

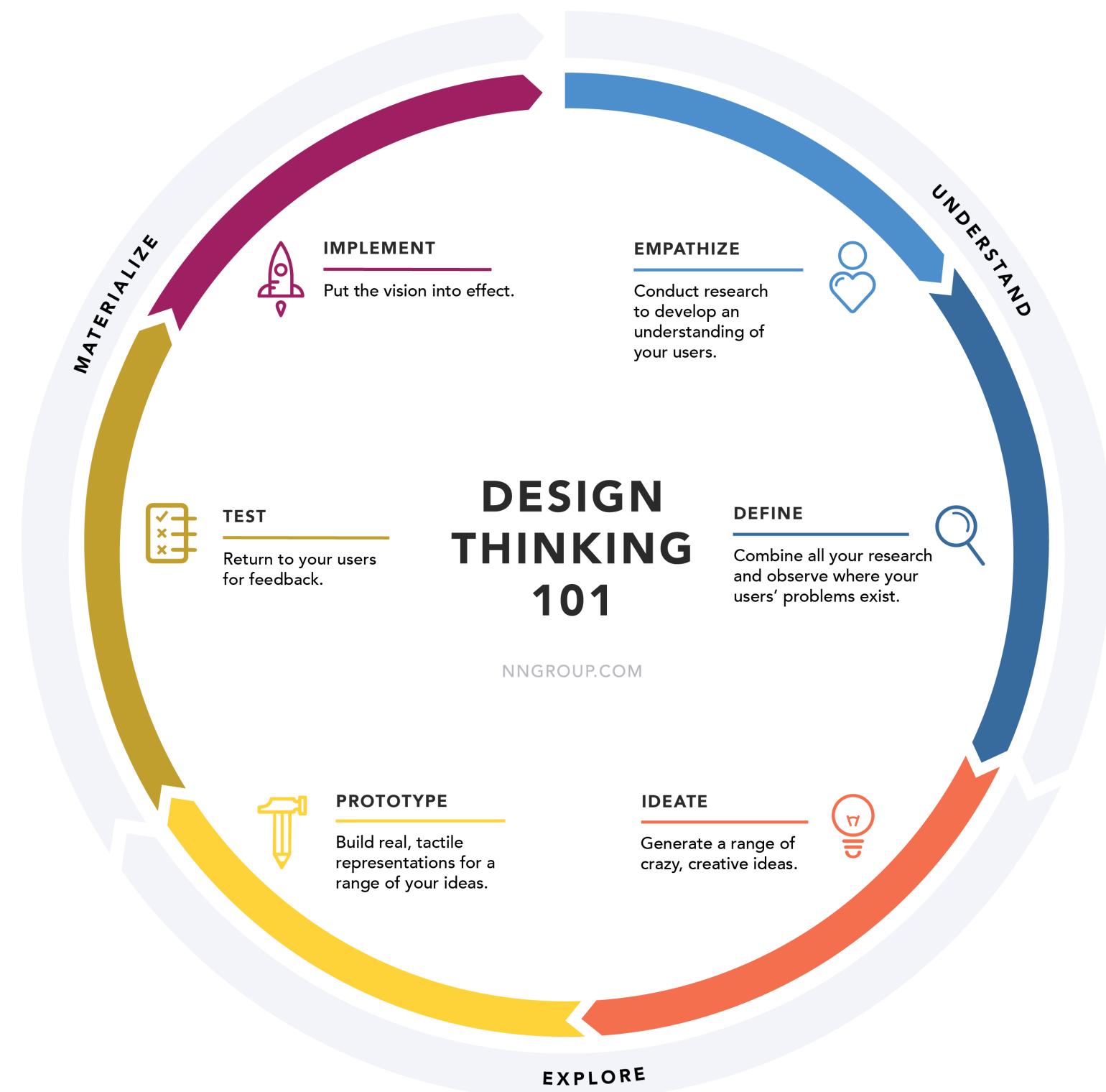
Building User Interfaces

Prototyping

Yuhang Zhao & Cole Nelson

What we will learn today?

- Prototyping methods
- Prototyping theory
- Choosing the right method



Prototyping¹

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.



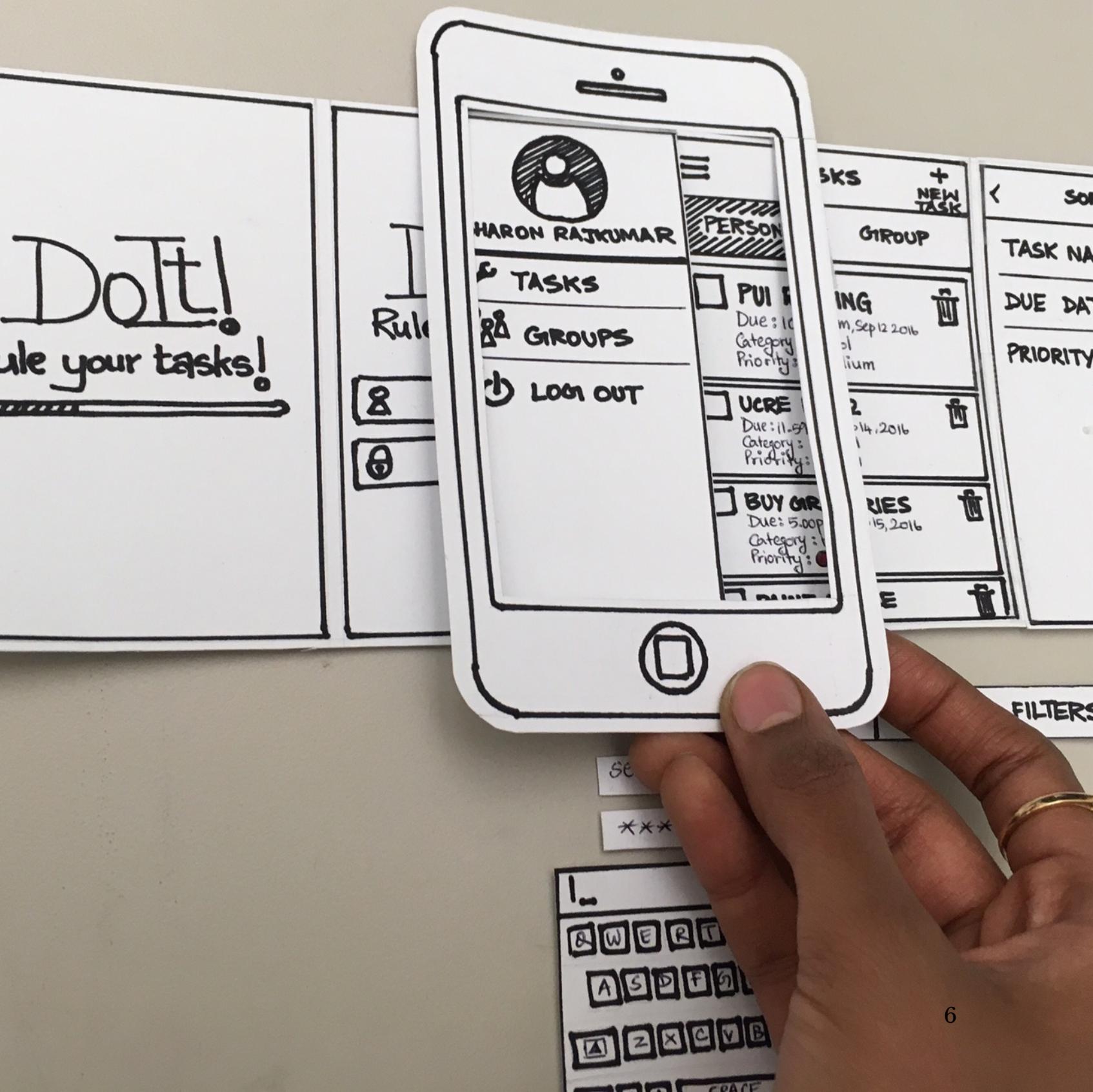
¹Image source

Prototyping Methods

- Paper prototyping
- Wireframes (with Annotation)
- Interactive prototyping
- Native prototyping

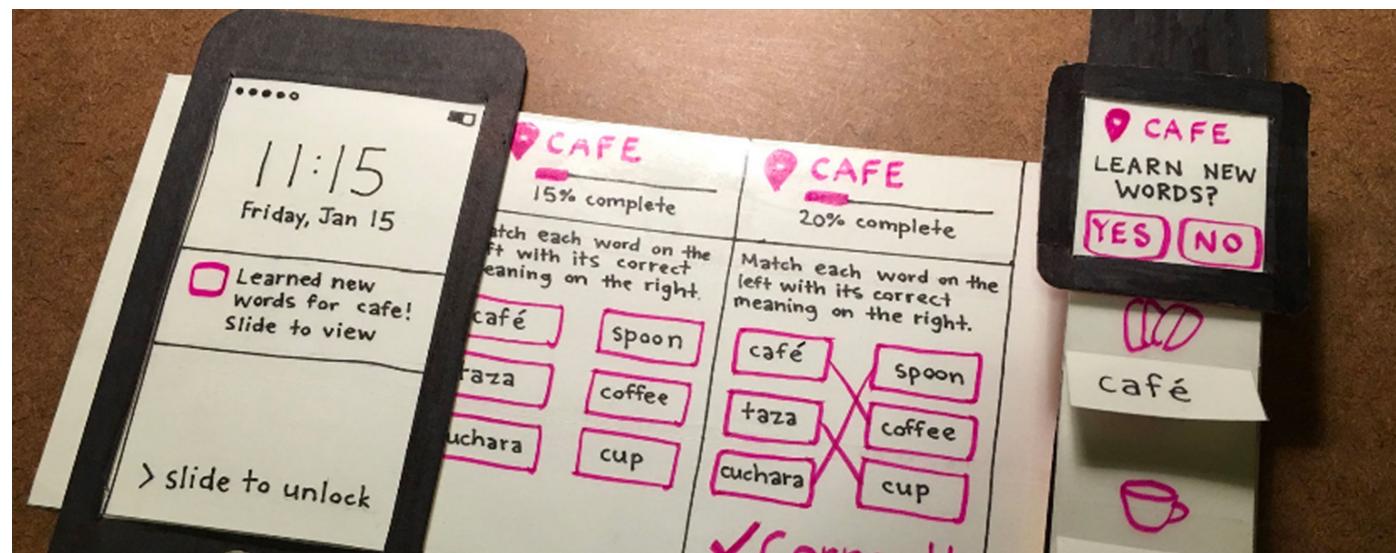
Paper Prototyping²

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.



²Image source

Most useful at the earliest stages of the design process.³



³Image source: [Left top](#), [Left bottom](#), [Right](#)

FILTERS SAVE
ASSIGNED TO ME
GROUPS
PILATES CLASS
UCRE CLASS
AEROBICS CLASS
FAMILY

PERSONAL GROUP
TASK NAME SAVE
DUE DATE
PRIORITY
CATEGORY SCHOOL
FITNESS
HOME

PERSONAL GROUP
TASK NAME SAVE
DUE DATE
PRIORITY
CATEGORY SCHOOL
FITNESS
HOME

X CLEAR FILTERS
Scenarios:
11 SORT FILTER SEARCH

Task
NEW TASK SAVE
TASK NAME
ASSIGN TO SAVE
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GROUPS UCRE GROUP
AEROBICS CLASS
FAMILY
NEW GROUP
CATEGORY
PRIORITY

DATE DUE SAVE
SEP 2016
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18 19 20 21 22 23 24
25 26 27 28 29 30

TIME DUE SAVE
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1 05
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CATEGORY SAVE
SCHOOL
FITNESS
HOME
NEW CATEGORY

PRIORITY SAVE
HIGH
MEDIUM
LOW

GROUPS NEW GROUP
PILATES CLASS
UCRE GROUP
AEROBICS CLASS
FAMILY

GROUP SAVE
GROUP NAME
AEROBICS CLASS
GROUP MEMBERS
Ruth Nelson
Annie Vannelli
Valliammai Palraj
Andie Jenkins
Bernice Mack
Bethany Matthew
Caroline Watters
Charlotte Wilson
Dennis Paul
Edward Morgan
Rick Turner

