

# Building User Interfaces

# Interaction Design

## Structure, Layout, & Navigation

# Professor Bilge Mutlu

# Announcements

- React 1  $\alpha$  and React 1  $\beta$  deadlines extended: *Thursday* → *Sunday*
- Review sandbox code (e.g., CodePen) provided in lectures

# What we will learn today?

- Interaction structure
- Visual layout design
- Principles of navigation

# Interaction Structure

# Information Architecture

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

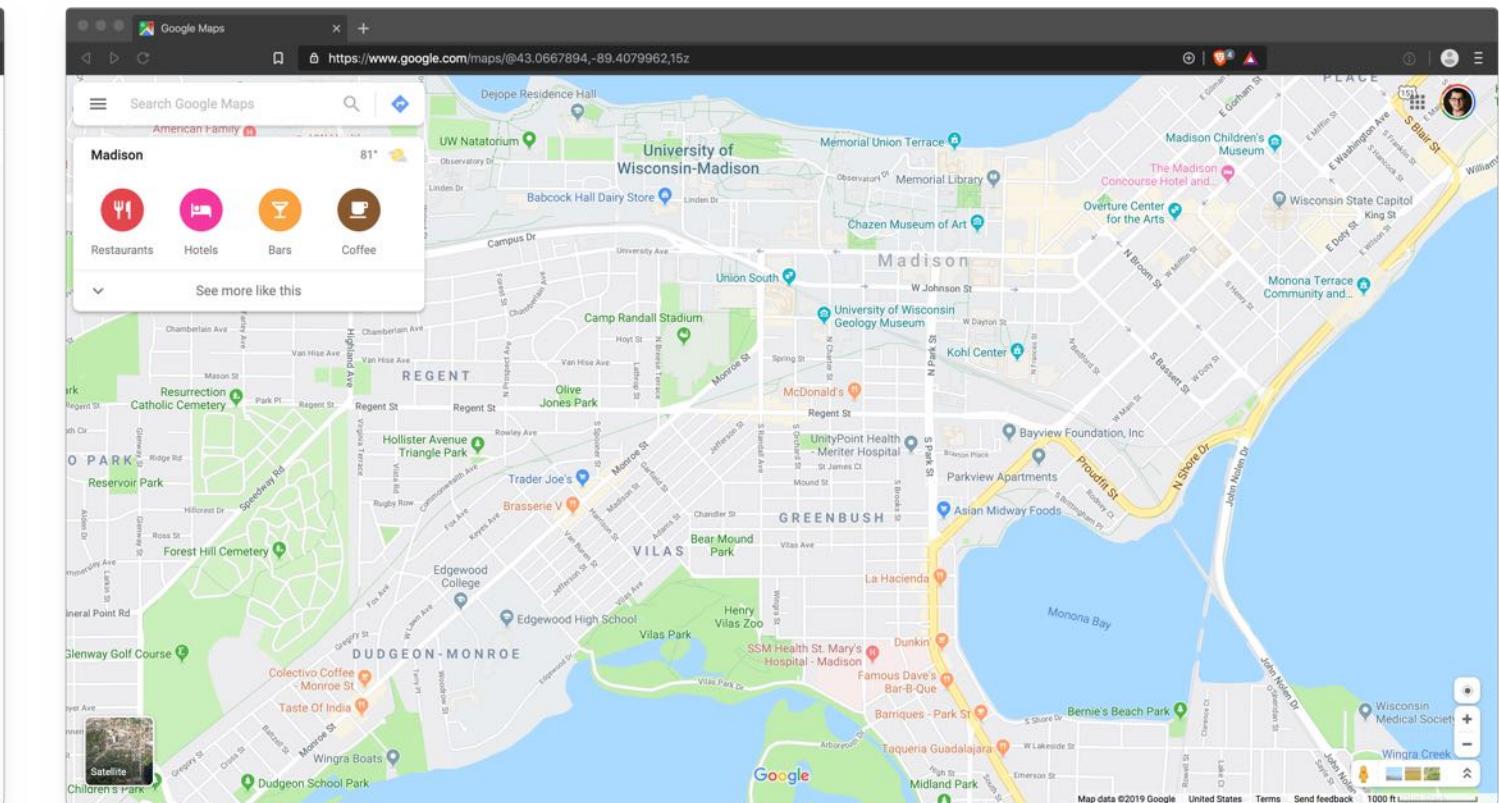
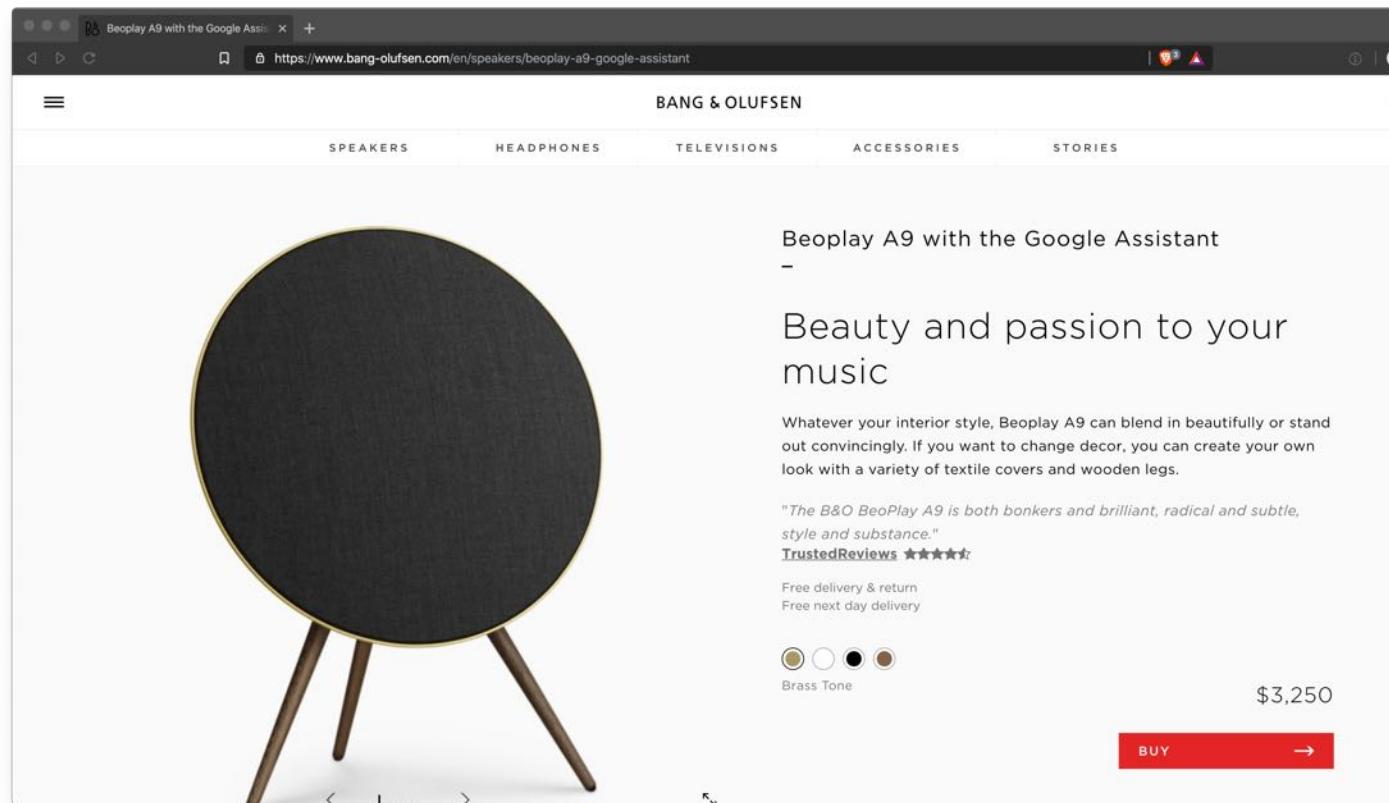
A set of structural categories:<sup>1</sup>

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>1</sup>Tidwell, 2010, *Designing Interfaces*

# "Show one single thing"

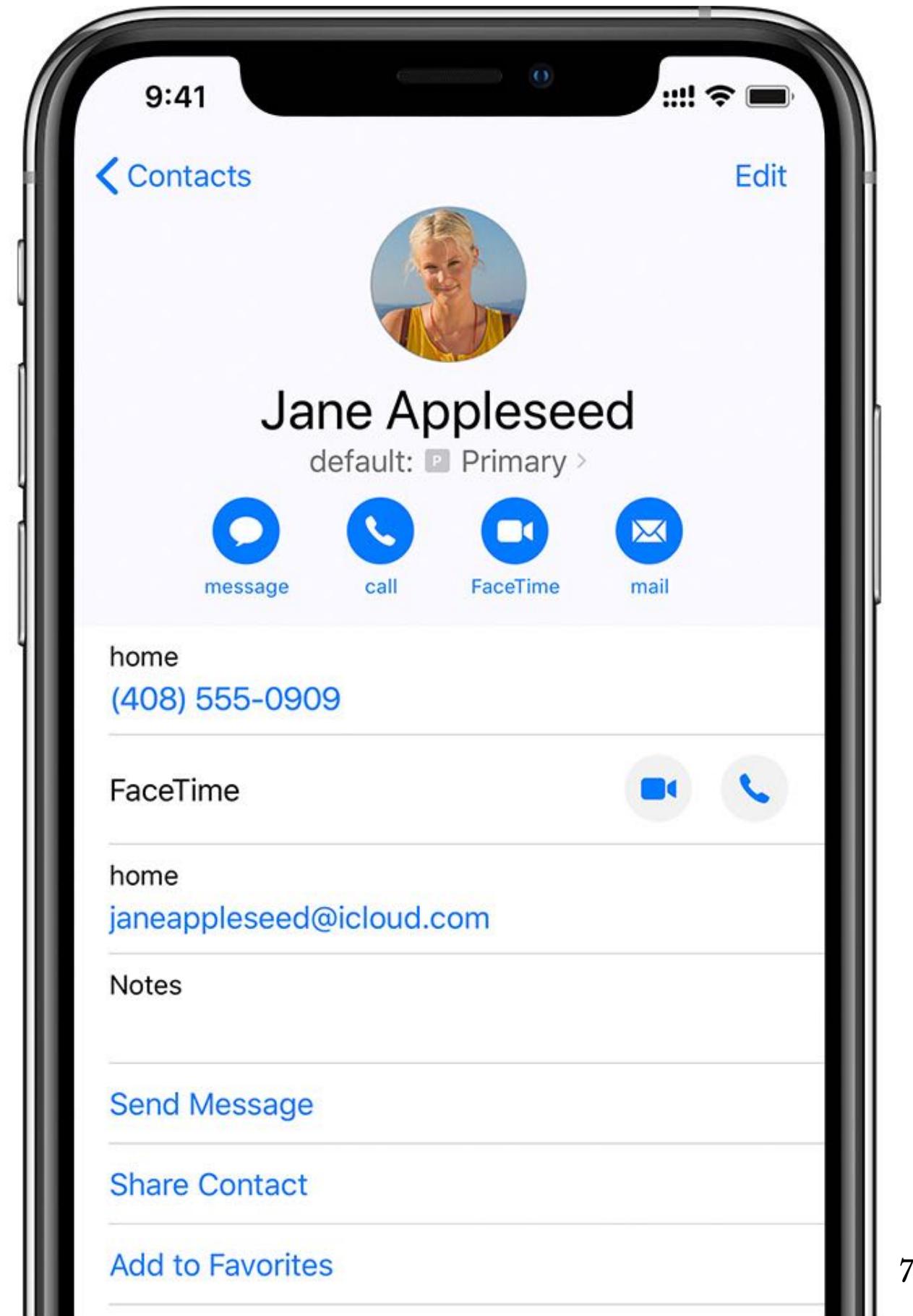
Focuses on conveying information on a specific topic/facilitating a specific activity



Supports a specific activity, eliminating other distractions.

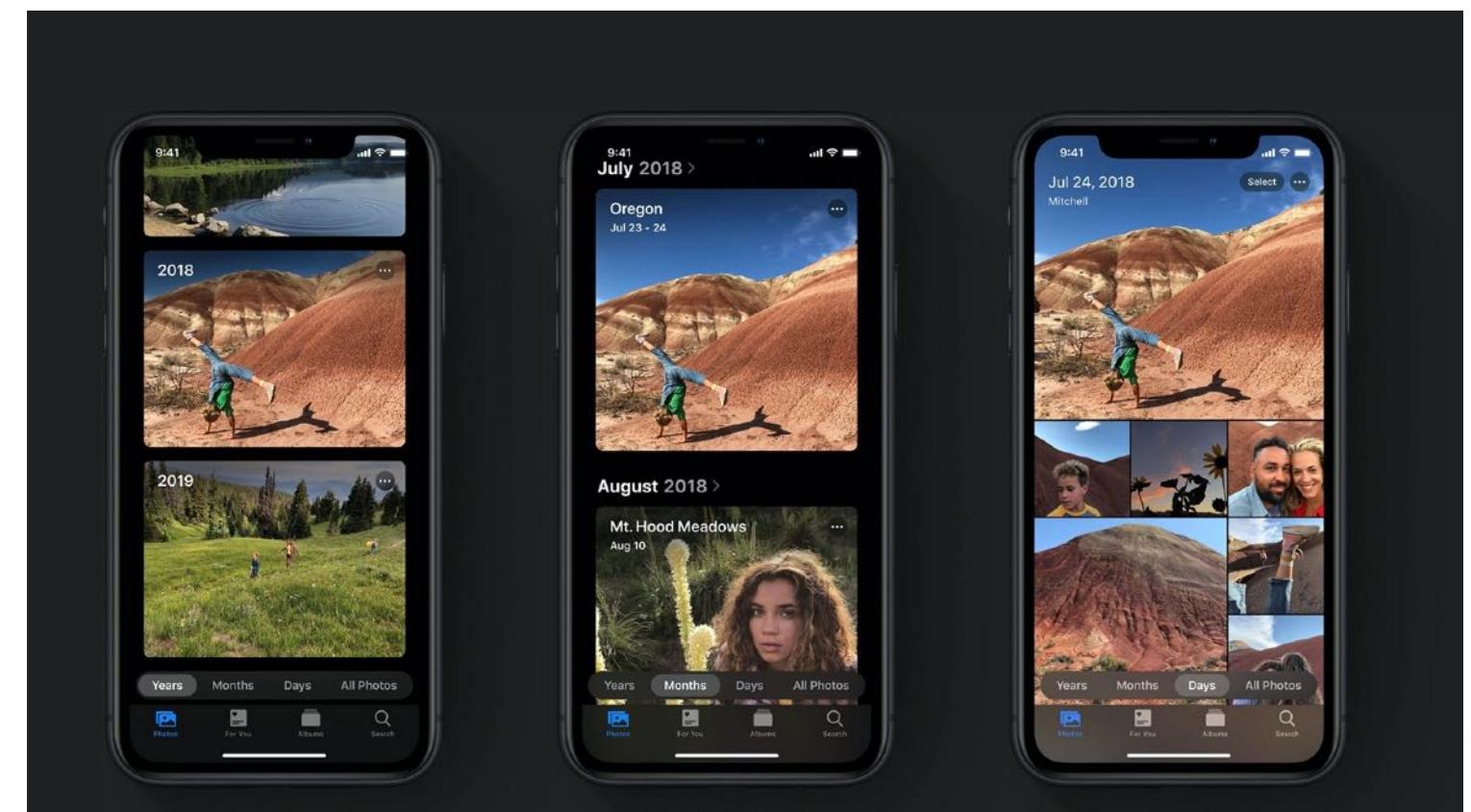
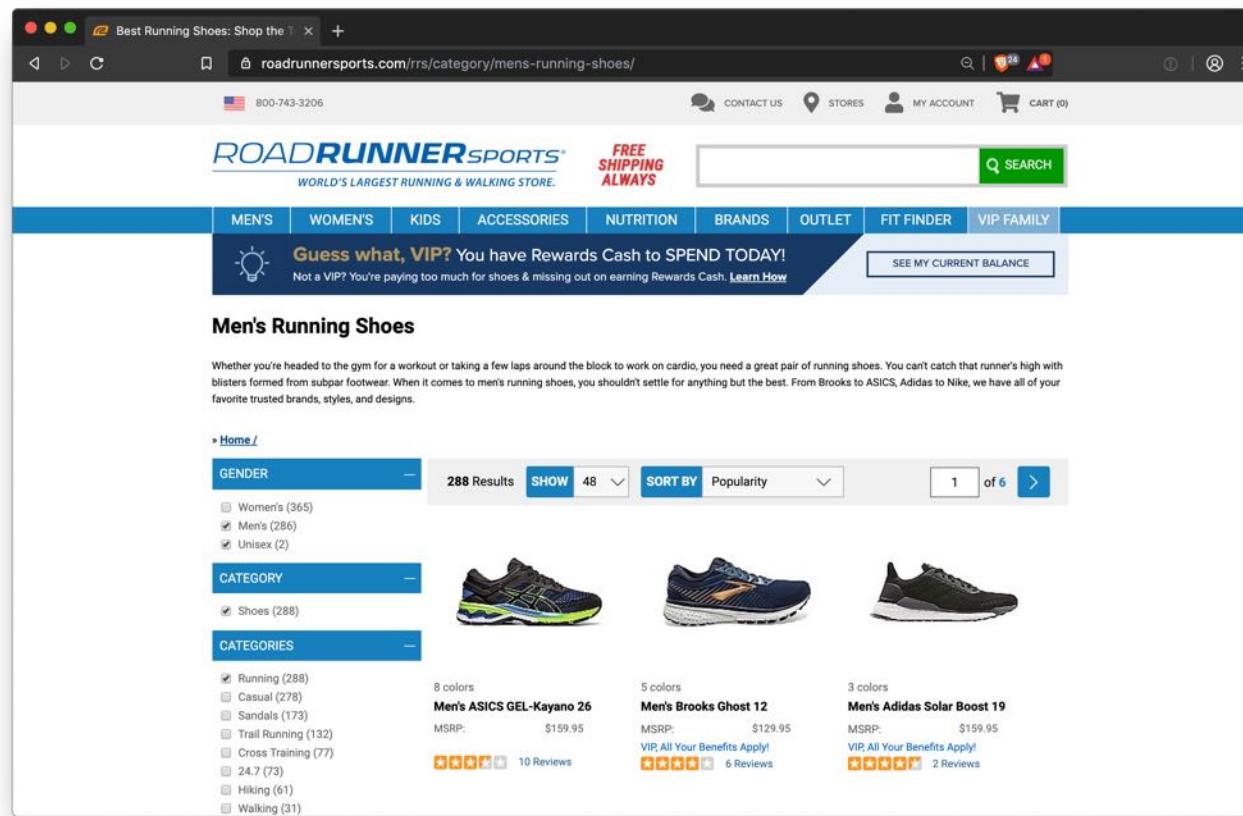
Includes key components:

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



# "Show a list or set of things"

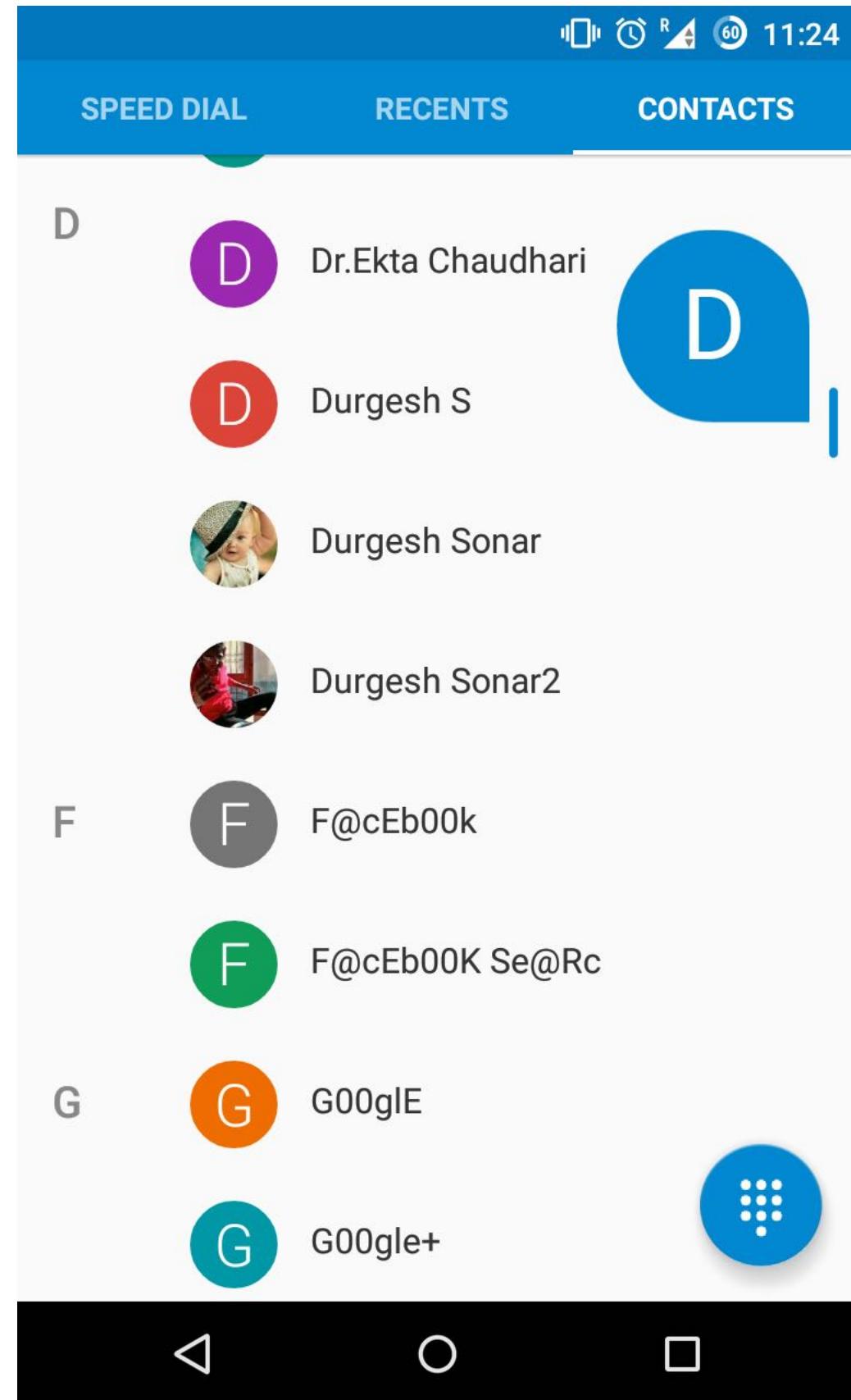
Provides rows or grids of items of the same kind that provide links to components that focus on that item.



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

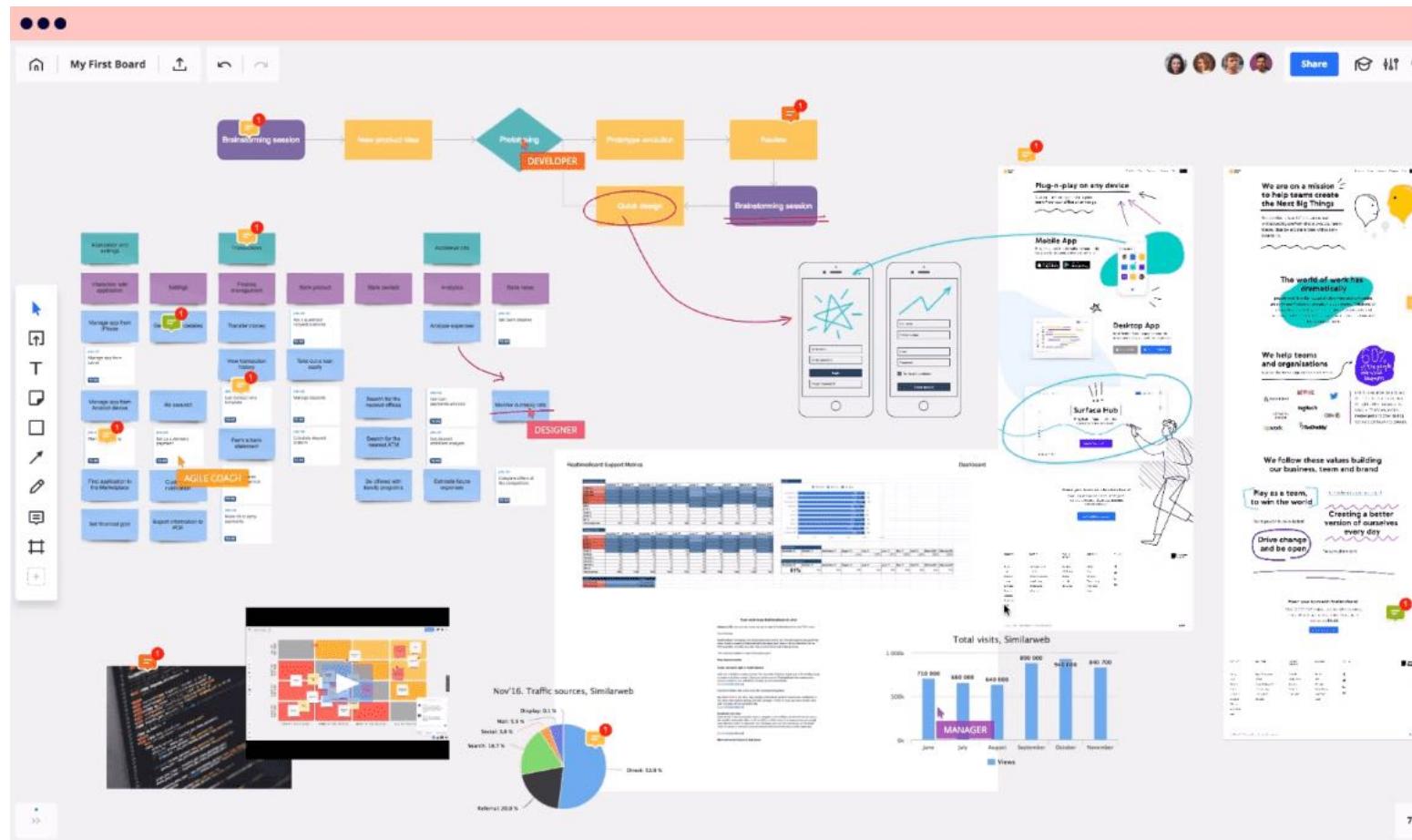
Can be applied hierarchically

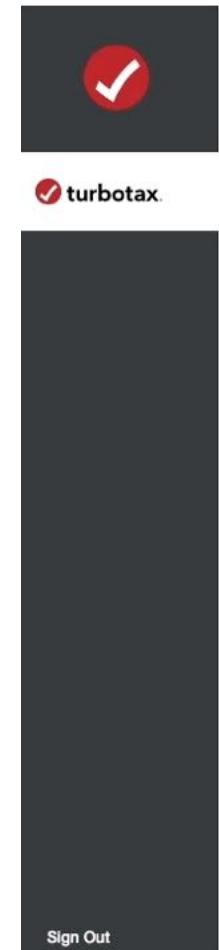
Does this remind you of something we've been discussing?



# "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

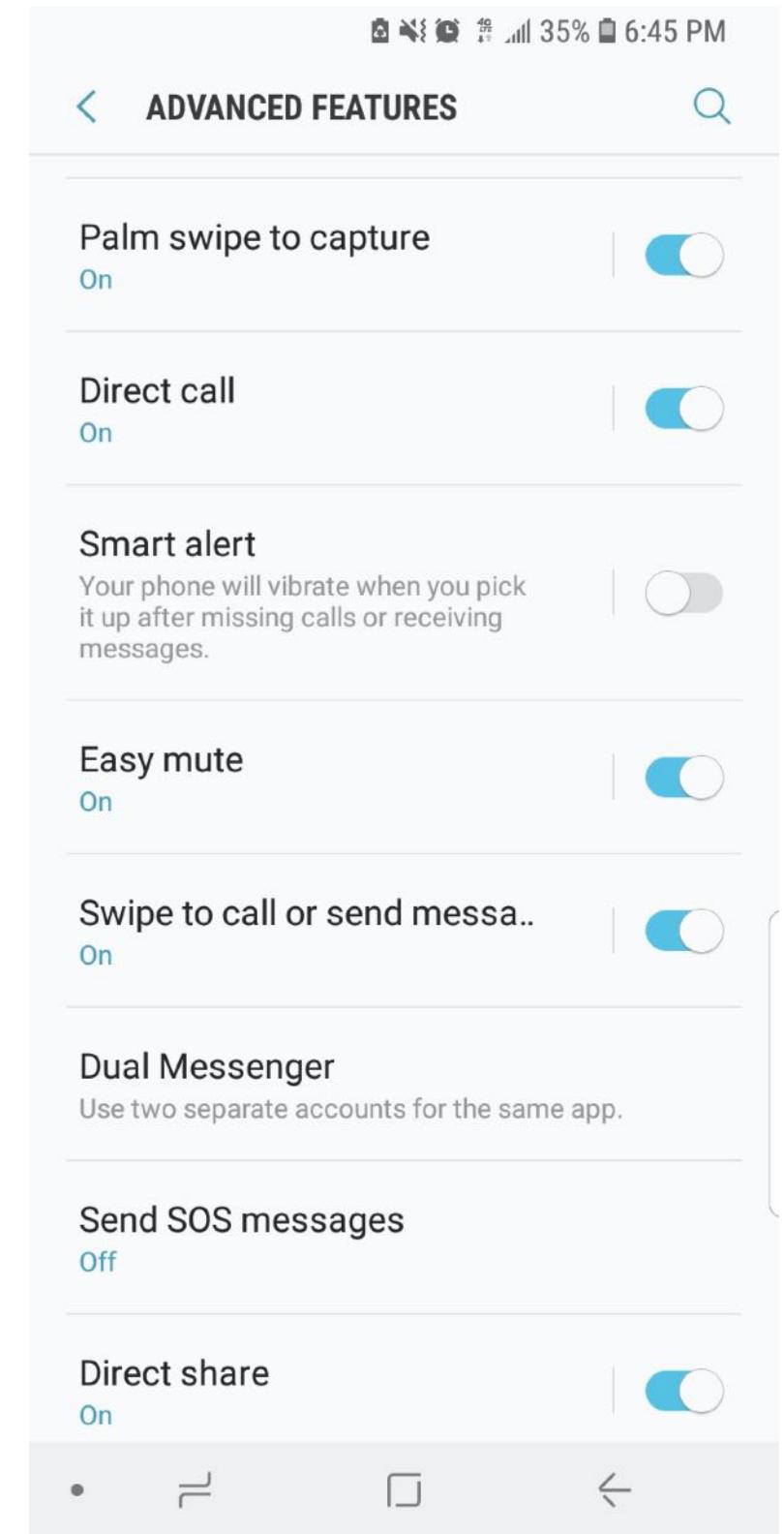




# "Facilitate a task"

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

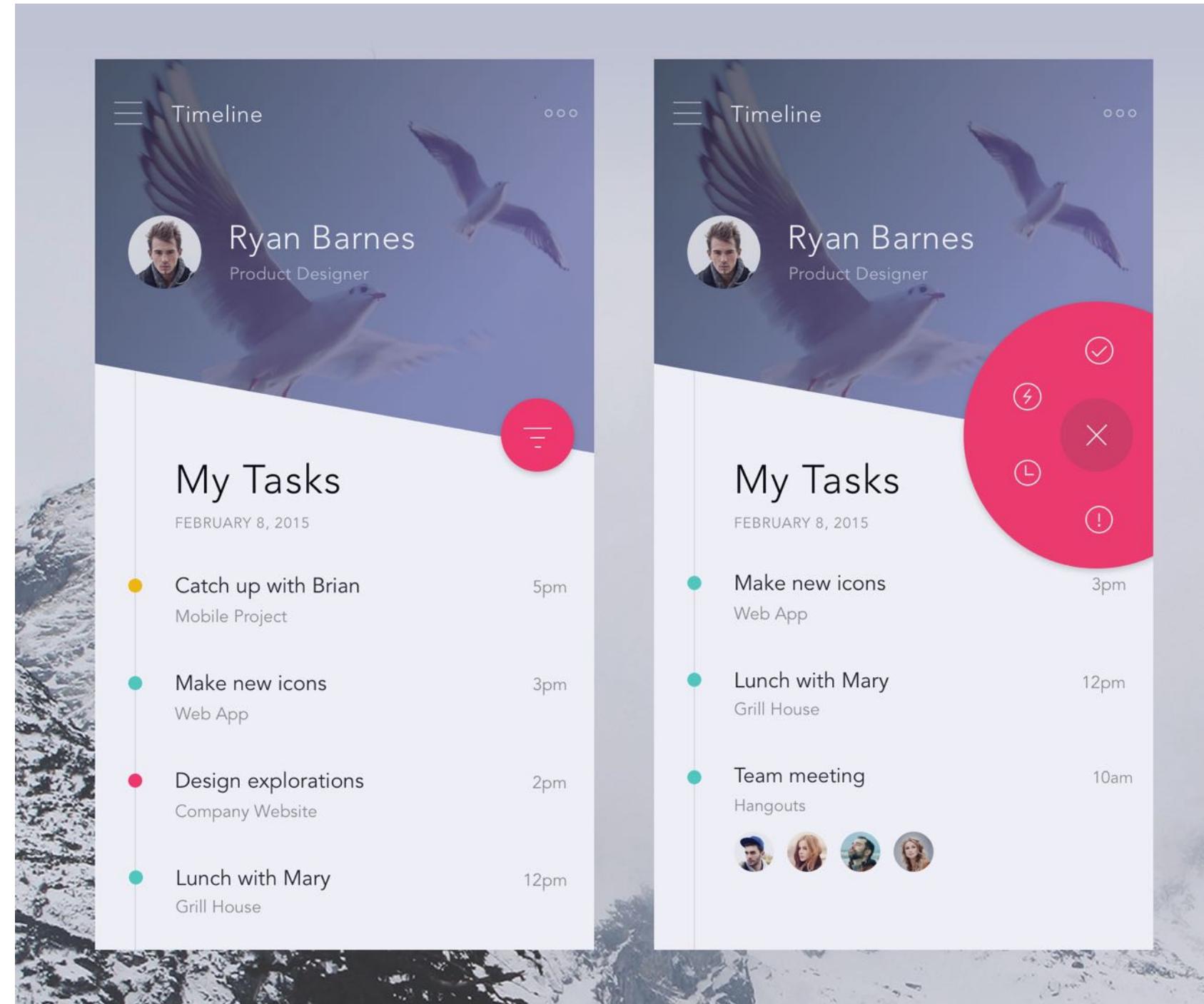
The designer must organize these controls in an effective and logical way



# Combining Structures

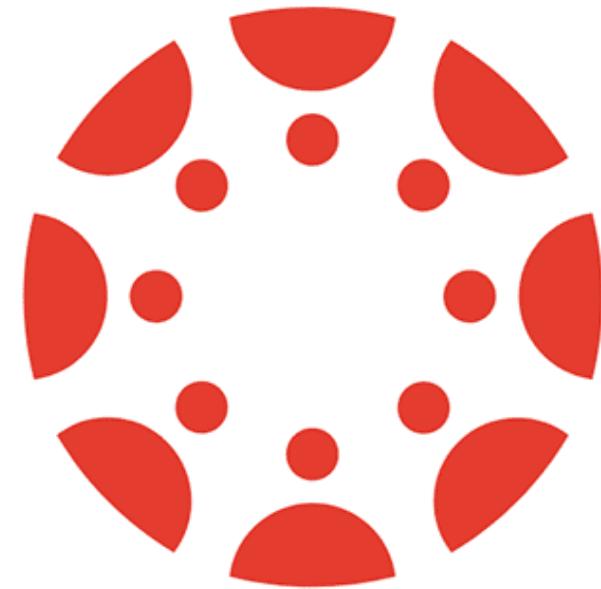
Any page/component can follow the structure of these components, thus they can be combined to create complex applications

Single-page applications (SPAs) often combine these structures



# Quiz 1

Complete the [Canvas quiz](#).



