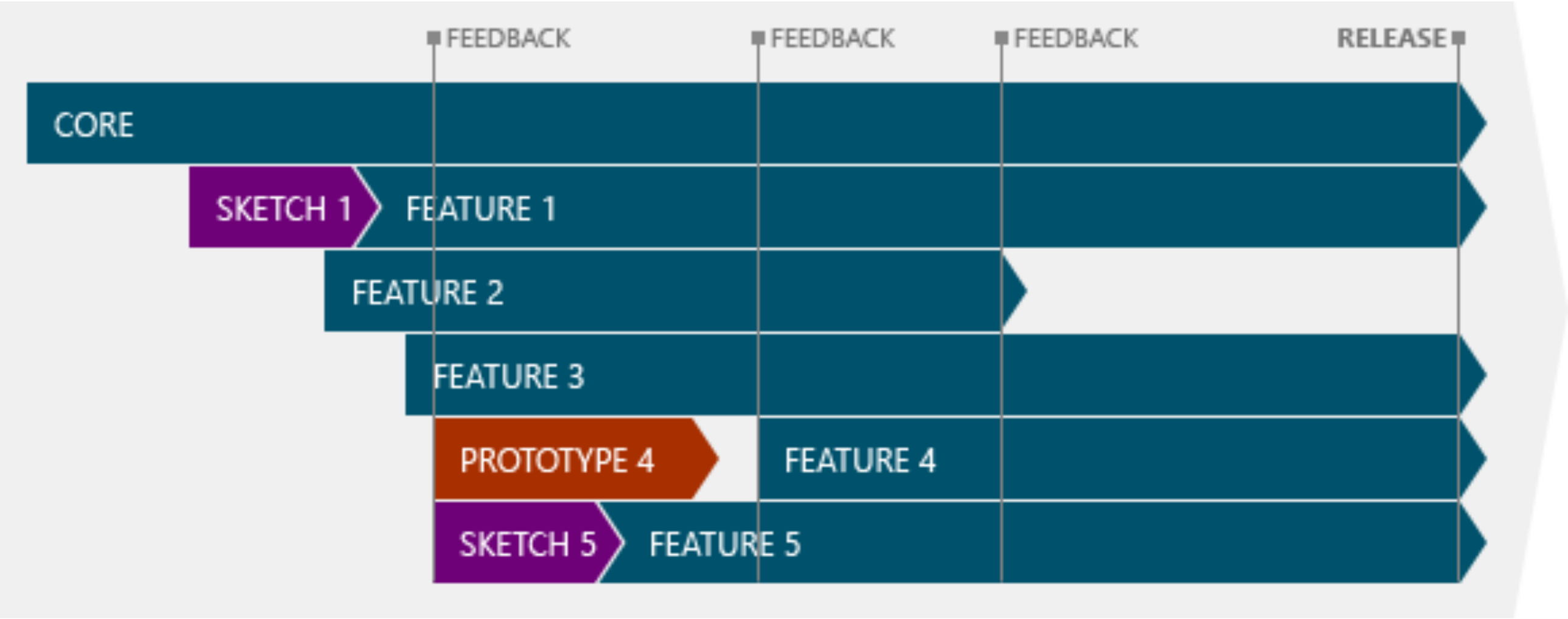
## Throwaway prototyping

**Definition:** Rapid prototyping to explore design ideas, demonstrate feasibility, communicate with stakeholders, and test the ideas with users and eventually discarding the prototype instead of further developing the model into a final product.

Most lo-fi and paper prototypes are throwaway protototypes.

Throwaway prototyping is usually combined with *sketching*.