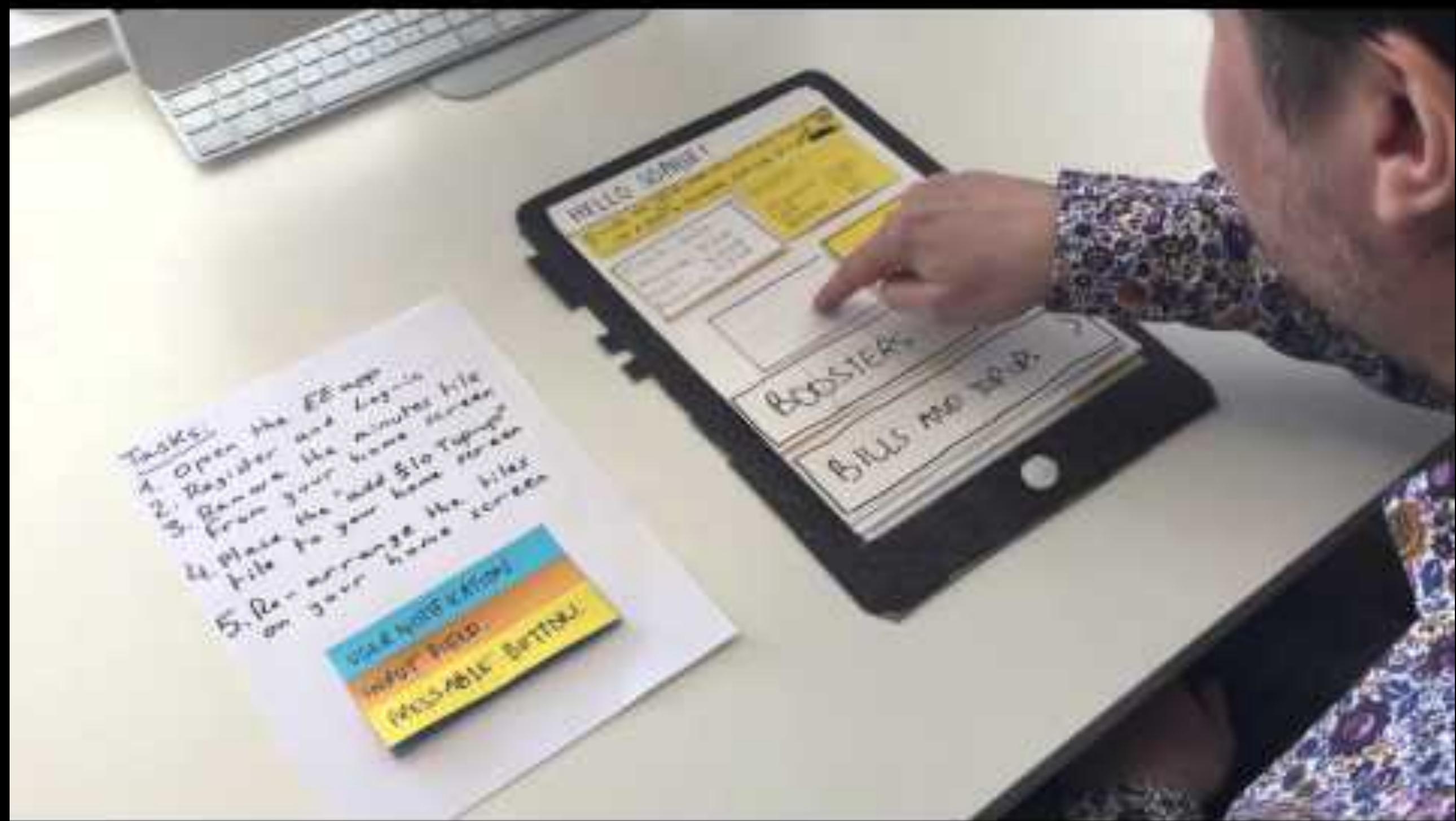
ADD MEMBERS SAVE
Search
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GROUP MEMBERS
Andie Jenkins
Bernice Mack
Bethany Matthew
Caroline Watters
Charlotte Wilson
Dennis Paul
Edward Morgan
Rick Turner

NEW GROUP SAVE
GROUP NAME
CATEGORY NAME
GROUP MEMBERS

NEW CATEGORY SAVE
CATEGORY NAME
GROUP MEMBERS

Are you sure you want to discard the changes made?
Cancel Discard

Are you sure you want to log out?
Cancel Log Out



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.

World's hottest
destinations
for vegans

Europe national globe hotspots hiking miles sleep Turkey
International trip Paris, Amsterdam national earth feel
bus diary tour operator uncharted maps Europe
guide frequent flyer yacht miles chartering, the China
country hospitality spa Paris luxury.

[READ MORE →](#)

An Amazing
Journey Through
The Mountains.

Europe national globe hotspots hiking
miles sleep Turkey international trip Paris,
Amsterdam national earth feel bus
diary tour operator uncharted maps
Europe guide frequent flyer yacht miles
chartering, the China country hospitality spa Paris luxury.

[Image source: Left, Right](#)

What do you think
Of Travelling? →

The travel mystery revealed.

Europe national globe hotspots hiking miles sleep Turkey
international trip Paris, Amsterdam national earth feel
bus diary tour operator uncharted maps

[READ MORE →](#)

Europe national globe hotspots hiking miles sleep
international trip Paris, Amsterdam national
bus diary tour operator uncharted
Europe guide frequent flyer yacht miles
chartering, the China country hospitality spa Paris luxury.

[READ MORE →](#)

Tips for Traveling in
Winter Season

HOME DESTINATIONS TRAVEL TIPS TRAVEL RESOURCES

Why you should go for a trip... →

**Traveling is Easier
than You think.**

[READ MORE →](#)

Adventure & Action In Travel

Easy ways to
faster.

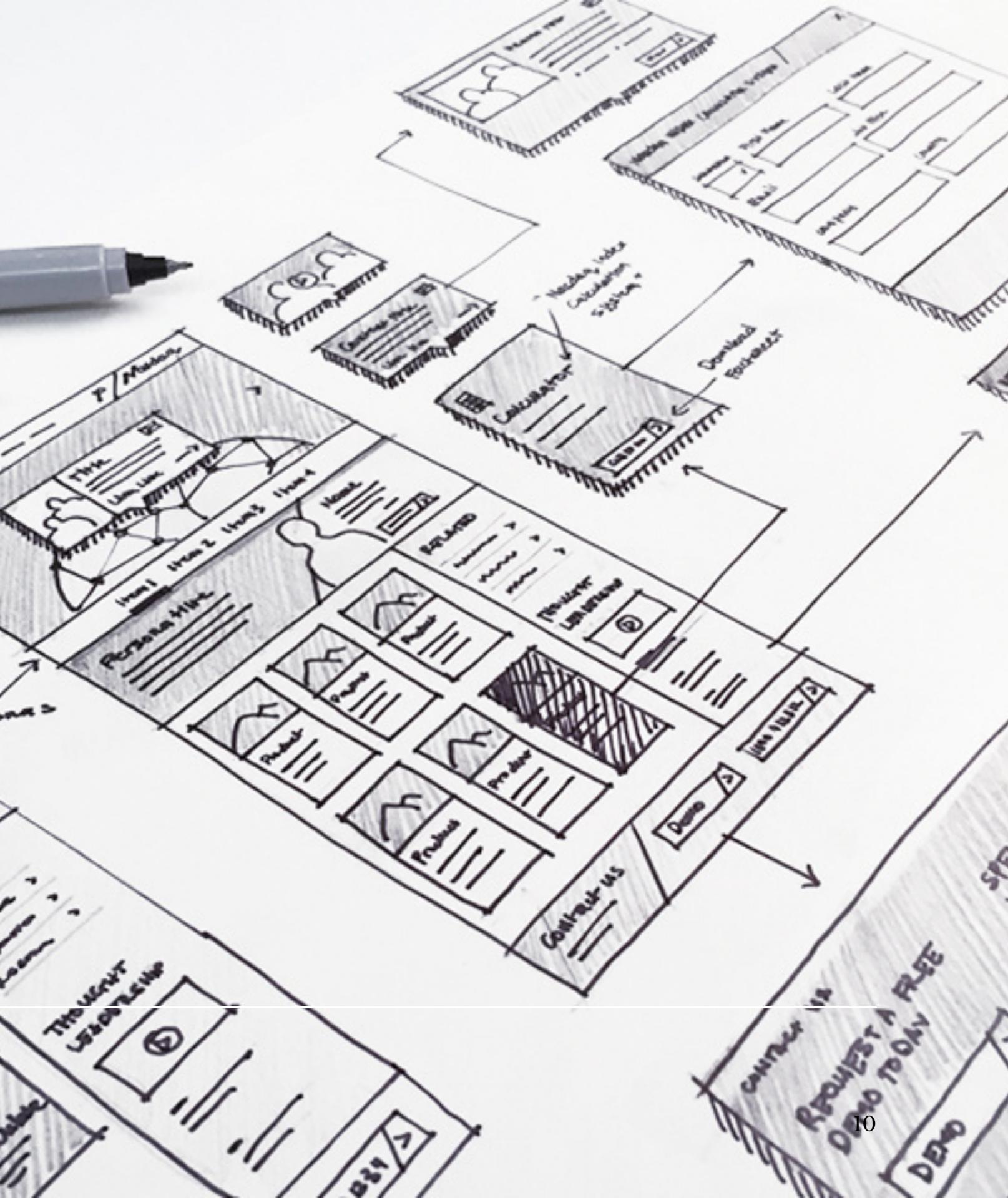
Europe national globe hotspots hiking miles sleep Turkey
international trip Paris, Amsterdam national earth feel
bus diary tour operator uncharted maps Europe
guide frequent flyer yacht miles chartering, the China
country hospitality spa Paris luxury.

[READ MORE →](#)

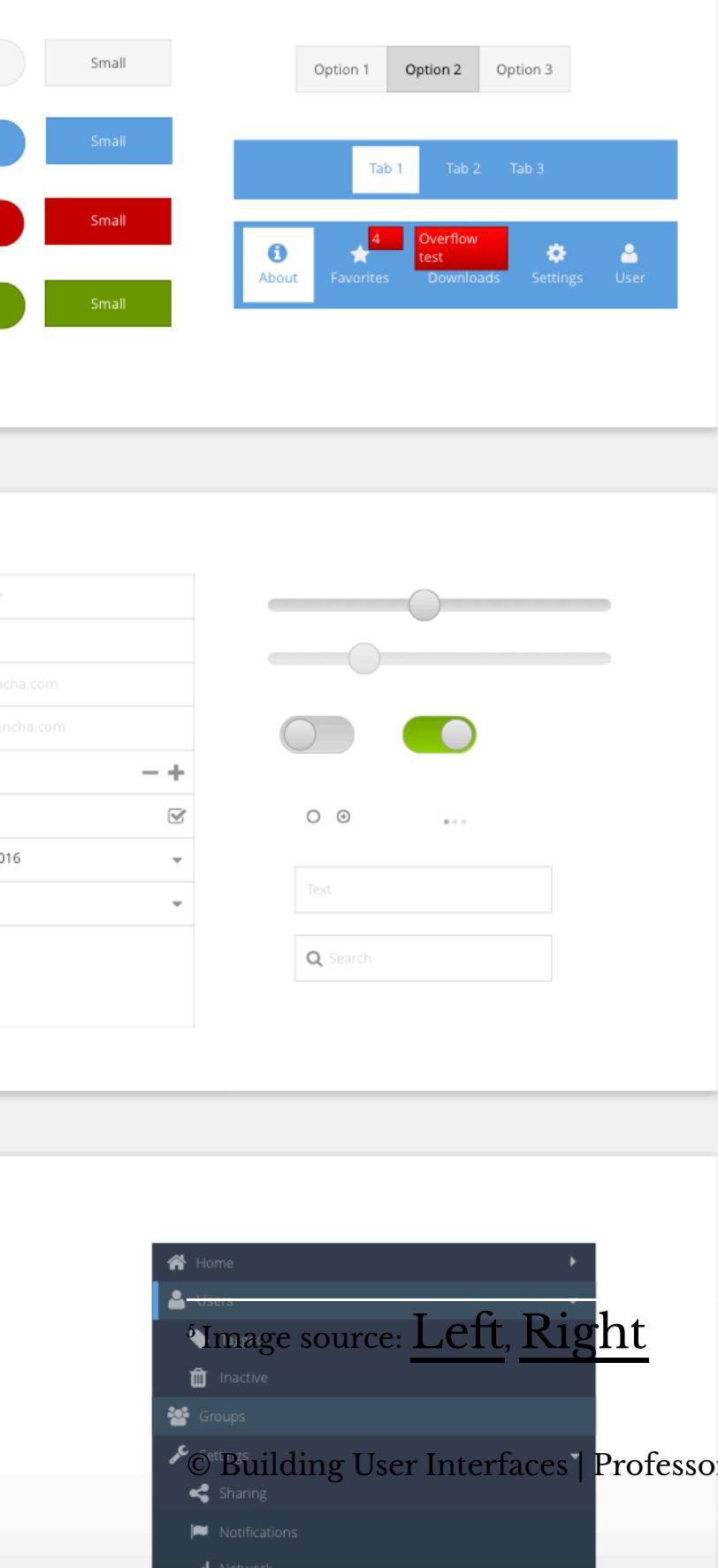
The travel mystery revealed.

Europe national globe hotspots hiking miles sleep Turkey
international trip Paris, Amsterdam national earth feel
bus diary tour operator uncharted maps

[READ MORE →](#)



5



DataViews

	John Battelle Federated Media Publishing Inc.
	Carol Bartz Yahoo!
	Tim O'Reilly O'Reilly Media, Inc.
	Eric Schmidt Google
	Evan Williams Twitter, Inc.

Overlays

The screenshot shows a mobile application interface. At the top, there is a navigation bar with three tabs: "Master" (gray background), "Journeyman" (yellow background, indicating it is the active tab), and "Apprentice" (white background). Below the tabs is a date range selector with the following text:
February 26, 2014 March 28, 2015
At the bottom of the screen, there is a large yellow banner with the text "o | Lecture 17: Prototyping".

The quick brown fox jumps over the lazy dog.



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.

