

# Building User Interfaces

# Interaction Design

## Structure, Layout, & Navigation

### Professor Yuhang Zhao

# What we will learn today?

- What is interaction design?
- Interaction structure
- Visual layout design
- Principles of navigation

# What is interaction design?

# Interaction Design

**Definition:** Defining behaviors for a system that engages the full spectrum of its user's perception, cognition, and movements.

Differs from visual design in its closer and more complex relationship to user behavior and context.

*Example:* visual designers do not think about navigation models!

# Five Dimensions of Interaction Design<sup>1</sup>

1. **1D:** Words
2. **2D:** Visual representations
3. **3D:** Physical objects and space
4. **4D:** Time
5. **5D:** Behavior

## 5 DIMENSIONS OF INTERACTION DESIGN

The image shows a simple web form titled "Application Form". At the top, there are three small dots in a horizontal row. Below the title, a text input field is labeled "Please enter the description below:" with placeholder text: "Lorem ipsum dolor sit amet, consectetur adipiscing elit. Donec etiam, natus id sapien quis, ultricies fringilla neque. Donec tempor, diam et congue rhoncus, metus tortor viverra lectus, ut hendrerit tellus laus efficitur. Vestibulum ante ipsum primis in faucibus orci luctus et ultrices posuere malesuada fames ac turpis est, etiam enim quis, dapibus congue tellus." At the bottom of the form is a dark blue "SUBMIT" button.



INTERACTION DESIGN  
FOUNDATION

INTERACTION-DESIGN.ORG

<sup>1</sup> Interaction Design Foundation

# Interaction Structure

# Information Architecture

**Definition:** The design of the organizing principle of an interactive system.

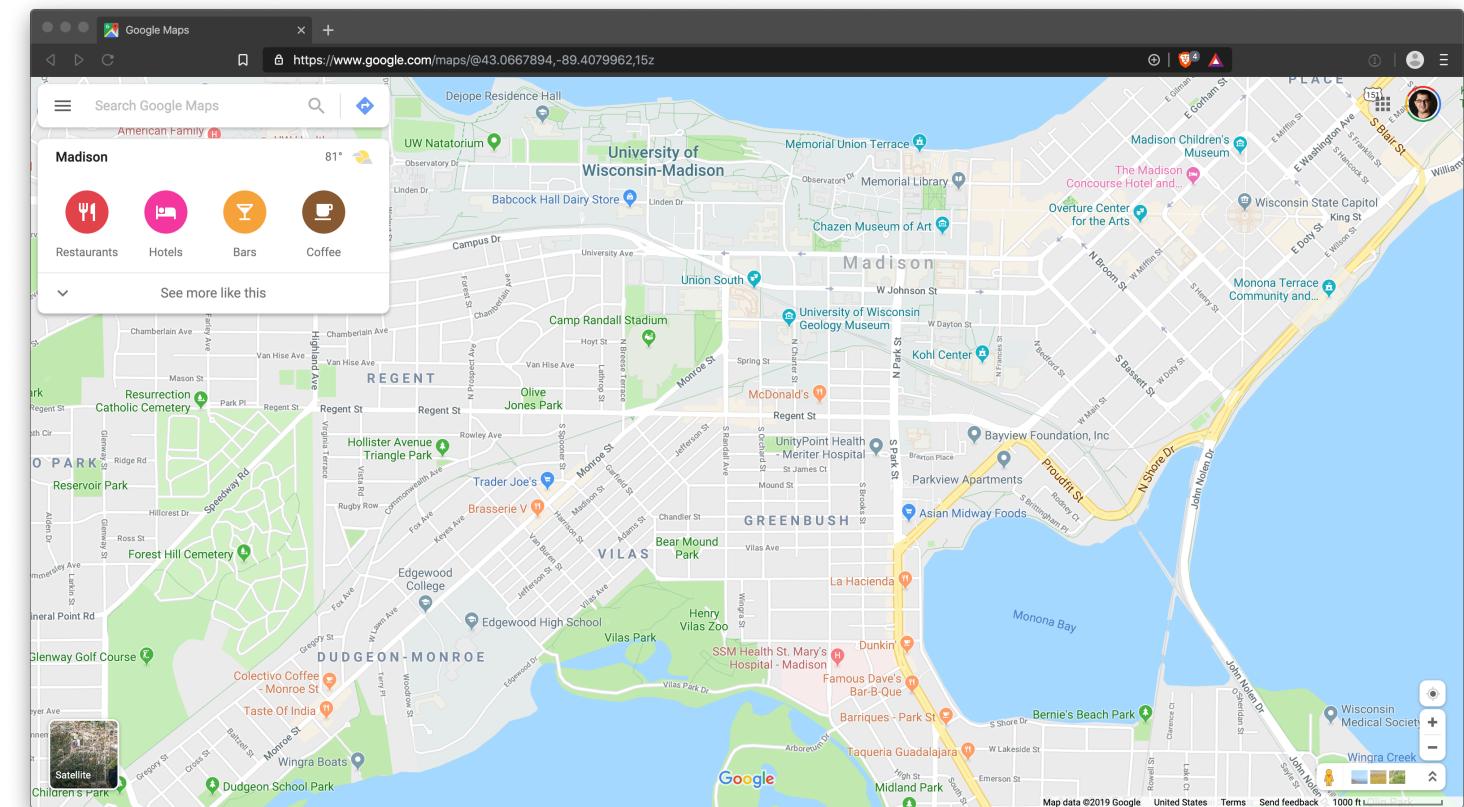
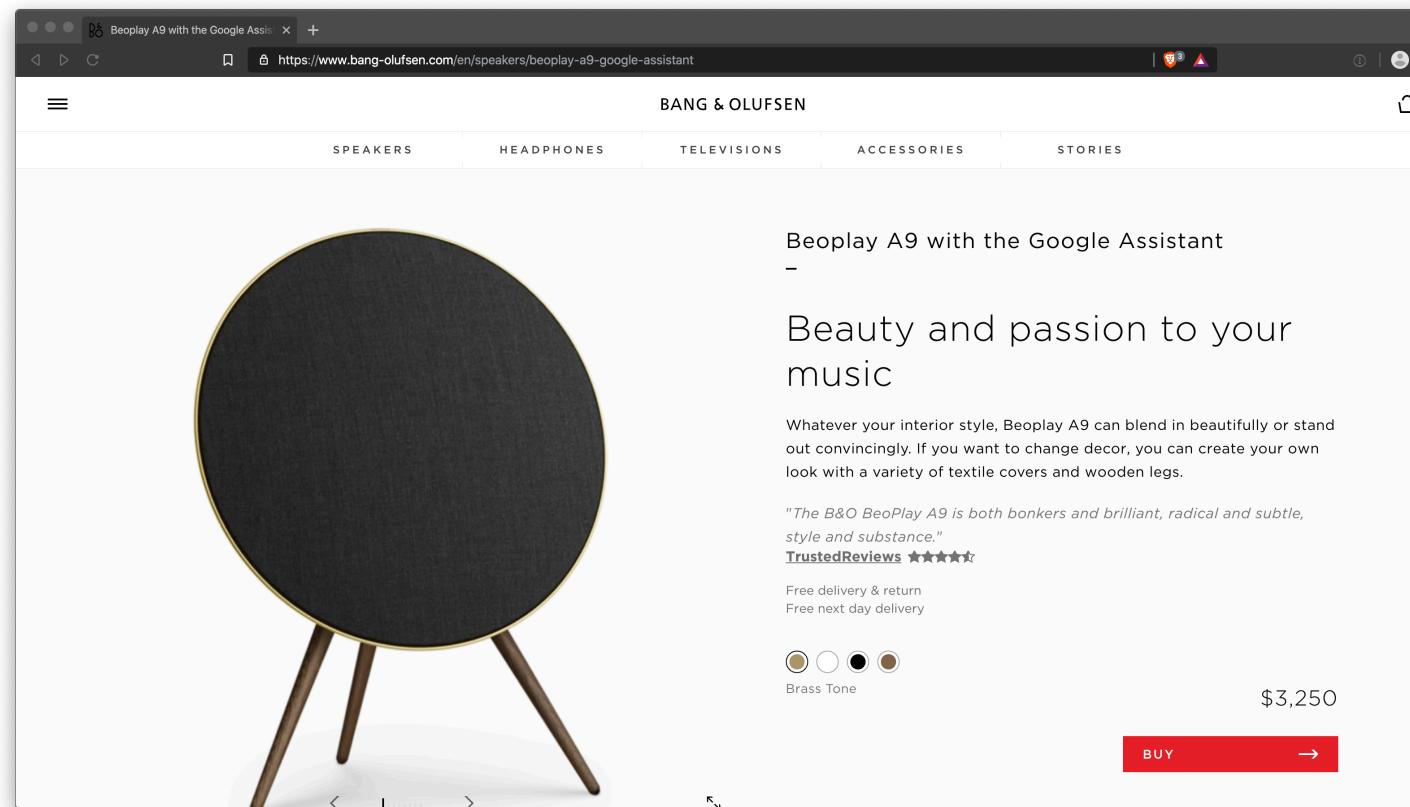
A set of structural categories:<sup>2</sup>

1. "Show one single thing"
2. "Show a list or set of things"
3. "Provide tools to create a thing"
4. "Facilitate a task"

<sup>2</sup> Tidwell, 2010, *Designing Interfaces*

# "Show one single thing"

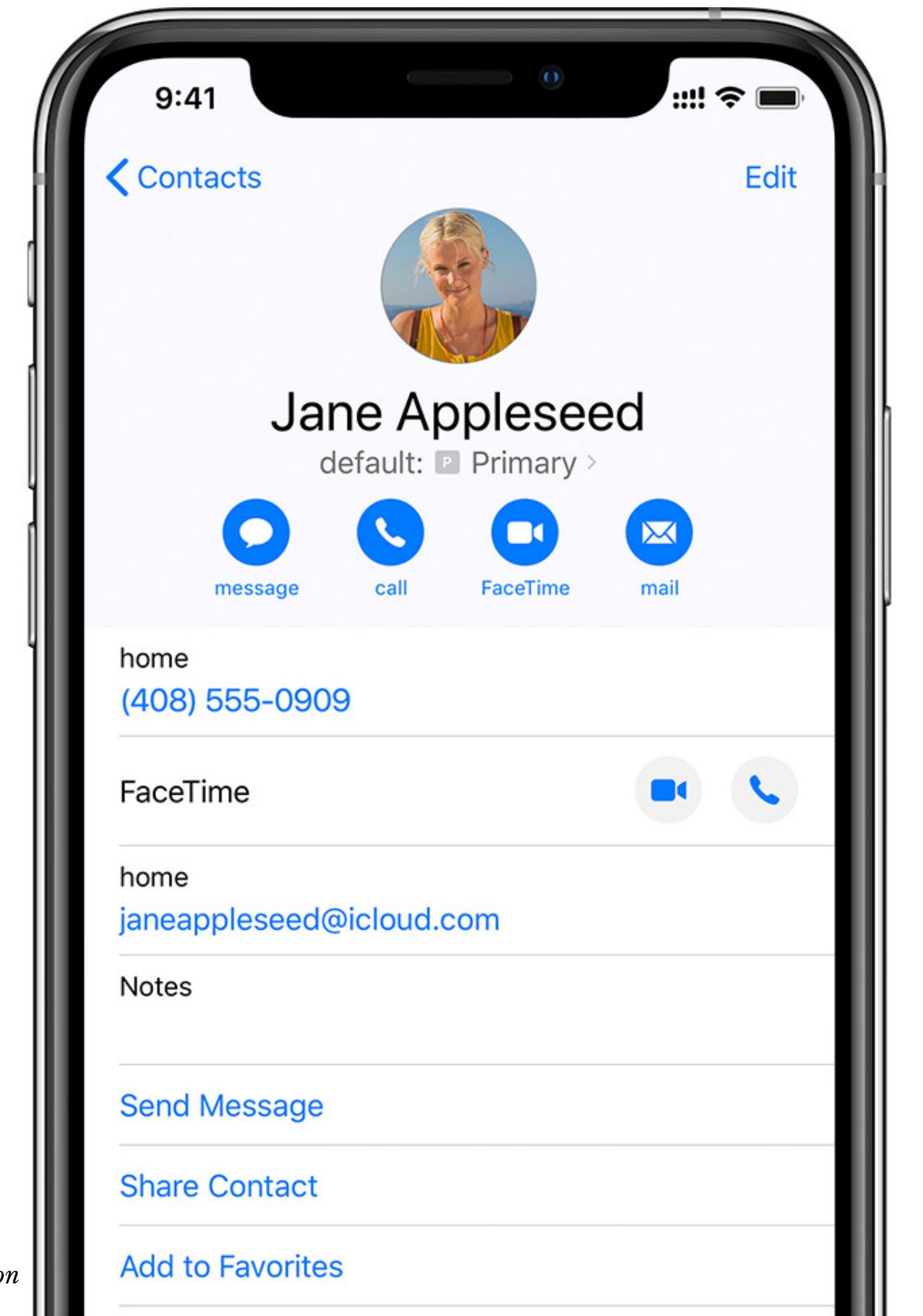
Focuses on conveying information on a specific topic/facilitating a specific activity



Supports a specific activity, eliminating other distractions.

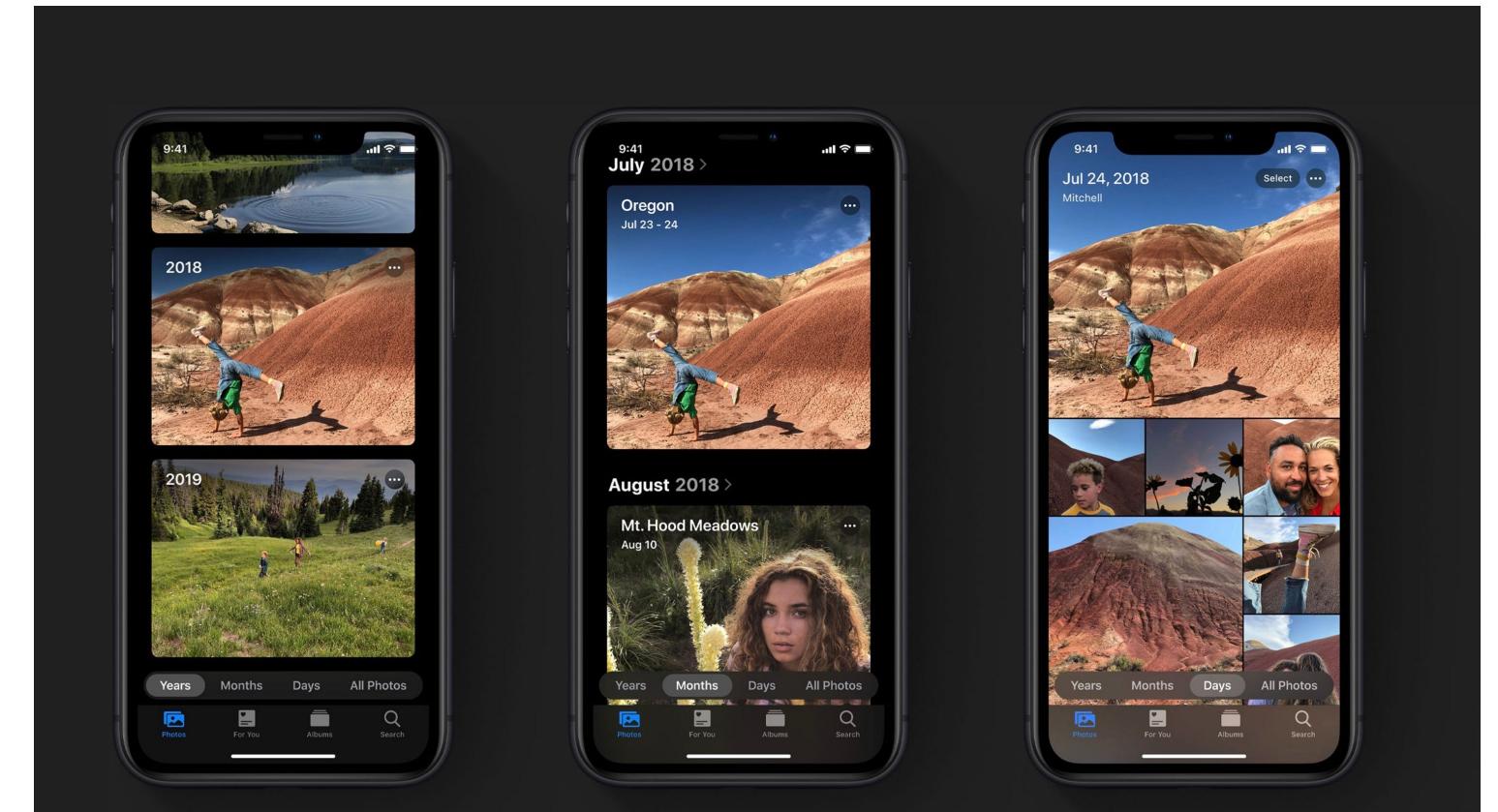
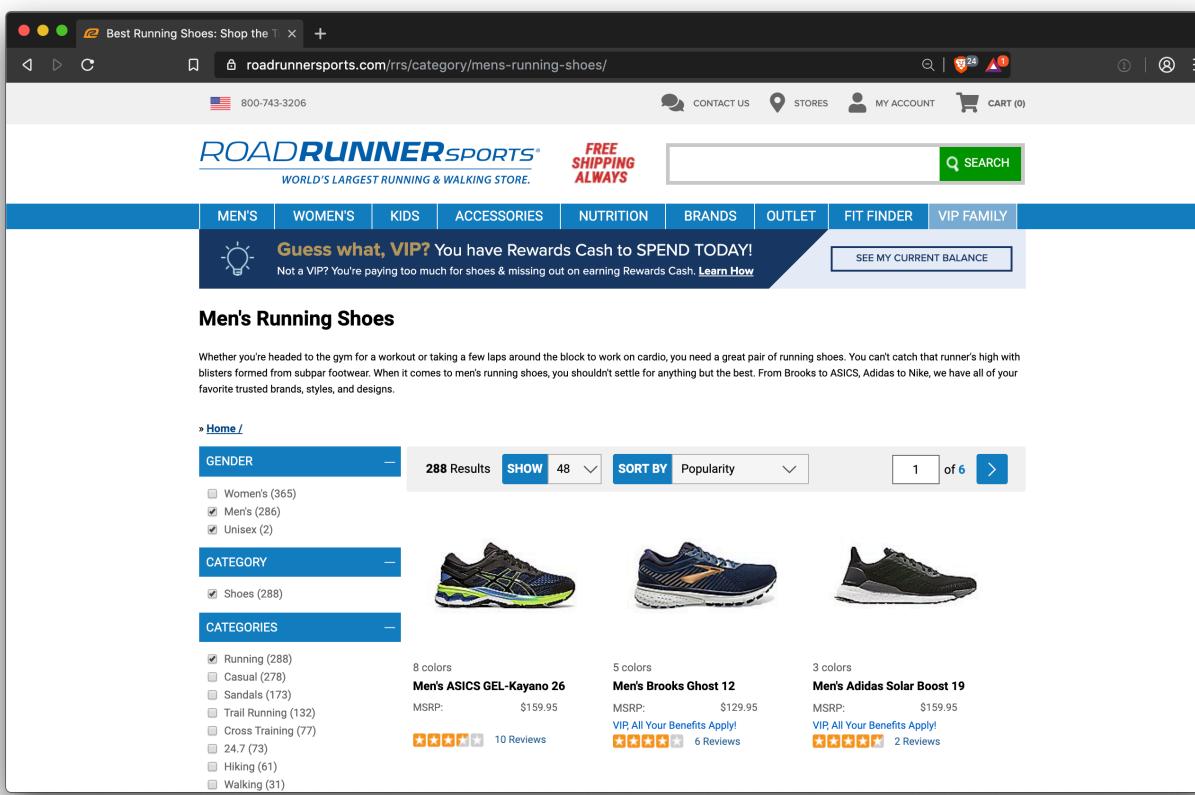
Includes key components:

1. Content of the "single thing"
2. Supporting tools that help the user act on the content



# "Show a list or set of things"

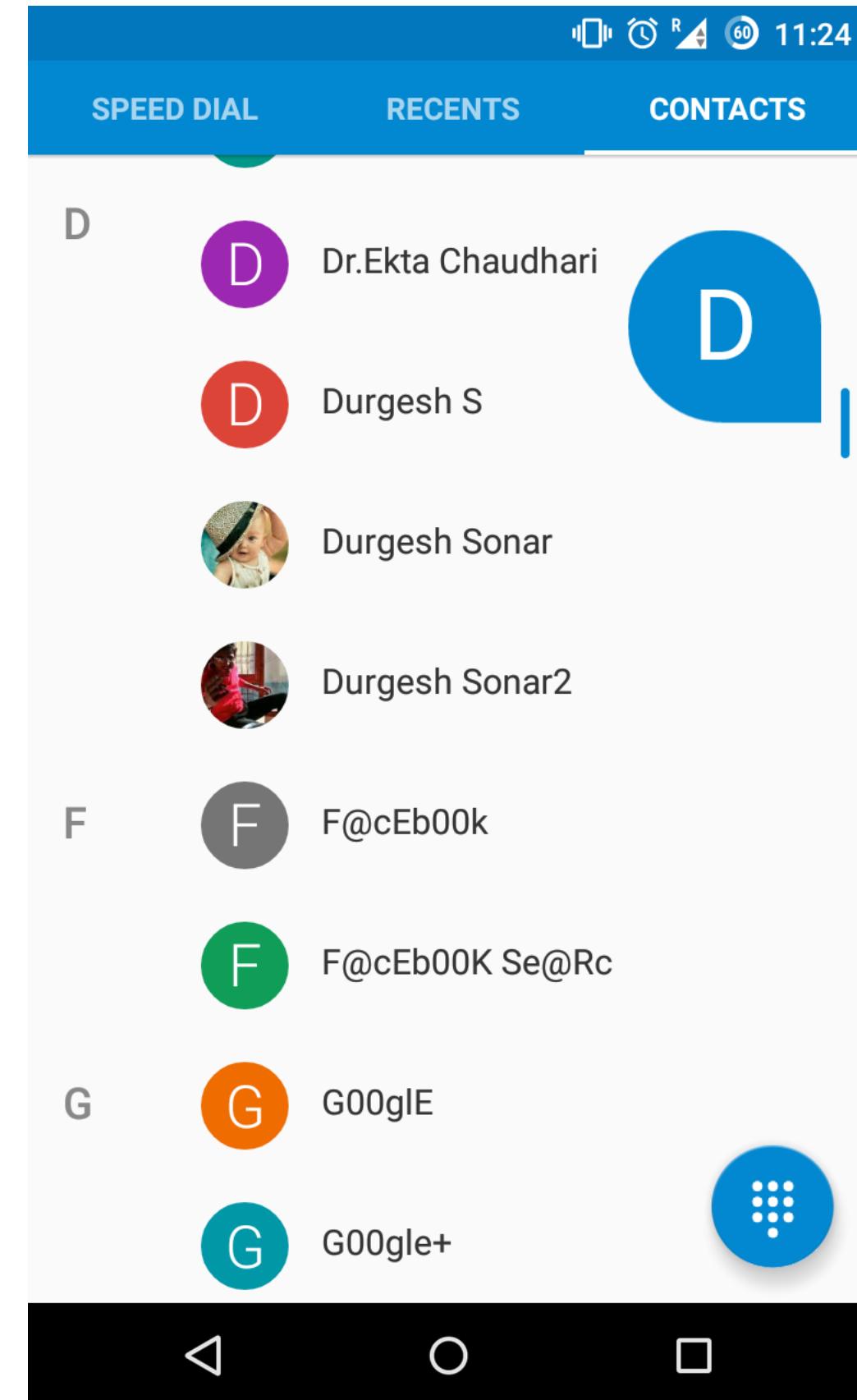
Provides rows or grids of items of the same kind that provide links to components that focus on that item.



Includes design elements that help the user organize and categorize the lists

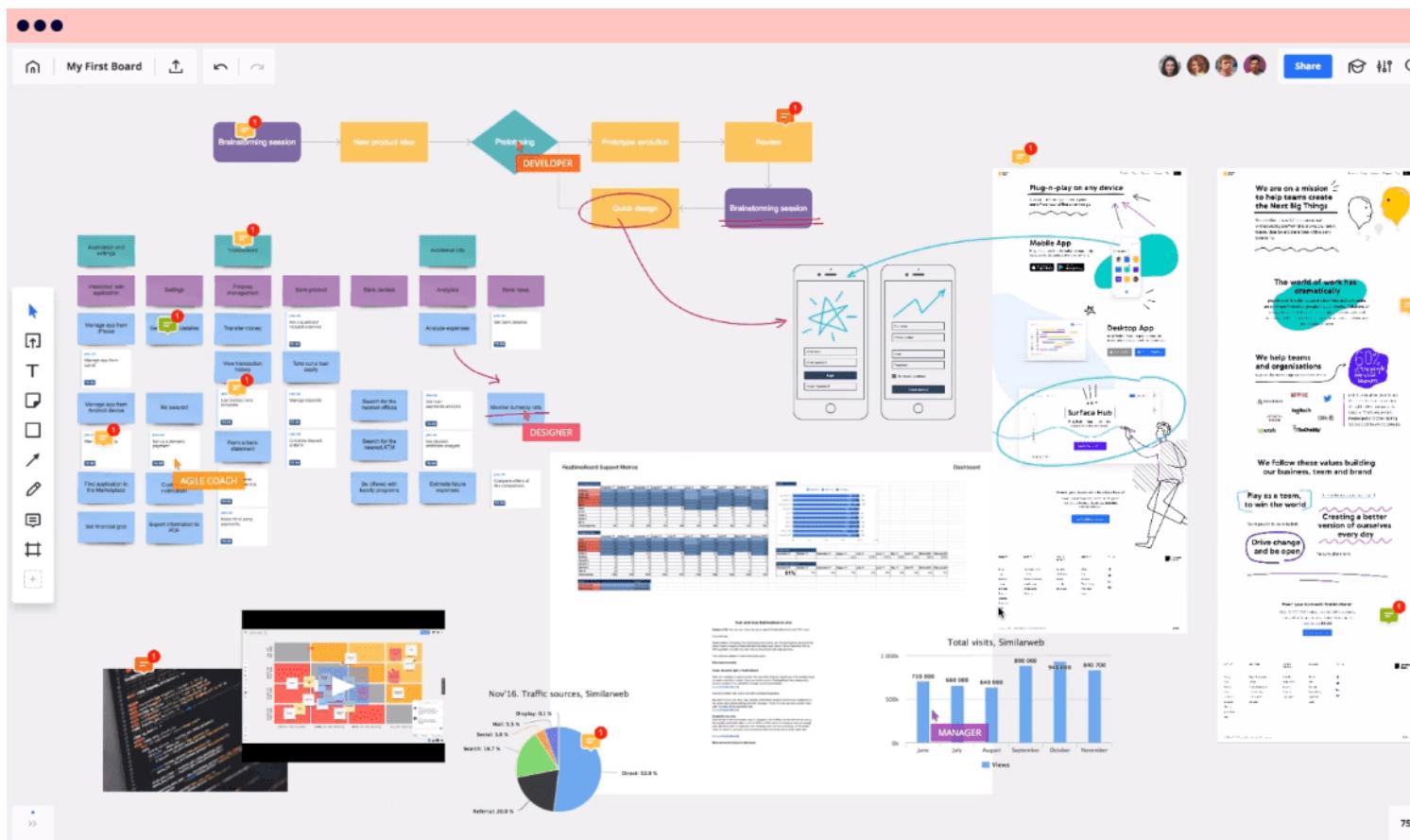
Can be applied hierarchically

Does this remind you of something we've been discussing?



# "Provide tools to create a thing"

Supporting user creation of new content, e.g., a canvas on which to write, draw, paint or structured form for data entry

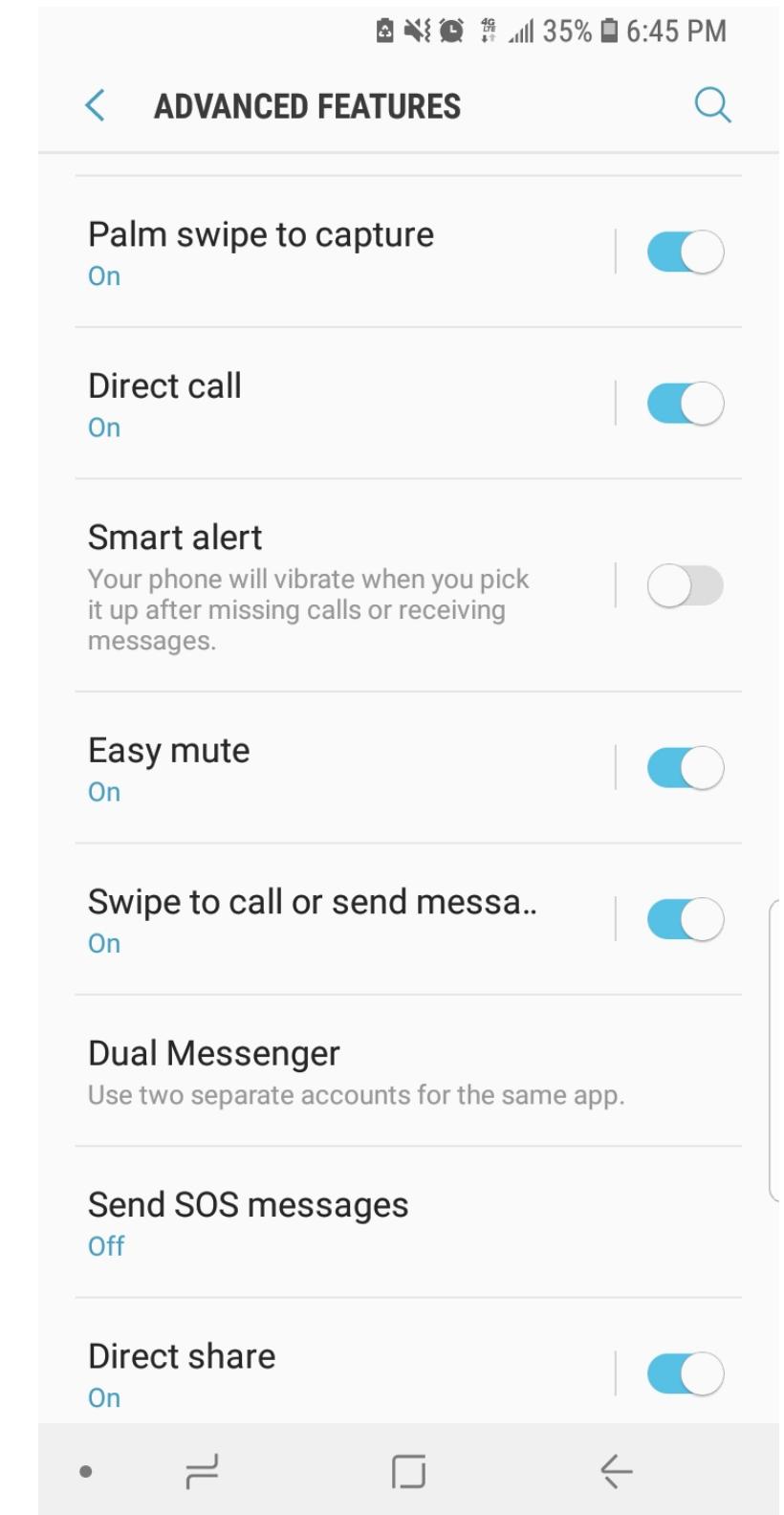




# "Facilitate a task"

Provides collections of components or controls that help users perform specific actions, e.g., changing a setting

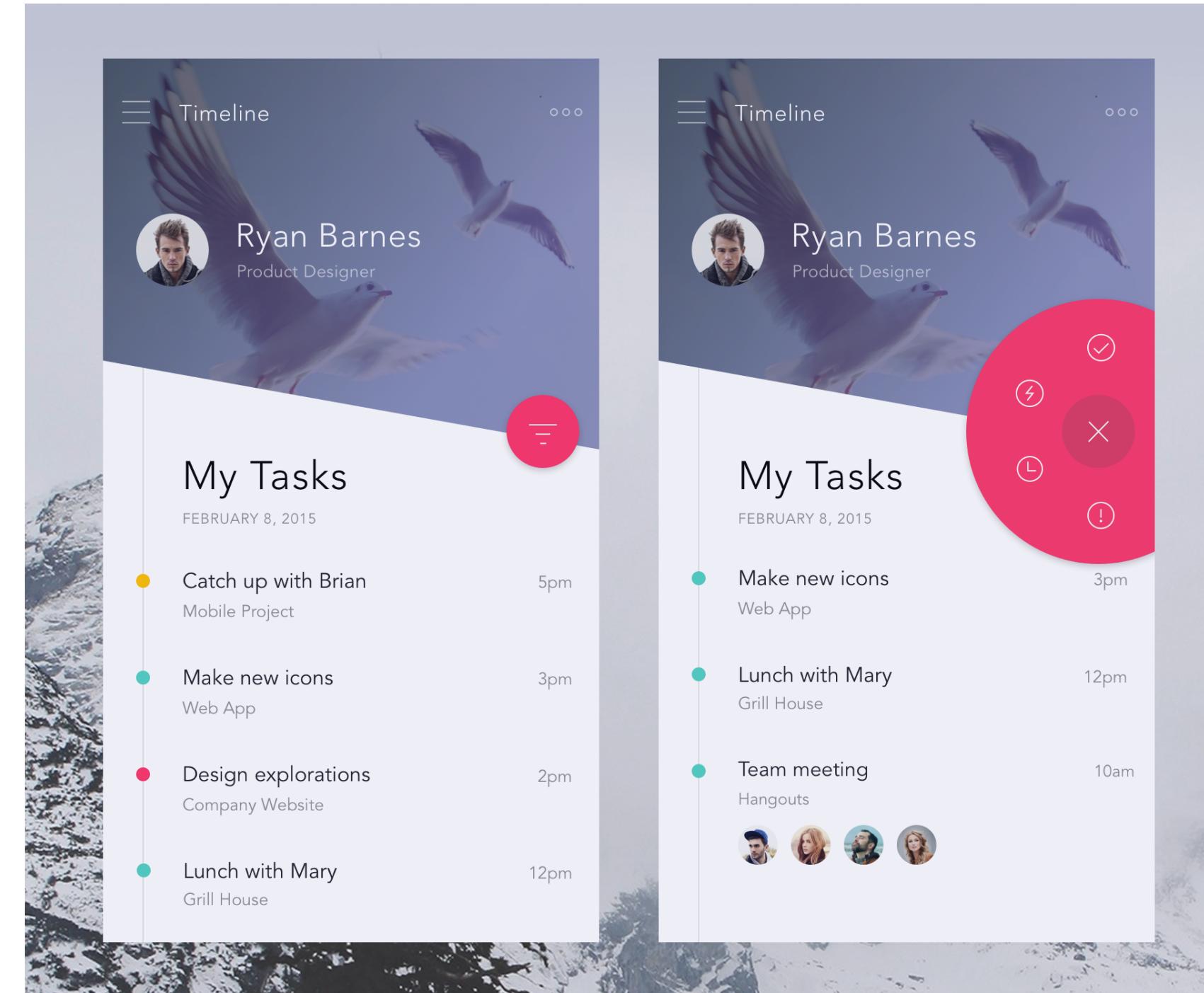
The designer must organize these controls in an effective and logical way



# Combining Structures

Any page/component can follow the structure of these components, thus they can be combined to create complex applications