14



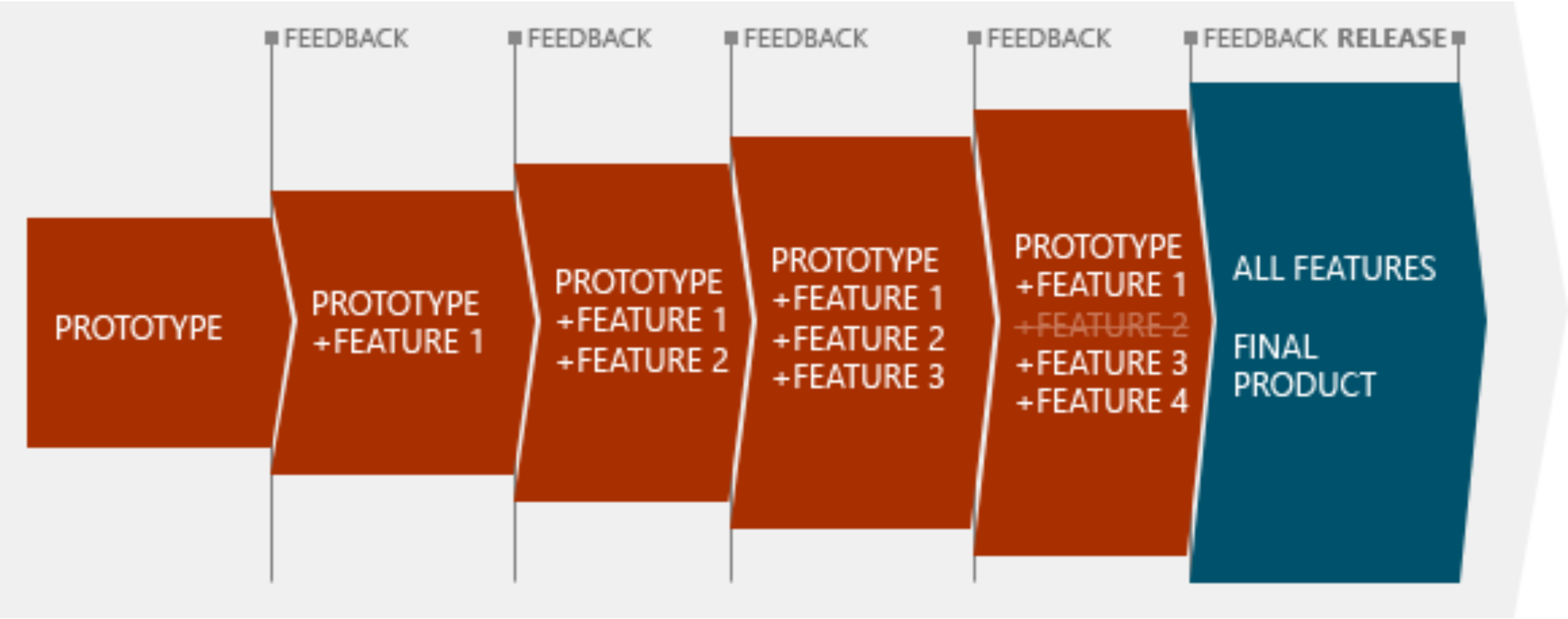

[14] Image source

## Evolutionary prototyping

**Definition:** Also called *breadboard prototyping*, the design team incrementally builds prototypes of a design idea, tests the idea with users, and refines the prototype until it reaches the desired level of maturity.

Most products we use are evolutionary prototypes that went through alpha, beta, etc. phases.

