

Building User Interfaces

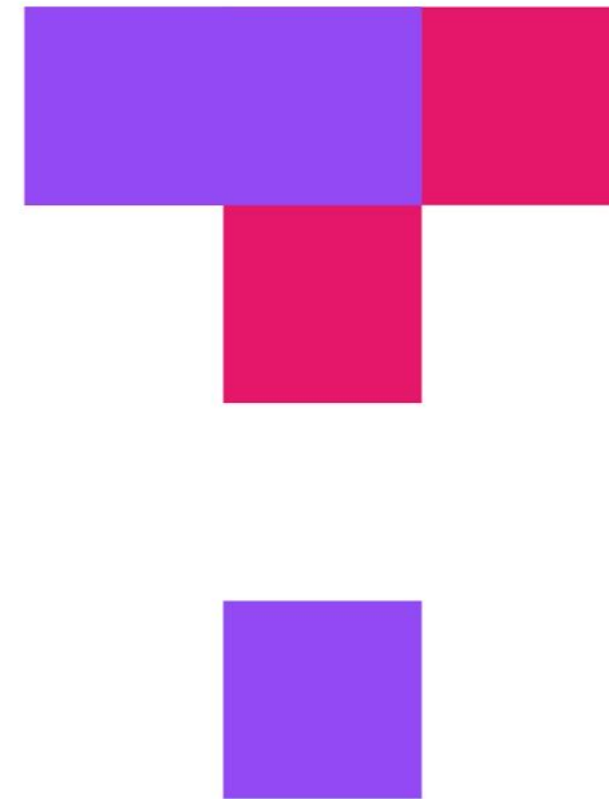
Structure, Layout, & Navigation

Professor Bilge Mutlu

What we will learn today?

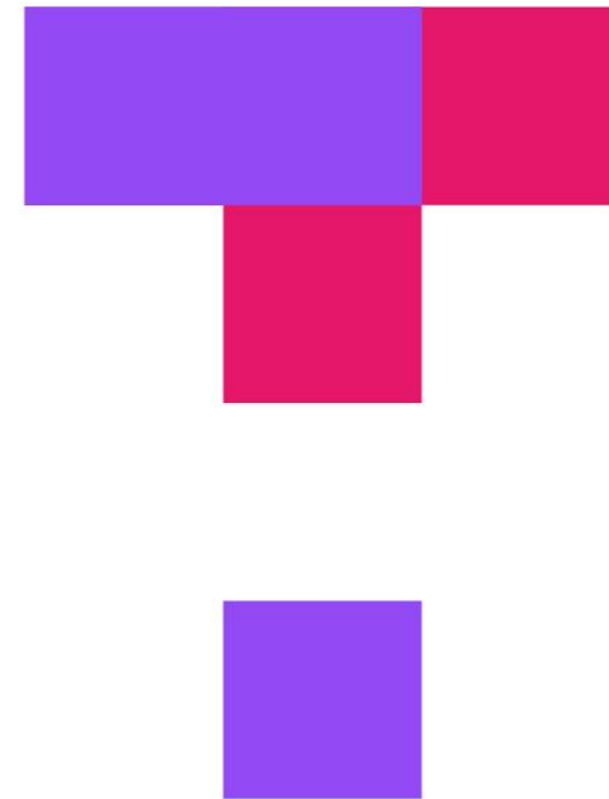
- >> Interaction structure *→ Information architects*
- >> Visual layout design
- >> Principles of navigation

TopHat Attendance



TOP HAT

TopHat Questions



TOP HAT

Interaction Structure

Information Architecture

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

Information architect
- Decides what content is served

Structural Categories¹

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

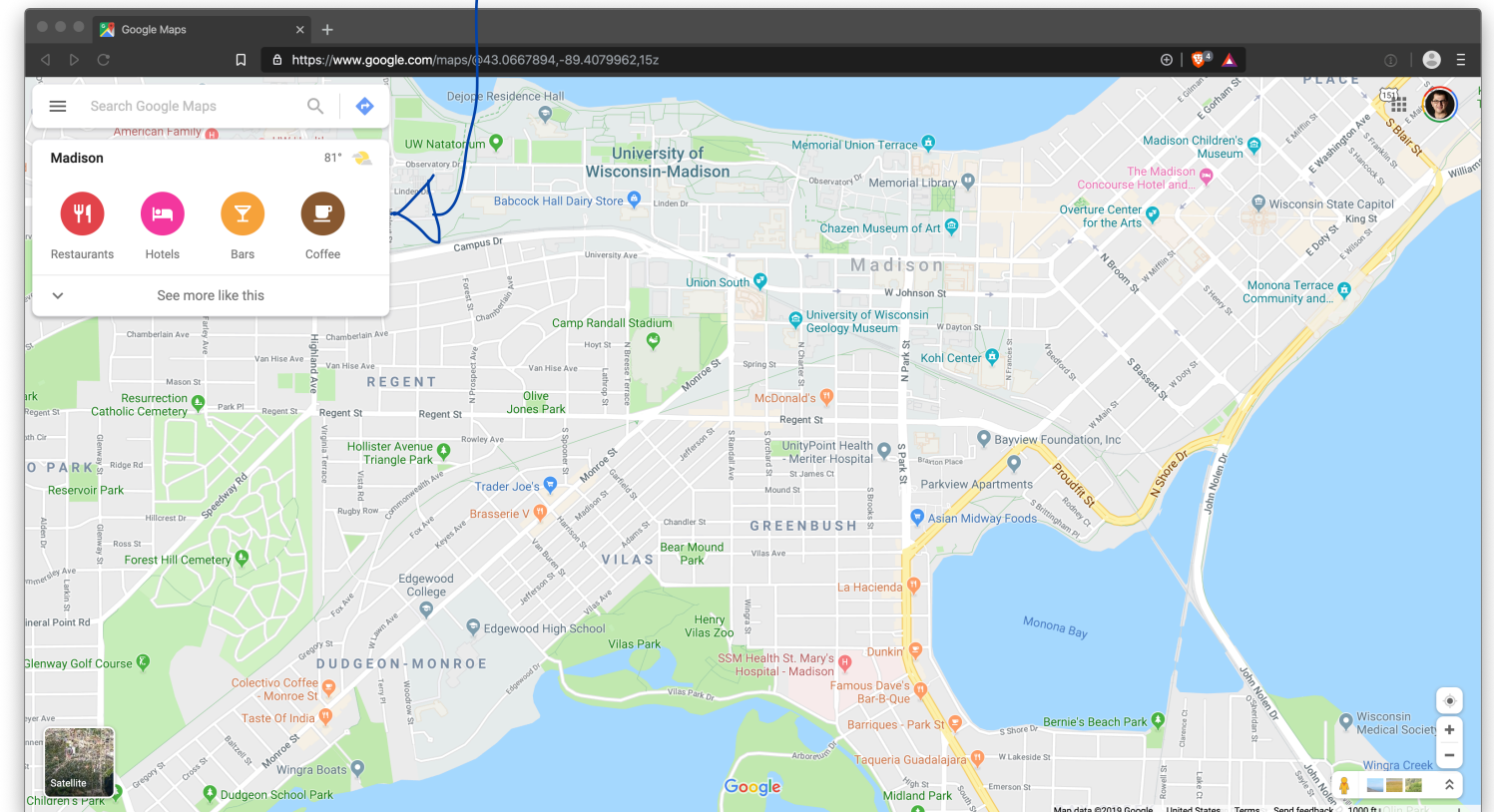
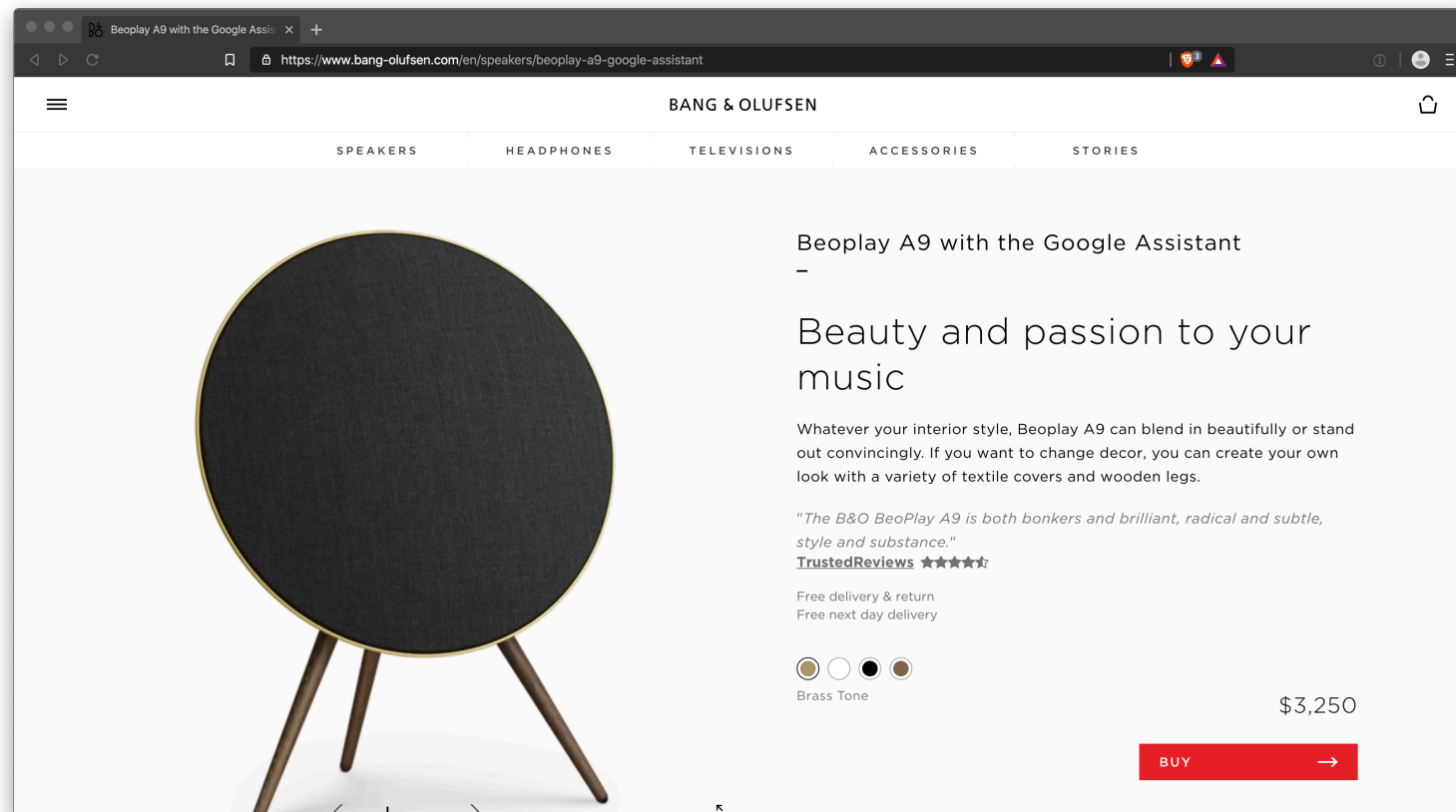
¹Tidwell, 2010, *Designing Interfaces*

"Show one single thing"

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

All we care about is showing the product

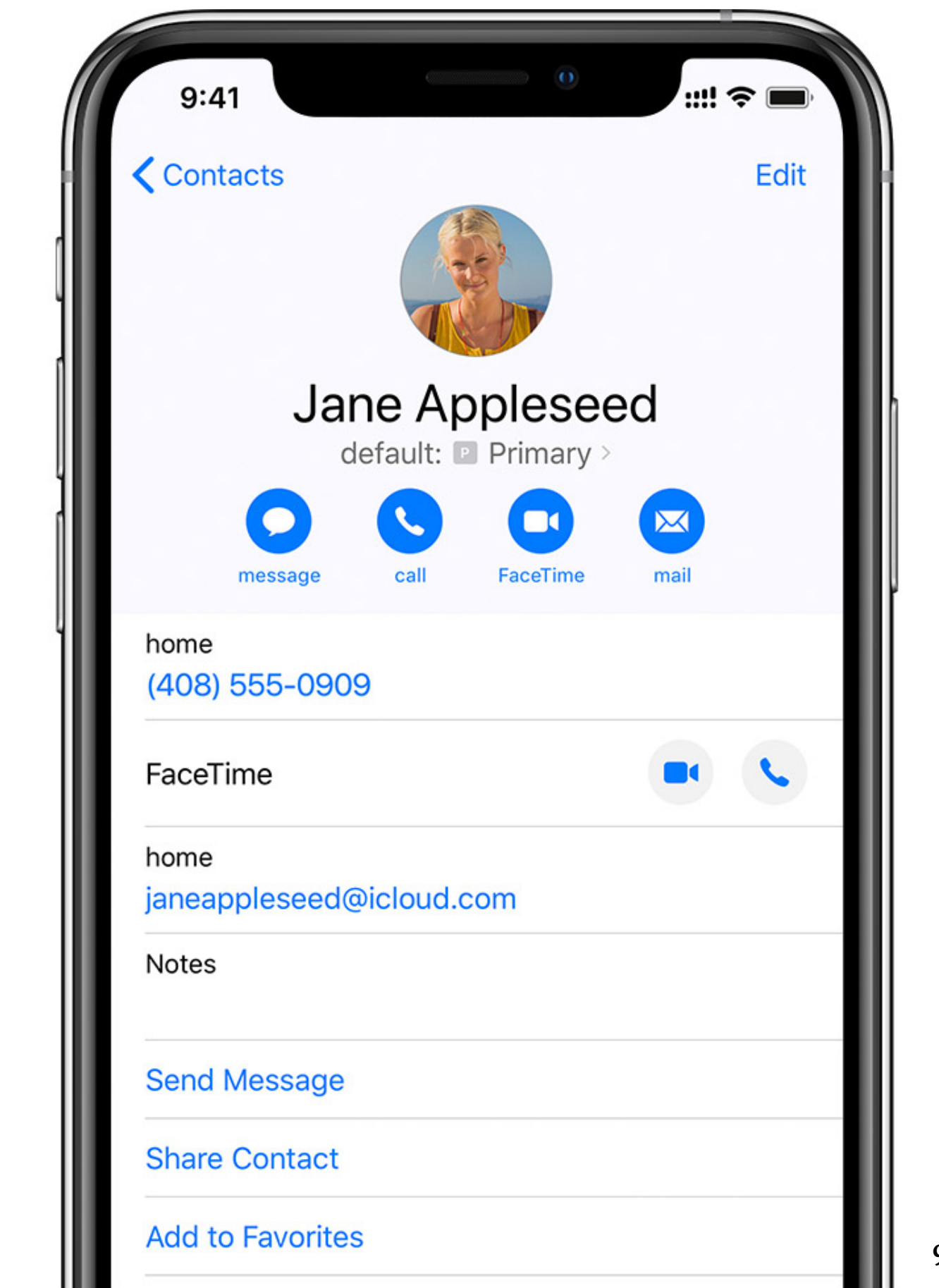
A few controls to support the task



Supports a specific activity,
eliminating other distractions

Includes key components:

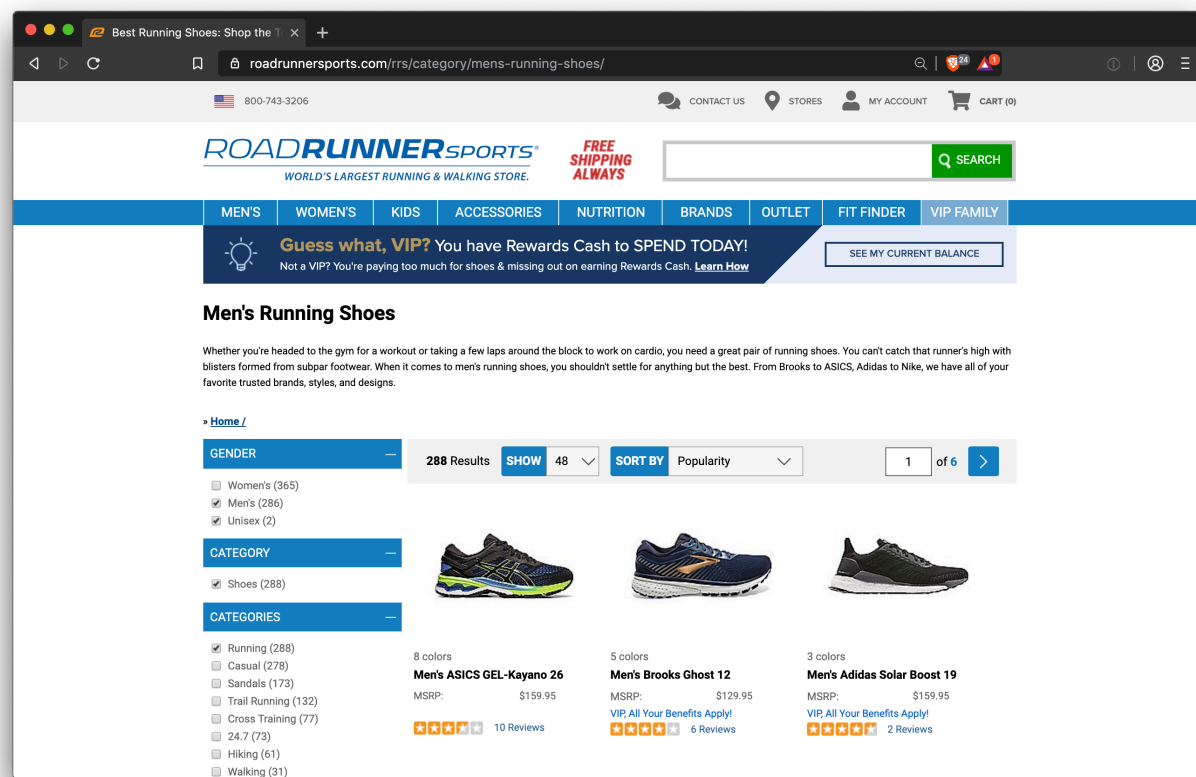
1. Content of the "single thing"
2. Supporting tools that help the user act on the content



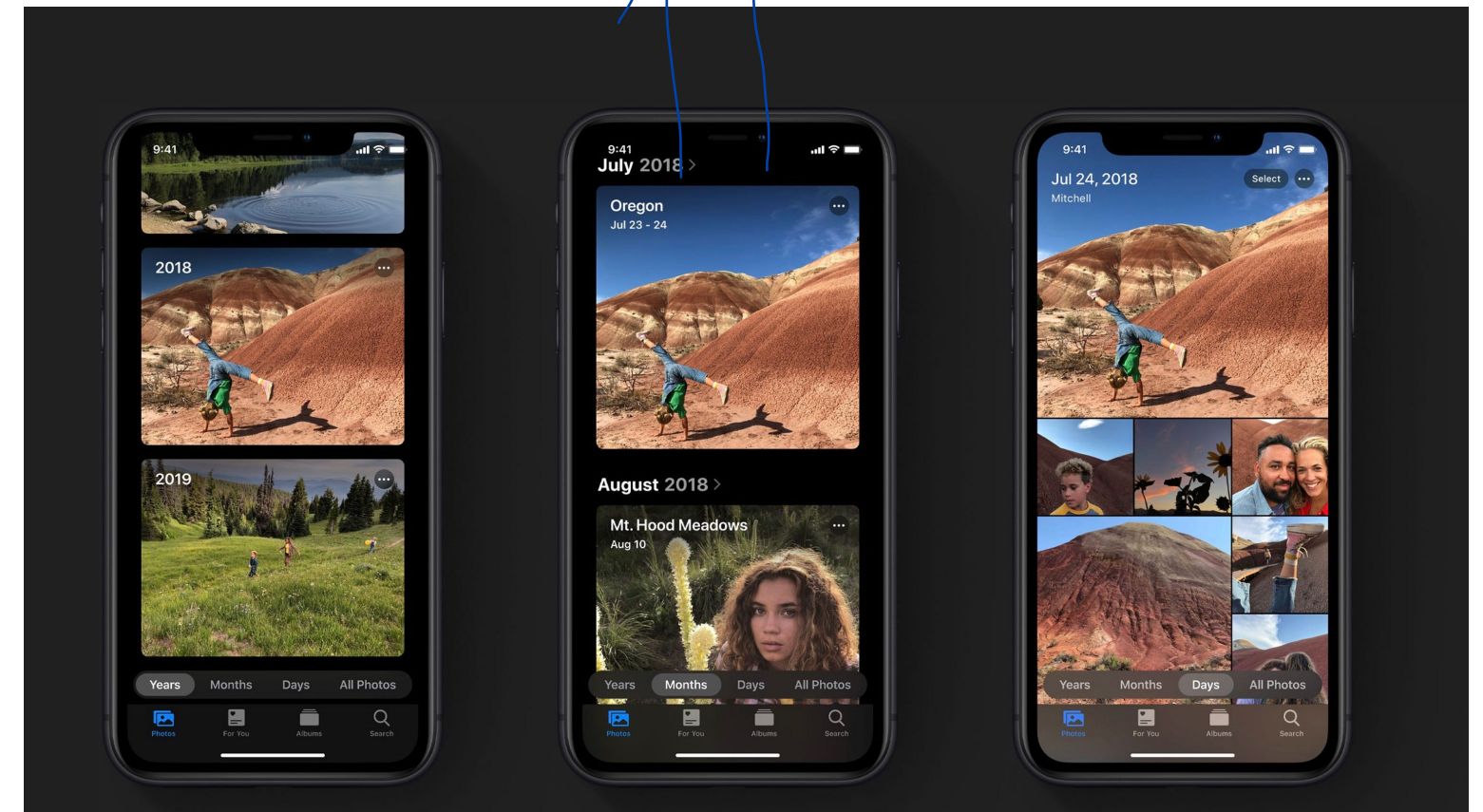
"Show a list or set of things"