MASTHEAD

Home > Shopping Cart

Shopping Cart

+ Save Cart | View Printable Cart

Your Items

	Unit Price	Quantity	Total Price
Dunlop Original Crybaby Wah Pedal Item #326874 In Stock Condition: New	\$100.00 -\$150.00	2	\$200.00
Dunlop Original Crybaby Wah Pedal Item #326874 In Stock Condition: New	\$100.00 -\$150.00	2	\$200.00

Delivery Options
By selecting any of the below shipping option will affect your entire order

Shipping: leaves warehouse in 3-4 days [Calculate Shipping](#)

Pick up in store: [check stores](#)

[Shipping outside the US?](#)

[Continue Shopping](#) [Continue to next step](#)

Product Image

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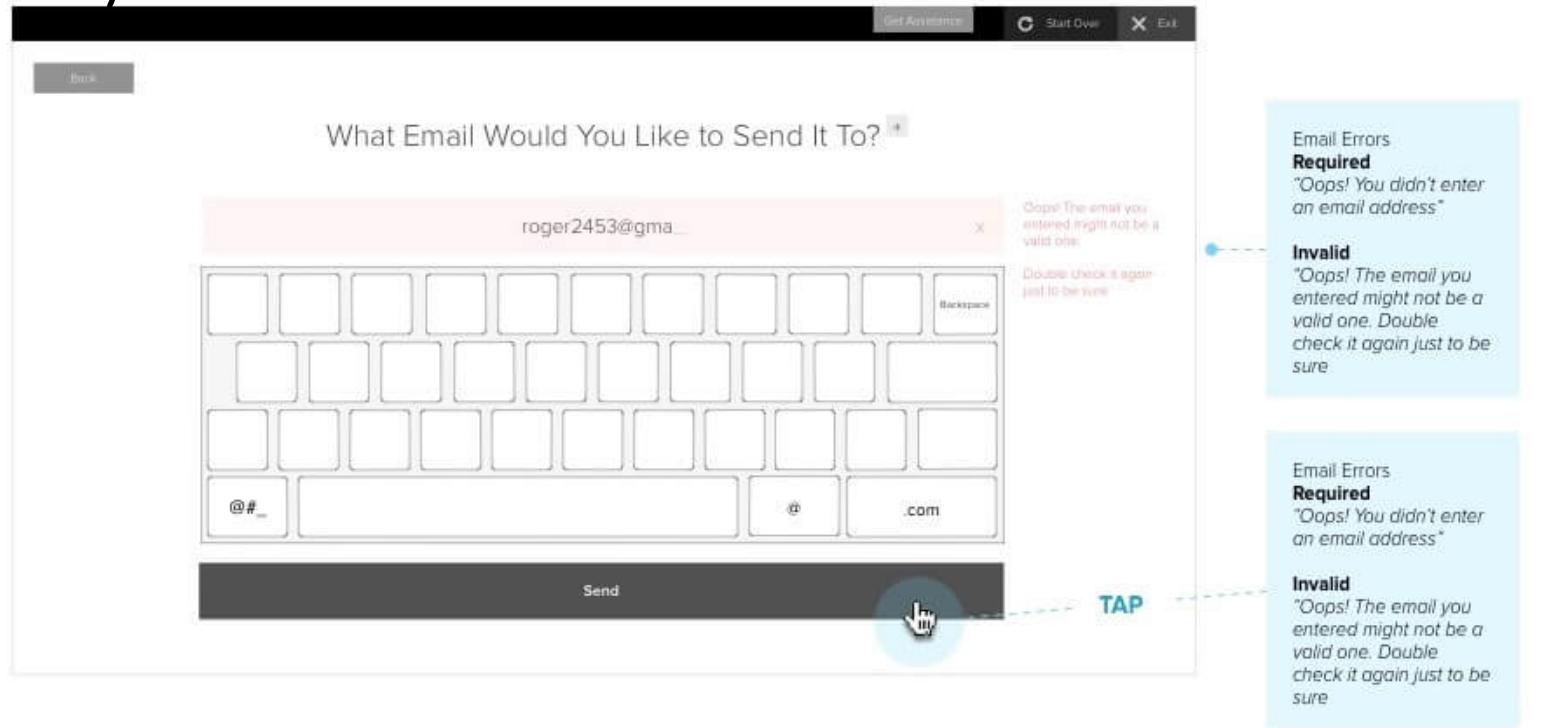
997

<

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	<p>Direct users to Pick up in store page (Page 3)</p> <p>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</p> <p>User can input a zip code in the search bar above to change location</p> <p>Please sync up this overlay and the one used on Product detail so that they are identical</p> <p>Page functionality is the same as the one on Product Detail, except we have made the following changes</p>	n/a	N

Email Validation & Confirmation



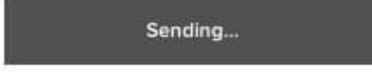
Success State



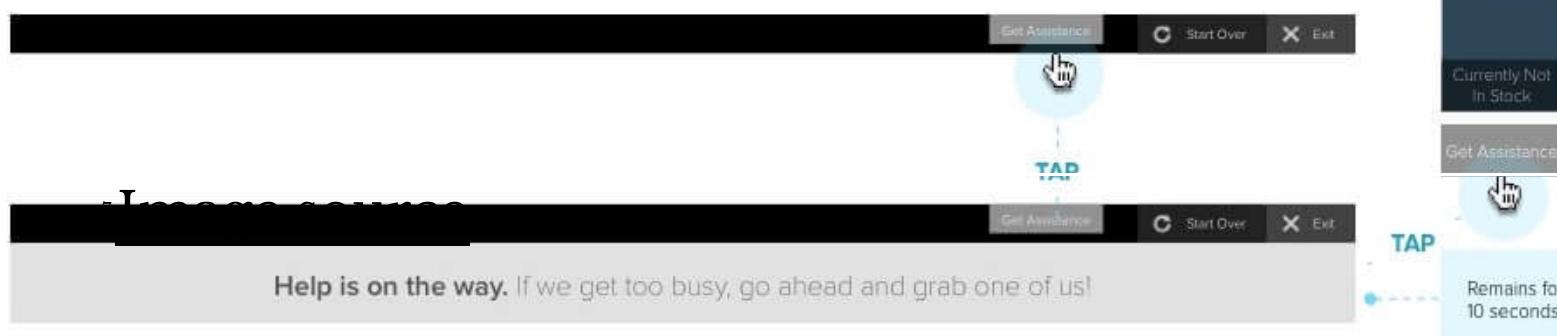
Failure State



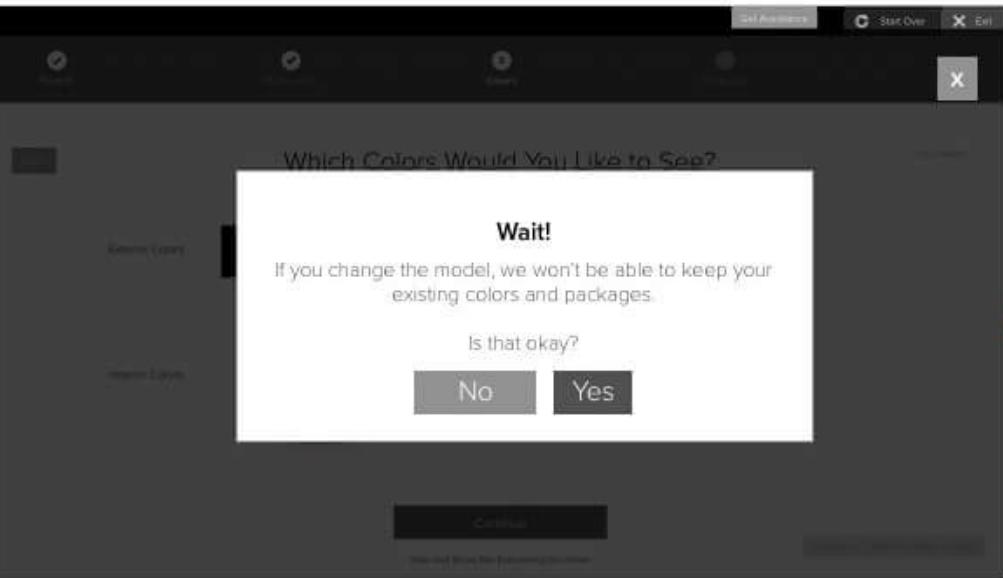
Sending State



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?"

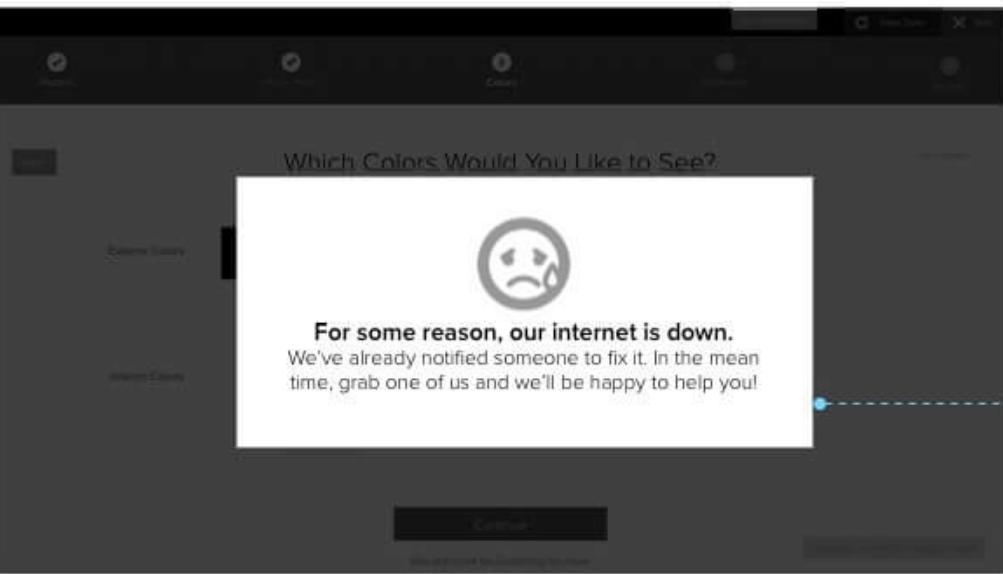
Start Over Event

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

Exit Event

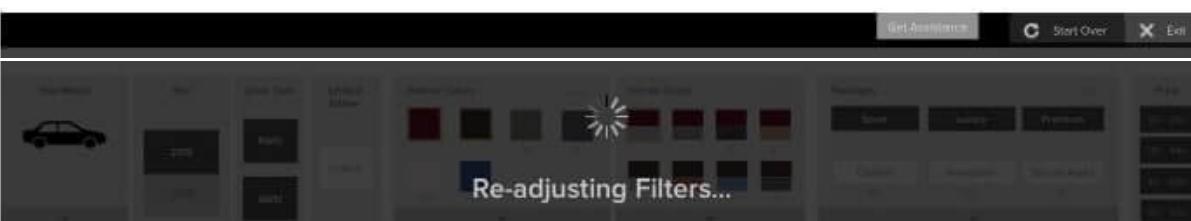
"You're about to exit the inventory search and will lose any work you've done so far. Is that okay?"

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.

Home

LATEST ADVENTURES

- CONQUERING EL CAPITAN**
Gear and Guides
- CAMPING: THE ROCKY MOUNTAINS**
Top destination
- LONGREAD: JOSHUE TREE**
Dept. of History

Latest - Rocky Mountains

ROCKY MOUNTAINS
Top destination for 2015

"There are days which occur in this climate, at almost any season of the year, wherein the world reaches its perfection, when the air, the heavenly bodies, and the earth, make a harmony, as if nature would indulge her offspring; when, in these bleak upper side of the planet, nothing is to desire that we have heard of the happiest latitudes, and we bask in the shining hours of Utah or Montana; when everything that has life gives signs of..."