Single-page applications (SPAs) often combine these structures



# Layout

# Layout

**Definition:** Arrangement of visual elements on a canvas.<sup>3</sup>

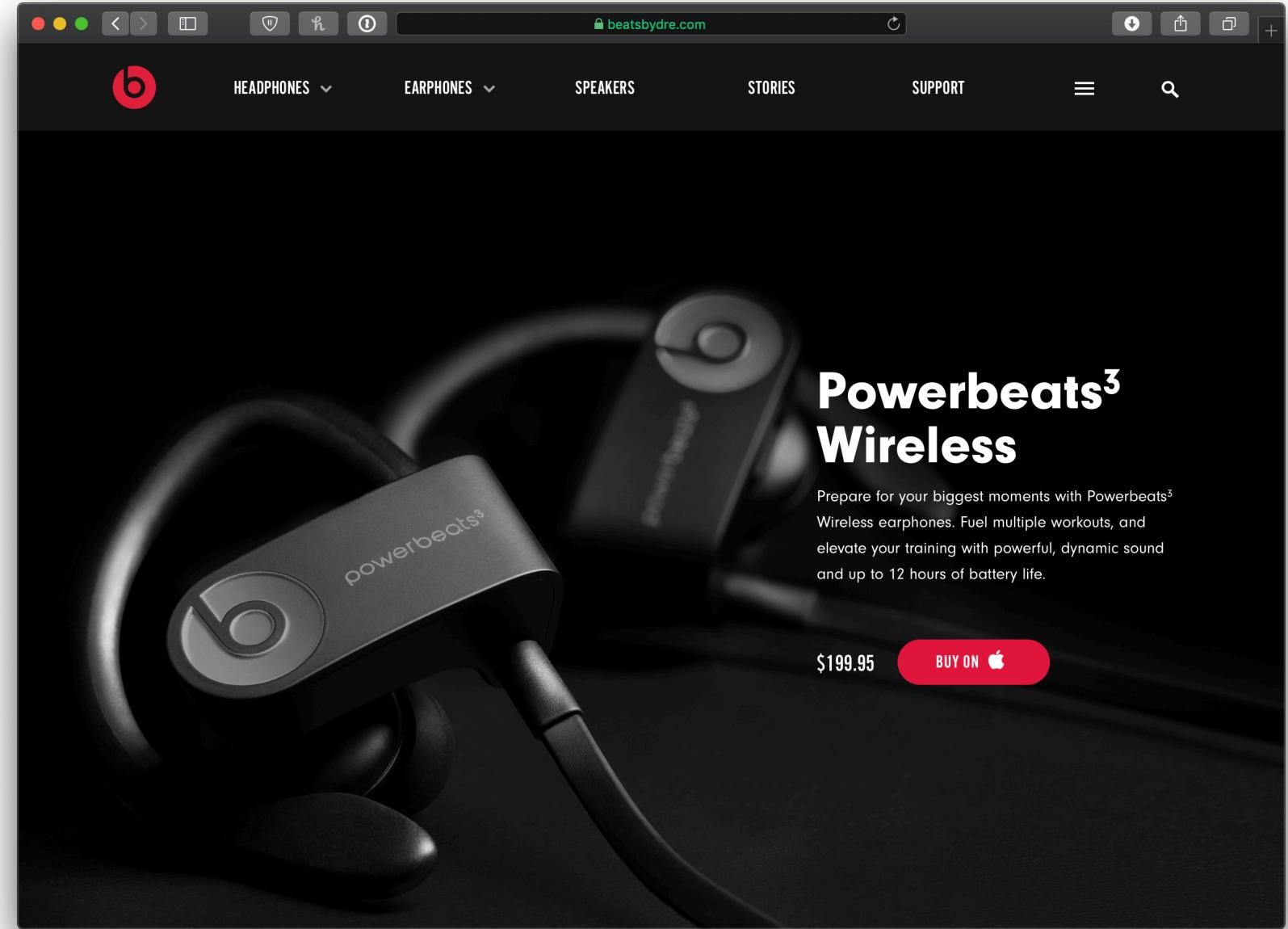
- Creating a focal point
- Following the golden ratio
- Using the rule of thirds
- Effectively using grids
- Integrating type
- Placing imagery
- Using negative space
- Grouping using gestalt theory
- Creating visual hierarchy
- Exploiting visual scan patterns
- Creating contrast/emphasis

<sup>3</sup> These build on the visual design elements/principles that we covered last week.

# Creating a focal point

**Definition:** Aka, center of visual interest, where the design directs the attention of the viewer first.

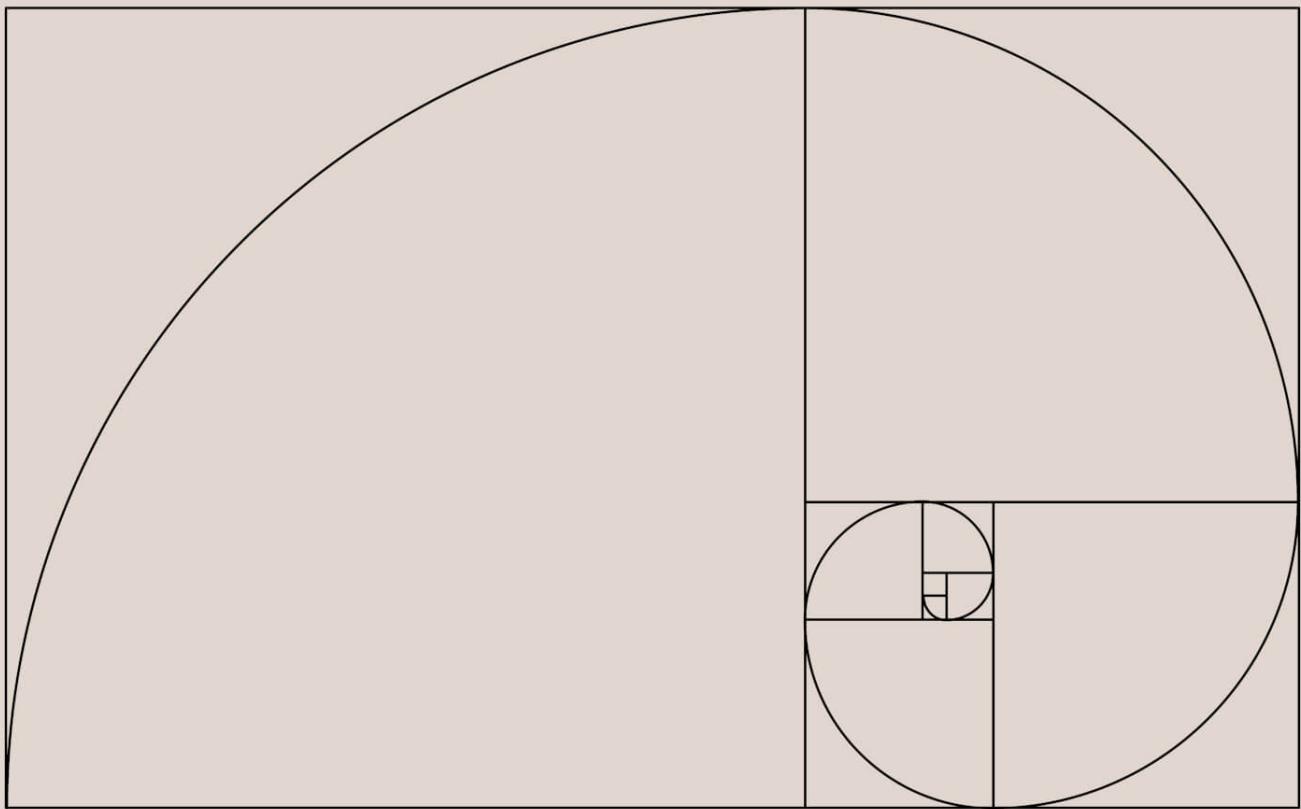
*Pro Tip:* Successful use locks attention to the focal point and gently guides it to its next destination.



# Following the golden proportion<sup>4</sup>

**Definition:** A ratio, 1:1.618, which creates a compositional grid that suggests an asymmetrical, but balanced placement of items on a layout and produces a universal aesthetic appeal.

## The golden ratio



[thesplashlab.com](http://thesplashlab.com)

<sup>4</sup>Further reading on the golden ratio



W/M

HOME ABOUT US SERVICES CONTACTS

# Business goals achieved with design

We are a design team with a strong expertise in design for business. We create branding, business graphics, websites and mobile apps. Let us help you win the competition, reach your maximum and score the company goals beautifully.

PRICING Contact Us

The graphic on the right features a stylized illustration of a person climbing a mountain, overlaid with a golden ratio grid and a purple ribbon-like element.

# Using the rule of thirds

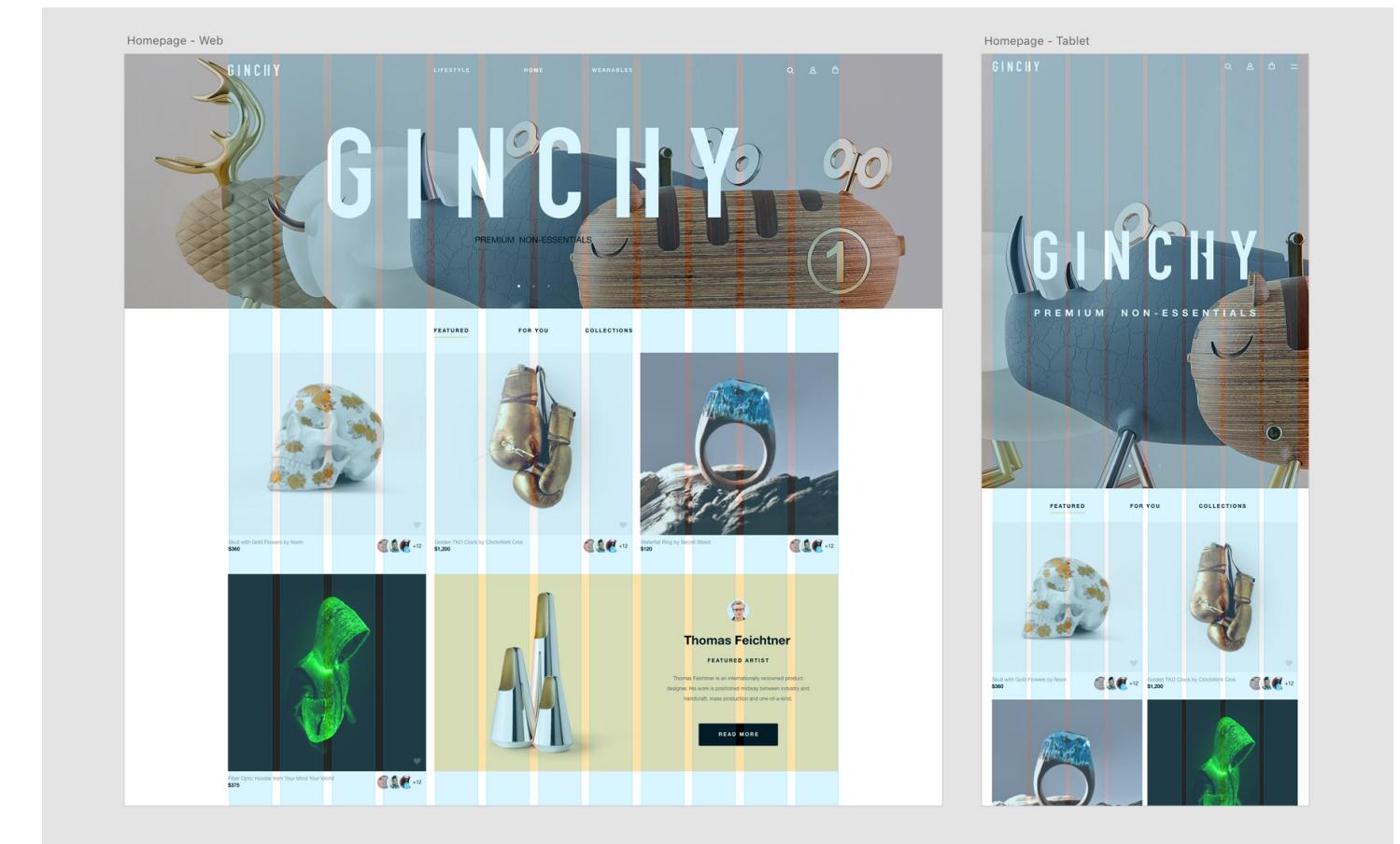
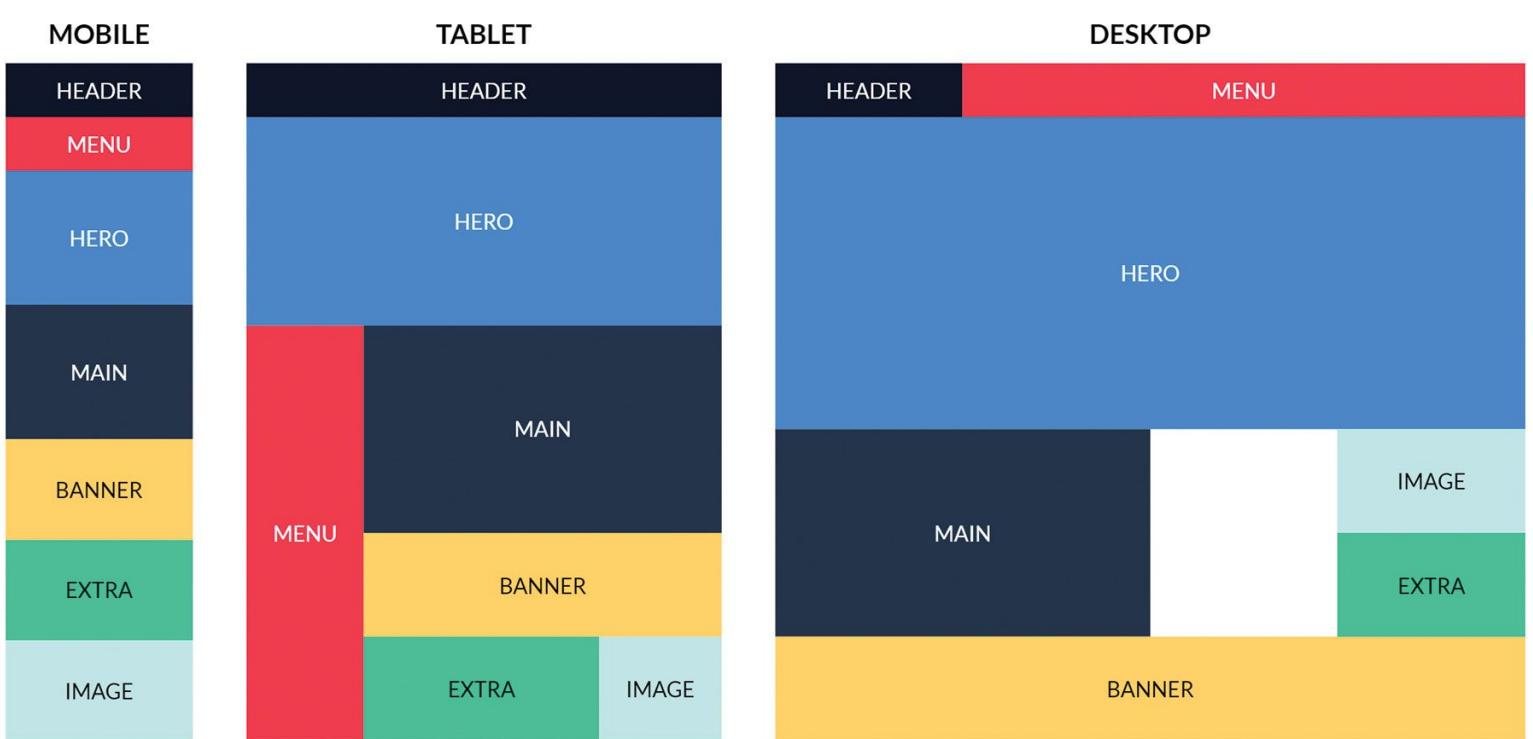
**Definition:** An approximation of the golden ratio that is easier and more flexible to use. When the canvas is divided into a 3x3 grid, the intersections serve as focal points.



# Effectively using grids

**Definition:** Grids serve as a visual framework for organizing elements in an orderly and balanced fashion.





# Integrating type

**Definition:** The use of *headlines* or *blocks of text* to guide the user's attention to messages.

IOTA makes it possible to securely store, sell, and access data streams.

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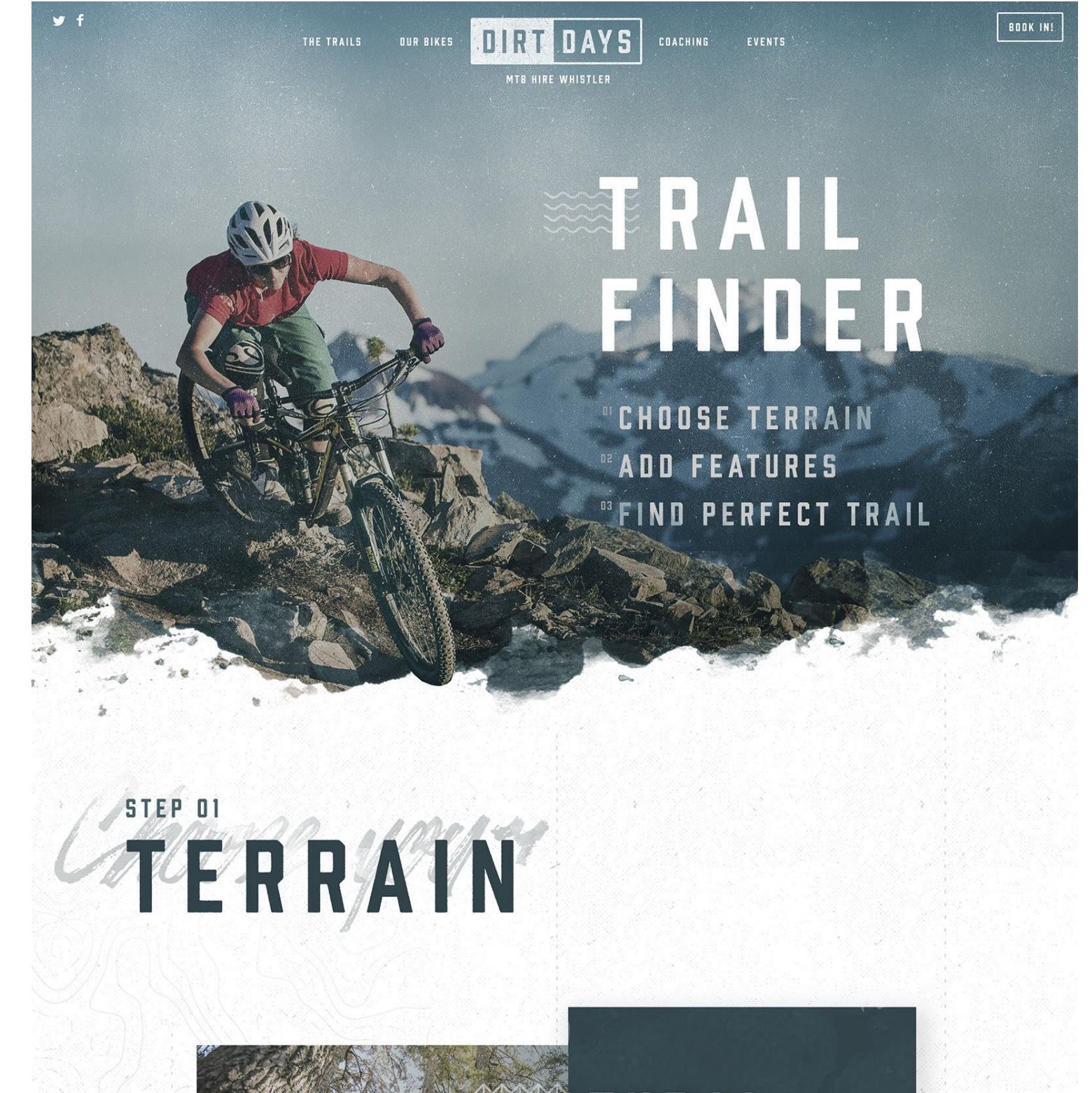
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[IOTA MARKETPLACE](#)

# Placing imagery

**Definition:** The use of imagery to create a focal point or movement on the canvas.

*Pro Tips:* Place on top, not bottom; direction should be toward next focal point; never flip images; do not interrupt headlines; do not wrap text around images.