canvas

# Layout

# Layout

**Definition:** Arrangement of visual elements on a canvas.<sup>2</sup>

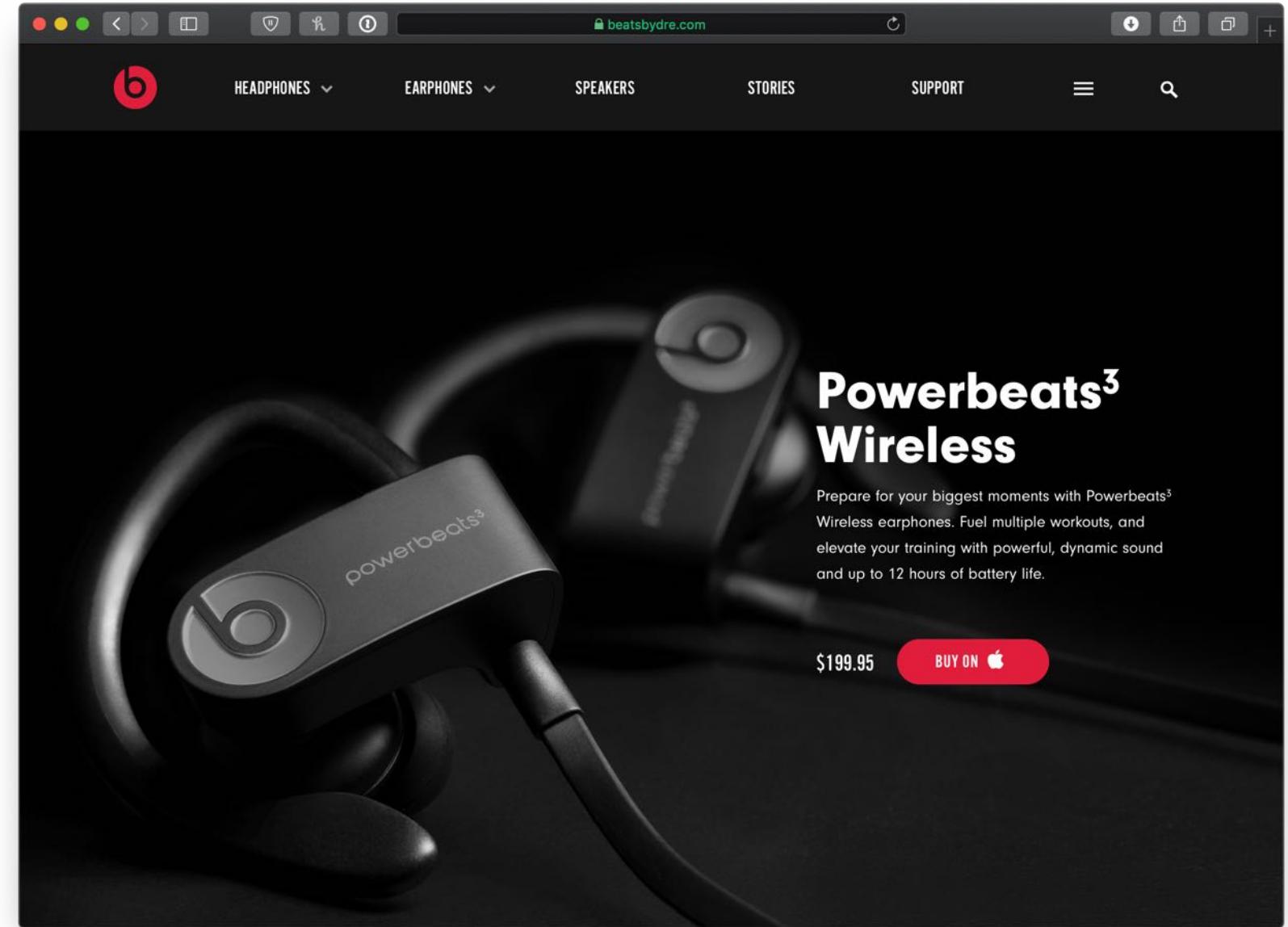
- 1. Creating a focal point
- 2. Following the golden ratio
- 3. Using the rule of thirds
- 4. Effectively using grids
- 5. Integrating type
- 6. Placing imagery
- 1. Using negative space
- 2. Grouping using gestalt theory
- 3. Creating visual hierarchy
- 4. Exploiting visual scan patterns
- 5. Creating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

<sup>2</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.

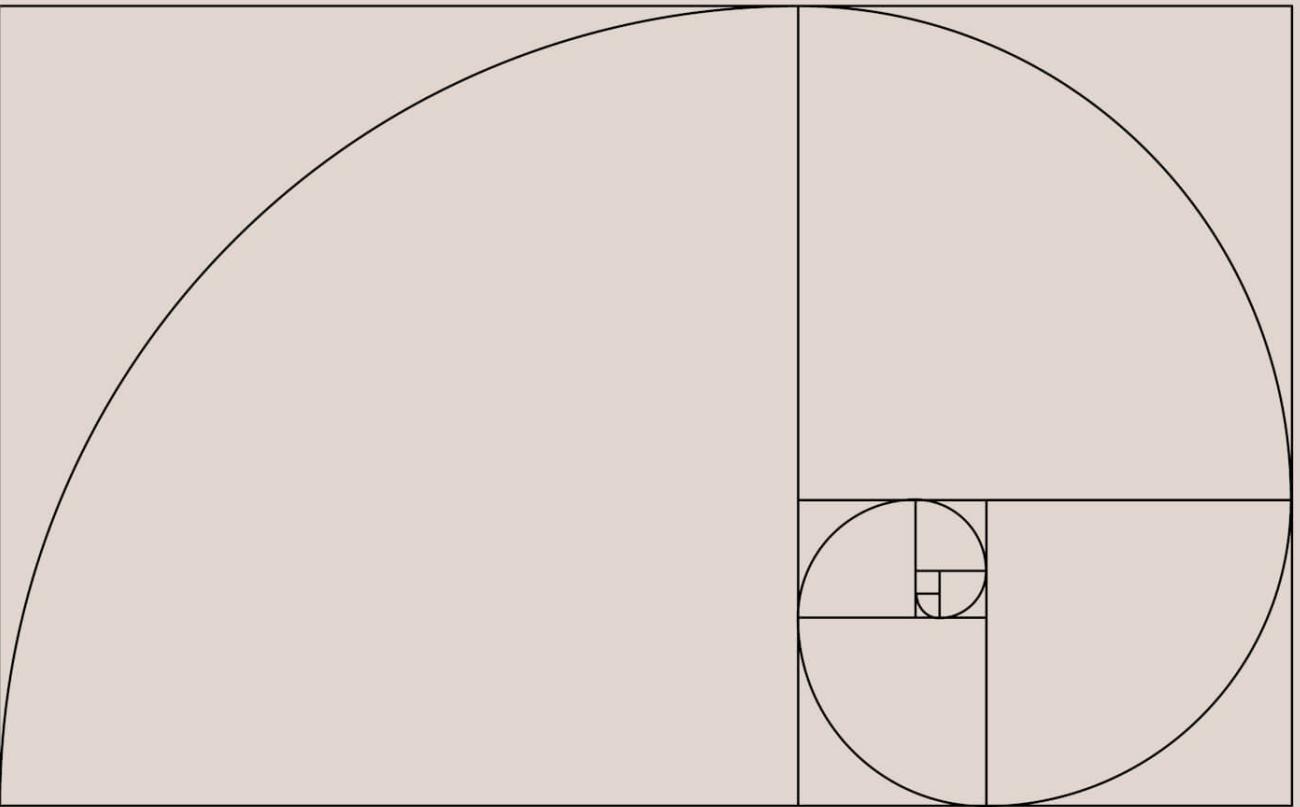
*Pro Tip:* Successful use locks attention to the focal point and gently guides it to its next destination.



# Following the golden proportion<sup>3</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)

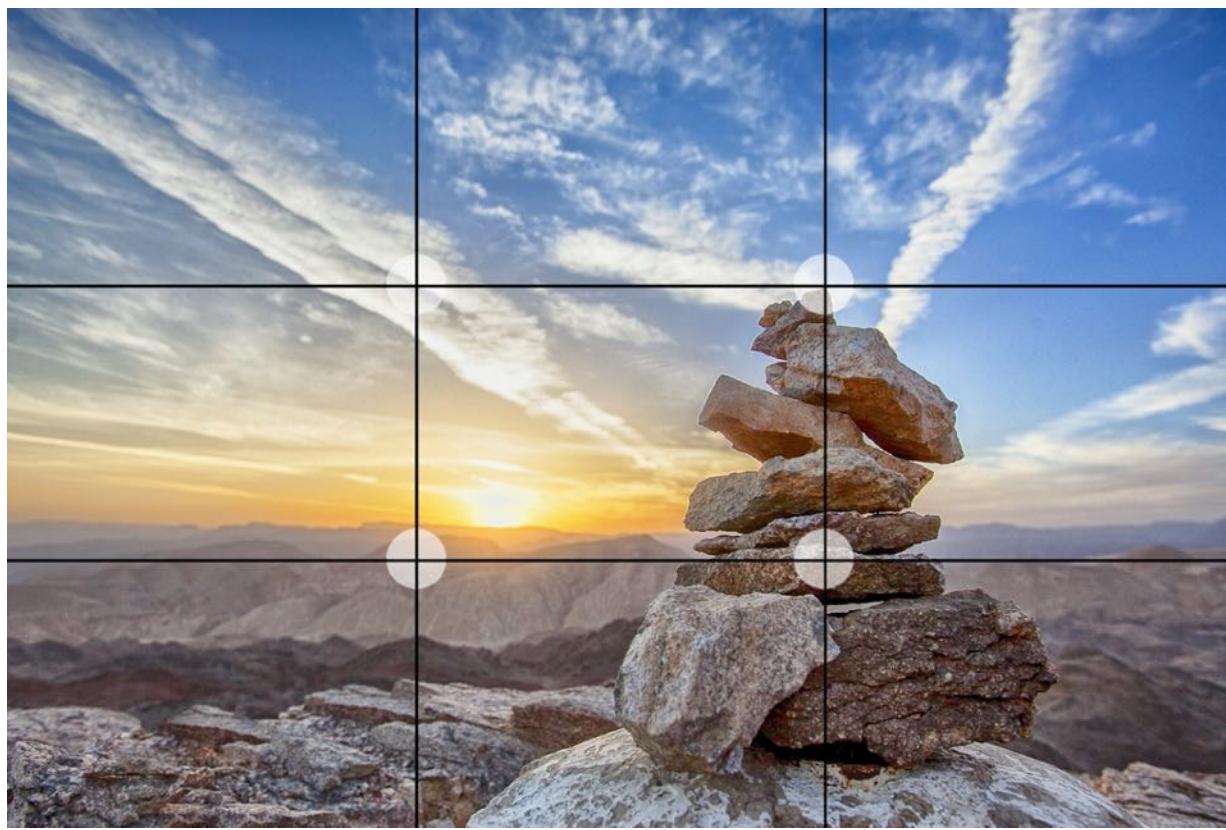
<sup>3</sup> Further reading on the golden ratio



A website landing page with a purple header bar containing a logo (W/M), navigation links (HOME, ABOUT US, SERVICES, CONTACTS), and a search bar. The main content area has a white background. It features a large heading "Business goals achieved with design" in bold black text. Below the heading is a paragraph of text: "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." At the bottom are two buttons: a blue "PRICING" button and a white "Contact Us" button. To the right of the text is a graphic of a basketball player in mid-air, performing a dunk. This graphic is overlaid on a large Fibonacci spiral. The background of the page has a subtle grid pattern of faint circles.

# 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.

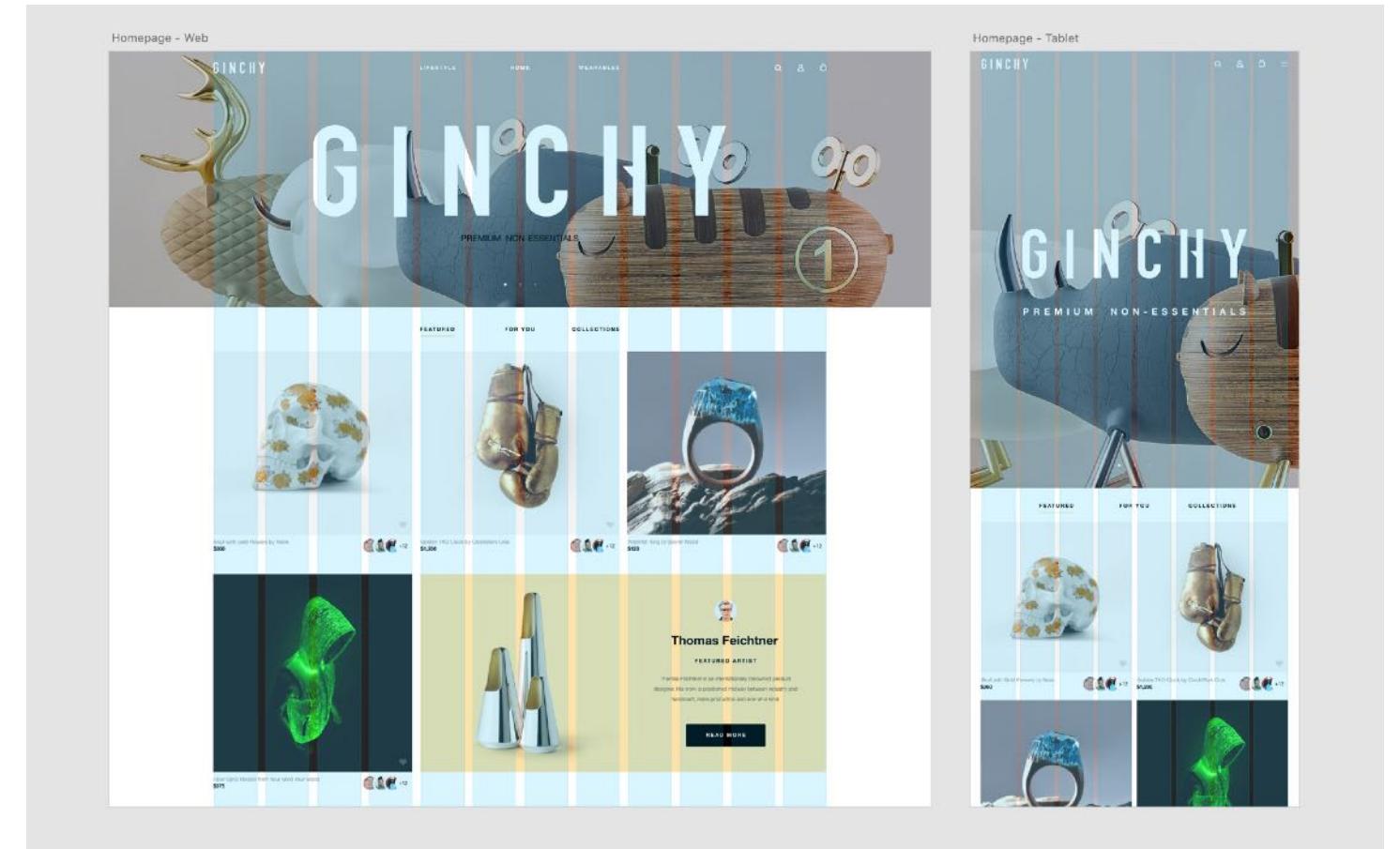


# Effectively using grids

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

Parameters associated with grids: *format, aspect ratio, margins, trim size, bleed, live area, column, alley, gutter, and grid*.





# 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.

Never has getting access to diverse, fine-granular data been this easy!

ABOUT THE MARKETPLACE

TRY THE MARKETPLACE

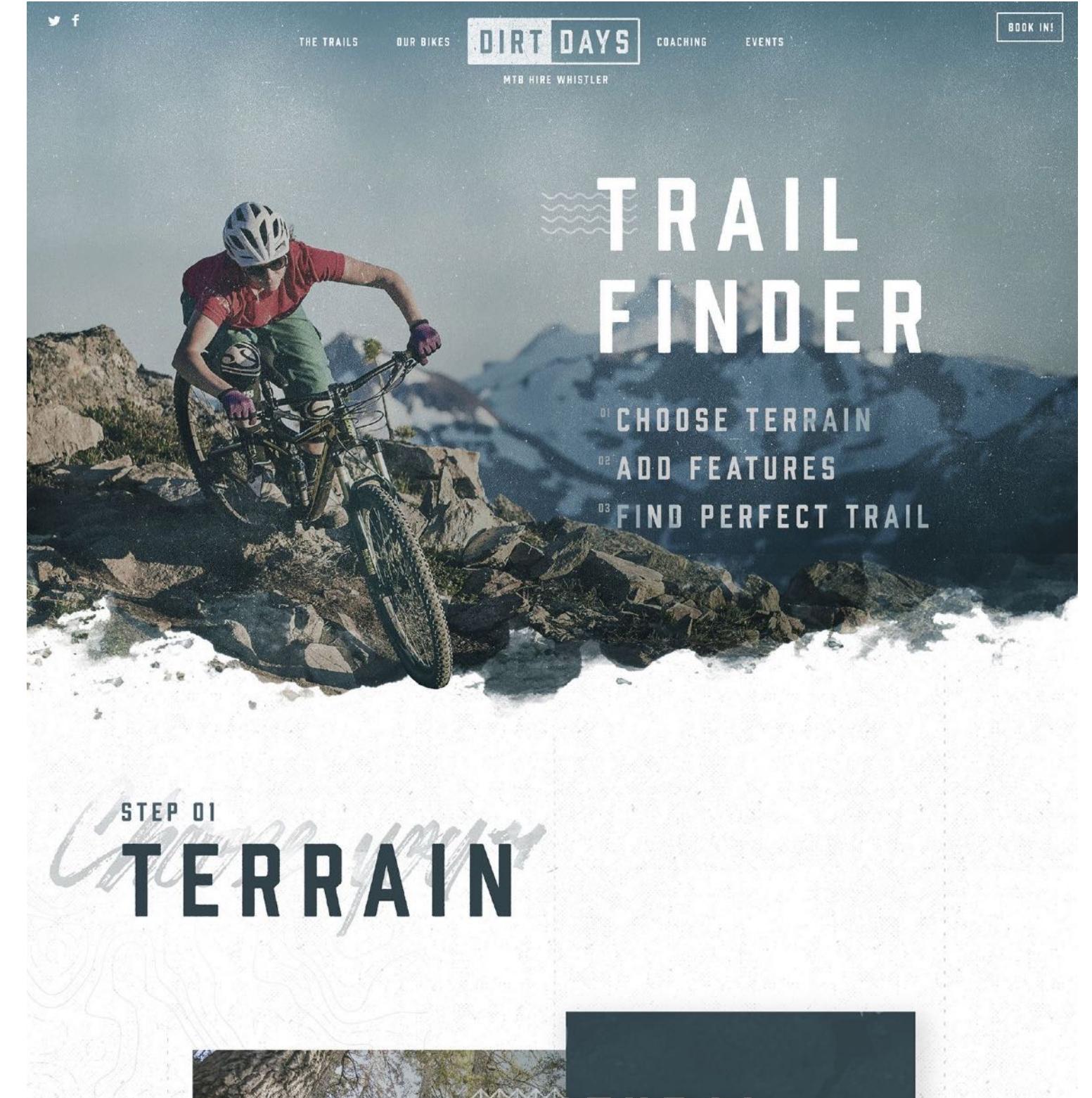
PARTICIPANTS

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.