SEE MORE

Feature Story - Zion

Backpacking Through Southern U

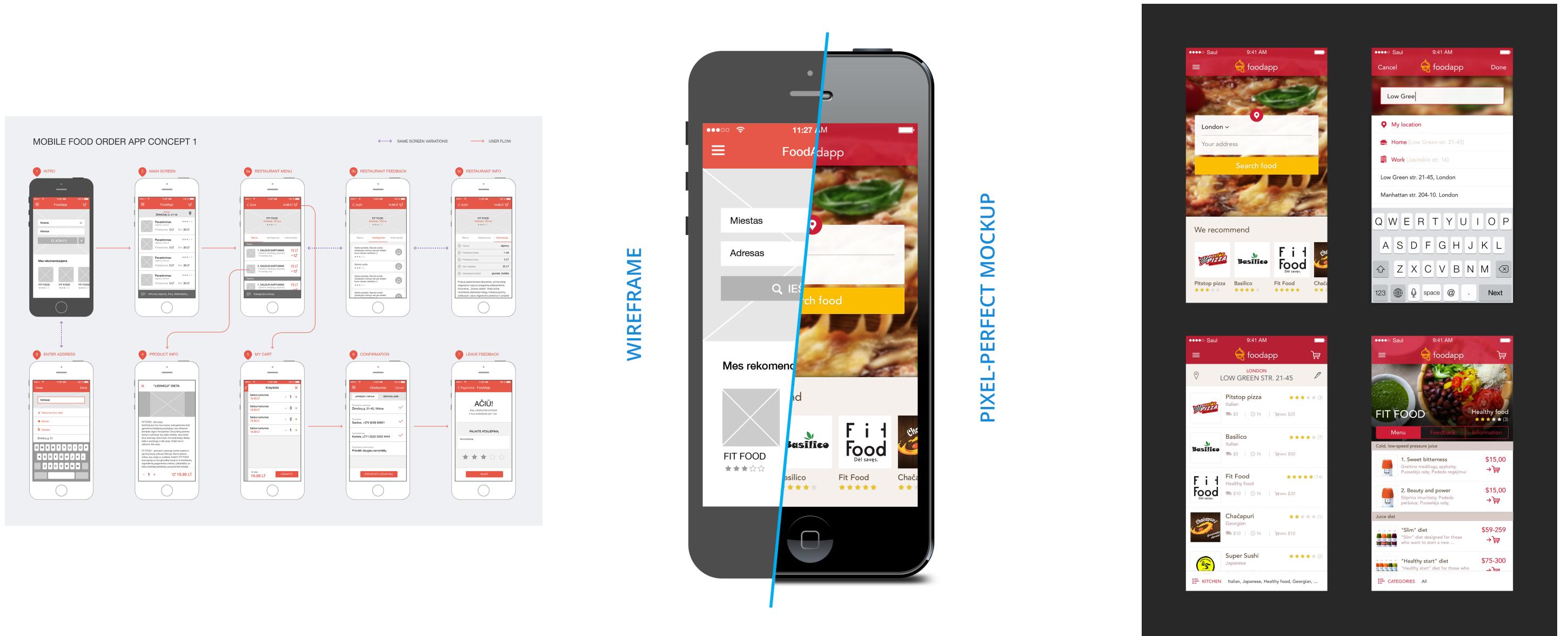
with Talin Wadsworth

10 DAYS | 54 MILES

Mt Majestic

Image source

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



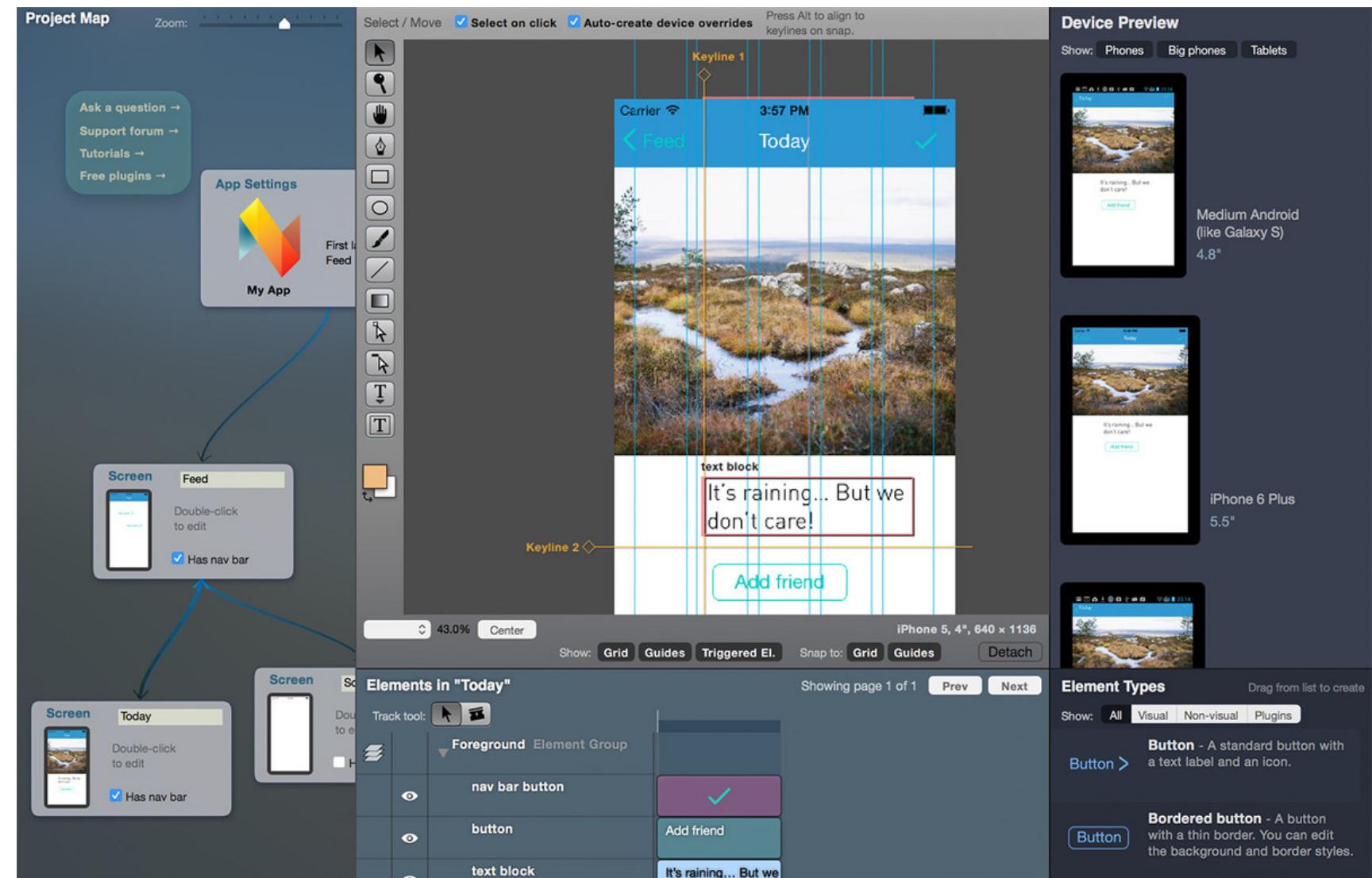
⁹ Images source

Native prototyping¹⁰

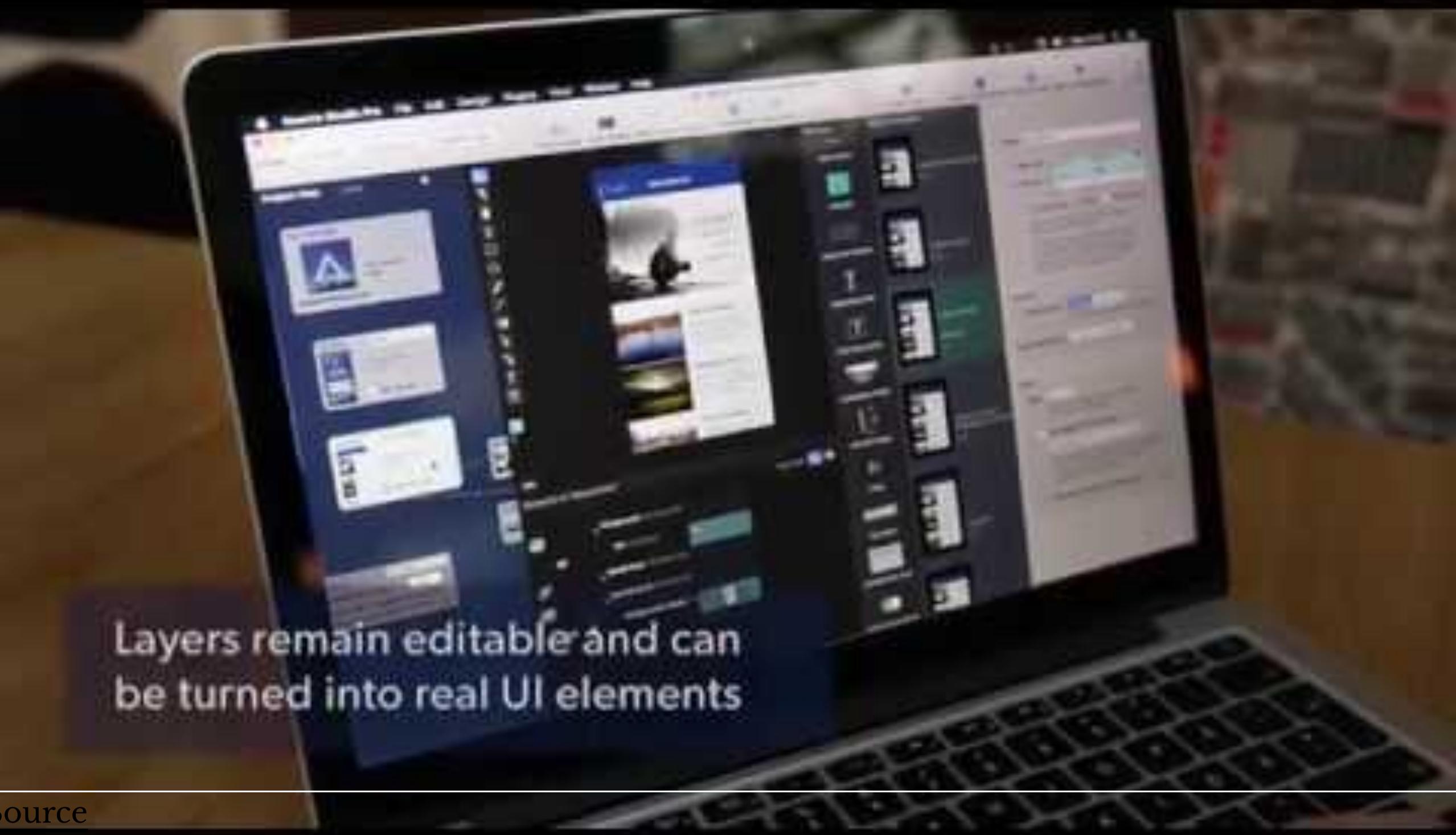
Definition: Implementing and testing design ideas on the target technology platform of the design.

Examples:

- React Studio
- Bootstrap Studio



¹⁰[Image source](#)



Source

ICA G: Prototyping

Create a *lo-fi* prototype of Badger Mart for a mobile device!

Re-visit the HW7 Demo video for features...

- A user should be able to view available products.
- A user should be able to add and remove products from their basket.
- A user should be able to submit an order.

[Link to Figma Education team \(CS571 F24\) to access professional features](#)

Prototyping Theory

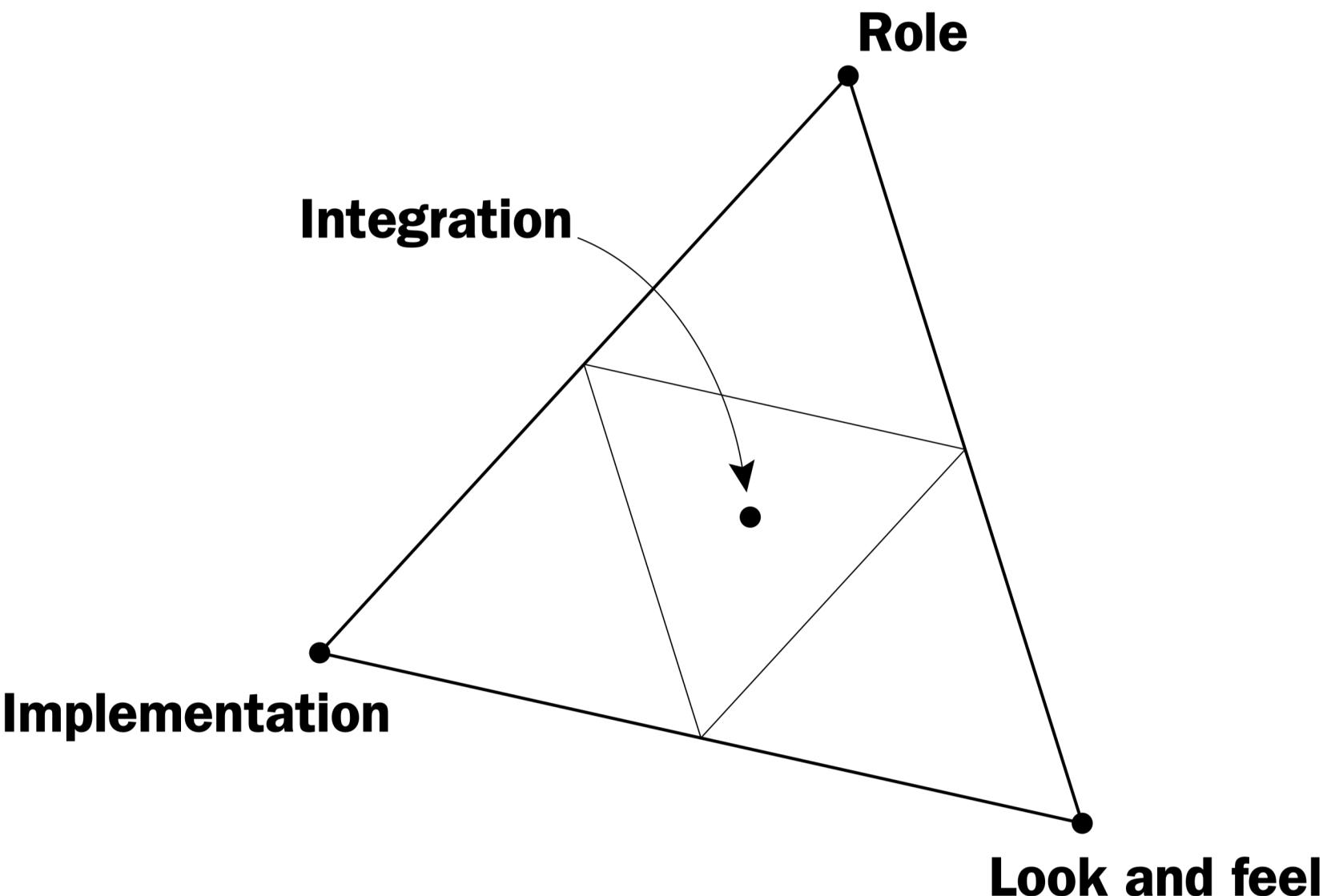
Prototyping Models & Strategies

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

Three-dimensional Model of Prototyping¹³

Prototypes represent three dimensions of a design idea:

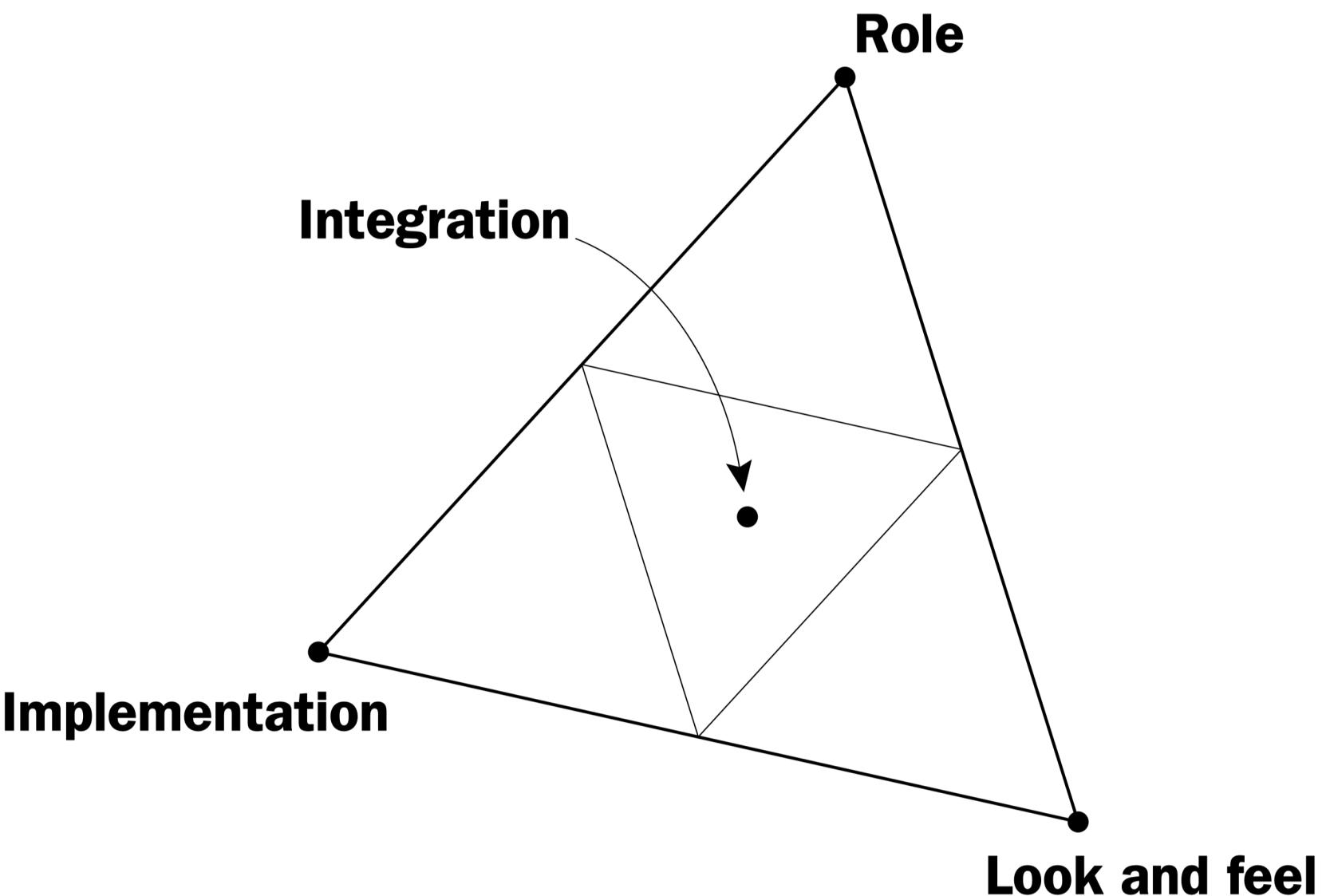
1. Role
2. Look and feel
3. Implementation



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

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

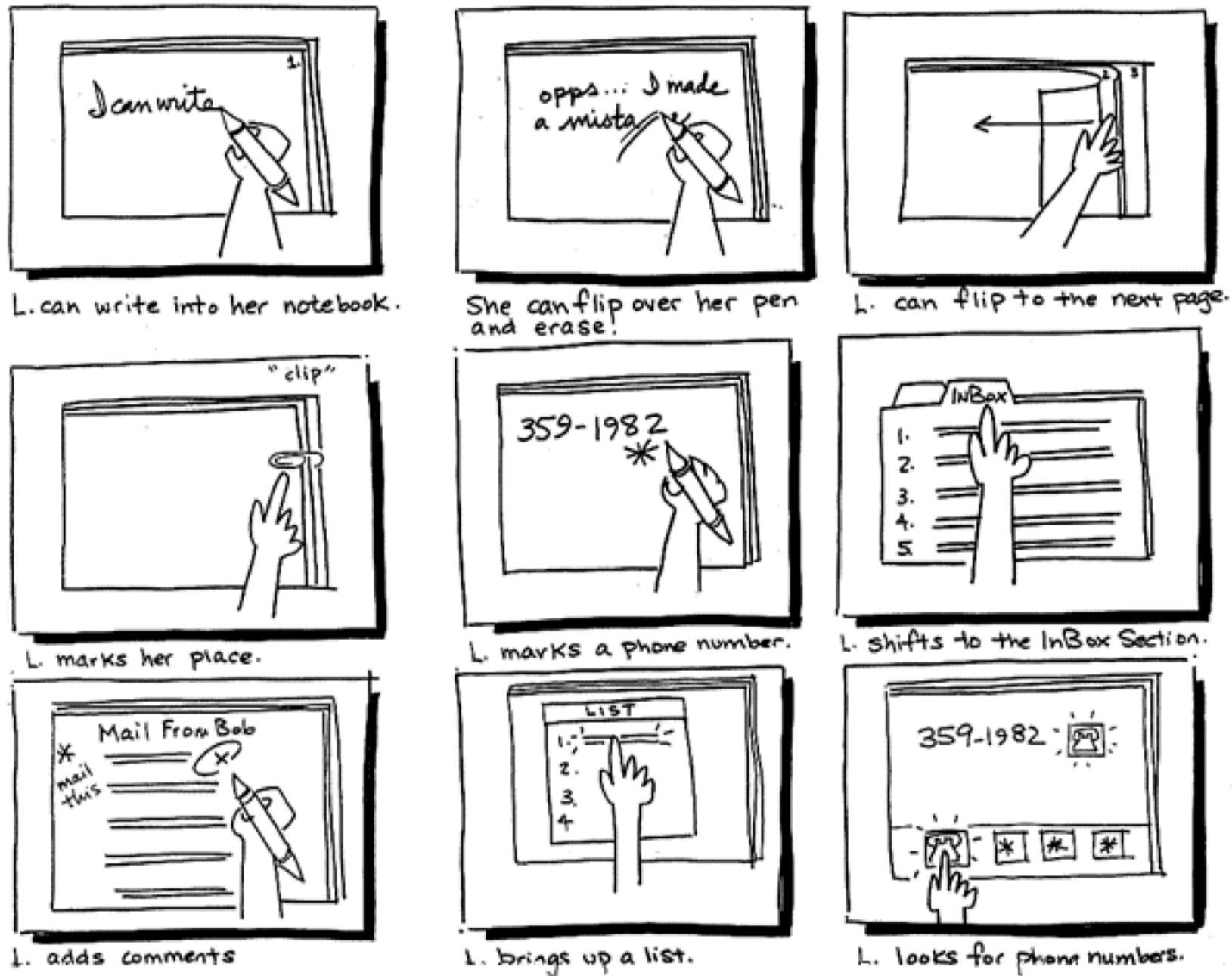
Their integration makes a working prototype or a pre-alpha product.



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

Dimension 1: Role¹³

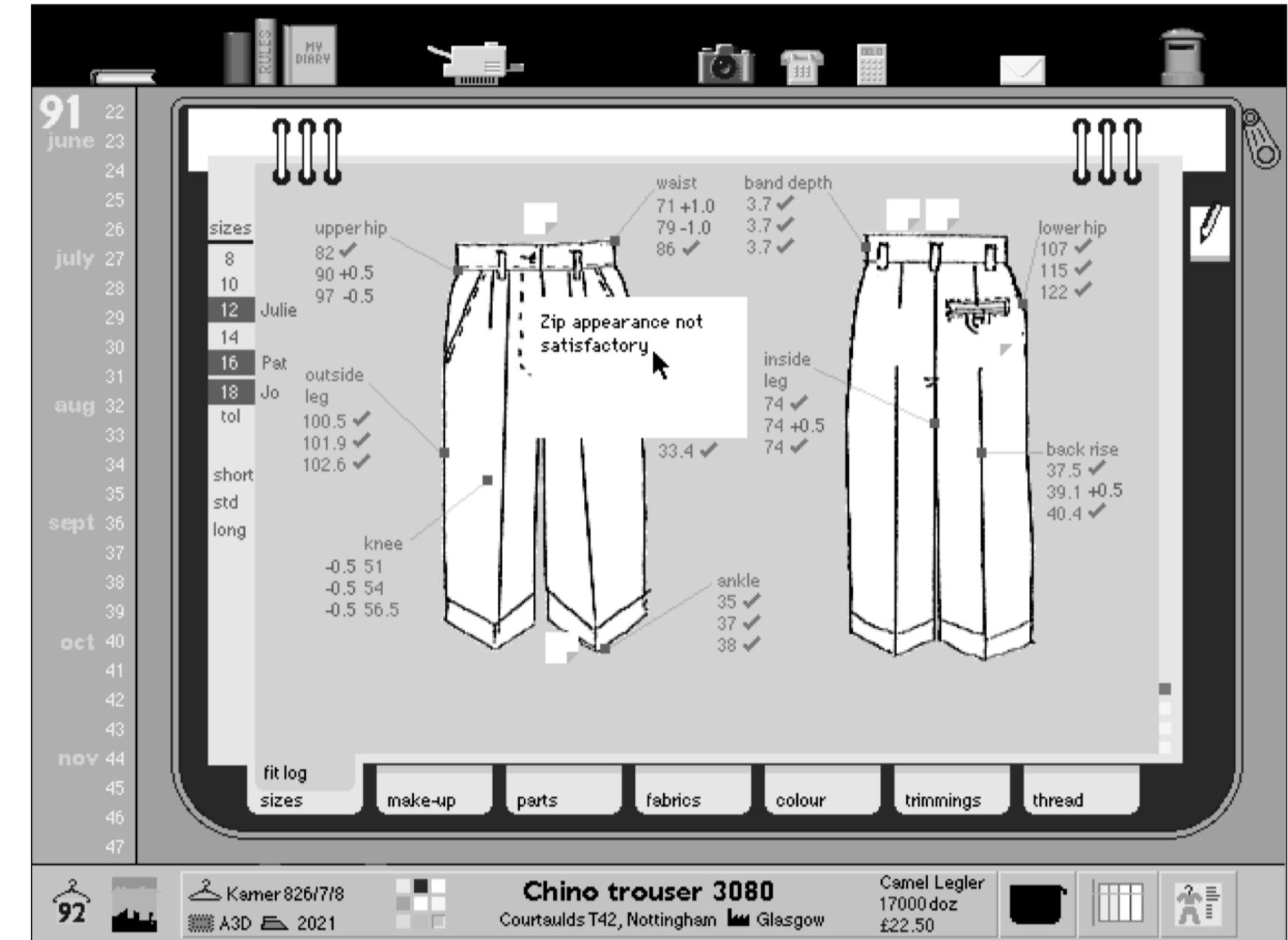
Definition: Represents the functions that the system serves in the user's life, i.e., how the system is useful to them.



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

Dimension 2: Look and Feel¹³

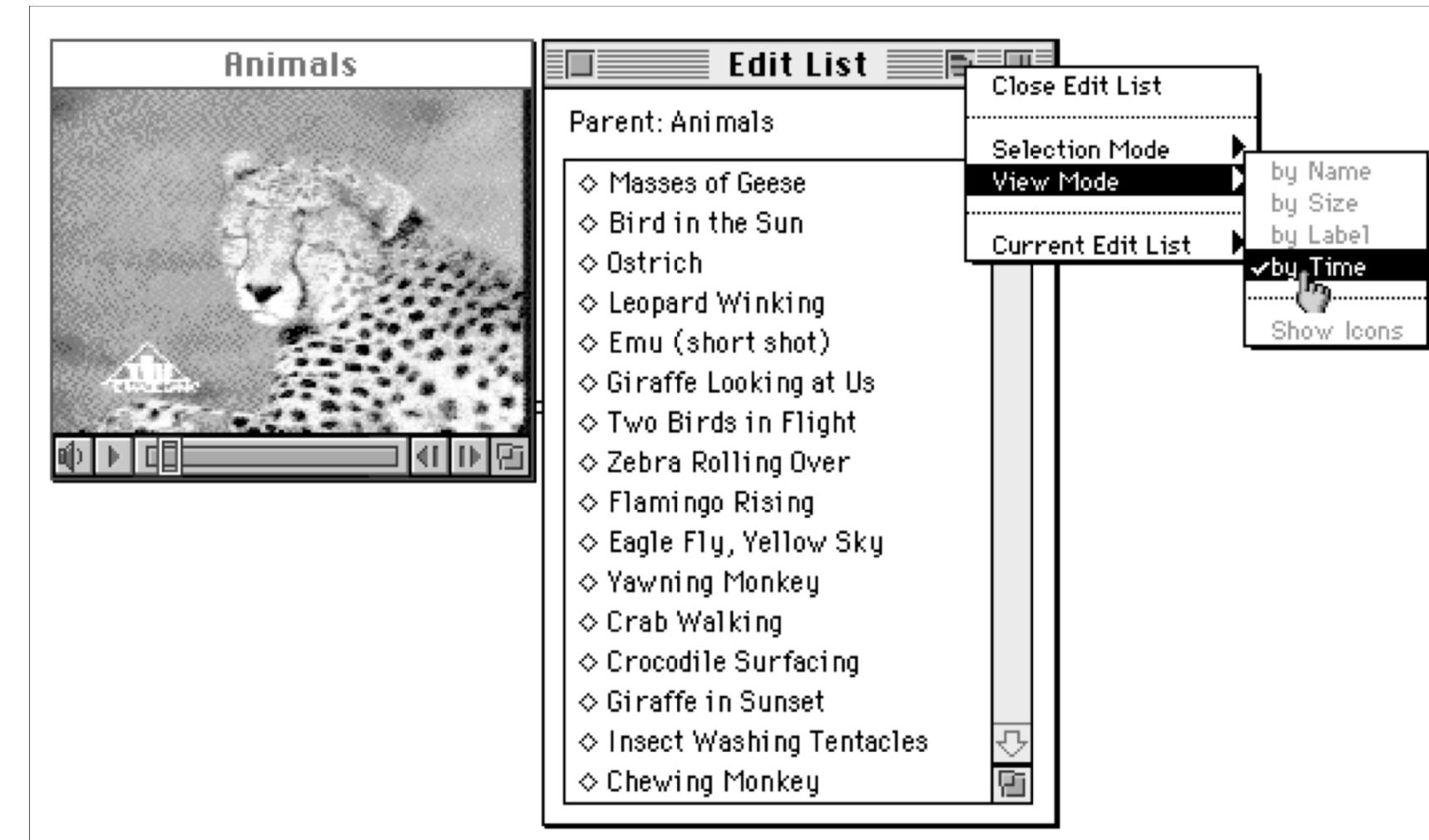
Definition: Simulates the sensory experience of the user while using the system, i.e., what the user sees, hears, and feels during use.



