

# Building User Interfaces

# User Interaction

# on Desktop and Web

## Cole Nelson

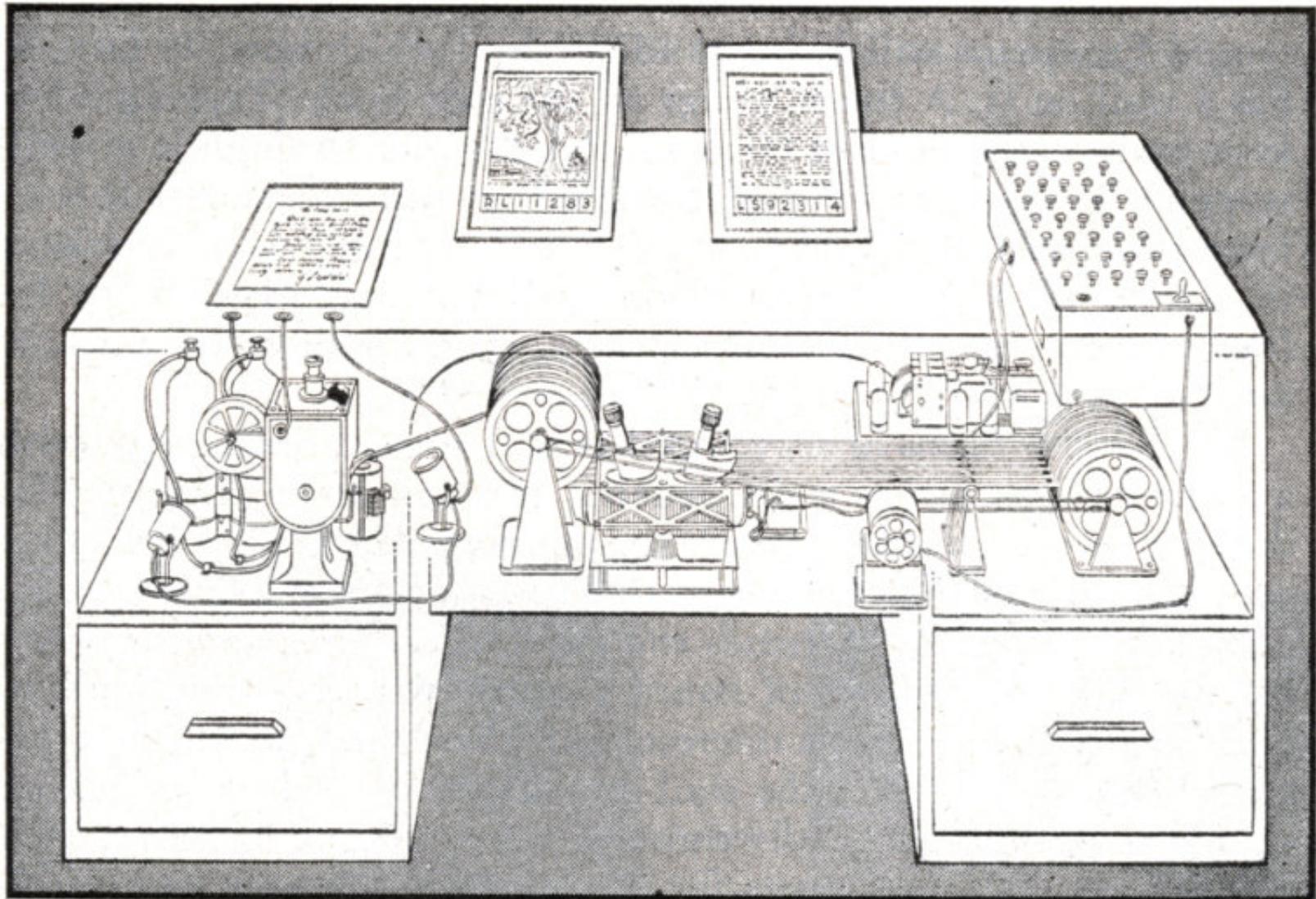
# What will we learn today?

- Know of the history of UI development.
- Explain the similarities and differences of WIMP and Web design
- Understand interaction design fundamentals
- Utilize techniques of driving user interaction
- Conceptualize navigation into different models

# A Brief History of User Interfaces

## Milestone 1: Memex, 1945<sup>1 2 3</sup>

A "proto-hypertext" system that connected documents using associated trails embedded into a desk, developed by Vannevar Bush.



**MEMEX** in the form of a desk would instantly bring files and material on any subject to the operator's fingertips. Slanting translucent viewing screens magnify supermicro-film filed by code numbers. At left is a mechanism which automatically photographs longhand notes, pictures and letters, then files them in the desk for future reference.

<sup>1</sup> Wikipedia: [Memex](#)

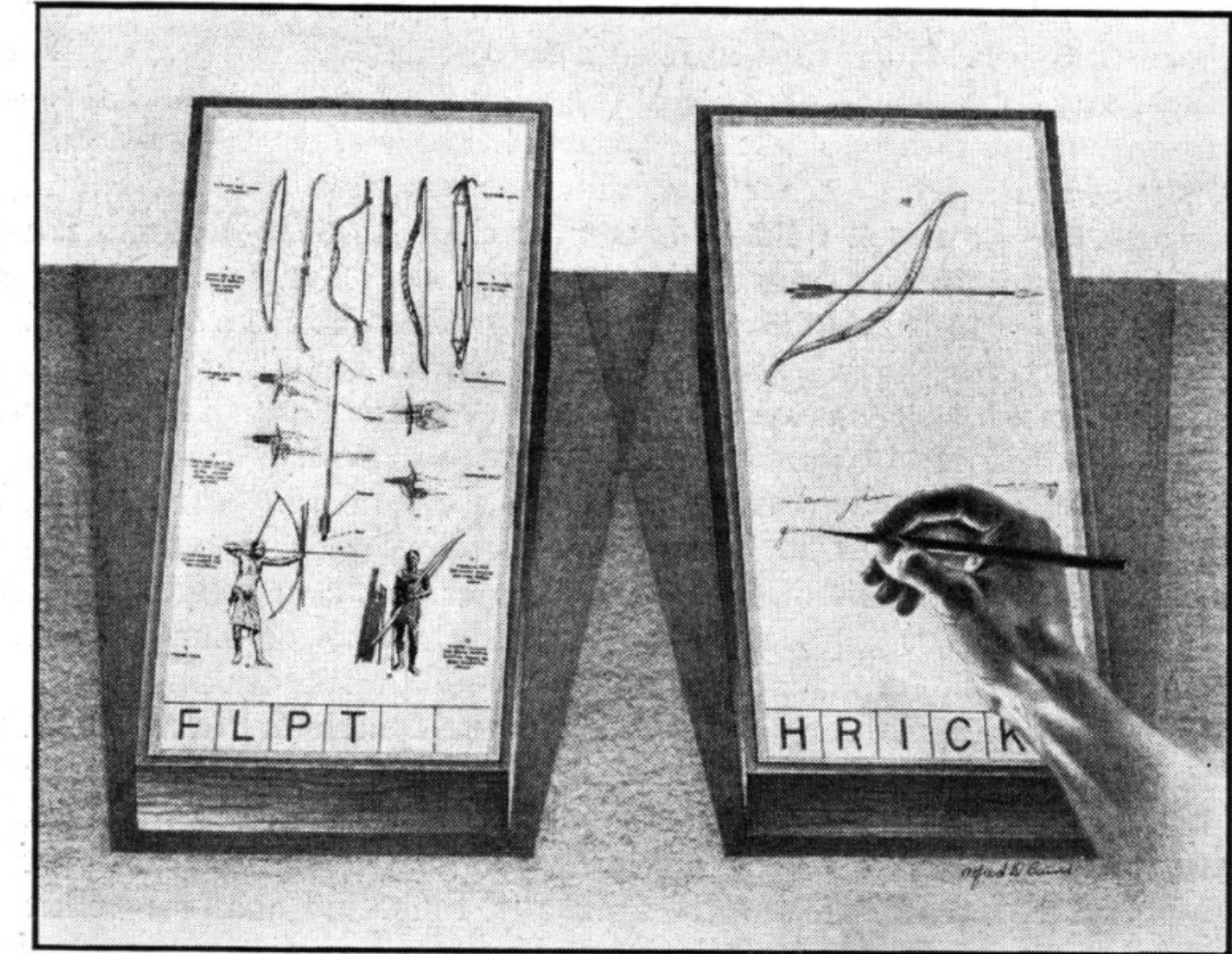
<sup>2</sup> The Atlantic: [As We May Think](#)

<sup>3</sup> Image Source: [Monoskop](#)

## Milestone 1, Continued<sup>4</sup> <sup>5</sup>

“Consider a future device ... in which an individual stores all his books, records, and communications, and which is mechanized so that it may be consulted with exceeding speed and flexibility. It is an enlarged intimate supplement to his memory.”

— Vannevar Bush, 1945



**MEMEX IN USE** is shown here. On one transparent screen the operator of the future writes notes and commentary dealing with reference material which is projected on the screen at left. Insertion of the proper code symbols at the bottom of right-hand screen will tie the new item to the earlier one after notes are photographed on supermicrofilm.

<sup>4</sup>The Atlantic: As We May Think

<sup>5</sup>Image Source: [Monoskop](#)

## Milestone 2: *Sketchpad*, 1963<sup>6</sup> <sup>7</sup>

The first program to utilize a complete graphical user interface and that implemented object-oriented programming, non-procedural programming, constraints, pen input, etc. Sketchpad was developed by Ivan Sutherland.



<sup>6</sup> Wikipedia: [Sketchpad](#)

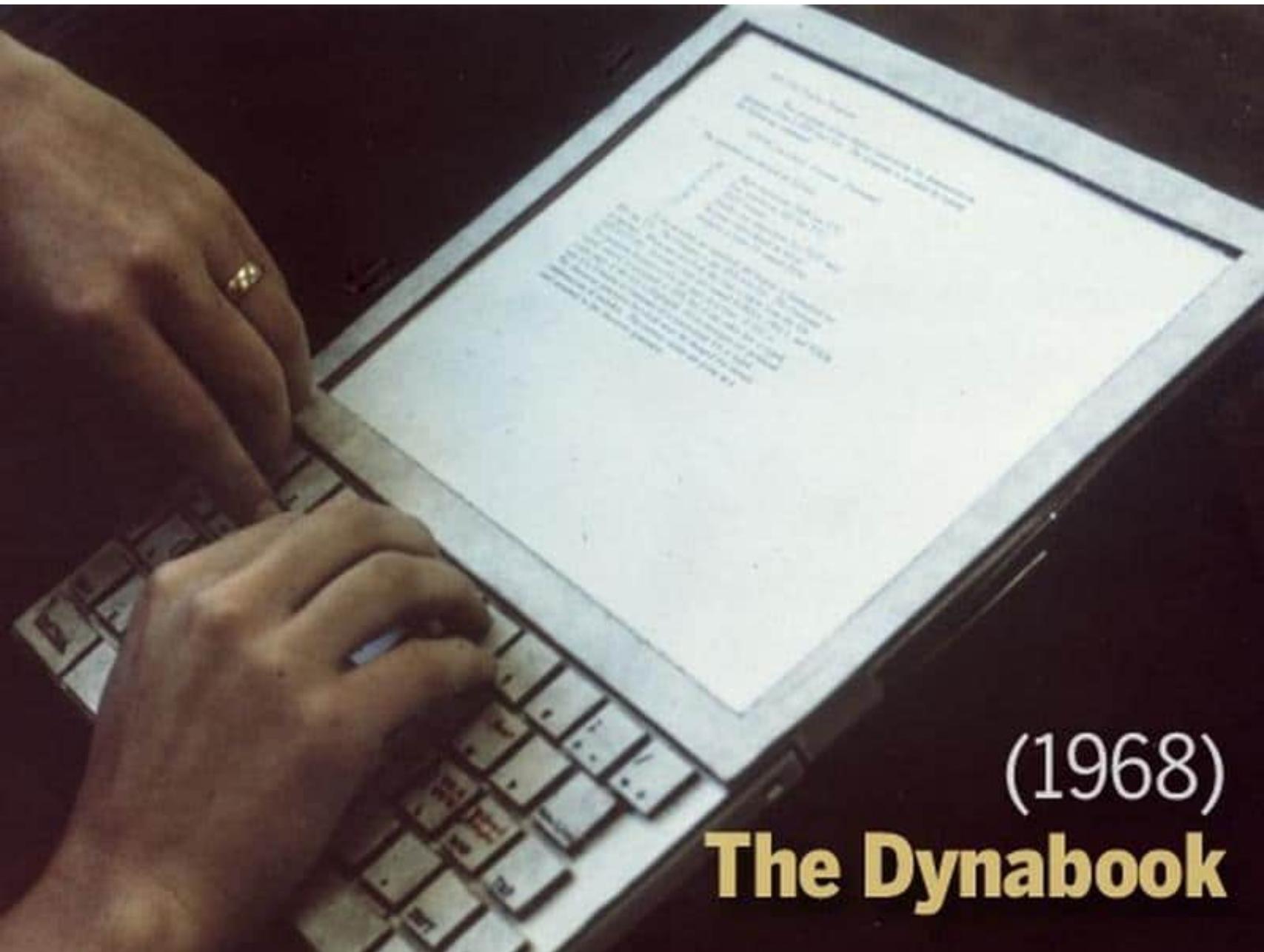
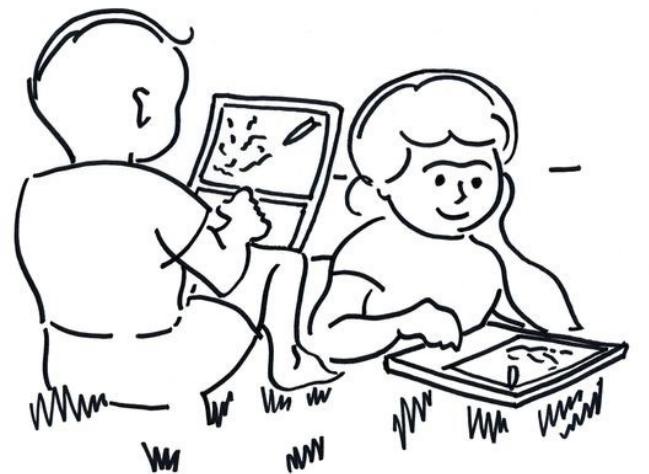
<sup>7</sup> [Image source](#)

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## Milestone 3: Dynabook, 1968<sup>10 11</sup>

A conceptual portable educational device for children (i.e., the first laptop/tablet computer) developed by Alan Kay.



<sup>10</sup> Image sources: [left](#), [right](#)

<sup>11</sup> [A talk by Alan Kay on the history of Dynabook](#)

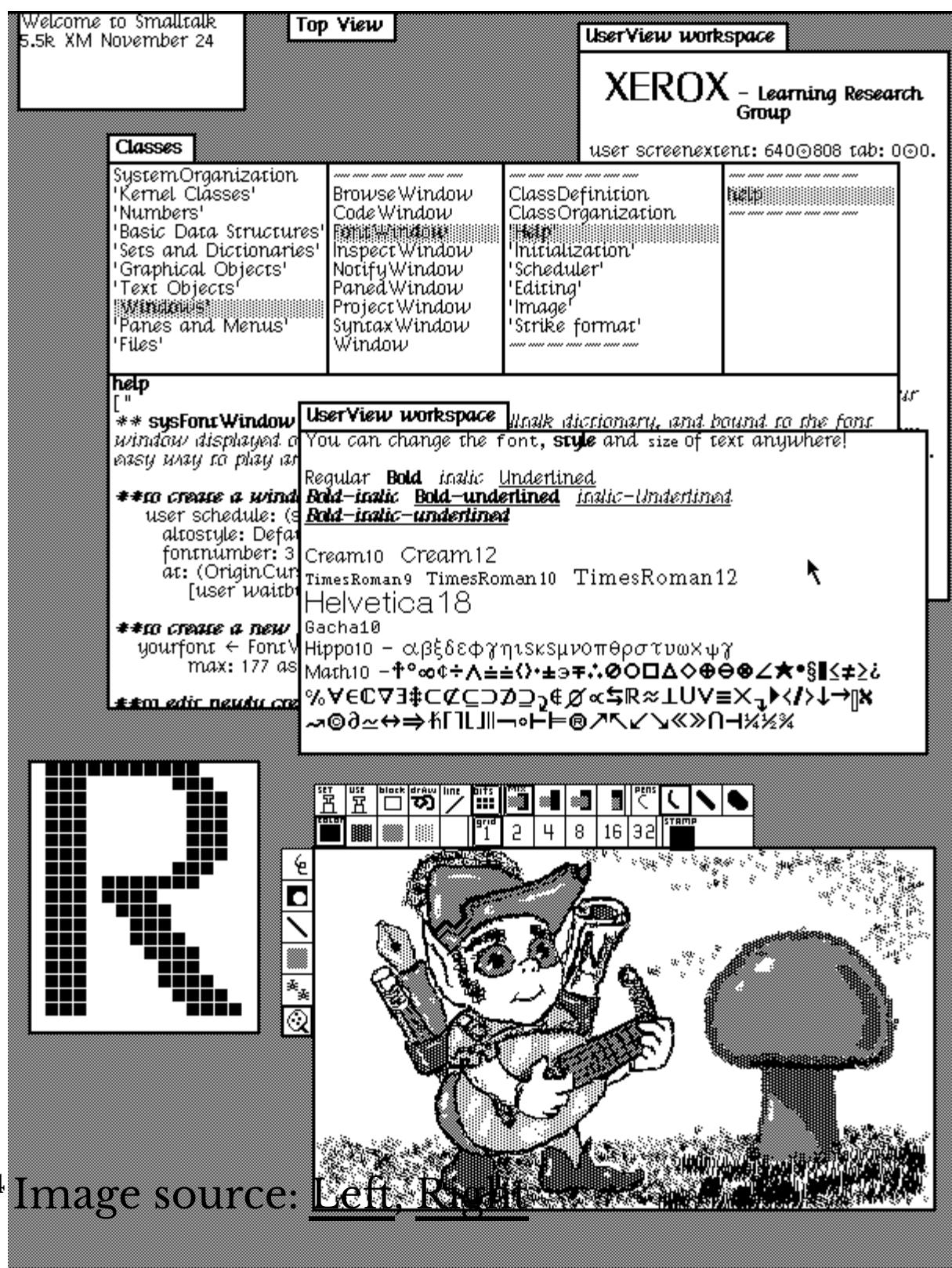
## Milestone 4: Xerox Alto, 1973<sup>12 13</sup>

The first computer to support an OS based on a GUI that integrated the ideas developed for Dynabook. It was developed at the Xerox PARC (Palo Alto Research Center).