14



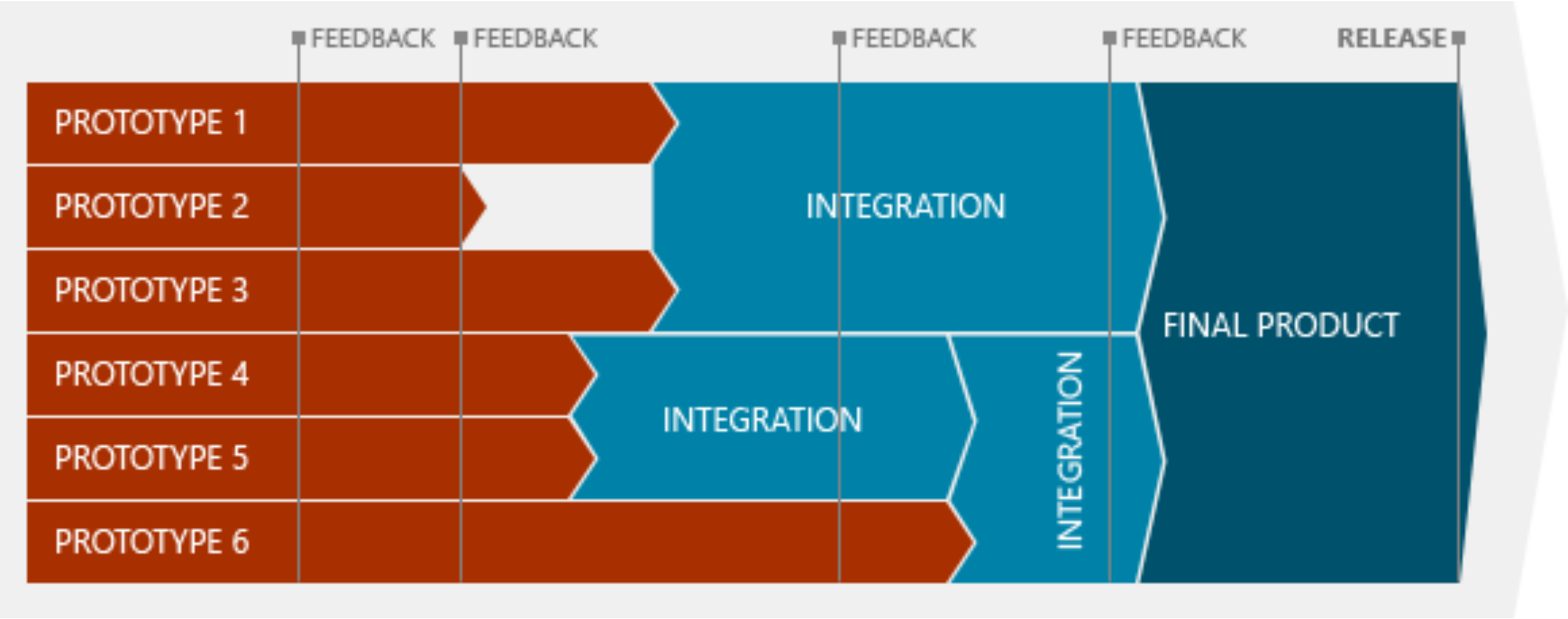

[14] Image source

## Incremental prototyping

**Definition:** Dividing system functionality into slices (vertical prototypes) based on design specifications and incrementally building each slice that is then integrated into the overall system.

Appropriate for large and complex projects.