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

Infinite scroll

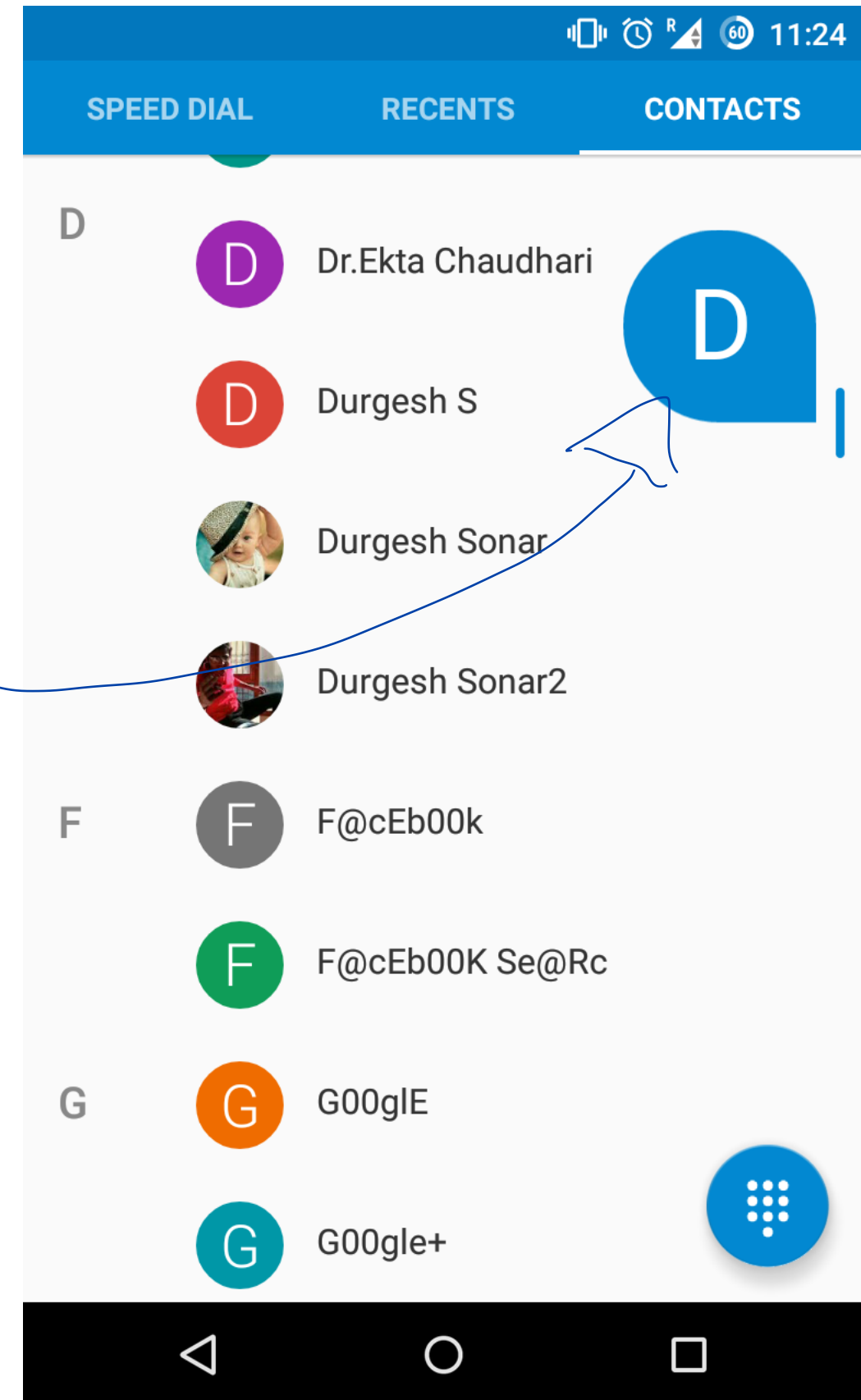


many more



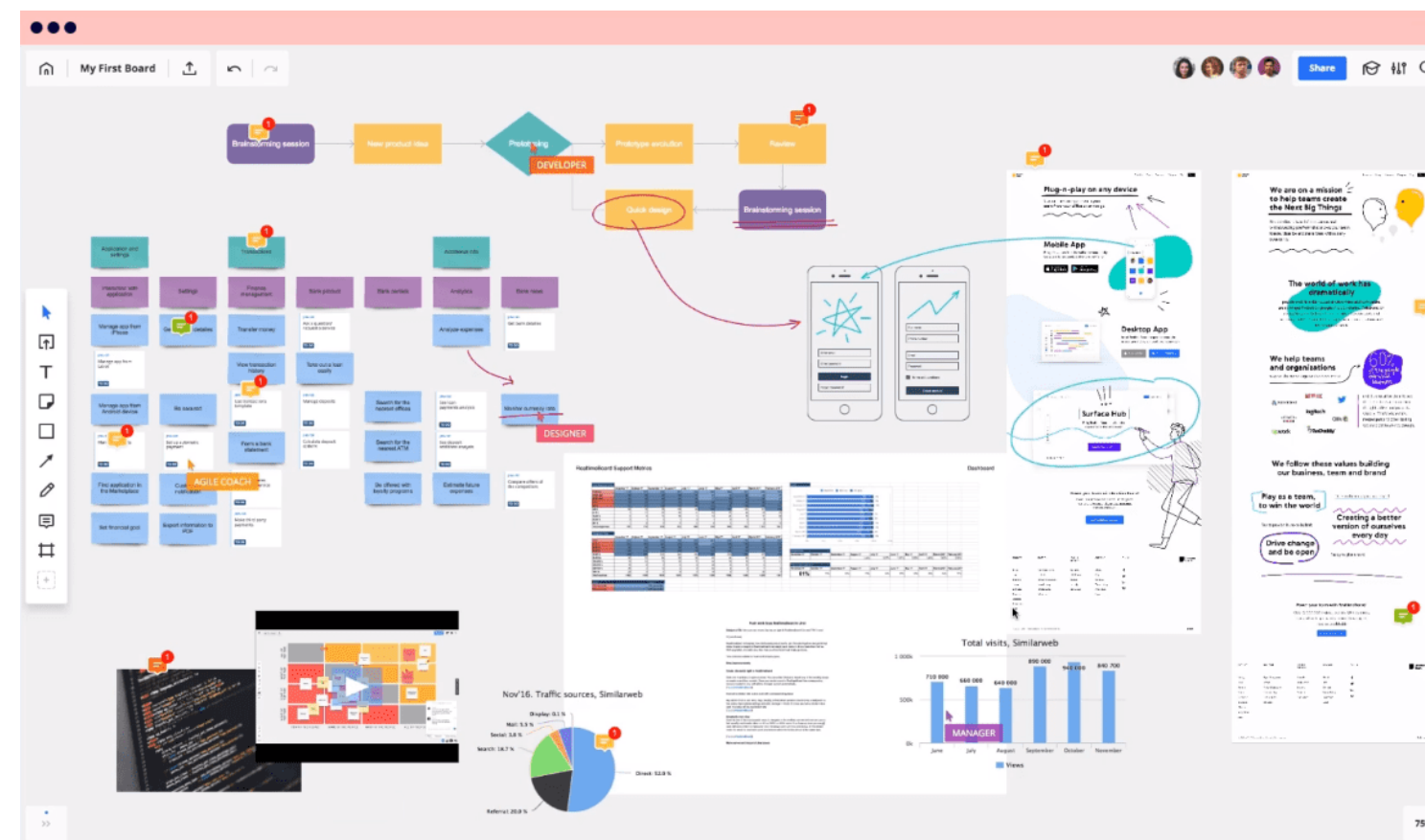
Includes design elements that help the user organize and categorize the lists

Helps the user navigate the long list

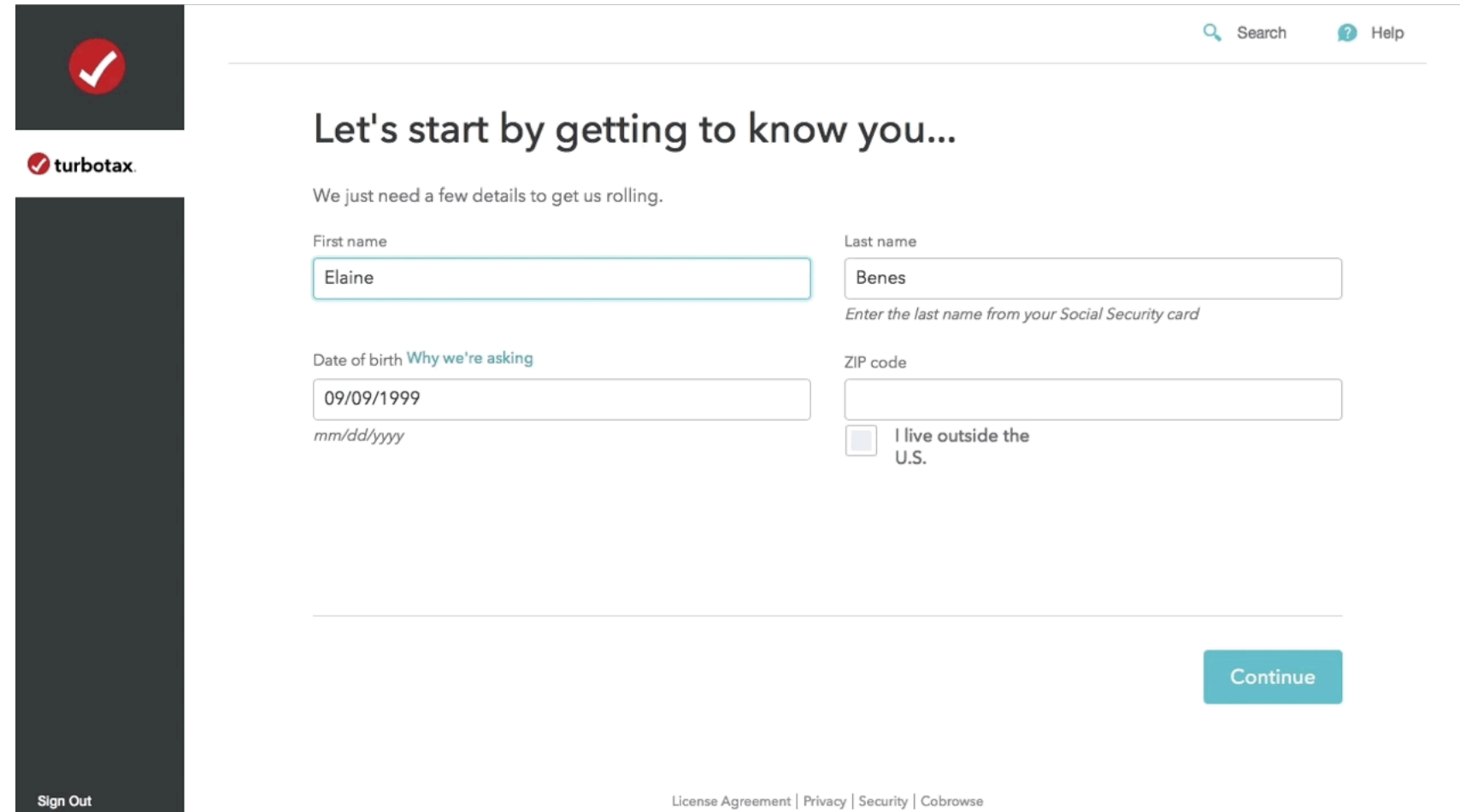


"Provide tools to create a thing"

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



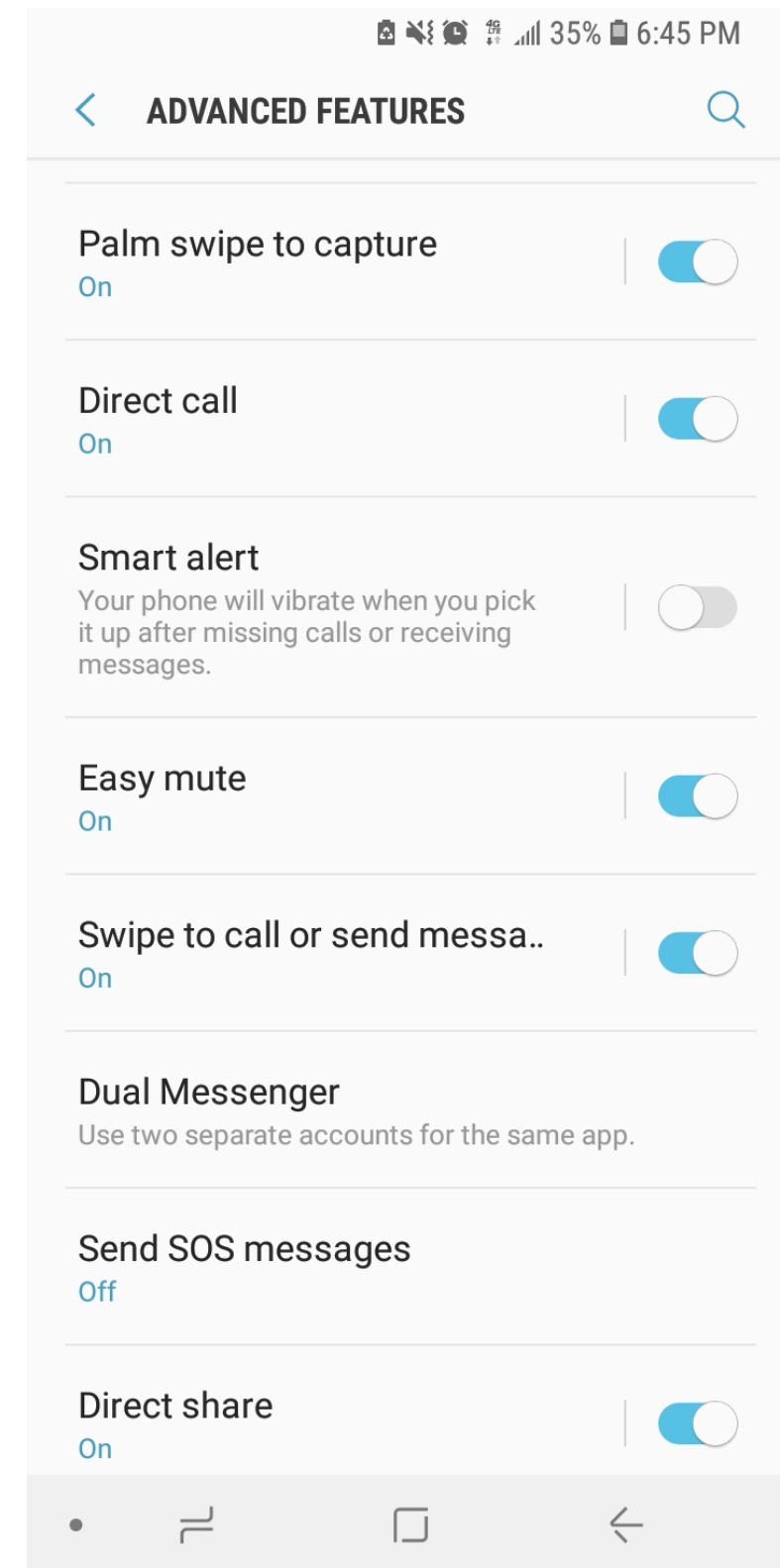
Helping a user through a complex process



"Facilitate a task"

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

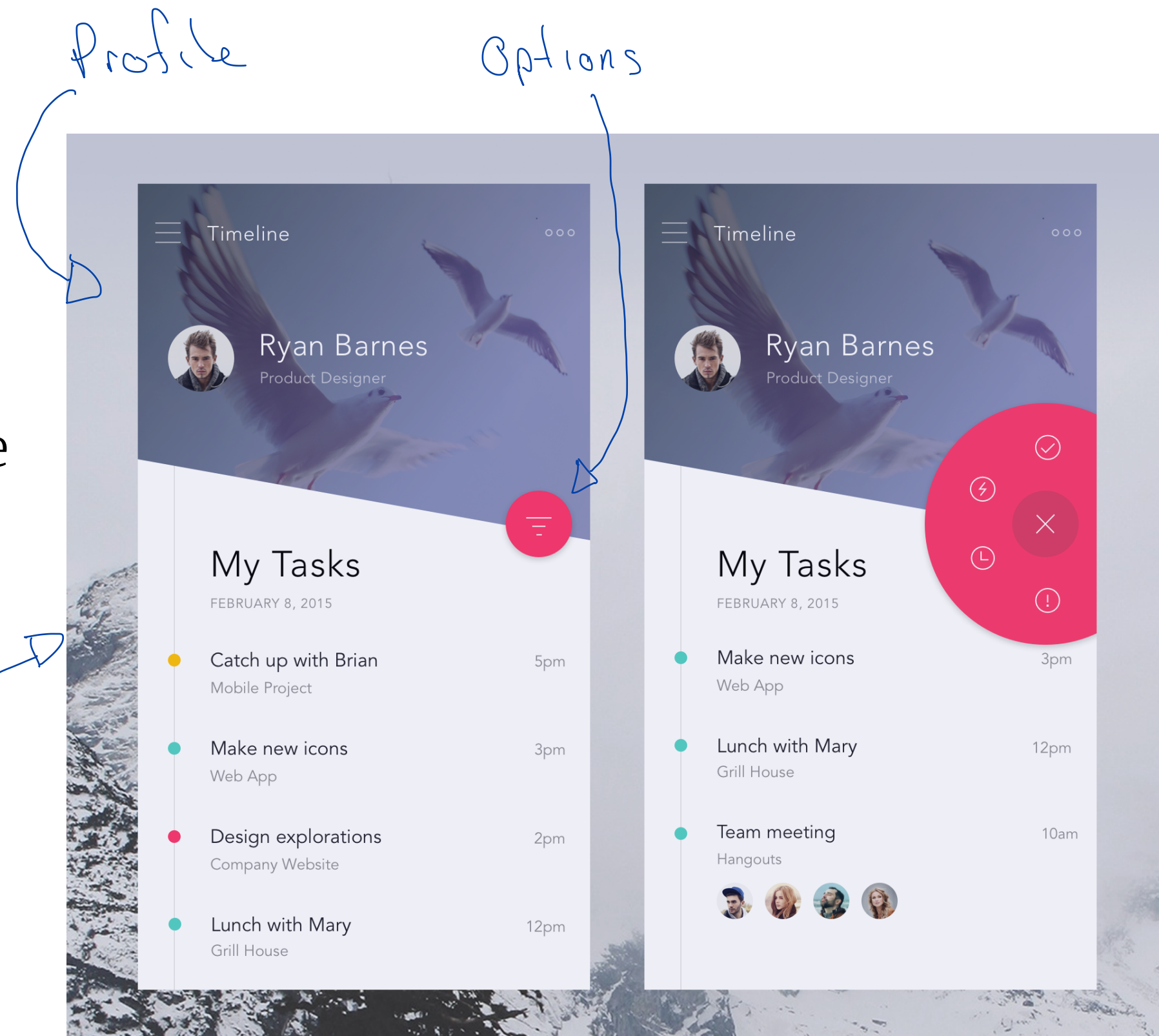
The designer must organize these controls in an effective and logical way



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

Building on design principles

Layout

Definition: Arrangement of visual elements on a canvas.²

1. Creating a focal point
2. Following the golden proportion
3. Using the rule of thirds
4. Effectively using grids
5. Integrating type

²These build on the visual design elements/principles that we covered last week.