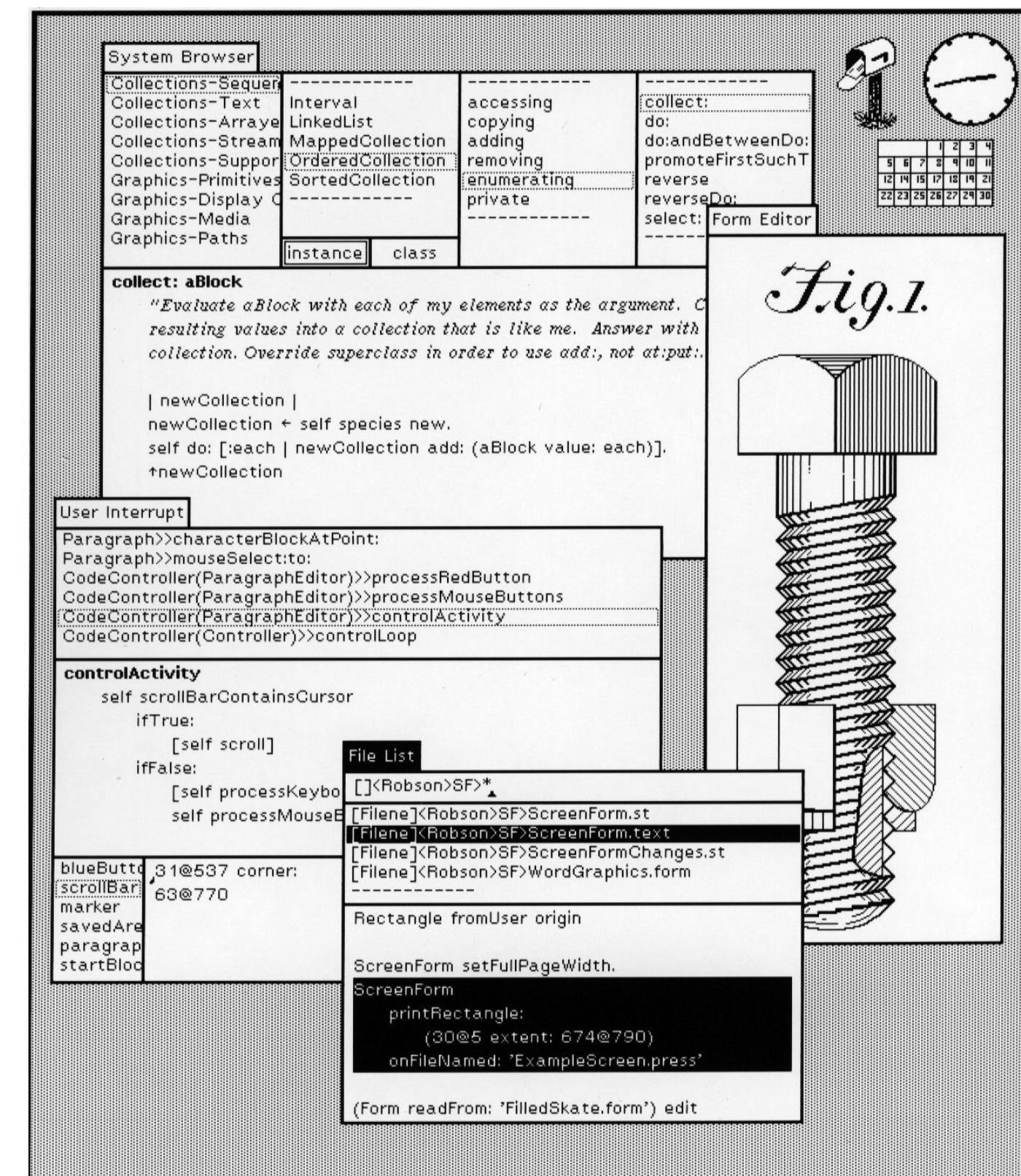


<sup>12</sup> [Wikipedia: Dynabook](#)

<sup>13</sup> [Image source](#)



<sup>14</sup> Image source: Left, Right



## Milestone 5: Xerox Star, 1981<sup>15 16 17</sup>

First commercial system with a user interface that integrates today's technologies, including windows, icons, folders, mouse, etc.



<sup>15</sup> Wikipedia: [Xerox Star](#)

<sup>16</sup> Videos of the Star Interface: [Part 1](#), [Part 2](#)

<sup>17</sup> [Image source](#)

**XEROX**  
**6085 Workstation**

**User-Interface Design**

To make it easy to compose text and graphics, to do electronic filing, printing, and mailing all at the same workstation, requires a revolutionary user-interface design.

**Bit-map display** - Each of the pixels on the 19" screen is mapped to a bit in memory; thus, arbitrarily complex images can be displayed. The 6085 displays all fonts and graphics as they will be printed. In addition, familiar office objects such as documents, folders, file drawers and in-baskets are portrayed as recognizable images.

**The mouse** - A unique pointing device that allows the user to quickly select any text, graphics or office object on the display.

**See and Paint**

All functions are visible to the user on the keyboard or on the screen. The user does filing and retrieval by selecting them with the mouse and touching the MOVE, COPY, DELETE or PROPERTIES command keys. Text and graphics are edited with the same keys.

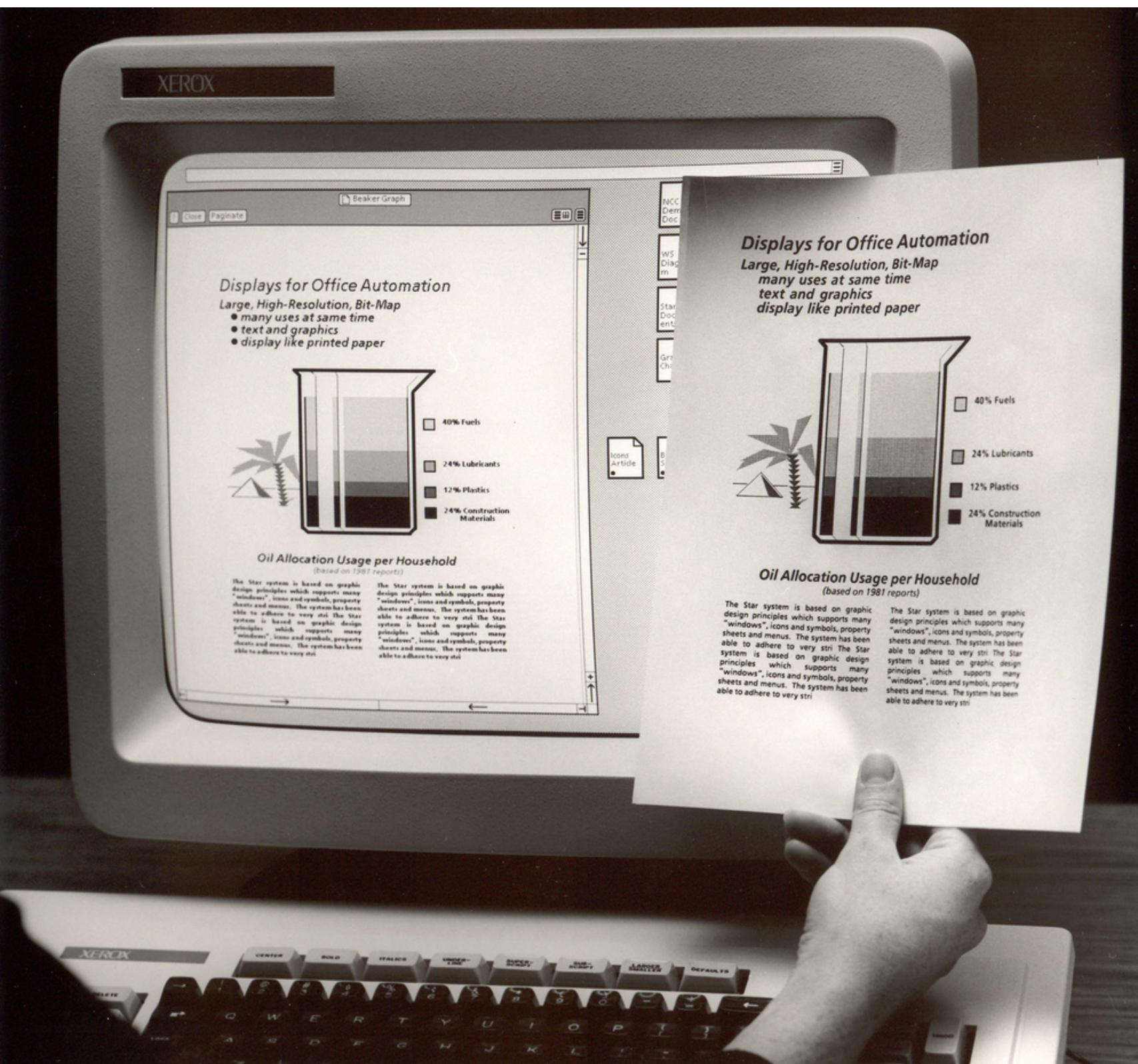
**Workstation usage percentages**

Table 1 and illustrated in Figure 1 shows the usage percentages of the 6085 users are likely to do no composition and layout, control process including printing and display.

**Text and Graphics**

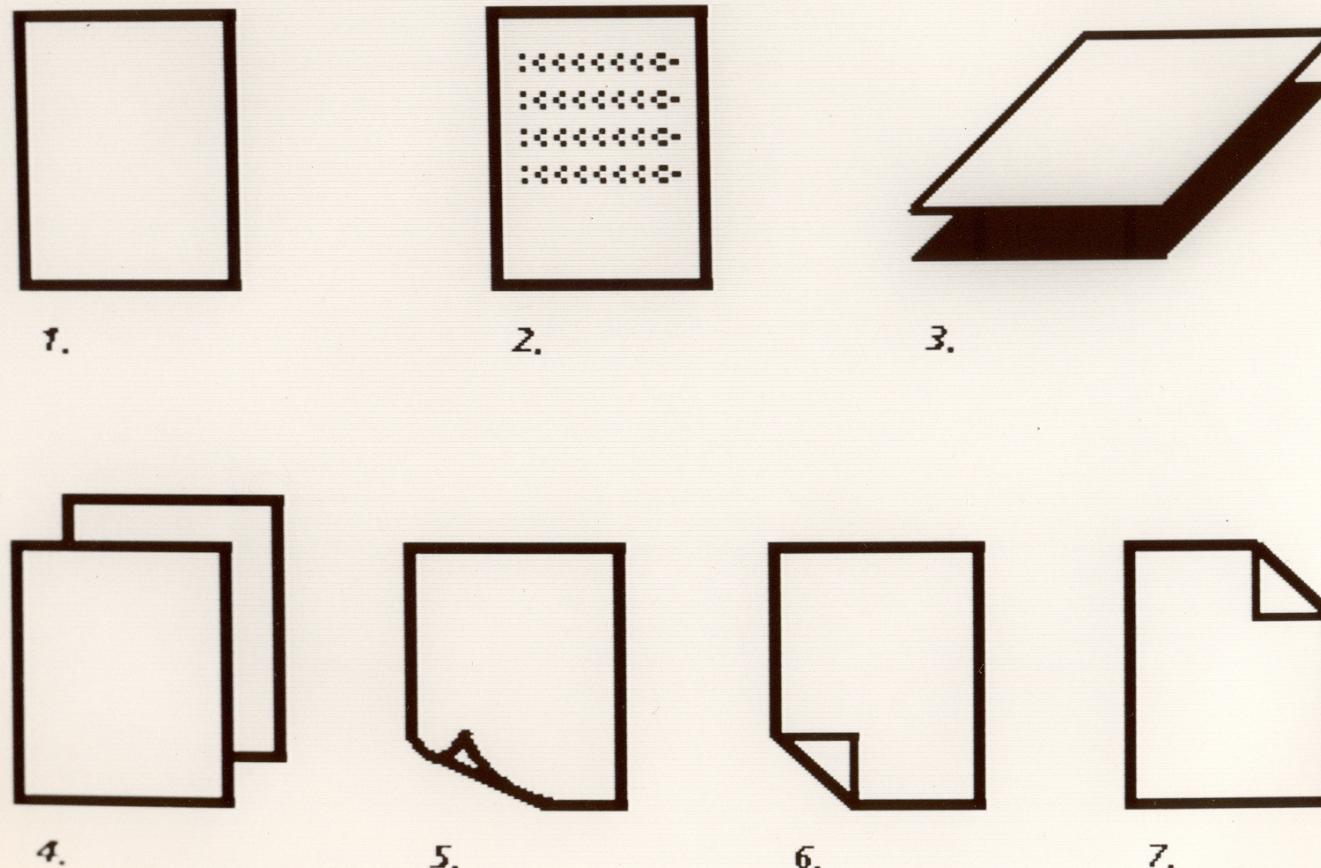
To replace typesetting, the 6085 offers a choice of type faces and sizes, from 6 point to 36 point.

Here is a sentence of 10-point text.  
Here is a sentence of 12-point text.  
18-point text.  
24-point text.  
36-point text.



