

**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 wireframe of a web application form. At the top, there are three small circles representing a menu or navigation. Below that is the title 'Application Form'. Underneath the title is a line of placeholder text: 'Please enter the description below:'. This is followed by a large rectangular text input area containing several lines of placeholder text. At the bottom of the form is a dark, rounded rectangular button labeled 'SUBMIT'.



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.

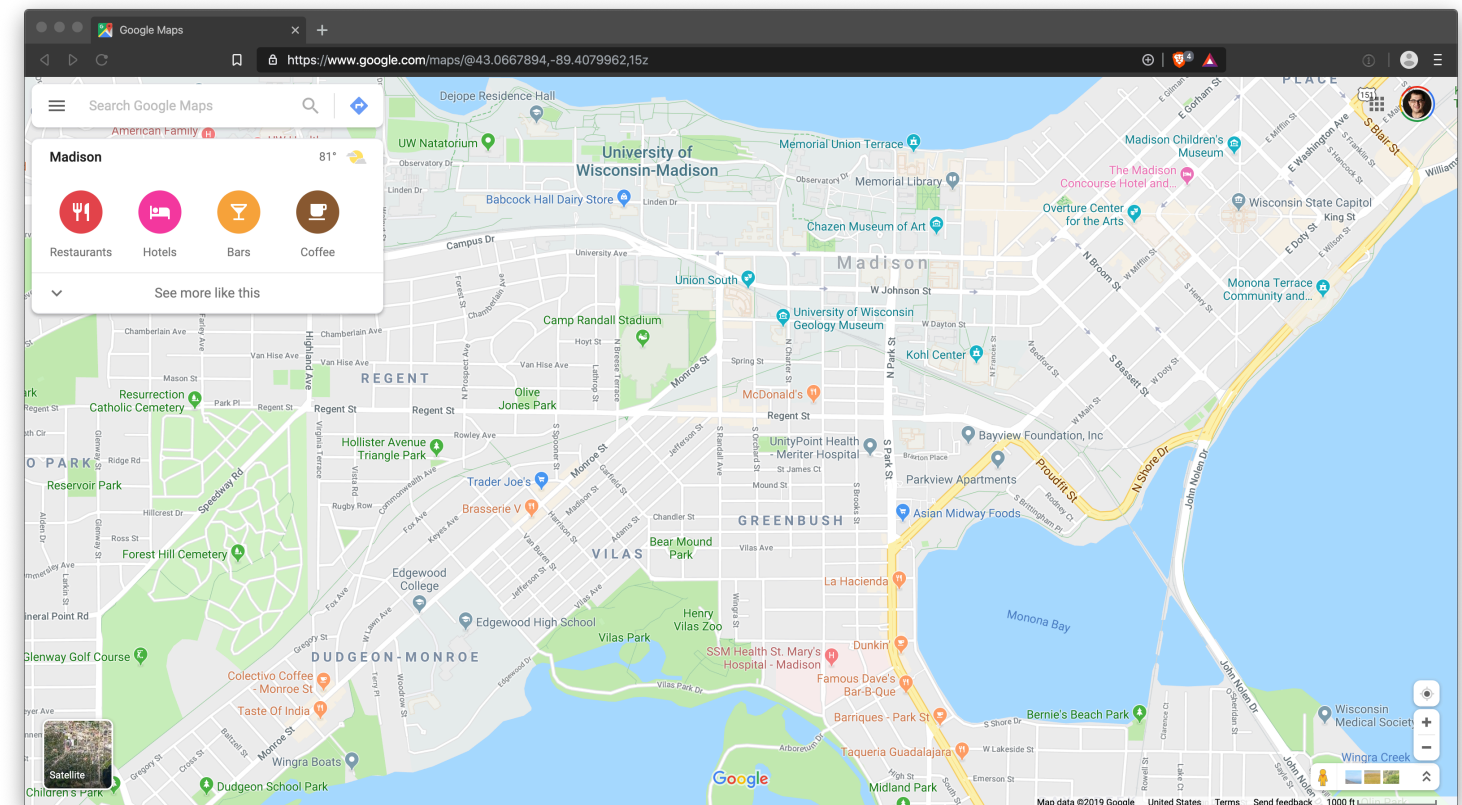
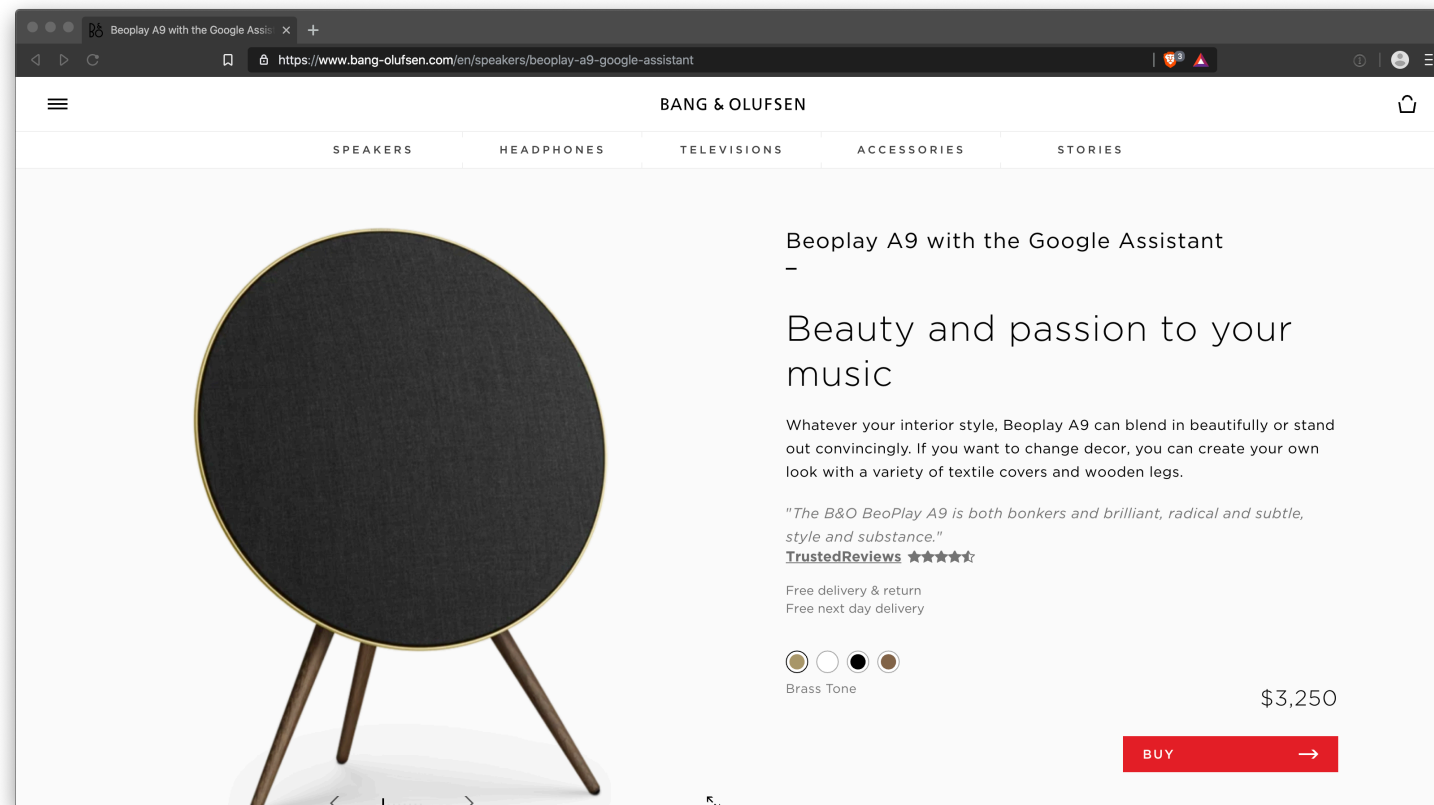
A set of structural categories:<sup>2</sup>

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"

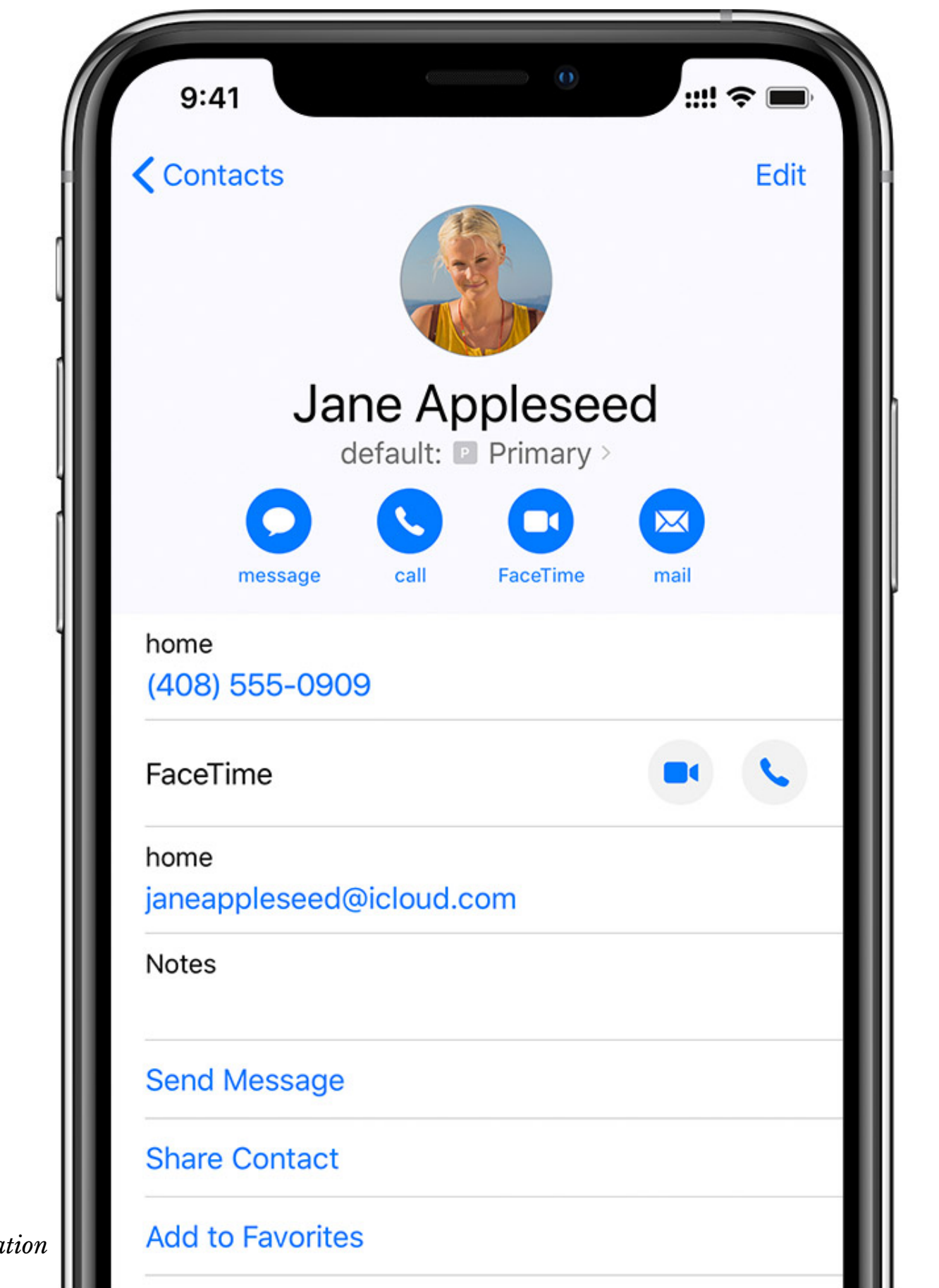
Focuses on conveying information on a specific topic/facilitating a specific activity



Supports a specific activity, eliminating other distractions.

Includes key components:

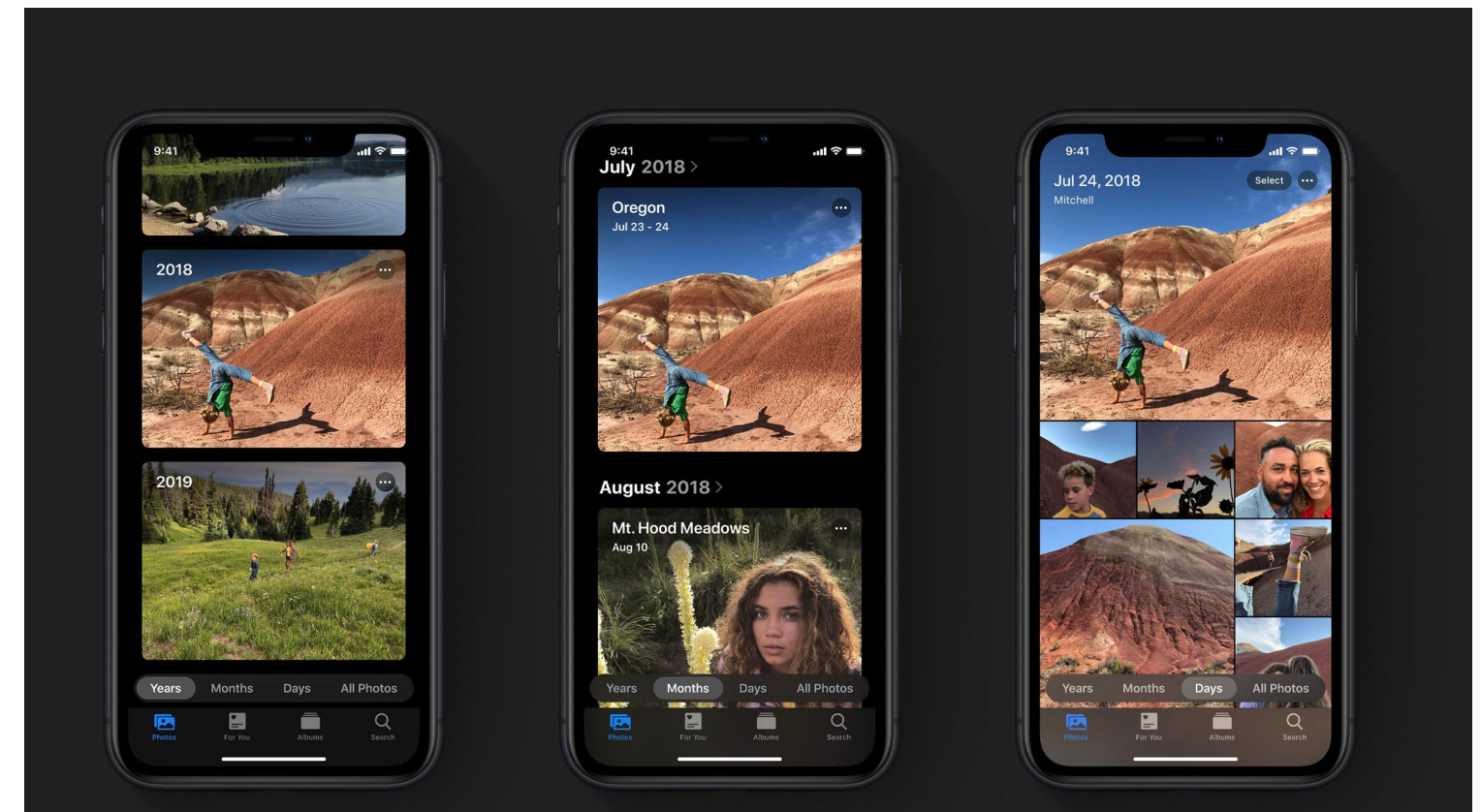
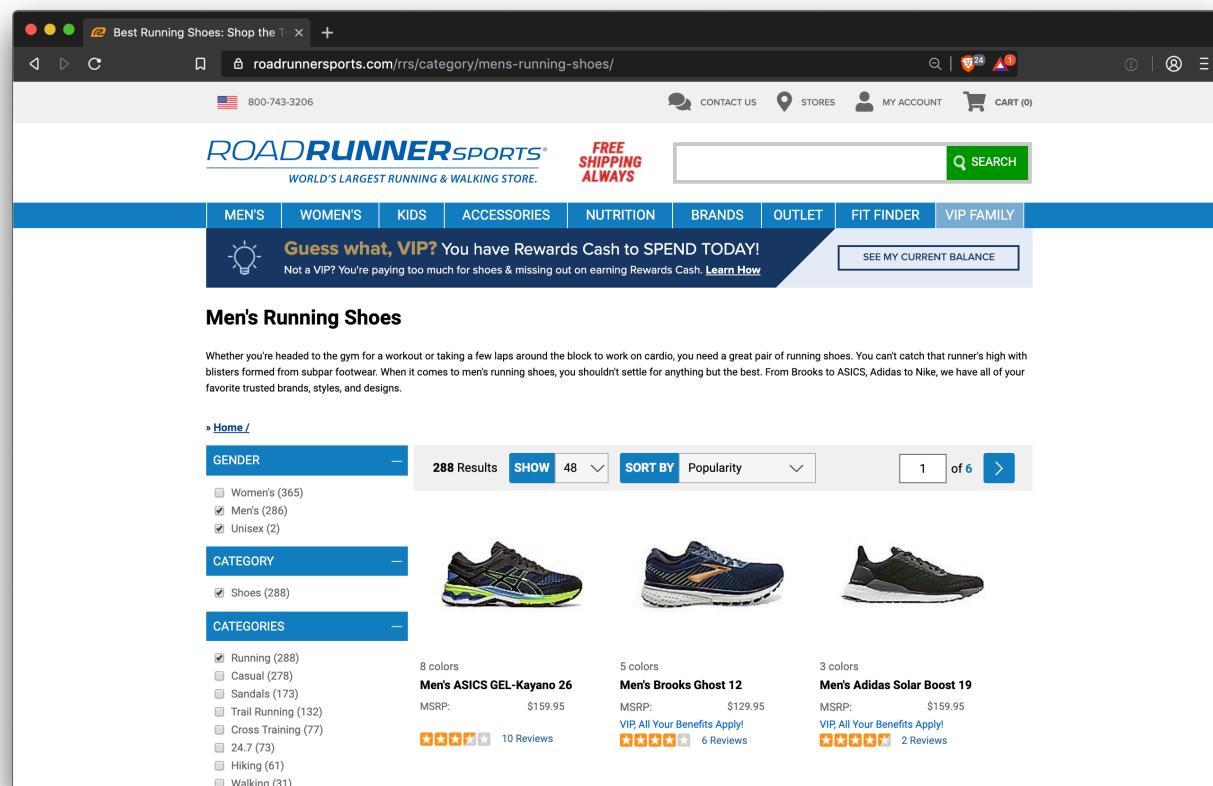
1. Content of the "single thing"
2. Supporting tools that help the user act on the content