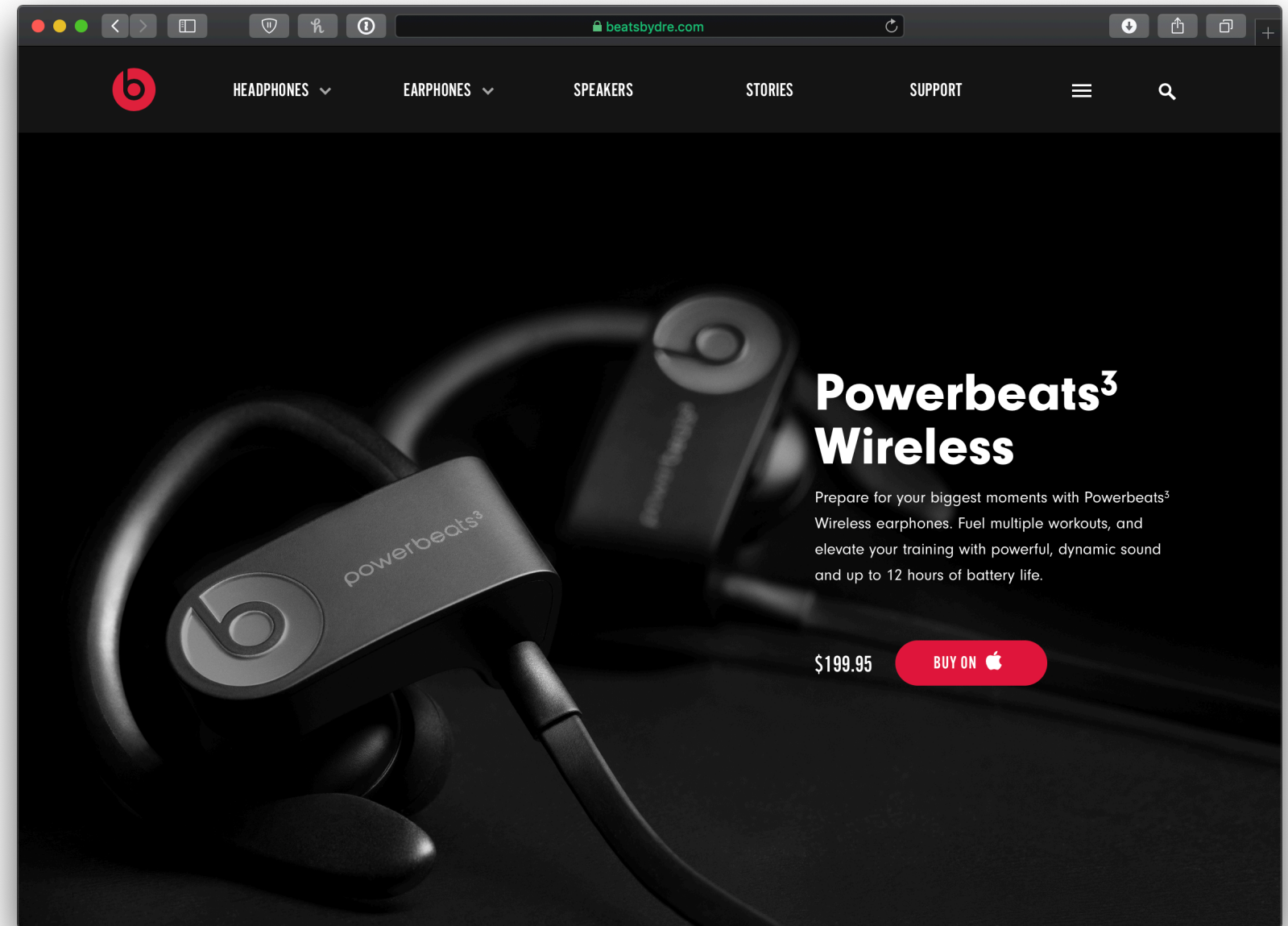
1. Placing imagery
2. Using negative space
3. Grouping using gestalt theory
4. Creating visual hierarchy
5. Exploiting visual scan patterns
6. Creating contrast and emphasis

Creating a focal point

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

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

Focal point for the product, but the "buy" button is also noticed because it is red



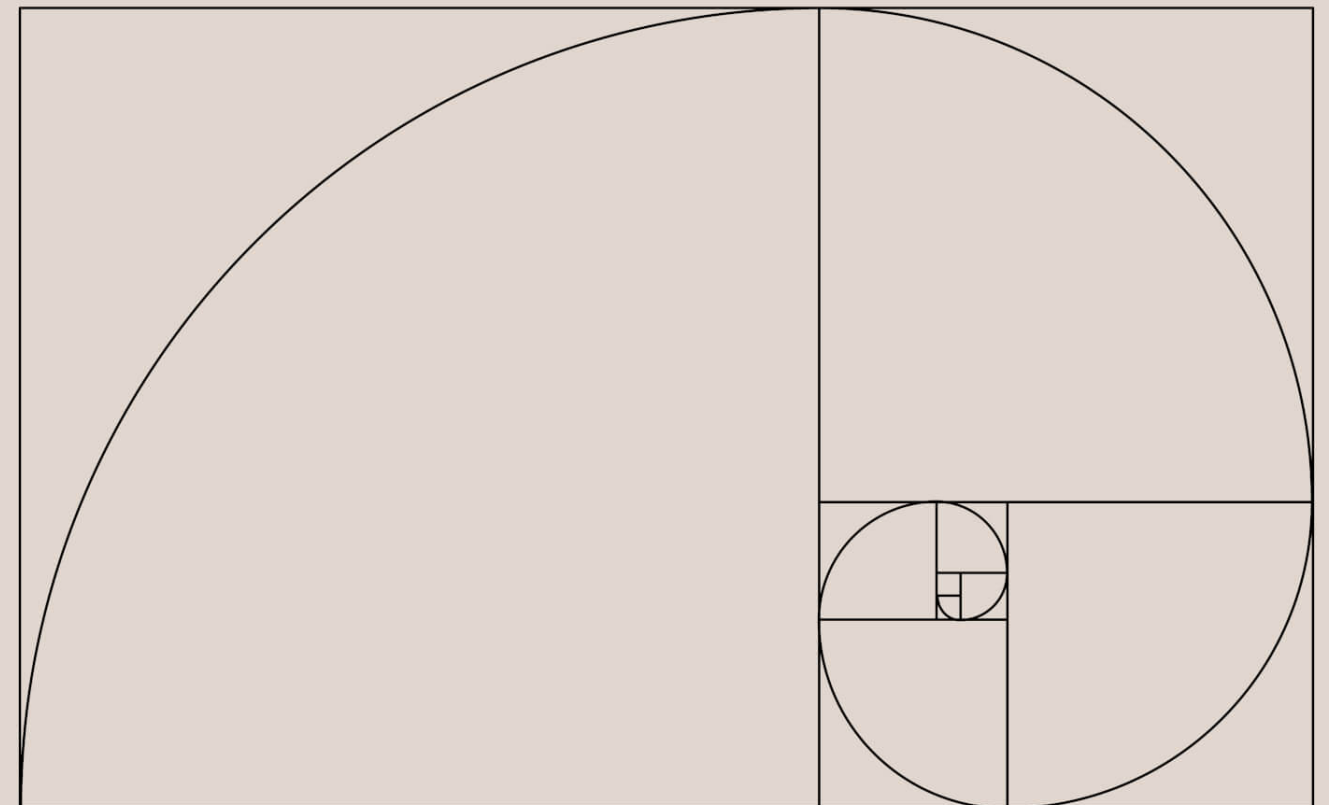
Following the golden proportion³

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.

Paper sizes follow this ratio

³Further reading on the golden ratio

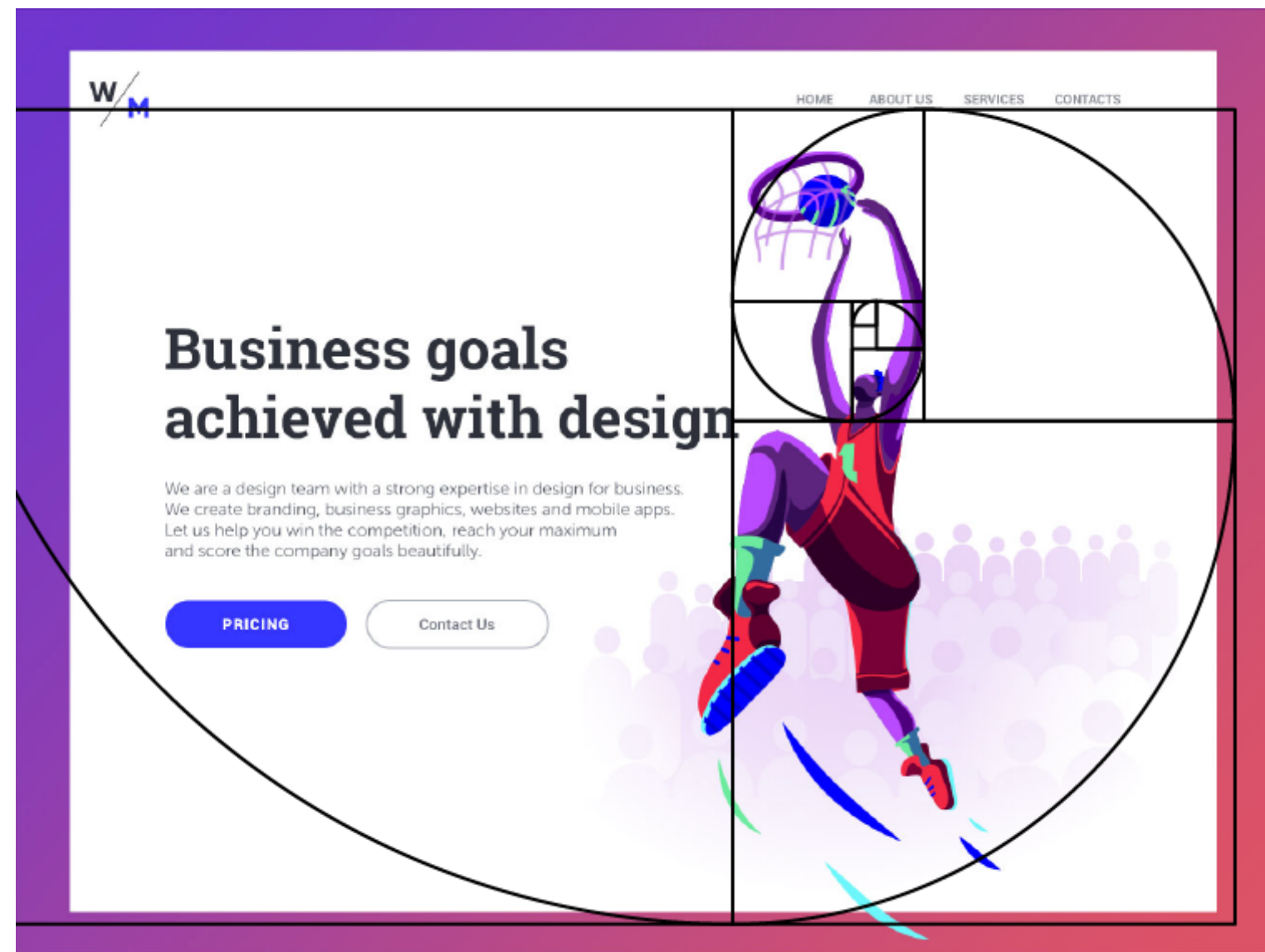
The golden ratio



thesplashlab.com



Creates the most powerful



attention management

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

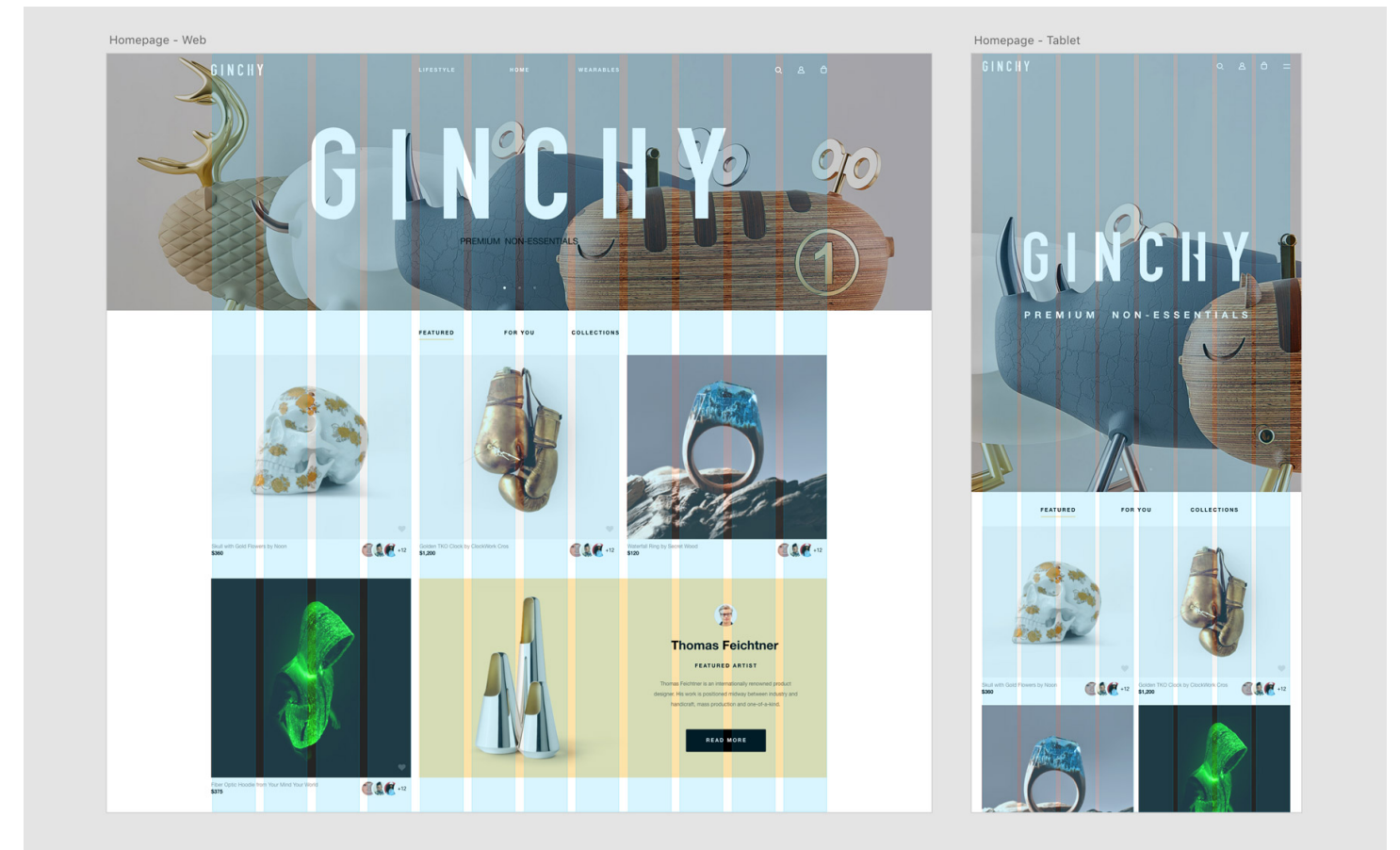
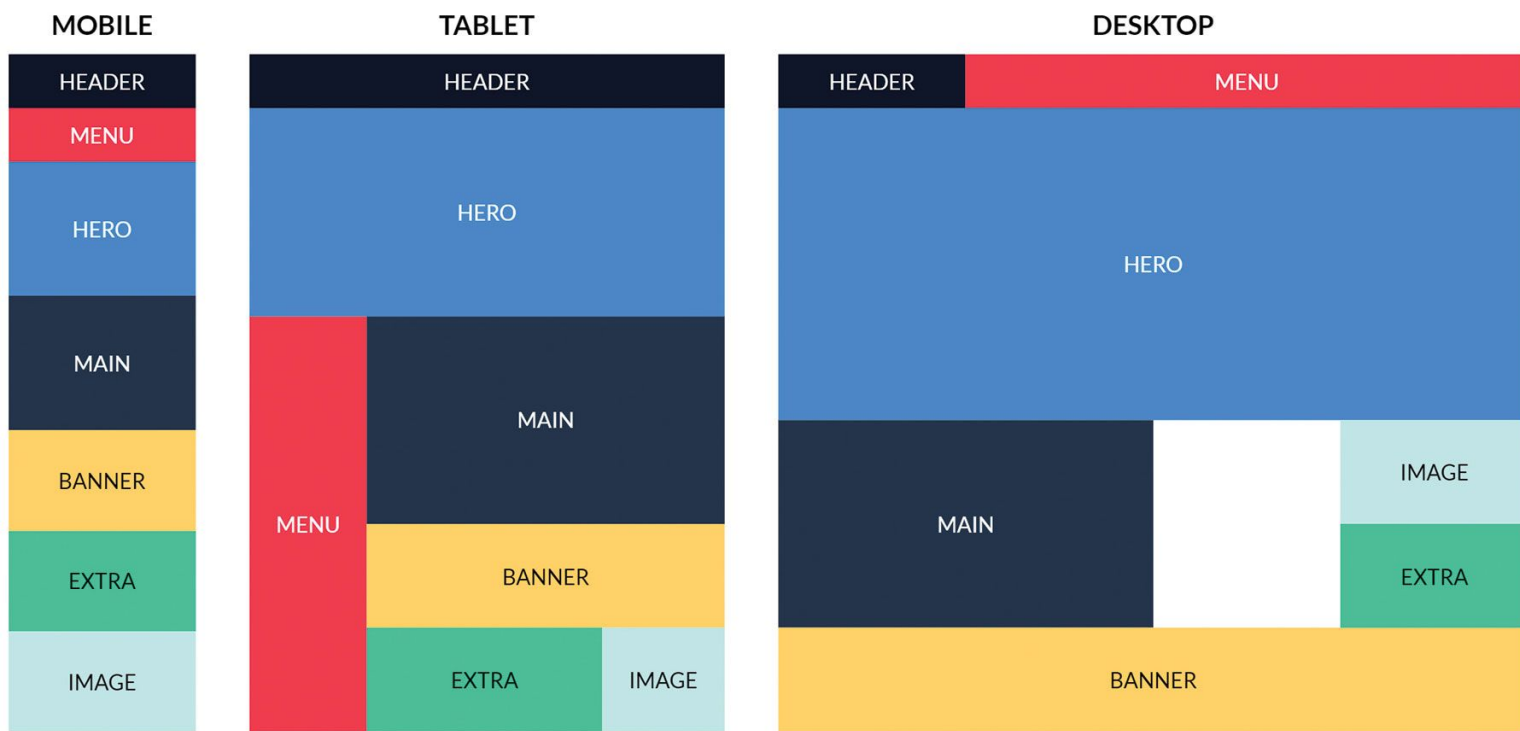
Definition: Grids serve as a visual framework for organizing elements in an orderly and balanced fashion.