14

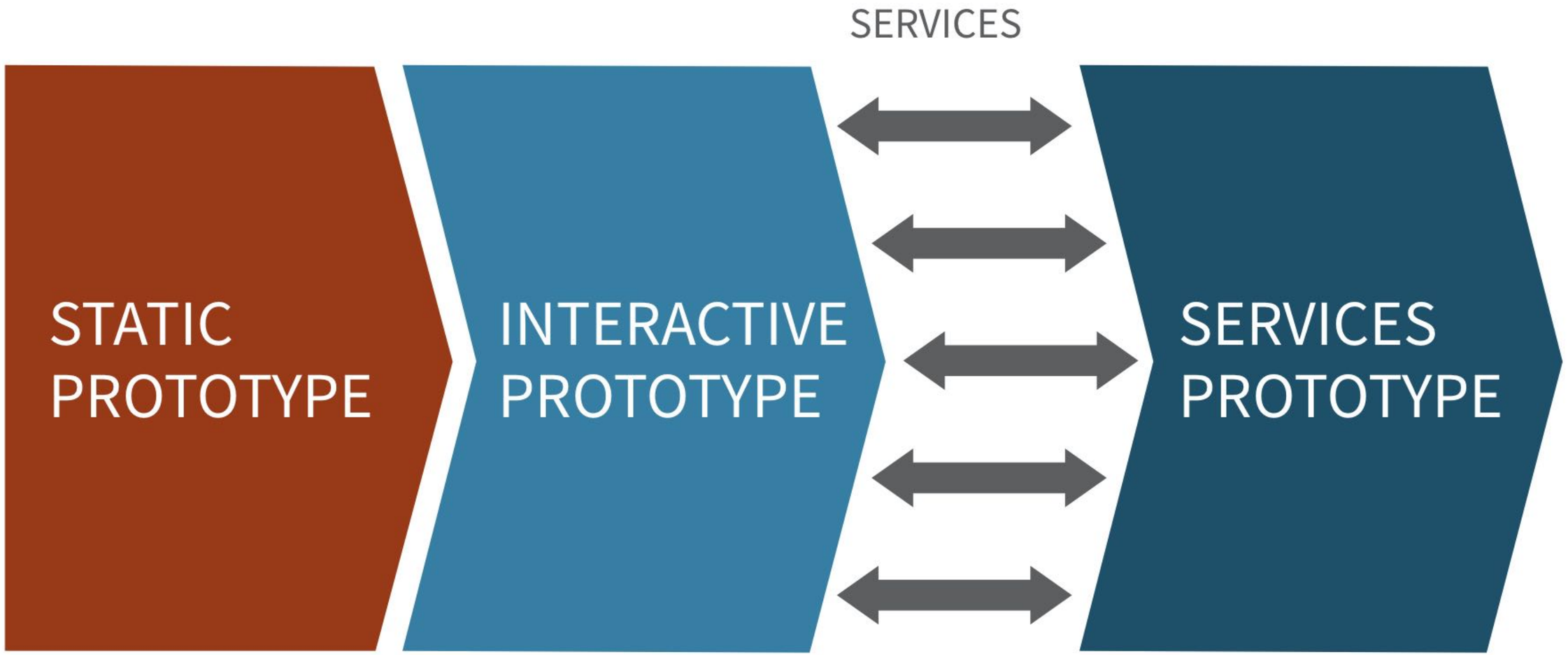



[14] Image source

## Extreme prototyping

**Definition:** Breaking down the development into three phases that build on each other: (1) building a static prototype, (2) building fully functional, interactive components that will simulate services, and (3) finally implementing the services.

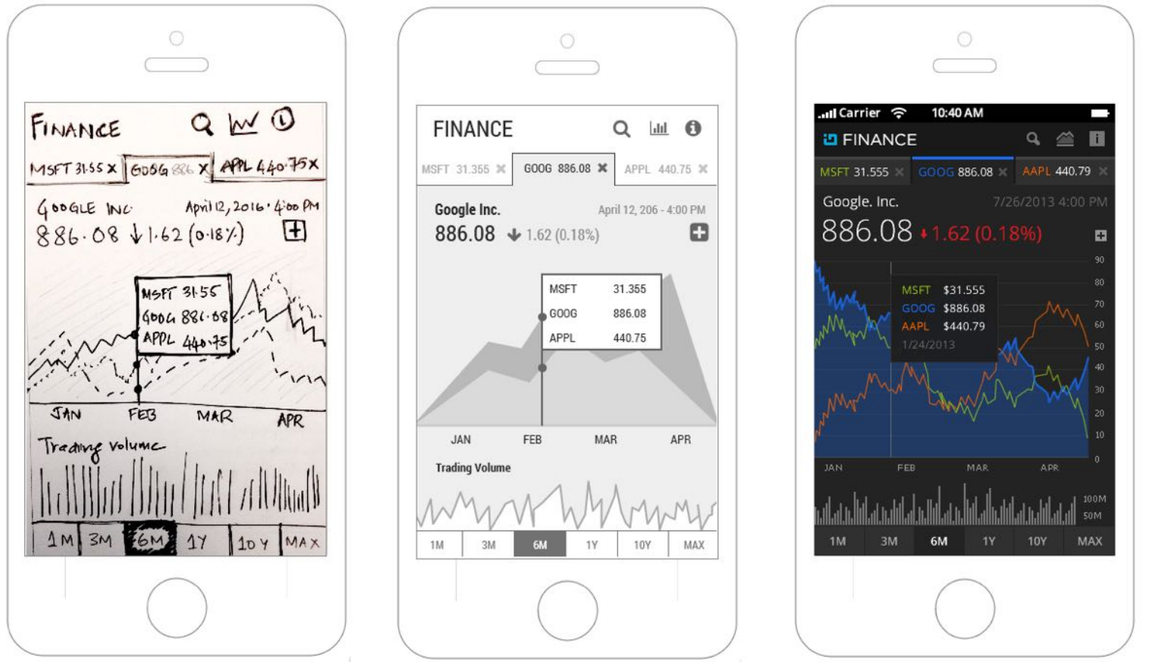
Enables rapid and parallel prototyping, testing, and refinement by removing dependencies between different components of a system or between the system and third party services.