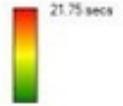
# Using negative space

**Definition:** Space left on the canvas from other design elements, used to provide a visual break and create balance.



A screenshot of a website for a photographer named Jonathan Davis. The header features the name 'DAVIS' with a camera icon. Below the header is a navigation bar with links: HOME, PORTFOLIO ▾, SERVICES, BLOG ▾, PAGES ▾, and CONTACTS. On the right side of the header is a yellow circular icon with a double-exposure camera and sun symbol. The main content area has a large, semi-transparent background image of a person sitting on a rocky cliff edge, holding a camera and looking through the viewfinder. Overlaid on this image is the text 'I'M JONATHAN DAVIS' in orange and 'Photographer &amp; Retoucher' in large, bold, black letters. To the right of the text is a yellow button labeled 'VIEW PORTFOLIO'. Below the main image, a descriptive paragraph reads: 'Based in San Diego, I specialize in various kinds of photography'.

Media: Diapers-01.jpg  
Time: 00:00:00.000 - 00:00:06.033  
Participant filter: All



## Exclusively gentle for the most sensitive skin.

So you have sensitive skin, add the chemicals and moisture on your diaper and you have diaper rash.

Baby Wipes' unique high-absorbency natural-blend cotton provides cotton-soft, extra thick, gel-free protection for your baby's sensitive skin. The chlorine-free materials and absorbent polymers is non-toxic and non-irritating. Clinically tested and pediatrician recommended for babies with allergies and sensitive skin.



baby <sup>TM</sup>

If you are not satisfied with the baby leakage protection, you will get your money back. Read more about our leakfree guarantee at [www.baby.com](http://www.baby.com)

Participant filter: All  
10.43 secs



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So you have sensitive skin, add the chemicals and moisture on your diaper and you have diaper rash.

Baby Wipes' unique high-absorbency natural-blend cotton provides cotton-soft, extra thick, gel-free protection for your baby's sensitive skin. The chlorine-free materials and absorbent polymers is non-toxic and non-irritating. Clinically tested and pediatrician recommended for babies with allergies and sensitive skin.



TM

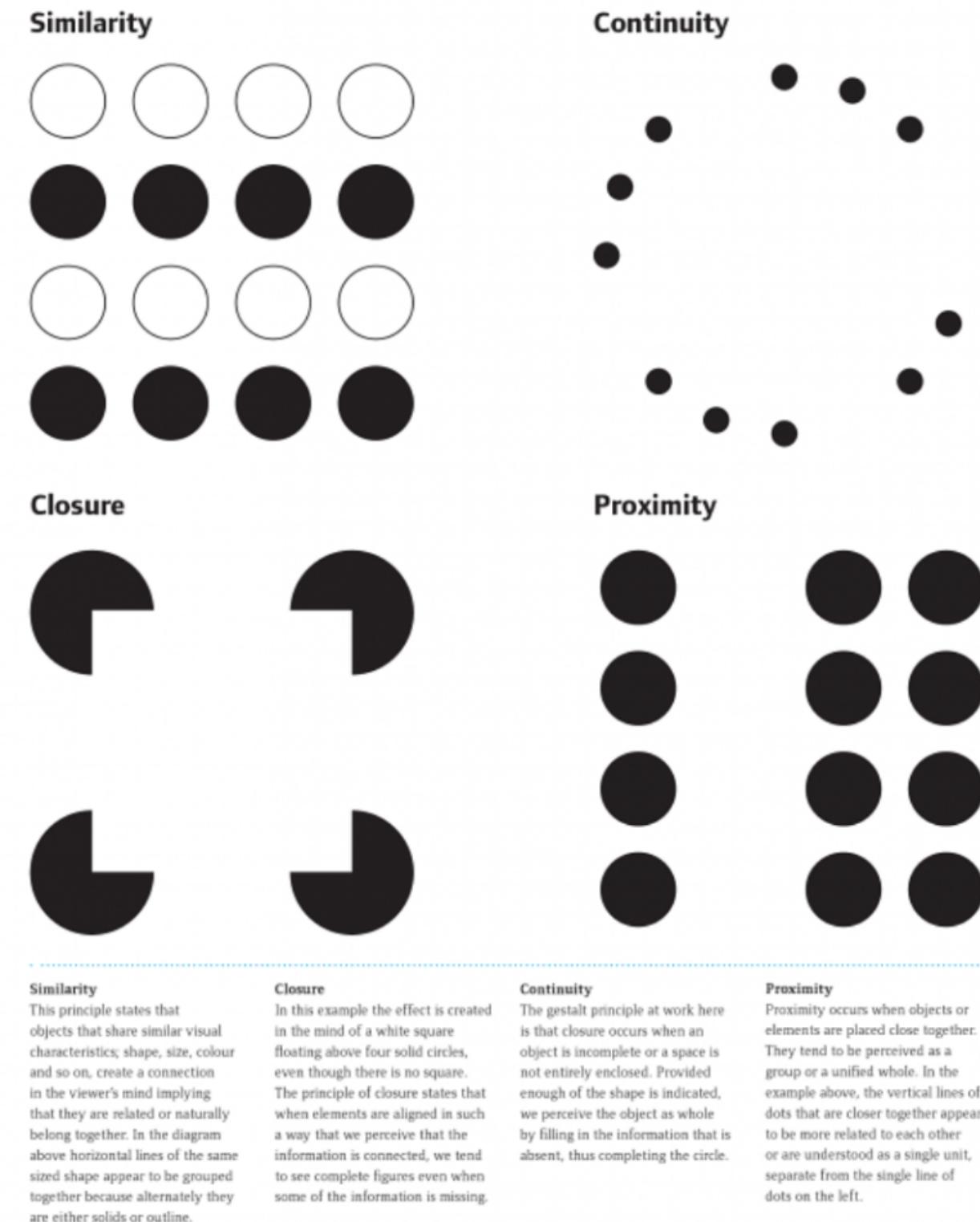
If you are not satisfied with the baby leakage protection, you will get your money back. Read more about our leakfree guarantee at [www.baby.com](http://www.baby.com)

# Grouping using Gestalt Theory

**Definition:** Visual perception principles that predict how users will perceive design elements.

Includes four key principles:

1. Proximity
2. Similarity
3. Continuity
4. Closure



# Creating visual hierarchy

**Definition:** Using relative positioning and sizing to communicate what design elements are more important and should be looked at first.

You will read this last.

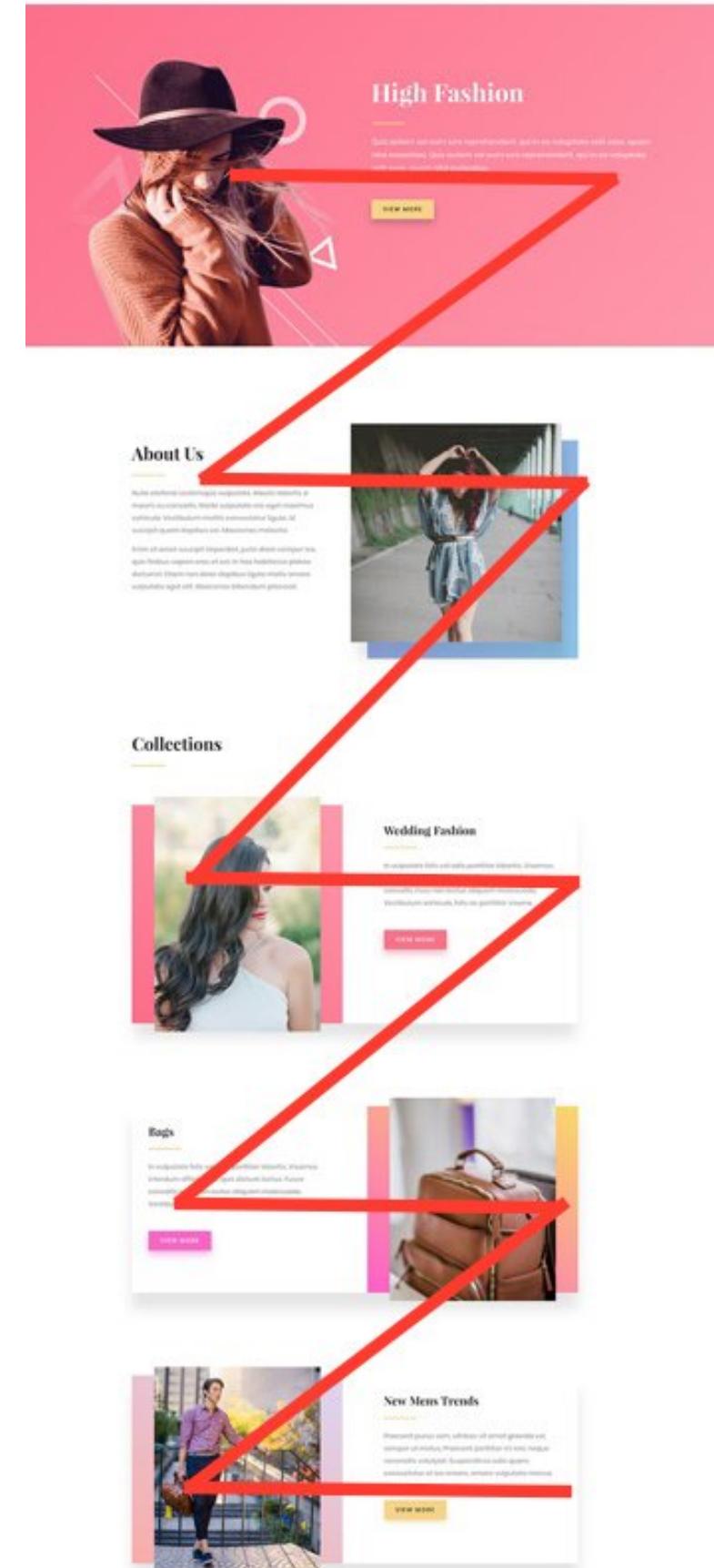
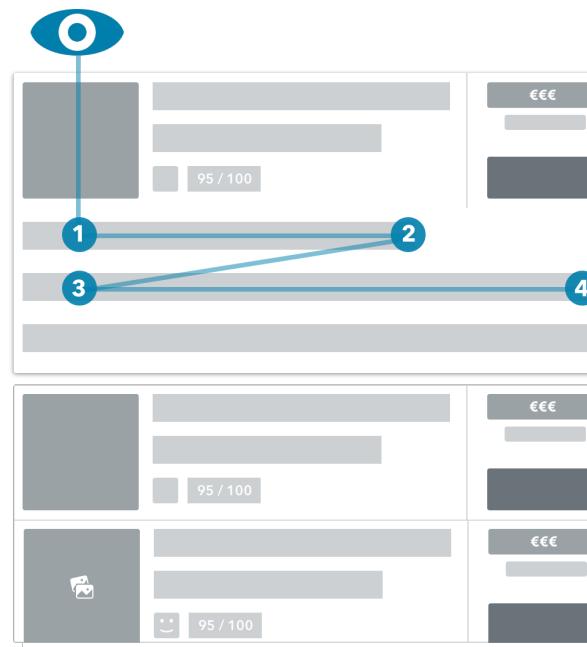
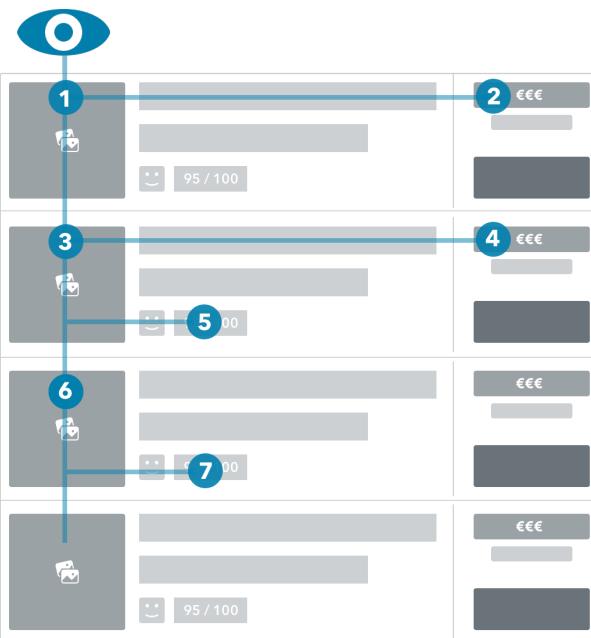
You will read  
this first.

Then you will read this.

And then this one.

# Exploiting visual scan patterns

**Definition:** Designing layouts that exploit common eye-scanning patterns, e.g., the F-pattern and the Z-pattern.



A detailed view of a fashion website's homepage. A large red arrow points from the top right towards the bottom left, indicating a Z-pattern scan direction. The page features a 'About Us' section with a woman's photo, a 'Driving Industry Trends' section with a woman's photo, a 'Sourced from Around the Globe' section with a woman's photo, an 'Our Designers' section showing four designer photos, and a 'Stay in Touch' footer with contact information. The main content area includes sections like 'Popular Outfits' (with a woman in a pink top) and 'New Mens Trends' (with a man in a purple shirt). Each section has a 'VIEW MORE' button.



SPEAK TO AN AGENT  
1-800-416-0599

Free credit monitoring and reports won't work to fix identity theft. We will.

Identity theft is more than credit card fraud. Free credit services don't look for threats like a criminal draining your 401(k), renting an apartment or committing crimes in your name. Our Advantage and Ultimate Plus memberships will. We detect<sup>1</sup> a wide range of threats and work to fix identity theft issues.

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## How LifeLock works to help protect you from identity theft.

Our proprietary technology alerts you to wide range of identity threats.<sup>2</sup> If you have an identity theft problem, our U.S.-based team of specialists will work to fix it.



### DETECT & ALERT

We can detect a wide range of threats and will alert you by phone,<sup>3</sup> email and text of the suspicious activity.<sup>4</sup>



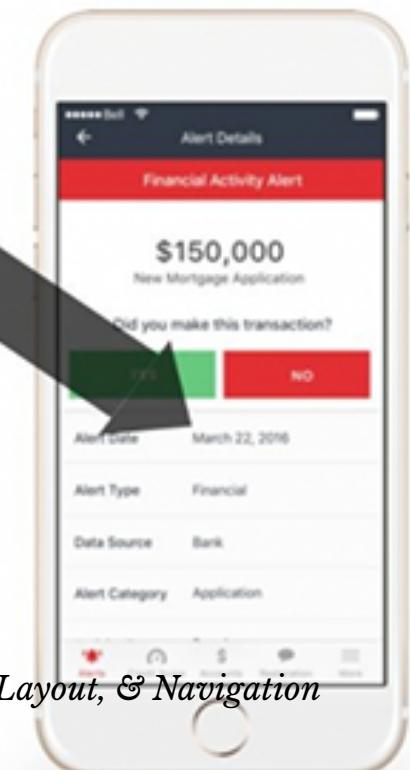
### RESTORE

If you become a victim of identity theft while a LifeLock member, a dedicated U.S.-based Identity Restoration Specialist will work with you from start to finish to help fix the issue. With our \$1M Service Guarantee<sup>5</sup>, we'll spend up to \$1M on lawyers and experts if needed.



### REIMBURSE

If you have money stolen due to identity theft, we'll replace it, as provided by your plan.<sup>6</sup>



# Creating contrast and emphasis<sup>5</sup>

**Definition:** Using contrast and emphasis to establish visual hierarchy by manipulating features of design elements, including position, size, color, typographic characteristics.

TABLE 10.1. Opposing features that can create contrast.