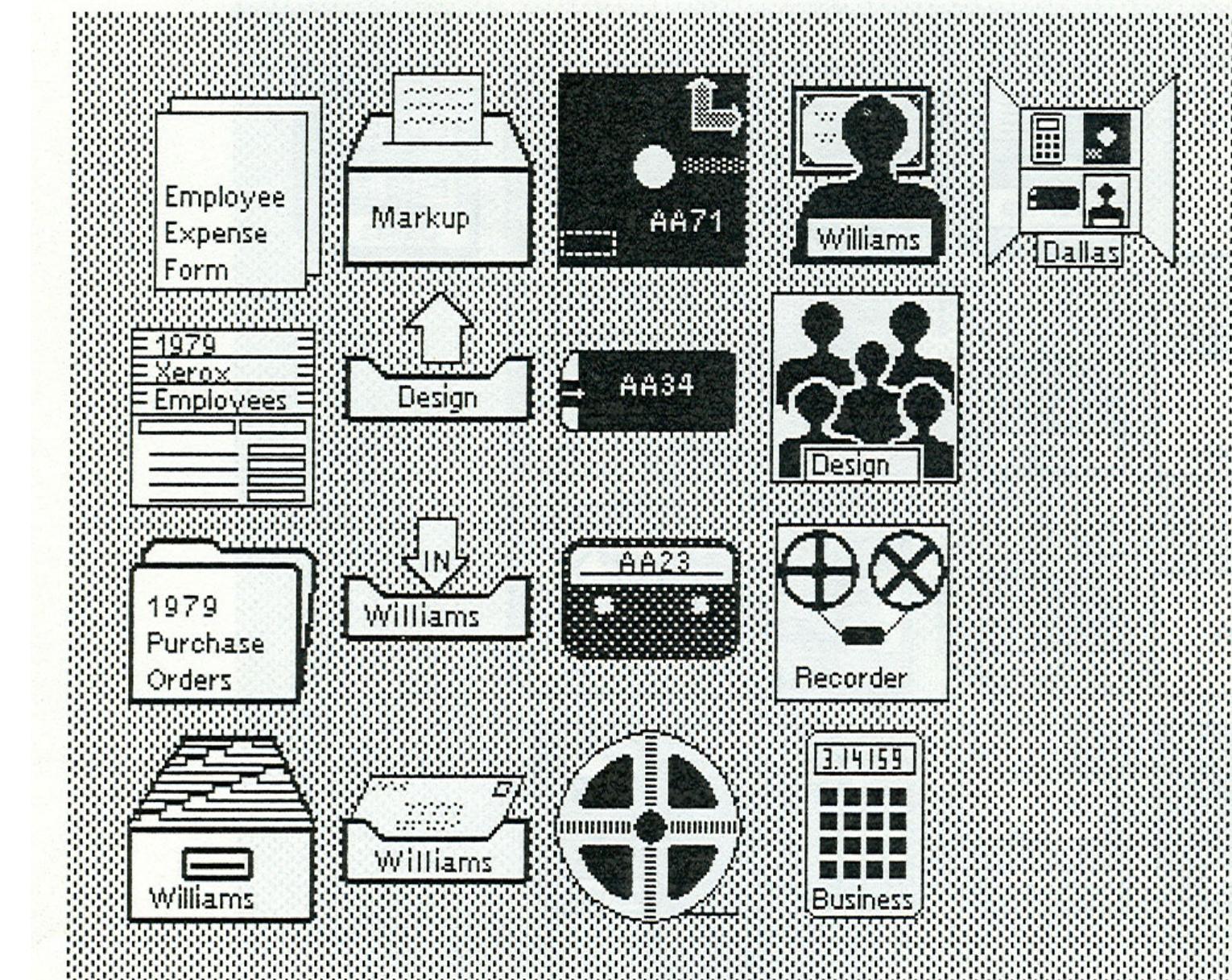
<sup>18</sup> Image source: [Left](#), [Right](#)

*Evolution of "Document" icon Shape*



<sup>19</sup> Image source: [Left](#), [Right](#)

Figure 4.  
Set 4 (Judd)

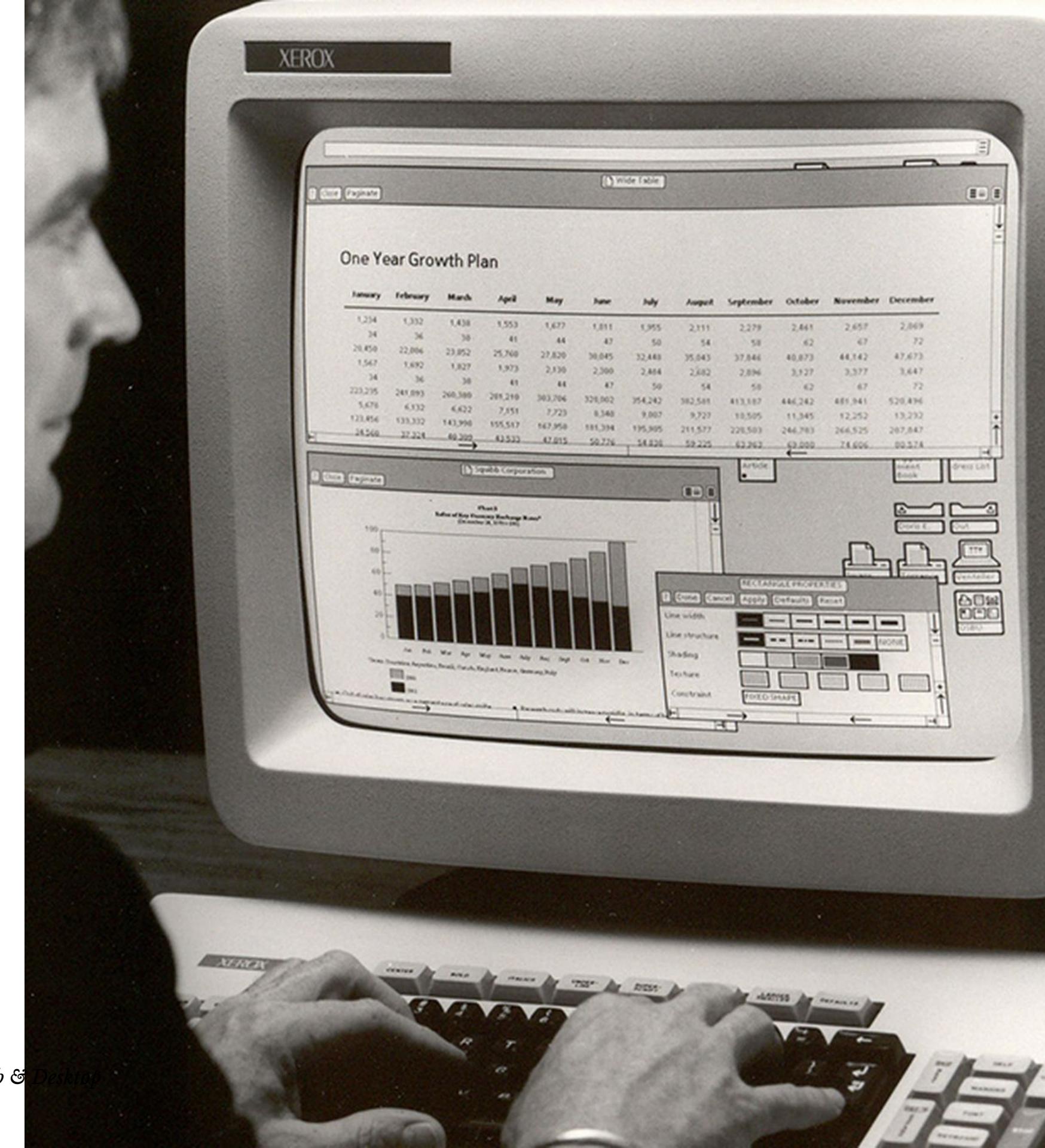


document	printer	floppy disk	user	directory
record file	out-basket	mag. card	group	file drawer
folder	in-basket	cassette	recorder	edit by
file drawer	in-basket (with mail)	mag. tape	calculator	read by

# Designing for the Desktop

# The WIMP Paradigm<sup>20</sup>

**Definition:** *Windows, icons, menus, and pointer*, or *WIMP*, is a design paradigm that current desktop interfaces follow that dates back to the Xerox Alto (1973).

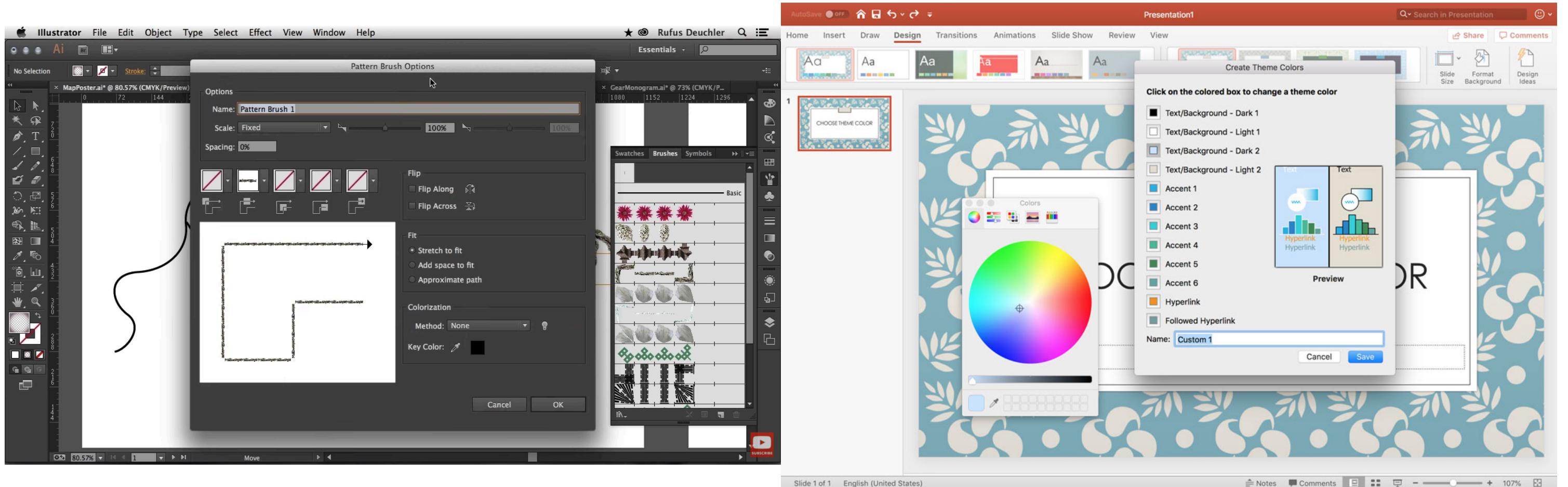


<sup>20</sup> Image source

## Elements of the WIMP Paradigm: *Windows*

**Definition:** Windows are resizable containers of individual applications.

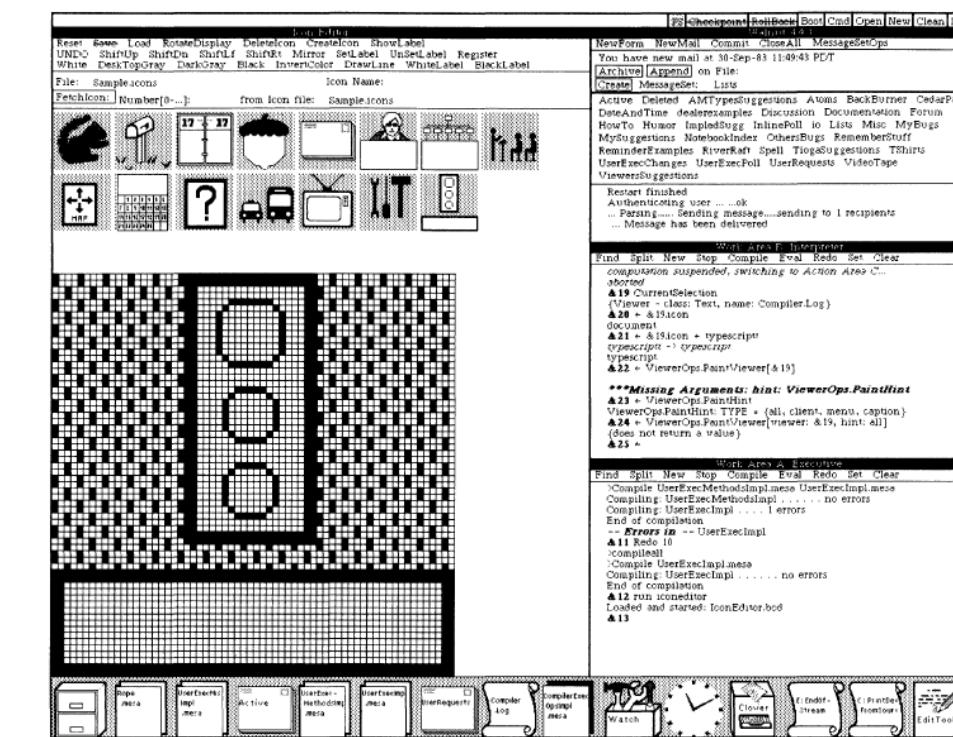
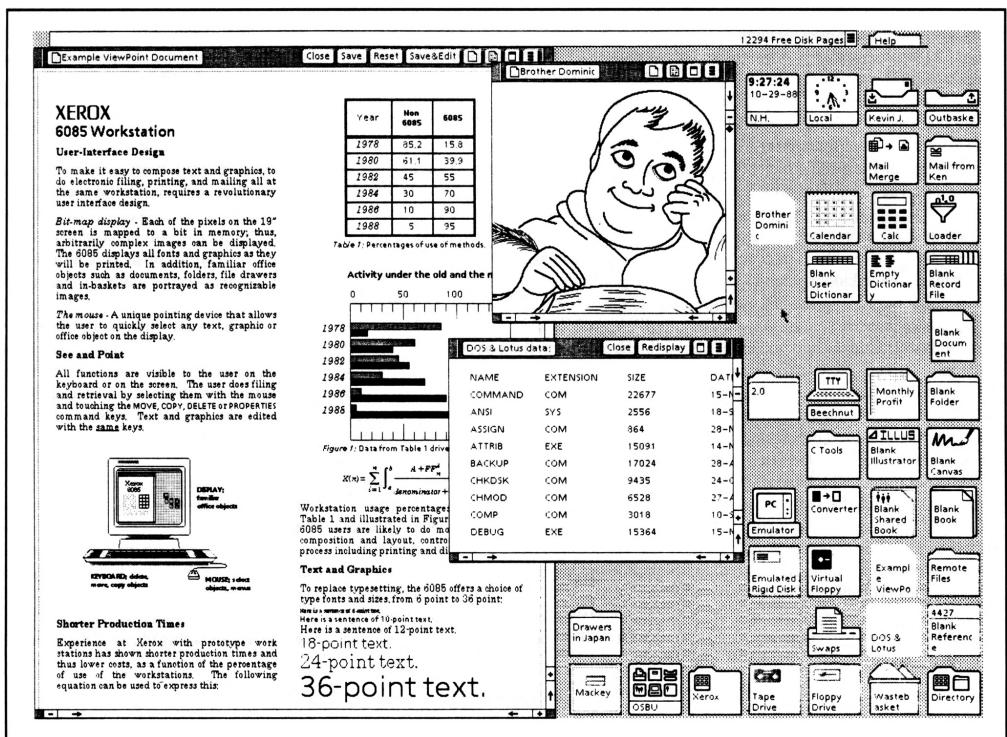
*Primary* windows contain elements for the main functionality of the application, such as a canvas. *Secondary* windows support main windows through modal panes, dialog boxes, etc.



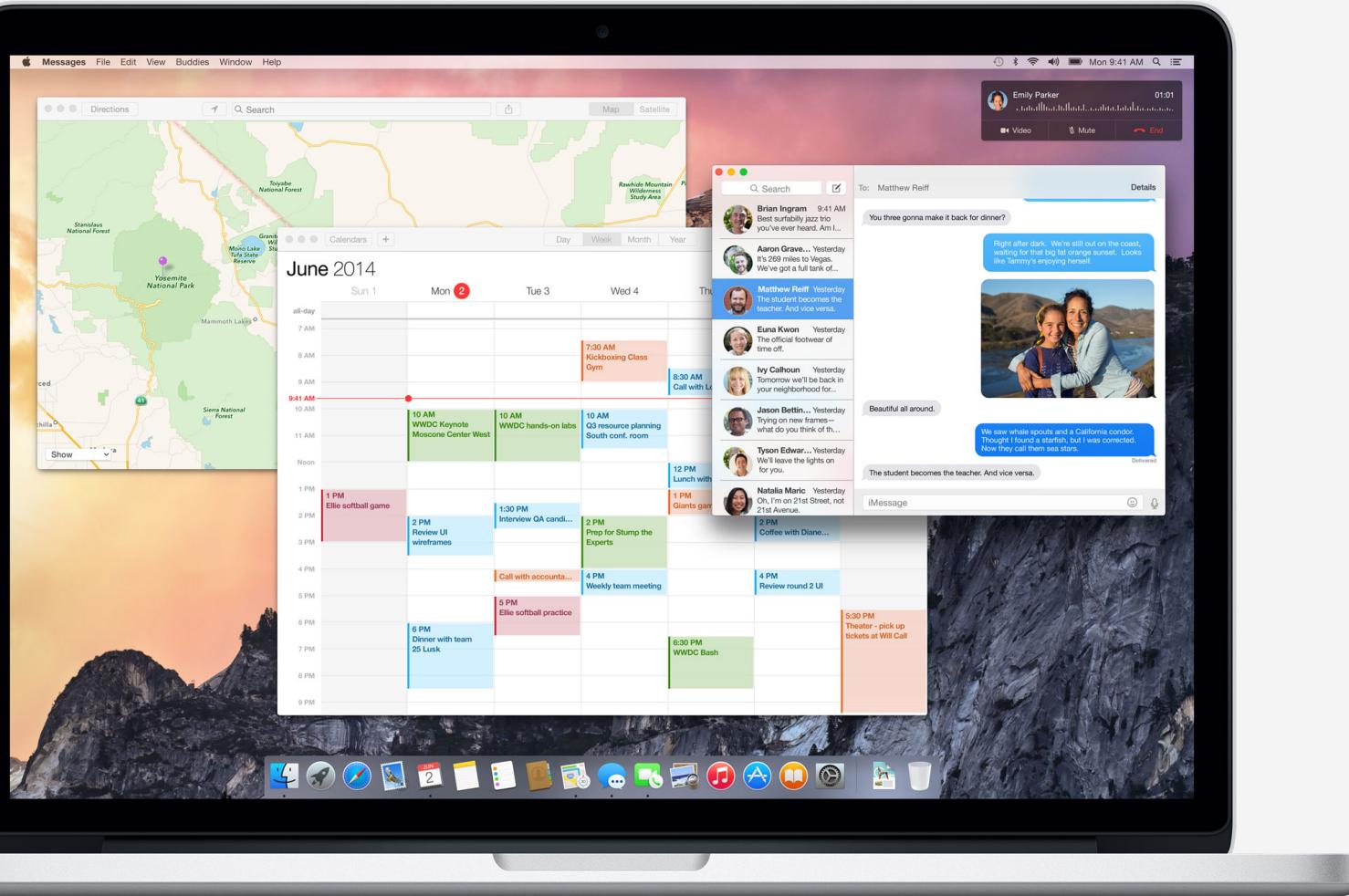
<sup>21</sup> Image source: [Left](#), [Right](#)