# "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.

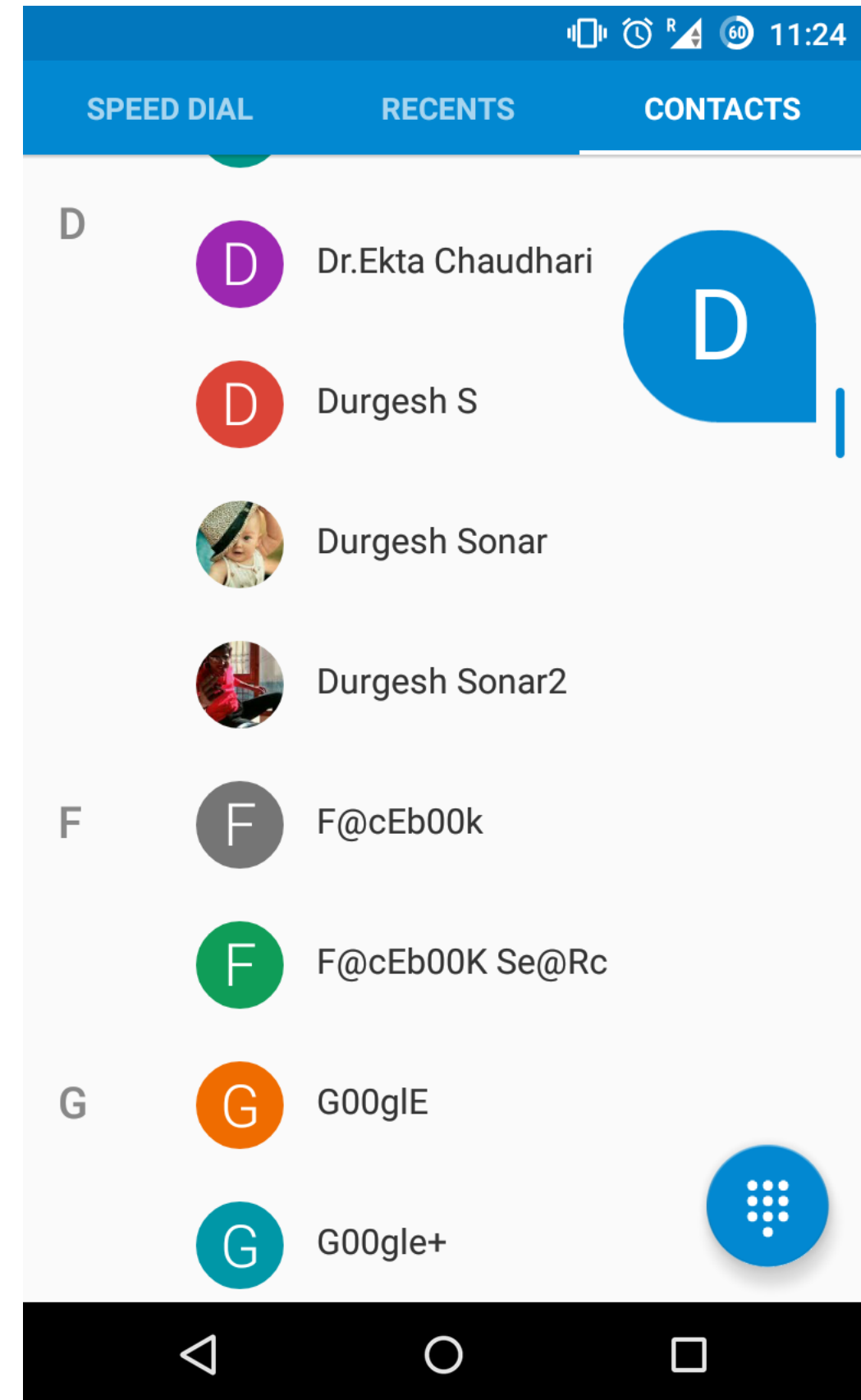




Includes design elements that help the user organize and categorize the lists

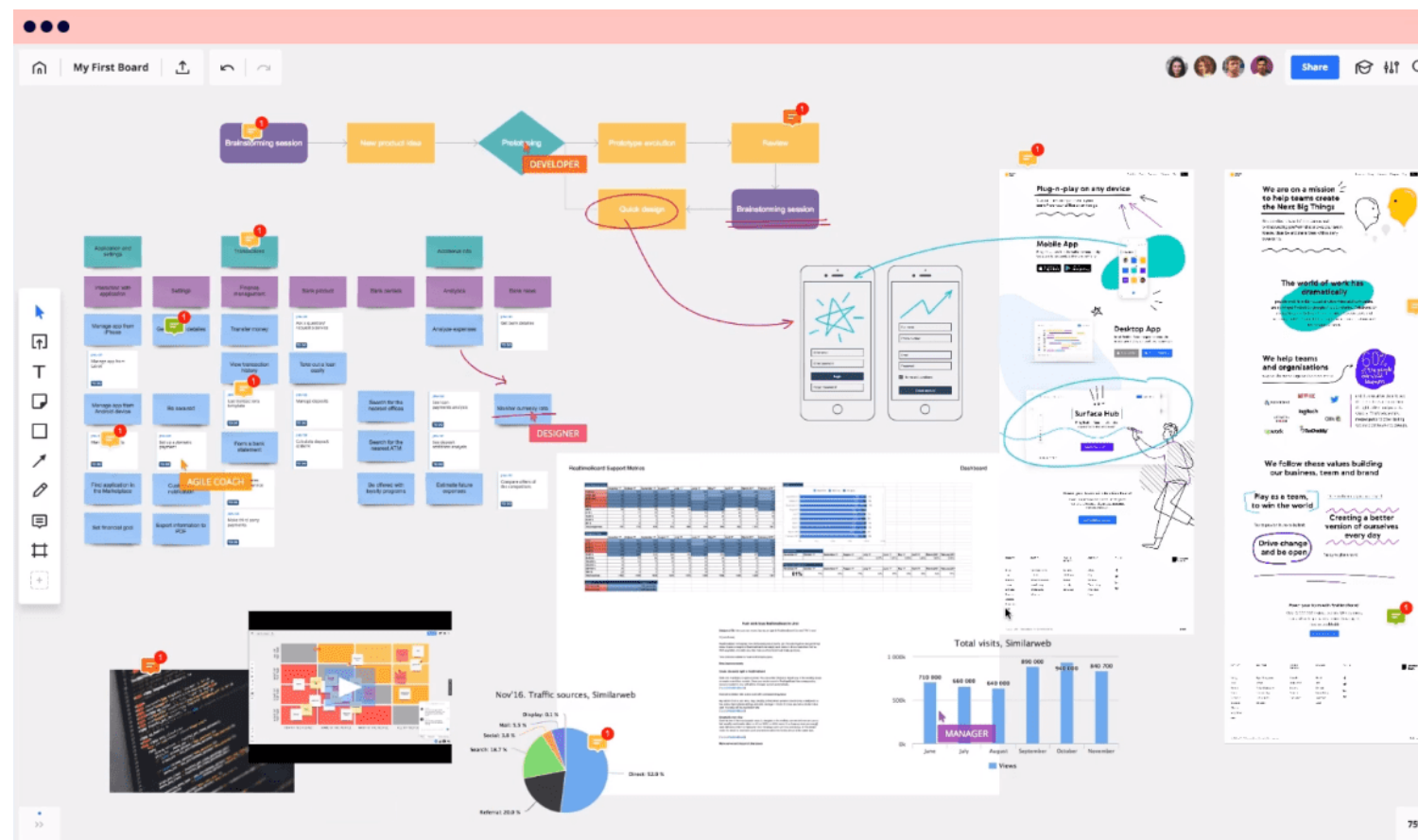
Can be applied hierarchically

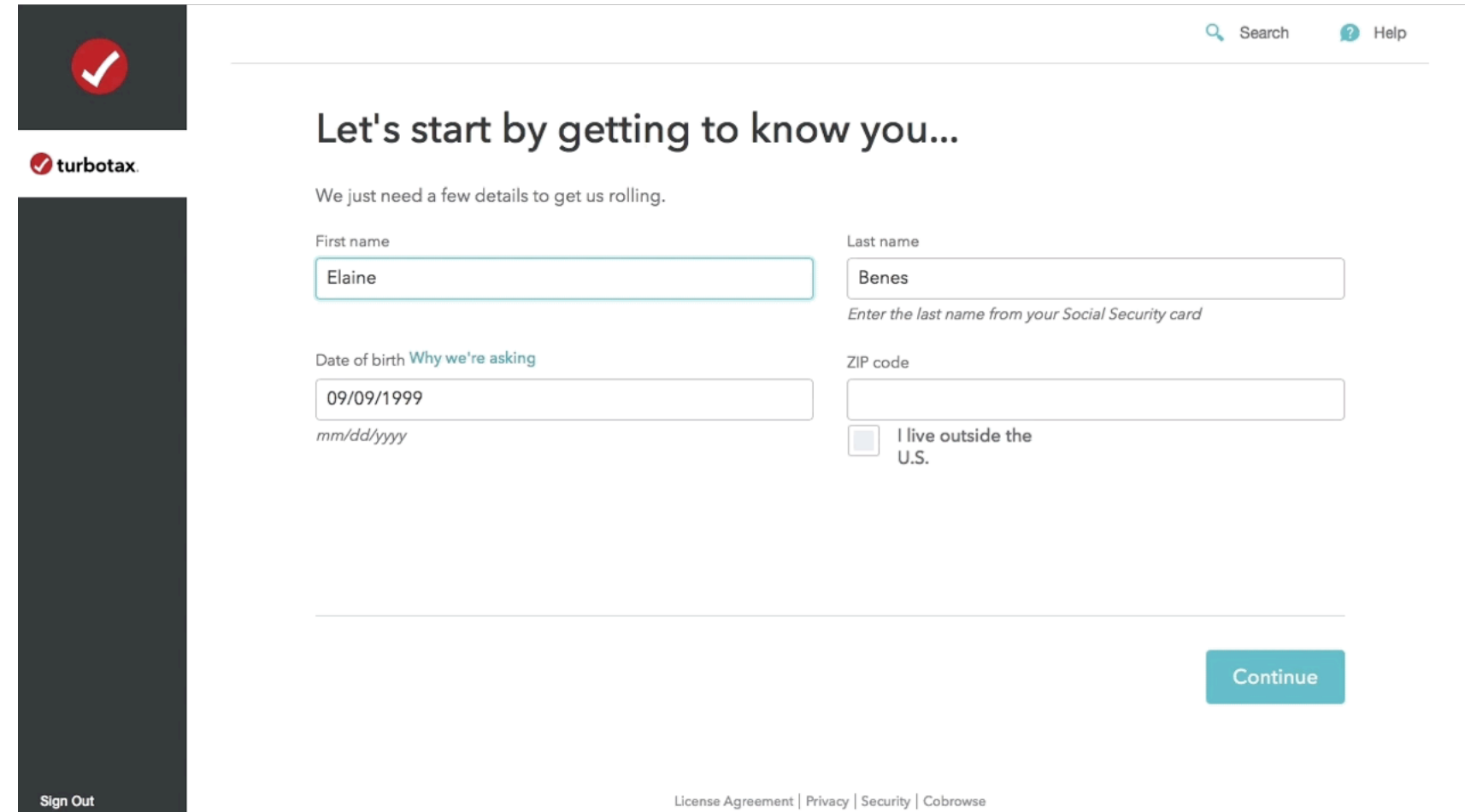
Does this remind you of something we've been discussing?



# "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

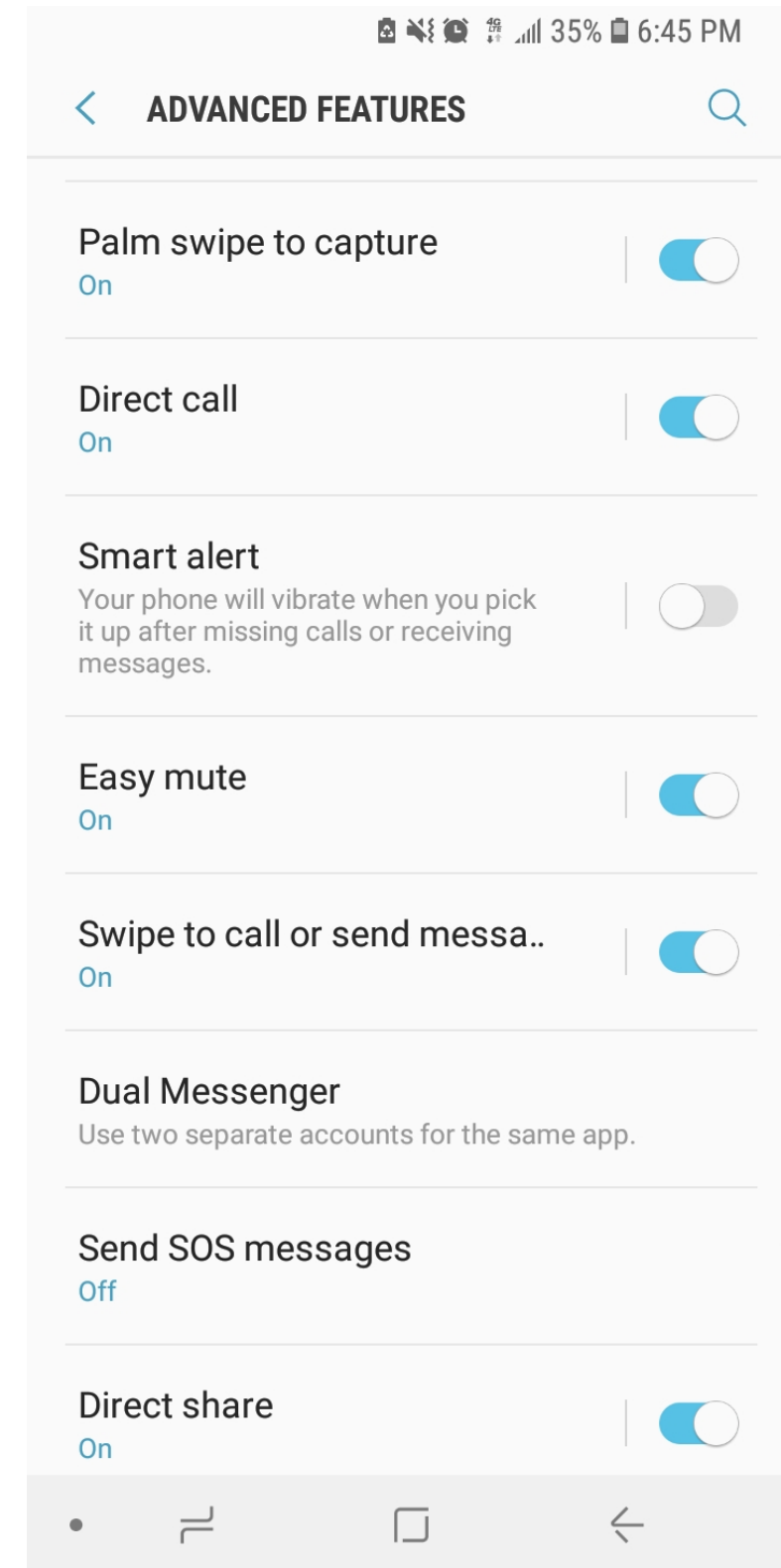




# "Facilitate a task"

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

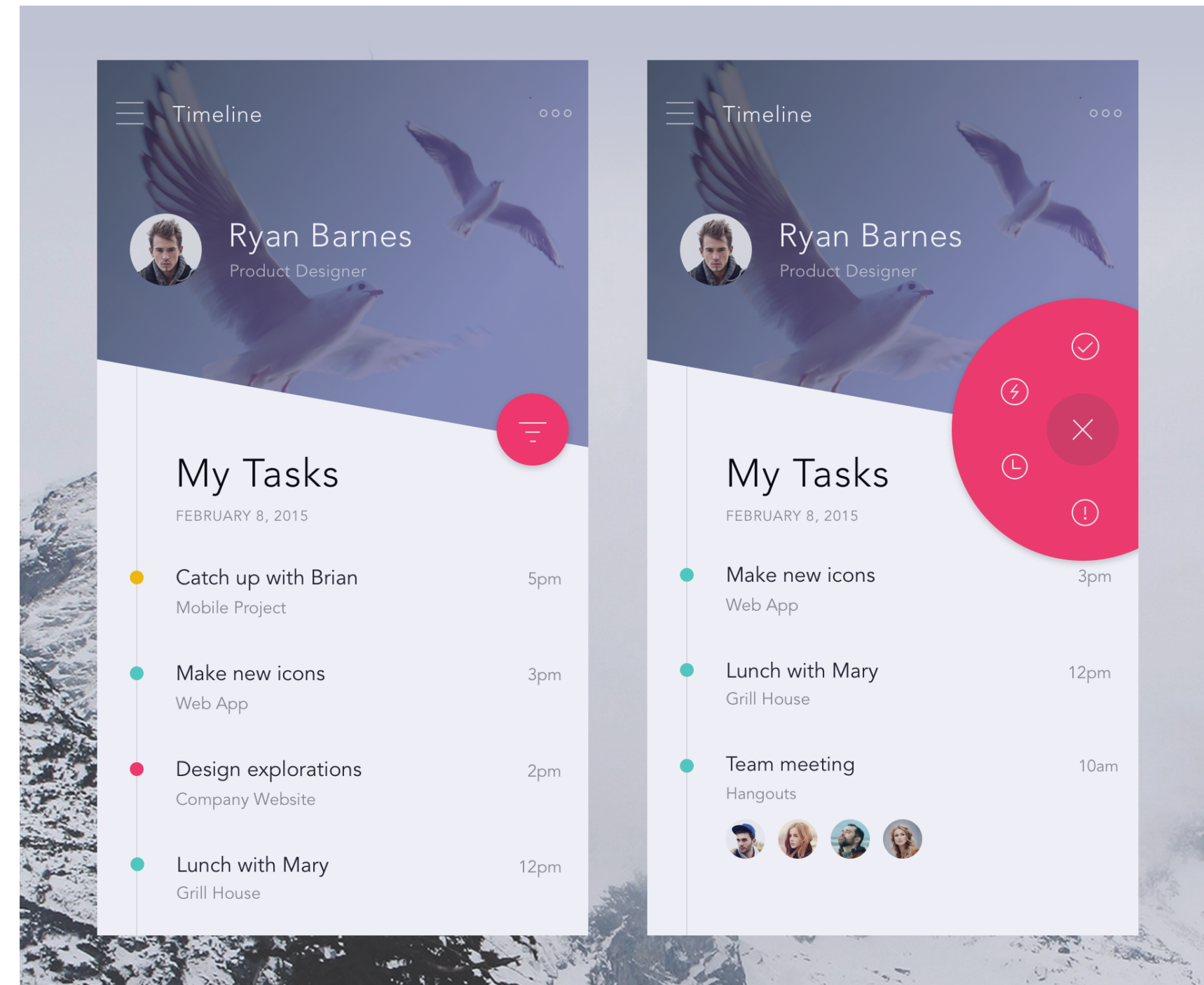
The designer must organize these controls in an effective and logical way



# 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

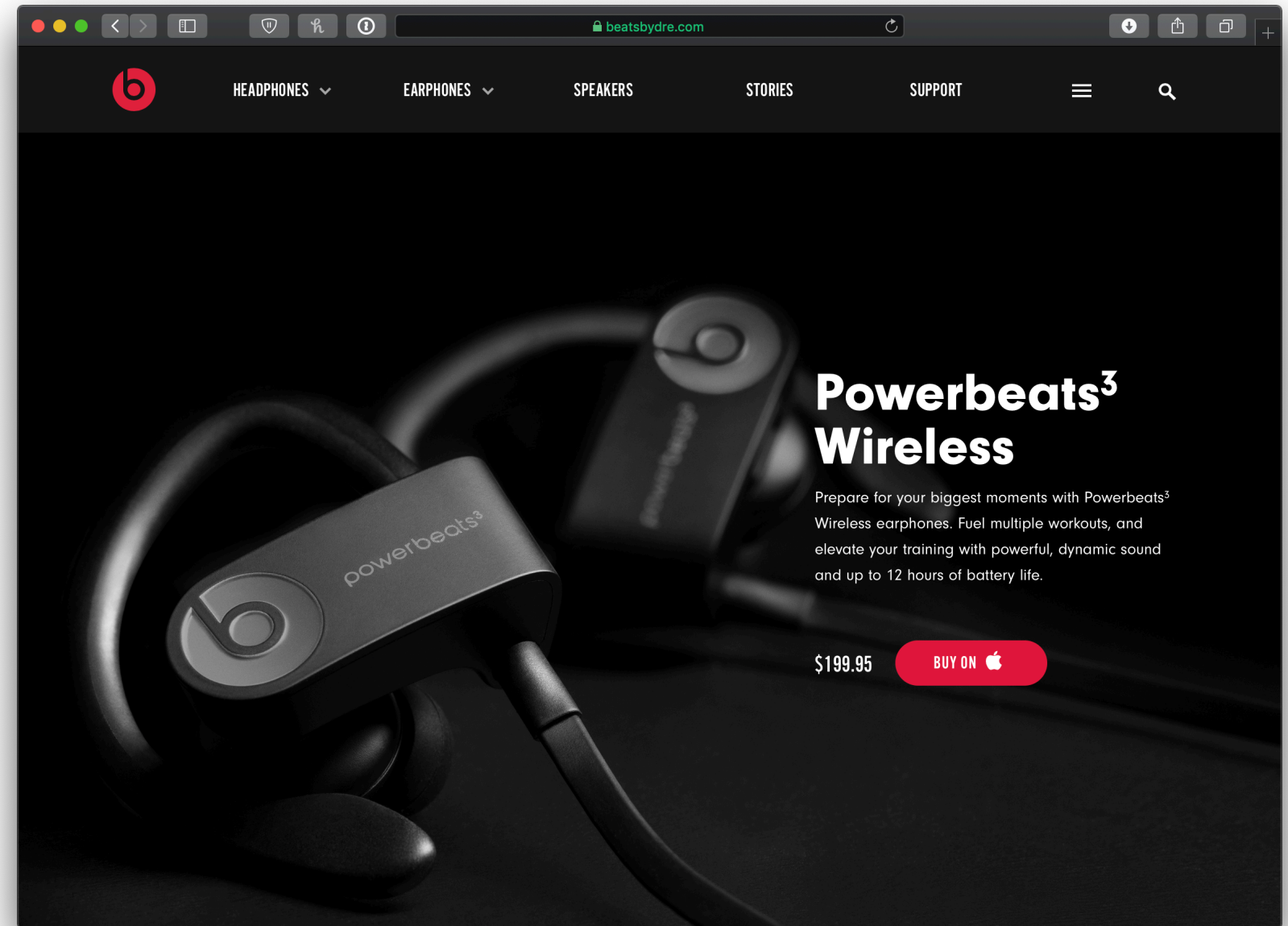
<sup>3</sup>These build on the visual design elements/principles that we covered last week.