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

- Responsive web design uses grids
- A simple way to make a good looking design



Responsive design

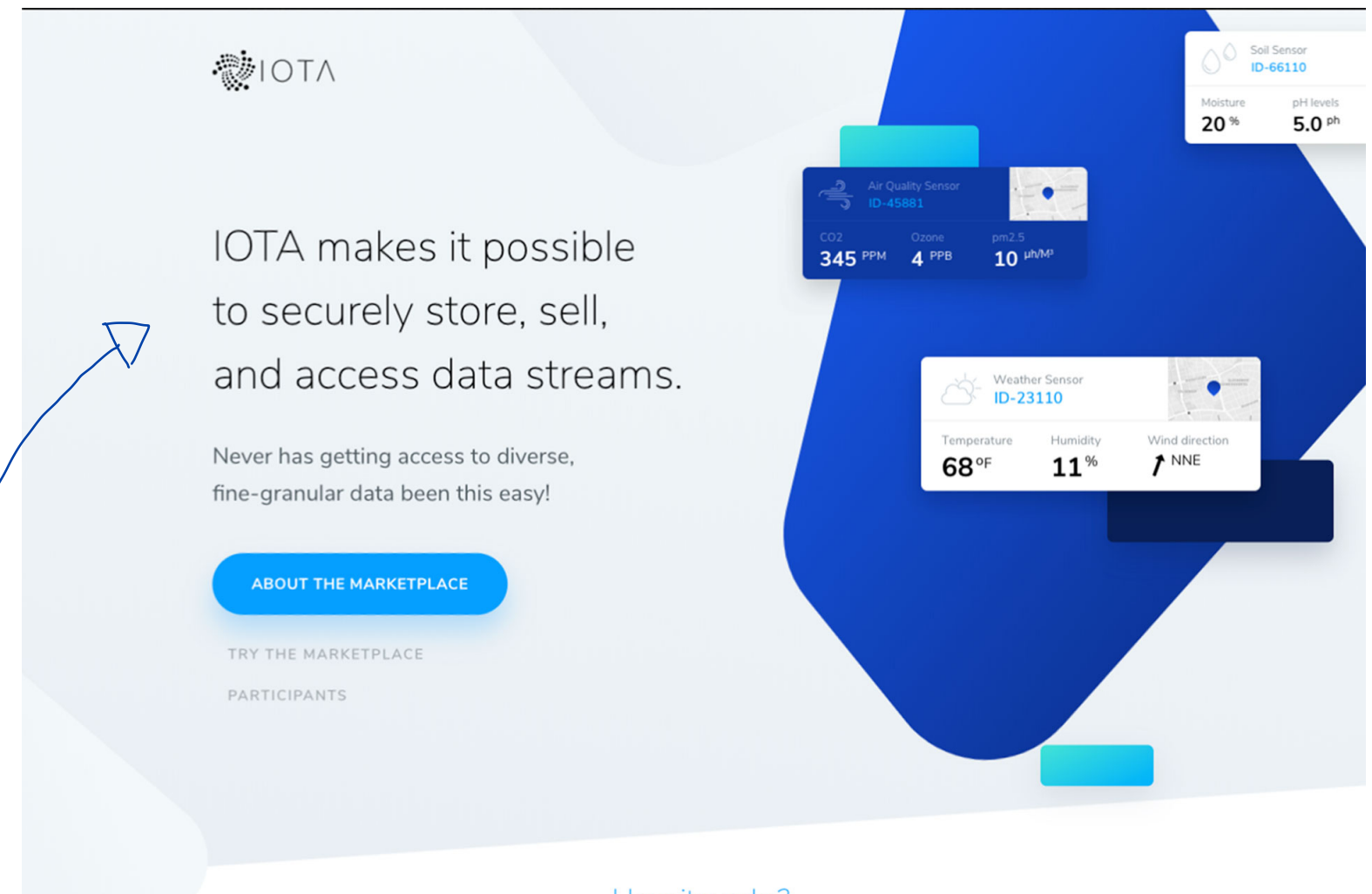


Integrating type

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

Could create focal point or hierarchy

Text draws attention

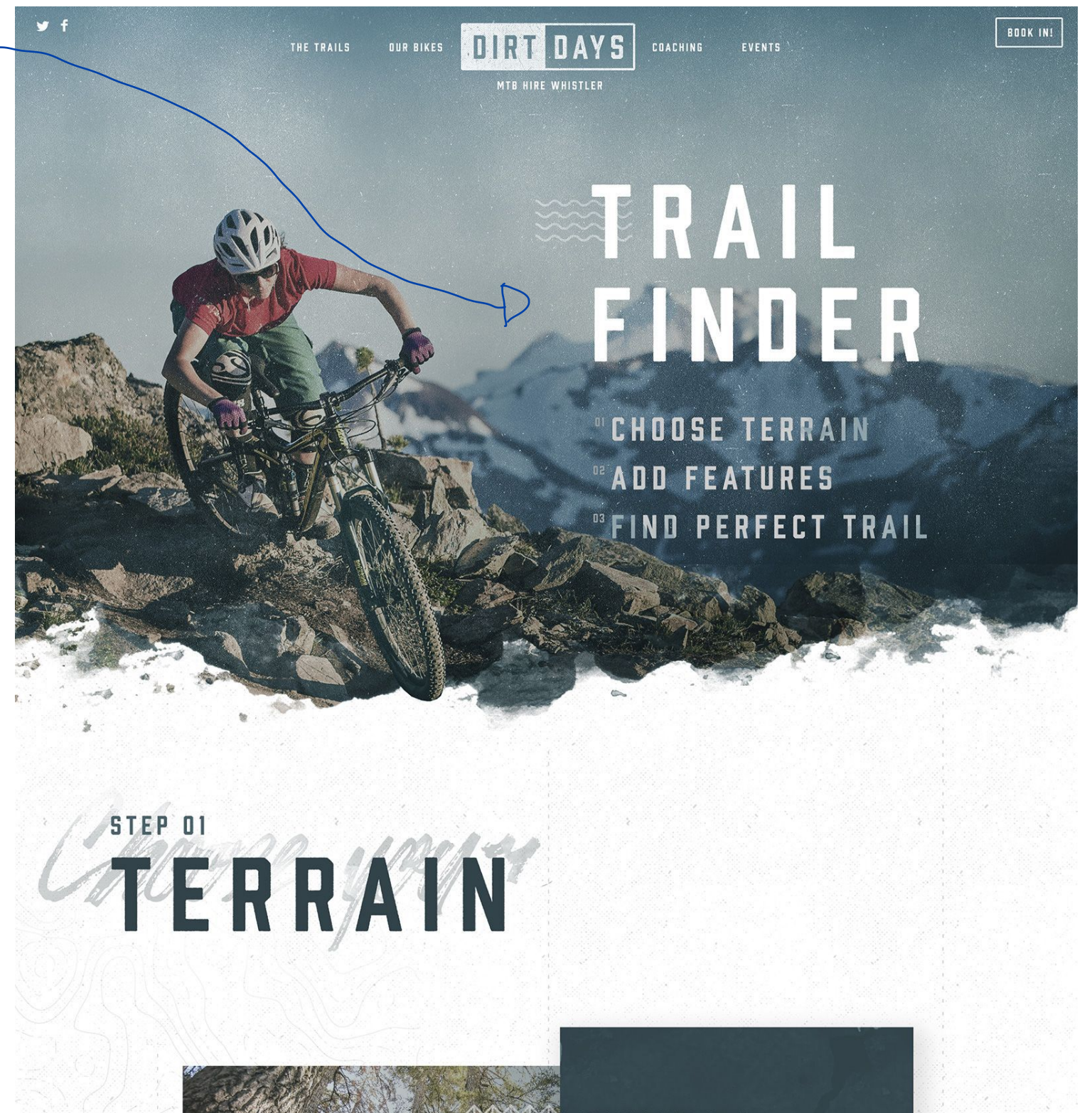


Placing imagery

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

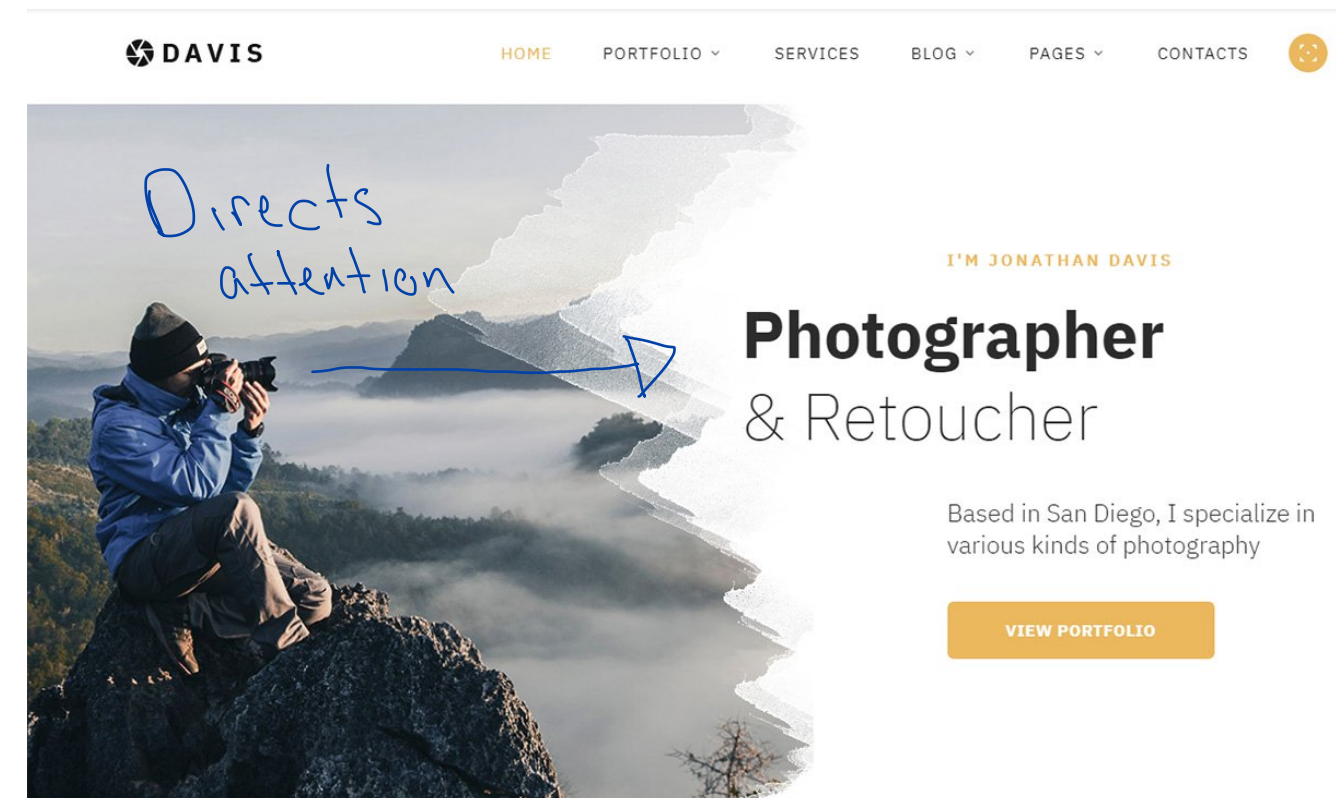
Pro Tips: Place on top, not bottom; direction should be toward next focal point; never flip images; do not interrupt headlines; do not wrap text around images.

Biker is facing text to draw attention to it



Using negative space

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

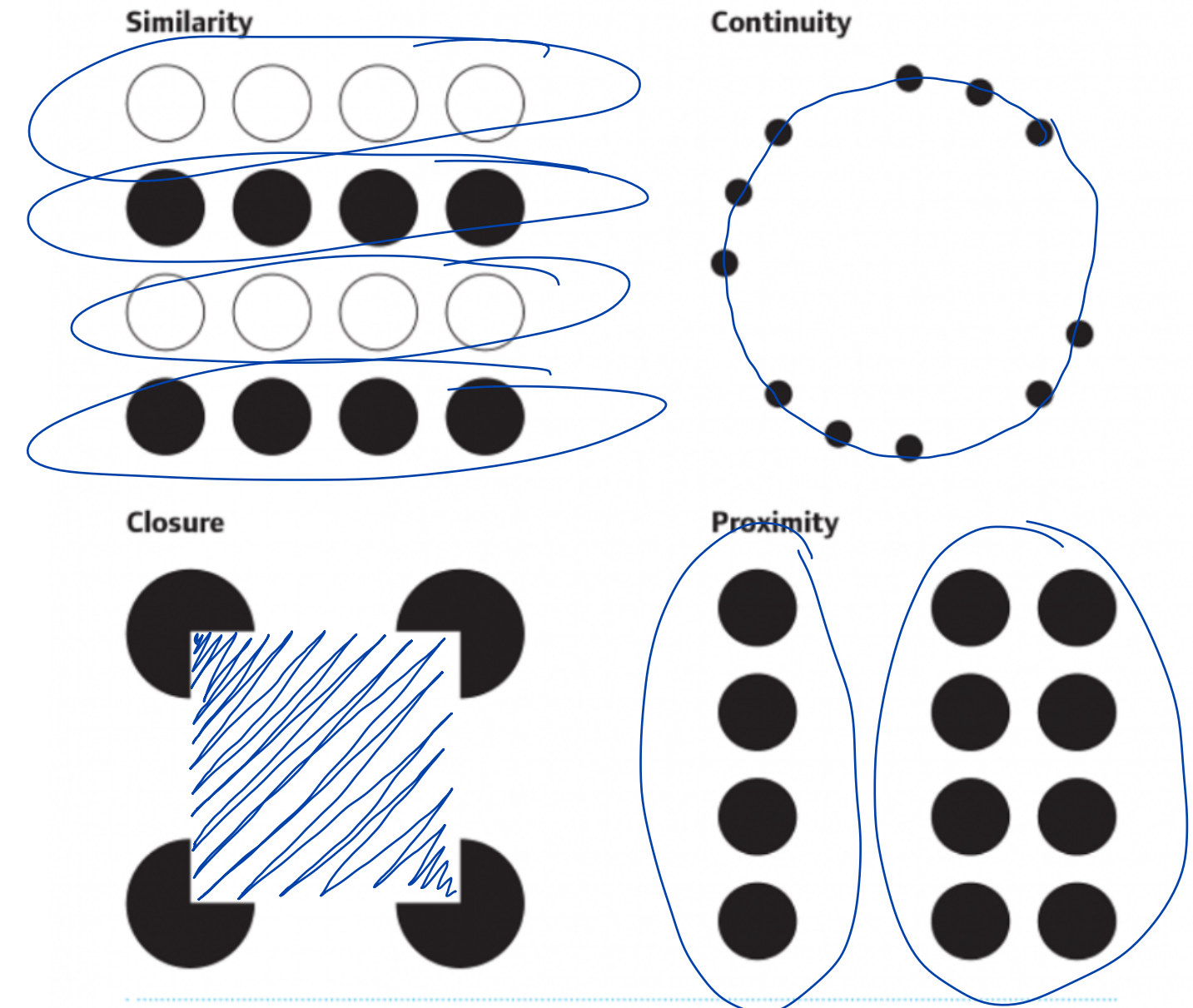


Grouping using Gestalt Theory

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.