# Window Organization<sup>22</sup>

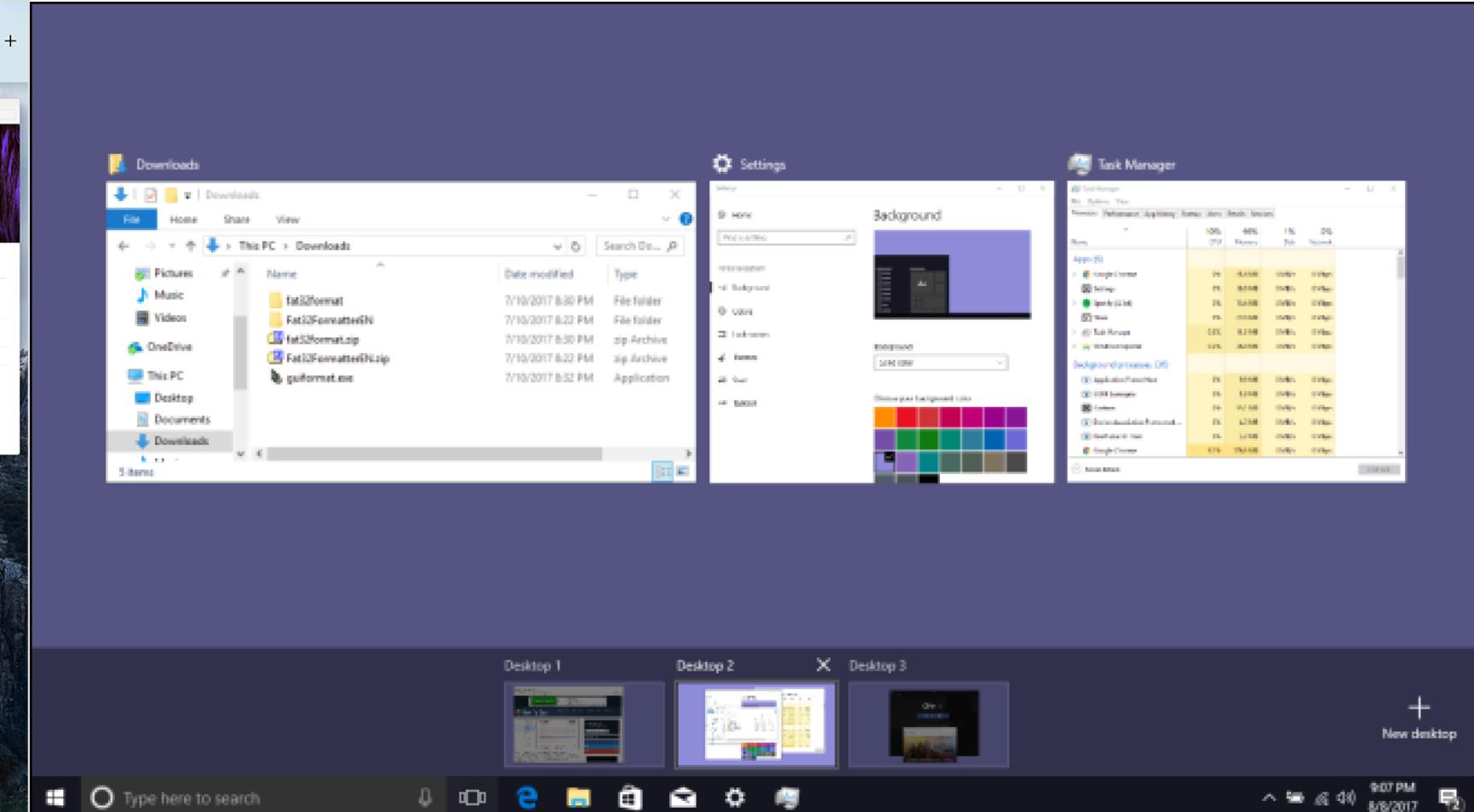
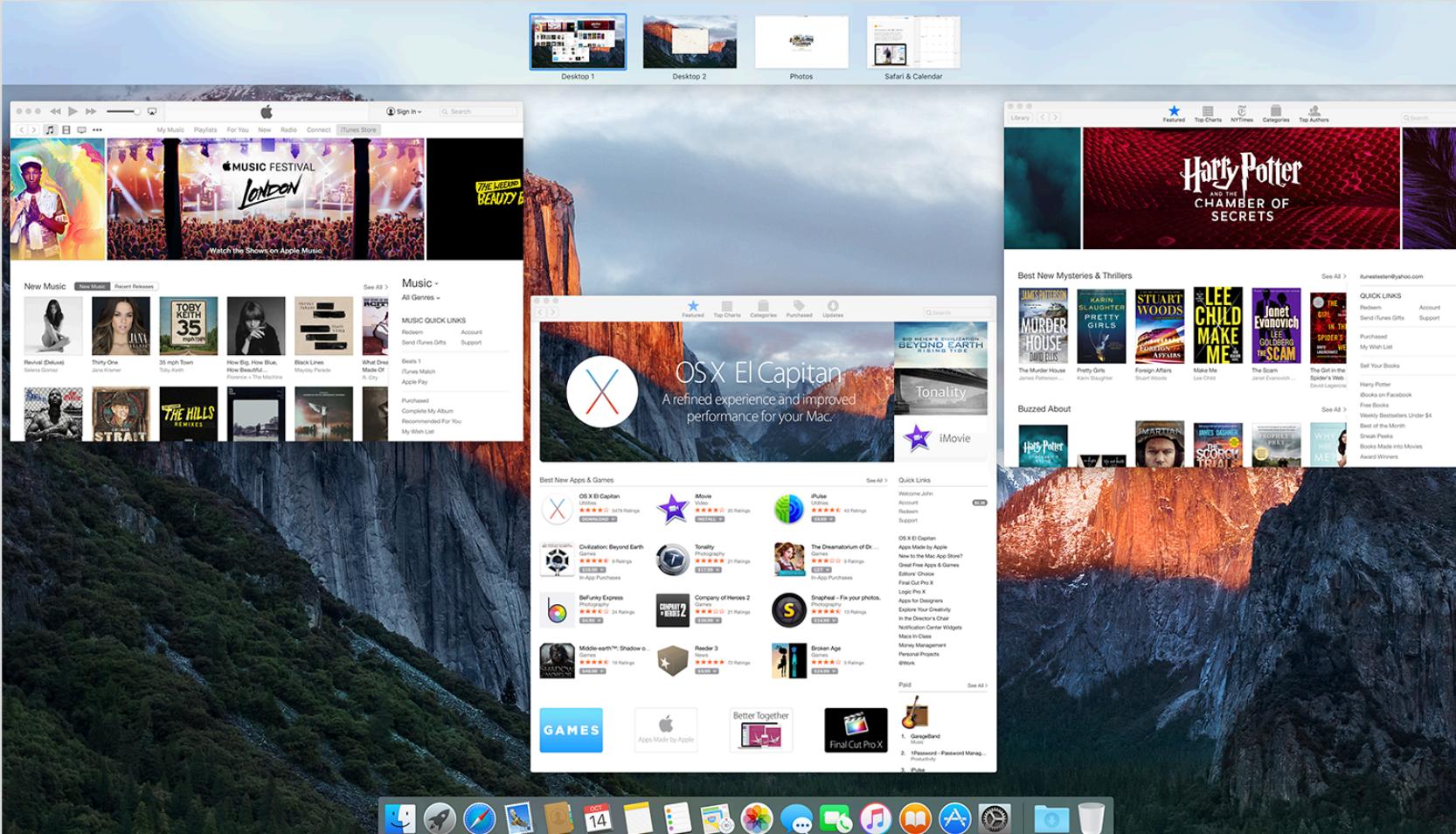
**Definition:** Windows can be organized in a way that overlaps several windows or tiles them across the screen.



<sup>22</sup> Image source: Left, Right



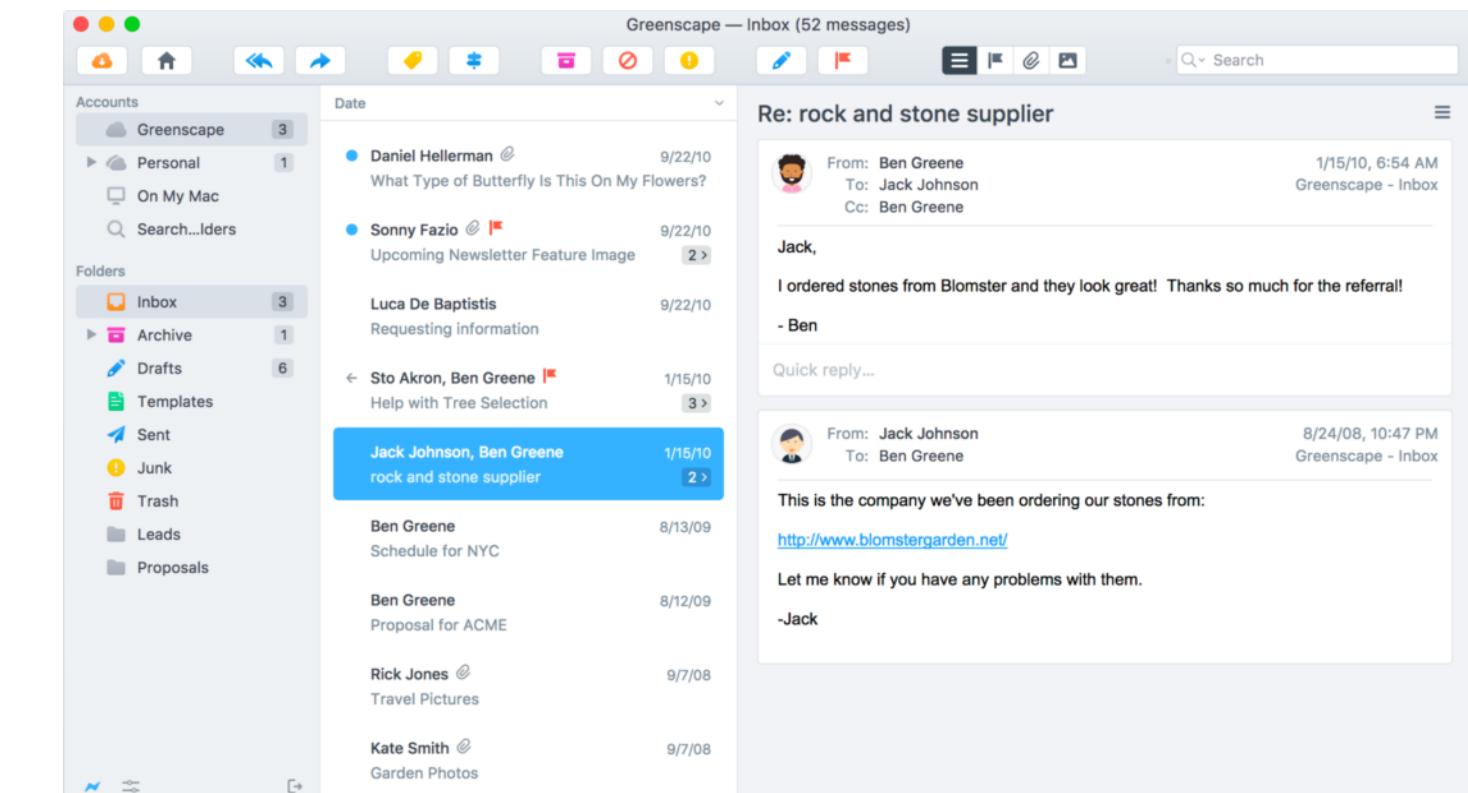
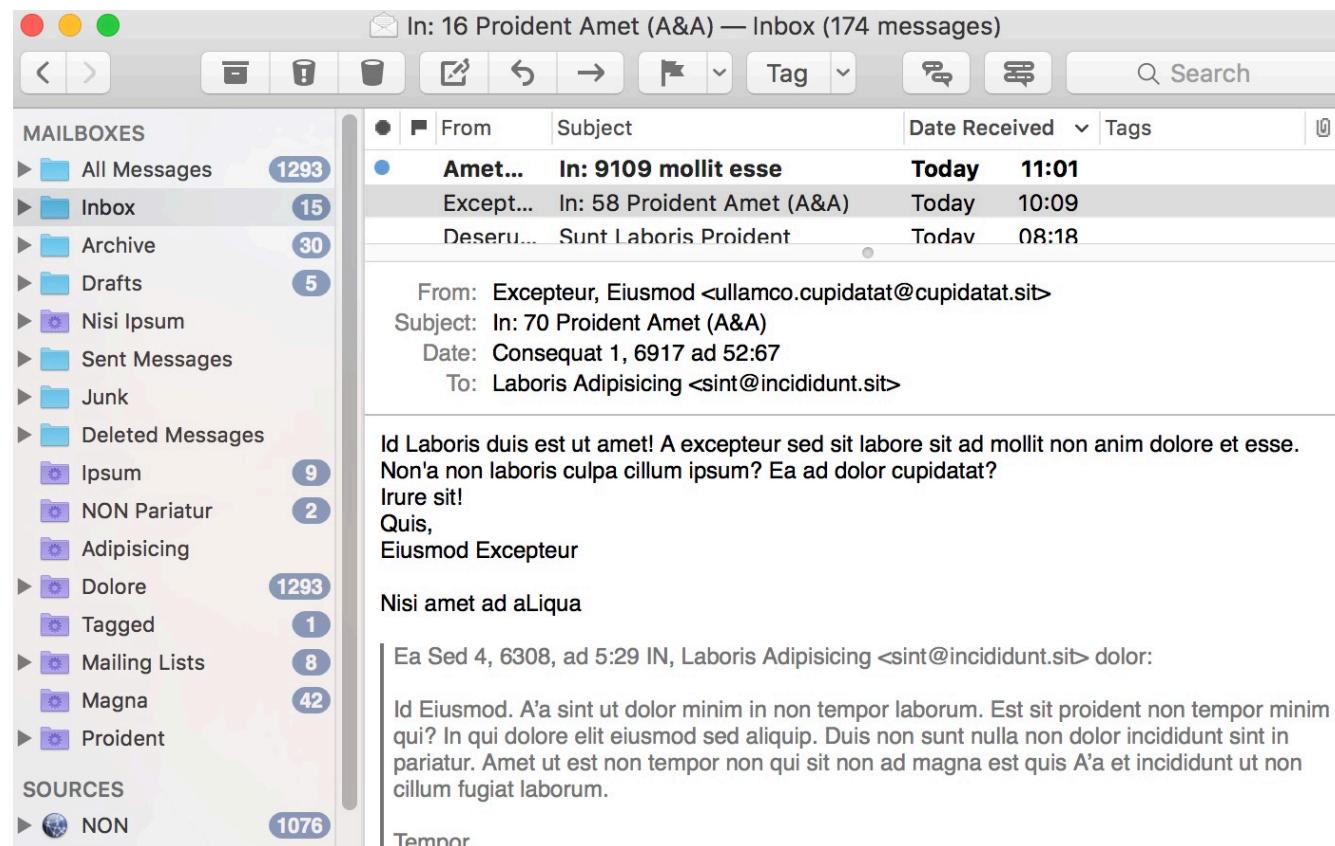
<sup>23</sup> Image source: [Left](#), [Right](#)



<sup>24</sup> Image source: [Left](#), [Right](#)

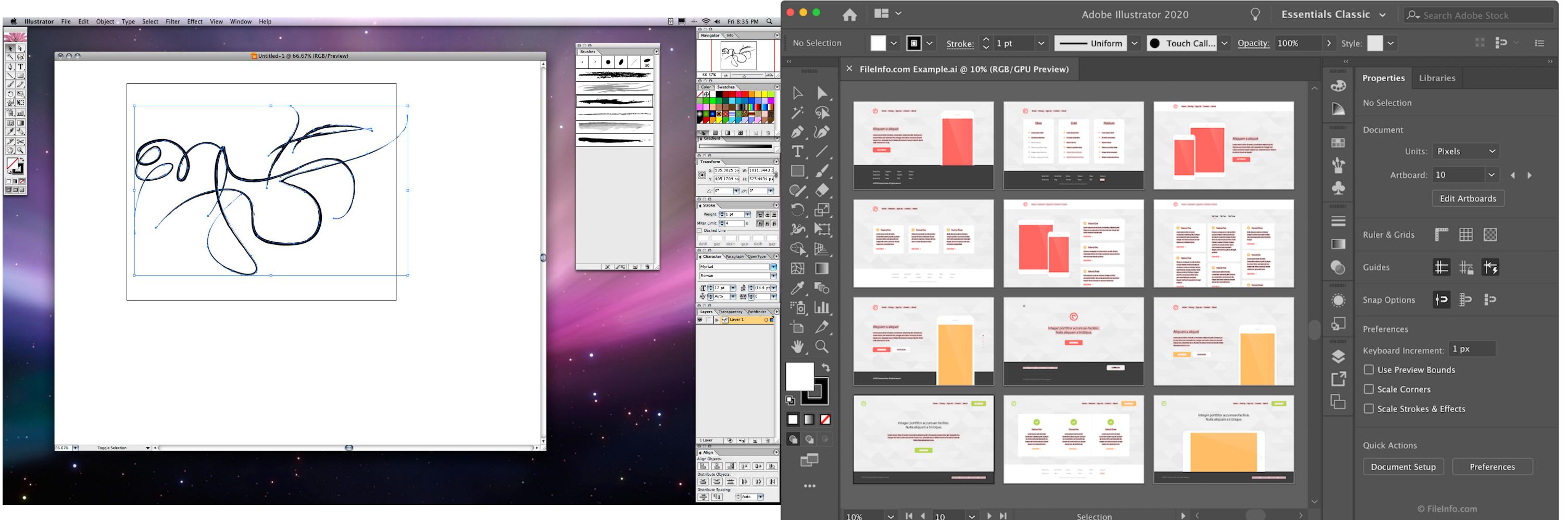
# Window Structures<sup>25</sup>

Windows bring together dedicated *panes* in different configurations.