SERVICES
STATIC PROTOTYPE
INTERACTIVE PROTOTYPE
SERVICES PROTOTYPE

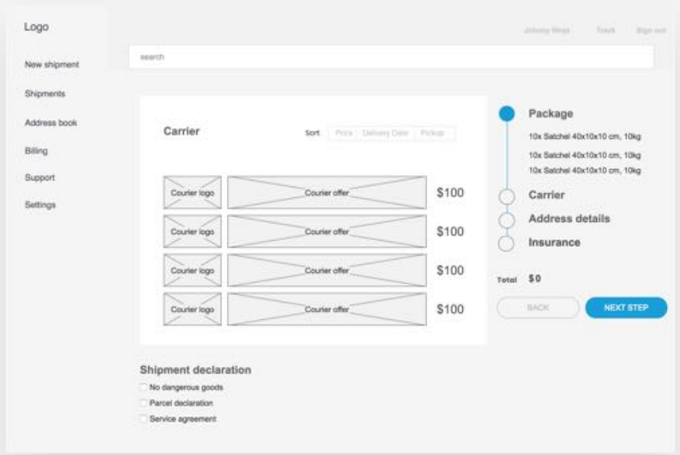
# Fidelity in Prototyping[15]

**Definition:** The level of detail in which a design is represented in the prototype.

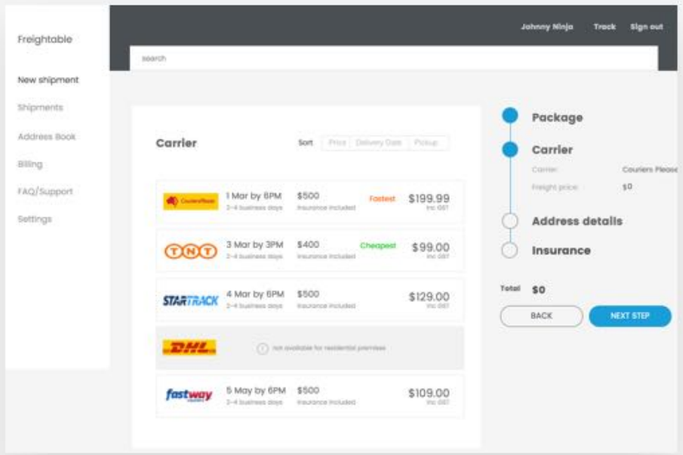
— Two ends of a fidelity spectrum:
  — Low-fidelity (lo-fi) prototyping
  — High-fidelity (hi-fi) prototyping



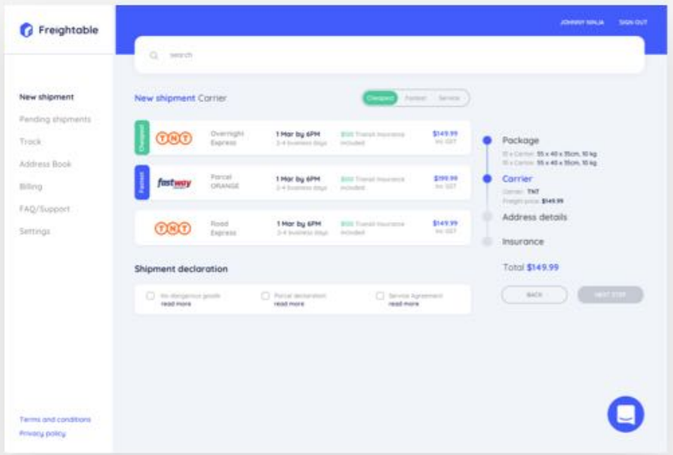

[15] Image source




Low-fidelity




High-fidelity




Final design

[16] Image source

# Why is fidelity important?[17]

The more "done" the prototype looks, the narrower the feedback will be; and vice versa.

**This is just an idea. I'm not done!**

As a principle, use no higher resolution than is necessary.