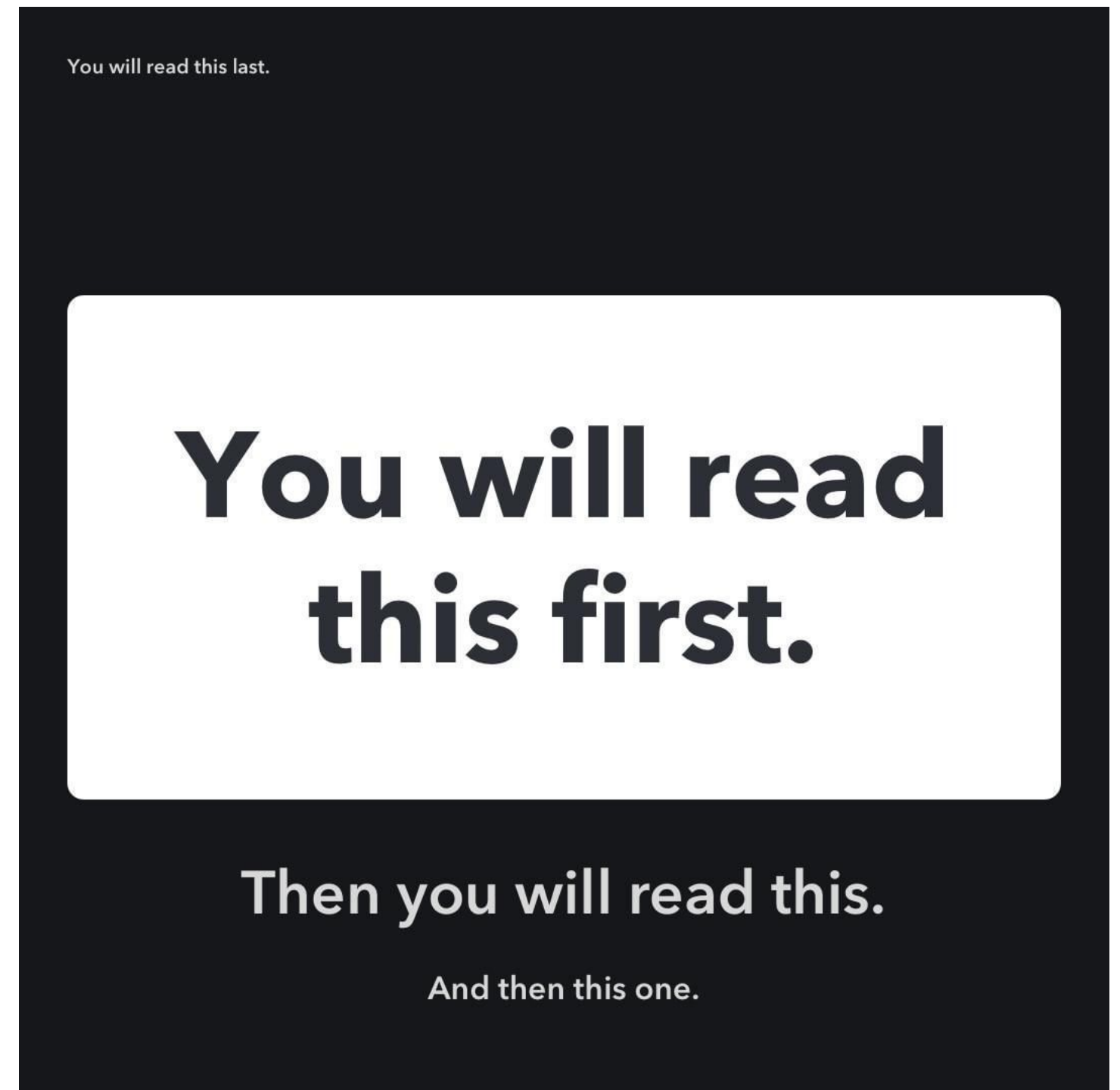
Proximity

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

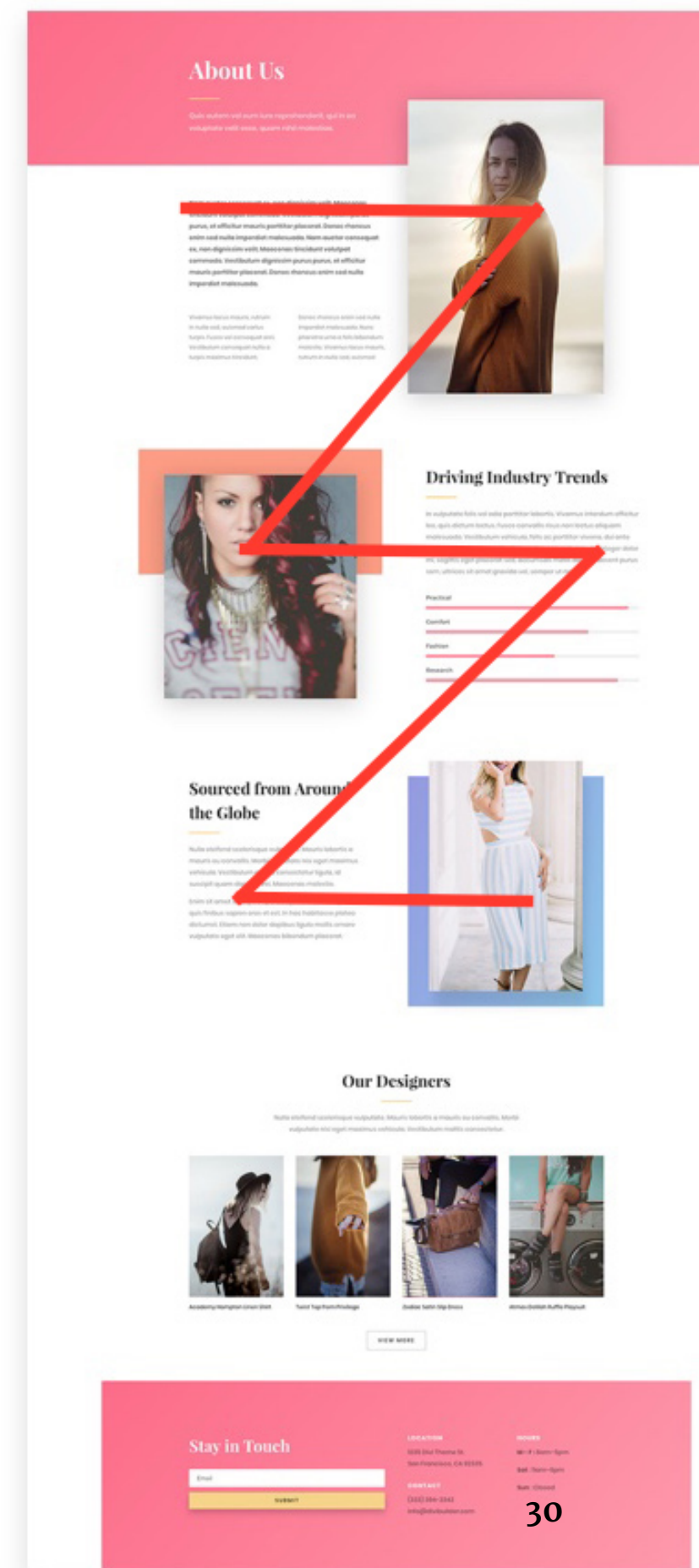
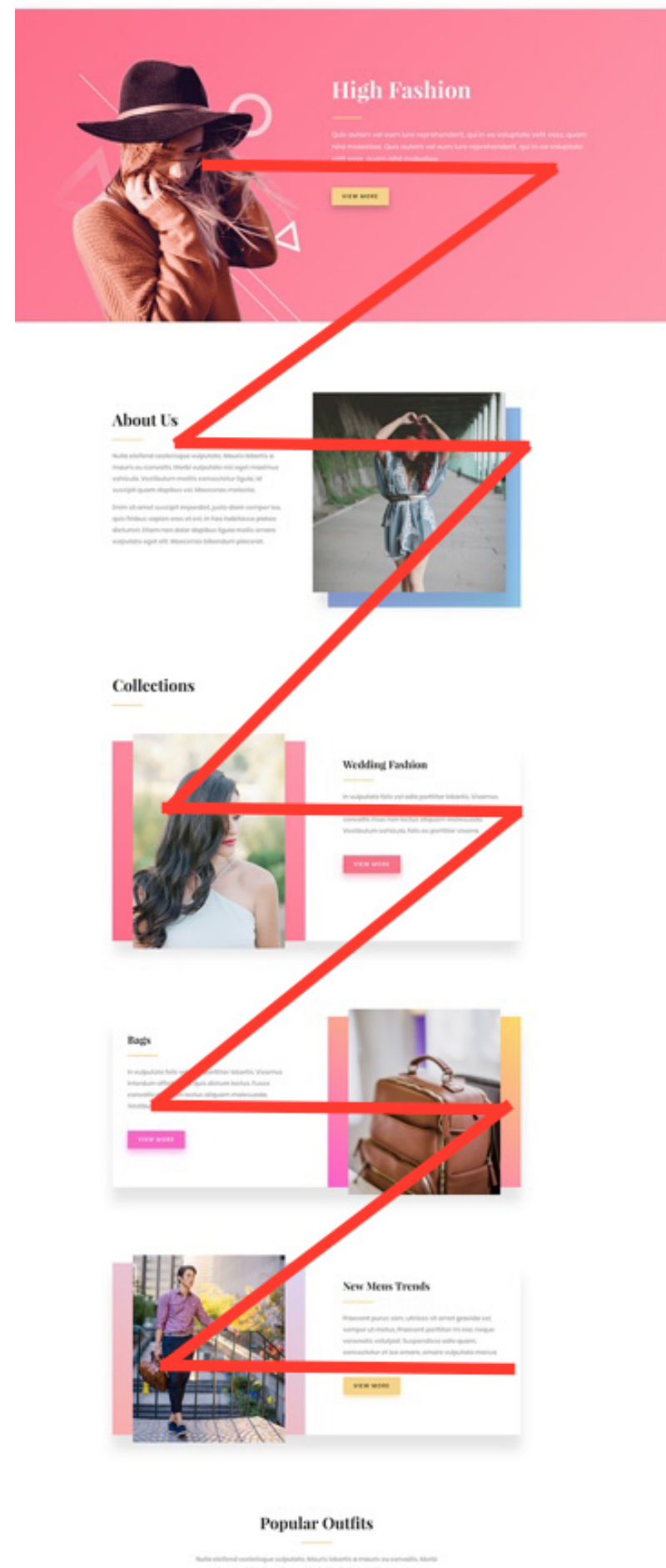
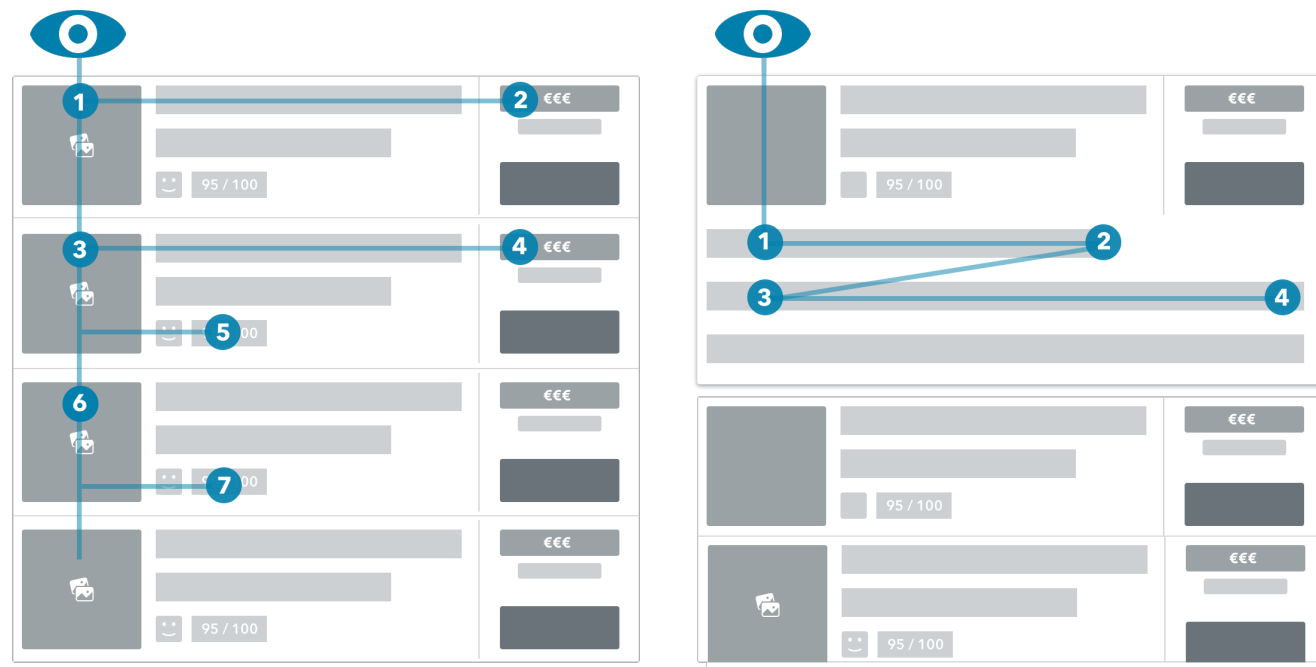
Definition: Using relative positioning and sizing to communicate what design elements are more important and should be looked at first.

Using only type and contrast →



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!

Important button stands out

How LifeLock works to help protect you from identity theft.

Our proprietary technology alerts you to wide range of identity threats.¹ 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,¹¹ email and text of the suspicious activity.¹



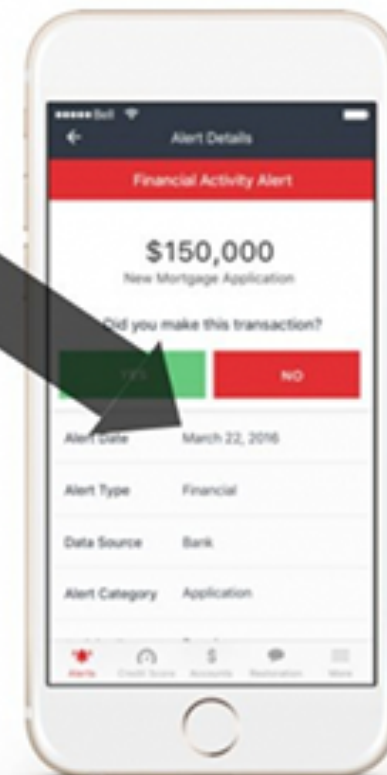
RESTORE

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 Guarantee², 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.¹



Creating contrast and emphasis⁴

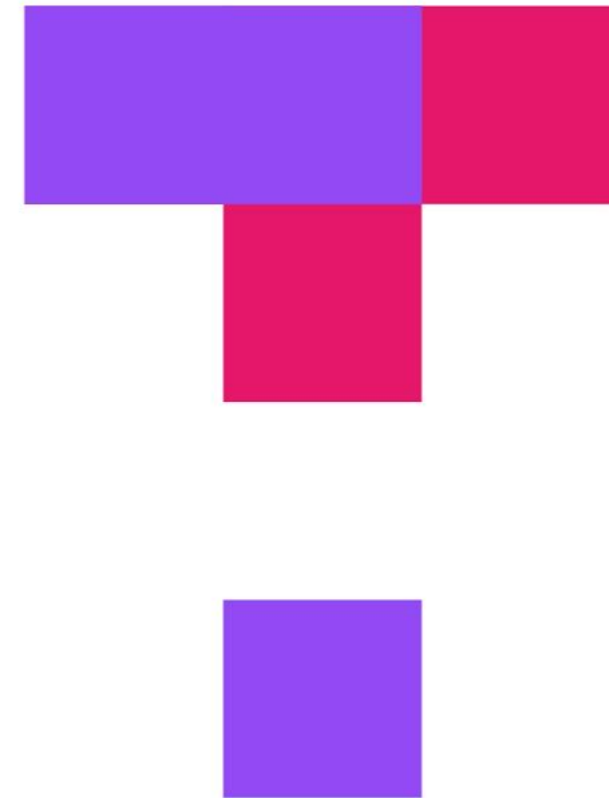
Definition: Using contrast and emphasis to establish visual hierarchy by manipulating features of design elements, including position, size, color, typographic characteristics.

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

⁴Golombisky & Hagen, 2010, *White space is not your enemy*

TopHat Quiz

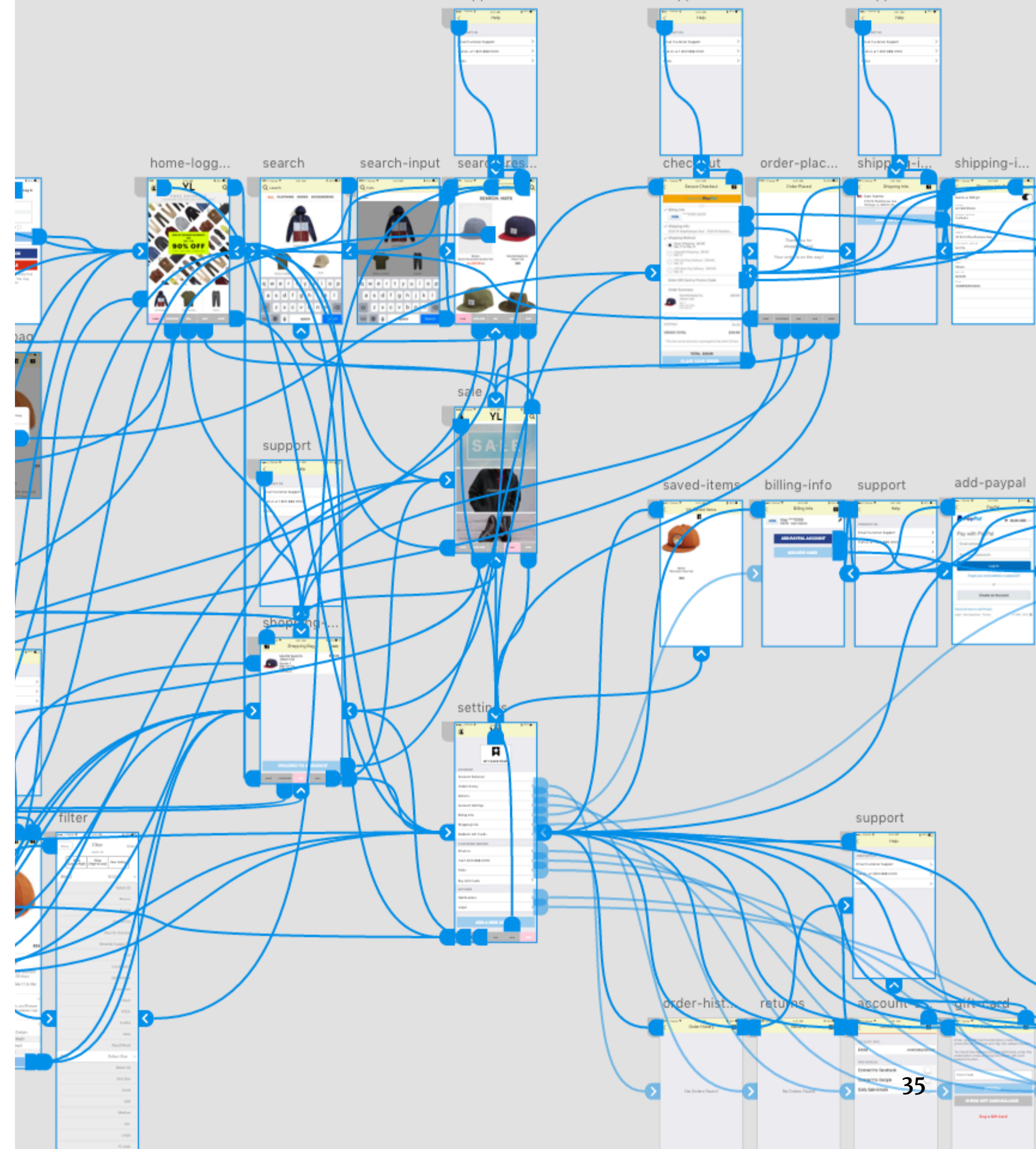


TOP HAT

Principles of Navigation

Principles of Navigation⁵

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



⁵Tidwell, 2010, *Designing Interfaces*

Wayfinding

Users have expectations and goals

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



E2 Centrum
E2 Amfiteatern
Huvudutgång



B



← BACK TO SHOP

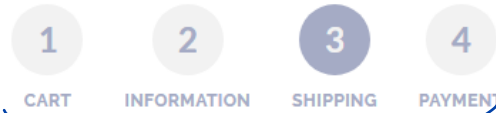
SECURE CHECKOUT

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



Steps labeled

← 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 EN Hello, Sign in [Account & Lists](#) [Orders](#)

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

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

Shop Cookware Sets amazonbasics Shop now ▶

ing > Cookware > Cookware Sets

Breadcrumbs



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 "cuisin..."

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 ~~\$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~~
& FREE Shipping
& FREE Returns
Want it? Buy it now.
Order with one-click.
Choose from different brands.
Check out with Amazon Pay.

In Stock
Qty: 1
70s
90s

Ships from Amazon.com
Amazon.com
Amazon.com
Amazon.com

Item available in limited quantities.
Add to cart
Add to list
Add to wish list

prime
Enjoy exclusive deals with Prime
Winnings with Prime
Click on today's deals
Deliver to you

Add to list
 Select



Complex site 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

↖ We want to minimize

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

Cognitive or physical

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 *Overall structure*
2. Utility navigation aids, *e.g.*, settings pane *Very particular*
3. Associative/in-line navigation aids, *e.g.*, related links *Keywords, hashtags*



Models

Definition: Commonly used patterns of navigation through interactive applications.