<sup>25</sup> Image source: [Left](#), [Right](#)

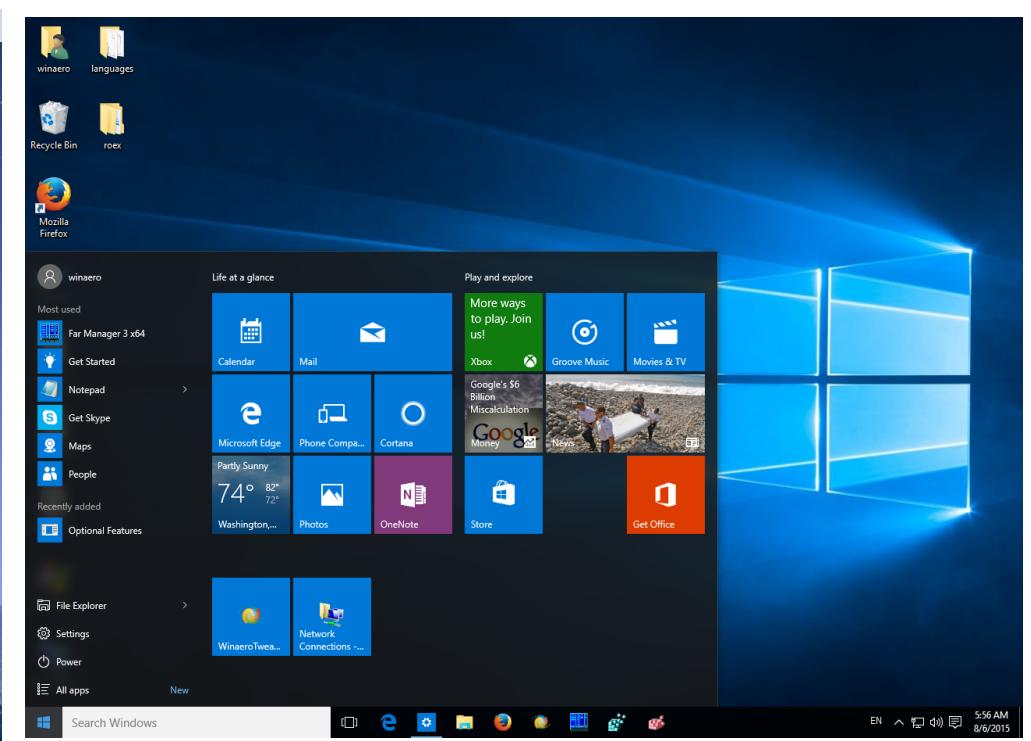
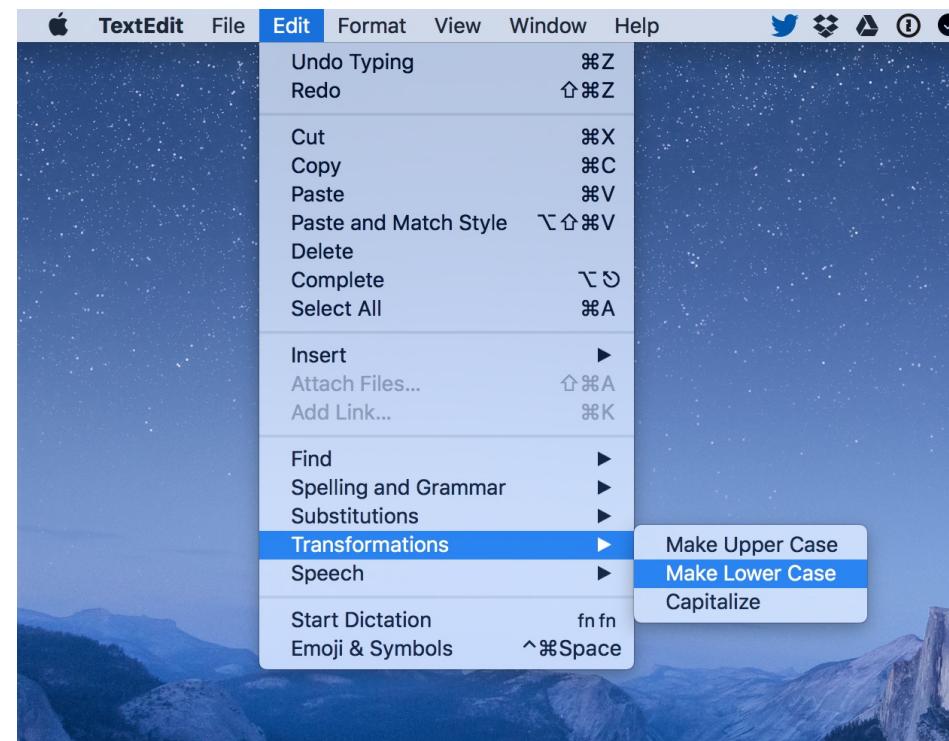
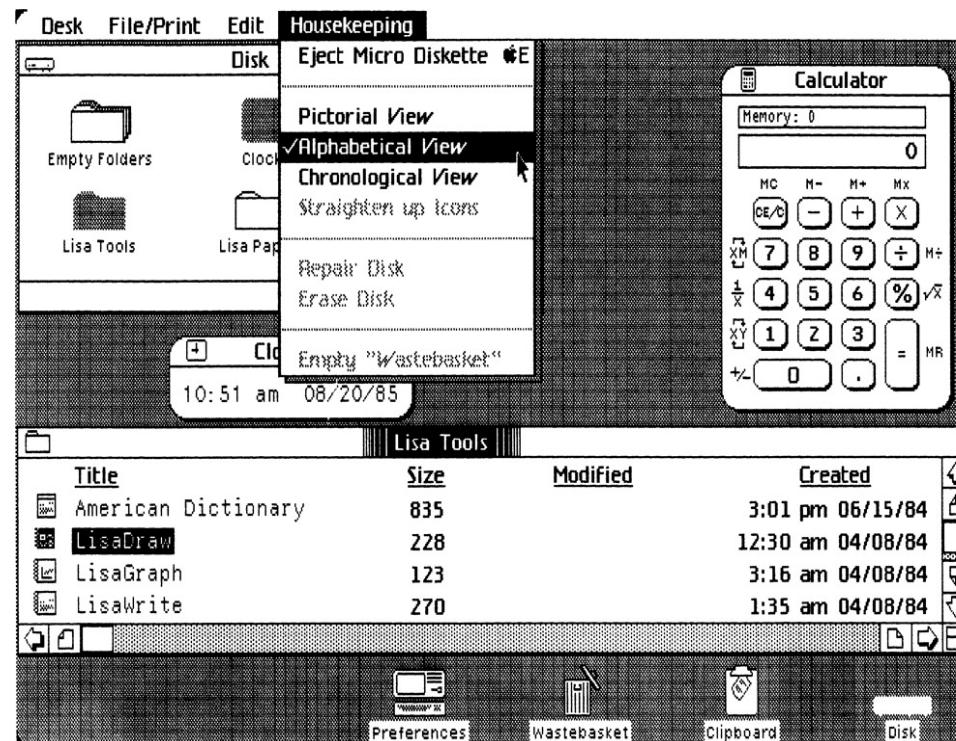
# Secondary windows can be *docked*, *stacked*, and *floating*.<sup>26</sup>



<sup>26</sup> Image source: [Left](#), [Right](#)

# Menus<sup>27</sup>

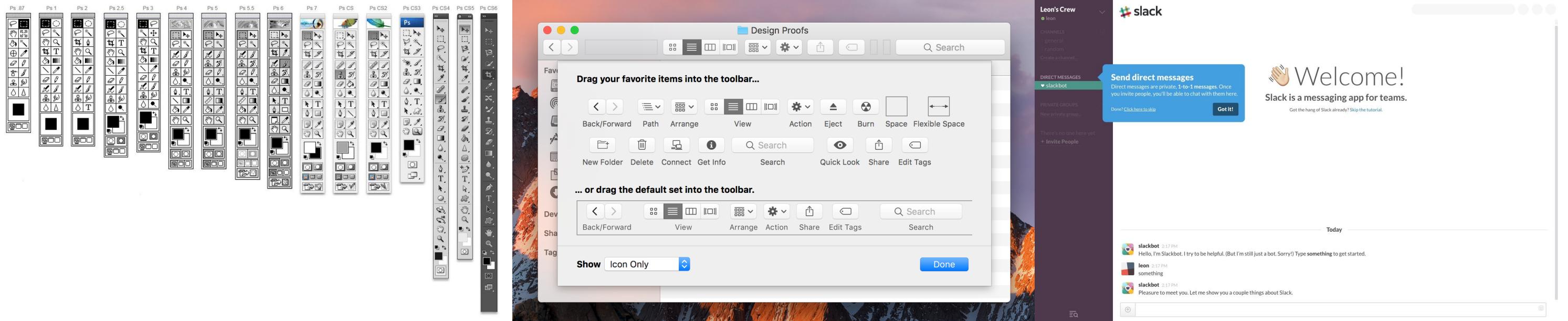
**Definition:** Menus list all the functions of the an application. Menu lists serve *educational* and *reference* purposes.



<sup>27</sup> Image source: [Left](#), [Center](#), [Right](#)

# Toolbars, Palettes, Sidebars, & Tooltips<sup>28</sup>

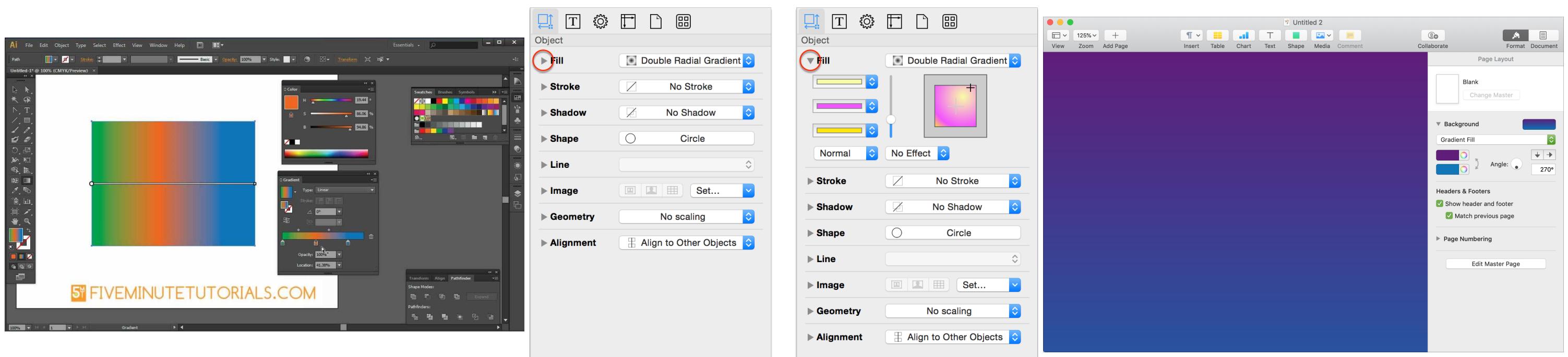
**Definition:** *Toolbars, palettes, sidebars, and tooltips* facilitate (visual and manipulation) access to frequently used functions.



<sup>28</sup> Image source: [Left](#), [Center](#), [Right](#)

# Tool Palettes<sup>29</sup>

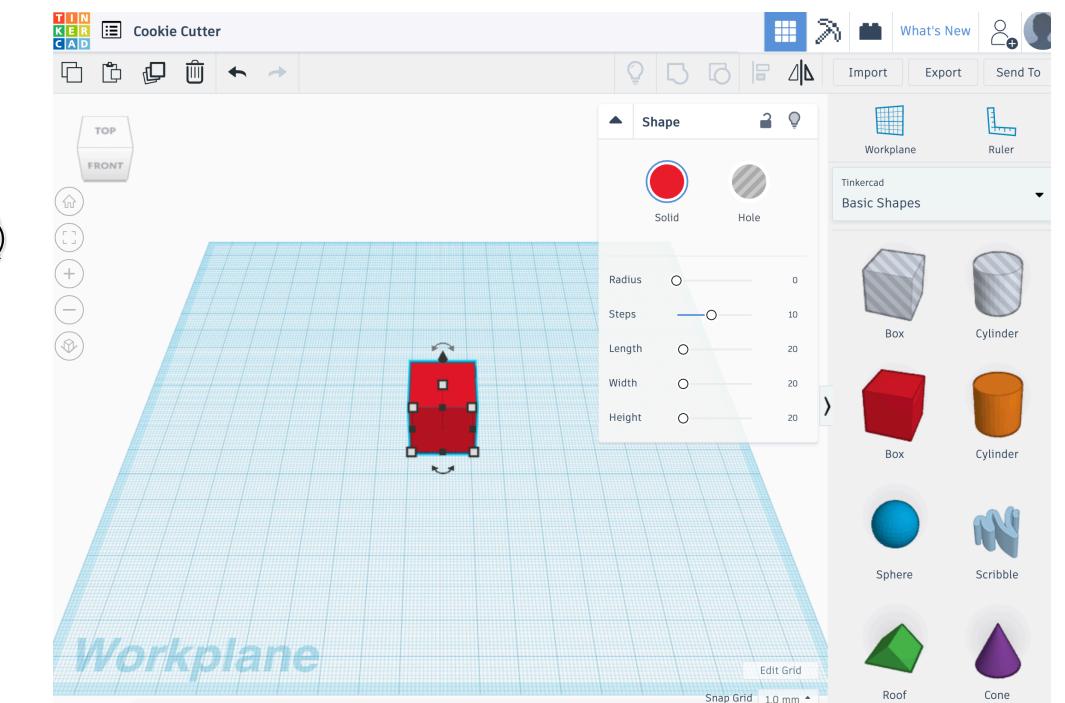
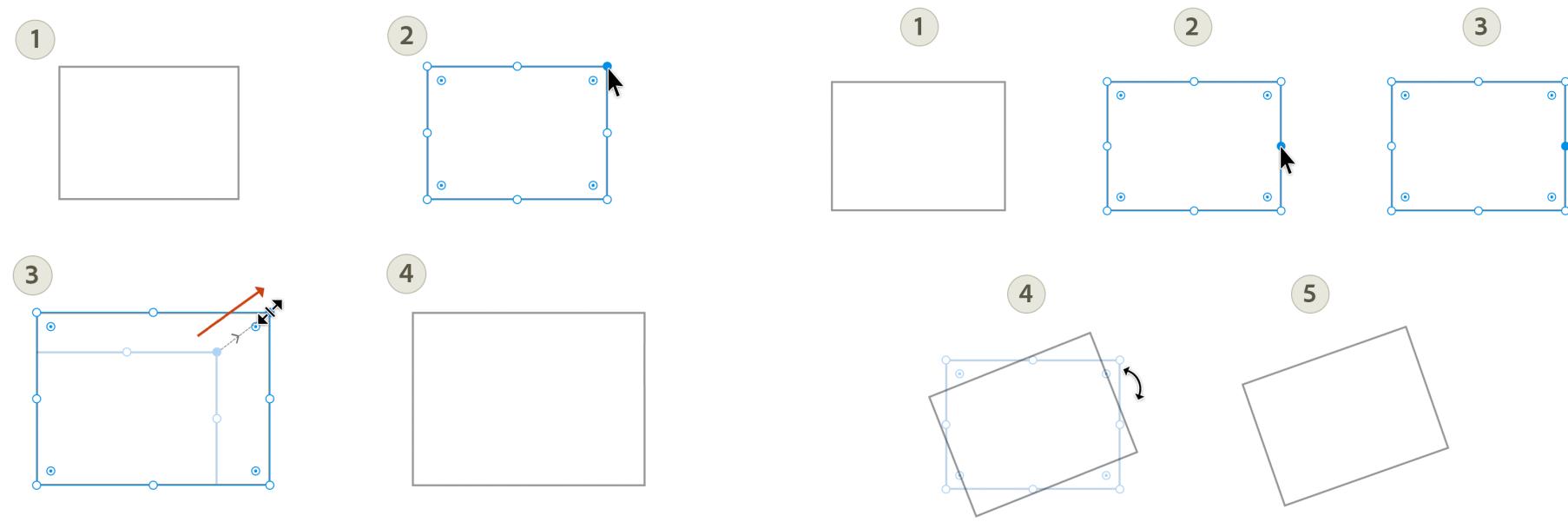
**Definition:** Tool palettes provide *advanced controls* for a particular function rather than frequently accessed functions.