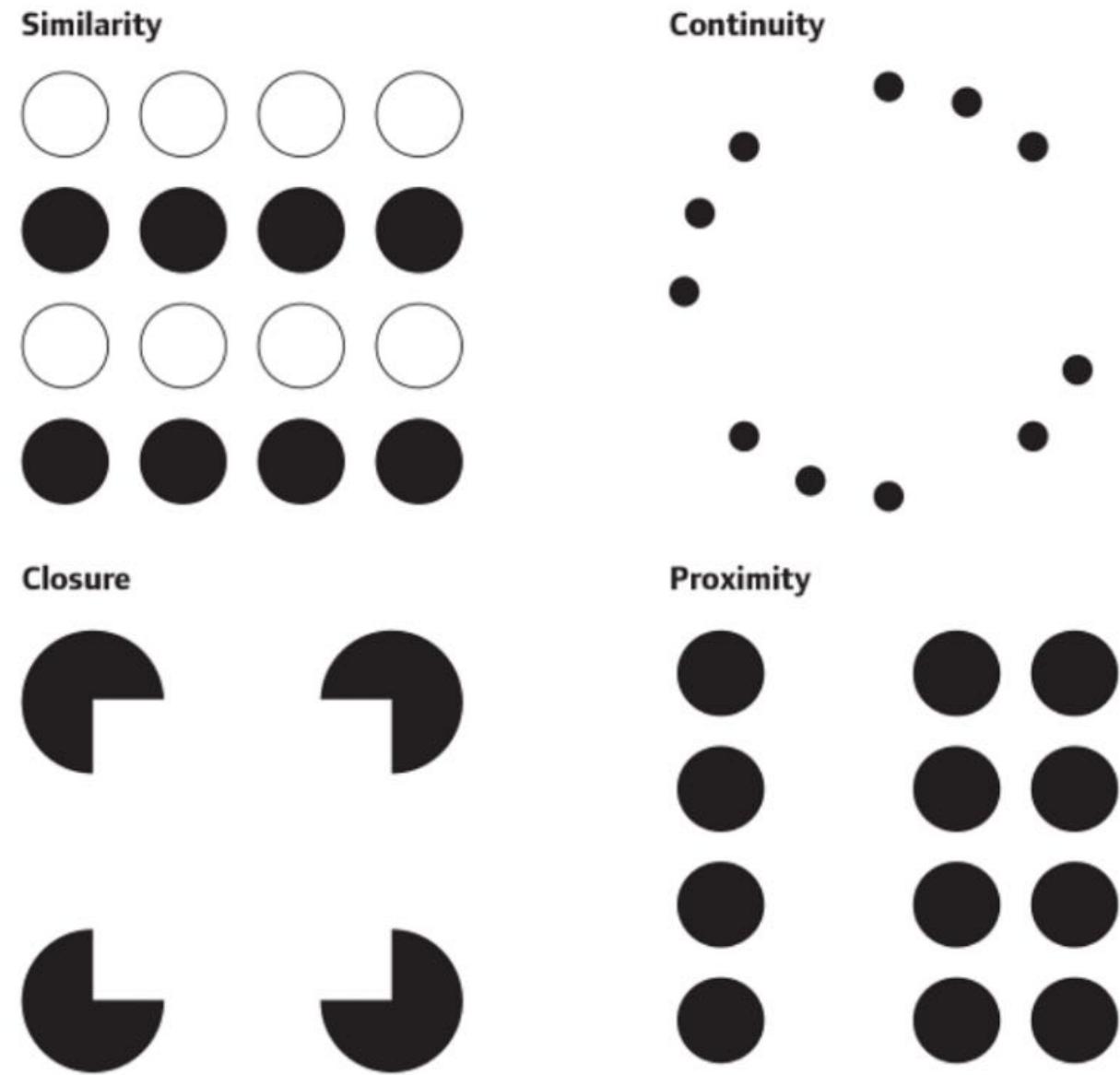
A screenshot of a website for a photographer named Jonathan Davis. The header includes the logo "DAVIS" with a stylized icon, and navigation links for "HOME", "PORTFOLIO", "SERVICES", "BLOG", "PAGES", and "CONTACTS". A yellow circular icon with a camera symbol is also present. The main content area features a large, scenic photograph of a person sitting on a rocky outcrop, taking a photograph of a misty mountain landscape. Overlaid on the photo is the text "I'M JONATHAN DAVIS" and "Photographer &amp; Retoucher". Below the photo, a bio states "Based in San Diego, I specialize in various kinds of photography" and a "VIEW PORTFOLIO" button.

# 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



**Similarity**  
This principle states that objects that share similar visual characteristics; shape, size, colour and so on, create a connection in the viewer's mind implying that they are related or naturally belong together. In the diagram above horizontal lines of the same sized shape appear to be grouped together because alternately they are either solids or outline.

**Closure**  
In this example the effect is created in the mind of a white square floating above four solid circles, even though there is no square. The principle of closure states that when elements are aligned in such a way that we perceive that the information is connected, we tend to see complete figures even when some of the information is missing.

**Continuity**  
The gestalt principle at work here is that closure occurs when an object is incomplete or a space is not entirely enclosed. Provided enough of the shape is indicated, we perceive the object as whole by filling in the information that is absent, thus completing the circle.

**Proximity**  
Proximity occurs when objects or elements are placed close together. They tend to be perceived as a group or a unified whole. In the example above, the vertical lines of dots that are closer together appear to be more related to each other or are understood as a single unit, separate from the single line of dots on the left.

# 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.

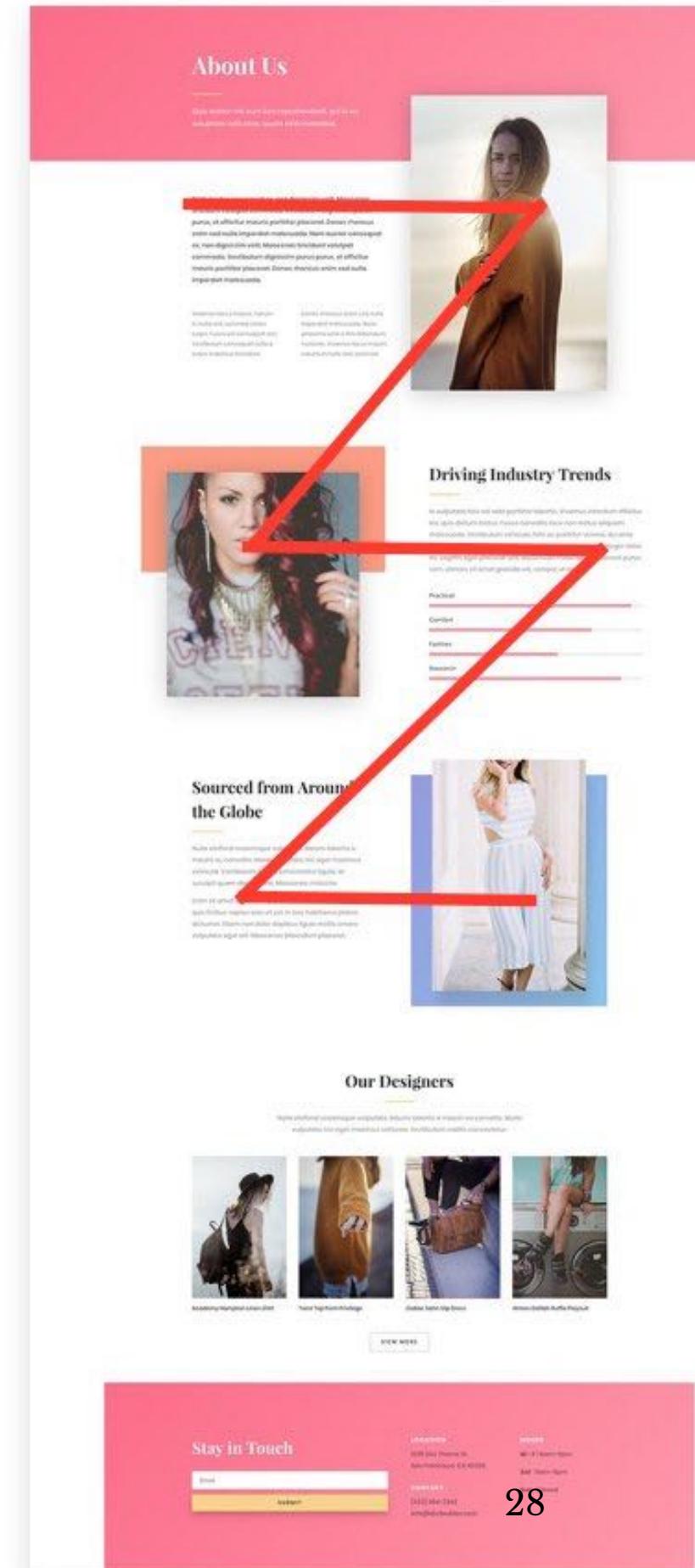
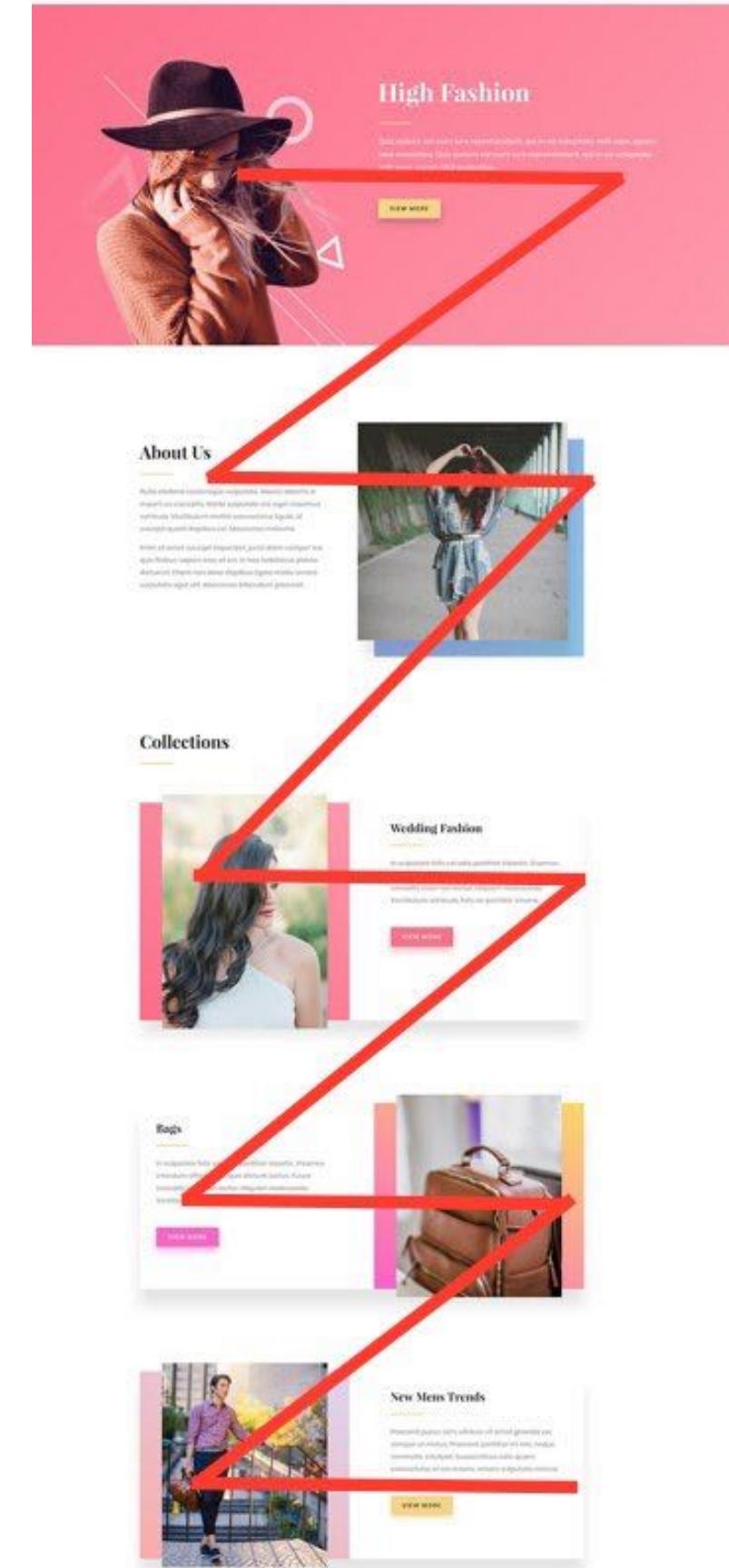
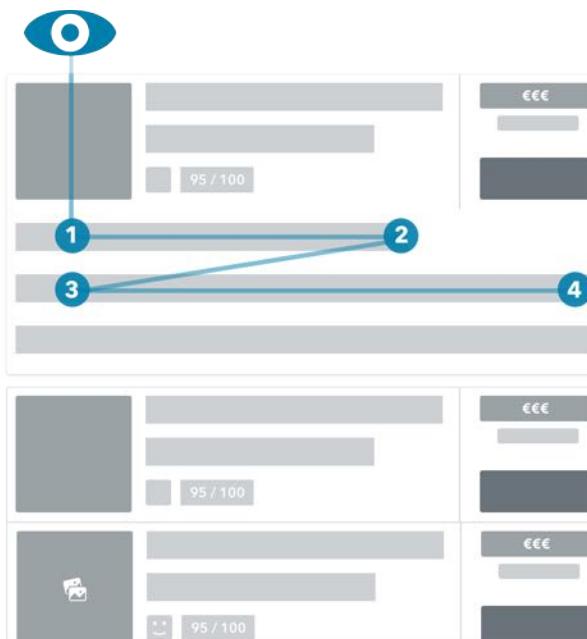
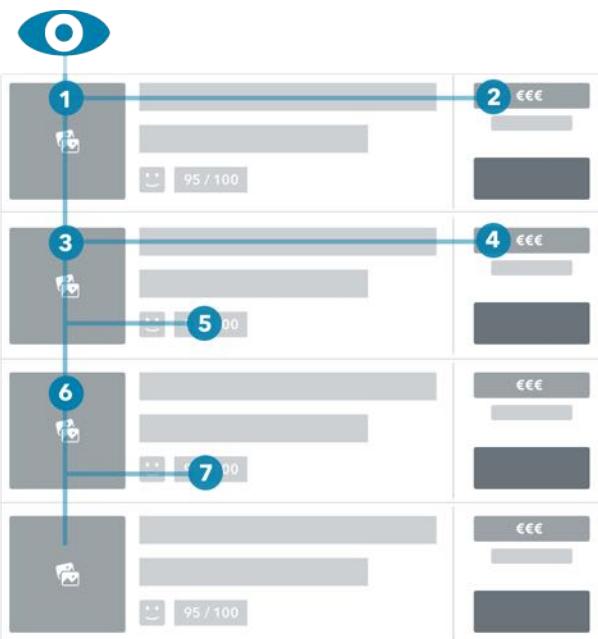
You will read  
this first.

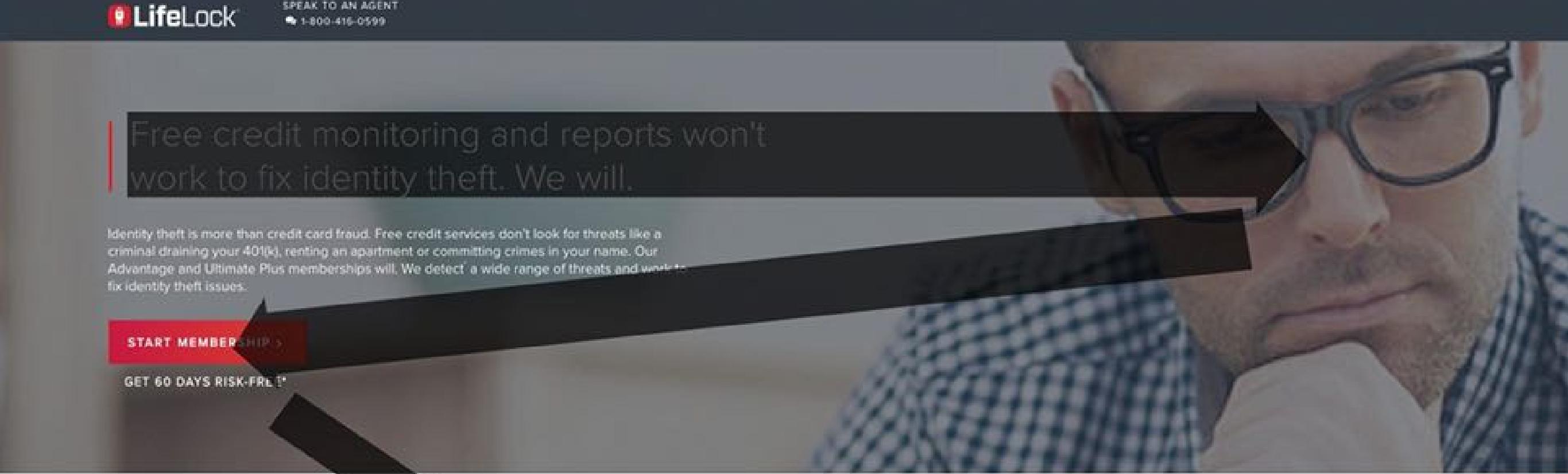
Then you will read this.

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.





**LifeLock**

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 a wide range of threats and work to fix identity theft issues.

[START MEMBERSHIP >](#)

[GET 60 DAYS RISK-FREE\\*](#)

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

Our proprietary technology alerts you to wide range of identity threats. 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, email and text of the suspicious activity.\*



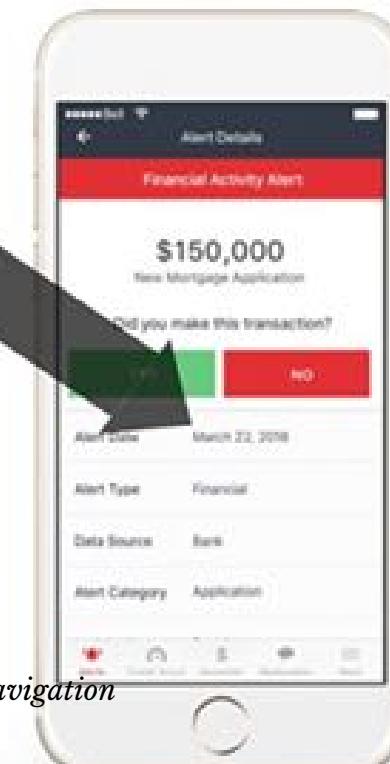
### RESTORE

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\*, 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.\*



# Creating contrast and emphasis<sup>4</sup>

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

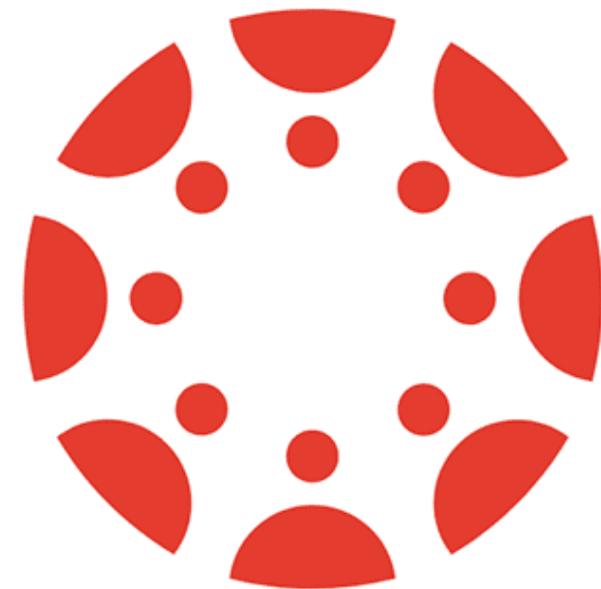
TABLE 10.1. Opposing features that can create contrast.