# 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.



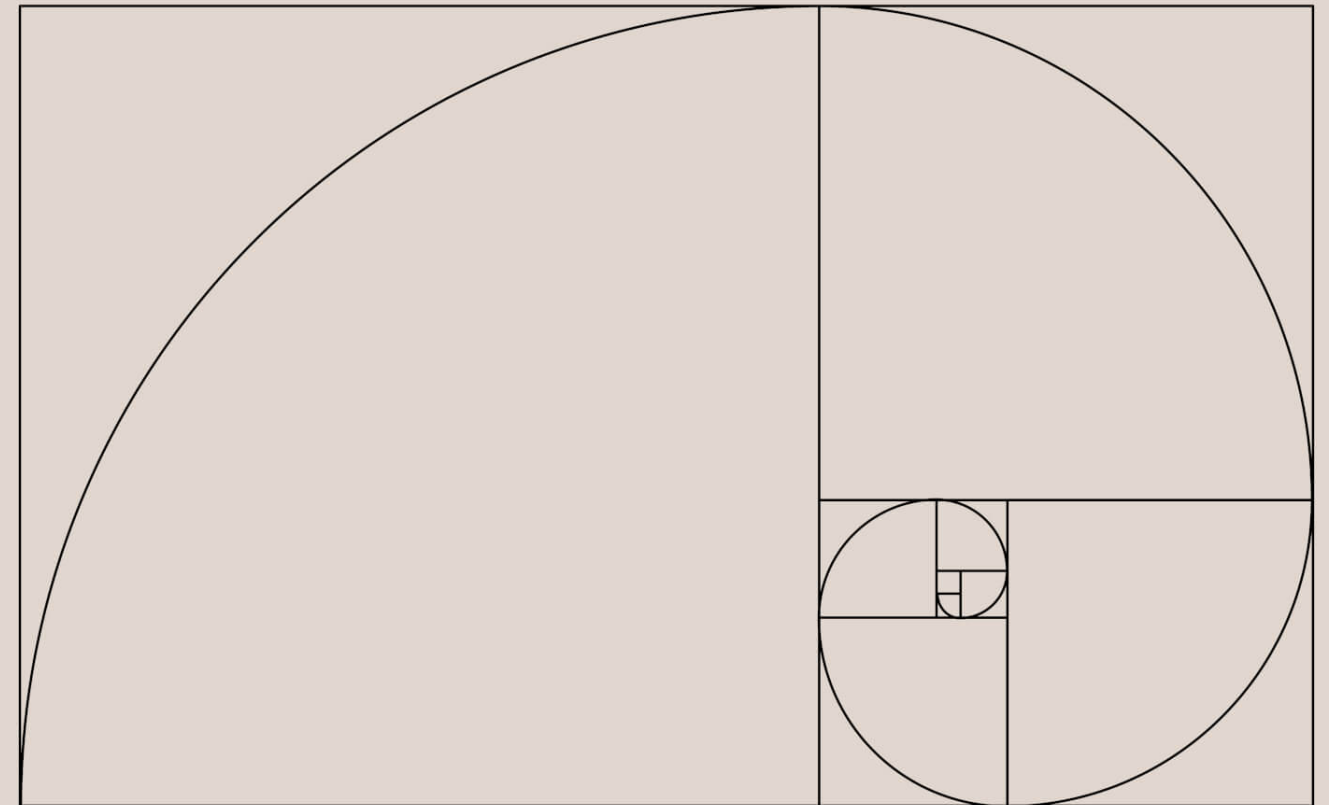


## Following the golden proportion<sup>4</sup>

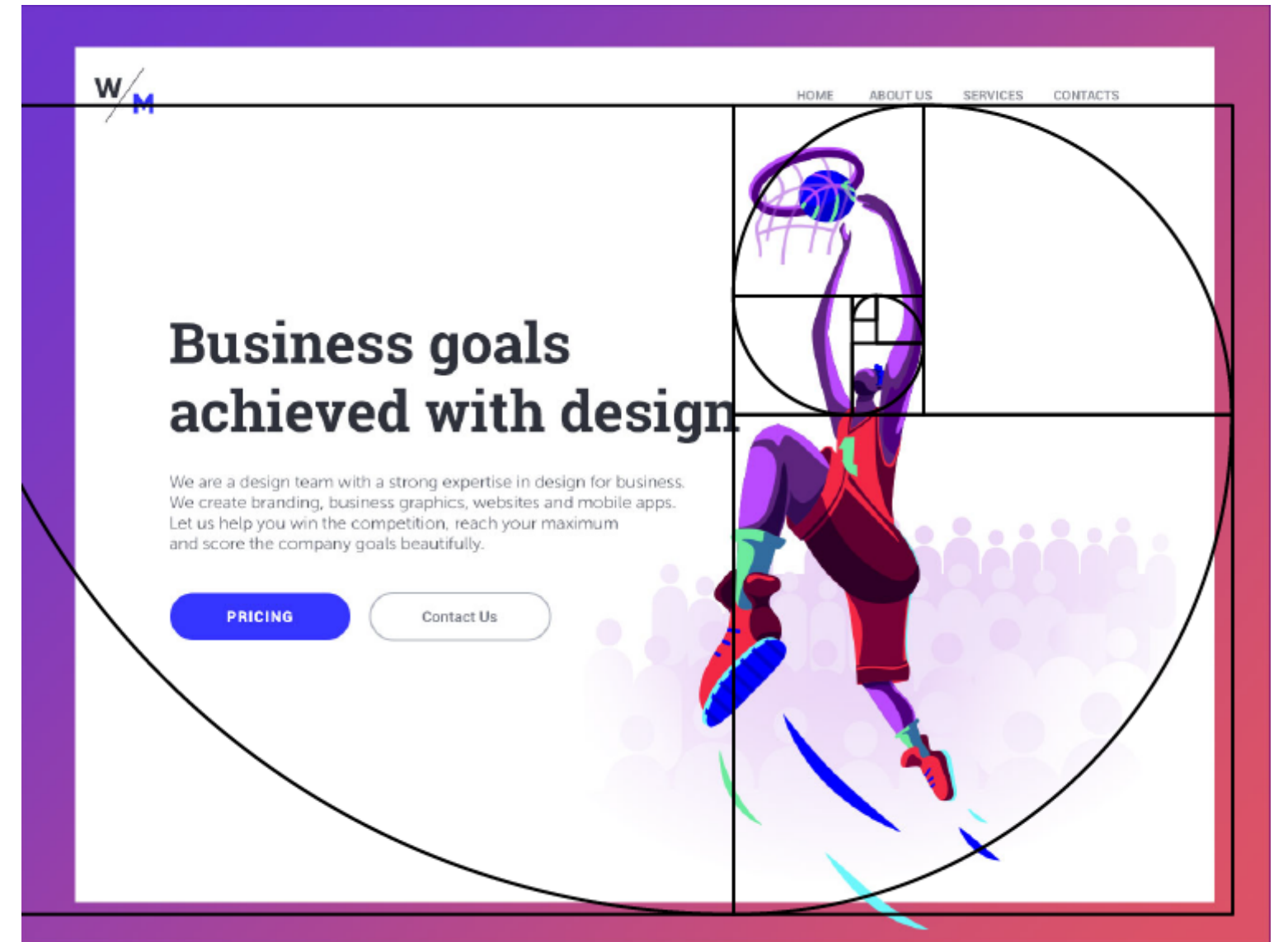
**Definition:** A ratio, 1:1.618, which creates a compositional grid that suggests an asymmetrical, but balanced placement of items on a layout and produces a universal aesthetic appeal.

<sup>4</sup>[Further reading on the golden ratio](#)

### The golden ratio



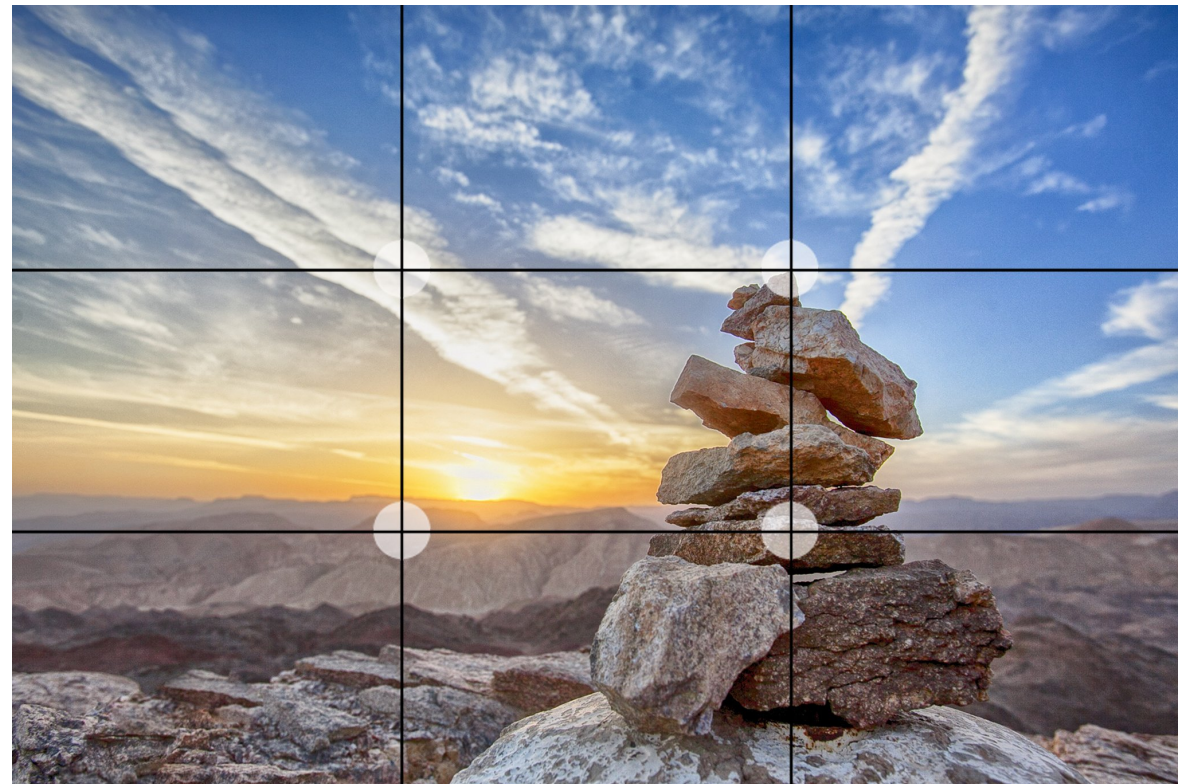
thesplashlab.com





## 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.

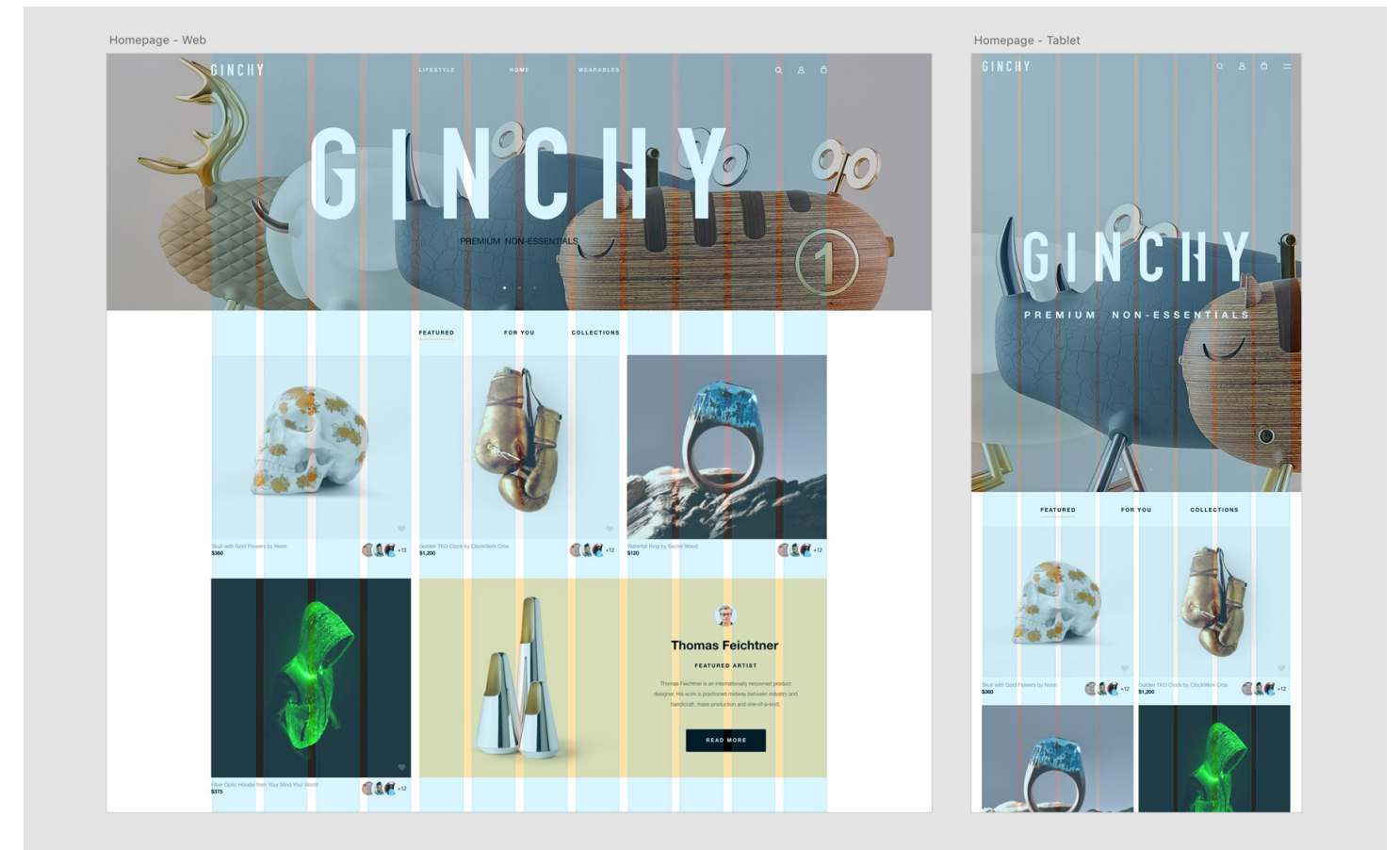
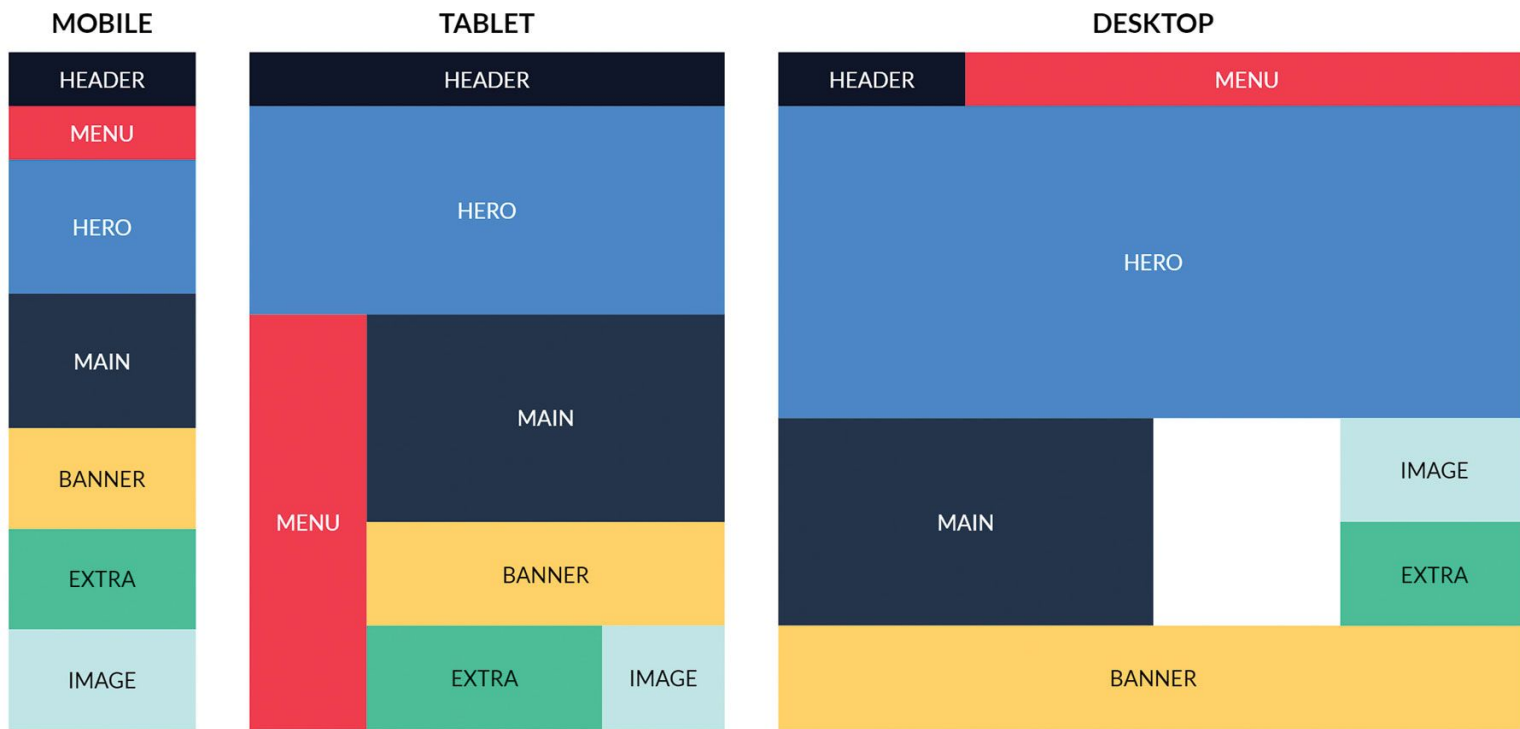