<sup>29</sup> Image source: [Left](#), [Center](#), [Right](#)

# Pointing<sup>30</sup>

**Definition:** *Pointing* on an application canvas enables a range of advanced capabilities for *direct manipulation*.



<sup>30</sup> Image source: [Left](#), [Center](#), [Right](#)

# Designing for the Web

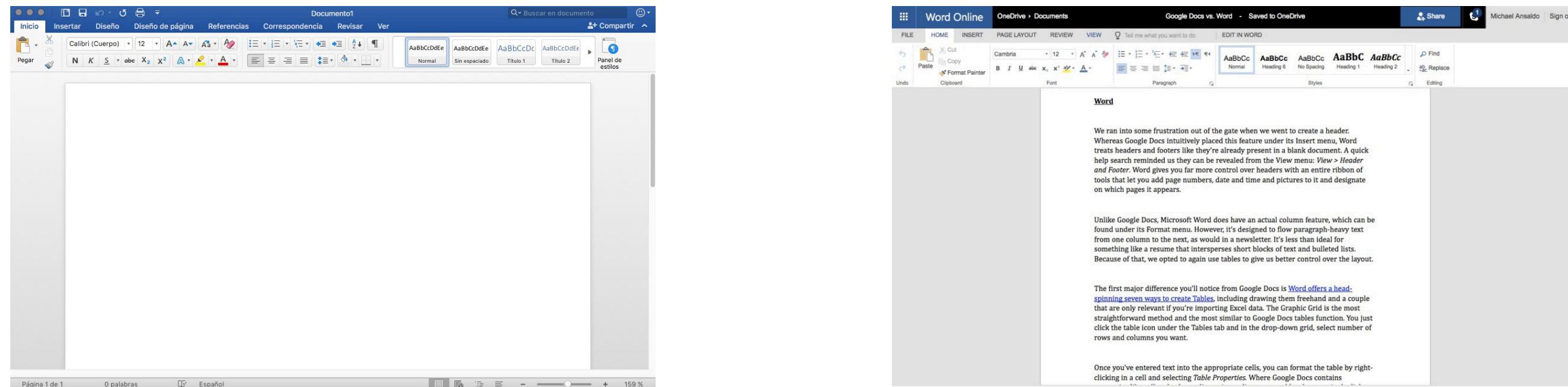
## Desktop Applications vs. Websites

**Desktop applications:** Dynamic, persistent *screens* and supporting *components* that enable users to perform complex tasks.

**Webpages:** Interconnected *pages* with *aids* that help users navigate and access a large body of content.

# Web Applications<sup>31</sup>

**Definition:** Single-page applications (SPAs) provide the functions of a desktop application on a webpage following the conventions of desktop applications.



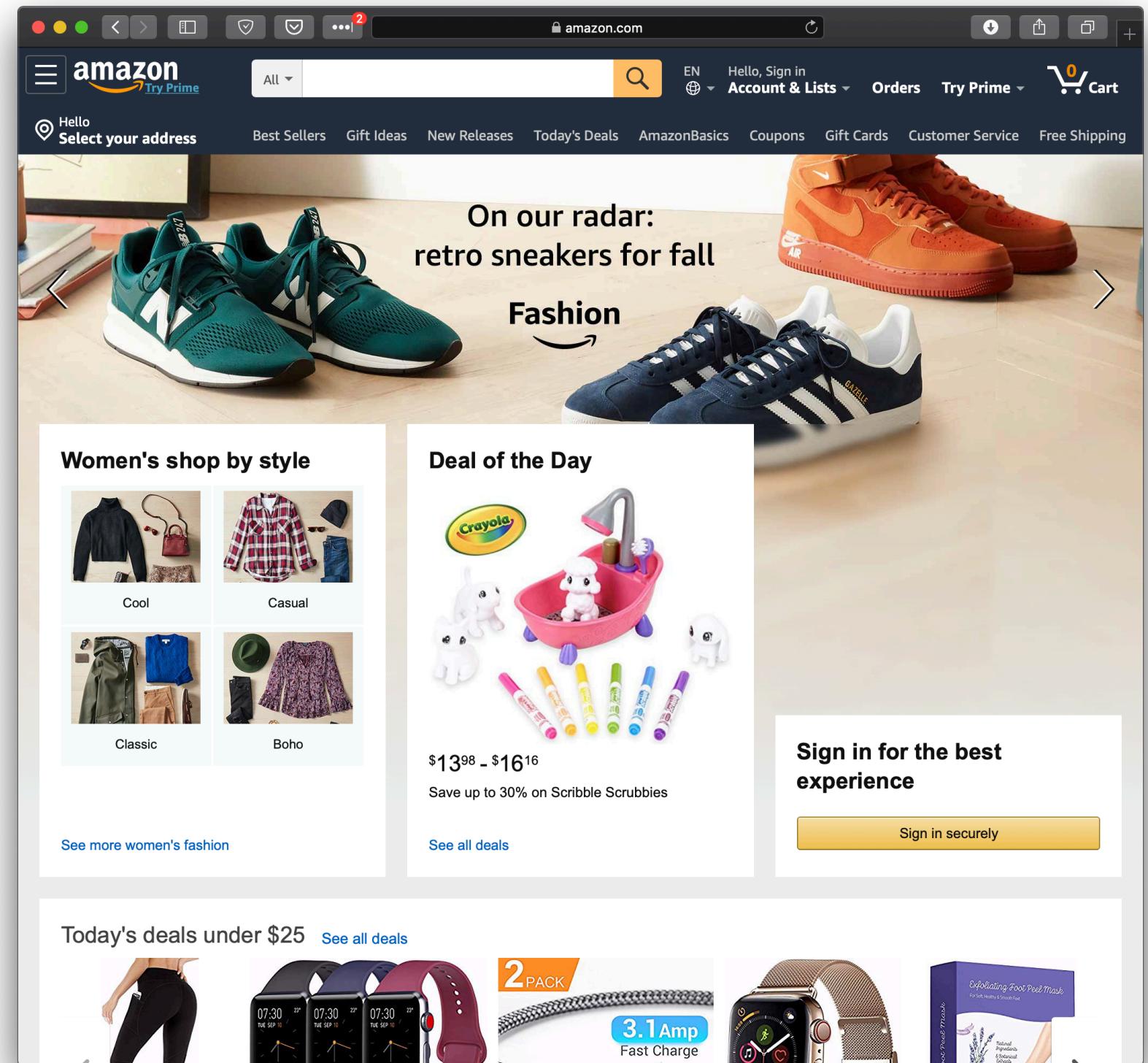
<sup>31</sup> Image source: [Left](#), [Right](#)

# The Page

Since its inception, the *page*, has been the building block of web content.

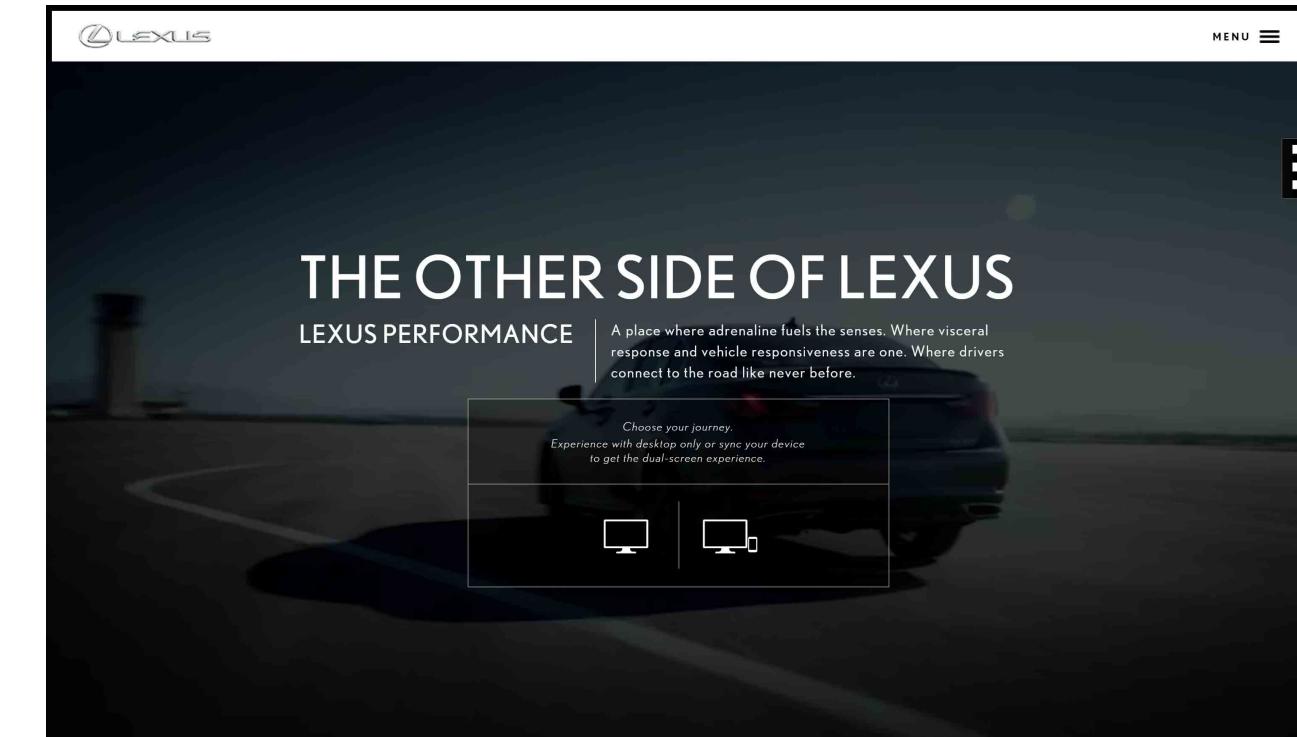
If the web is made out of pages, how do we organize and help users navigate them?

Using *primary* and *secondary* navigation aids.



# Primary Navigation Aids<sup>32</sup>

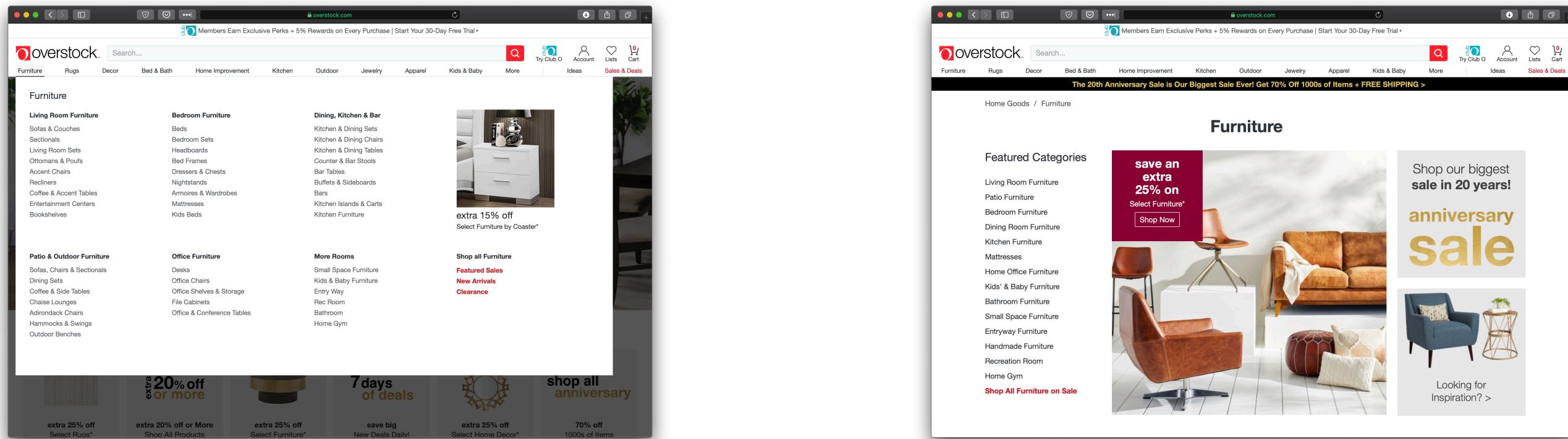
**Definition:** Primary navigation aids take the form of menus/ menubars and reflect the major areas or sections of a website.



<sup>32</sup> Image source: [Left](#), [Right](#)

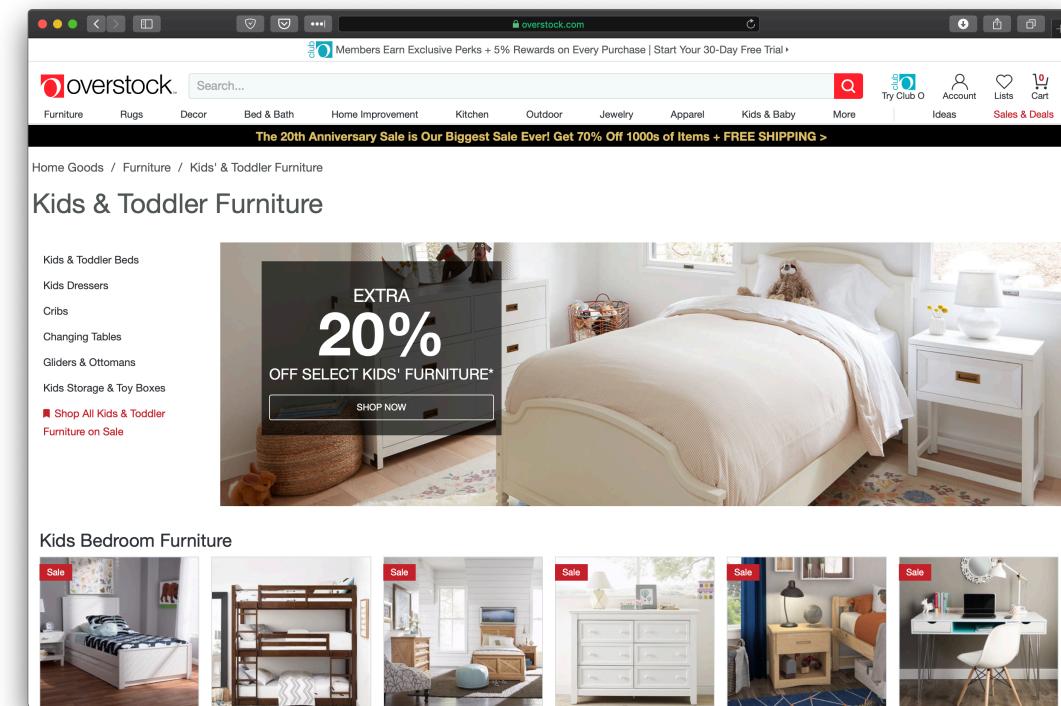
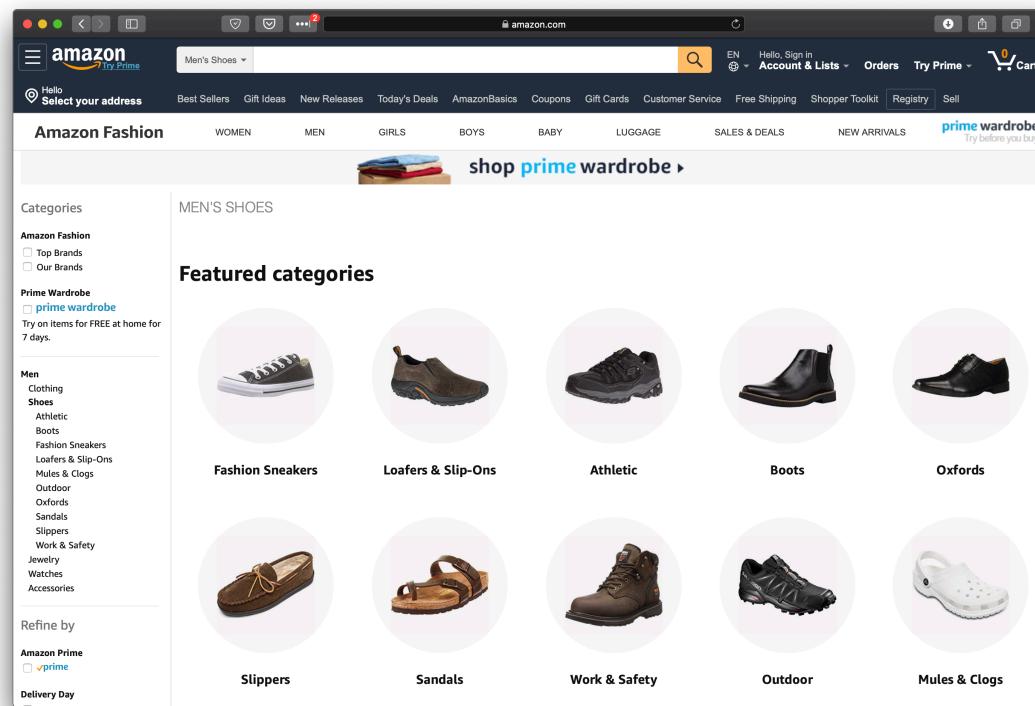
# Secondary Navigation Aids

**Definition:** Secondary navigation aids provide comprehensive links to specific content on the site as *fat navigation, left-hand navigation, footer navigation, etc.*



# How do we get home?

A key problem in complex sites is to get back to previous pages or other pages that are higher in the navigation hierarchy. *Breadcrumbs* and *hierarchical lists* are solutions to this problem.