[17] Image source: *unknown*

## Why bother with lo-fi prototyping?

- Has lower development cost
- Prevents designers from prematurely wedding to specific design ideas
- Enables exploring, communicating, and testing of conceptual designs
- Helps designers identify structural, navigation, and organizational issues

## Why bother with lo-fi prototyping? *Continued*

- Allows rapid evaluation of multiple design ideas
- Enables communication among stakeholders
- Allows identifying market requirements before dedicating resources to development

## Limitations of Lo-fi Prototyping

- Requires a facilitator to drive the prototype during testing and communication
- Offers limited ability to identify breakdowns in design
- Lacks sufficiently low-level specifications for development
- Provides limited sense of feasibility

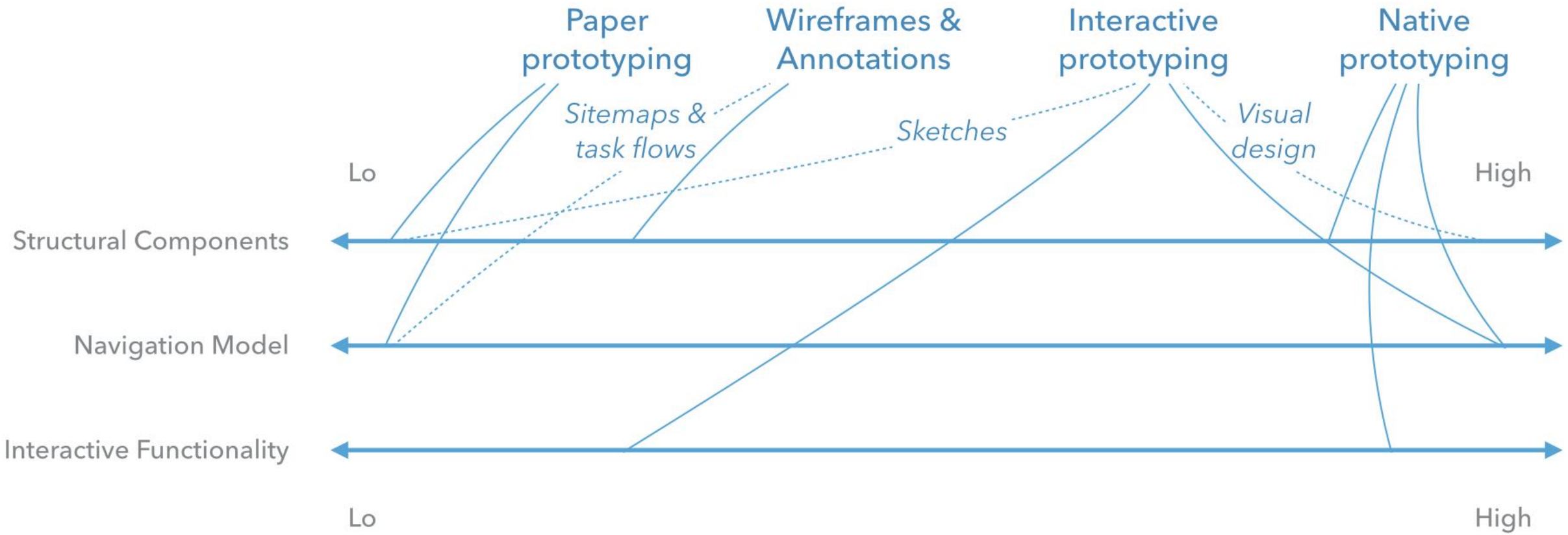
# Quiz 3

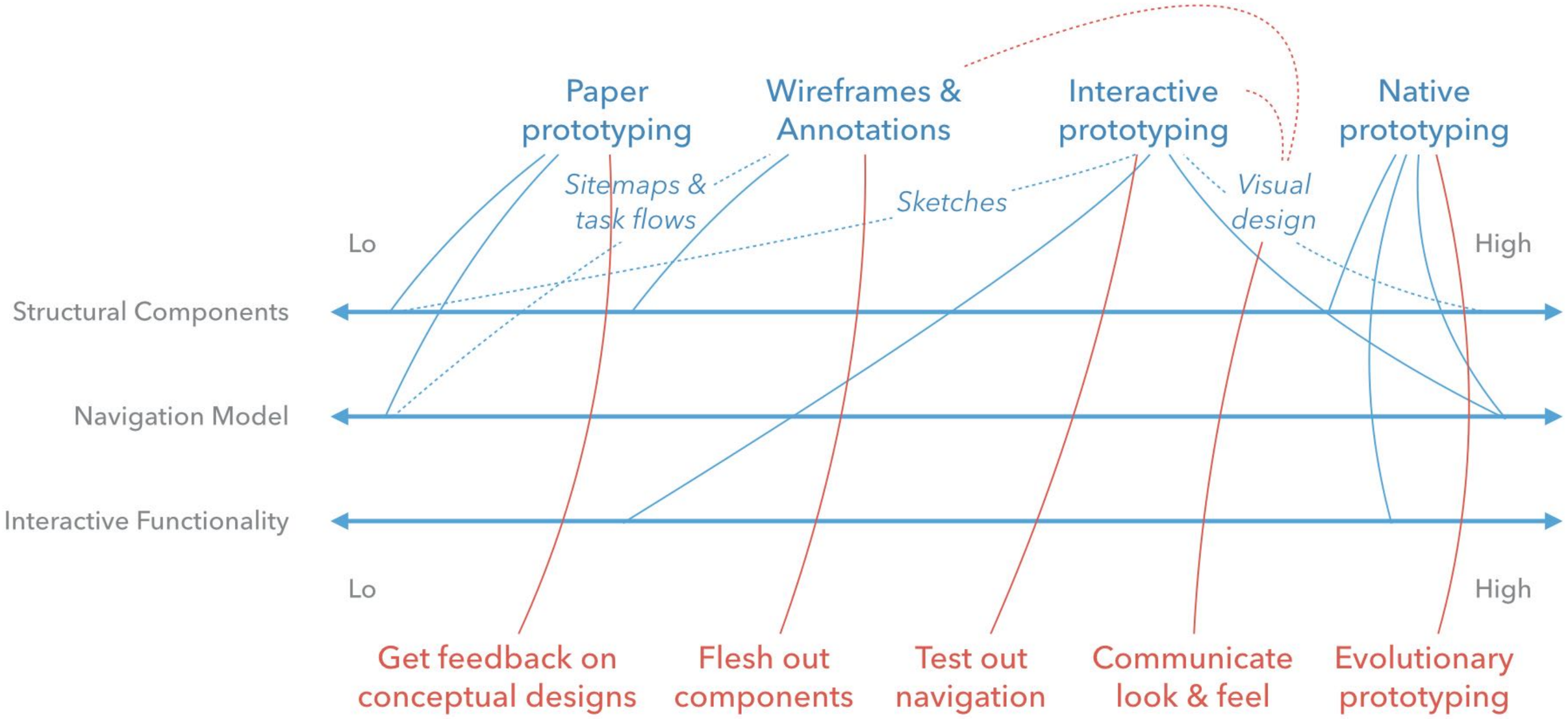
Complete the Canvas quiz.

# Choosing the Right Method

## How do we choose the right method?

- Various methods, approaches, and strategies for prototyping
- Criteria for choosing the right method:
  - Design team goals
  - Capabilities and resources
  - Available time for prototyping


Paper prototyping
Wireframes & Annotations
Interactive prototyping
Native prototyping
Sitemaps & task flows
Sketches
Visual design
Lo
High
Structural Components
Navigation Model
Interactive Functionality
Lo
High


Paper prototyping
Wireframes & Annotations
Interactive prototyping
Native prototyping
Sitemaps & task flows
Sketches
Visual design
Lo
High
Structural Components
Navigation Model
Interactive Functionality
Lo
High
Get feedback on conceptual designs
Flesh out components
Test out navigation
Communicate look & feel
Evolutionary prototyping

# In-Class Activity

## Paper-prototyping interaction with a *mobile fitness app*

We will paper-prototype user interaction with a *mobile fitness app*:

1. We will make breakout groups of two
2. Choose from one of the following: (1) logging into the app; (2) logging food; (3) logging exercise; (4) reviewing progress for the past week
3. Think about design elements, components, what will change and be updated, and how you might simulate *visual design* and *navigation/updates*
4. Using the tempalte, prototype, demonstrate the prototype to your partner
5. Volunteer to demonstrate to class

# Quiz 4

Complete the Canvas quiz.

# What did we learn today?

— Prototyping methods
— Prototyping theory
— Choosing the right method
— Hands-on activity