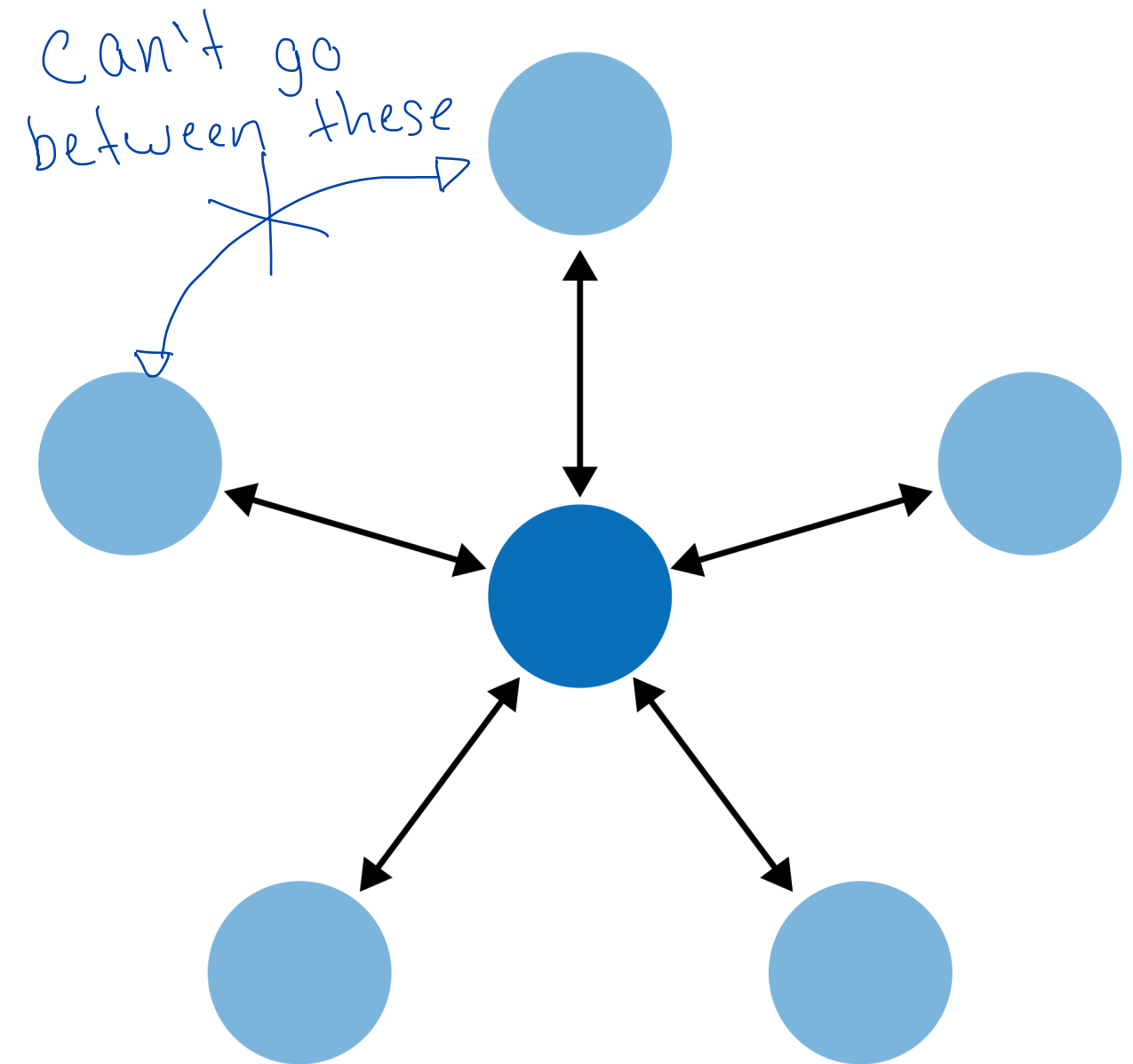
1. Hub and spoke
2. Fully connected
3. Multi-level
4. Stepwise
5. Pyramid

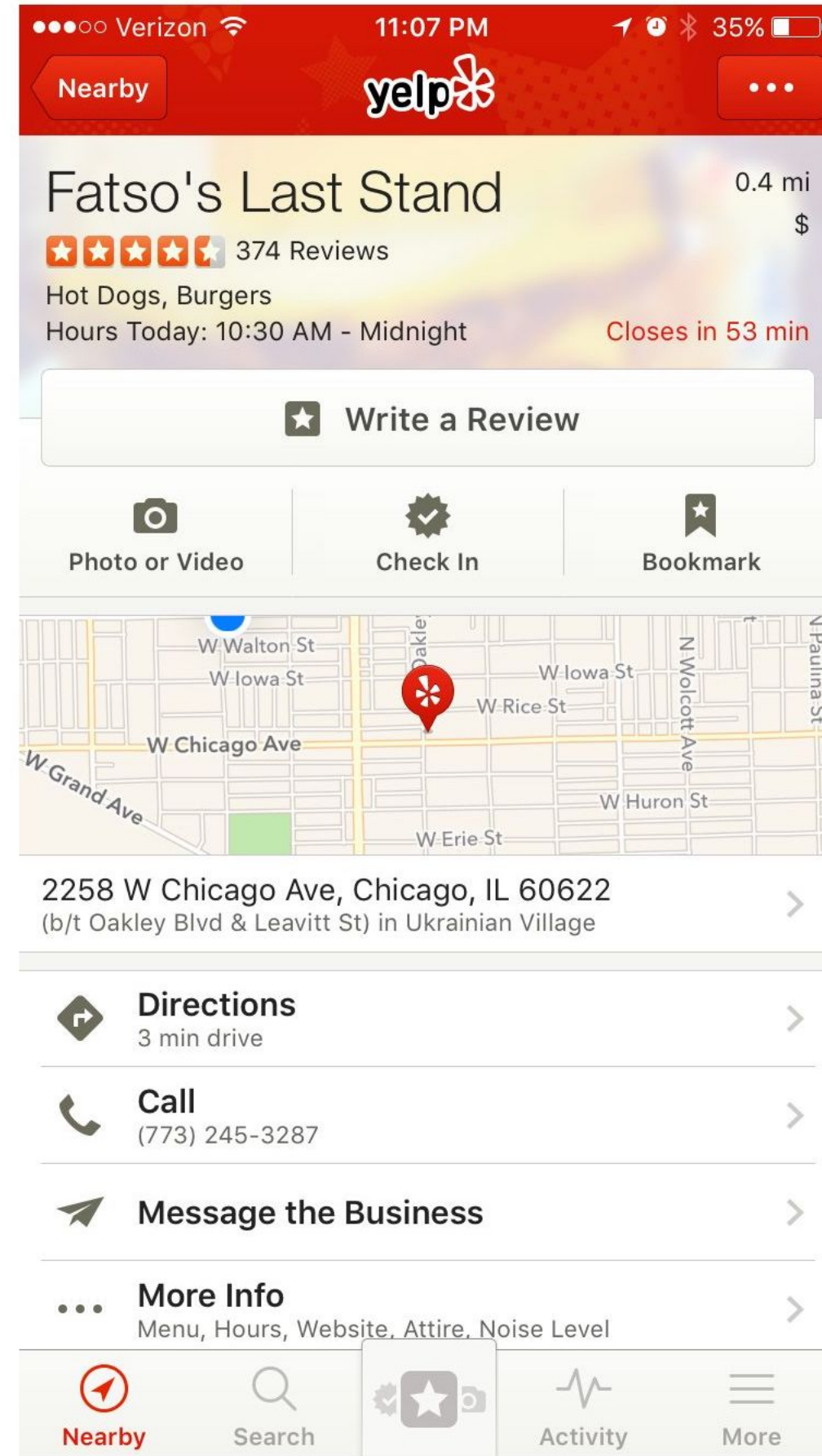
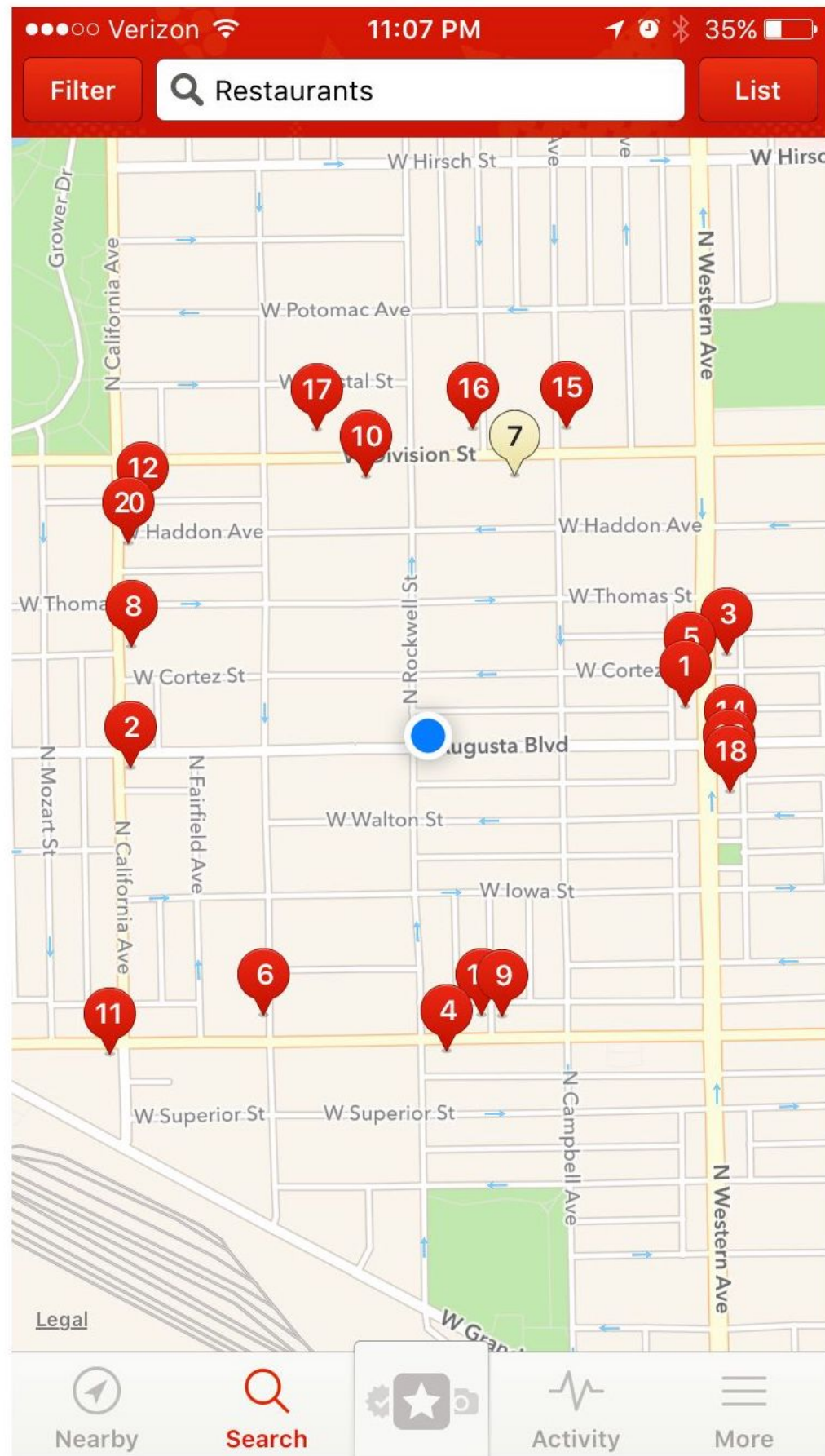
Models, *continued*

1. Pan-and-zoom
2. Flat navigation
3. Modal panel
4. Clear entry points
5. Bookmarks
6. Escape hatch

Models: Hub & spoke

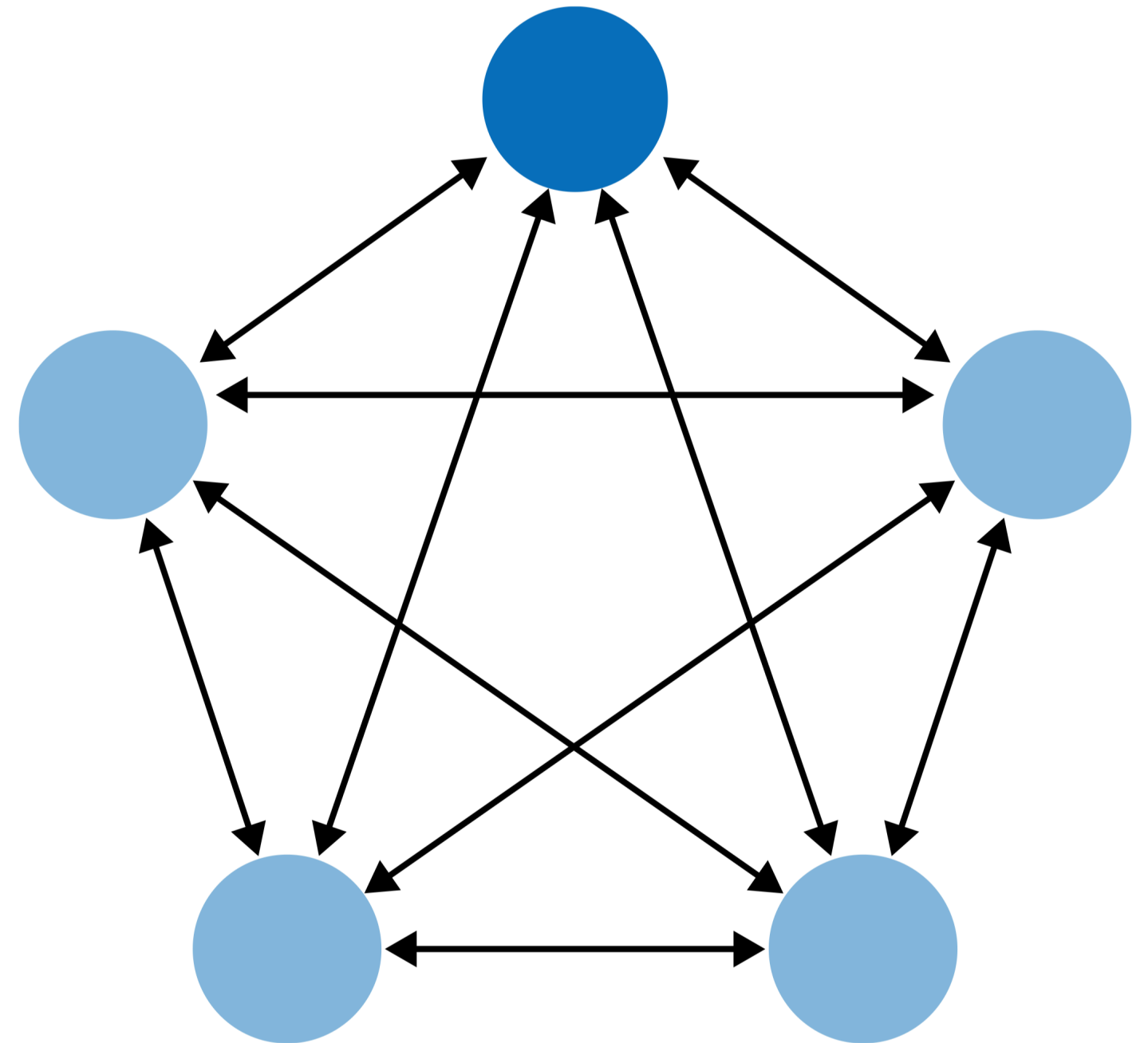
Definition: Involves a central hub, e.g., a home screen, that provides transitions to and from several specialized components.





Models: Fully connected

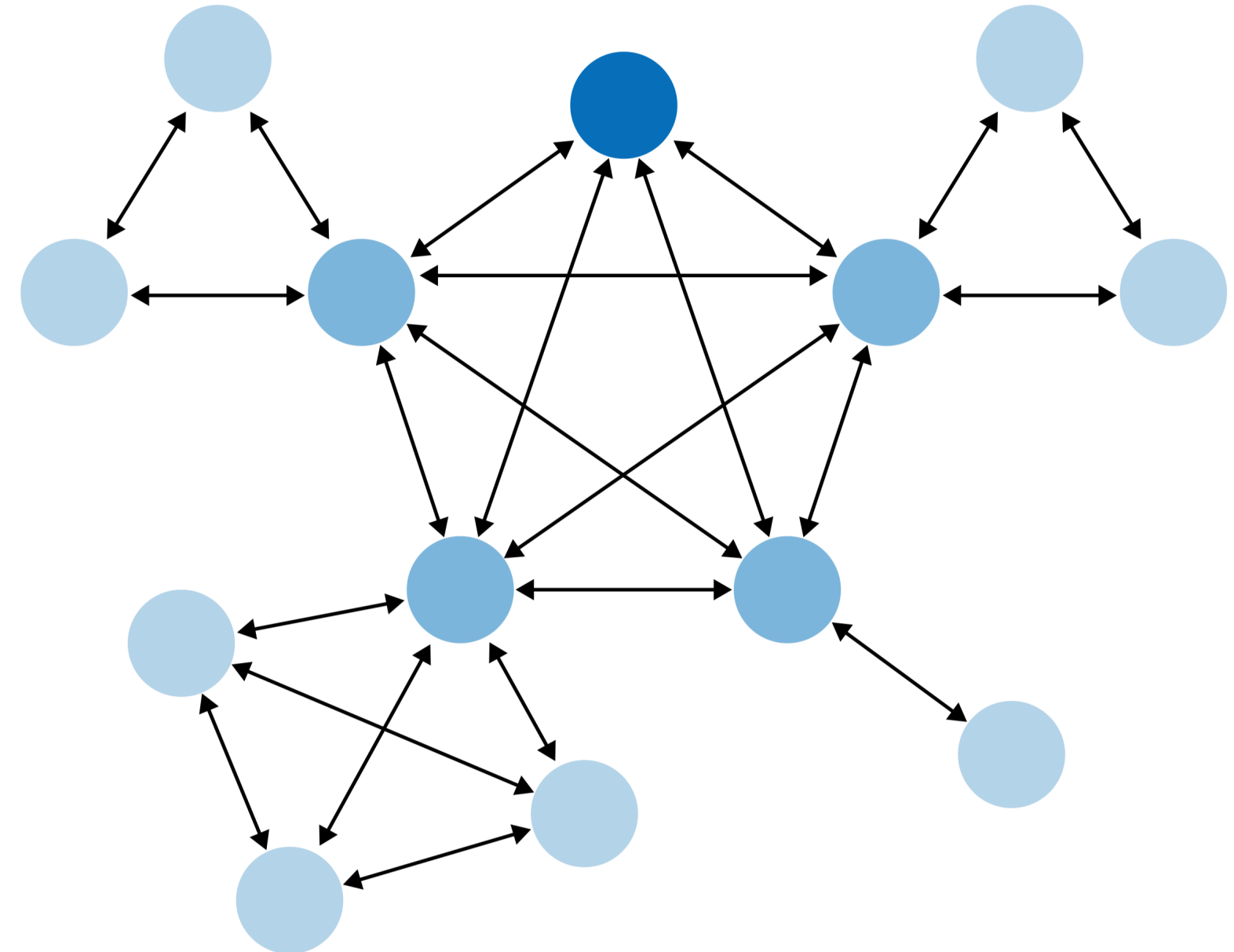
Definition: A central component/page is connected to all other components that are also linked to each other.



Models: Multi-level

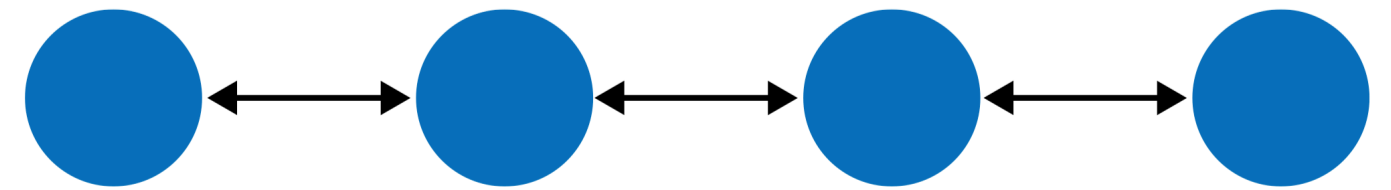
Most websites and apps use this

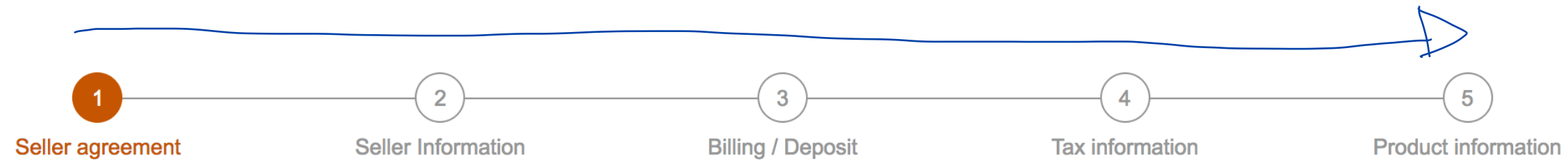
Definition: Involves main components that are fully connected with each other and sub-components that are only connected among themselves.