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

Dimension 3: Implementation¹³

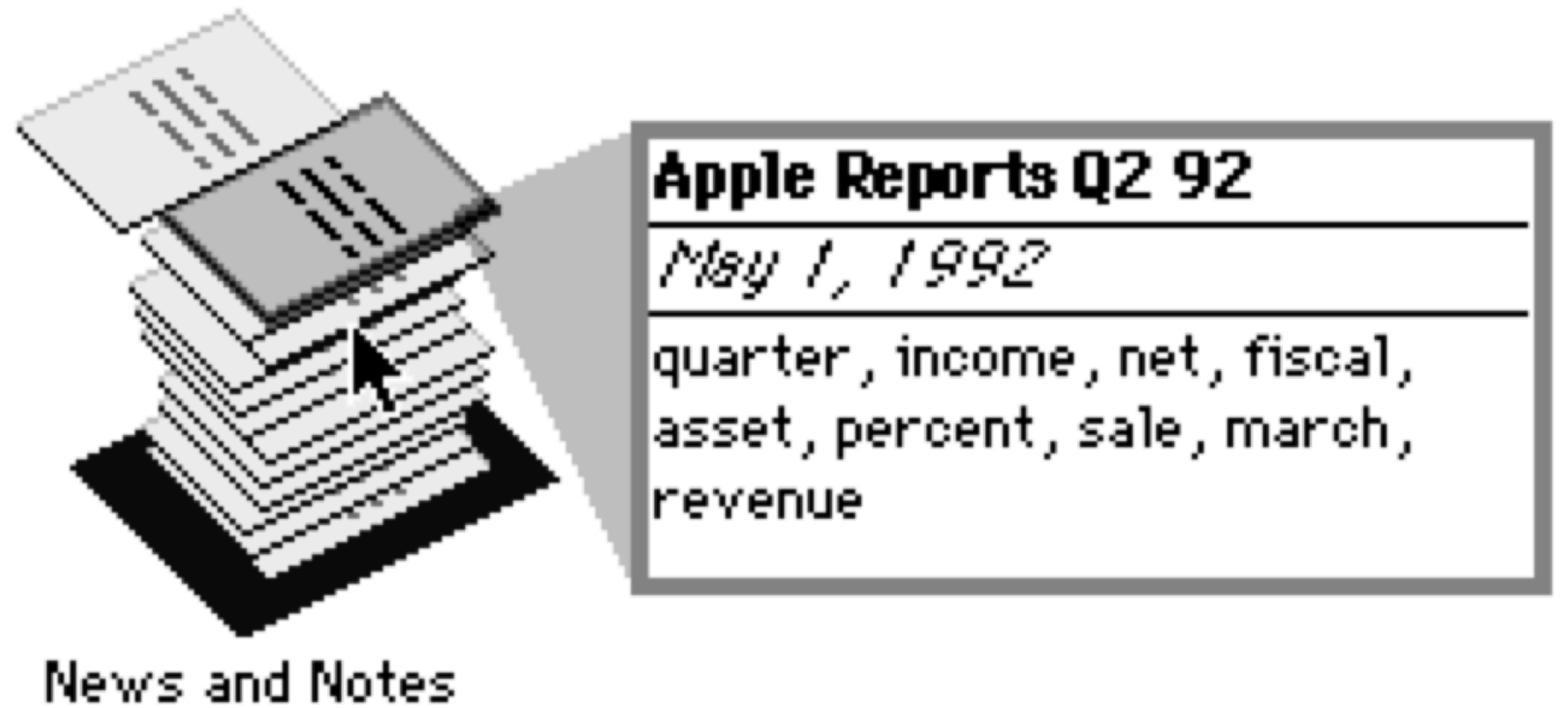
Definition: Includes the technical capabilities that enable the system to perform its function, i.e., the low-level details of how the system works.



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

Dimensions Combined: *Integration*¹³

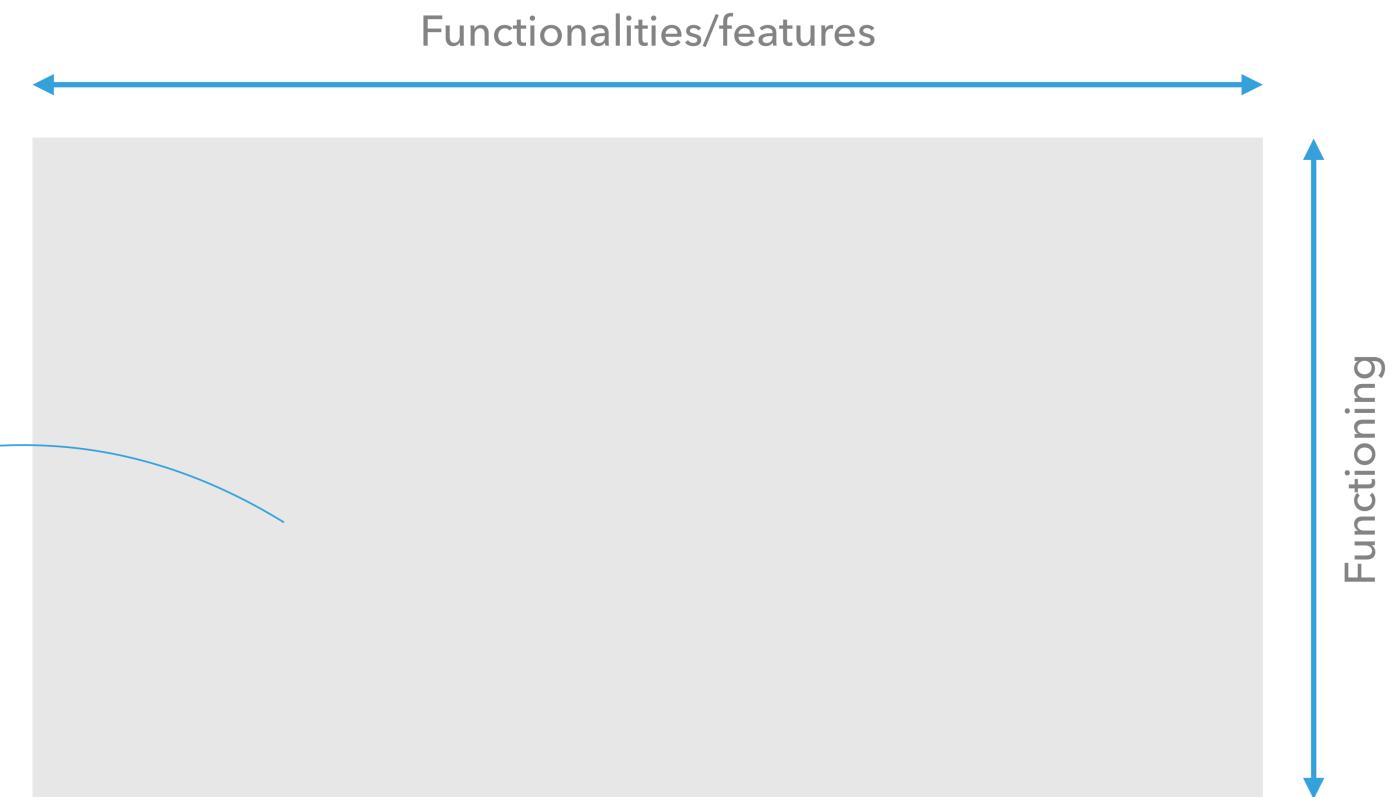
Definition: Represents the complete user experience with the system as envisioned in the conceptual design.



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

Prototyping Scope

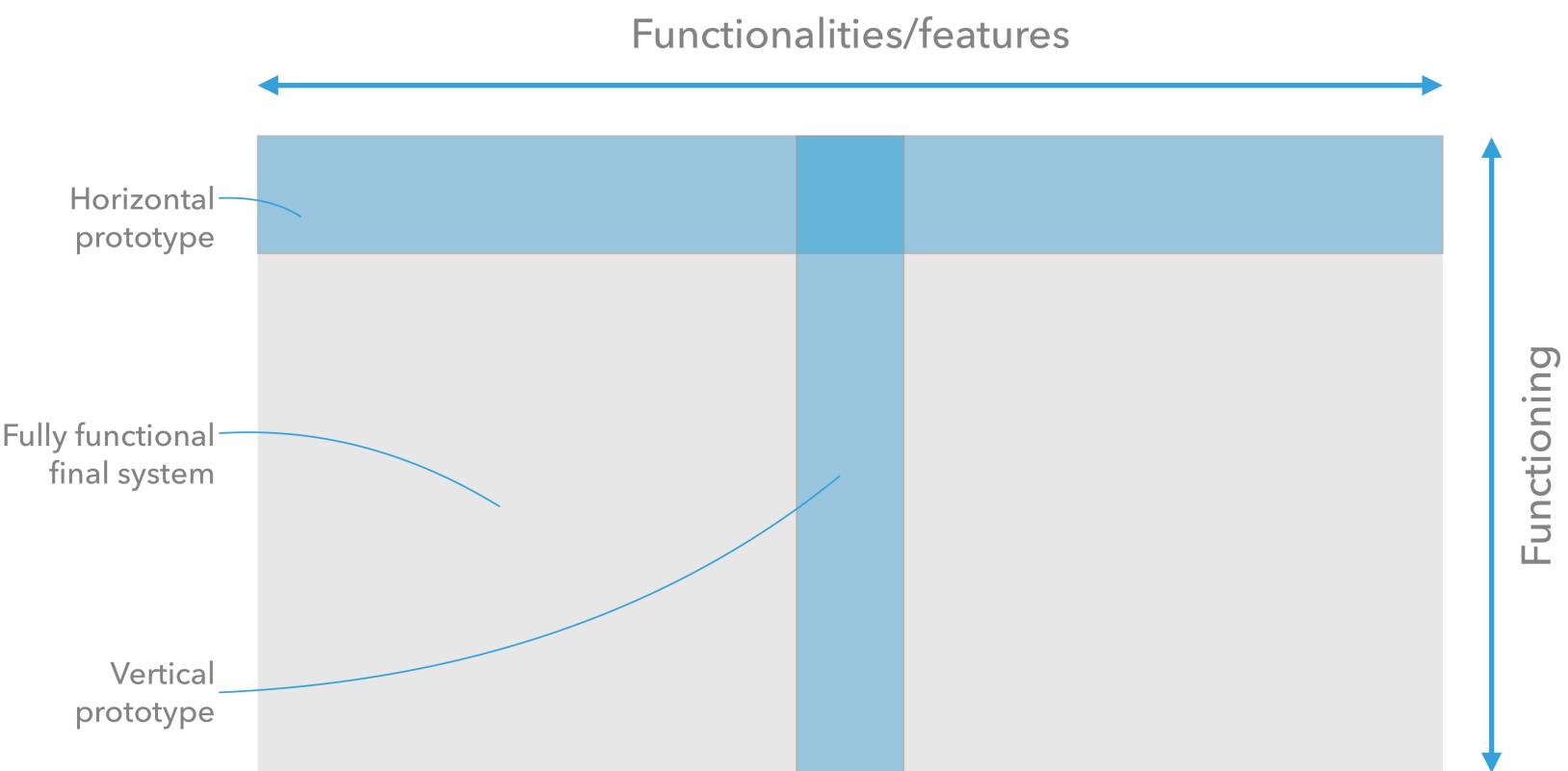
Consider the space of *features* and *functioning* as everything that a system does.