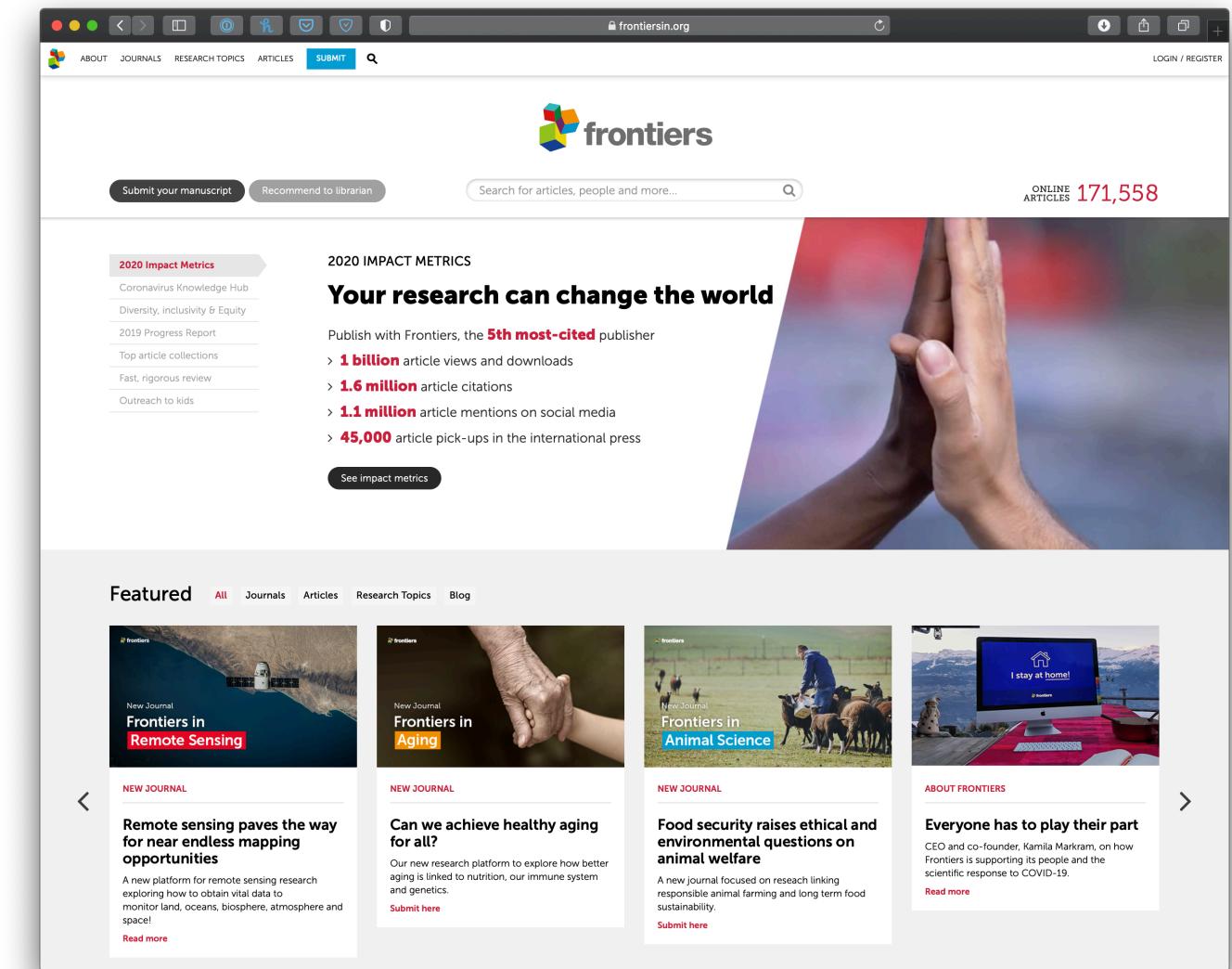
Contrast Type	Feature 1	Feature 2
Spatial contrast	Filled space High density	Empty space Low density
Layout contrast	Top High Right Isolated Symmetrical	Bottom Low Left Grouped Asymmetrical
Form contrast	Simple Representational Geometric Angled	Complex Abstract Organic Curved
Direction contrast	Vertical Static	Horizontal Moving
Style contrast	Technical and precise Playful	Hand-drawn and irregular Serious
Size	Large Long Wide	Small Short Narrow
Color contrast	Dark Black and white Warm colors Vivid	Light Colorful Cool colors Muted
Texture contrast	Fine Smooth	Coarse Rough
Typographic contrast	Serif Roman style (regular)	Sans serif Bold style

<sup>5</sup> Golombisky & Hagen, 2010, *White space is not your enemy*

# In-Class Activity 1: Layout Deconstruction

# Cheatsheet: \*

*Creating a focal point  
Following the golden ratio  
Using the rule of thirds  
Effectively using grids  
Integrating type  
Placing imagery  
Using negative space  
Grouping using gestalt theory  
Creating visual hierarchy  
Exploiting visual scan patterns  
Creating contrast/emphasis*

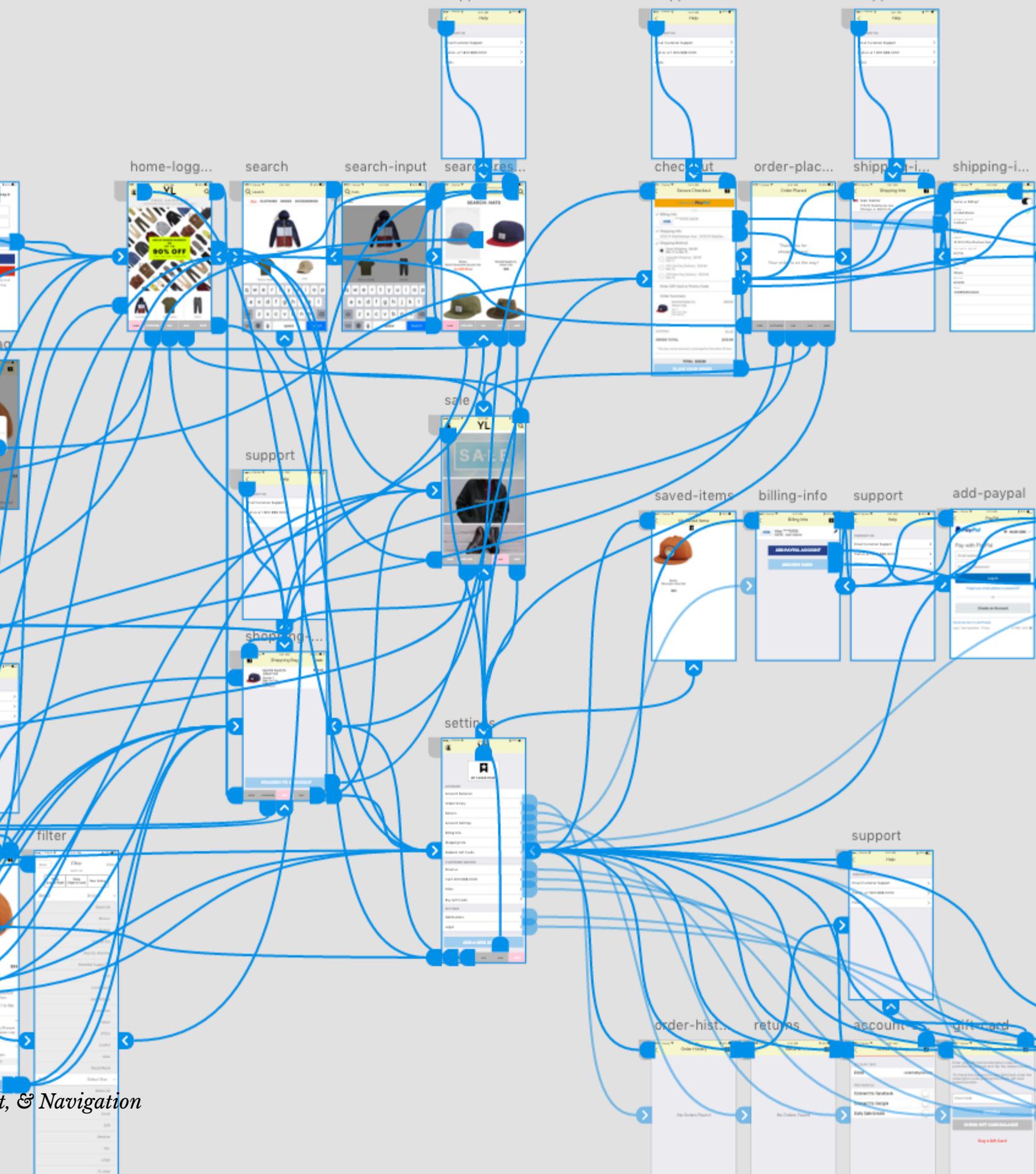


\* Google form

# Principles of Navigation

# Principles of Navigation<sup>6</sup>

1. Wayfinding
2. Cost
3. Aids
4. Models



<sup>6</sup>Tidwell, 2010, *Designing Interfaces*

# Wayfinding

**Definition:** User behavior where navigation across components follows a particular workflow or supports user goals.

Three key elements:

1. Signage
2. Environmental clues
3. Maps, *e.g.*, site maps



[BACK TO SHOP](#)

SECURE CHECKOUT

Home &amp; Kitchen ▾



EN

Hello, Sign in

Account &amp; Lists ▾

Orders

Today's Deals Your Amazon.com Gift Cards Help Whole Foods Registry Sell

oom Discover Shop by Style Home Décor Furniture Kitchen &amp; Dining Bed &amp; Bath Ga



ing &gt; Cookware &gt; Cookware Sets

## Complete Your Purchase

**NEED HELP?**

If you need help, contact us and let us help you. Support is available for 24 hours.

+111 2 345 678 mail@company.com

1

2

3

4

CART

INFORMATION

SHIPPING

PAYMENT

[← BACK](#)**SHIPPING METHOD**

Choose one of the shipping methods below

 Standard Shipping 2-3 Days

\$3.00

 Special Shipping 1-2 Days

\$7.50

**SHIPPING TO**

John Doe  
32 Syarifudin Street, West Bogor, West Java,  
Indonesia 112233

PHONE 012 34 567 89  
ETD 1-2 Days

**ESTIMATION**

Order	\$137.19
Shipping	\$0.00
Discount	\$0.00
Tax	\$10.00
<b>TOTAL</b>	<b>\$147.19</b>

Is this wrong? [Change here](#)[GO TO PAYMENT METHOD →](#)

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Roll over image to zoom in

### Cuisinart MCP-12N Multiclad Pro Stainless Steel 12-Piece Cookware Set

by Cuisinart

 2,264 customer reviews
   
| 729 answered questions

Amazon's Choice for "cuisinart"

Price: **\$197.21** & FREE Shipping. Details & FREE Returns

Coupon

Save an extra \$6.09 when you apply this coupon.

Details

Get \$50 off instantly: Pay \$197.21 \$147.21 upon approval for the Amazon Rewards Visa Card. No annual fee.

Size: 12-PC Set

7-PC Set

10-PC Set

12-PC Set

- Polished cooking surface does not discolor, react with food or alter flavors.
- Cookware also features cool grip handles secured with stainless steel rivets and self-basting, tight fitting lids, Triple-Ply construction

**\$197.21**

&amp; FREE Shipping. Details &amp; FREE Returns

Want it faster  
Order view  
choose per brand  
checkou

In Sto

50s

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H&amp;M HOME

&amp; Other Stories

ARKET

Afound

Animal welfare

Chemicals

Climate positive value cha

Water

Business ethics

**Get involved**

Care for your clothes

Recycle your clothes

Sustainability Summary 201

**Investors**

Financial calendar

Reports and presentations

The H&amp;M group 2017 in wor

pictures

Capital Markets Day 2018

The share

Shareholders

Dividend

Five year summary

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**Enjoy our culture**

More about our values

Be proud

**Lead the way**

Randall April, H&amp;M

Andreas Sjunnesson, Weekday

Anna Norling, Cheap Monday

Michael Hafner, Monki

Sofia Carpentier, &amp; Other Stories

Helene Fredell, H&amp;M Home

**Stylish rewards**

H&amp;M Incentive Program

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Newsroom

Image galleries

Calendar

Social media

Media contacts

**Sustainability****Vision and strategy**

Sustainability strategy

Stakeholder engagement

## Cost

**Definition:** The time and effort required by users to navigate between components.

Two key principles:

1. Minimize factors that increase cost of navigation: *context switch, errors, delays*
2. Minimize travel time by minimizing number of steps and context switches

# Aids

**Definition:** Design elements that aid users in navigating through content.

Three types of navigation aids:

1. Global navigation aids, *e.g.*, menus, tabs, sidebars
2. Utility navigation aids, *e.g.*, sign in, help, print
3. Associative/in-line navigation aids, *e.g.*, related links



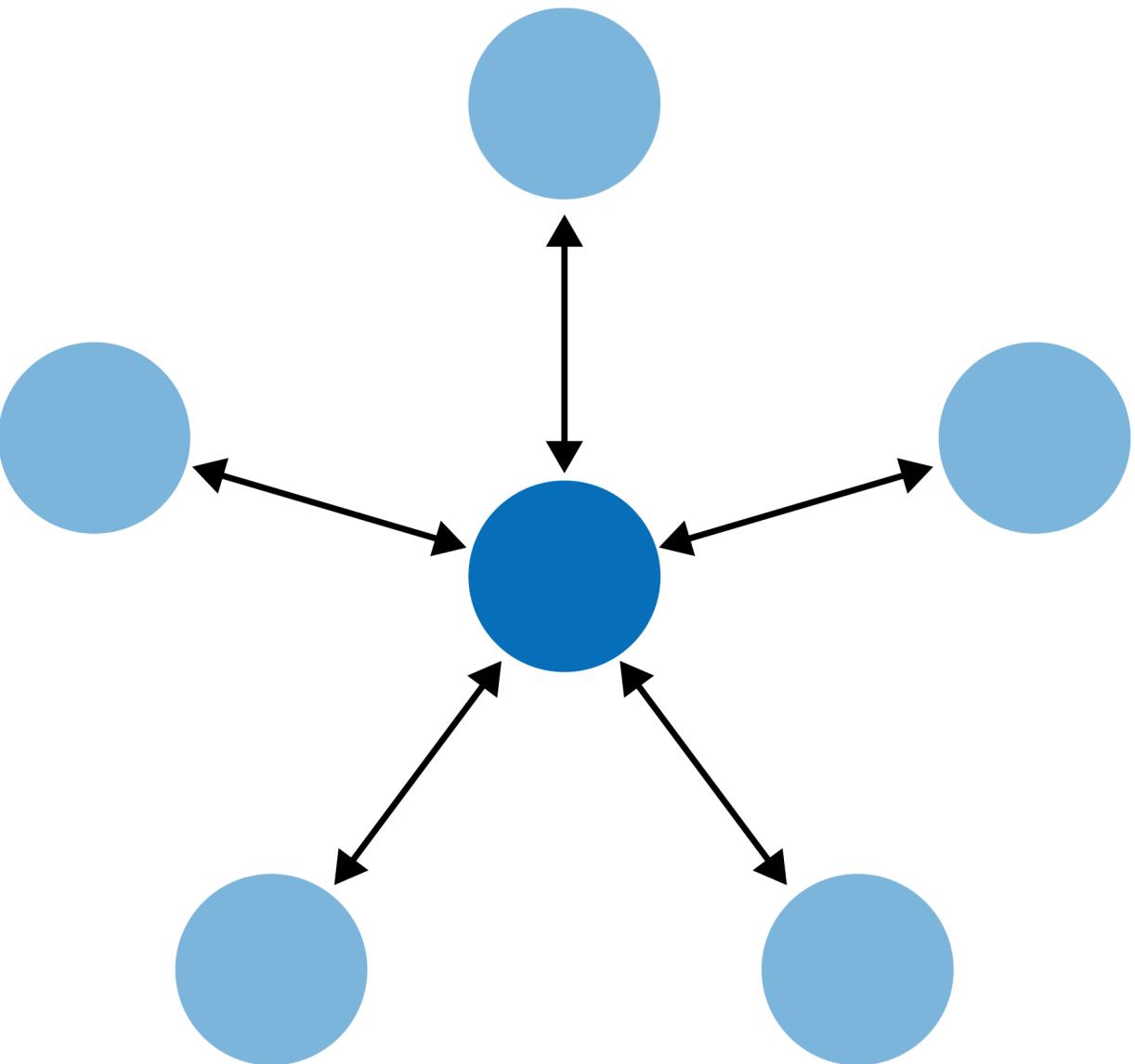
# Models

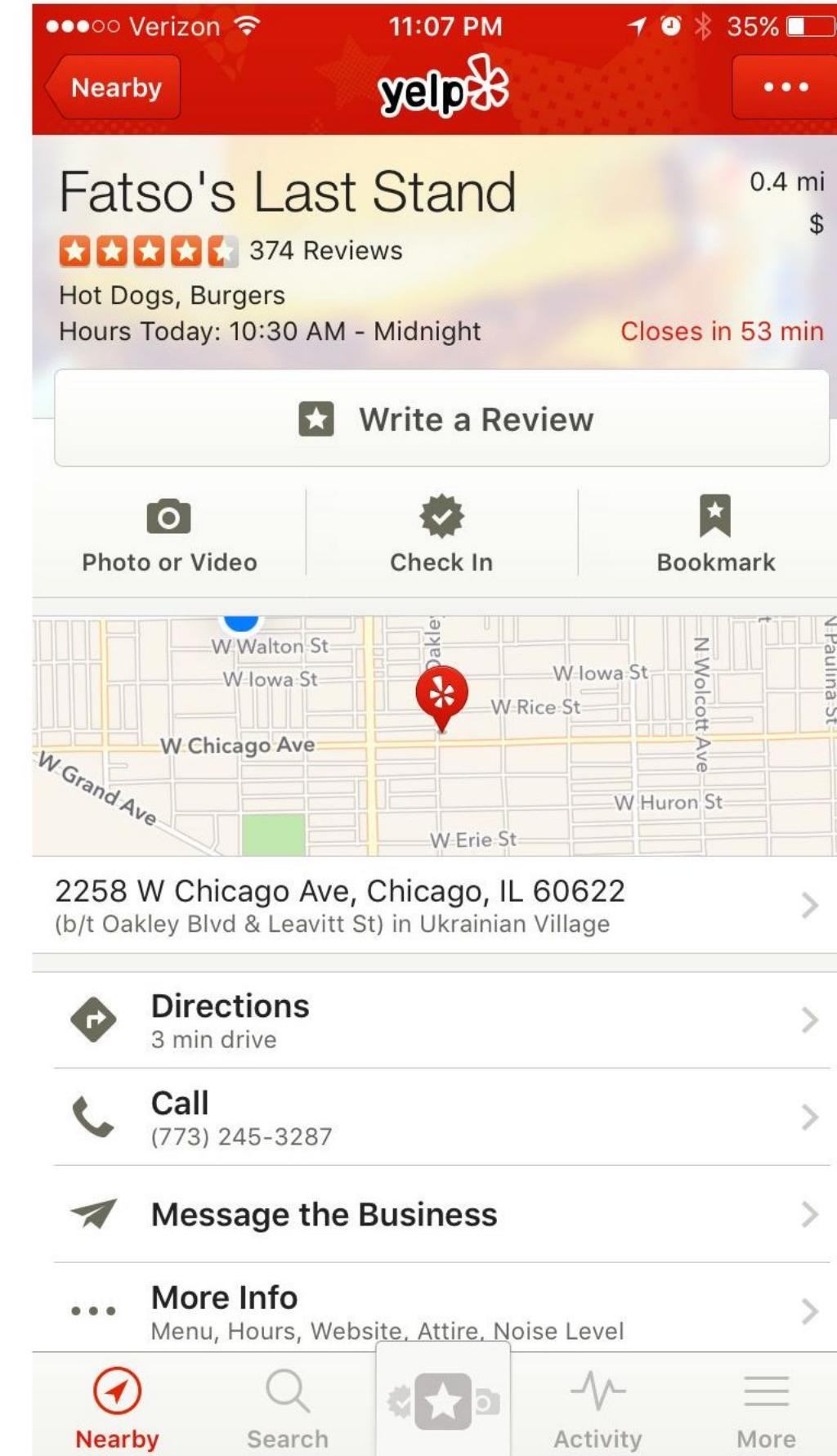
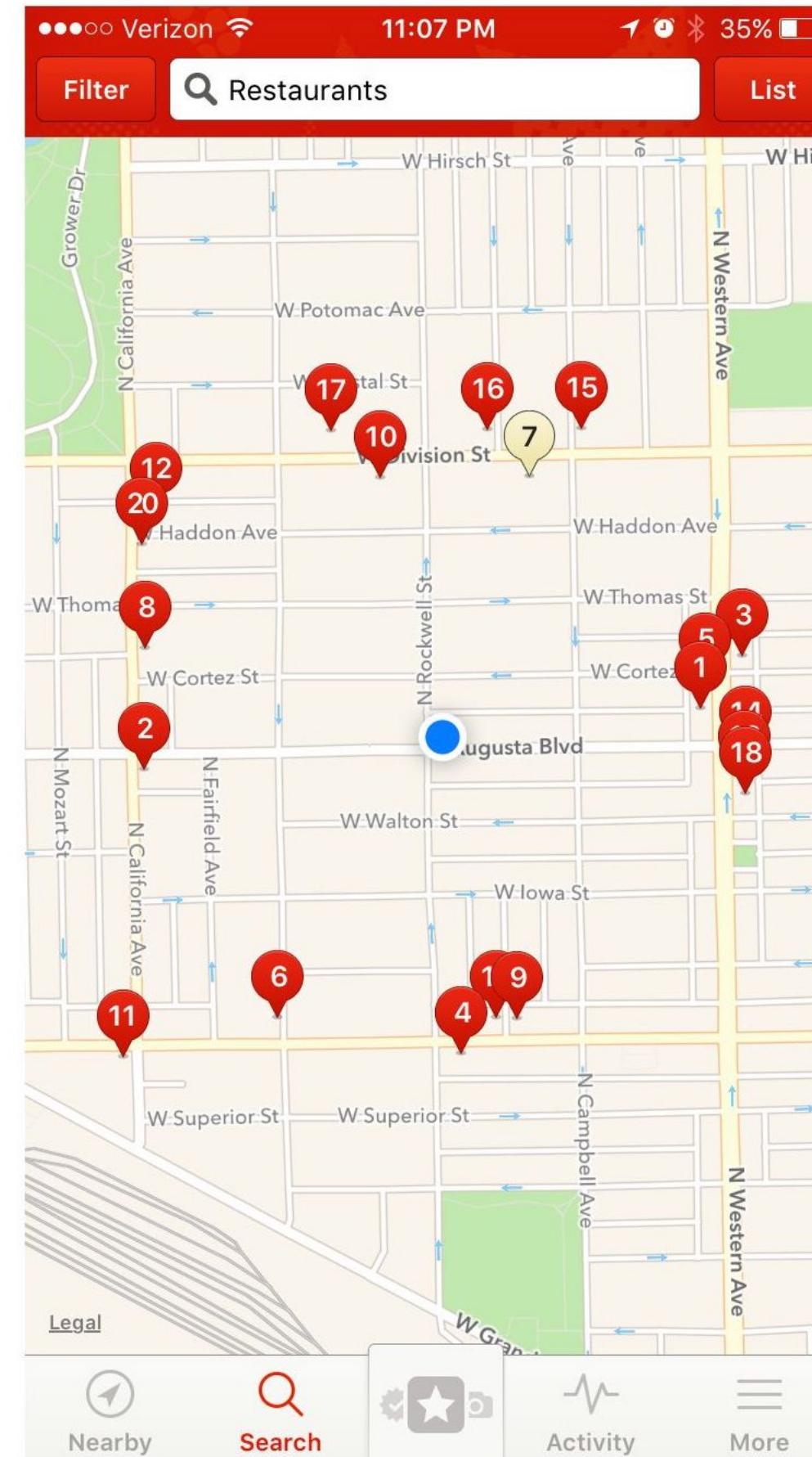
**Definition:** Commonly used patterns of navigation through interactive applications.