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? ▸](#)

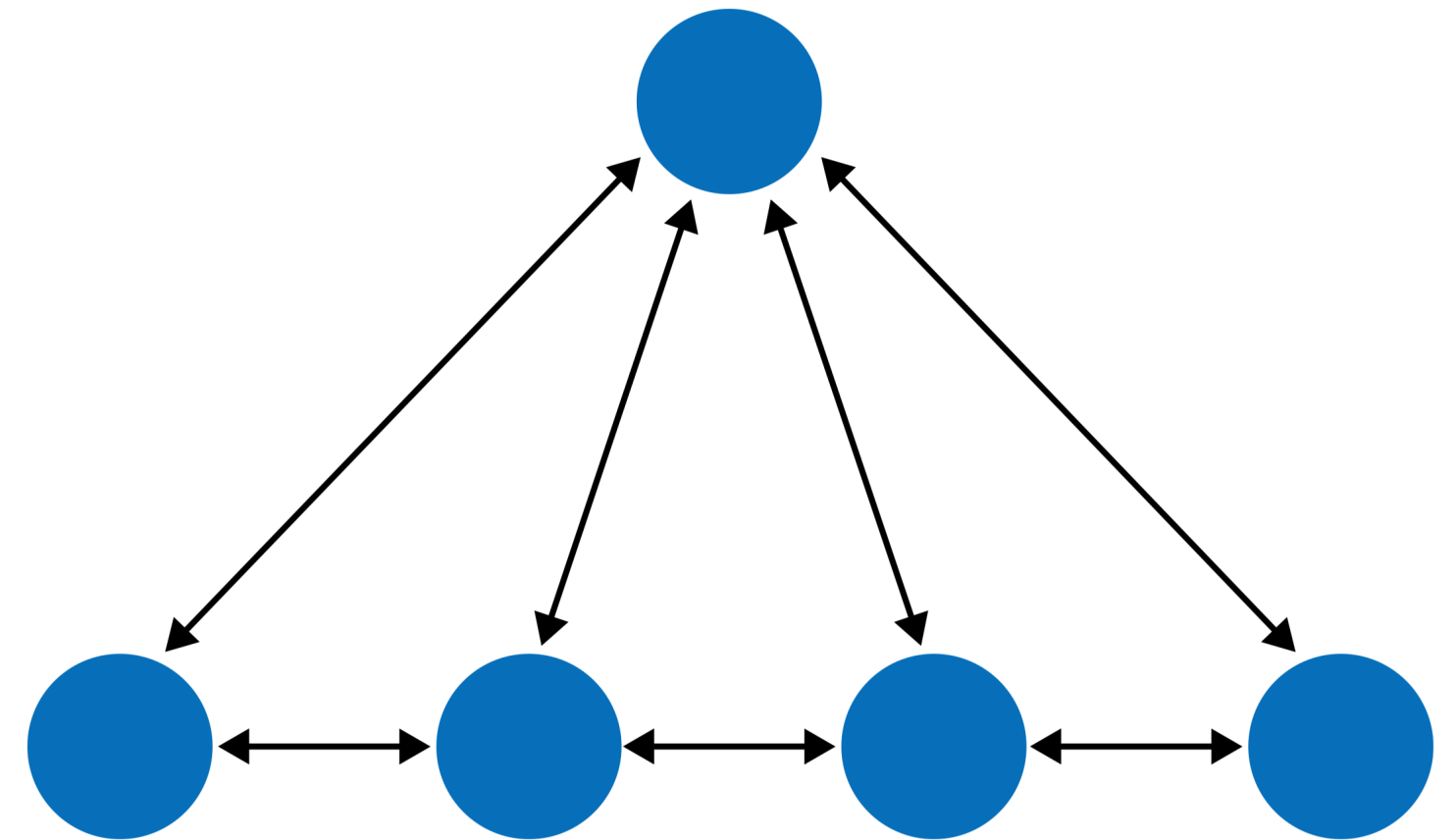
Seller agreement

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:

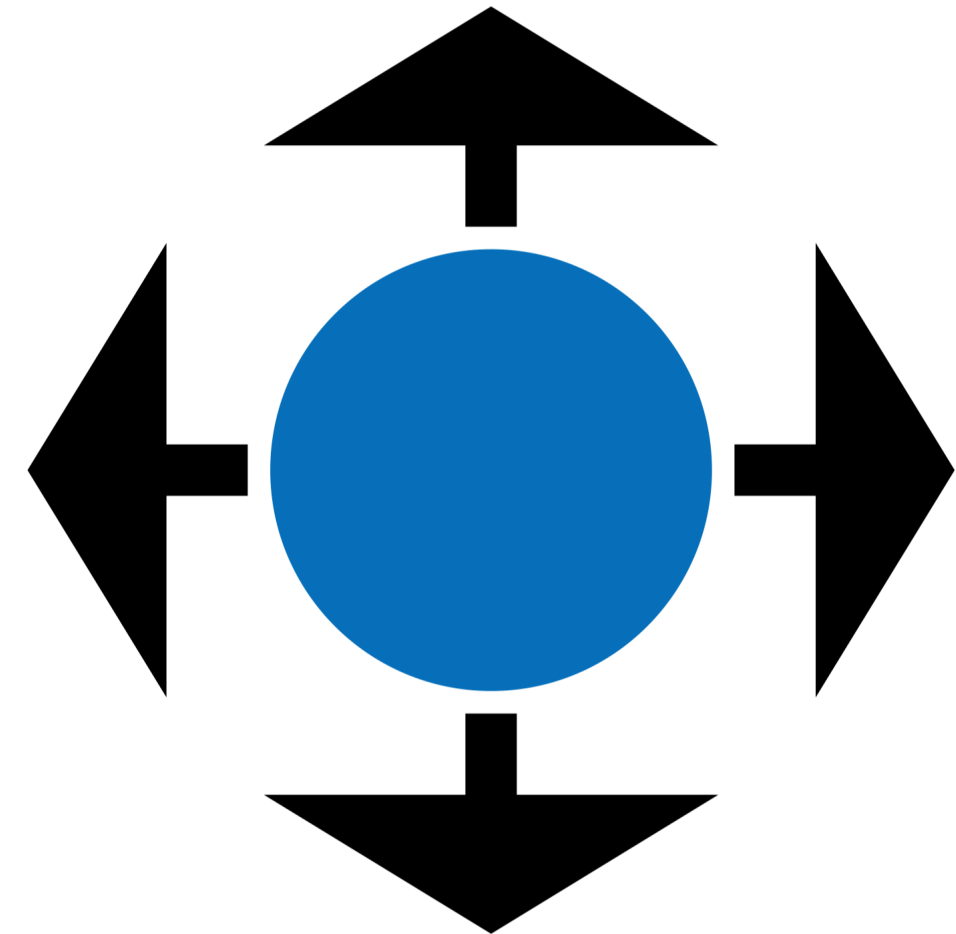
- We'll cover your state requirements
- We'll search for state tax breaks
- We'll help ensure your taxes are accurate

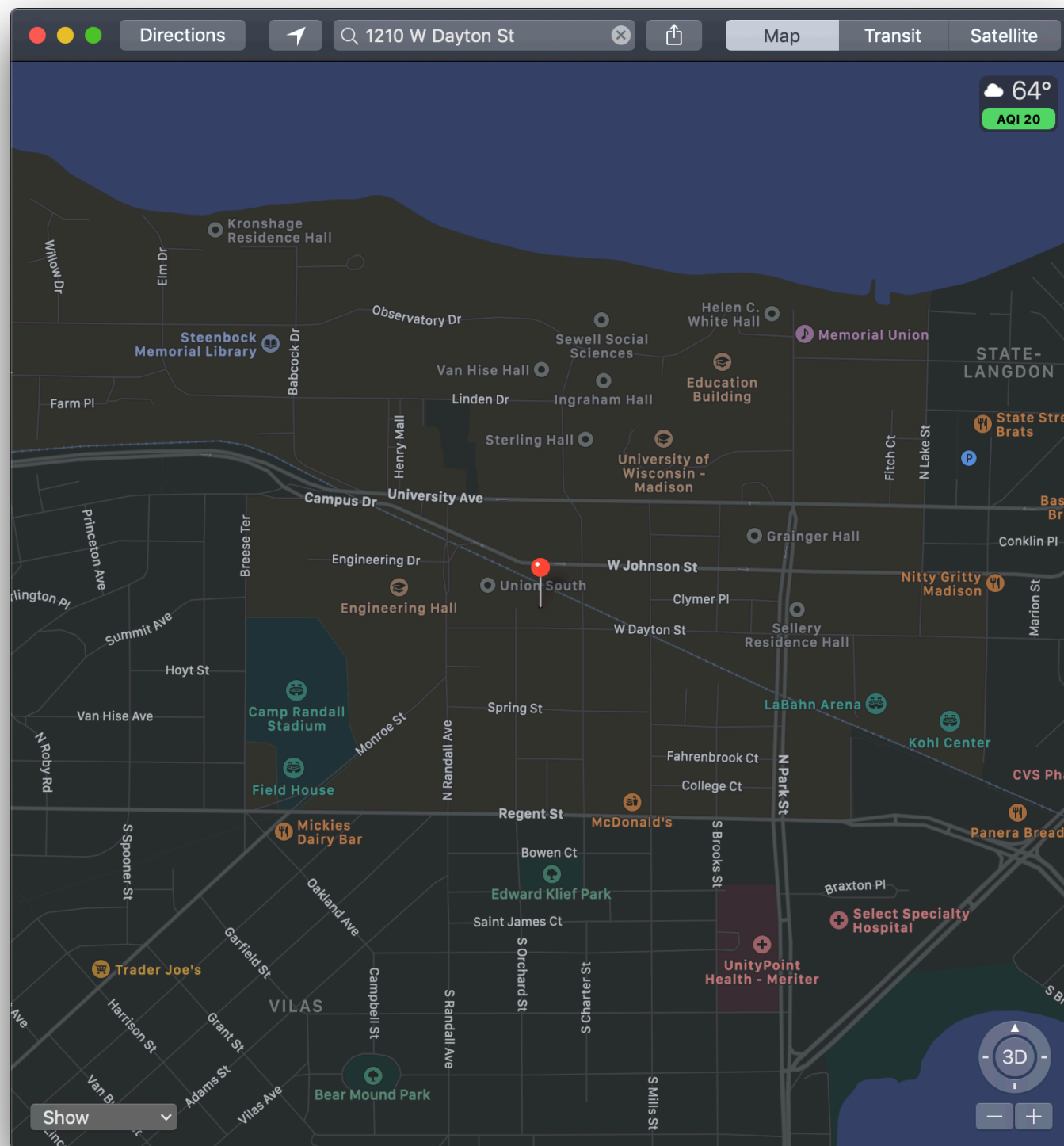
< Back

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.

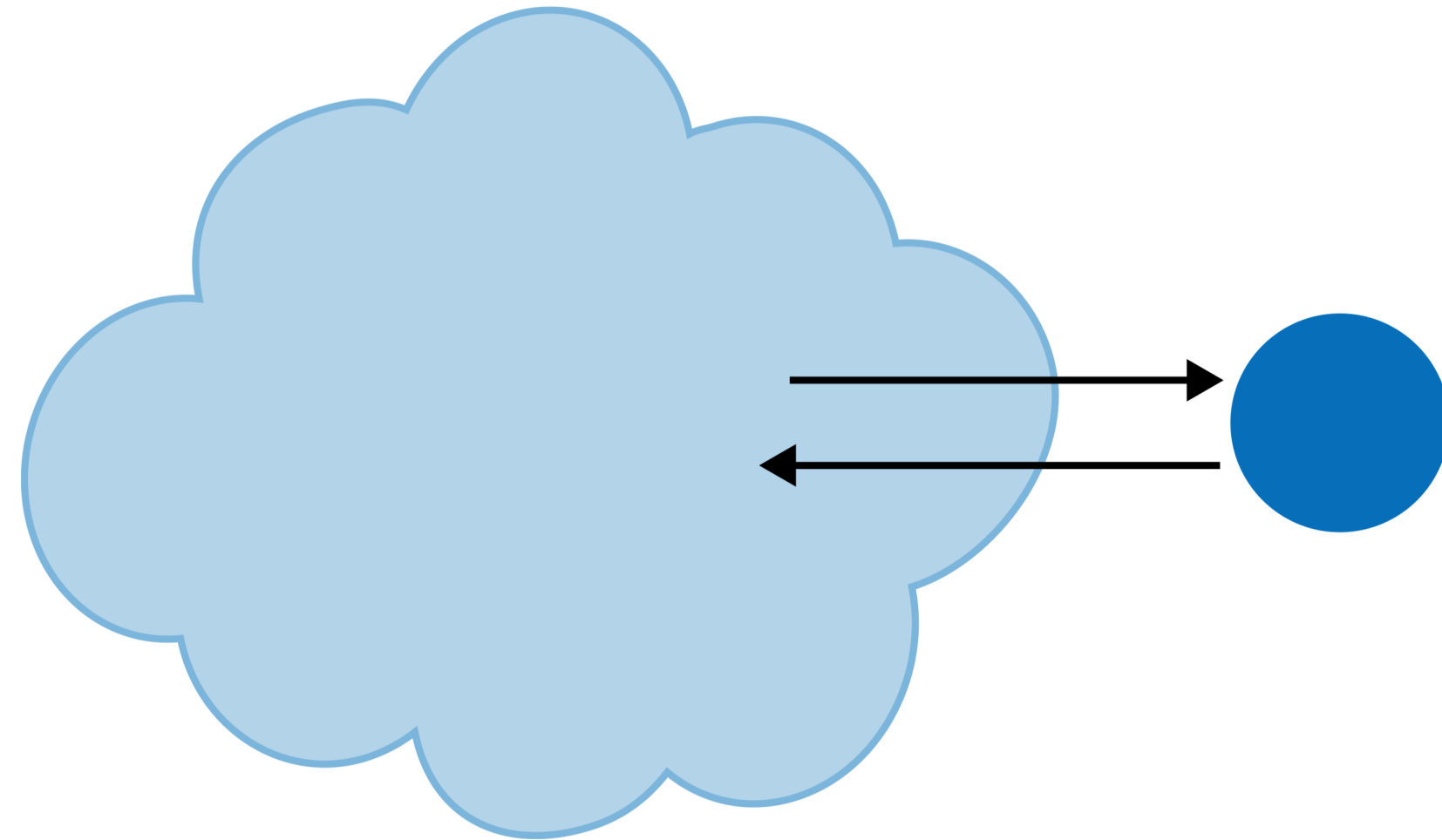
Cras eu scelerisque enim. Sed id diam pharetra, gravida lectus at, maximus nisl. Curabitur eu magna imperdiet, accumsan purus id, faucibus neque. Praesent quam mauris, tincidunt in turpis et, posuere porttitor justo. Donec in dignissim risus. Sed ut ultricies orci, nec pharetra ante. Sed quis ex augue.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

Etiam ultrices massa vitae neque malesuada, a malesuada nulla vulputate. Curabitur at odio a ligula hendrerit mattis eget nec lectus. Sed elementum ex et lorem facilisis, non pharetra nunc fermentum. Etiam id sagittis tortor. Ut suscipit tristique porttitor. Nullam condimentum rhoncus feugiat. Nam odio lorem, pellentesque id euismod ornare, finibus vitae felis. Maecenas tempus facilisis ipsum in venenatis. Fusce porttitor ante vel quam elementum, ac pulvinar augue tristique. Duis justo nisi, condimentum placerat ipsum ut, fermentum pretium

Models: Flat navigation

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

All needed tools are laid out
to not break the flow



Page 1 1 of 1

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

Frame

iPhone X 375x812

MacBook

Welcome

START NOW

VIDEO

3

Modal panel:

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

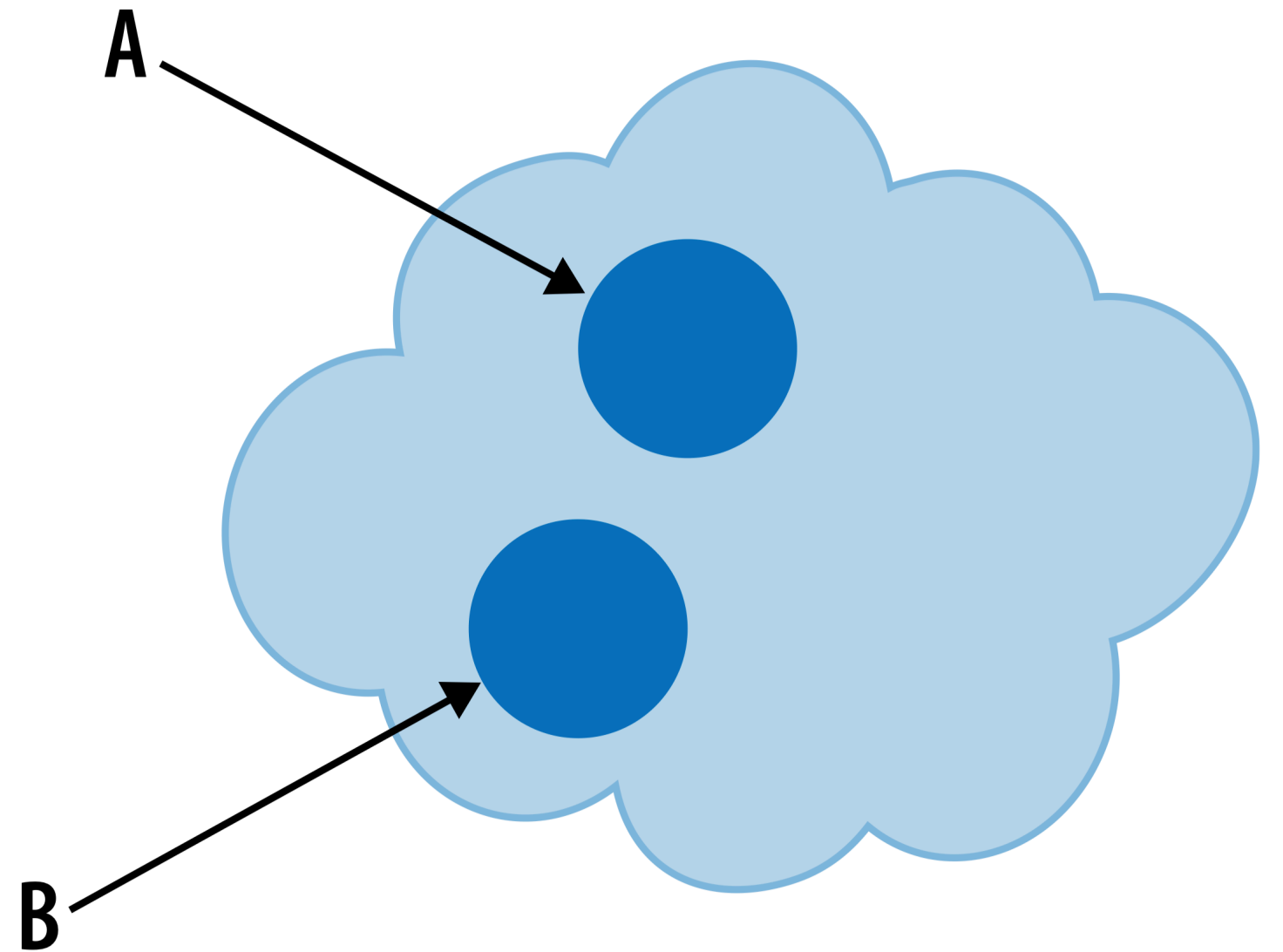
Page 1

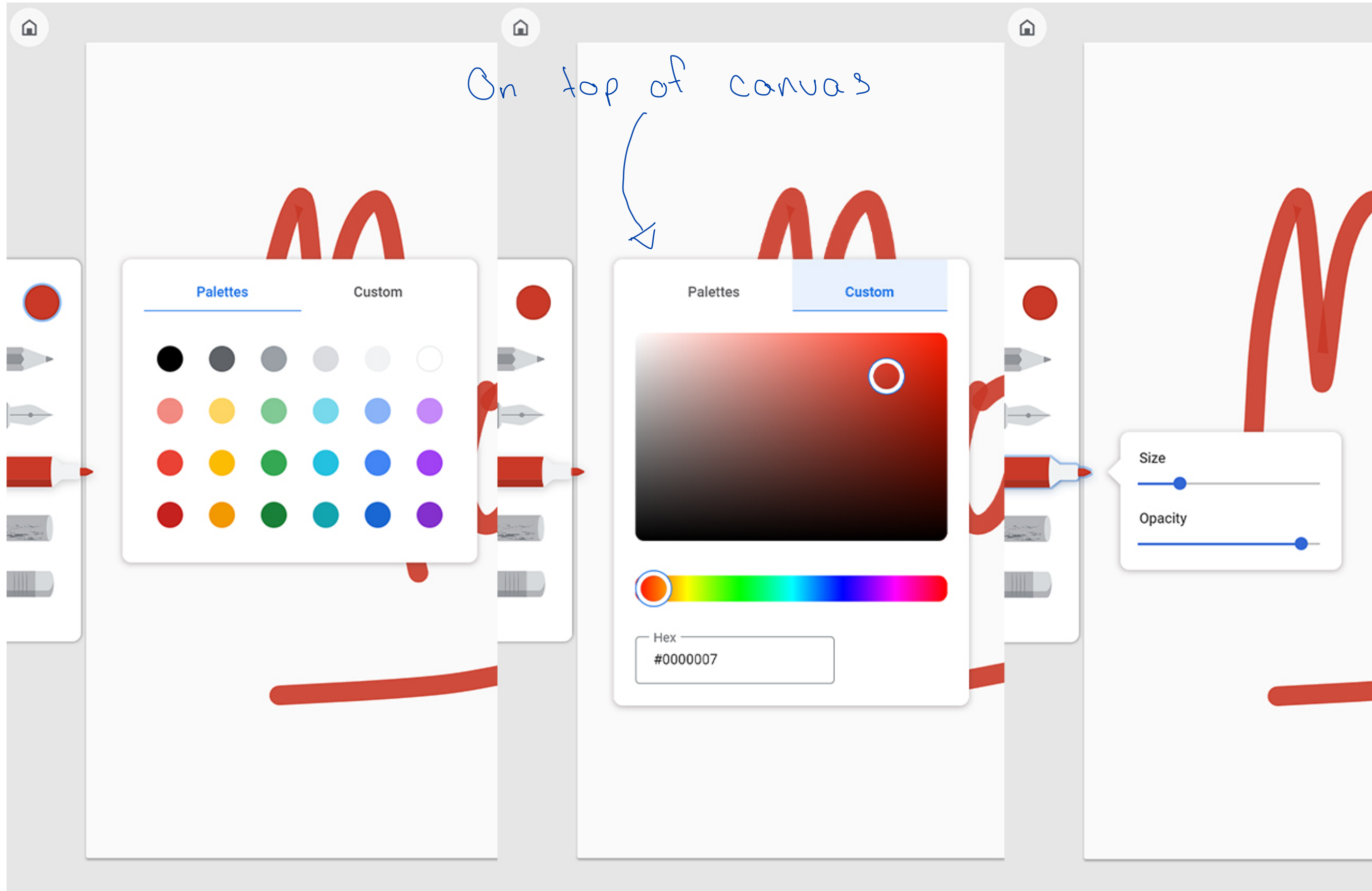
- 3 Maria, a few seconds ago
Let's add some UI elements to make it
- 2 Maria, 26 minutes ago
This is cool.
- 1 Maria, 39 minutes ago
This should be a color-branded button