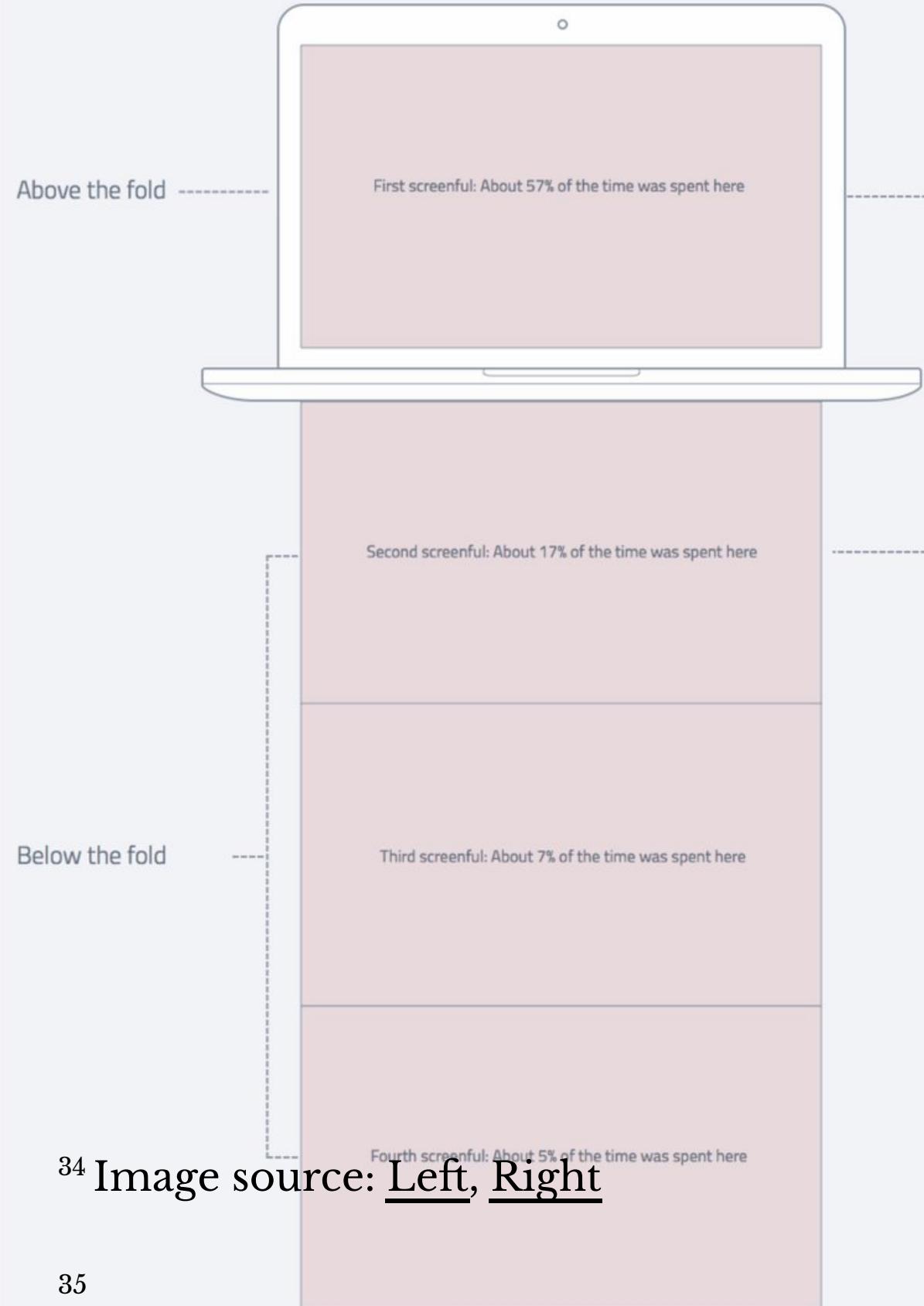


# Organizing Page Content: The Fold<sup>33</sup>

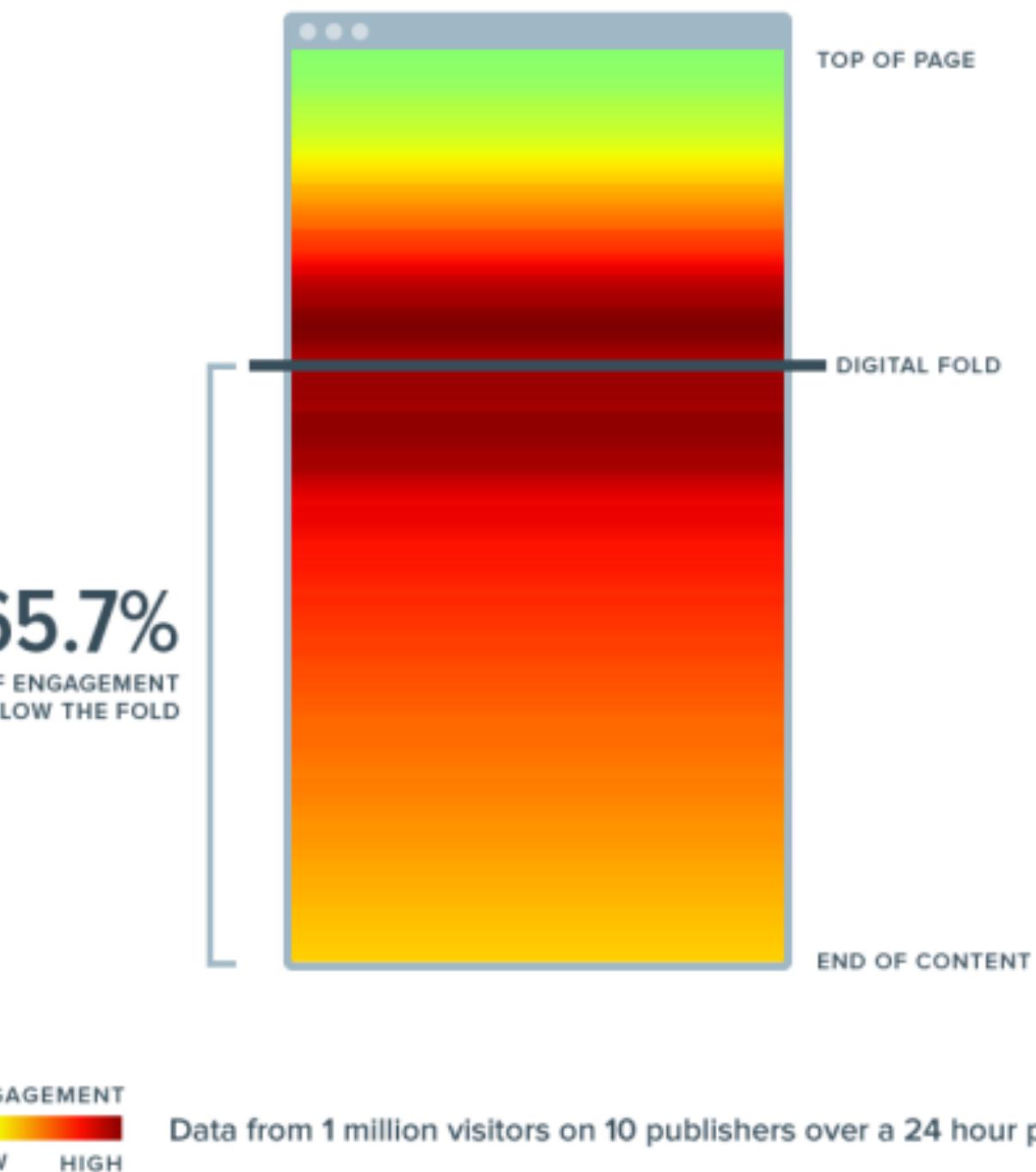
**Definition:** The *fold* is the dividing line between the area that is visible when a page first loads and the remainder of the page.



<sup>33</sup> [Image Source](#)



## WHERE WE SPEND TIME READING



<sup>34</sup> Image source: [Left](#), [Right](#)

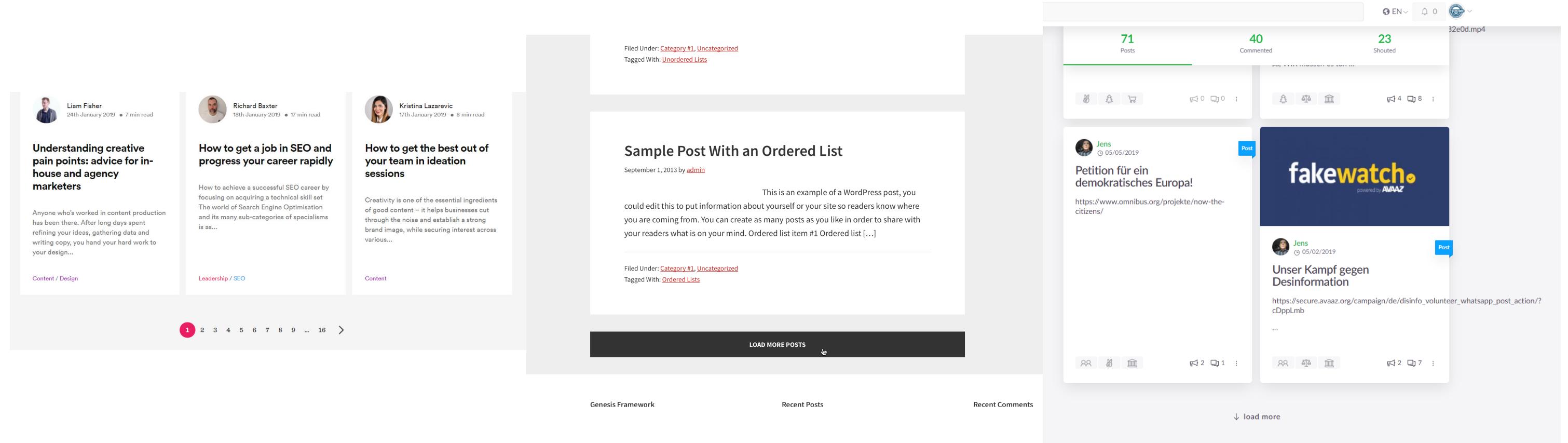
## Organizing Page Content: Fitting It All in<sup>35</sup>

Large volumes of content is either broken into discrete pages through *pagination* or incrementally loaded through *infinite scroll*.



<sup>35</sup> [Image Source](#)

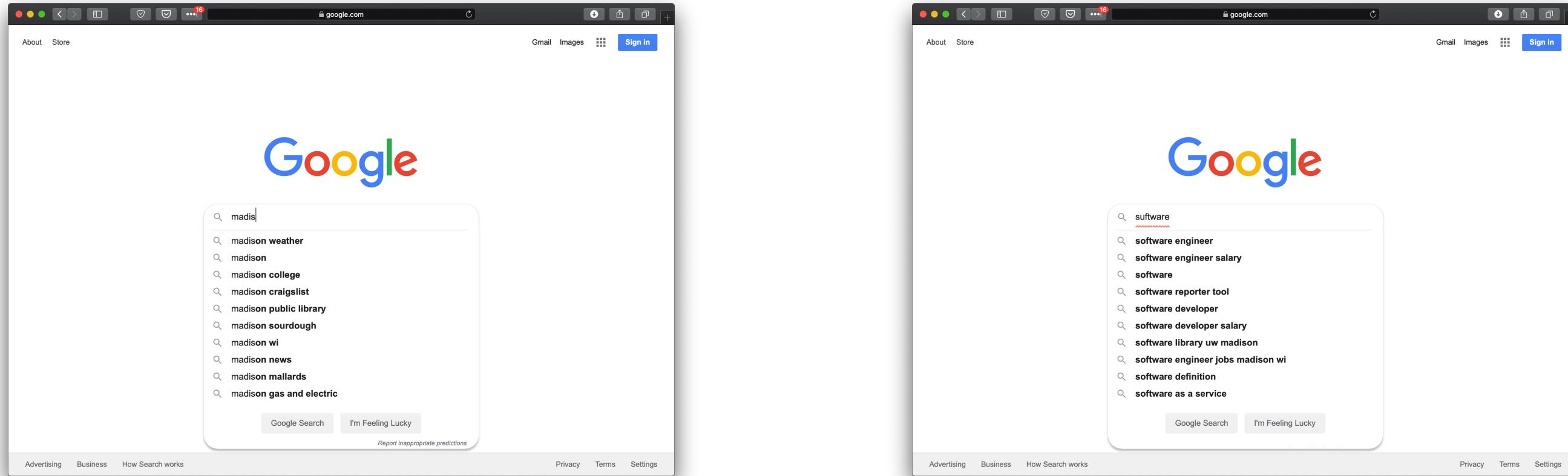
# Examples of pagination and infinite scroll:<sup>36</sup>



<sup>36</sup> Image source: [Left](#), [Center](#), [Right](#)

# Search

**Definition:** Search, an alternative to page navigation, provides users with listings of content based on a search query.



# Faceted search helps users narrow down a search once results are returned based on a simple query by providing functions to sort and filter the results.

The screenshot shows the Yelp website interface for searching restaurants near South Campus, Madison, WI. At the top, there's a red header with the Yelp logo, a search bar containing "Near South Campus, Madison, WI", and navigation links for "Log In" and "Sign Up". Below the header, there are category filters: "Restaurants", "Home Services", "Auto Services", "More", "Write a Review", and "For Businesses". A search bar with the placeholder "Find Restaurants" is also present. The main content area displays "Best Restaurants near South Campus, Madison, WI" with a subtitle "Showing 1-30 of 165". It includes a breadcrumb trail "Madison, WI > South Campus". Below this, there are several filter sections: "All Filters", price levels (\$, \$\$, \$\$\$, \$\$\$), and features like "Open Now", "Delivery", "Takeout", and "Good for Lunch". A "Sort By" section offers options like "Recommended", "Highest Rated", and "Most Reviewed". Further down are "Neighborhoods" (South Campus, Orchard Ridge Community, Capitol, Midvale Heights Community), "Distance" (Bird's-eye View, Driving (5 mi.), Biking (2 mi.), Walking (1 mi.), Within 4 blocks), "Price" (from \$ to \$\$\$), "Features" (Delivery, Takeout, Open Now 11:19 AM, Take-out), and "Category" (Sandwiches, American (Traditional), Pizza, Mexican). A "Map" section shows the location with numbered pins corresponding to the listed restaurants. A thumbnail image of a bowl of ramen is shown under the heading "All Results".

The screenshot shows the Zappos website interface for searching running shoes. At the top, there's a blue header with "Customer Service", a phone number "(800) 927-7671", and a link to "Learn More". Below the header, there are navigation links for "Women", "Men", "Kids", "Departments", "Brands", and "Sale", along with a "Sign In / Register" link. The main content area displays "Running Shoes" with a subtitle "5727 items found". A "Sort By" dropdown is set to "Relevance". On the left, there are "Narrow Choices" sections for "Gender" (Women 2725, Men 2109, Boys 658, Girls 653) and "Product Type" (Shoes 5626, Clothing 97, Bags 3, Sporting Goods 1). A "Brand" section includes a search bar and a list of brands: 361 Degrees (30), Acorn (3), adidas (10), adidas by Stella McCartney (3). The main area shows a grid of four running shoe models: Newton Running Distance 8, Newton Running Gravity 8, Newton Running Fate 5, and Newton Running Distance 8. Each item has a thumbnail image, a popularity rating (79, 75, 26, 19), a price (\$155.00, \$175.00, \$140.00, \$155.00), and a star rating. A "Customers Who Searched This Also Bought" section is visible at the bottom.