- 1. Hub and spoke
- 2. Fully connected
- 3. Multi-level
- 4. Stepwise
- 5. Pyramid
- 1. Pan-and-zoom
- 2. Flat navigation
- 3. Modal panel
- 4. Clear entry points
- 5. Bookmarks
- 6. Escape hatch

## Models: Hub & spoke

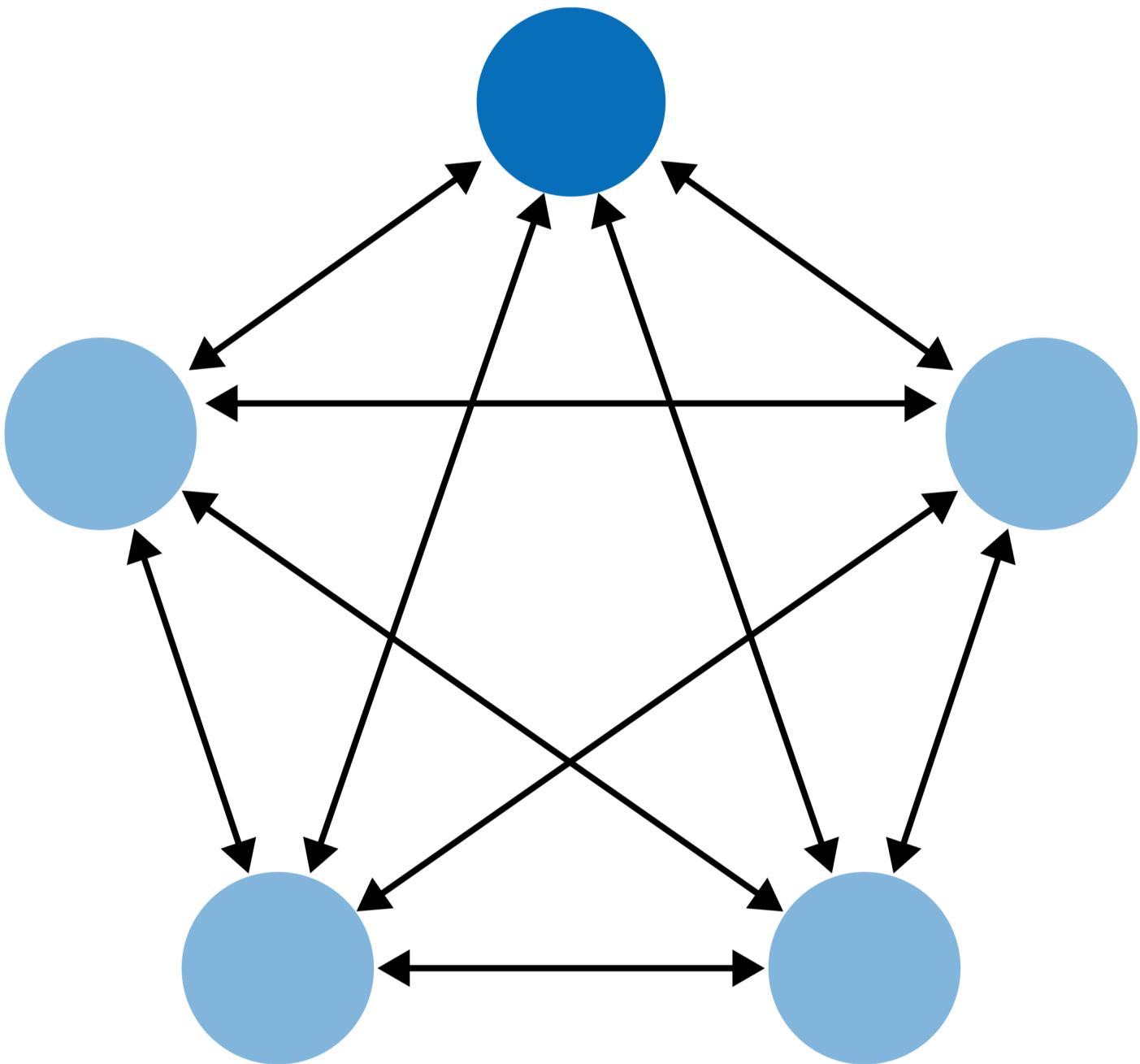
**Definition:** Involves a central hub, e.g., a home screen, that provides transitions to and from several specialized components.





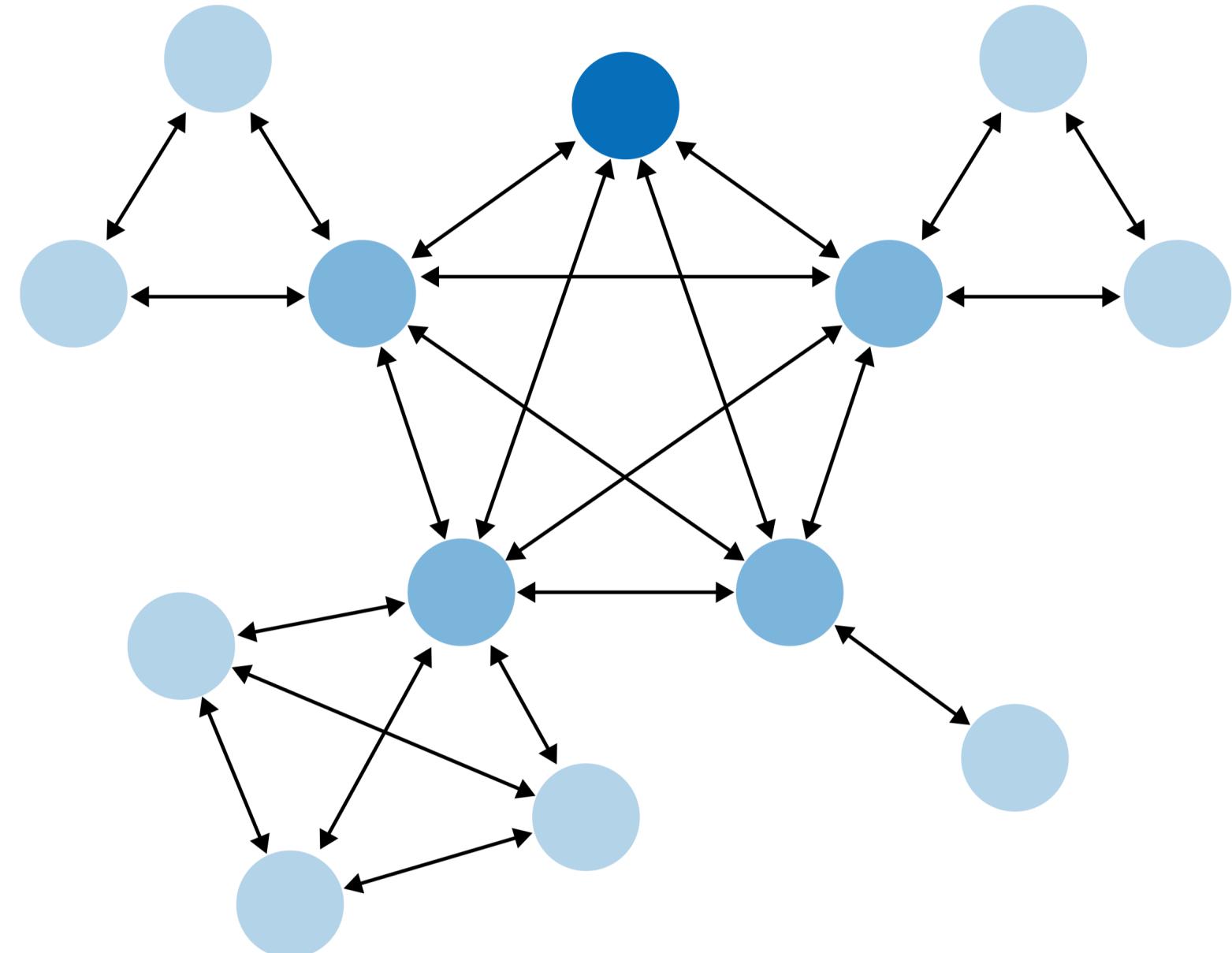
## Models: Fully connected

**Definition:** A central component/page is connected to all other components that are also linked to each other.



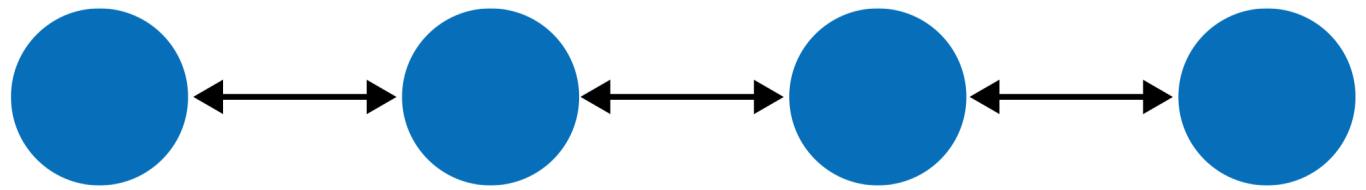
## Models: Multi-level

**Definition:** Involves main components that are fully connected with each other and sub-components that are only connected among themselves.



## Models: Stepwise

**Definition:** Follows a sequential or branching navigation that represents step-by-step process, e.g., checking out on an e-commerce site.





## Set up your Amazon selling account

Have the following available:



**Business name &  
address**



**Mobile or  
telephone number**



**Chargeable credit  
card & valid bank  
account**



**Tax information  
account**

### Legal name

[What is a legal name? ›](#)

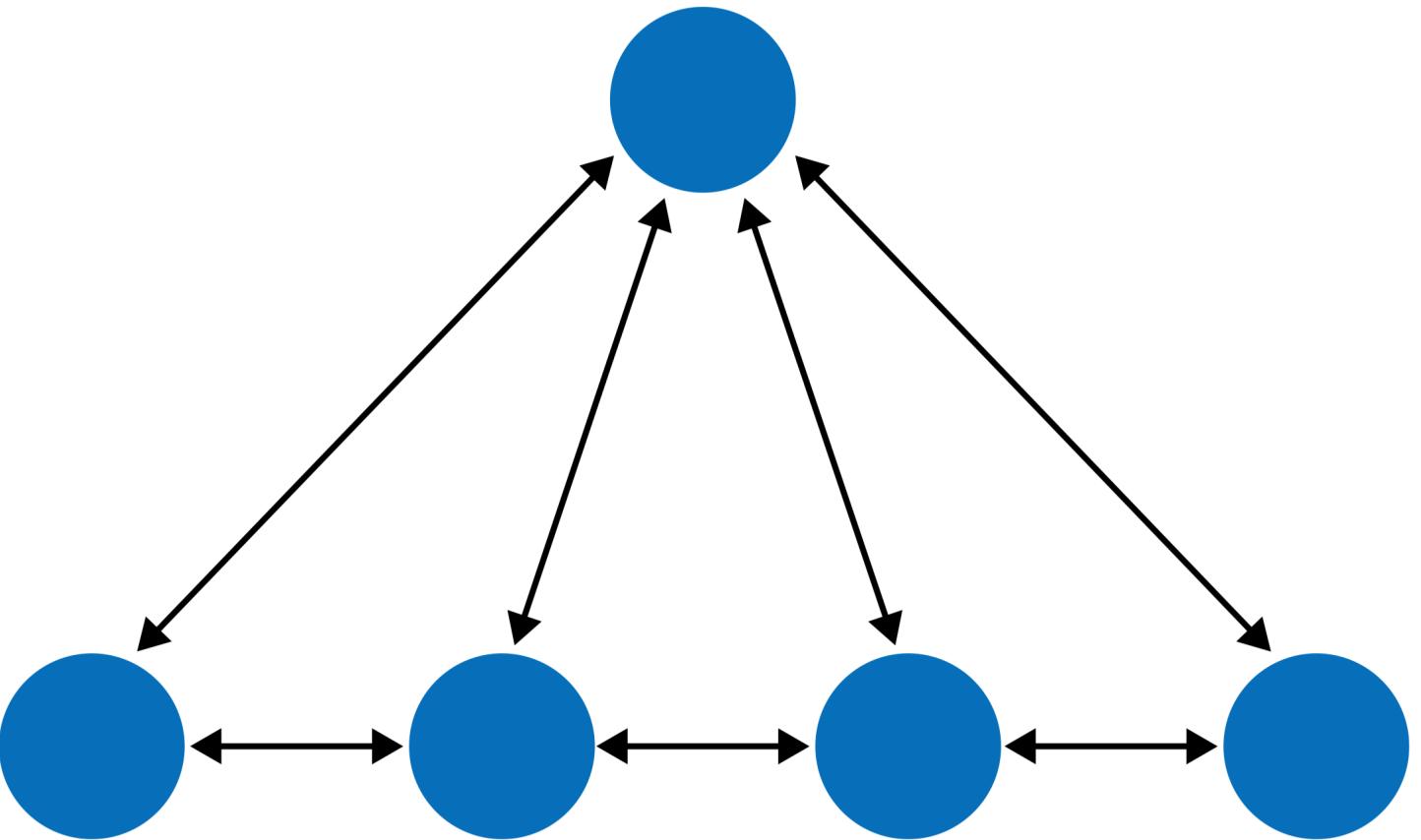
### Seller agreement

I have read and accepted the terms and conditions of the  
[Amazon Services Business Solutions Agreement](#)

Please Leave Feedback

## Models: Pyramid

**Definition:** Similar to the stepwise model, but at each step, the user can navigate to the hub and back.



TurboTax Online

**intuit** **turbotax** Federal Free Edition

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< Tax Timeline Personal Info Federal Taxes State Taxes Review File

\$0 Federal Refund \$0 NY Refund (in progress) Hide

Prepare State Your State Returns State Review



Let's get your state taxes done right

Here's what's coming up:

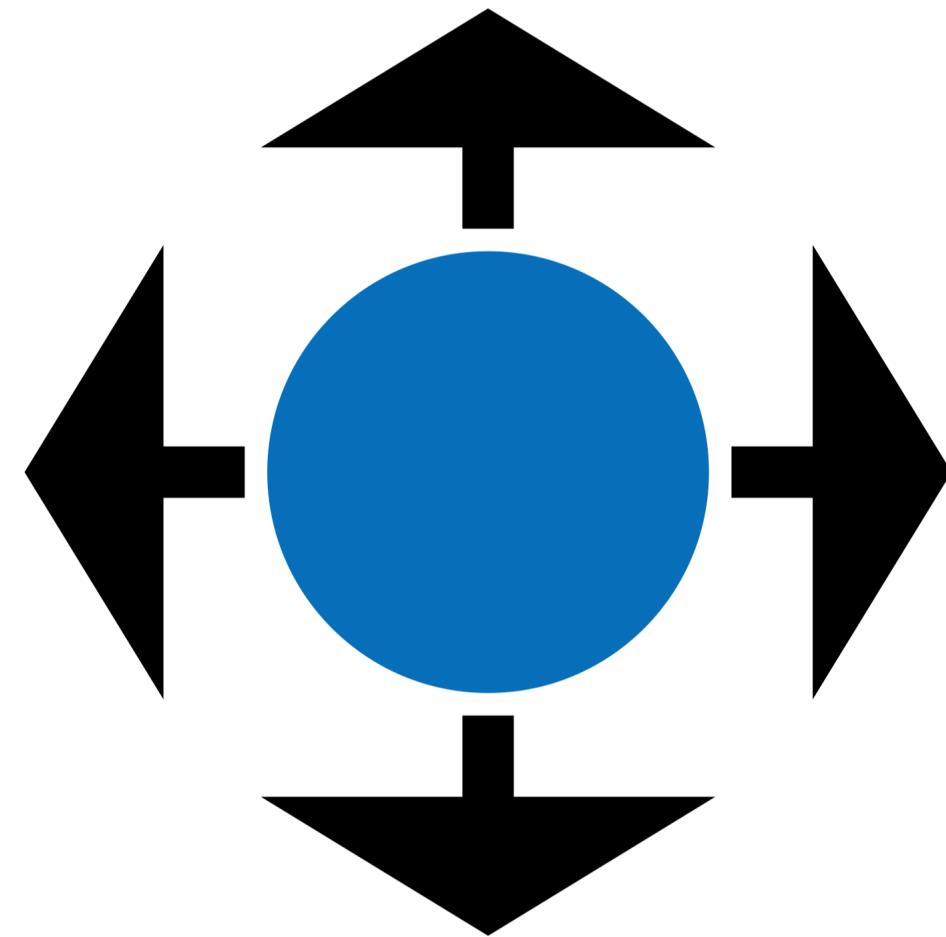
- We'll cover your state requirements
- We'll search for state tax breaks
- We'll help ensure your taxes are accurate