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

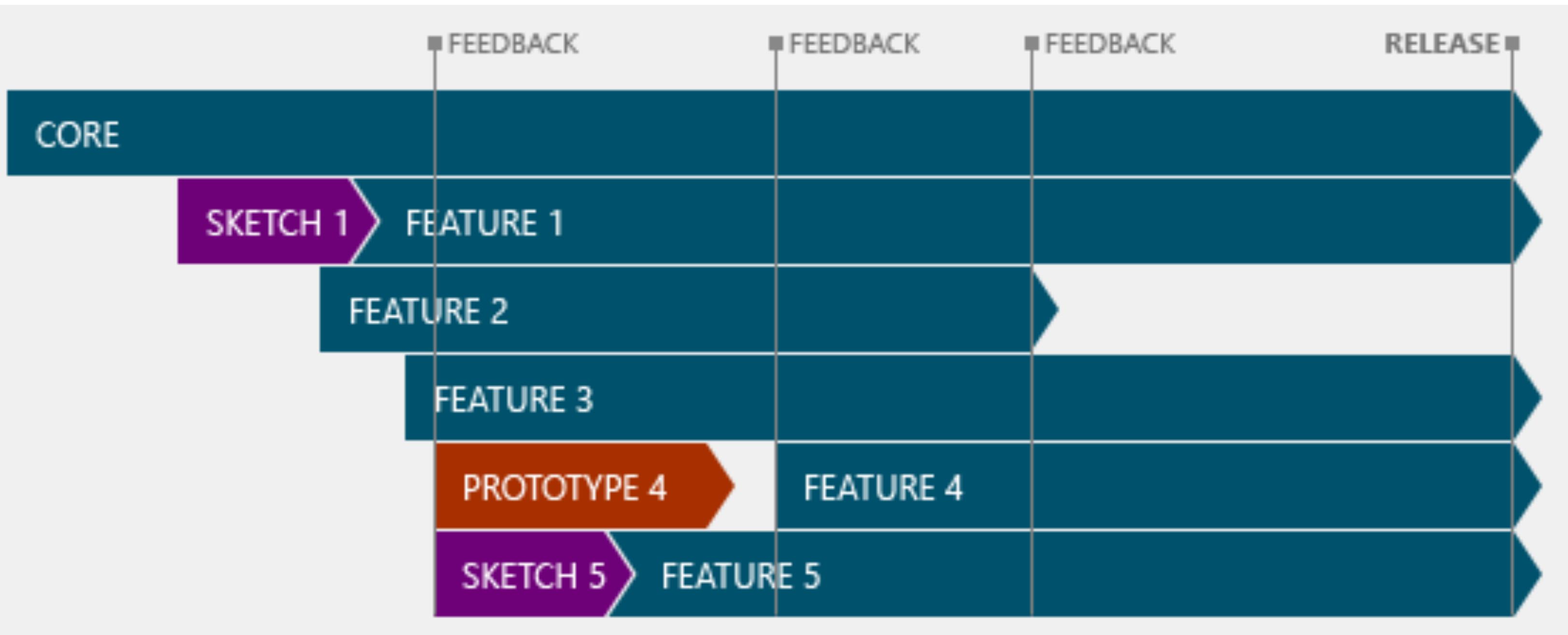
- Throwaway prototyping
- Evolutionary prototyping
- Incremental prototyping
- Extreme prototyping

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 prototypes.

Throwaway prototyping is usually combined with *sketching*.

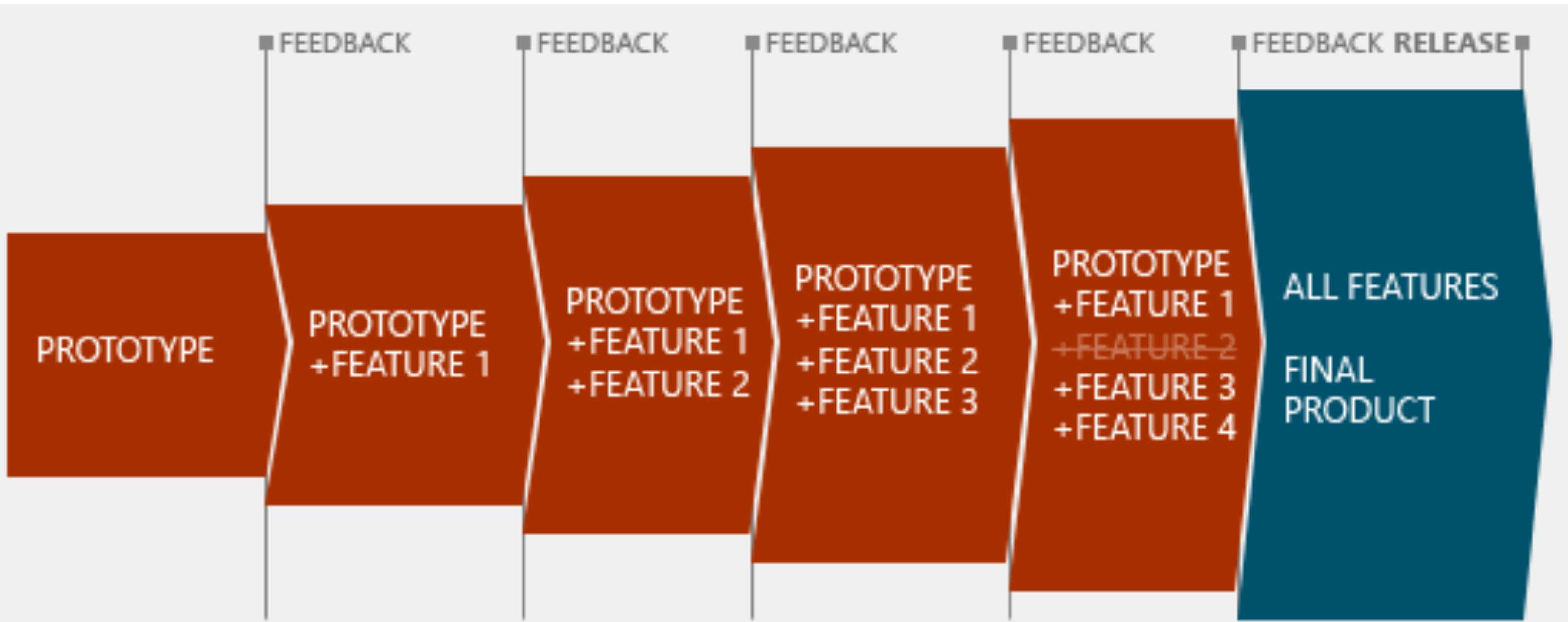


¹⁴Image source

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.

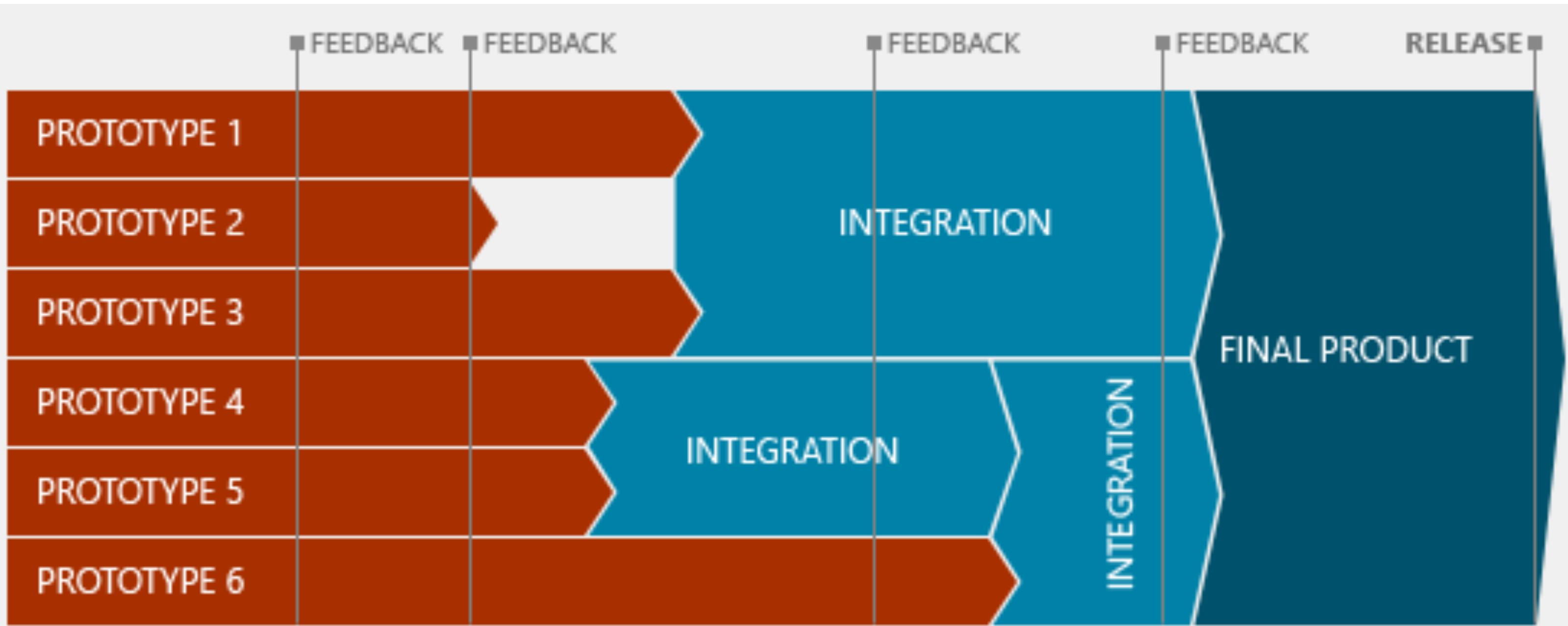


¹⁴Image source

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.

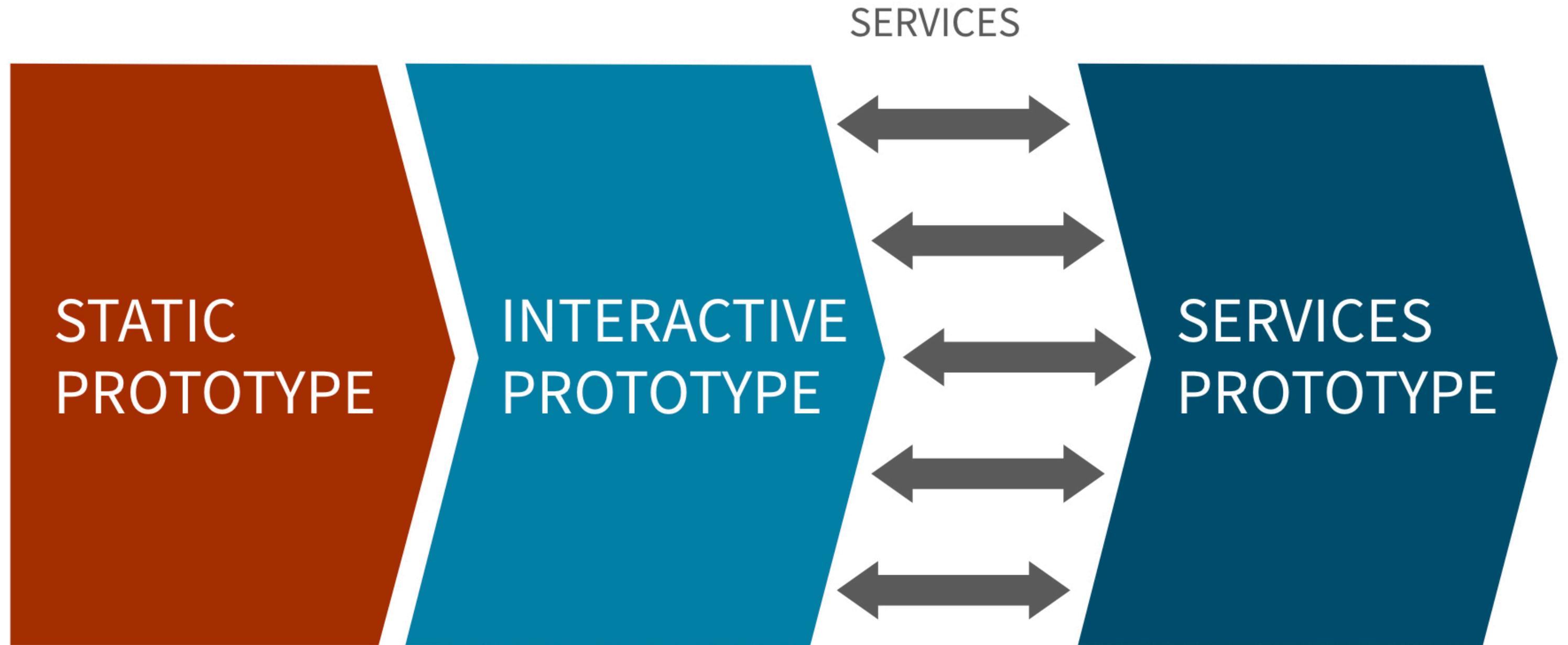


¹⁴[Image source](#)

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.