# Effectively using grids

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

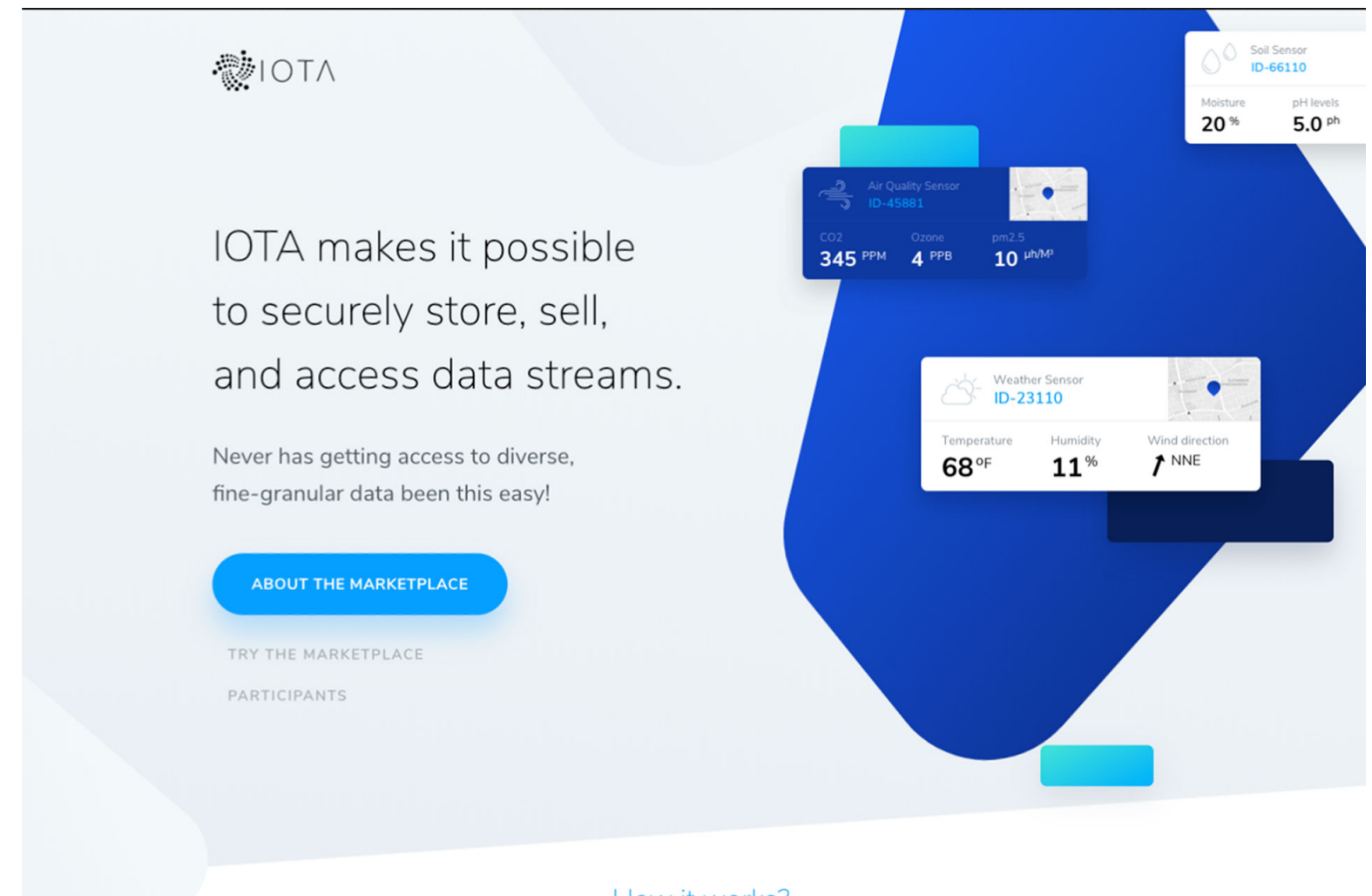






# Integrating type

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

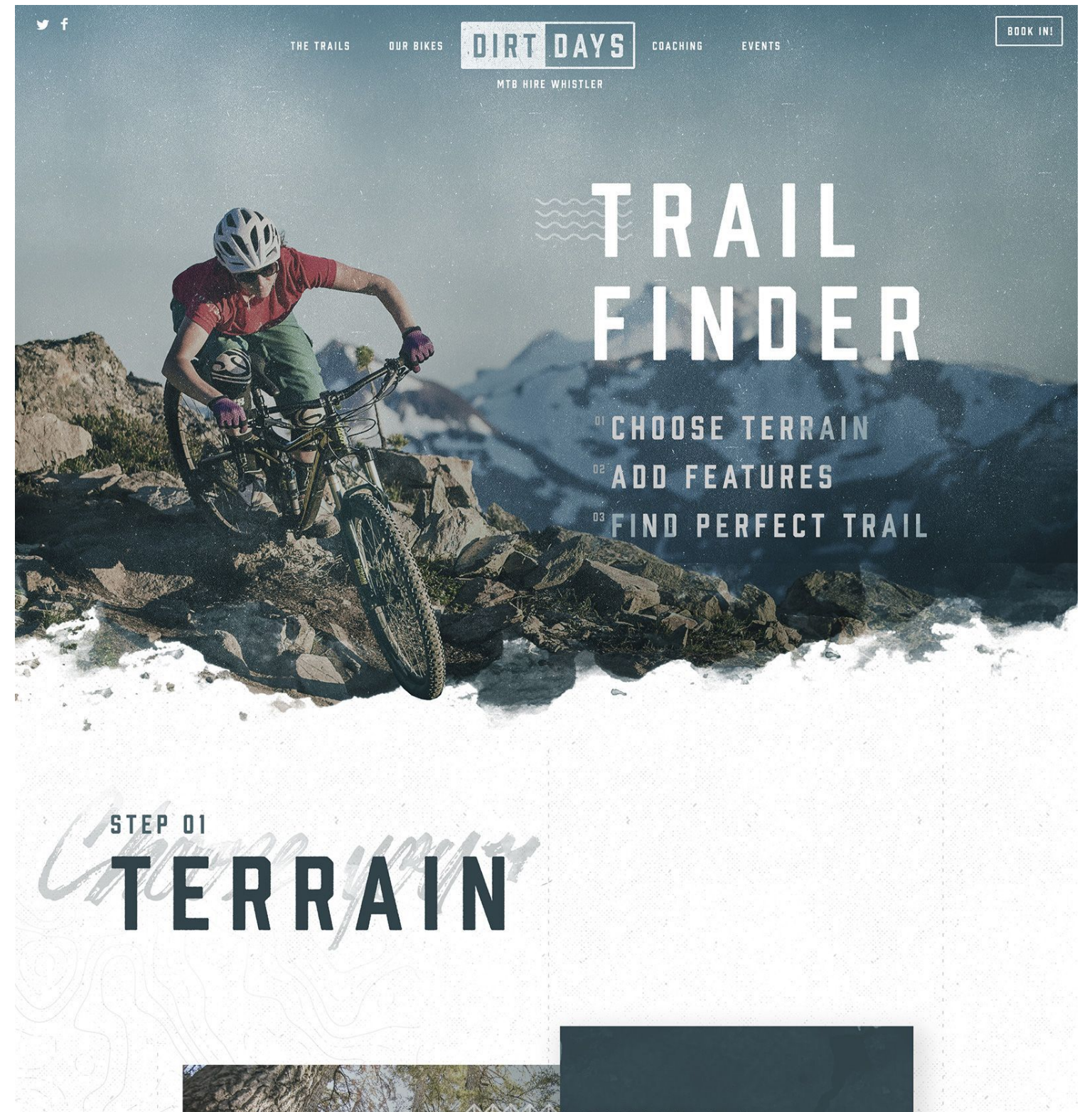




## Placing imagery

**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.





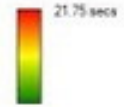
## Using negative space

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





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



## Extra gentle for the most sensitive skin.

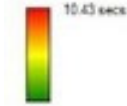
Sensitive skin is delicate. To soothe sensitive skin, add the chemicals and moisture of a diaper. If you have diaper rash.

Baby Wipes's 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.



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)

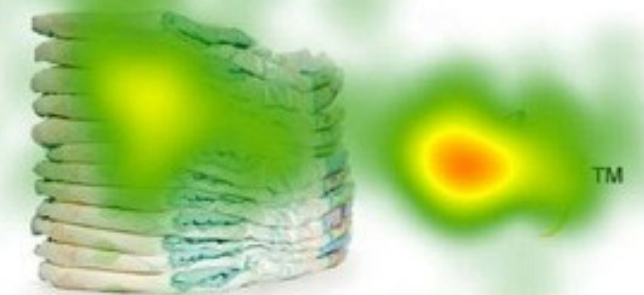
Participant filter: All



## Extra gentle for the most sensitive skin.

Sensitive skin is delicate. To soothe sensitive skin, add the chemicals and moisture of a diaper. If you have diaper rash.

Baby Wipes's 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.



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)

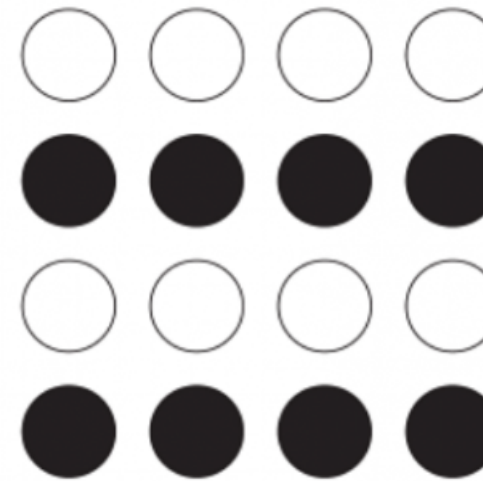
# Grouping using Gestalt Theory

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

Includes four key principles:

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

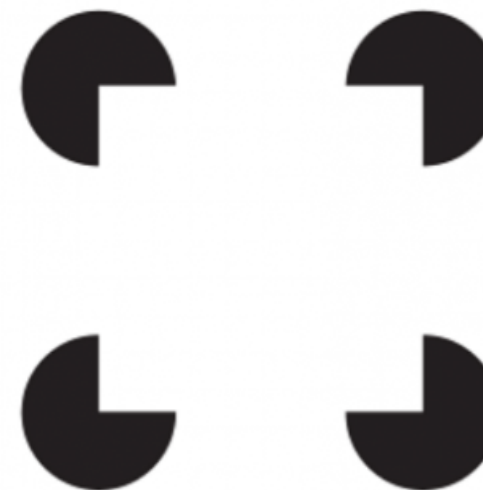
## Similarity



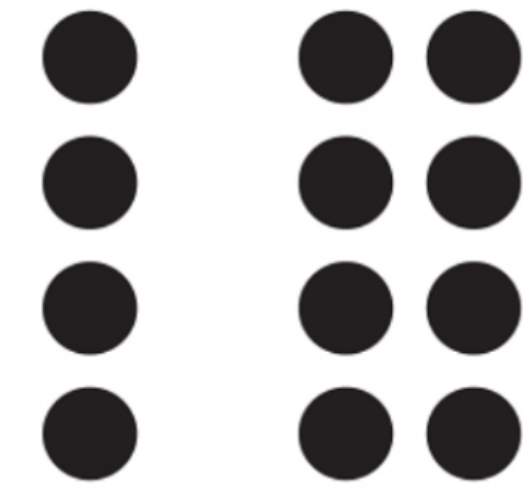
## Continuity



## Closure



## Proximity



### 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

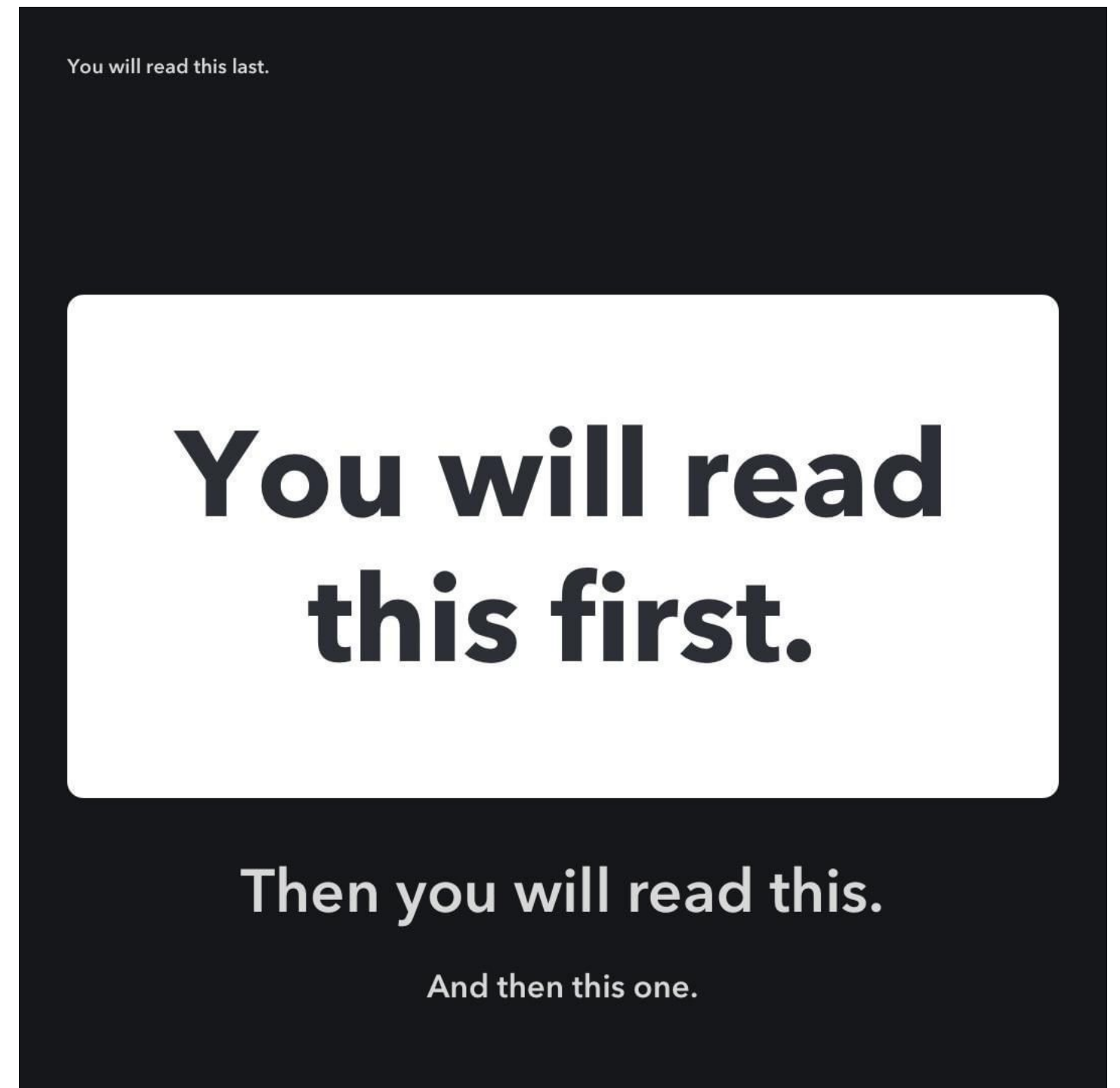
The gestalt principle at work here is that closure occurs when an object is incomplete or a space is not entirely enclosed. Provided enough of the shape is indicated, we perceive the object as whole by filling in the information that is absent, thus completing the circle.