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>4</sup> Golombisky & Hagen, 2010, *White space is not your enemy*

# Quiz 2

Complete the [Canvas quiz](#).

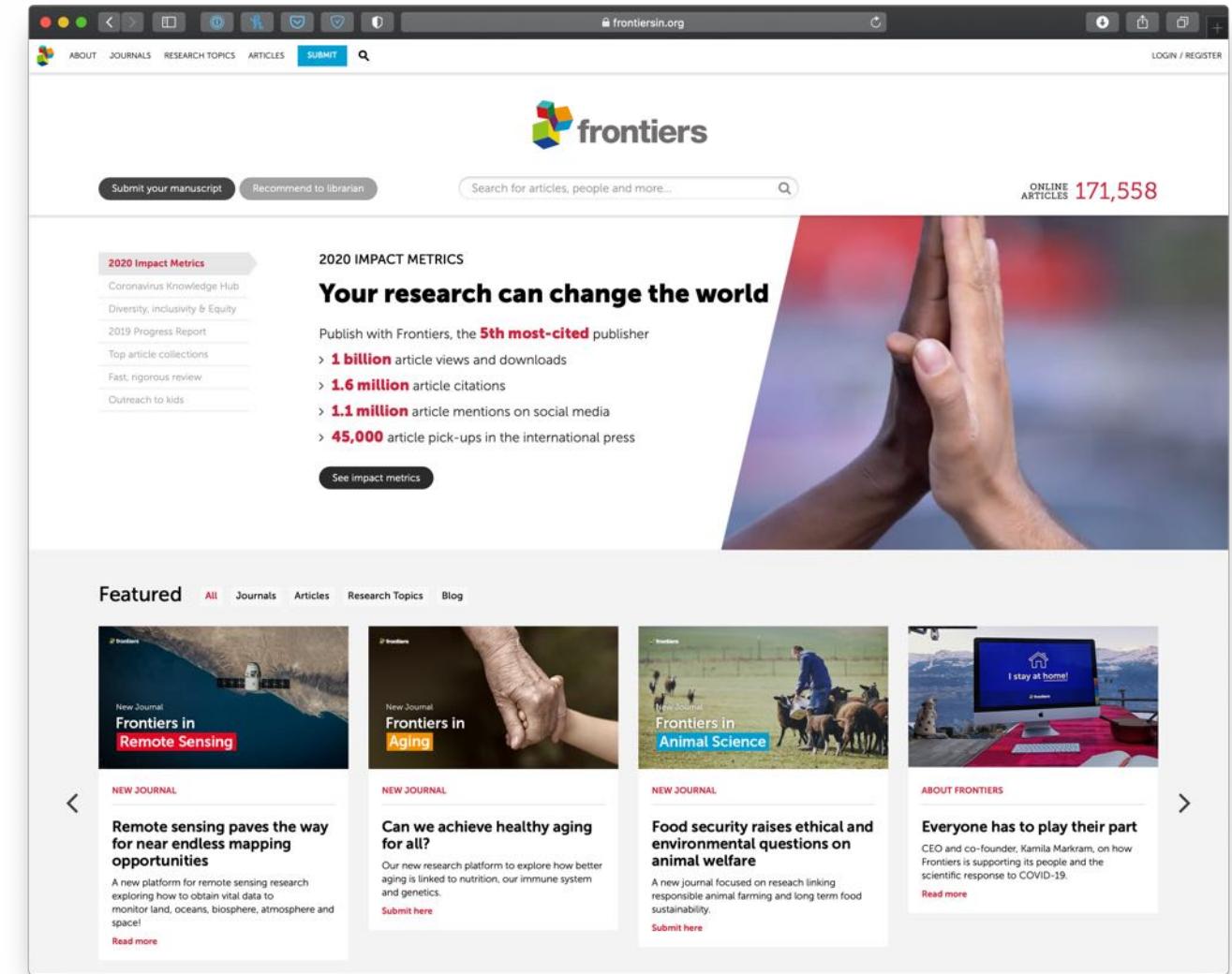


canvas

# In-Class Activity 1: Layout Deconstruction

# Cheatsheet:

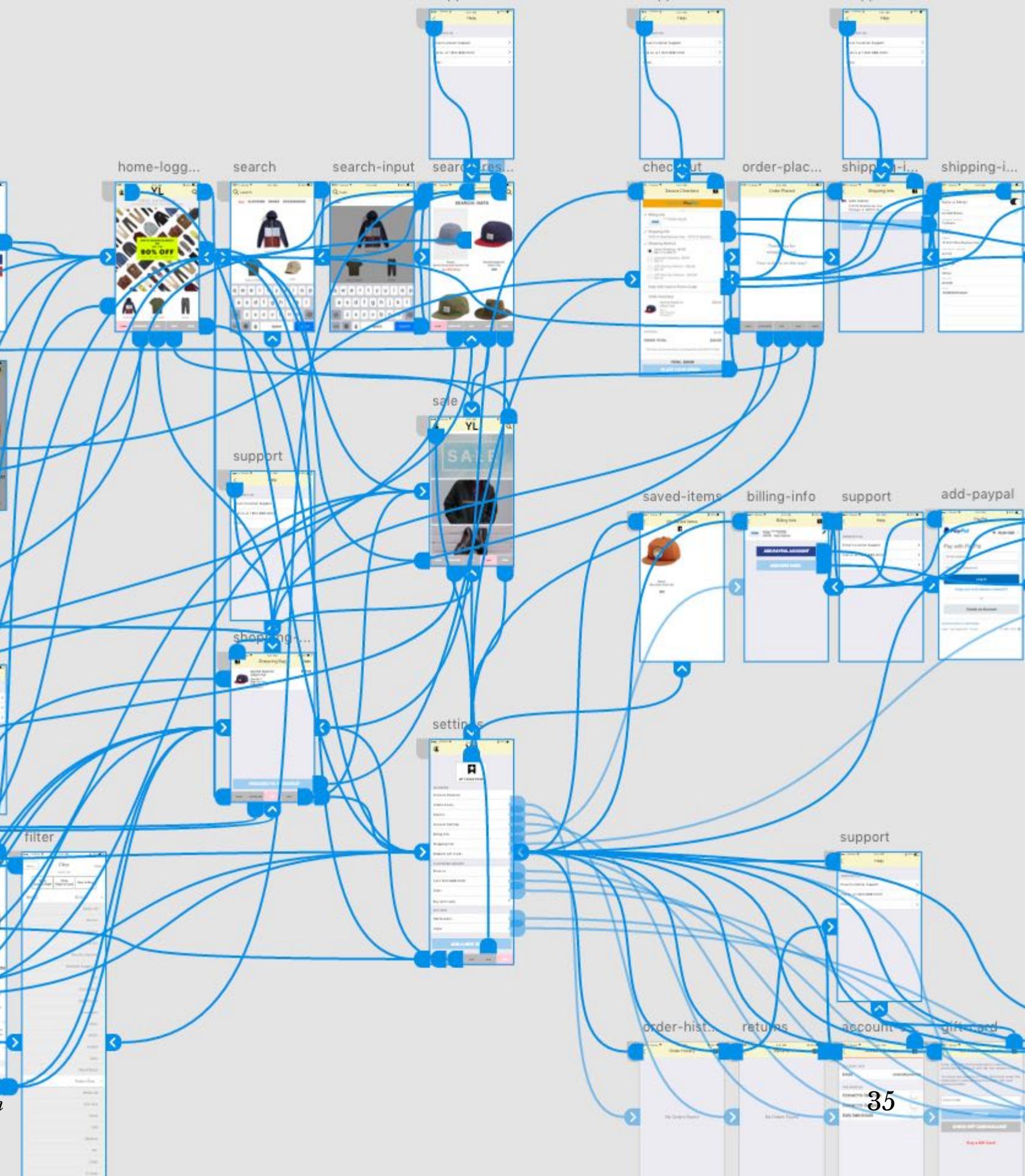
*Creating a focal point  
Following the golden ratio  
Using the rule of thirds  
Effectively using grids  
Integrating type  
Placing imagery  
Using negative space  
Grouping using gestalt theory  
Creating visual hierarchy  
Exploiting visual scan patterns  
Creating contrast/emphasis*



# Principles of Navigation

# Principles of Navigation<sup>5</sup>

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



<sup>5</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. Labels & signage
2. Navigation clues & aids
3. Maps, *e.g.*, site maps



# SITEMAP

[← BACK TO SHOP](#)

**SECURE CHECKOUT**

## Complete Your Purchase

**NEED HELP?**  
If you need help, contact us and let us help you. Support is available for 24 hours.  
+111 2345 678 mail@company.com

**1 CART** **2 INFORMATION** **3 SHIPPING** **4 PAYMENT**

[← BACK](#)

### SHIPPING METHOD

Choose one of the shipping methods below

<input type="radio"/> Standard Shipping 2-3 Days	\$3.00
<input type="radio"/> 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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Cookware > Cookware Sets

**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 cookware sets"

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

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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

- Monki
- H&M HOME
- & Other Stories
- ARKET
- Afound
- Animal welfare
- Chemicals
- Climate positive value chain
- Water
- Business ethics
- Get involved**
  - Care for your clothes
  - Recycle your clothes
  - Sustainability Summary 2017
- Career**
  - Grow with us
  - Be yourself
  - Enjoy our culture**
    - More about our values
    - Be proud
  - Investors**
    - Financial calendar
    - Reports and presentations
    - The H&M group 2017 in words and pictures
    - Capital Markets Day 2018
    - The share
    - Shareholders
    - Dividend
    - Five year summary
    - Subscribe
  - Media**
    - Newsroom
    - Image galleries
    - Calendar 37
    - 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.

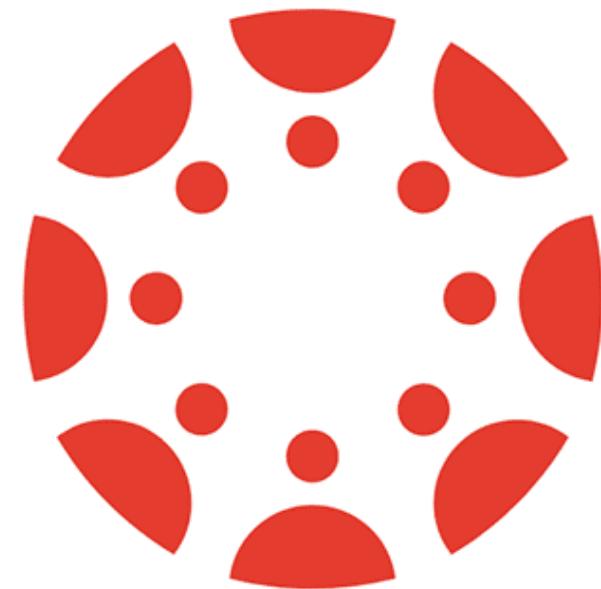
Three types of navigation aids:

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



# Quiz 3

Complete the [Canvas quiz](#).