Modal panel

Models: Modal panel

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

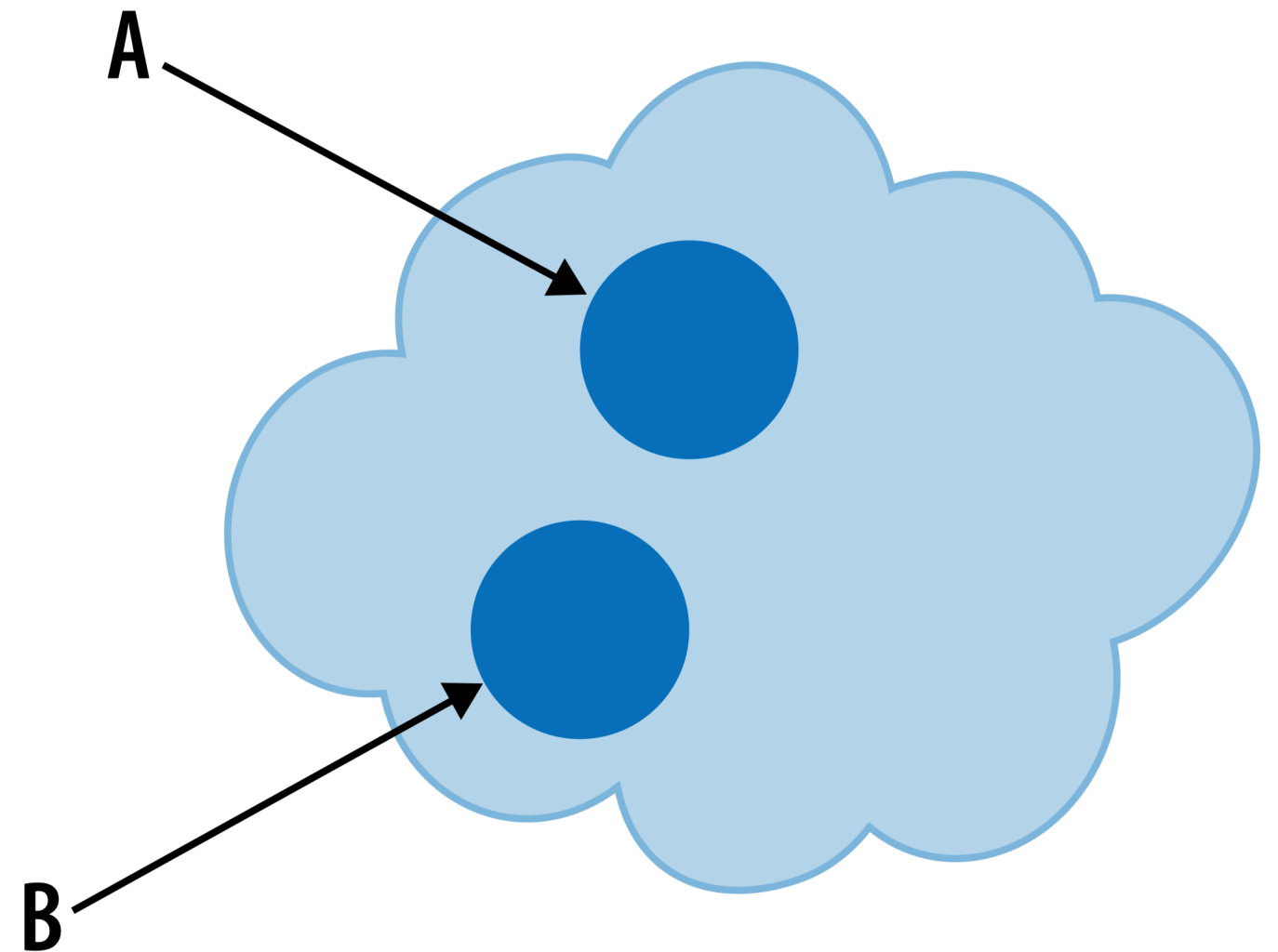




Models: Clear entry points

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.

Amazon prime day has a clear entry point on the homepage



basecamp.com

Basecamp [How it works](#) [Before & after](#) [Got clients?](#) [Pricing](#) [Support](#) [Sign in](#) [Try it FREE](#)

Get it together and manage projects the right way.

Before Basecamp: Projects feel scattered, things slip, it's tough to see where things stand, and people are stressed. **After Basecamp:** Everything's organized in one place, you're on top of things, progress is clear, and a sense of calm sets in.

[Give Basecamp a Try](#)
4,883 companies signed up in the last week alone!

Create Basecamp projects for everything you're working on.

Involve everyone who's working on the project.

Acme Co
2020 Marketing

The client Add/remove people

Message Board

- Retouched team photos
FYI — Hey Victor, here's
- Logo concept
Question — Hey Victor,
- 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

To-dos

Requests

- Company logo

Business cards

- finalize overall design Jul 23
- create press-ready files
- 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

Mac iPad iPhone Watch TV Music Support

iPhone 11 Pro

Pro cameras. Pro display. Pro performance.
From \$24.95/mo. or \$599 with trade-in.*

[Learn more >](#) [Buy >](#)



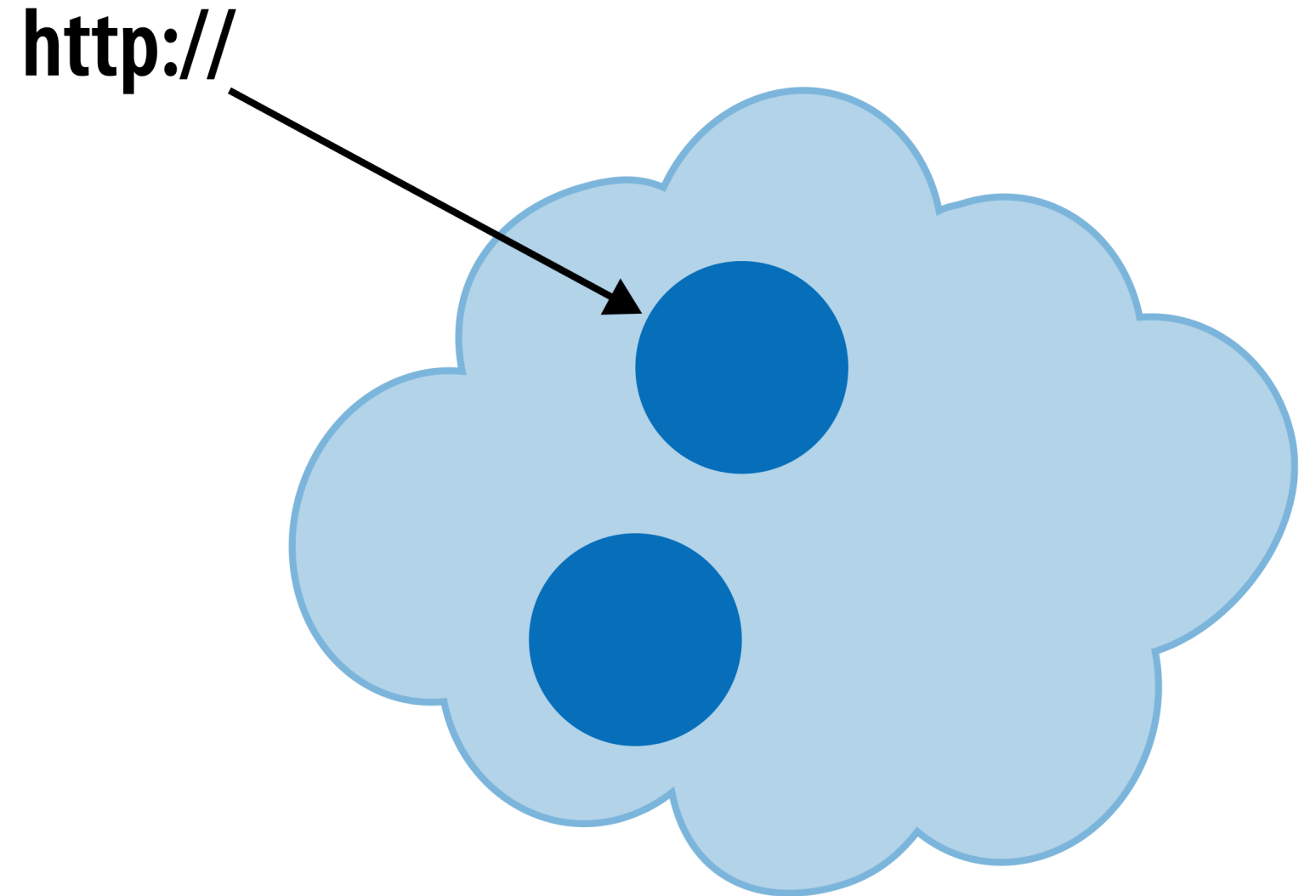
iPhone 11

Just the right amount of everything.
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.

Accessing a very specific point in a complex system



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*

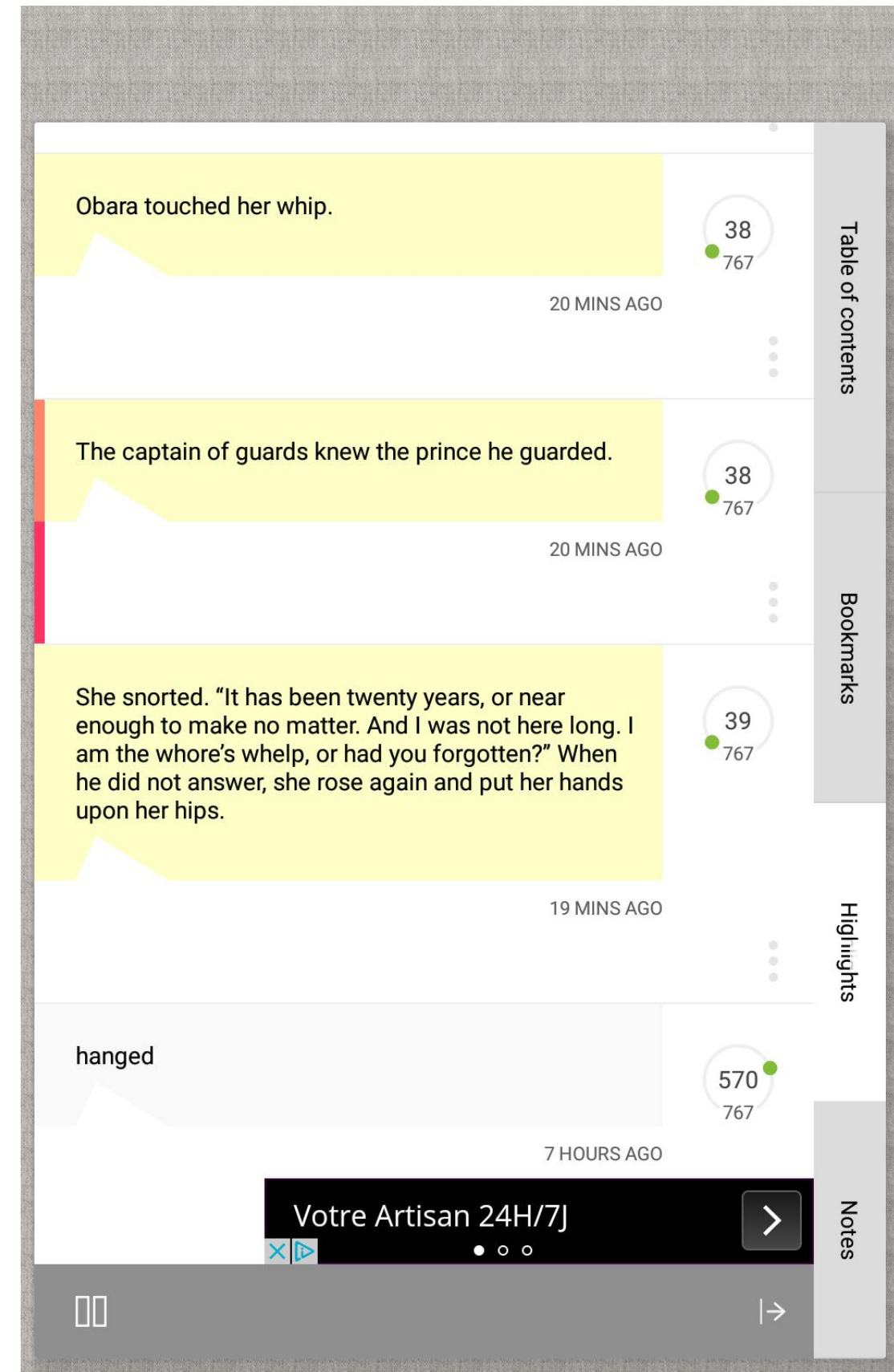
“He do  Hotah said again.

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—”

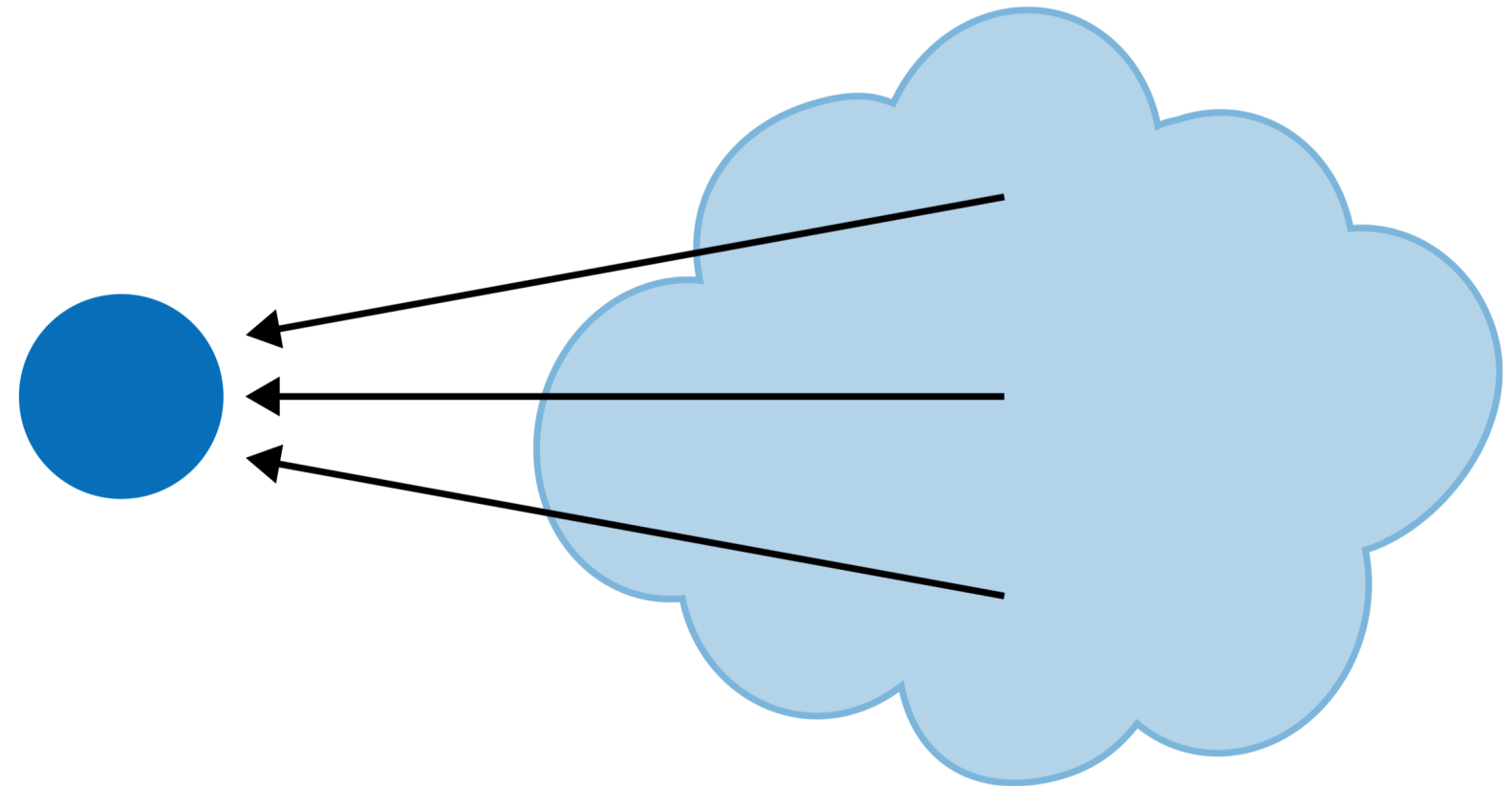
“Captain,” came the command, from behind. “Let her pass. I will speak with her.” The prince’s voice was hoarse.

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 the trail steps back.



amazon.com


amazon Try Prime

EN Hello, Sign in Account & Lists Orders Try Prime

Deliver to Madison 53711


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

All-new blink XT2



- Works with Alexa
- 2-year battery life
- 2-way audio

Deal of the Day

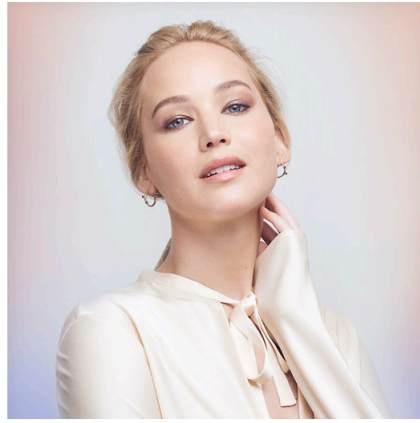


\$117⁹⁹ - \$119⁰⁰

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 [See all deals](#)



apple.com


Mac iPad iPhone Watch TV Music Support

iPhone 11 Pro

Pro cameras. Pro display. Pro performance.

From \$24.95/mo. or \$599 with trade-in.*

[Learn more >](#) [Buy >](#)



iPhone 11

Just the right amount of everything.

From \$16.62/mo. or \$399 with trade-in.*

Principles of Navigation

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

What did we learn today?

- >> Interaction structure
- >> Visual layout design
- >> Principles of navigation