### 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

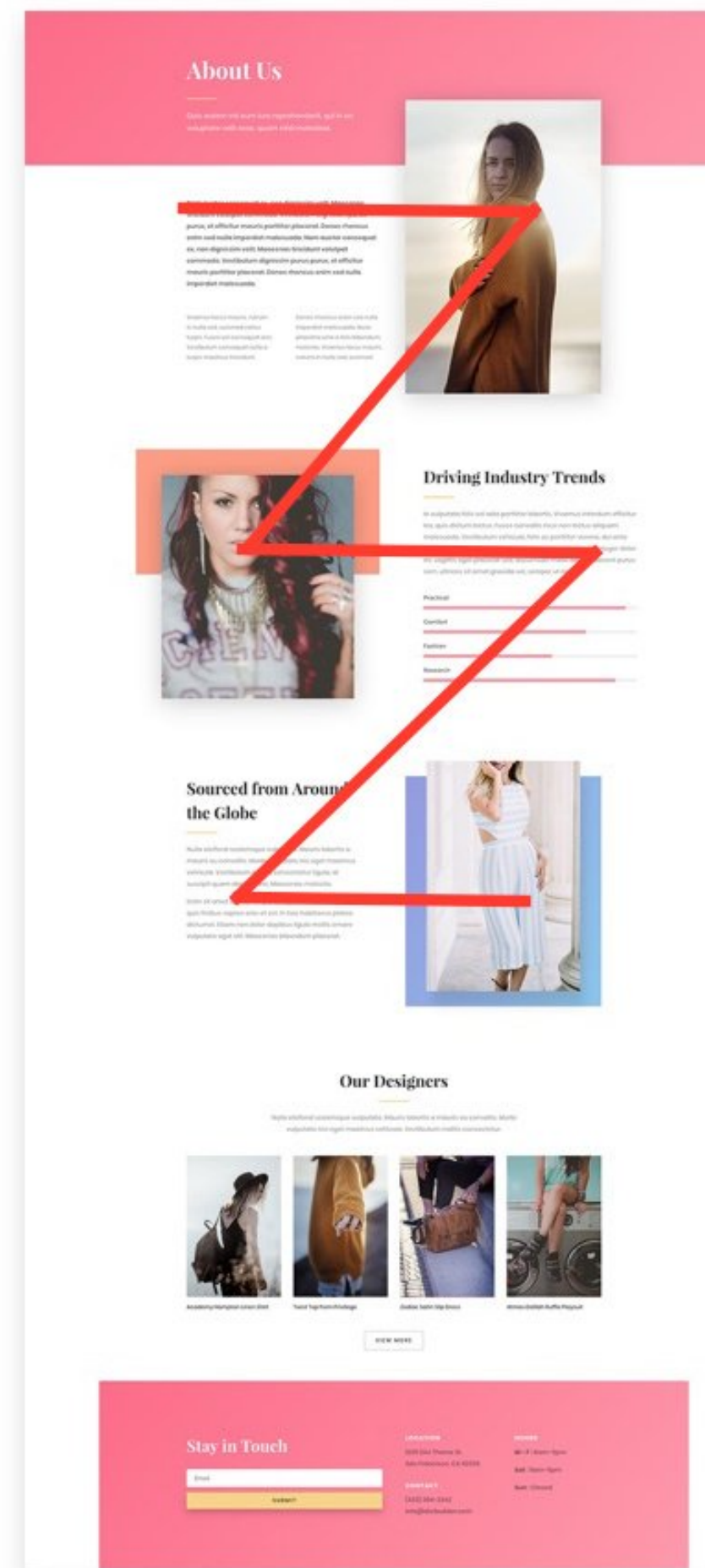
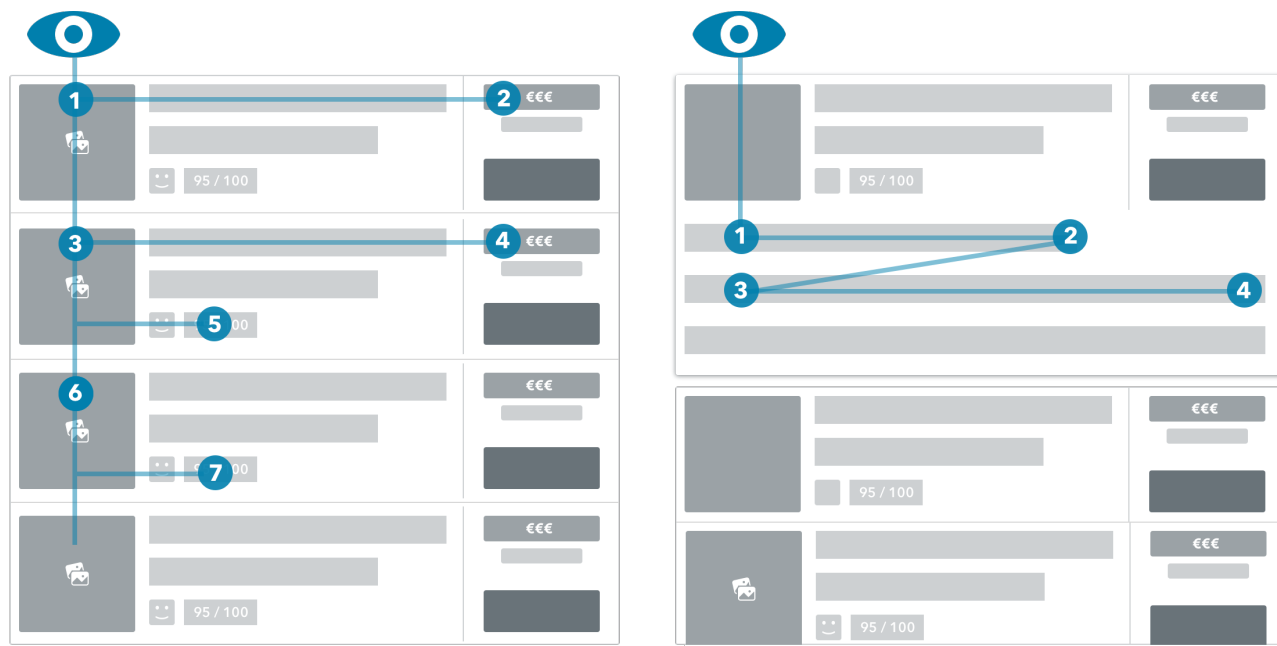
**Definition:** Using relative positioning and sizing to communicate what design elements are more important and should be looked at first.





# Exploiting visual scan patterns

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



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.<sup>1</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>1</sup> email and text of the suspicious activity.<sup>1</sup>



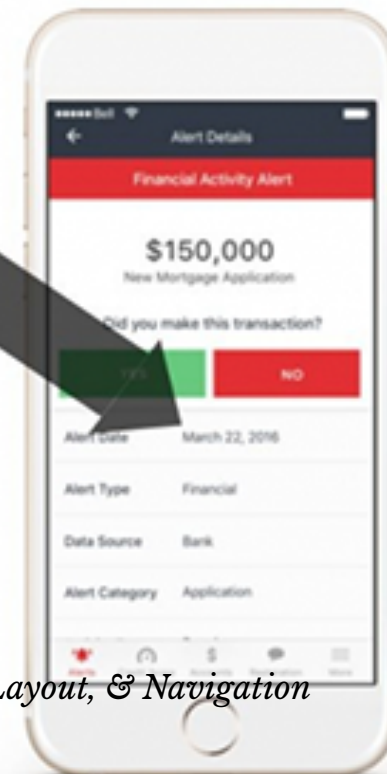
### RESTORE

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>2</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>1</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

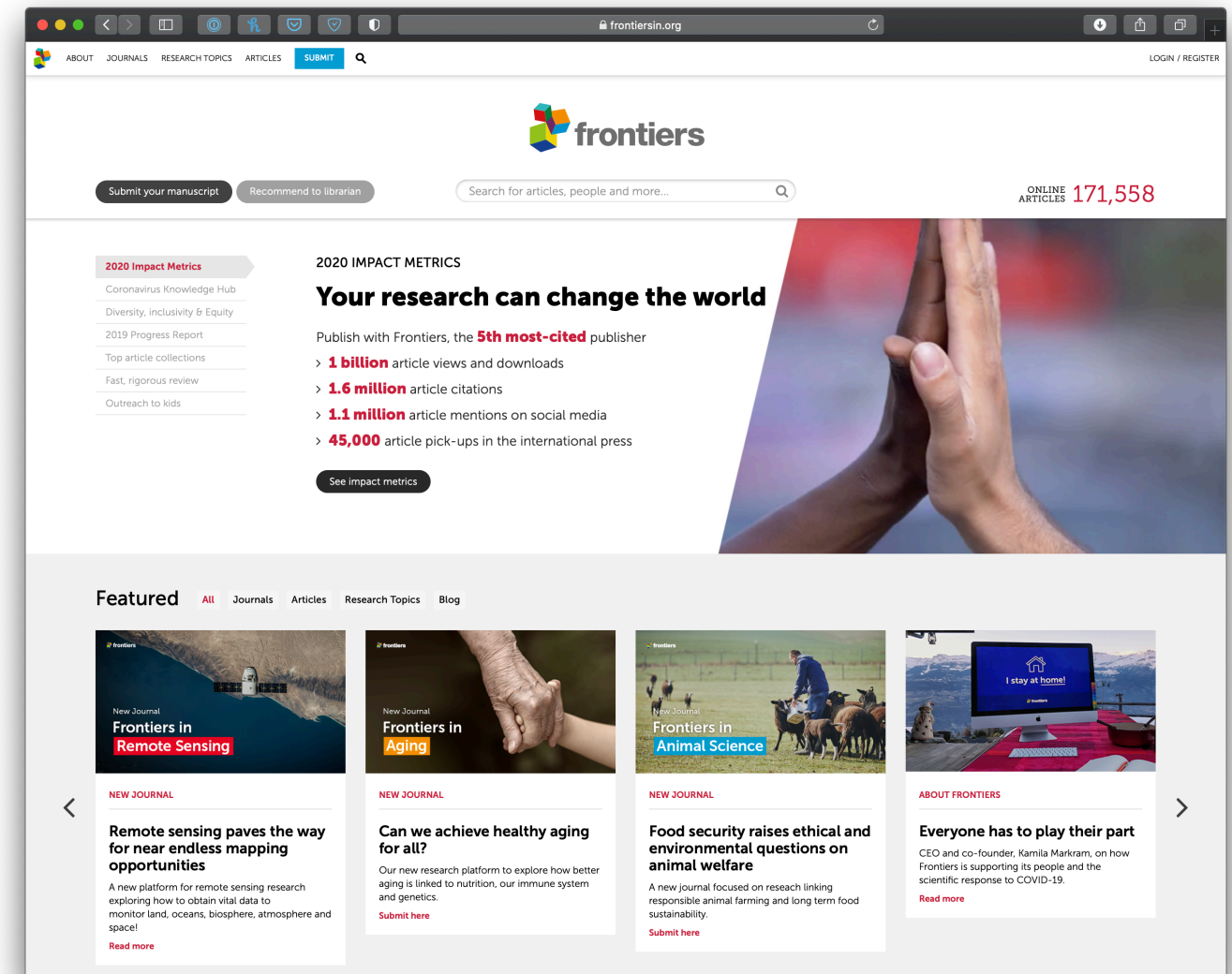
<sup>5</sup> Golombisky & Hagen, 2010, *White space is not your enemy*



# 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*



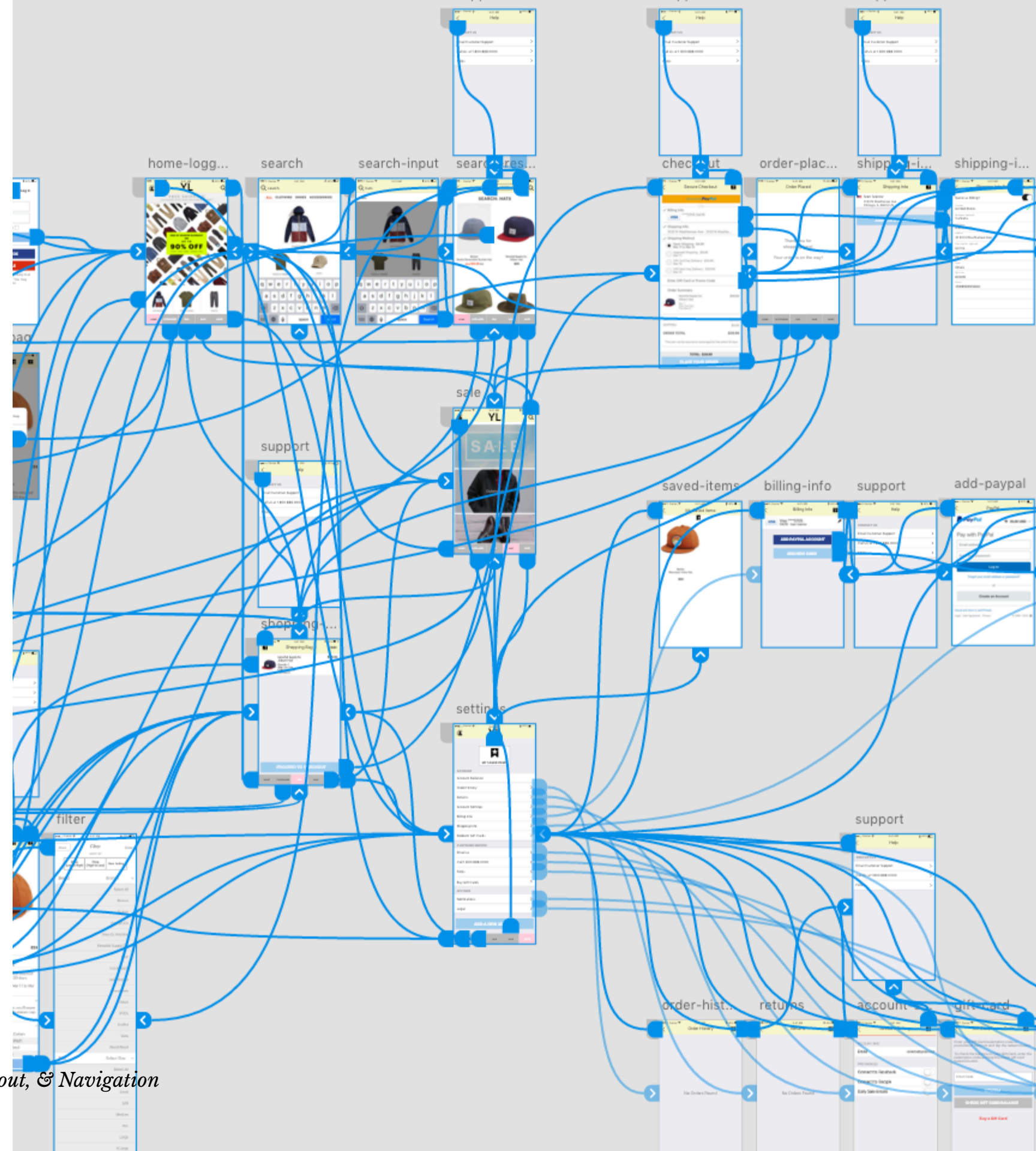
\* Google form



# Principles of Navigation

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

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



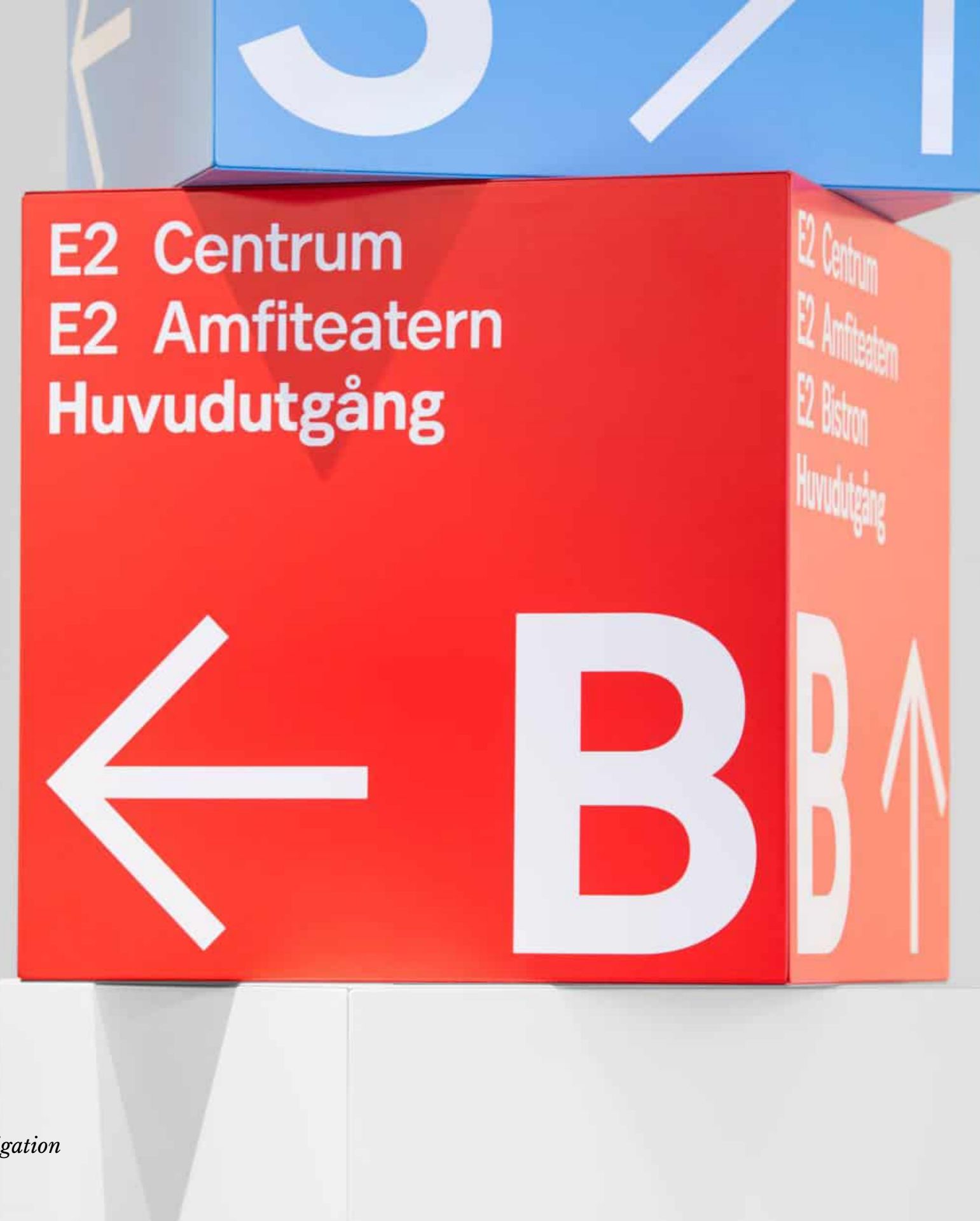
<sup>6</sup>Tidwell, 2010, *Designing Interfaces*

# 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

## 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  
CART
- 2  
INFORMATION
- 3  
SHIPPING
- 4  
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

Is this wrong? [Change here](#)

### ESTIMATION

Order	\$137.19
Shipping	\$0.00
Discount	\$0.00
Tax	\$10.00

**TOTAL**  
**\$147.19**

GO TO PAYMENT METHOD →

Home & Kitchen



Hello, Sign in

Account & Lists

Orders

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

Room Discover Shop by Style Home Décor Furniture Kitchen & Dining Bed & Bath



## Shop Cookware Sets

amazonbasics  
Shop now

Home & Kitchen > 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"

Get the Best Deal

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 \$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 & FREE Shipping. Details & FREE Returns  
Want it? Order with Amazon's Choice. Choose from 100+ brands. Check out.

In Stock  
Qty: 1



Ships from Amazon.com. Corporate governance report. Amazon.com

Item available. Choose from 100+ brands. Packaging details.

Prime members enjoy exclusive deals. Winnie the Pooh. Click on today's delivery.