canvas

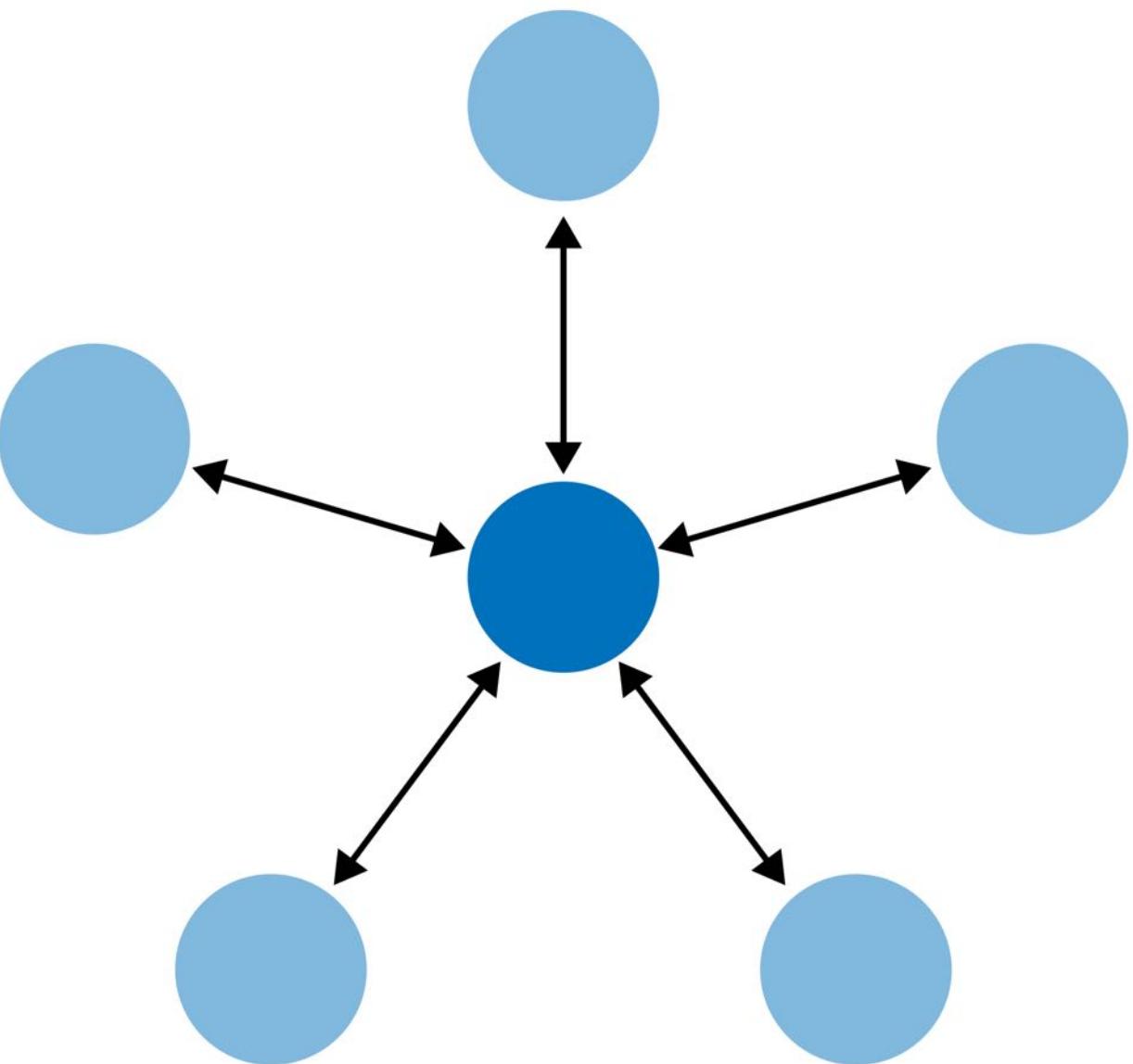
# Models

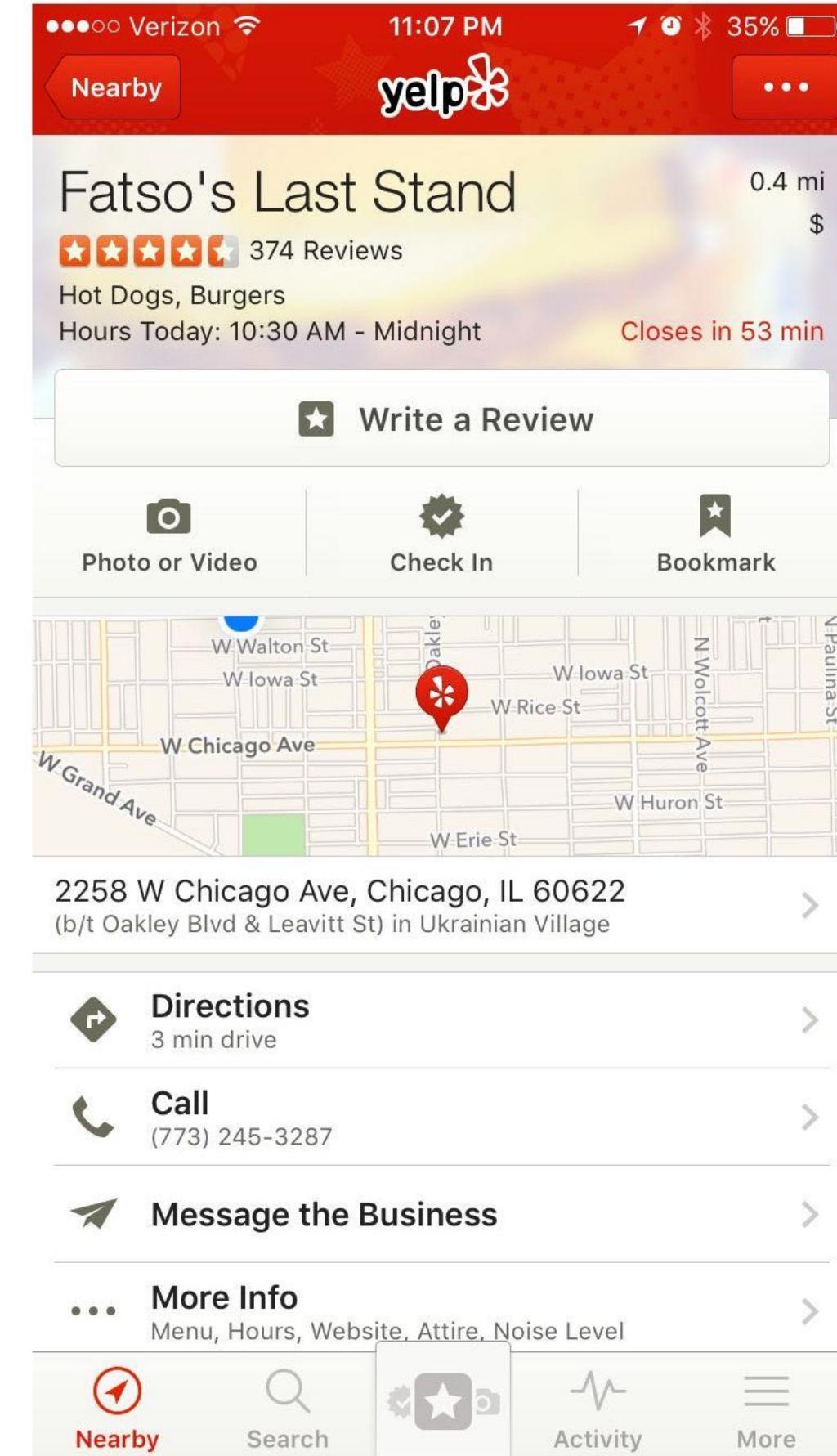
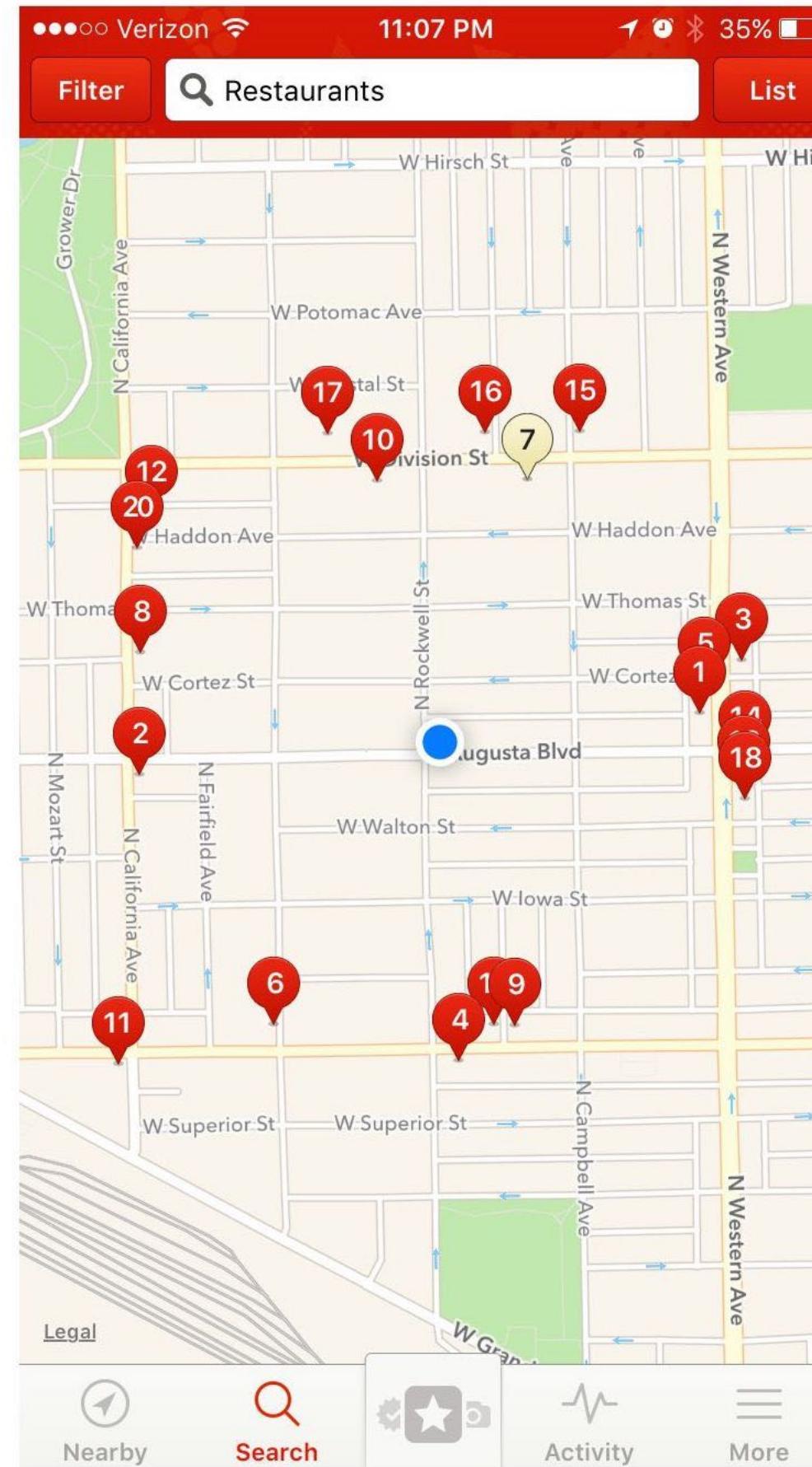
**Definition:** Commonly used patterns of navigation through interactive applications.

- 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

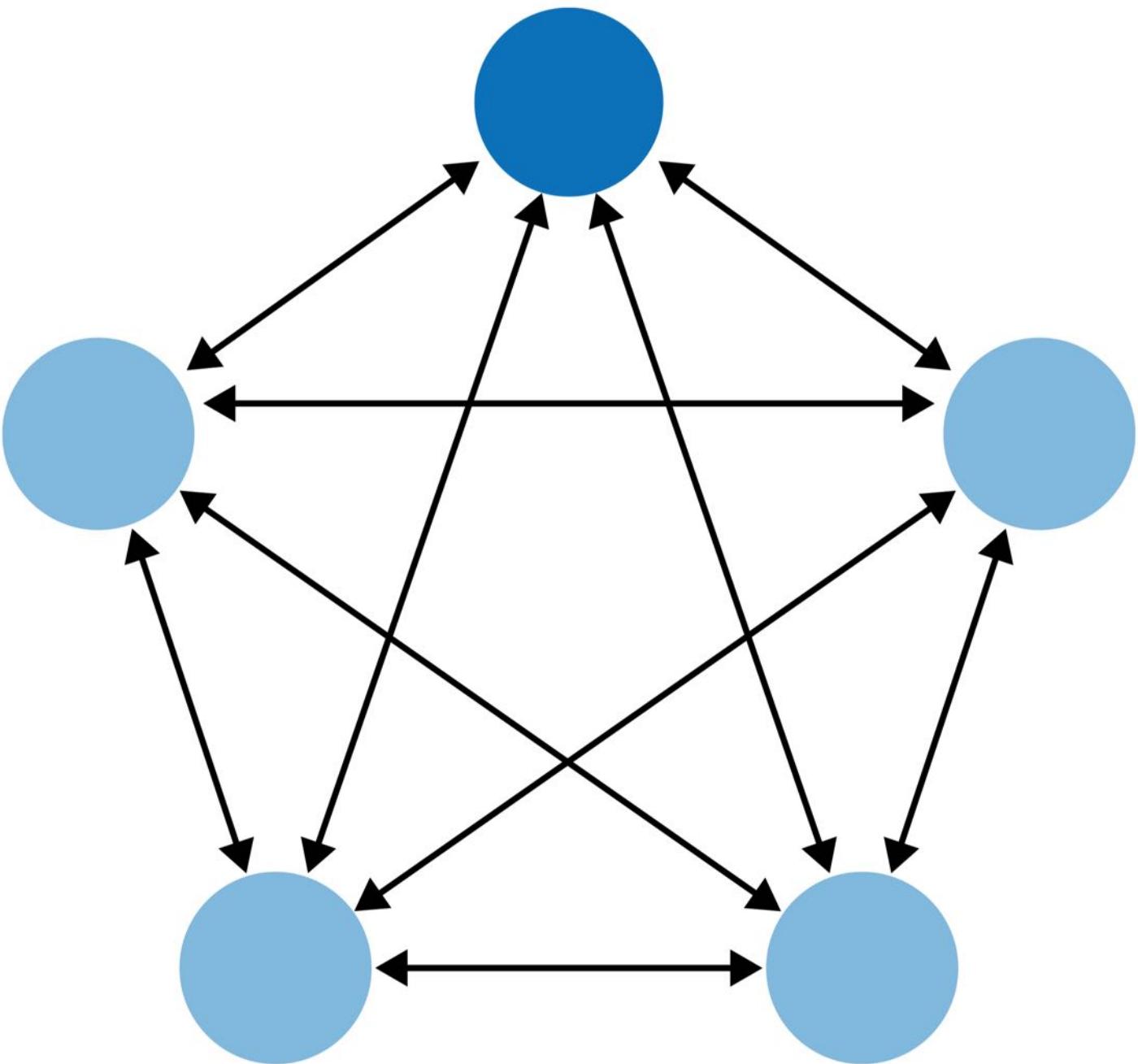
**Definition:** Involves a central hub, e.g., a home screen, that provides transitions to and from several specialized components.





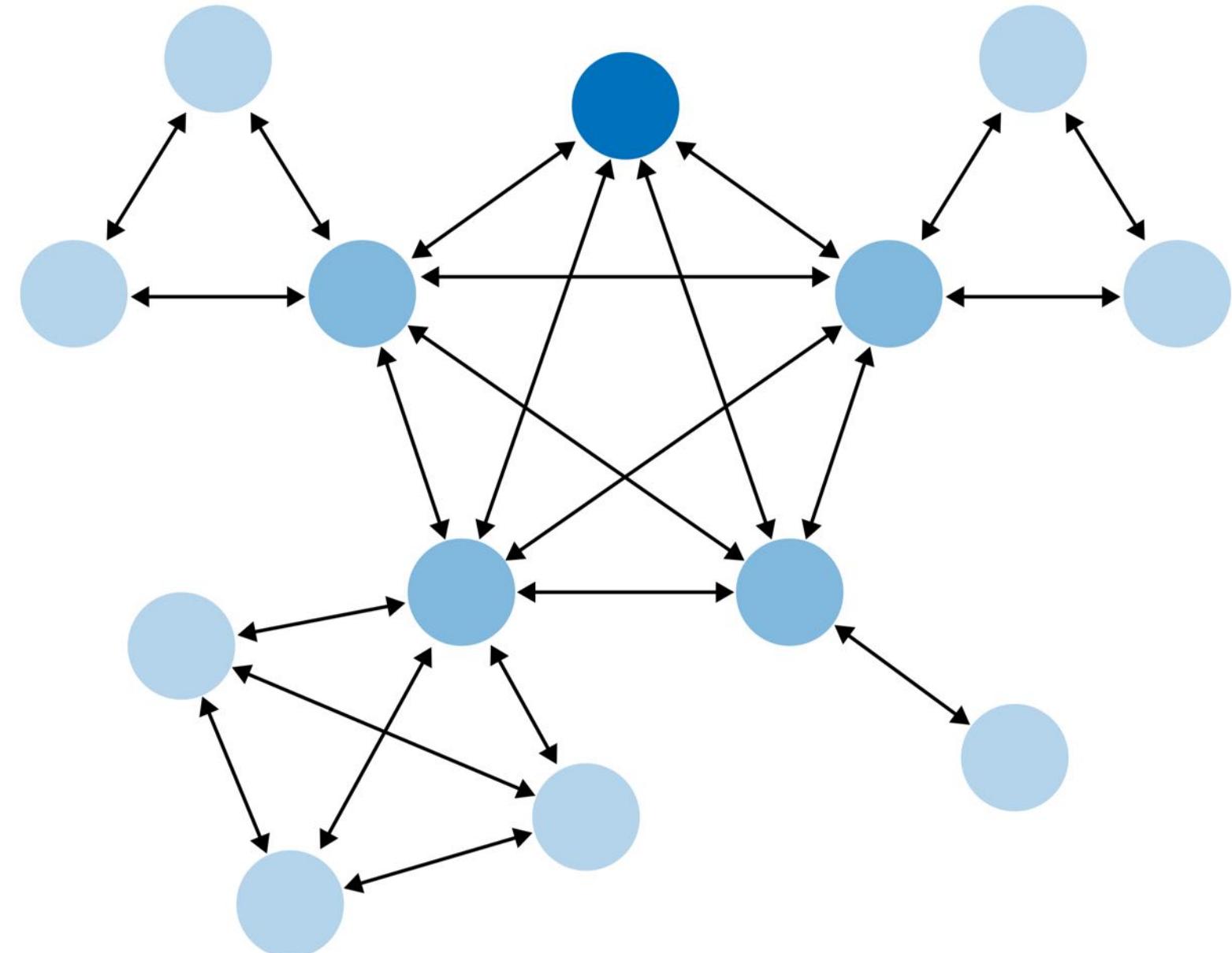
## Models: Fully connected

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



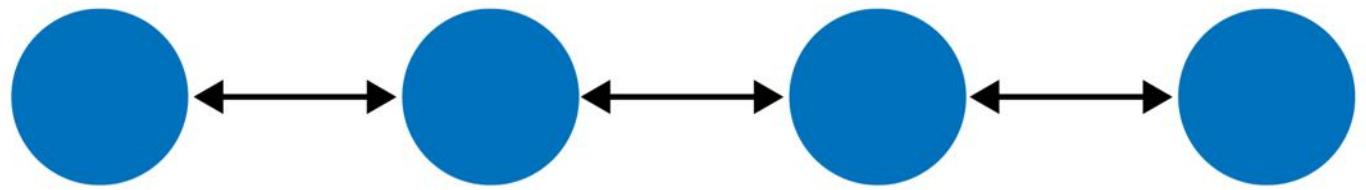
# Models: Multi-level

**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  
What does this mean?

### Legal name

[What is a legal name? ›](#)

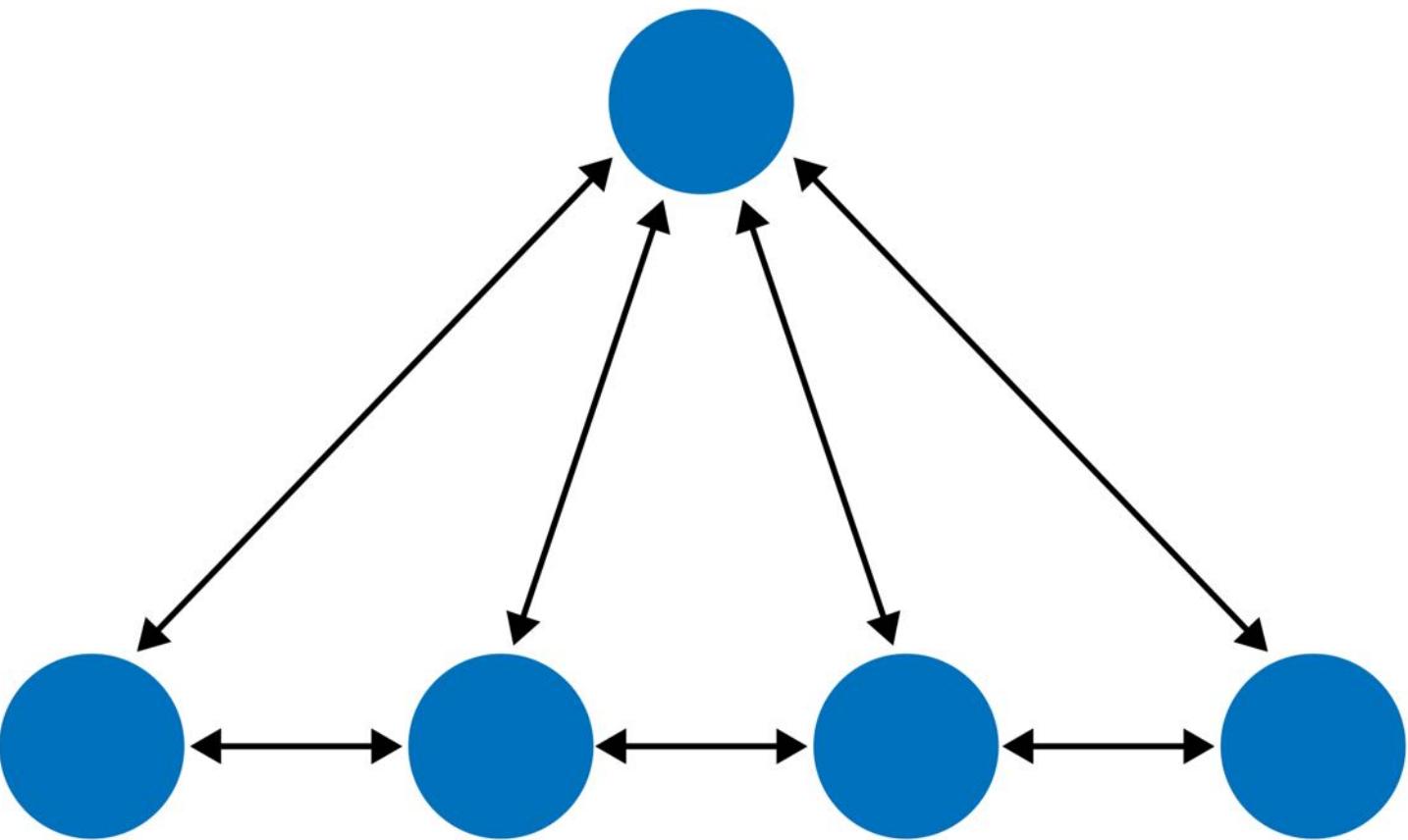
### Seller agreement

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

Upgrade My Account Search Contact

< 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:

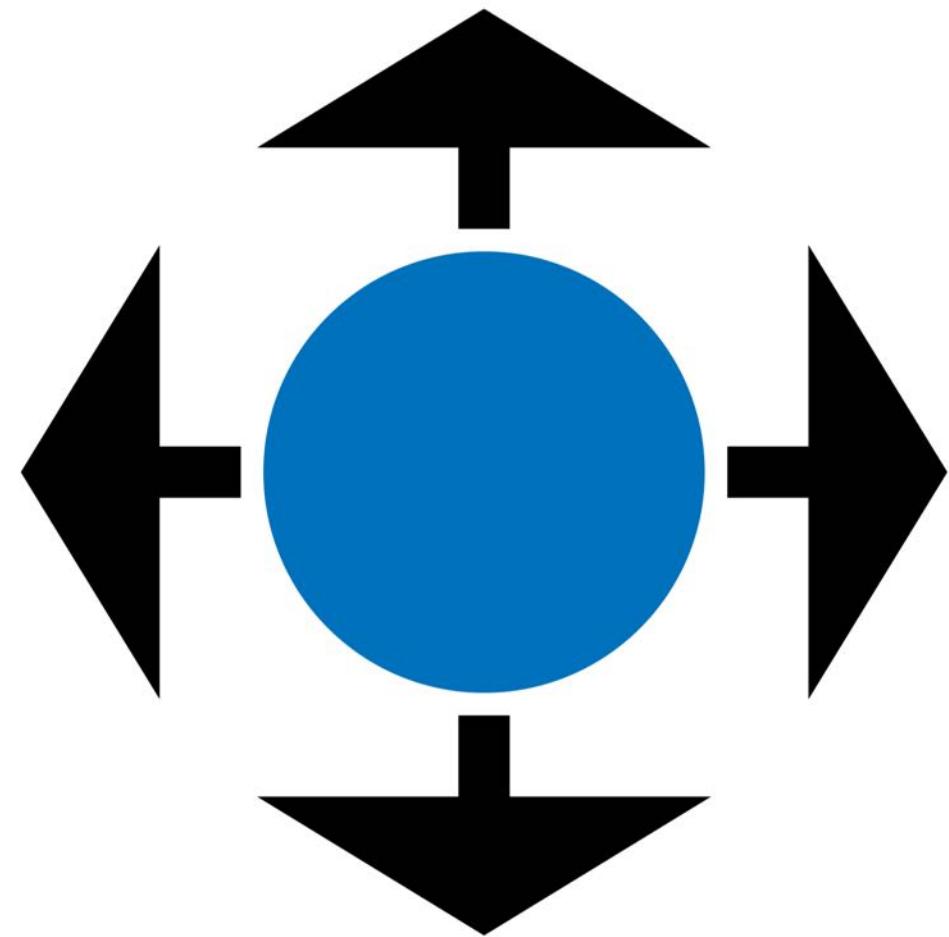
- We'll cover your state requirements
- We'll search for state tax breaks
- We'll help ensure your taxes are accurate