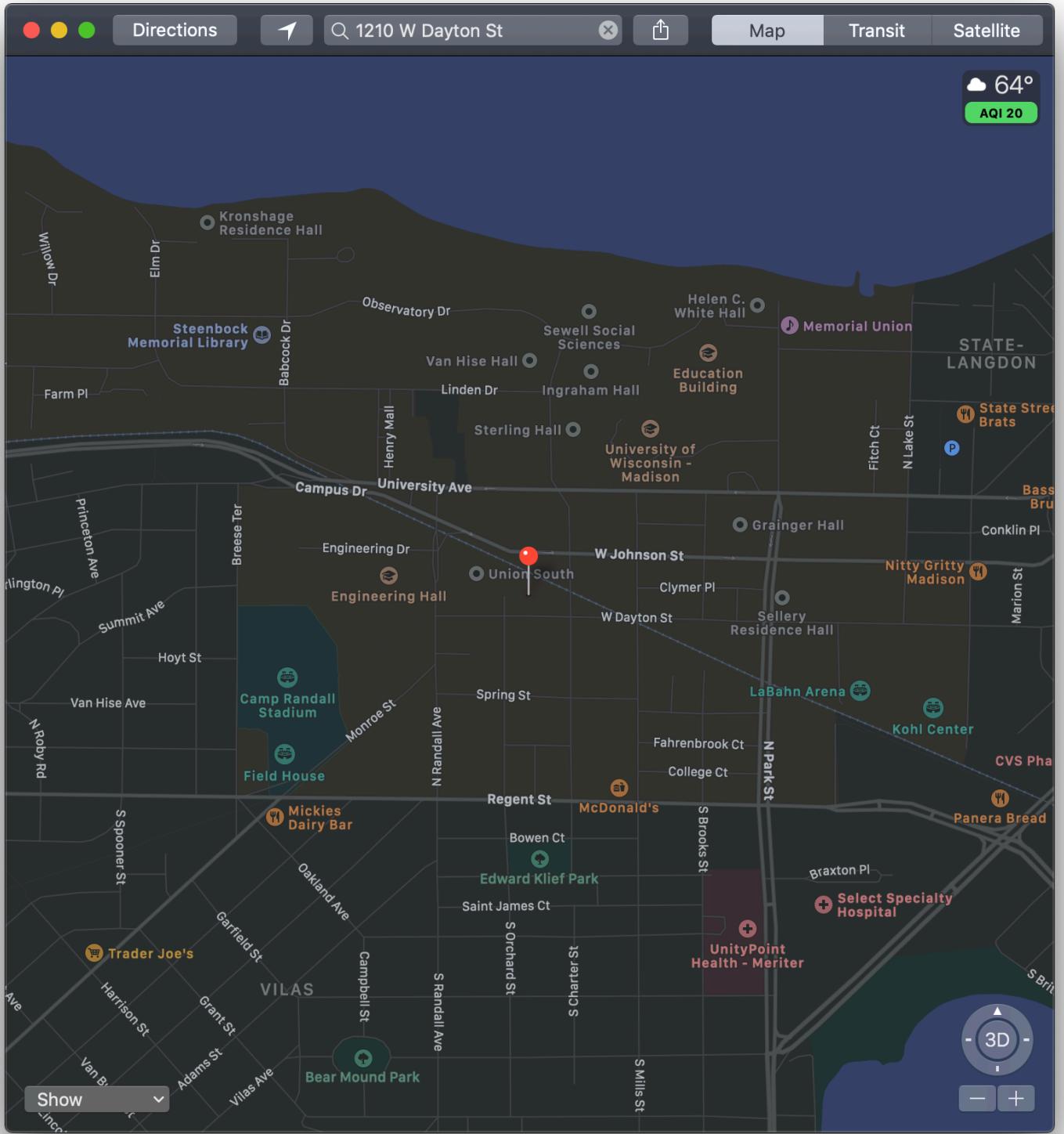
< Back Continue

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## Models: Pan-and-zoom

**Definition:** Provides users with the ability to continuously navigate across a large space of content, e.g., a map, a list, or a written document.





Vestibulum sodales sem sit amet erat faucibus pellentesque. Duis vestibulum in velit ac cursus. Nullam ultrices feugiat nisl sed fermentum. Donec neque eros, molestie vel ullamcorper at, molestie vitae risus. Cras ut vestibulum mi. Pellentesque vitae bibendum sapien, sed mattis sem. Nam eu quam orci. In ut imperdiet nibh. Sed lectus est, commodo non augue at, vehicula tristique tellus. Proin condimentum, orci sed imperdiet commodo, nisl ipsum sodales ipsum, et maximus mauris dui sed felis. Aliquam tincidunt quam sed aliquet elementum. Aliquam nec ex et diam luctus semper vel in augue.

Cras eu scelerisque enim. Sed id diam pharetra, gravida lectus at, maximus nisl. Curabitur eu magna imperdiet, accumsan purus id, faucibus neque. Praesent quam mauris, tincidunt in turpis et, posuere porttitor justo. Donec in dignissim risus. Sed ut ultricies orci, nec pharetra ante. Sed quis ex augue. Aenean id magna quis purus tristique sodales. Quisque bibendum dolor at ante viverra, sed placerat erat suscipit. Proin finibus lacus quis ligula pulvinar imperdiet.

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## **Models: Flat navigation**

**Definition:** Involves a central workspace that is always visible and functions that do not require context switches or navigation.

Drafts / Untitled

Share

32%

COMMENTS

Show Resolved Comments

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Page 1

Maria, a few seconds ago  
Let's add some UI elements to make it clear  
that they should scroll down further. 😊  
a few seconds ago

Maria, 26 minutes ago  
This is cool.

Maria, 39 minutes ago  
This should be a color-branded button

Frame

Welcome

START NOW

iPhone X

Welcome

START NOW

MacBook

Welcome

START NOW

VIDEO

iPhone X

375x812

Frame

Group

Rectangle 2

Group

Polygon

VIDEO

Rectangle 3

Frame

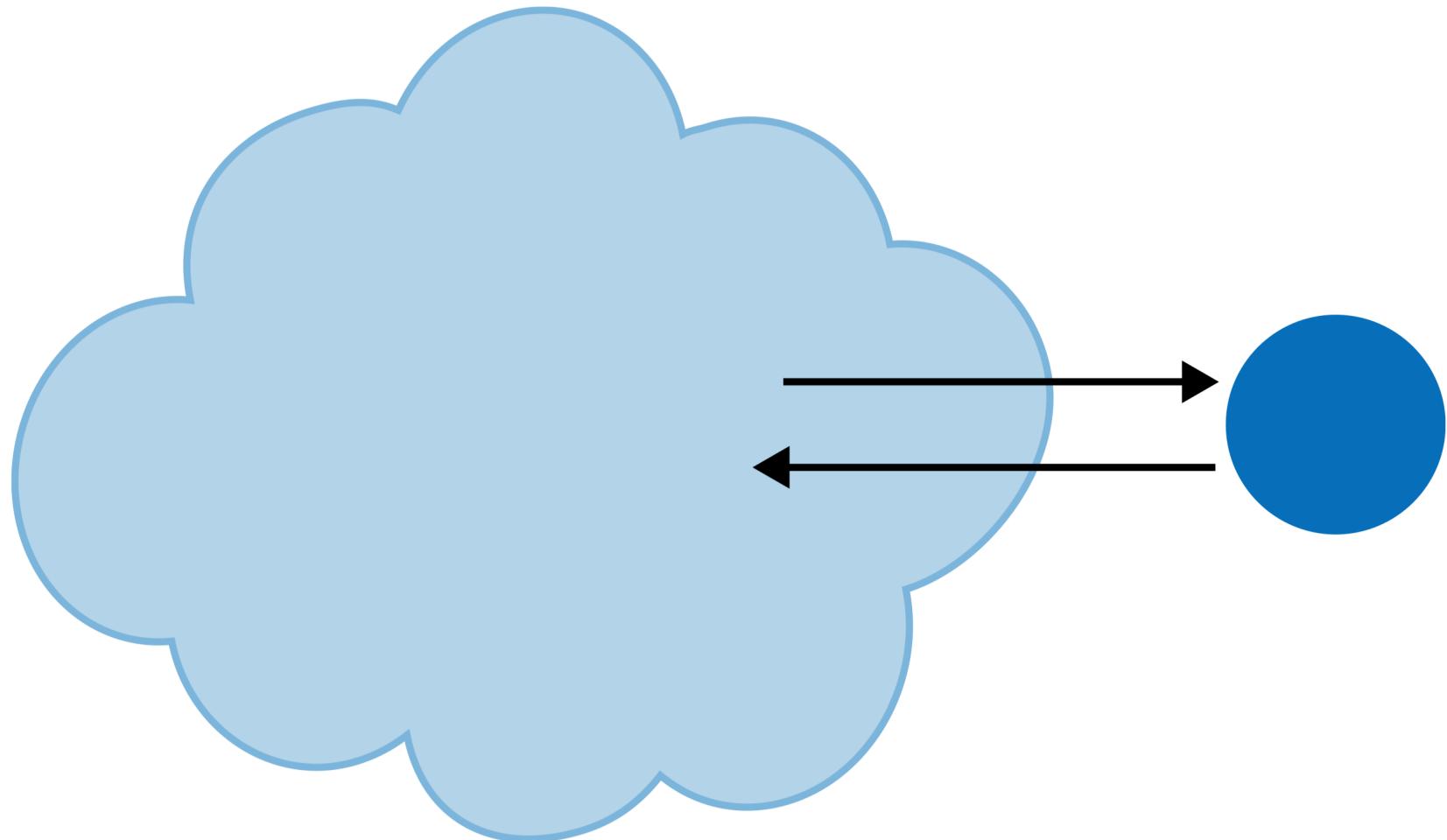
Group

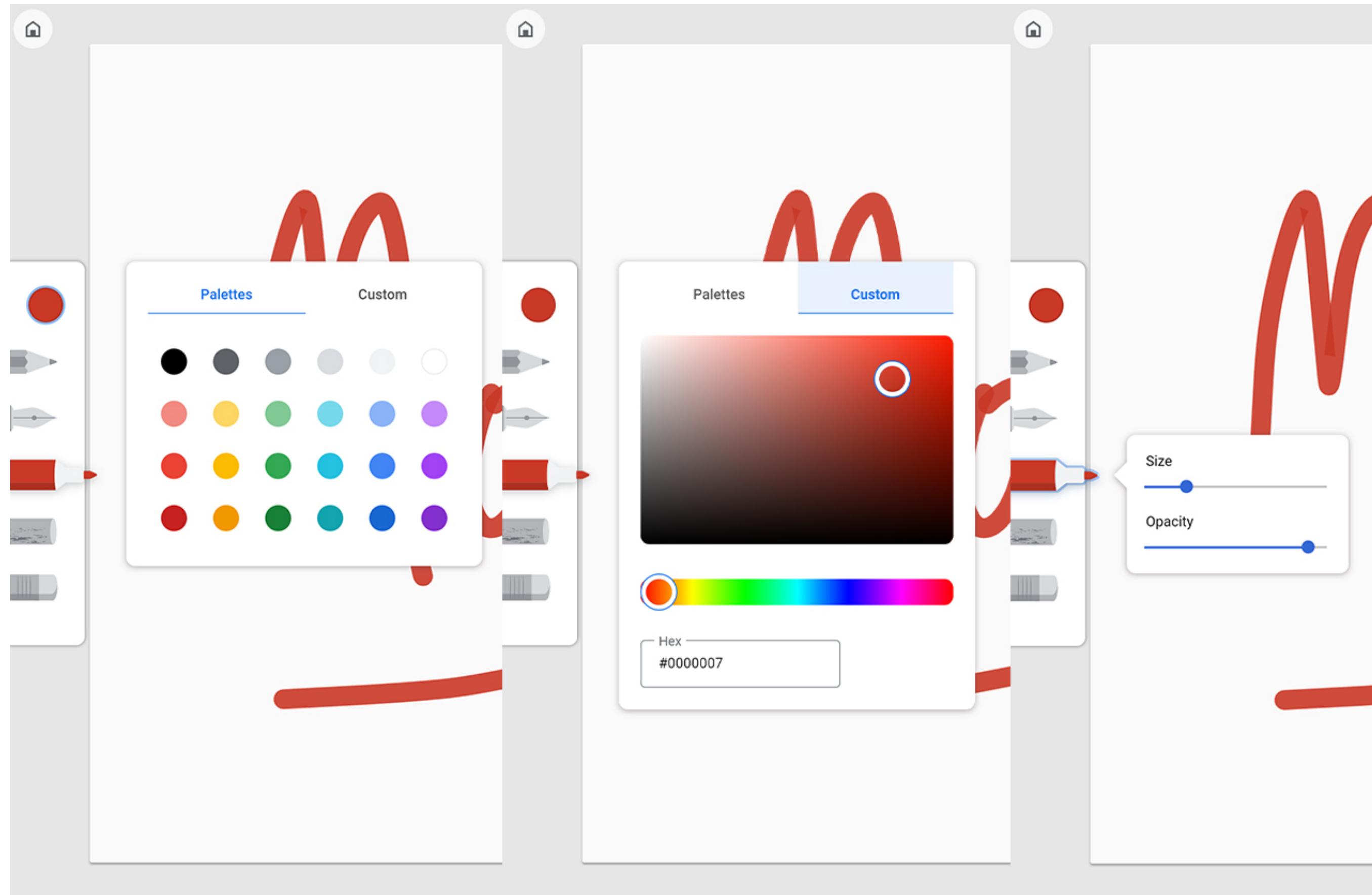
Comments

?

## Models: Modal panel

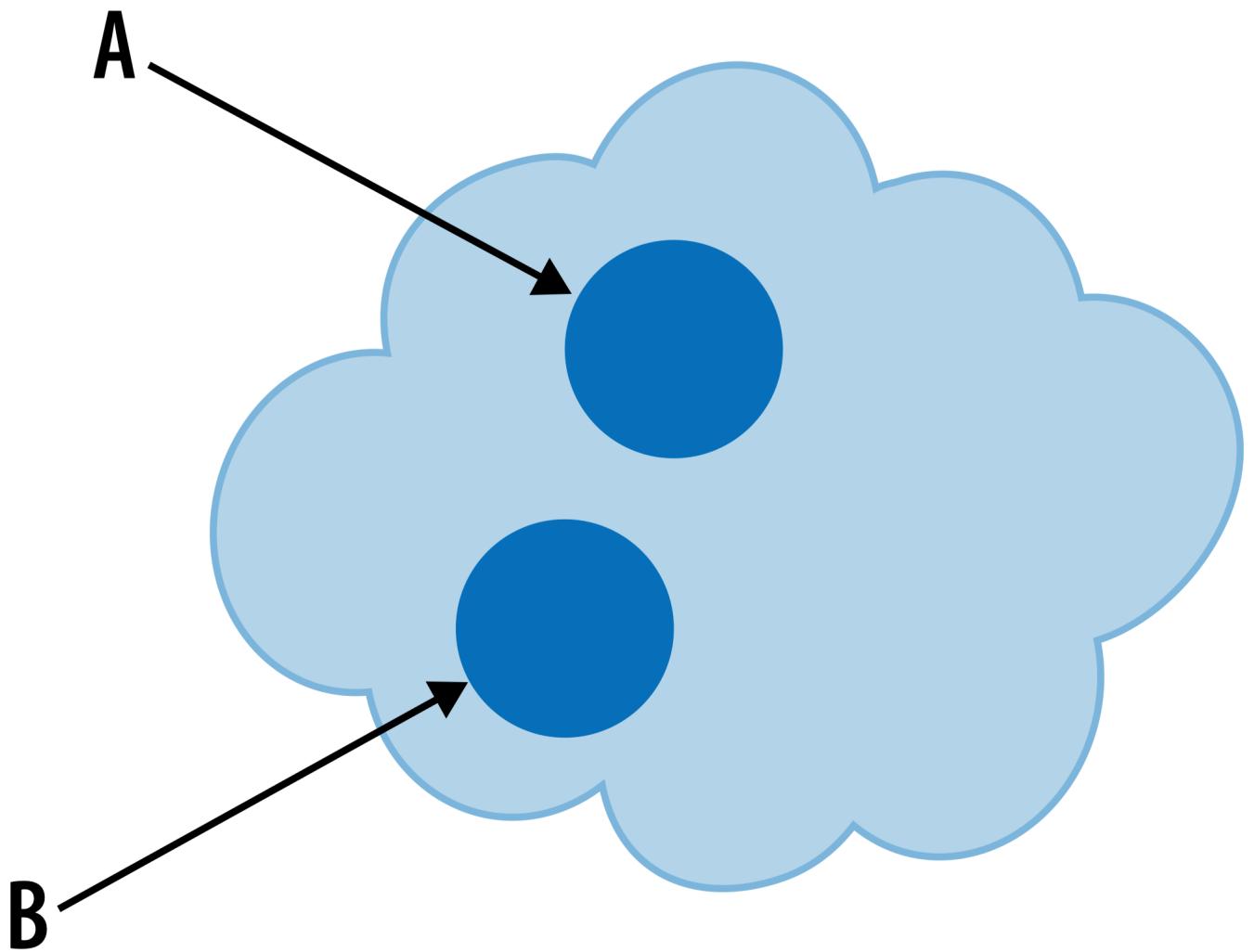
**Definition:** Follows the flat navigation model except for modal dialogs that are temporarily overlaid on the canvas to help the user perform specific functions.