Add to list

Select



# SITEMAP

Monki  
H&M HOME  
& Other Stories  
ARKET  
Afound

## Career

Grow with us  
Be yourself

## Enjoy our culture

More about our values  
Be proud

## Lead the way

Randall April, H&M  
Andreas Sjunnesson, Weekday  
Anna Norling, Cheap Monday  
Michael Hafner, Monki  
Sofia Carpentier, & Other Stories  
Helene Fredell, H&M Home

## Stylish rewards

H&M Incentive Program  
Find your career with us

## Sustainability

### Vision and strategy

Sustainability strategy  
Stakeholder engagement

Animal welfare  
Chemicals  
Climate positive value chain  
Water  
Business ethics

## Get involved

Care for your clothes  
Recycle your clothes  
Sustainability Summary 2017

## 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  
Social media  
Media contacts

## 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





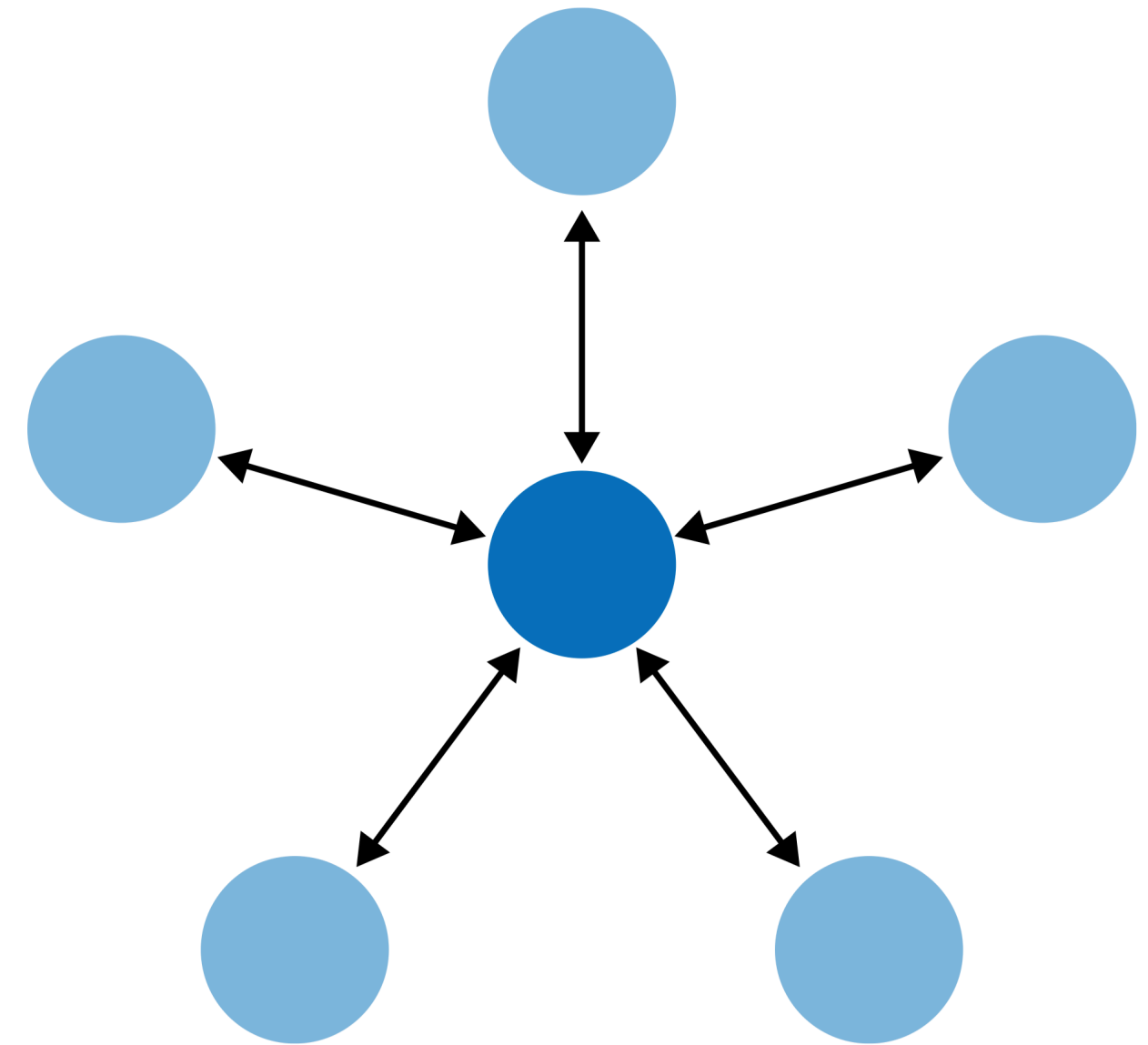
## Models

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

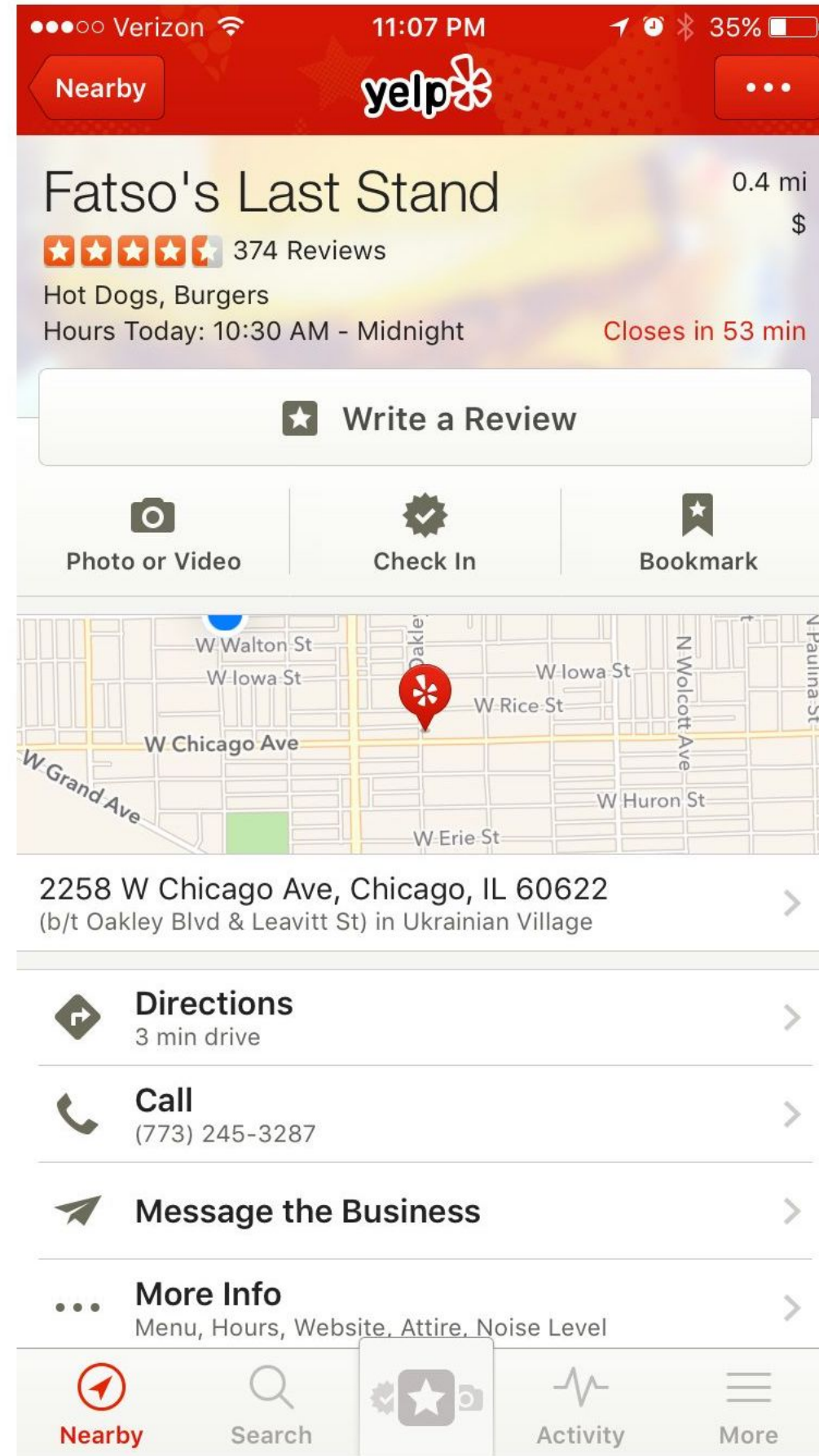
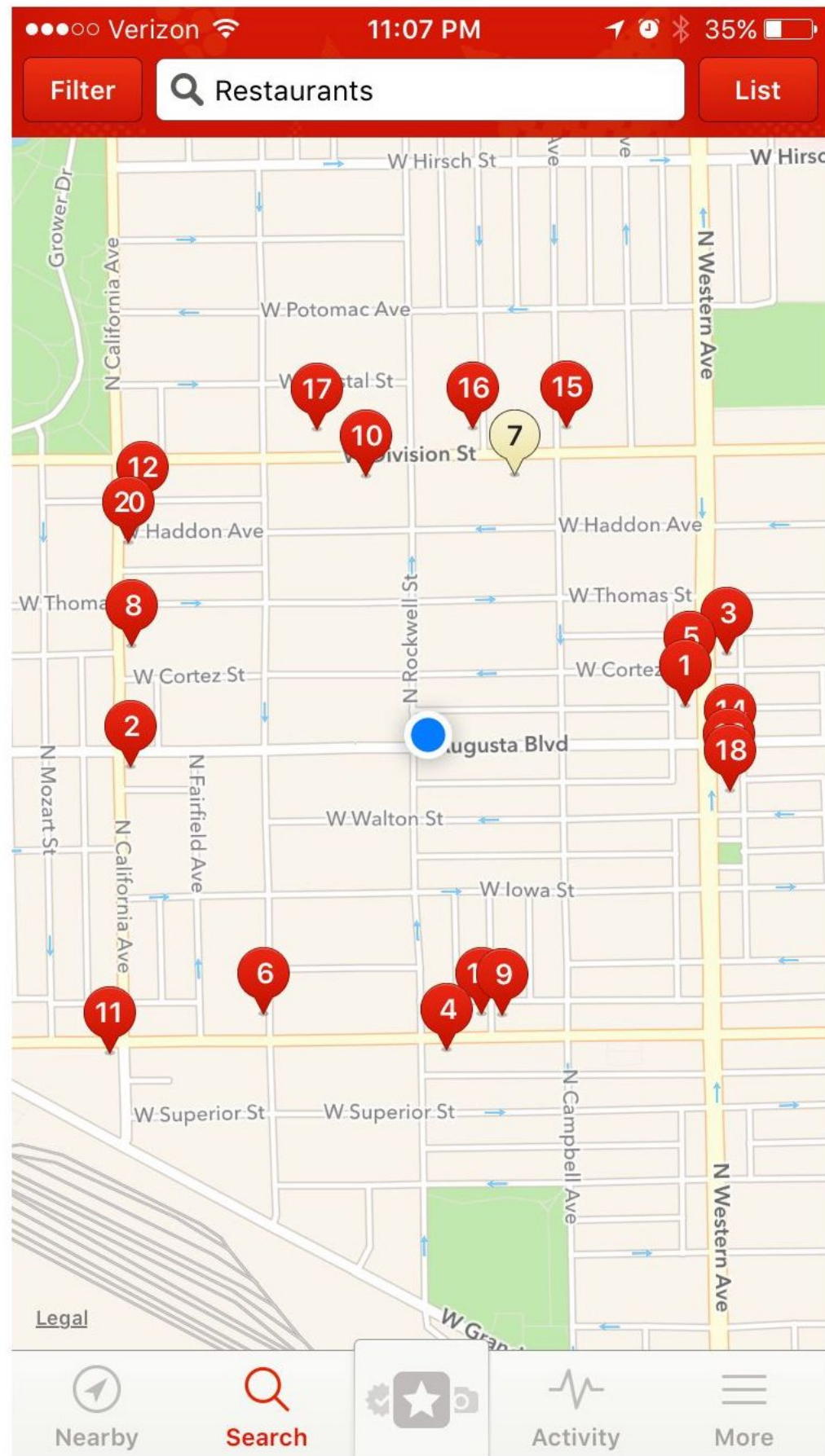
1. Hub and spoke
2. Fully connected
3. Multi-level
4. Stepwise
5. Pyramid
1. Pan-and-zoom
2. Flat navigation
3. Modal panel
4. Clear entry points
5. Bookmarks
6. Escape hatch

## Models: Hub & spoke

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

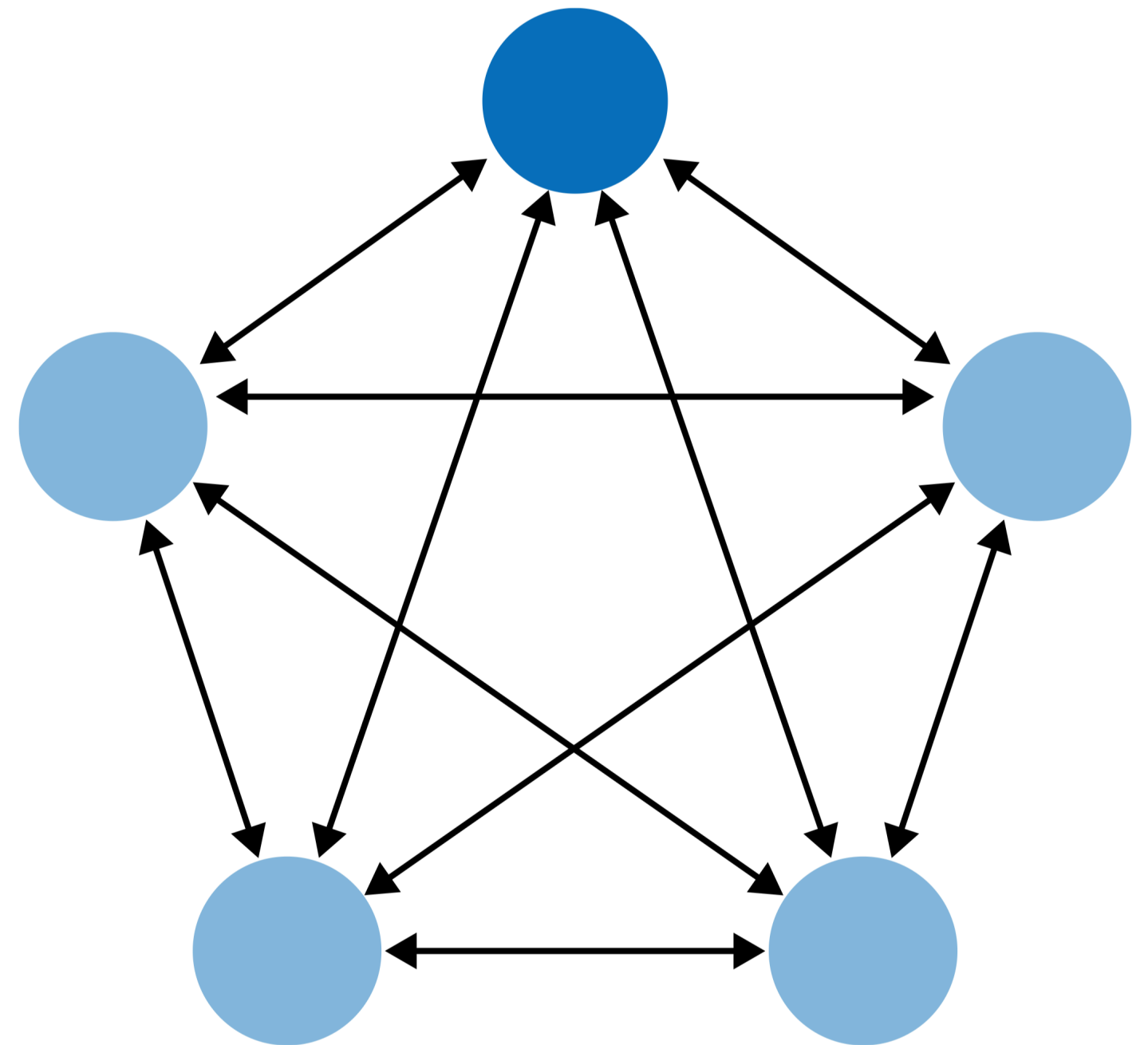






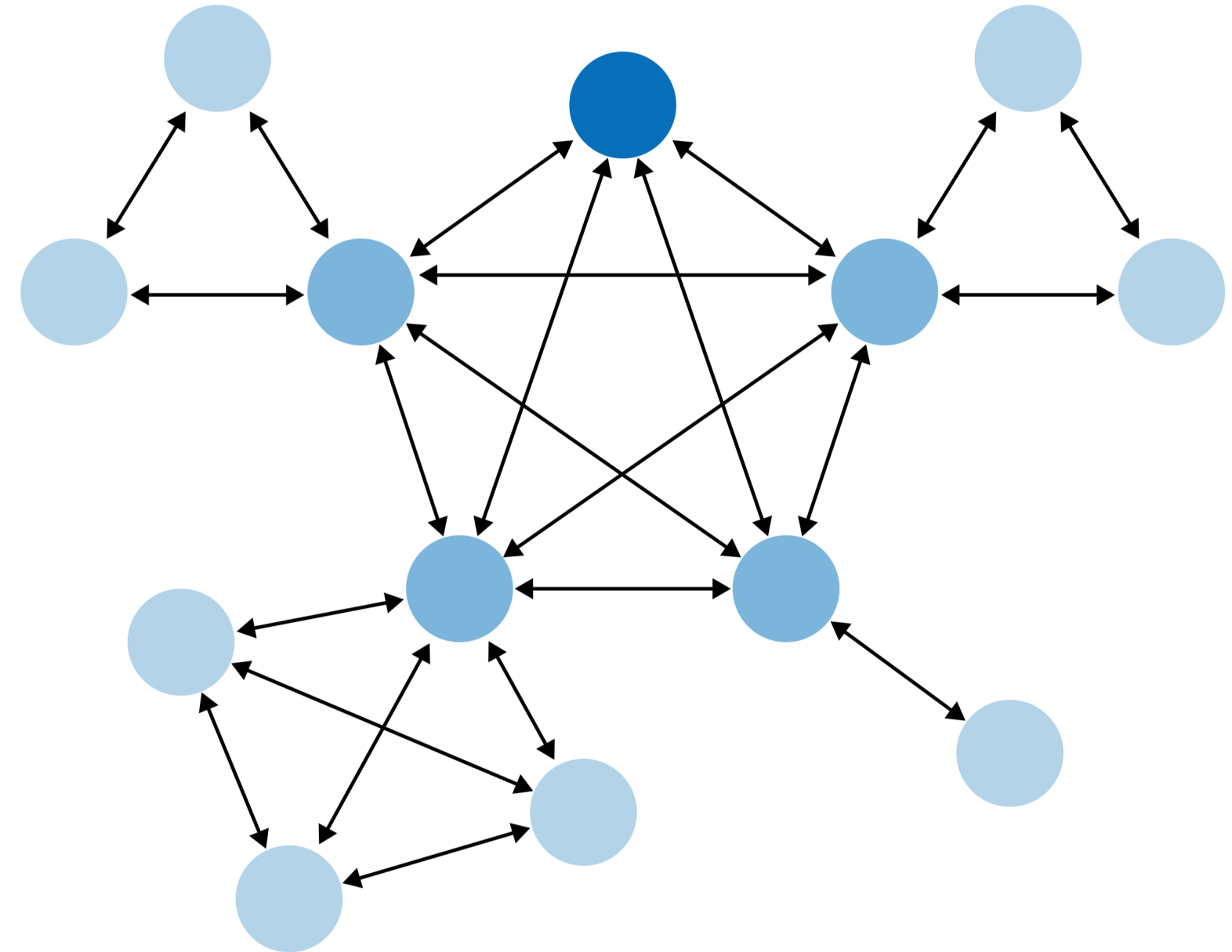
## Models: Fully connected

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



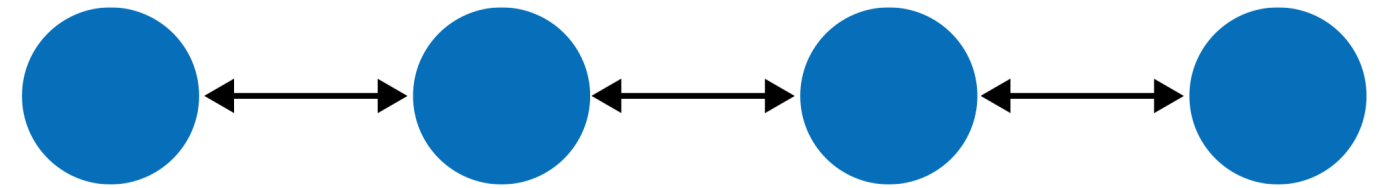
## Models: Multi-level

**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** [What does this mean?](#)

### Legal name

[What is a legal name? ▸](#)