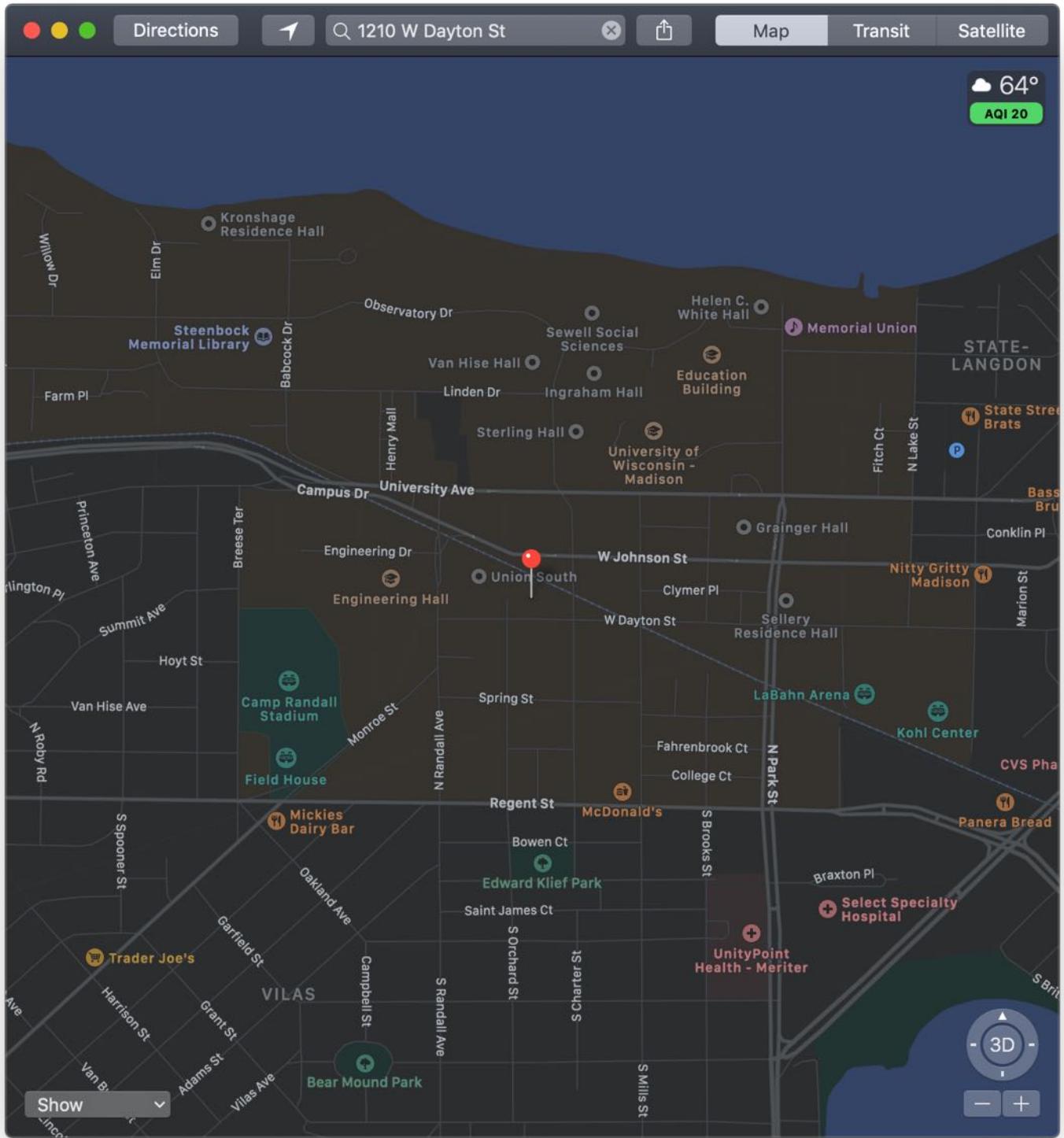
< Back Continue

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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.





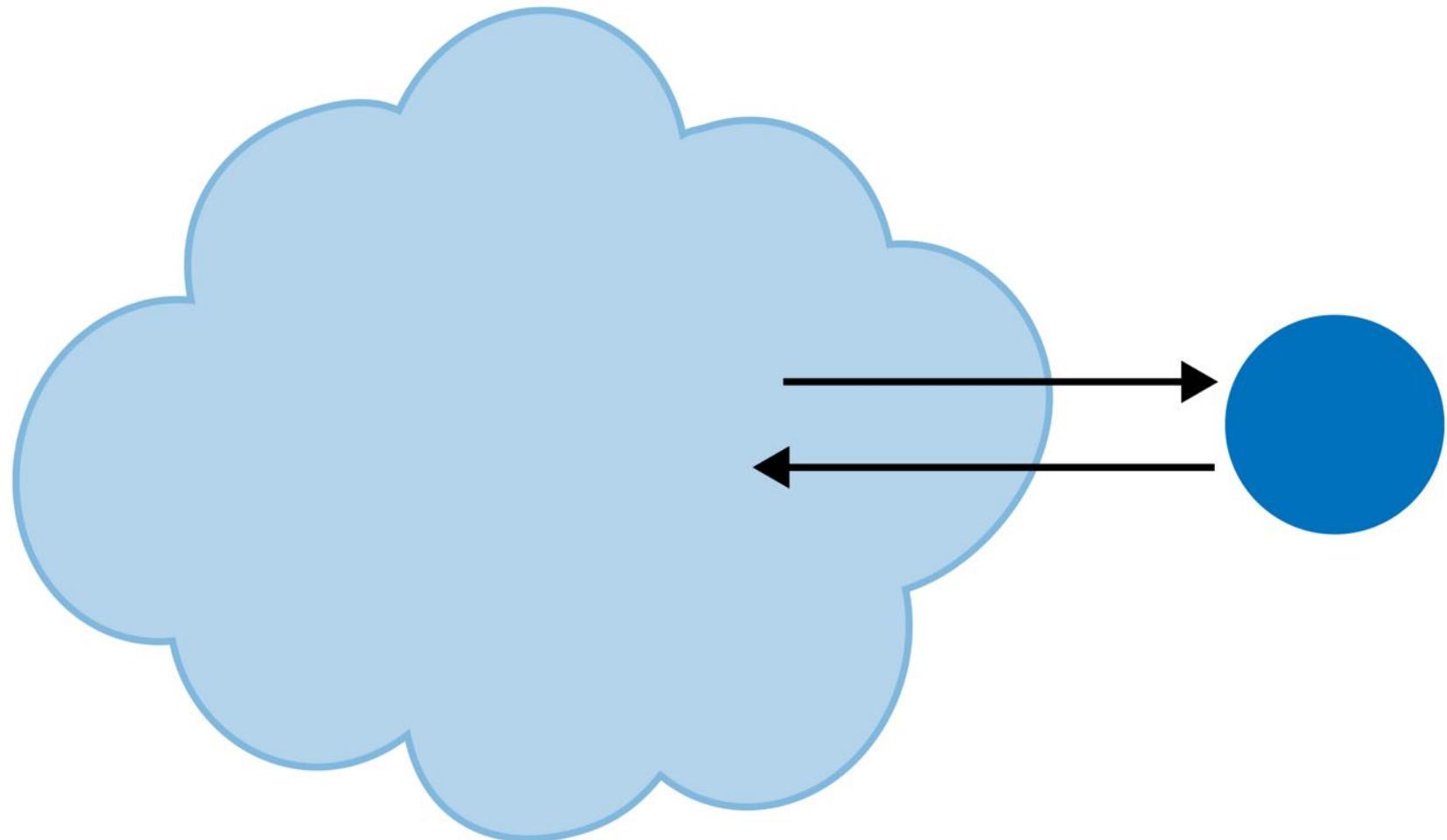
Vestibulum sodales sem sit amet erat faucibus pellentesque. Duis vestibulum in velit ac cursus. Nullam ultrices feugiat nisl sed fermentum. Donec neque eros, molestie vel ullamcorper at, molestie vitae risus. Cras ut vestibulum mi. Pellentesque vitae bibendum sapien, sed mattis sem. Nam eu quam orci. 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.



☰ ▶ ⌂ ⌂ T D

Drafts / Untitled

Share

32%

Frame

Welcome

START NOW

VIDEO

iPhone X

MacBook

Welcome

START NOW

iPhone X

MacBook

Welcome

START NOW

375x812

Maria

Resolve

Let's add some UI elements to make it clear that they should scroll down further. 😊

a few seconds ago

Maria

Cancel

Reply

COMMENTS

Show Resolved Comments

Receive email notifications

Page 1

3 Maria, a few seconds ago Let's add some UI elements to make it

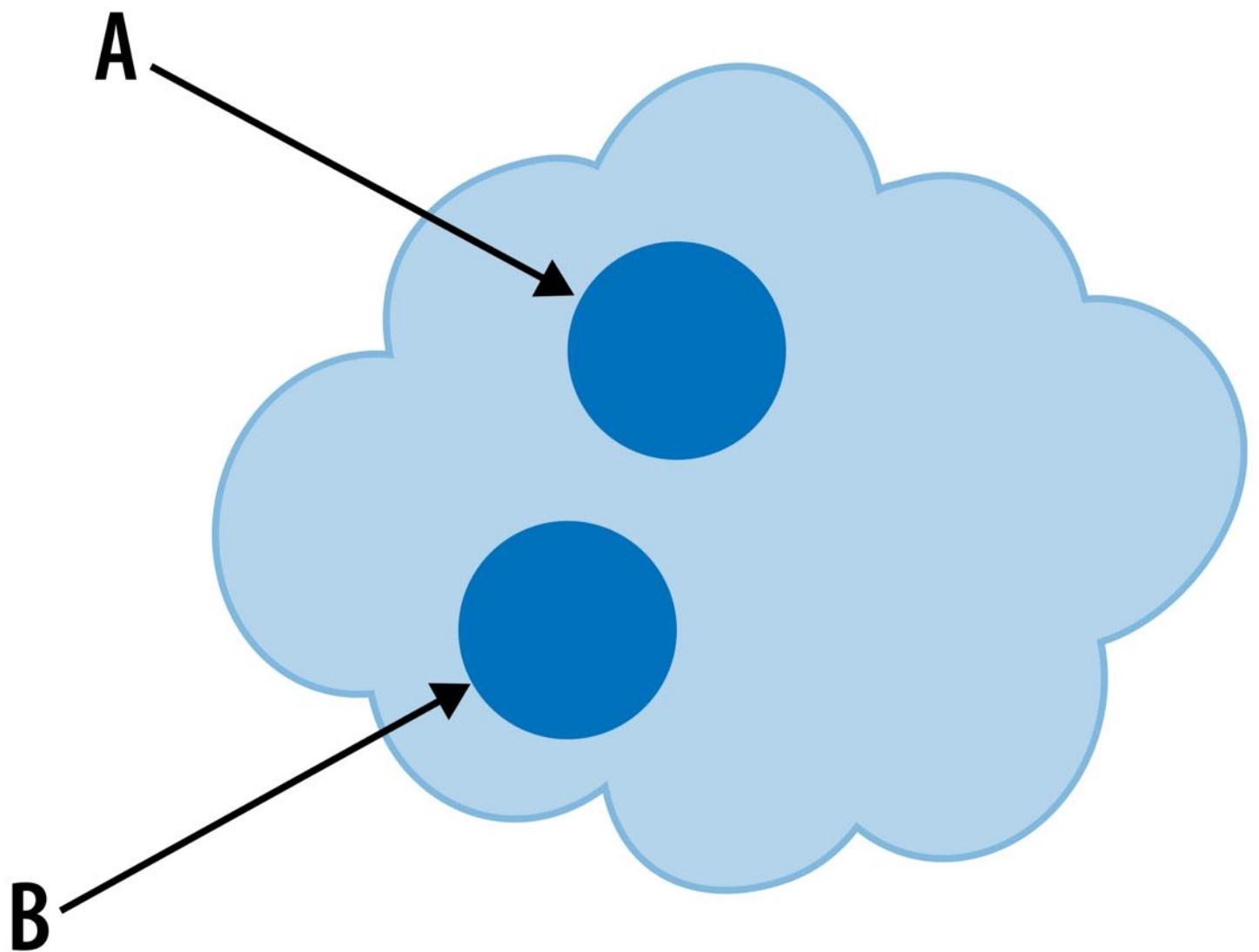
2 Maria, 26 minutes ago This is cool.

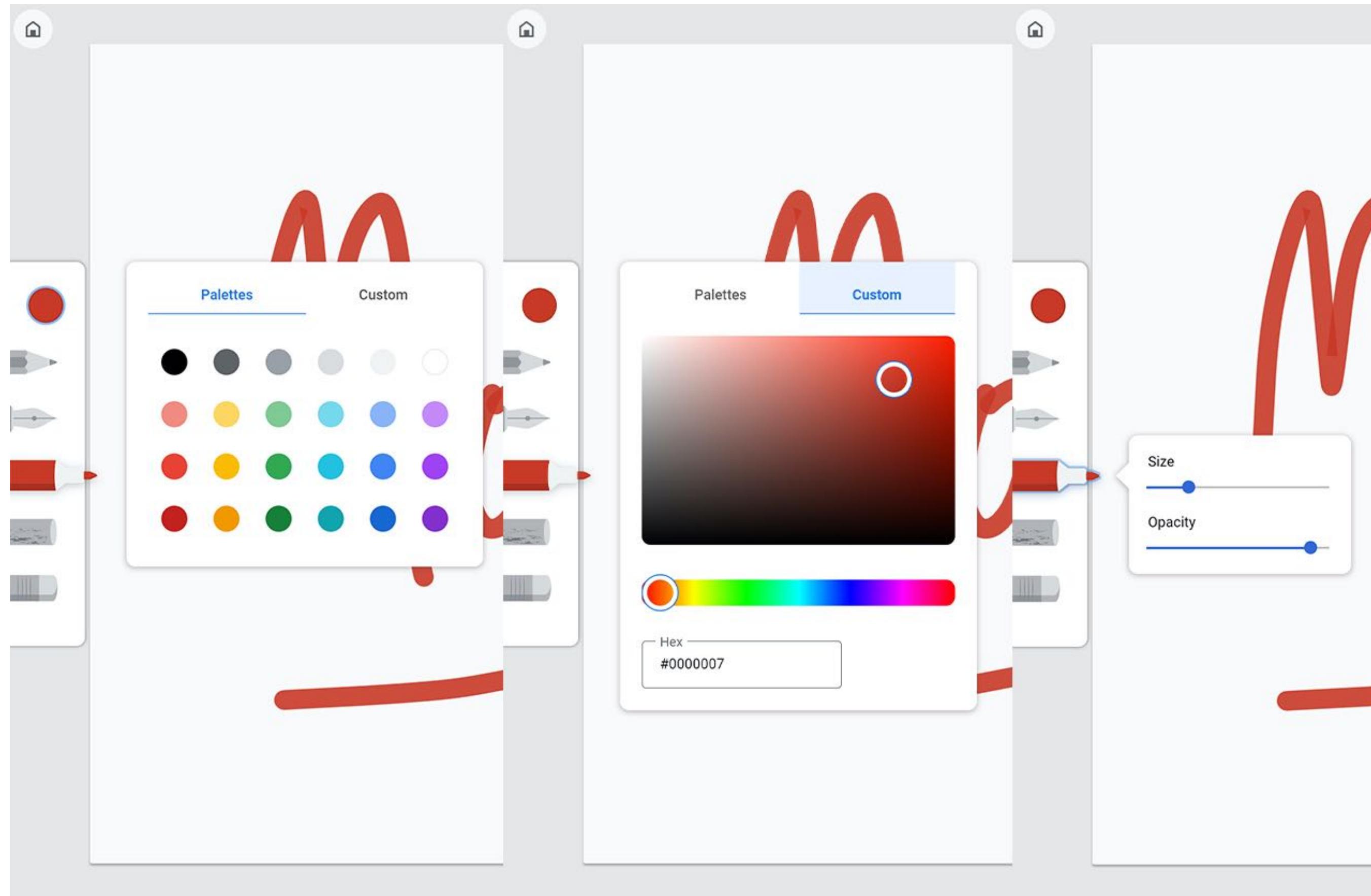
1 Maria, 39 minutes ago This should be a color-branded button

?