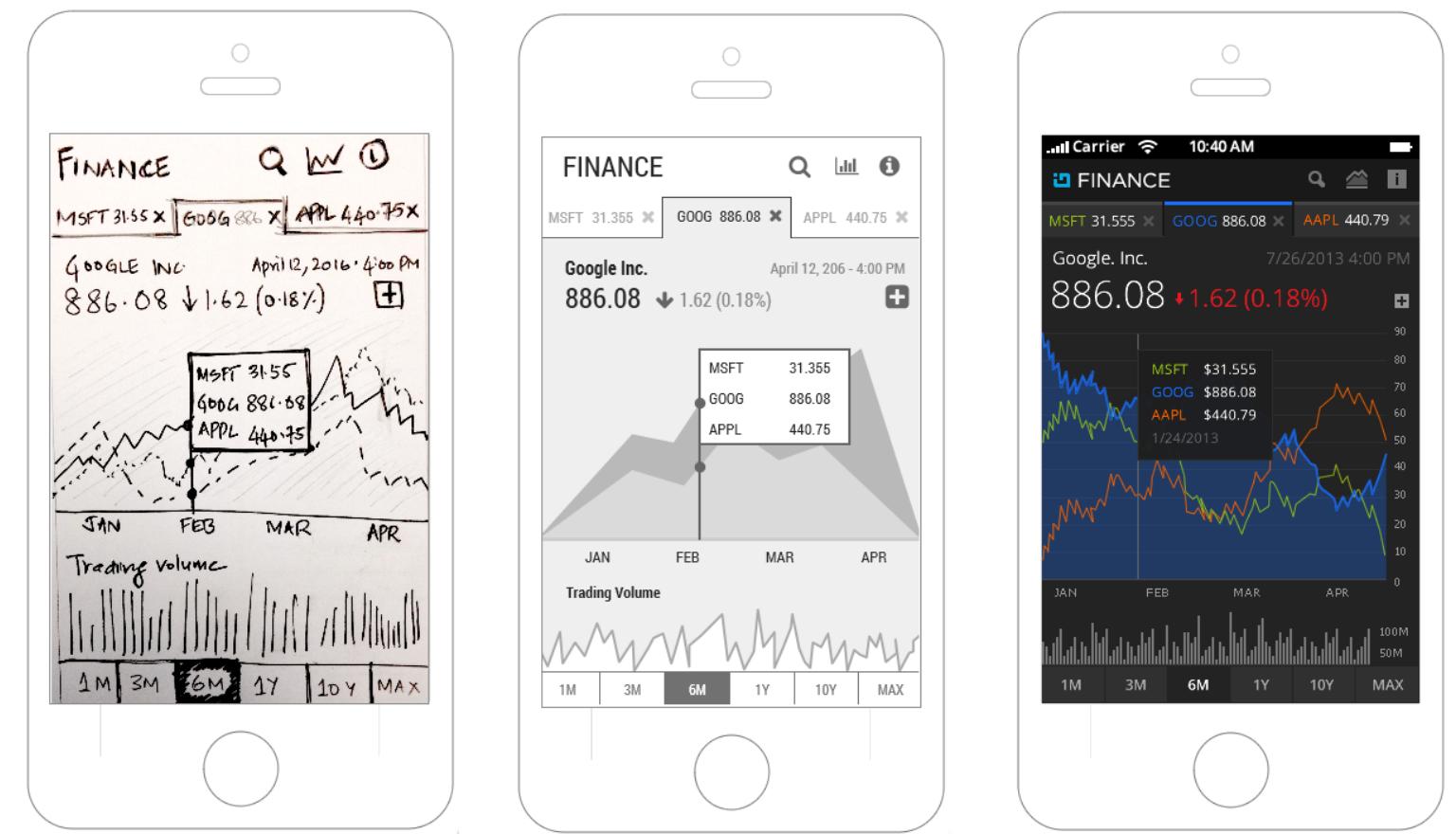
Enables rapid and parallel prototyping, testing, and refinement by removing dependencies between different components of a system or between the system and third party services.



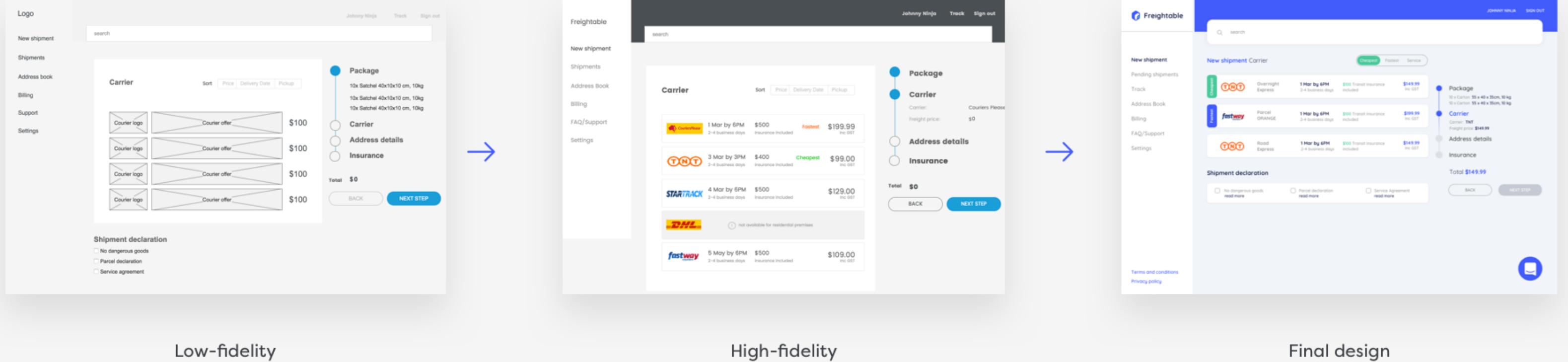
Fidelity in Prototyping¹⁵

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](#)



¹⁶ Image source

Why is fidelity important?

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.

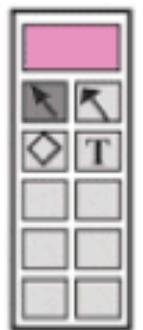


Looks Done

Mocked up in Photoshop, a multimedia program (Director, Flash, etc.), or a GUI builder (NetBeans, Visual Studio, etc.)

"Can you change the font on that 'T'?"
Not sure I like the bevel line weight..."

Feedback: detailed tweaks to specific features. Very focused and incremental.

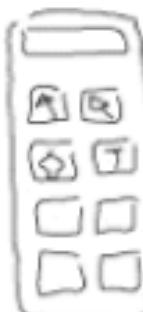


Visio, Powerpoint, etc.

Illustrated using a professional drawing or presentation tool.

"I don't like the two-column layout for tools. Can we have them go across the top?"

Feedback: tweaks to the 'screen' or page as a whole. Incremental improvements.



Rough Sketch

Scanned from a hand-drawing, made with a drawing app and a tablet, or using the Napkin Look and Feel skin.

"Maybe the tools should be context-specific... Let's kill the toolbar and bring up only the tools that make sense at that moment..."

Feedback: higher-level features are questioned, bigger changes possible.



Storyboard or Use Case

The "story" of how the user might need or want to interact with the interface (app, book, product, etc.)

"We should NOT try to put a drawing feature in here... it's featuritis without a key benefit to most users."

Feedback: big-picture ideas, possibility for revolutionary changes.

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
- Allows rapid evaluation of multiple design ideas

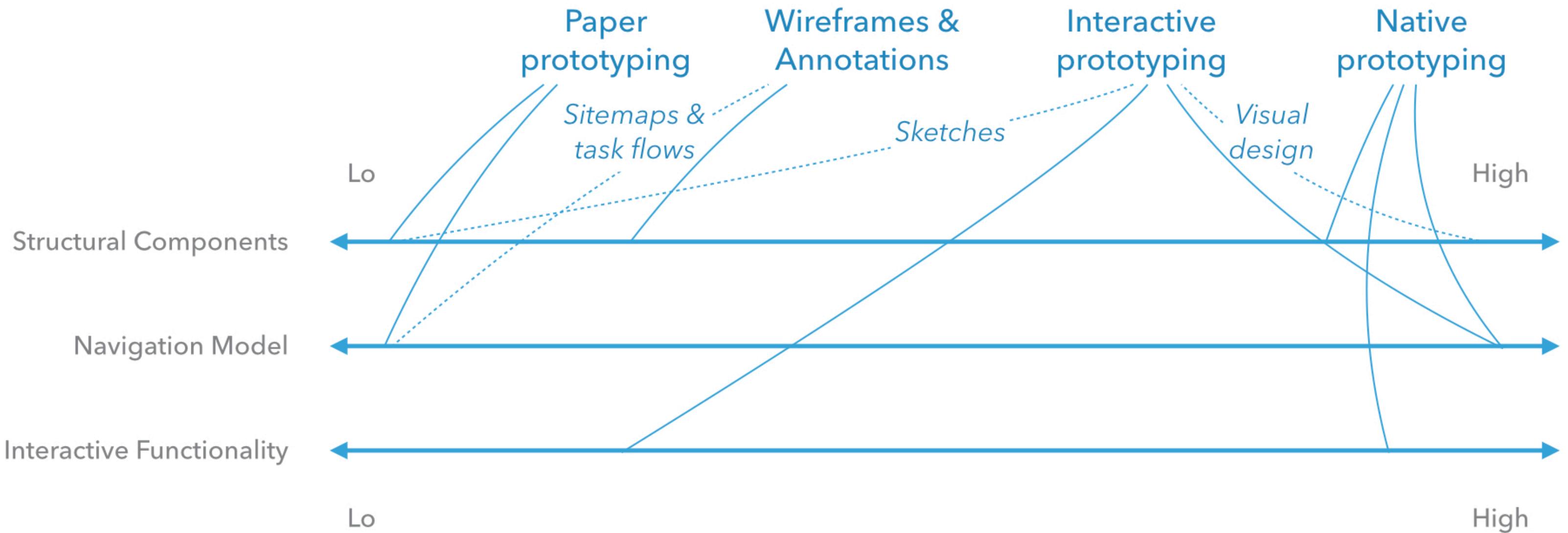
Limitations of Lo-fi Prototyping

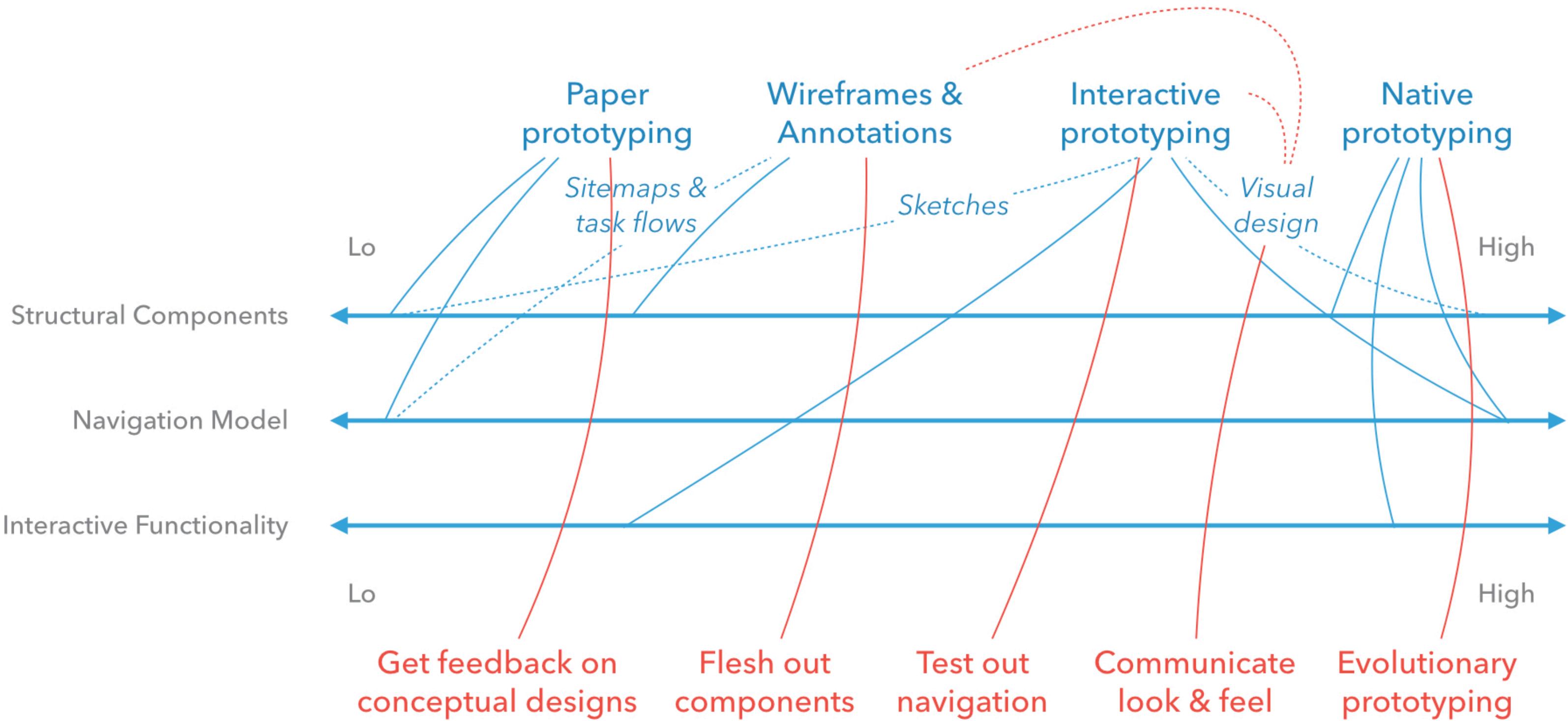
- Requires a facilitator to drive the prototype during testing and communication
- Offers limited ability to identify breakdowns in design
- Lacks sufficiently low-level specifications for development
- Provides limited sense of feasibility

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





ICA G: Prototyping

Turn your *lo-fi* prototype into a *hi-fi* prototype!

Strategically use...

- Color
- Imagery
- Type

What did we learn today?

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