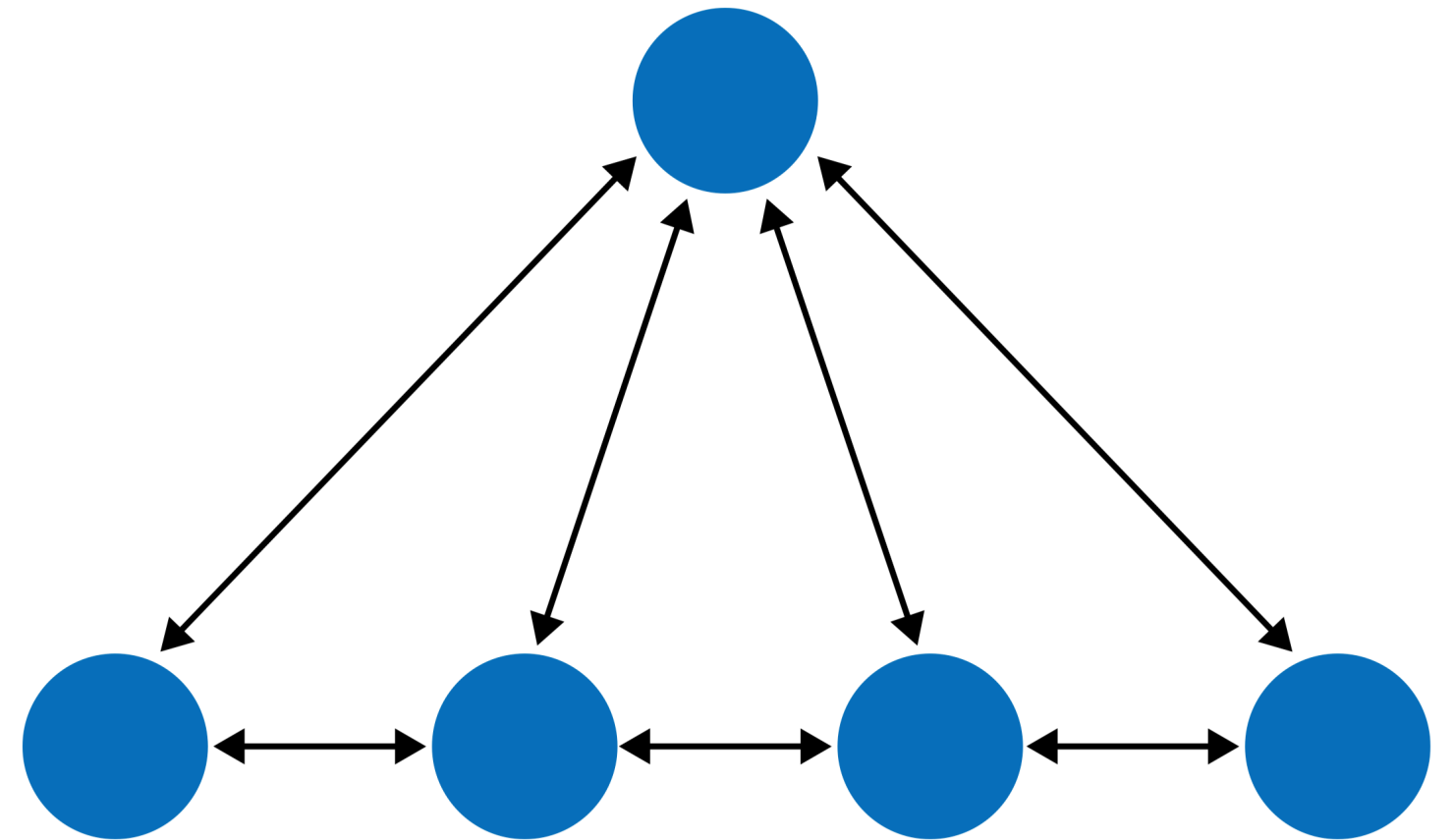
### Seller agreement

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.



\$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

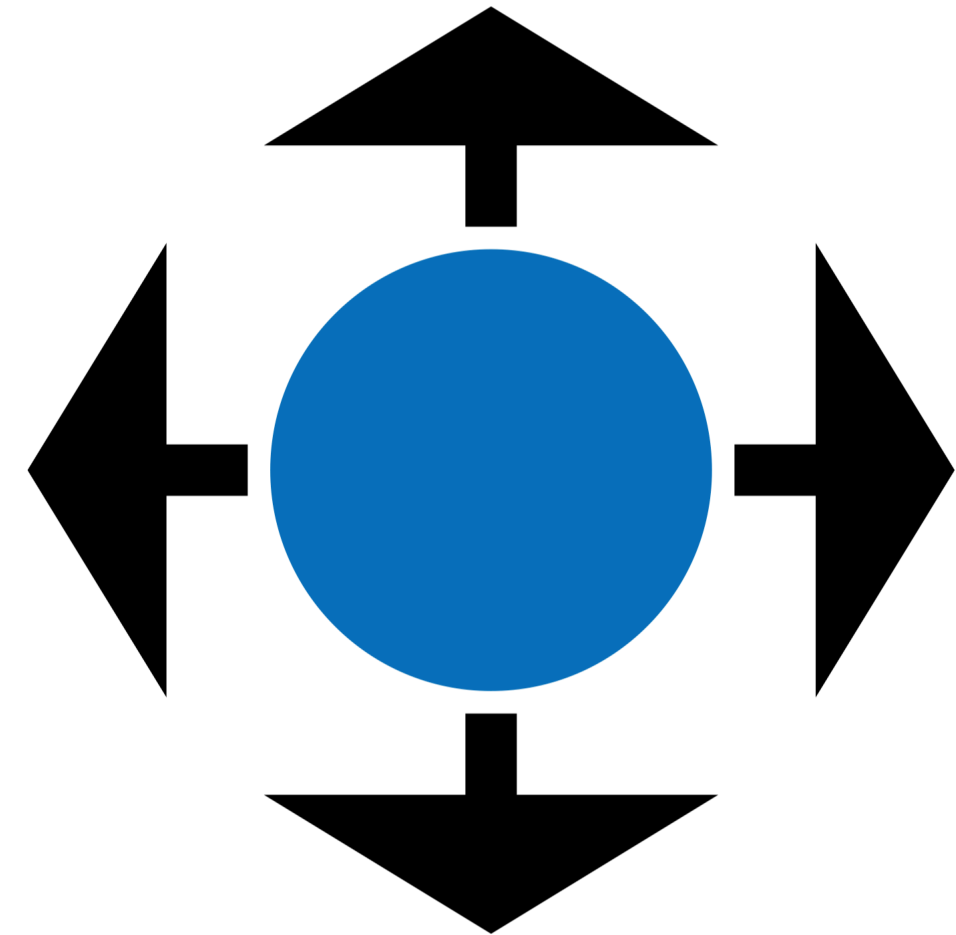
< Back

Continue

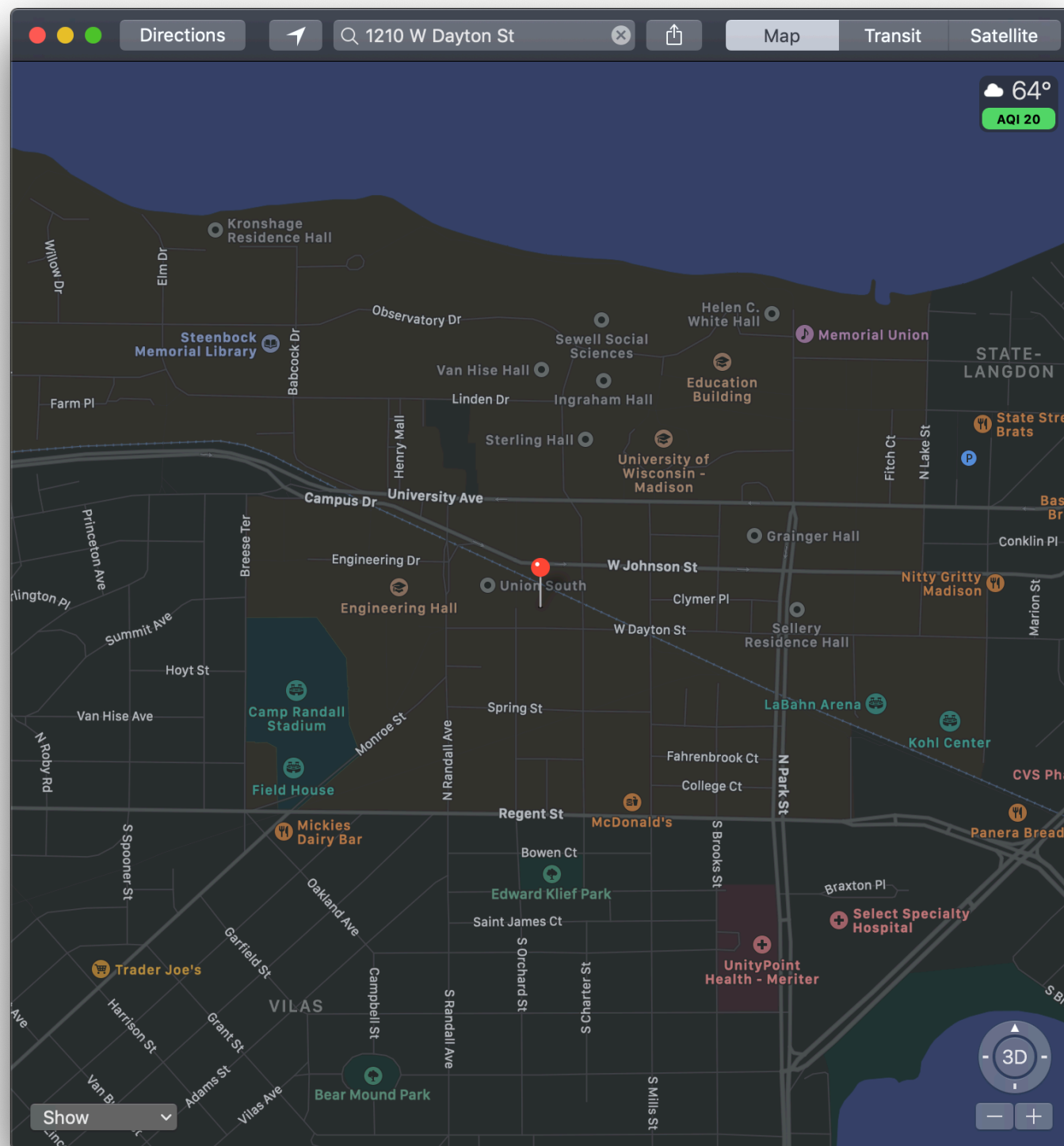


## Models: Pan-and-zoom

**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.

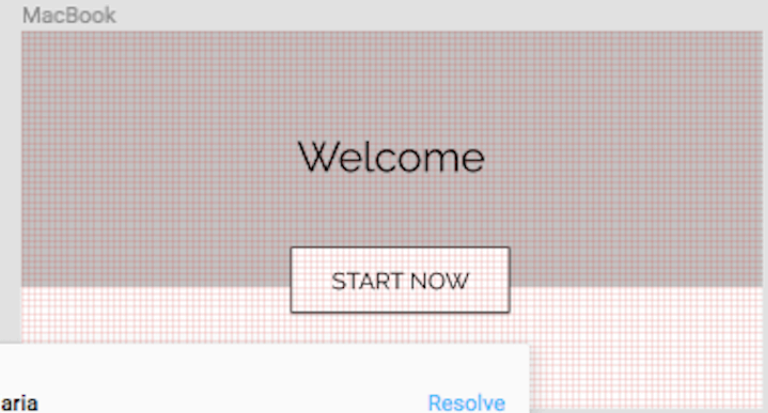
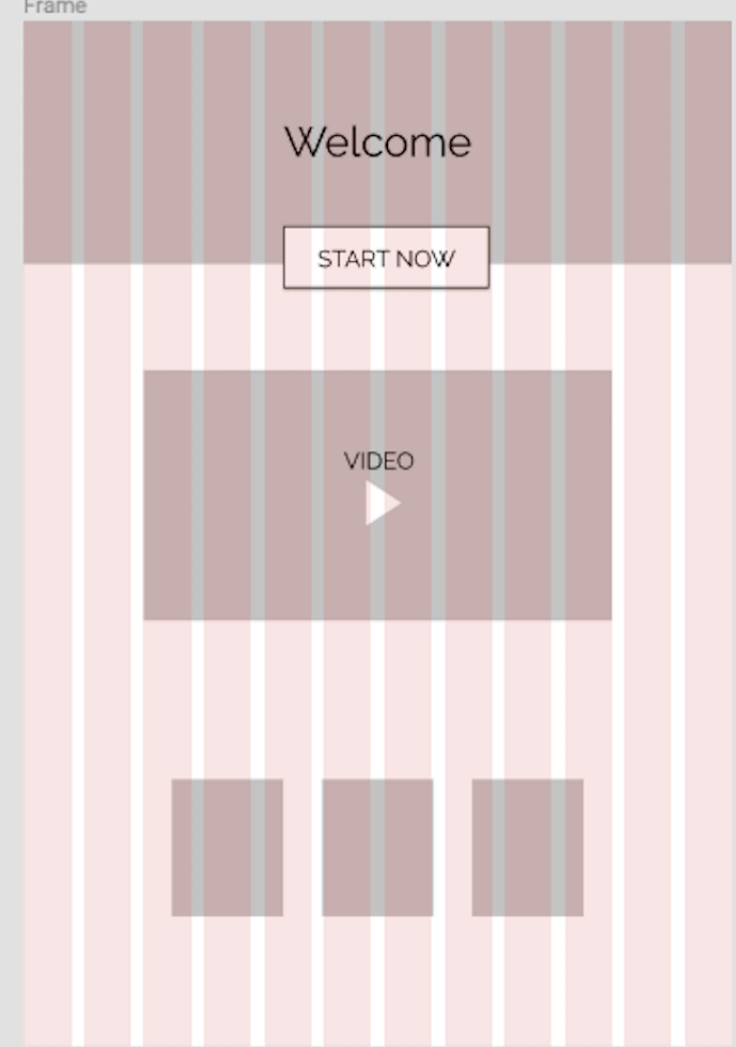
Cras eu scelerisque enim. Sed id diam pharetra, gravida lectus at, maximus nisl. Curabitur eu magna imperdiet, accumsan purus id, faucibus neque. Praesent quam mauris, tincidunt in turpis et, posuere porttitor justo. Donec in dignissim risus. Sed ut ultricies orci, nec pharetra ante. Sed quis ex augue. 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.

- MacBook
  - Header
    - Button
    - Welcome
    - Rectangle 2
- iPhone X
  - Button
    - START NOW
    - Rectangle 3
  - Welcome
  - Rectangle 2
  - Group
    - Polygon
    - VIDEO
    - Rectangle 3
- Frame
  - Group



Comment from Maria: "Let's add some UI elements to make it clear that they should scroll down further. 😊"