## Models: Modal panel

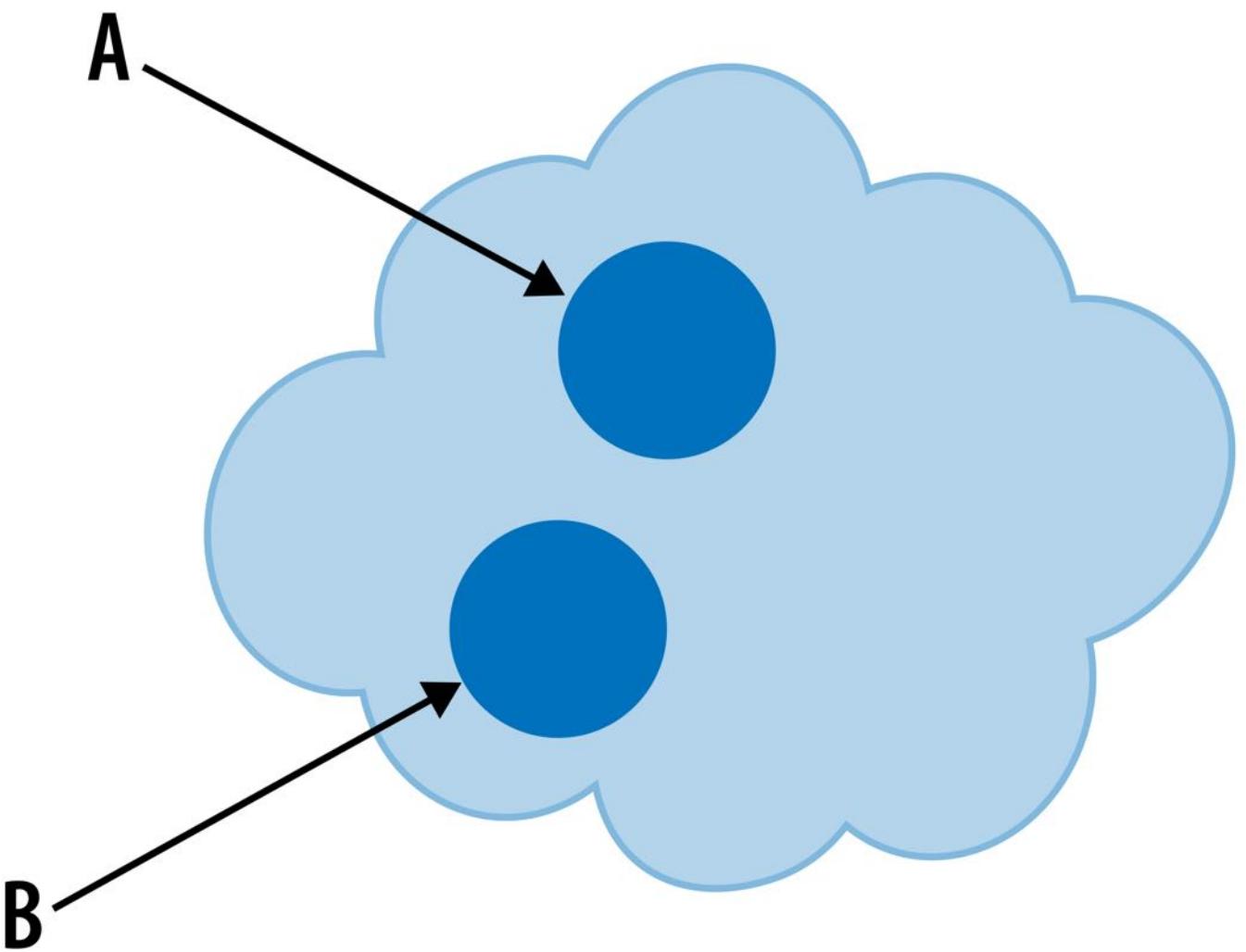
**Definition:** Follows the flat navigation model except for modal dialogs that are temporarily overlaid on them in canvas to help the user perform specific functions.

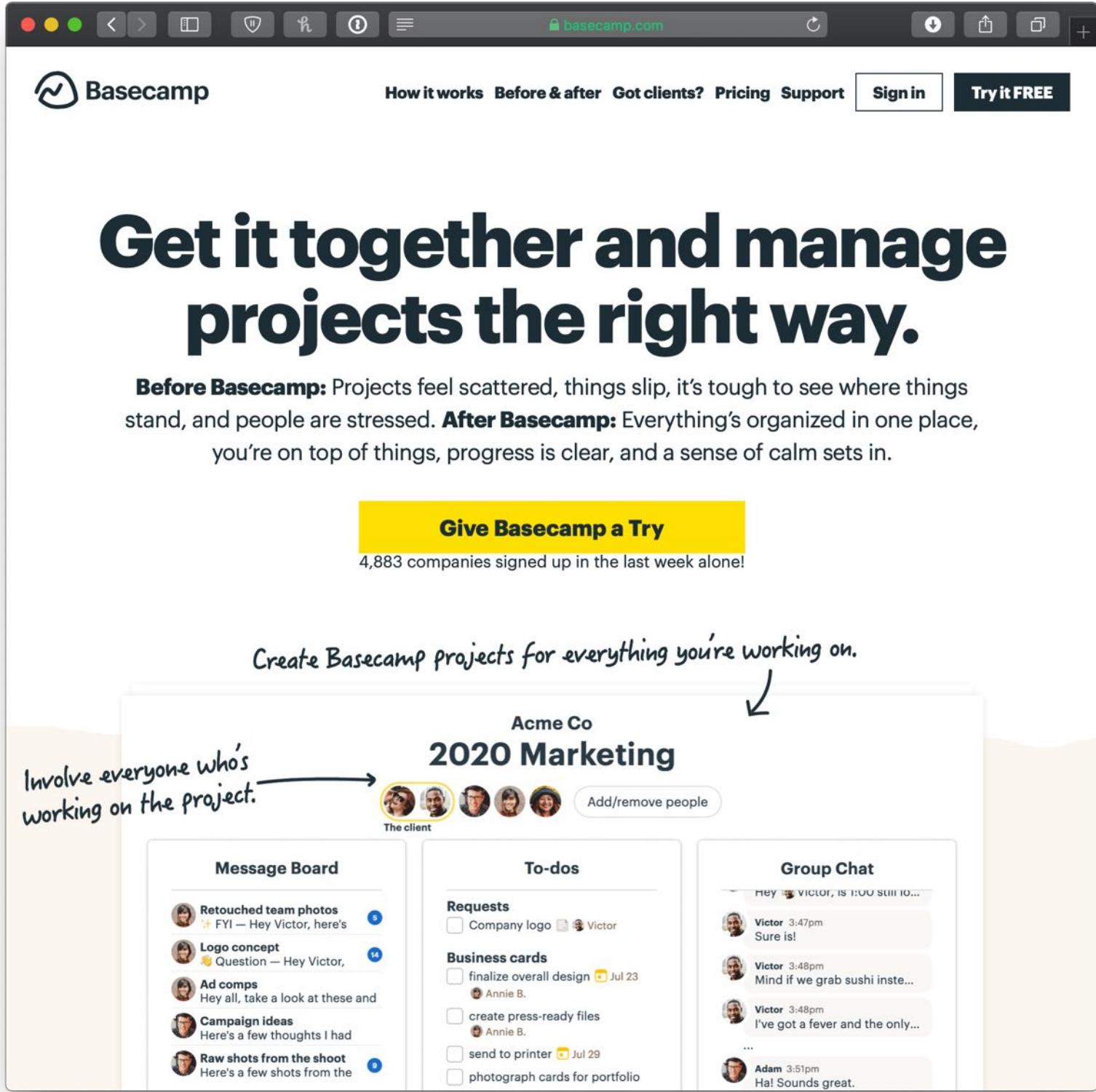




# Models: Clear entry points

**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.

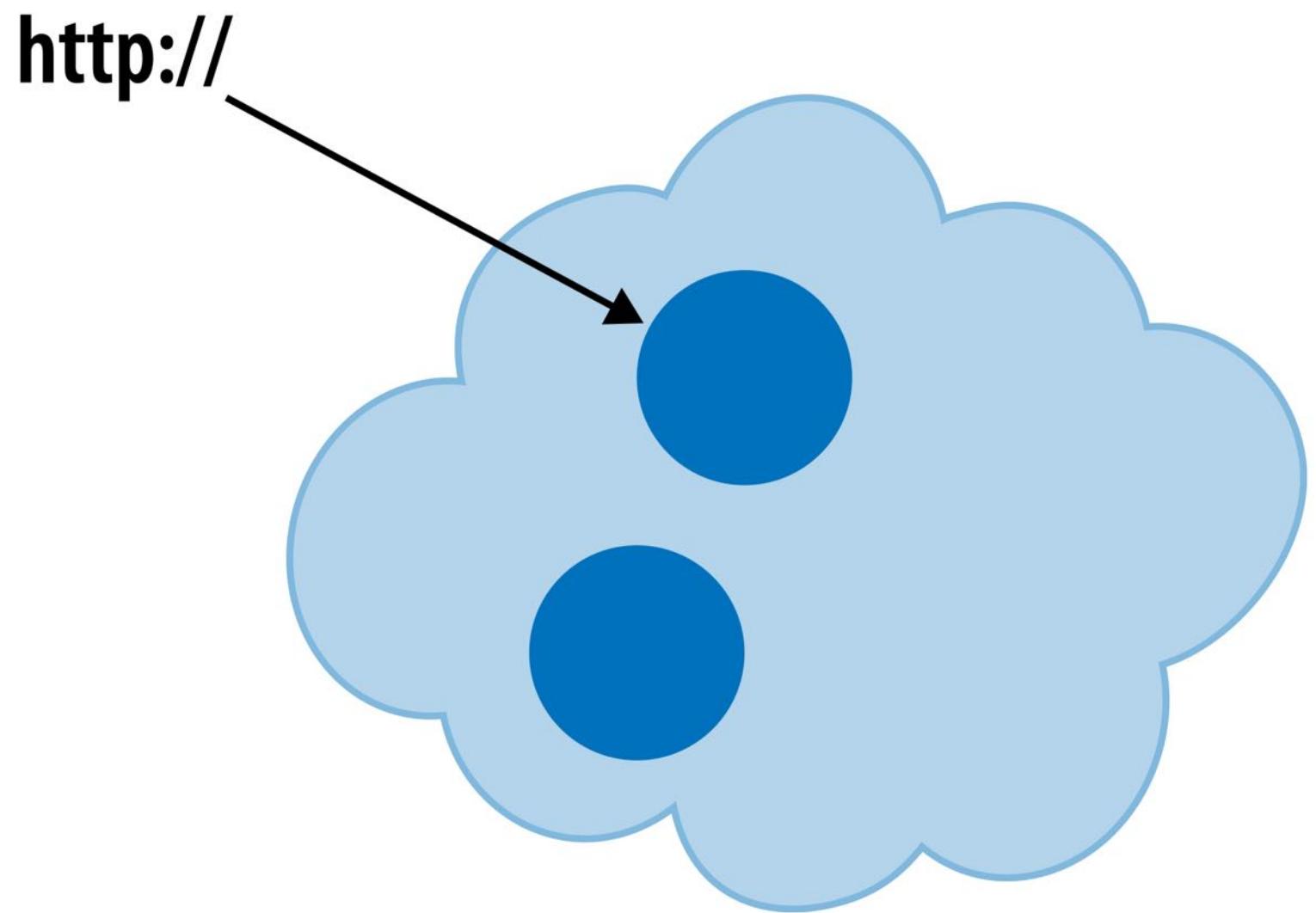


A screenshot of the Basecamp website. At the top, there's a navigation bar with links for "How it works", "Before & after", "Got clients?", "Pricing", "Support", "Sign in", and a prominent "Try it FREE" button. The main headline reads "Get it together and manage projects the right way." Below the headline, a section compares "Before Basecamp" (scattered projects, stress) with "After Basecamp" (organized projects, calm). A yellow button says "Give Basecamp a Try". A note below it says "4,883 companies signed up in the last week alone!". A callout box highlights the "Message Board" feature with the text "Involve everyone who's working on the project." An arrow points from this text to the "Message Board" section, which shows a list of messages from team members like "Retouched team photos", "Logo concept", "Ad comps", "Campaign ideas", and "Raw shots from the shoot". Other sections shown include "To-dos" (with Requests and Business cards) and "Group Chat".

Two screenshots from the Apple website. The top one is for the iPhone 11 Pro, featuring a black background with a green phone in the center. The phone has three cameras and a bright green liquid splashing around it. The headline says "iPhone 11 Pro" and "Pro cameras. Pro display. Pro performance." with a price of "From \$24.95/mo. or \$599 with trade-in.\*". Below it are "Learn more" and "Buy" buttons. The bottom screenshot is for the iPhone 11, also with a black background and a green phone. The phone has two cameras and a smaller amount of green liquid. The headline says "iPhone 11" and "Just the right amount of everything." with a price of "From \$16.62/mo. or \$399 with trade-in.\*".

## Models: Bookmarks

**Definition:** Bookmarks allow frequent or infrequent users to directly access particular functions without having to navigate through hierarchical structures.



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 does not," Hotah said again.

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

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

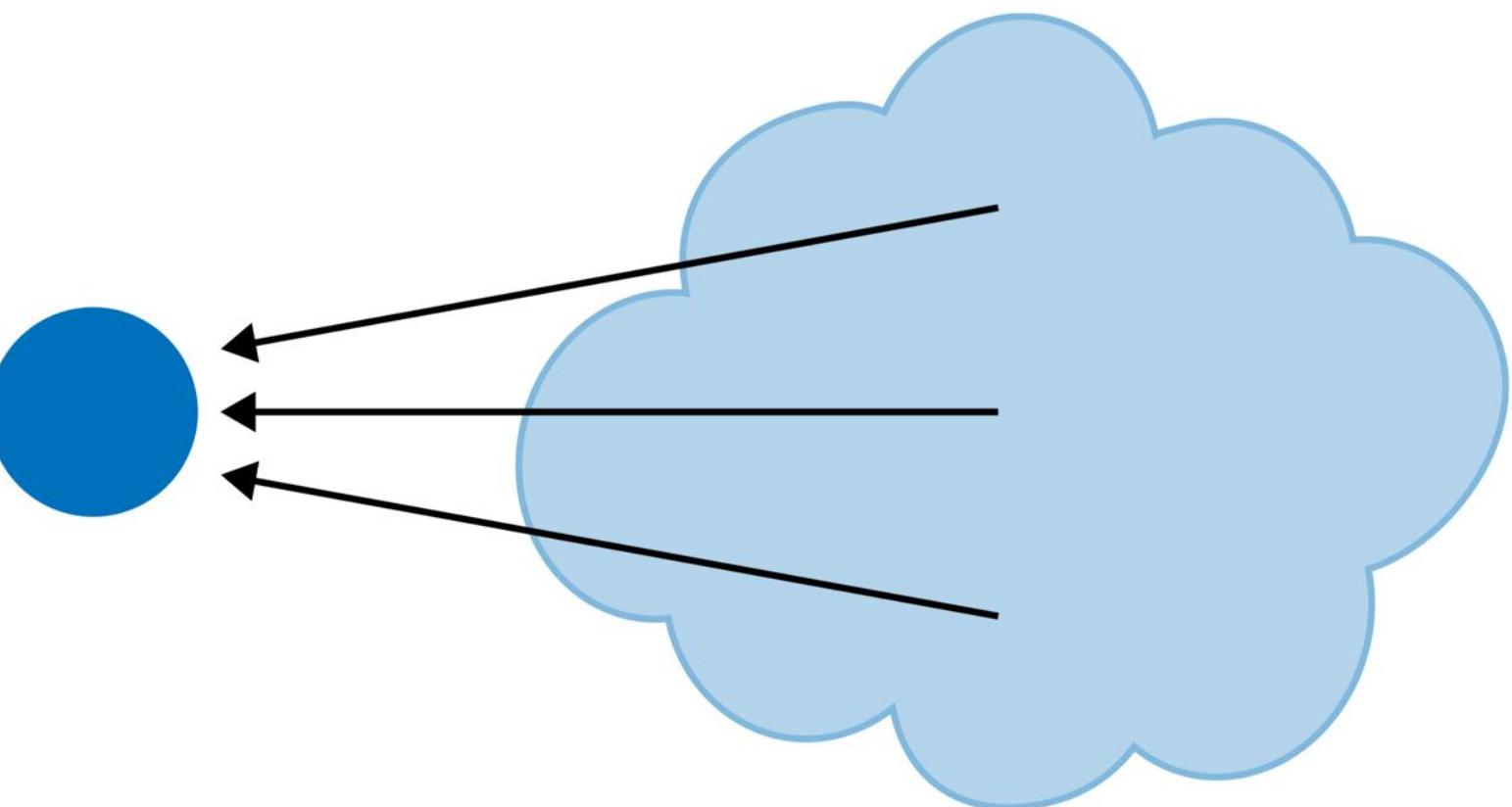
hanged  
7 HOURS AGO  
570 767

Votre Artisan 24H/7J

Table of contents  
Bookmarks  
Highlights  
Notes

## 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 the trail steps back.



The Amazon.com homepage features a large advertisement for the All-new blink XT2 smart camera. The camera is shown against a blue background. Below the camera, the text "All-new" and "blink XT2" is displayed, along with icons indicating it "Works with Alexa", has "2-year battery life", and includes "2-way audio".

**Deal of the Day**

\$117<sup>99</sup> - \$119<sup>00</sup>  
 Save up to 40% on a BodyBoss Home Gym 2.0  
[See all deals](#)

**Jennifer's gift picks**

Jennifer Lawrence's wedding registry guide  
[Explore now](#)

**Sign in for the best experience**

[Sign in securely](#)

**Today's deals under \$25**

The apple.com homepage features two main advertisements. The top one is for the iPhone 11 Pro, with the text "iPhone 11 Pro" and "Pro cameras. Pro display. Pro performance. From \$24.95/mo. or \$599 with trade-in.\* Learn more > Buy >". The bottom one is for the iPhone 11, with the text "iPhone 11" and "Just the right amount of everything. From \$16.62/mo. or \$399 with trade-in.\*". Both ads feature images of the phones with water splashes.

# In-Class Activity 2: Reverse Engineering Navigation Models

amazon.com

All ▾

Hello, Sign in Account & Lists Returns & Orders Try Prime Cart 0

Select your address Best Sellers Customer Service New Releases Today's Deals AmazonBasics Whole Foods Gift Cards Prime Day is October 13-14

OCT. 13 - 14

Two days. Epic deals. prime day

Exclusively for Prime members

Dresses with 4+ stars



Shop styles with hundreds of 4+ stars

See more

Halloween costumes



Our favorite designs, from sweet to spooky

Shop women's costumes

Shop small businesses, get \$10 on Prime Day



Shop now

Sign in for the best experience

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handmade



Exquisite. Original. Handcrafted.

Discover Handmade >

Sponsored

Prep for college for less Explore more

College Shopping Guide



Electronics



Room Hacks



Women's Fashion



Men's Fashion



Smart Room

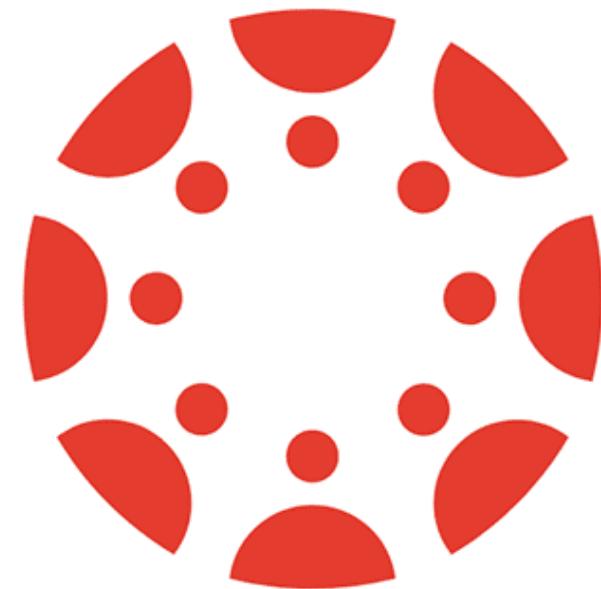


# Principles of Navigation

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

# Quiz 4

Complete the [Canvas quiz](#).



canvas

# What did we learn today?

- Interaction structure
- Visual layout design
- Principles of navigation