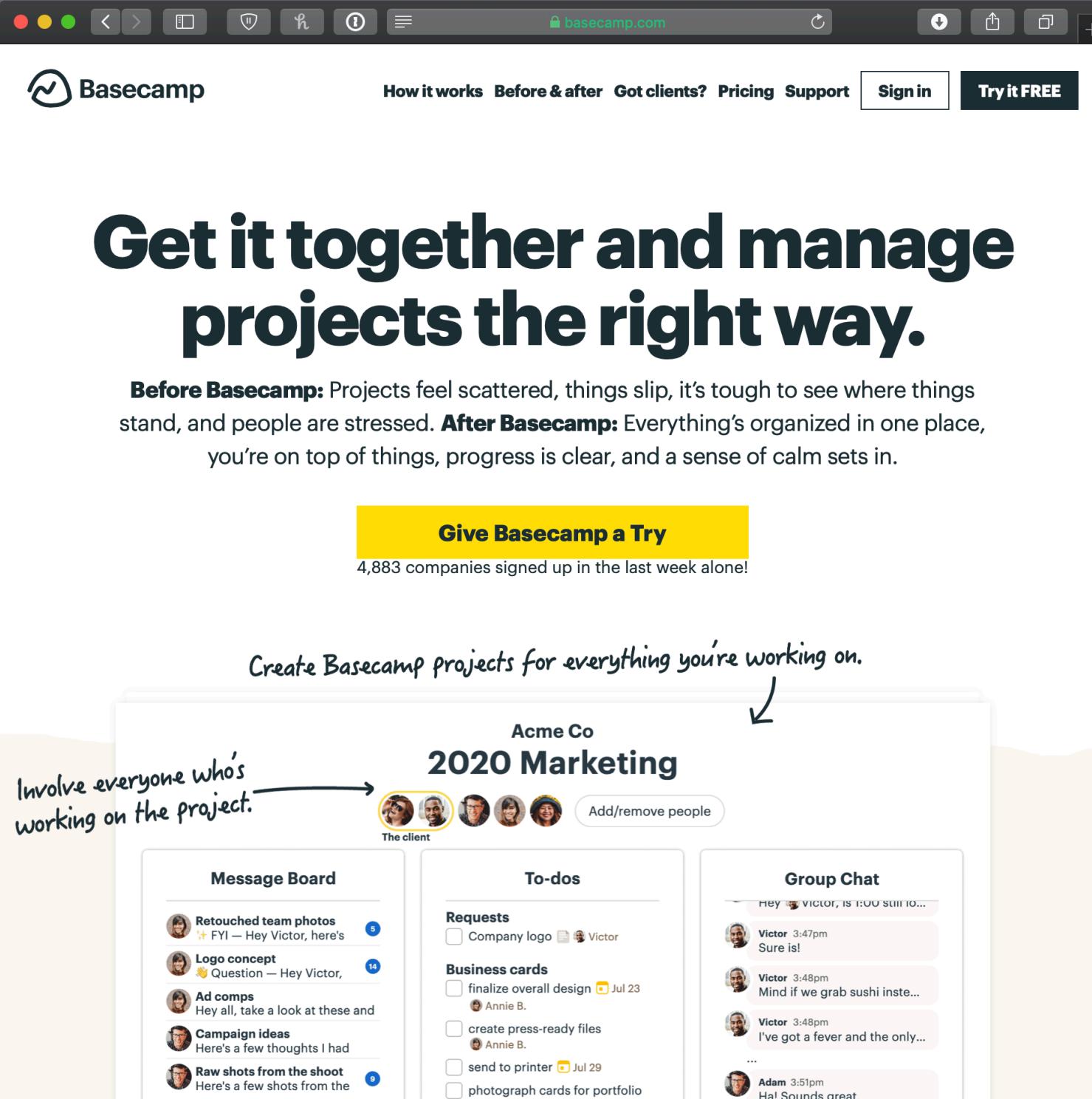


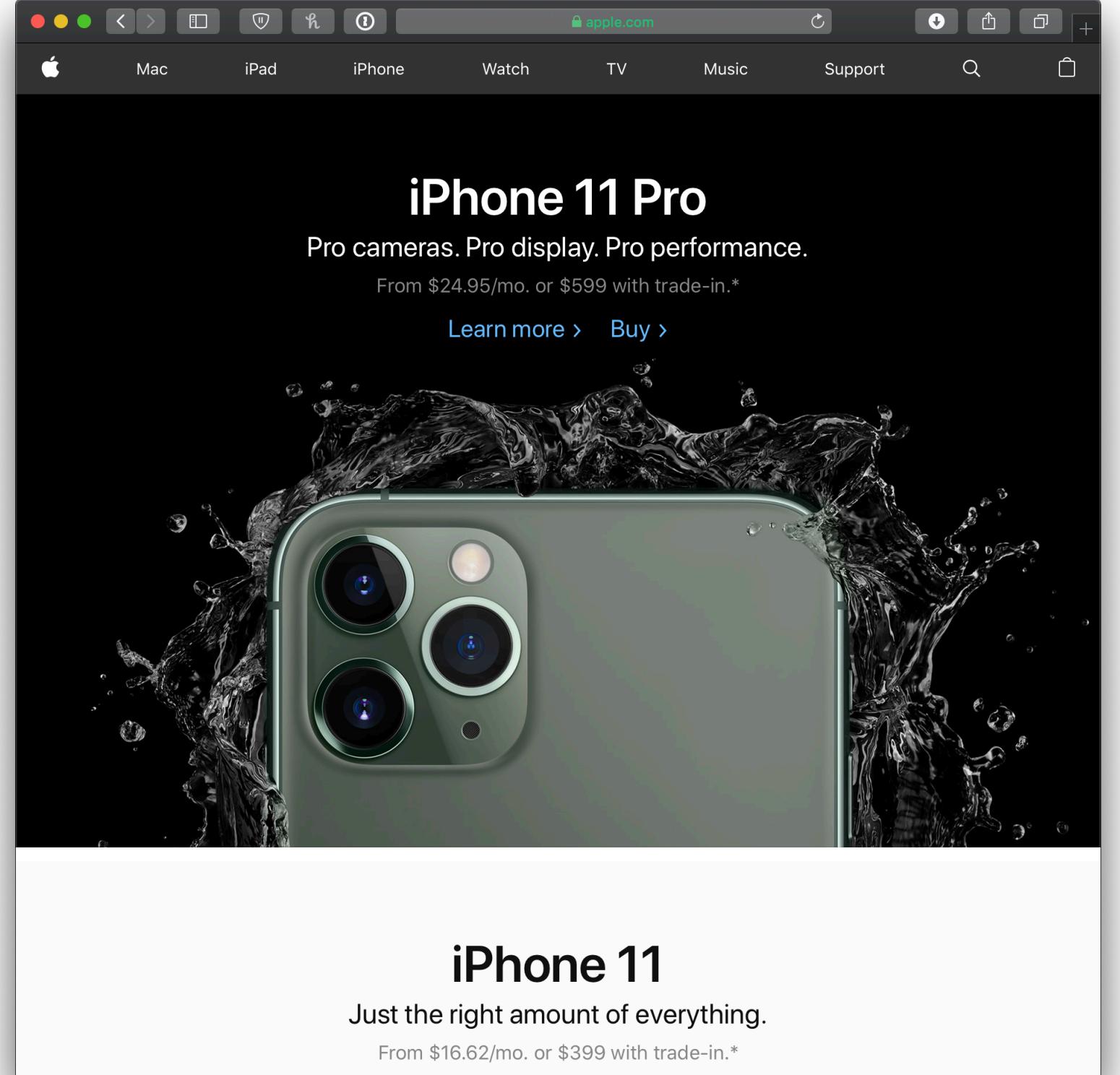


## Models: Clear entry points

**Definition:** Complex applications involve navigational models with clear entry points that guide the user to frequently used or temporary functions without having to go through the hierarchical structure or a step-by-step process.

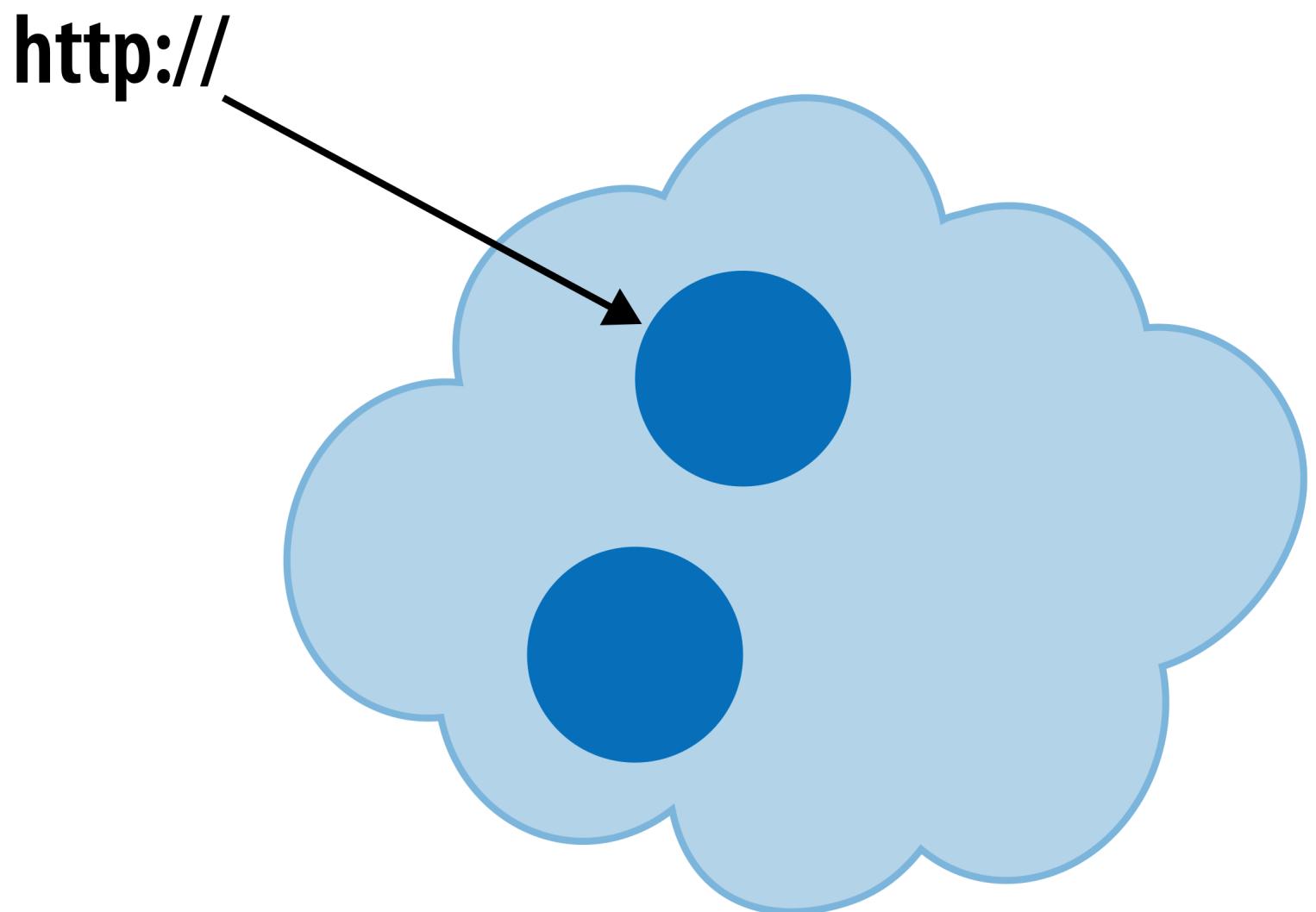


The screenshot shows the Basecamp website homepage. At the top, there's a navigation bar with links for "How it works", "Before & after", "Got clients?", "Pricing", "Support", "Sign in", and a prominent "Try it FREE" button. Below the navigation, a large headline reads "Get it together and manage projects the right way." A sub-section titled "Before Basecamp" discusses scattered projects and stress, while "After Basecamp" promises organization and calm. A yellow button labeled "Give Basecamp a Try" is followed by the text "4,883 companies signed up in the last week alone!". A callout box highlights the "Message Board" section, which includes a "To-dos" board, a "Group Chat" window showing recent messages, and a "Business cards" section. A handwritten note on the left side of the interface says "Involve everyone who's working on the project." An arrow points from this note to the "Add/remove people" button in the "Acme Co 2020 Marketing" project header.

The image contains two side-by-side screenshots from the Apple website. The left screenshot is for the iPhone 11 Pro, featuring a black background with a green iPhone 11 Pro shown from a top-down perspective. Water is splashing around the phone, and the text "iPhone 11 Pro" is at the top, followed by "Pro cameras. Pro display. Pro performance." and a price of "From \$24.95/mo. or \$599 with trade-in.\*". Below the phone are "Learn more" and "Buy" buttons. The right screenshot is for the iPhone 11, also with a black background and a green iPhone 11 shown from a top-down perspective with water splashing around it. The text "iPhone 11" is at the top, followed by "Just the right amount of everything." and a price of "From \$16.62/mo. or \$399 with trade-in.\*".

## Models: Bookmarks

**Definition:** Bookmarks allow users to conveniently navigate to a point of his choice, anytime he wants, even if it's deep inside a navigational structure. These give people a way to avoid traversing many links to get to a desired page or state.



what will Doran do? *What will his brother do to avenge our murdered prince?*" She moved closer to the captain. "And you say, he does not wish to be a



"He do

The captain of guards knew the prince he guarded. Once, long ago, a callow youth had come from Norvos, a big broad-shouldered boy with a mop of dark hair. That hair was white now, and his body bore the scars of many battles... but his strength remained, and he kept his longaxe sharp, as the bearded priests had taught him. *She shall not pass*, he told himself, and said, "The prince is watching the children at their play. He is *never* to be disturbed when he is watching the children at their play."

"Hotah," said Obara Sand, "you will remove yourself from my path, else I shall take that longaxe and—"

"Captain," came the command, from behind. "Let her pass. I will speak with her." The prince's voice was hoarse.

Areo Hotah jerked his longaxe upright and stepped to one side. Obara gave him a lingering last look and strode past, the maester hurrying at her heels. Caleotte was no more than five feet tall and bald as an egg. His face was so smooth and fat that it was hard to tell his age, but he had been here before the captain, had even served the

Table of contents

Bookmarks

Highlights

Notes

Obara touched her whip.  
20 MINS AGO  
38 767

The captain of guards knew the prince he guarded.  
20 MINS AGO  
38 767

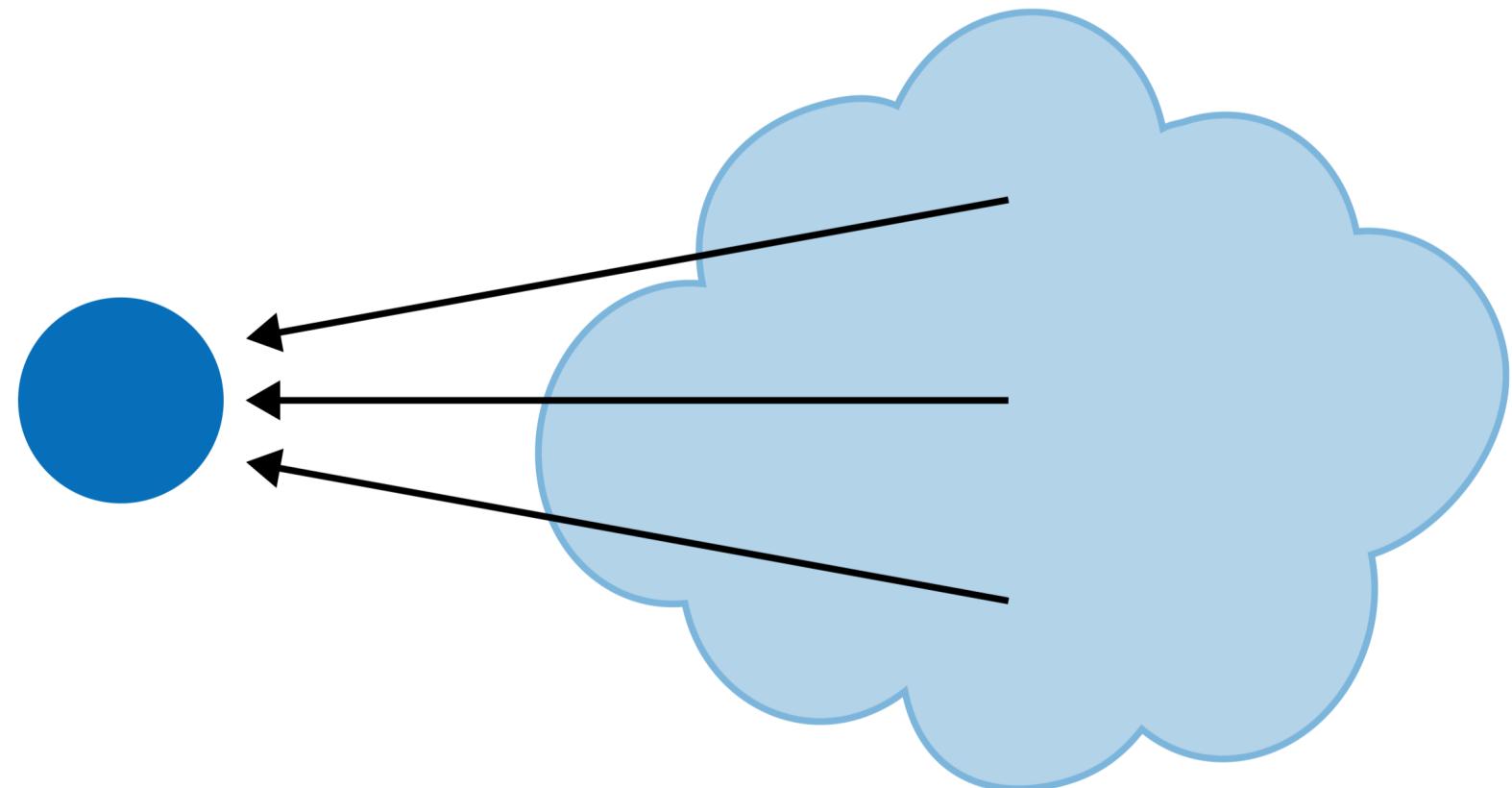
She snorted. "It has been twenty years, or near enough to make no matter. And I was not here long. I am the whore's whelp, or had you forgotten?" When he did not answer, she rose again and put her hands upon her hips.  
19 MINS AGO  
39 767

hanged  
7 HOURS AGO  
570 767

Votre Artisan 24H/7

## Models: Escape hatch

**Definition:** An "escape hatch" provides users with the ability to go back to the main component/page in a complex structure without having to trace steps back.



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# In-Class Activity 2: Reverse Engineering Navigation Models

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Smart Room



# What did we learn today?

- Interaction structure
- Visual layout design
- Principles of navigation