Reply from Maria: |

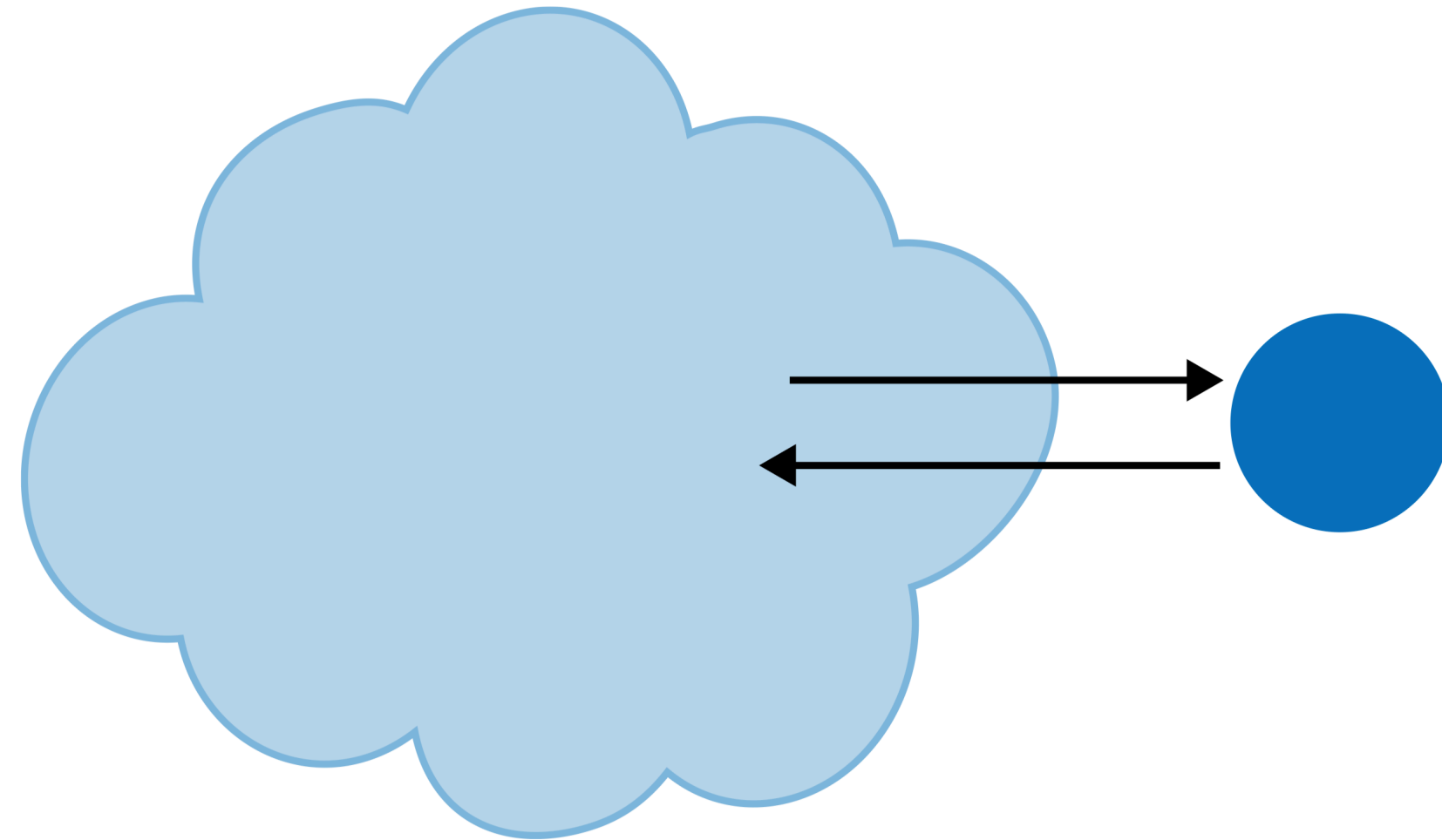
Buttons: Cancel, Reply

- COMMENTS
- Show Resolved Comments
  - Receive email notifications

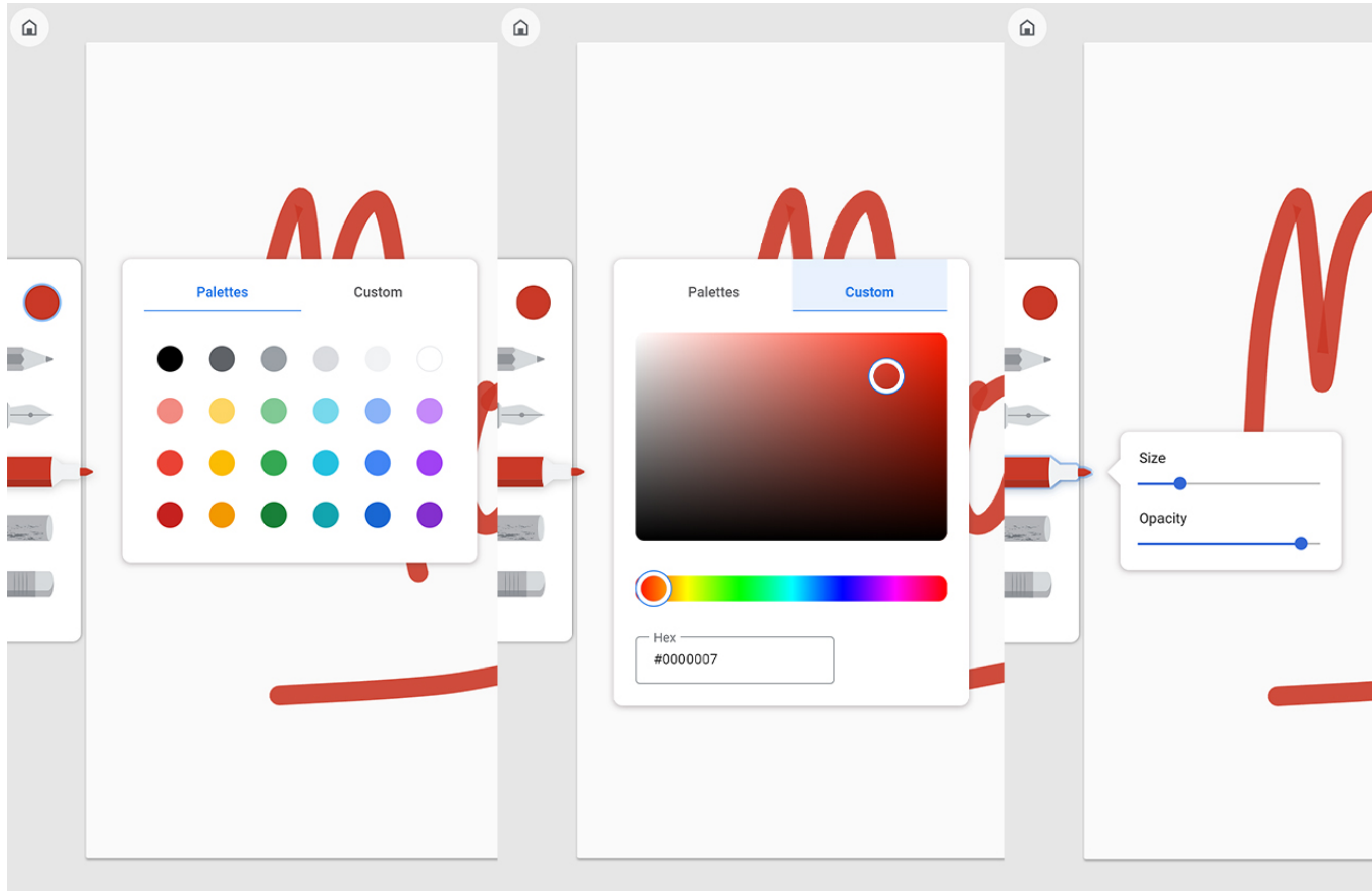
- Page 1
- 3 Maria, a few seconds ago  
Let's add some UI elements to make it
  - 2 Maria, 26 minutes ago  
This is cool.
  - 1 Maria, 39 minutes ago  
This should be a color-branded button

## Models: Modal panel

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

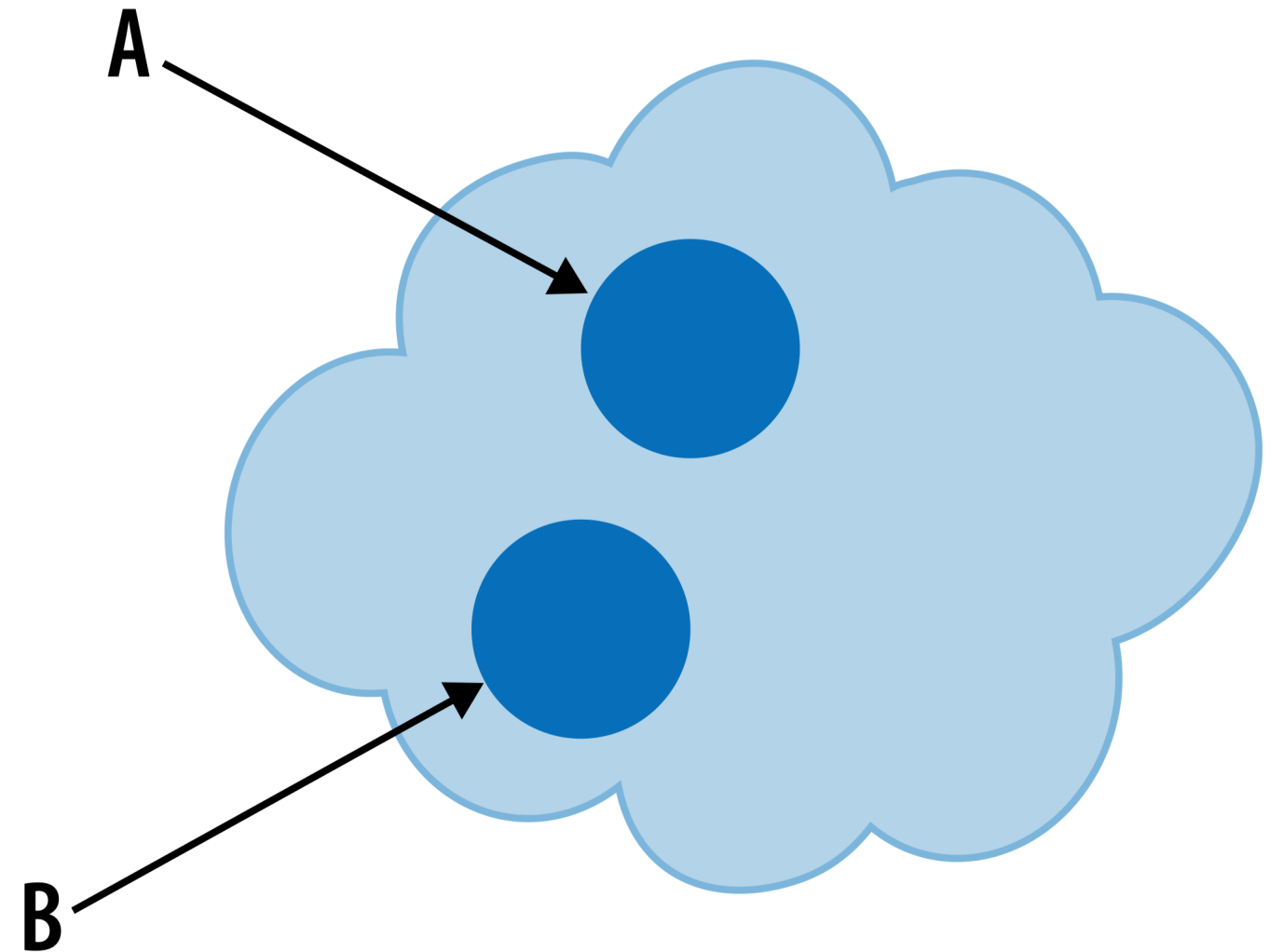






## Models: Clear entry points

**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.



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The client  [Add/remove people](#)

**Message Board**

- Retouched team photos**  
FYI — Hey Victor, here's 5
- Logo concept**  
Question — Hey Victor, 14
- Ad comps**  
Hey all, take a look at these and
- Campaign ideas**  
Here's a few thoughts I had
- Raw shots from the shoot**  
Here's a few shots from the 9

**To-dos**

**Requests**

- Company logo Victor

**Business cards**

- finalize overall design Jul 23 Annie B.
- create press-ready files Annie B.
- send to printer Jul 29
- photograph cards for portfolio

**Group Chat**

Hey Victor, is 1:00 still to...

**Victor** 3:47pm  
Sure is!

**Victor** 3:48pm  
Mind if we grab sushi inste...

**Victor** 3:48pm  
I've got a fever and the only...

...

**Adam** 3:51pm  
Ha! Sounds great.


apple.com

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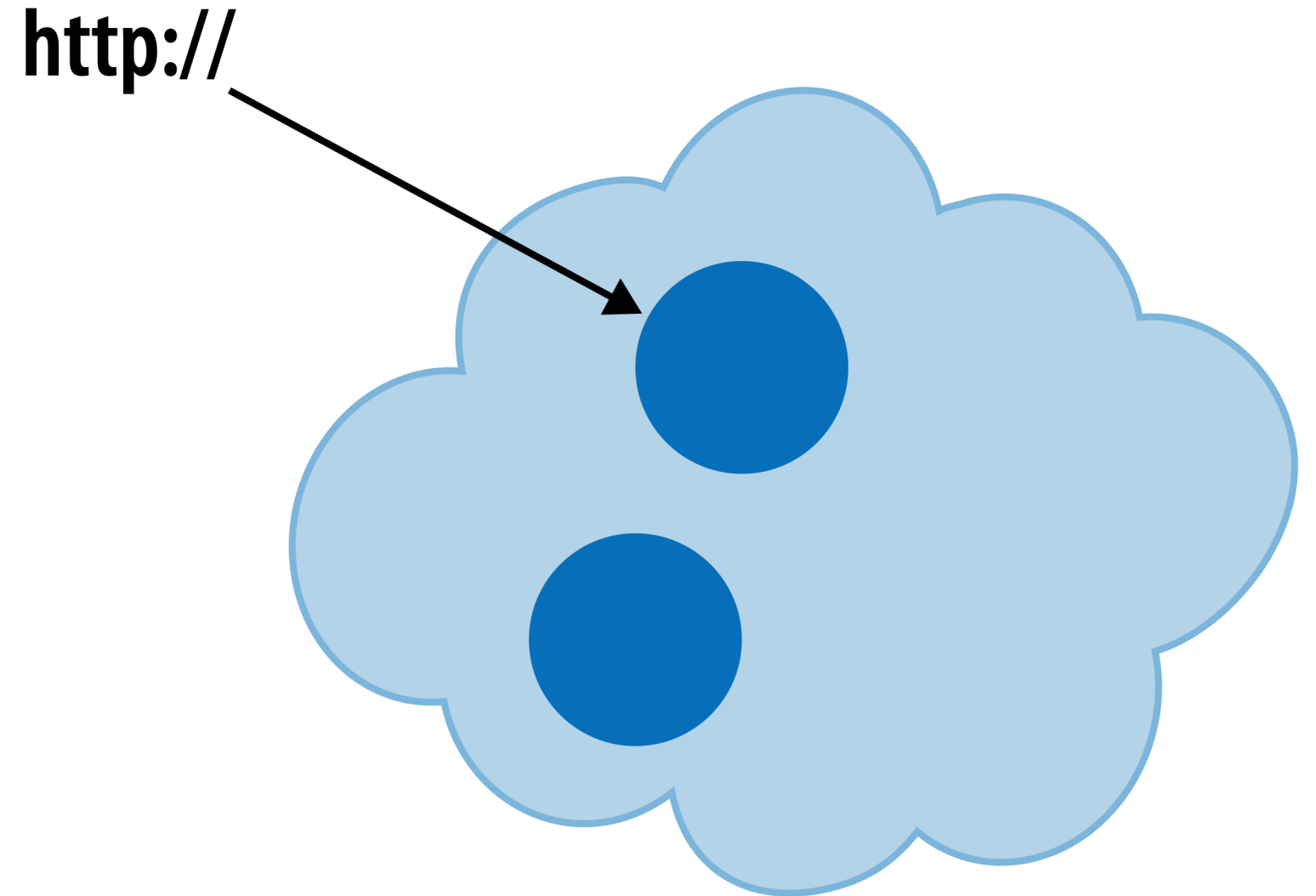


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## Models: Bookmarks

**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*

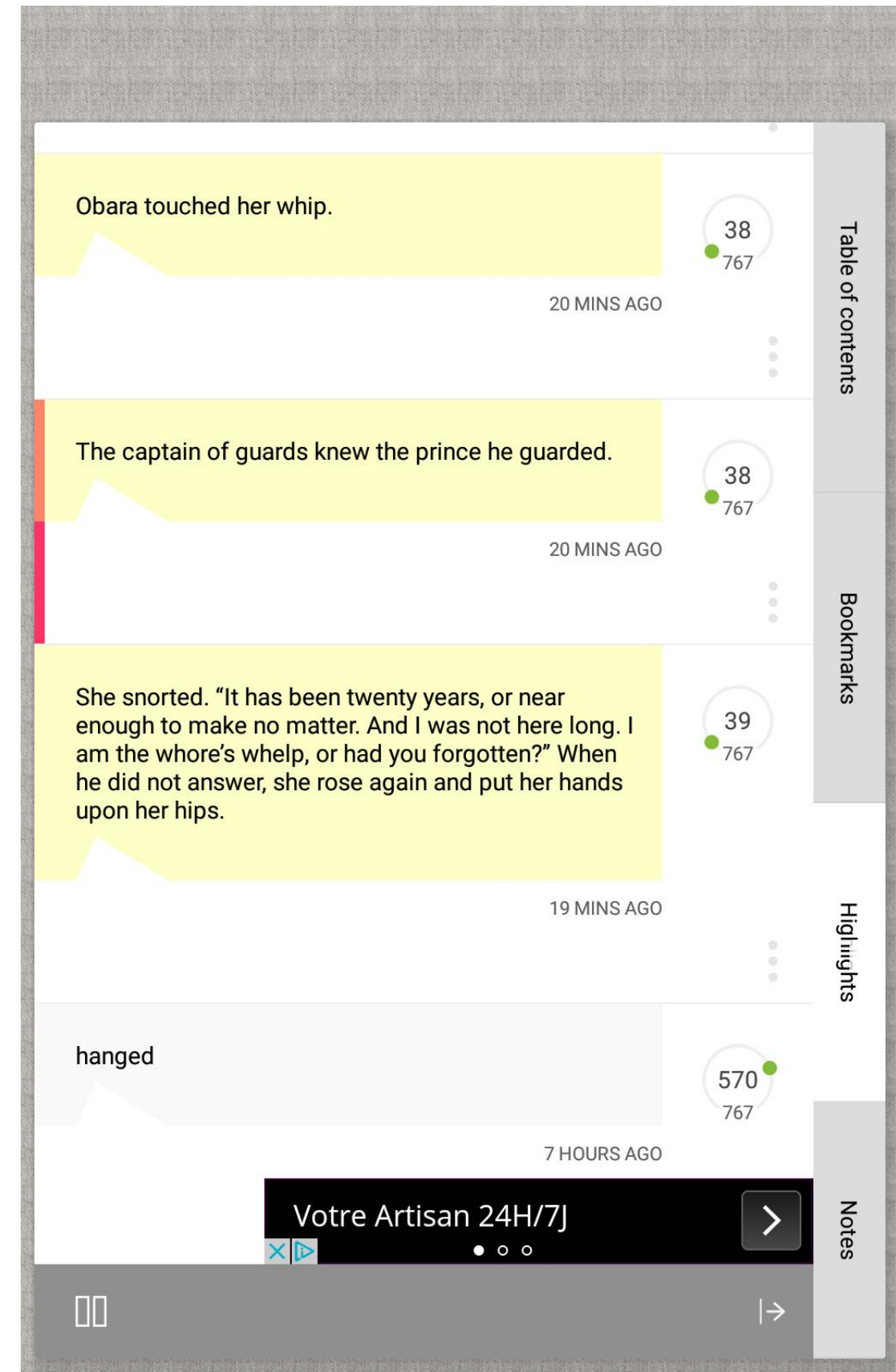
“He do  Hotah said again.

**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—”

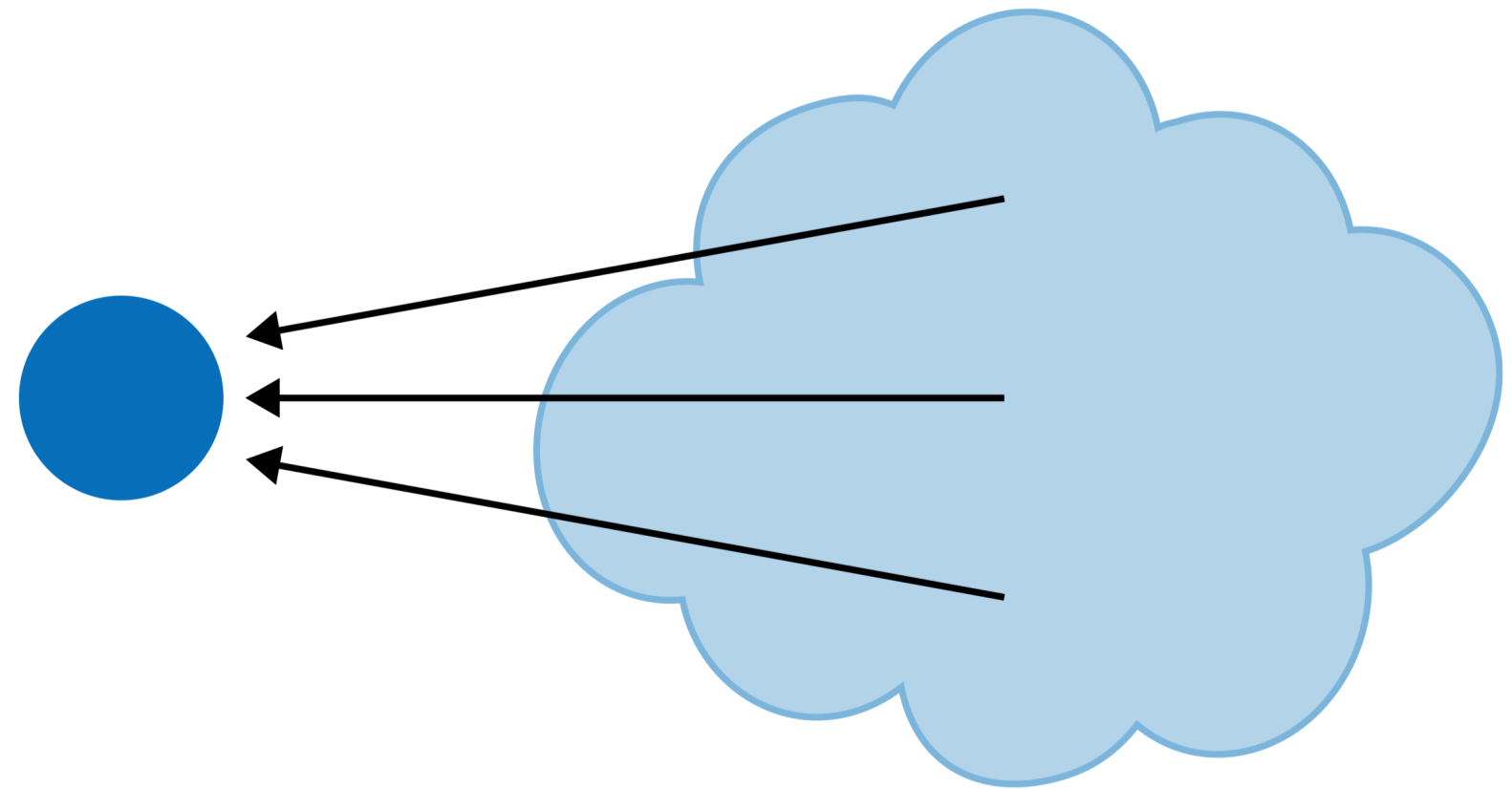
“Captain,” came the command, from behind. “Let her pass. I will speak with her.” The prince’s voice was hoarse.

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



## 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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## What did we learn today?

- Interaction structure
- Visual layout design
- Principles of navigation