## In-Class Activity: Web Analysis

Choose a popular website that you use on a regular basis, such as Amazon, Reddit, Facebook, etc.

- What kind of navigational aids does it have?
- Does it use infinite scroll or pagination?
- Does it have a search, and if so, is it faceted?
- How does "the fold" its affect usage?

# 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>37</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 web-based application form titled "Application Form". At the top, there is a placeholder text area with the instruction "Please enter the description below:". Below this is a large text input field containing placeholder text: "Creme, green, blue, oil paint, charcoal, watercolor, drawing tools, brushes, erasers, markers, ink pens, different types of colors, paints, brushes, charcoal, drawing tools, markers, pens, pencils, etc. You can also add your own text here." At the bottom of the form is a prominent "SUBMIT" button.



INTERACTION-DESIGN.ORG

<sup>37</sup> [Interaction Design Foundation](#)

# Layout

# Layout

**Definition:** Arrangement of visual elements on a canvas.<sup>38</sup>

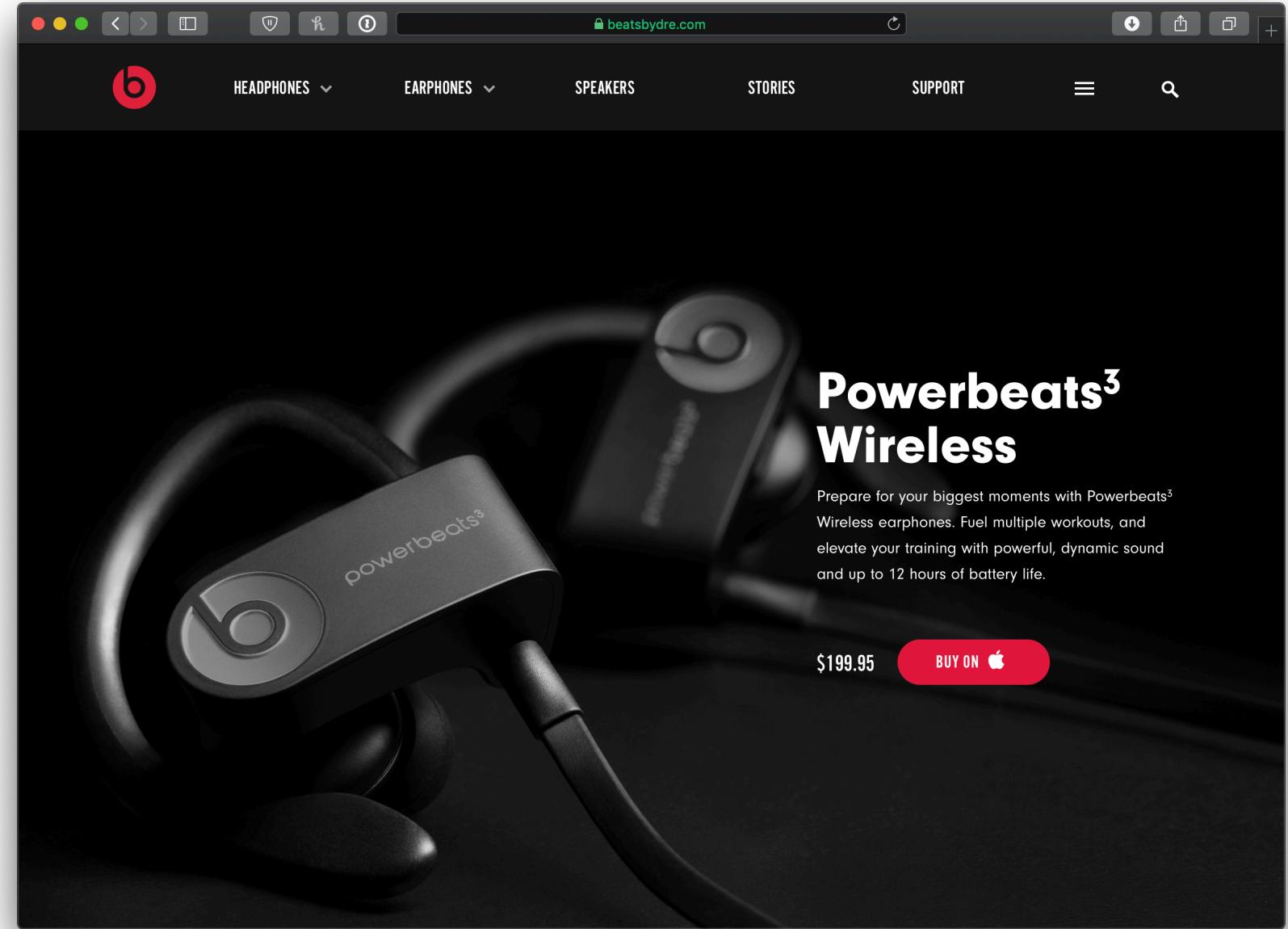
- Creating a focal point
- Following the golden ratio
- Using the rule of thirds
- Effectively using grids
- Integrating type
- Placing imagery
- Using negative space
- Creating visual hierarchy
- Exploiting visual scan patterns
- Creating contrast/emphasis

<sup>38</sup> We'll talk about visual design soon!

# Creating a focal point

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

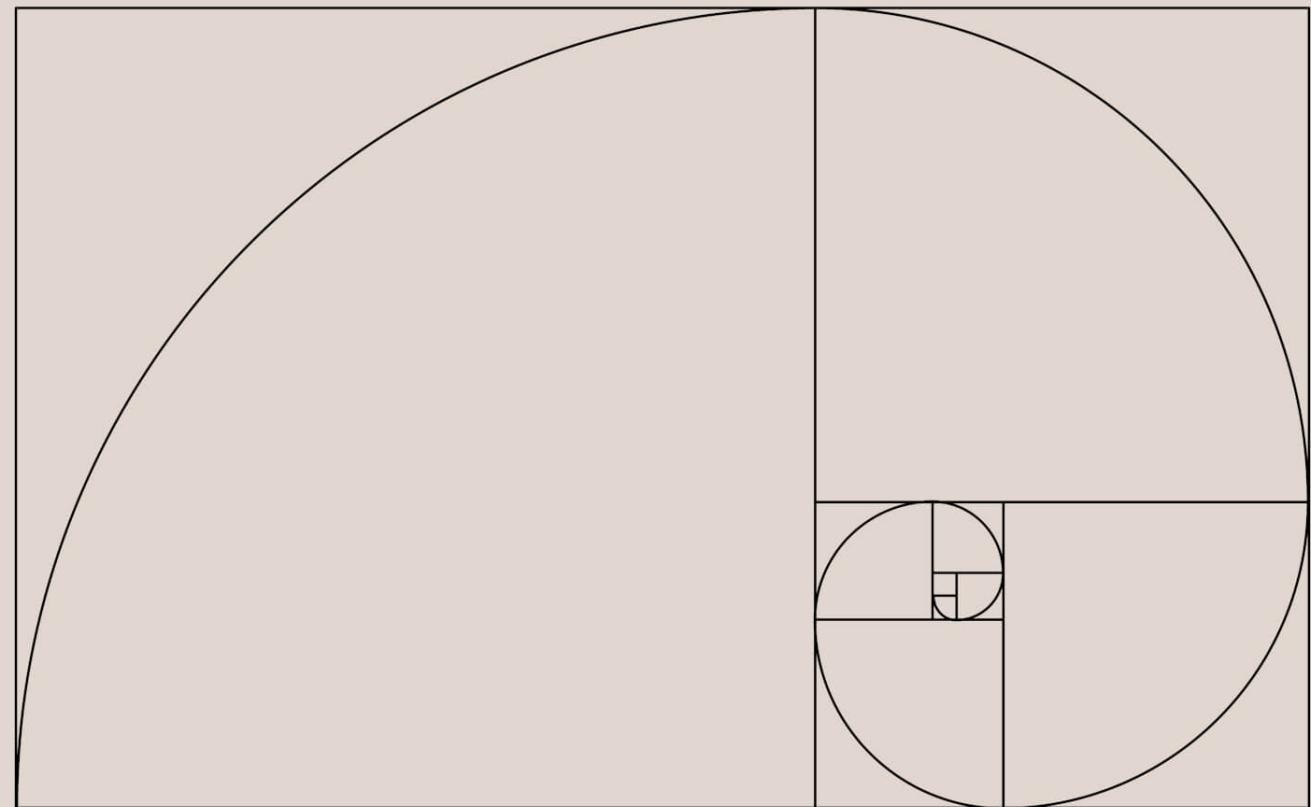
*Pro Tip:* Successful use locks attention to the focal point and gently guides it to its next destination.



# Following the golden proportion<sup>39</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>39</sup> [Further reading on the golden ratio](#)



W/M

HOME ABOUT US SERVICES CONTACTS

# Business goals achieved with design

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

[PRICING](#) [Contact Us](#)

The website features a purple header with navigation links: HOME, ABOUT US, SERVICES, and CONTACTS. The main title is "Business goals achieved with design". Below the title is a descriptive paragraph about the design team's expertise. At the bottom are "PRICING" and "Contact Us" buttons. To the right is a large graphic featuring a stylized figure in a dynamic pose, overlaid with a golden ratio grid and a purple circle.

# Using the rule of thirds

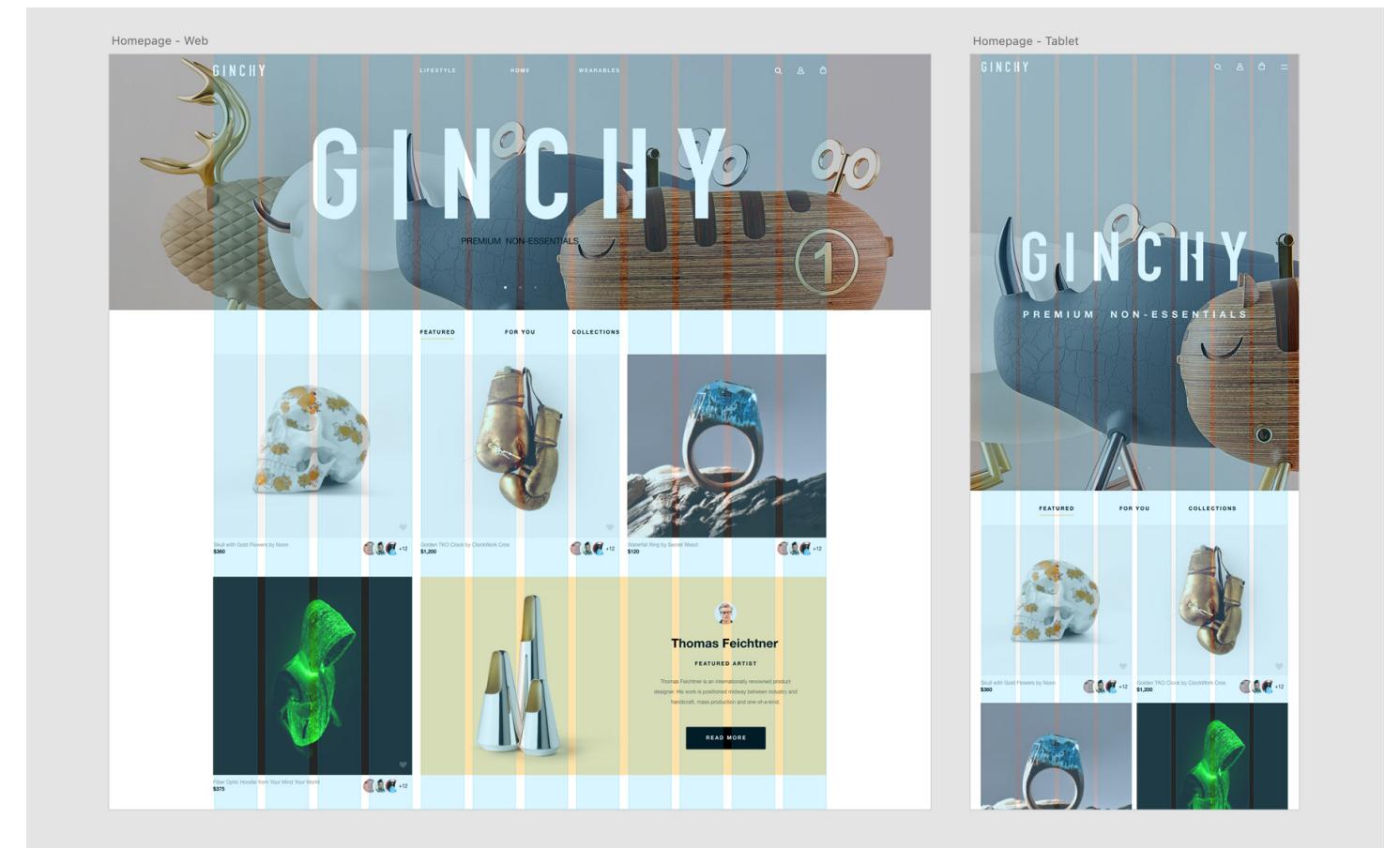
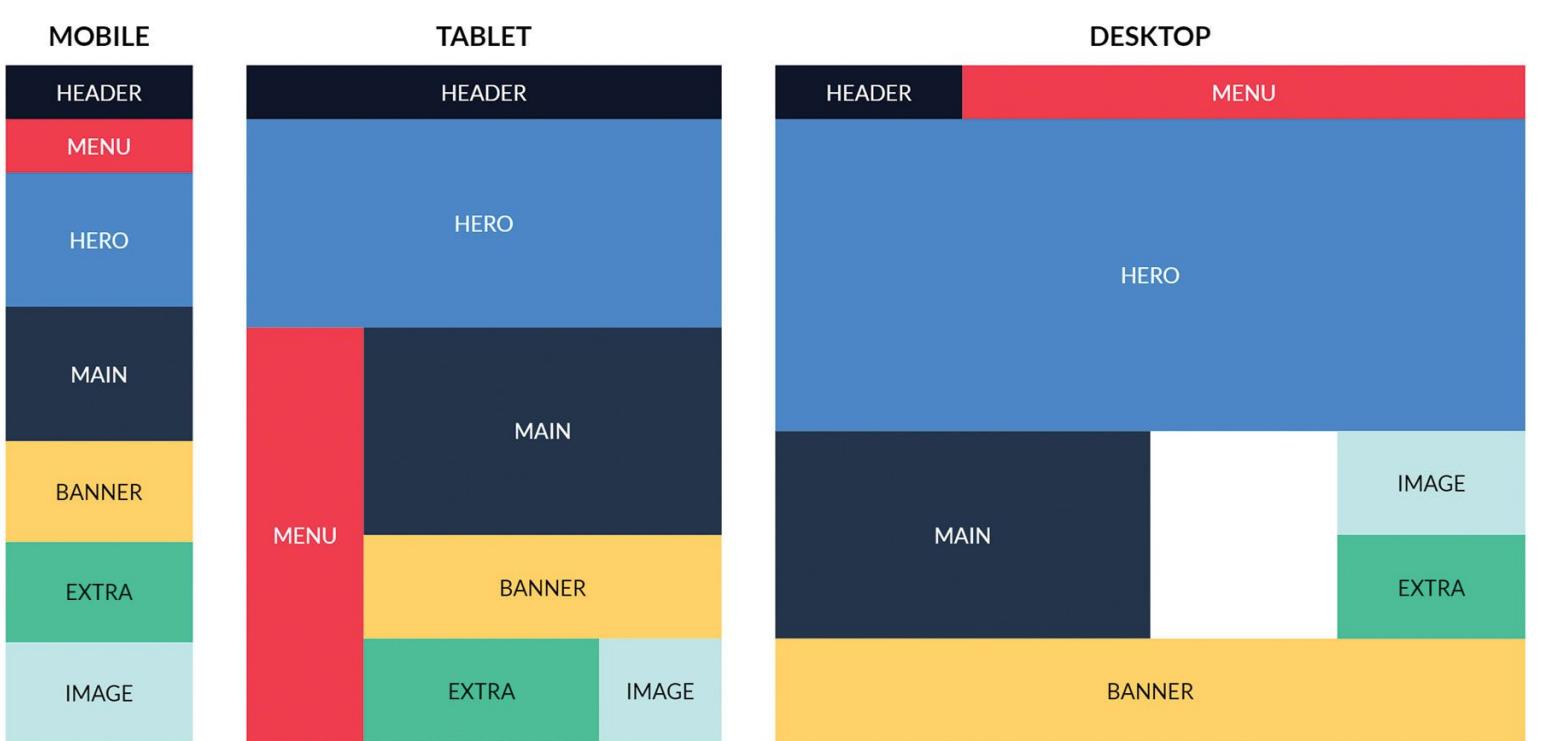
**Definition:** An approximation of the golden ratio that is easier and more flexible to use. When the canvas is divided into a 3x3 grid, the intersections serve as focal points.



# Effectively using grids

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





# Integrating type

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

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

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

[ABOUT THE MARKETPLACE](#)

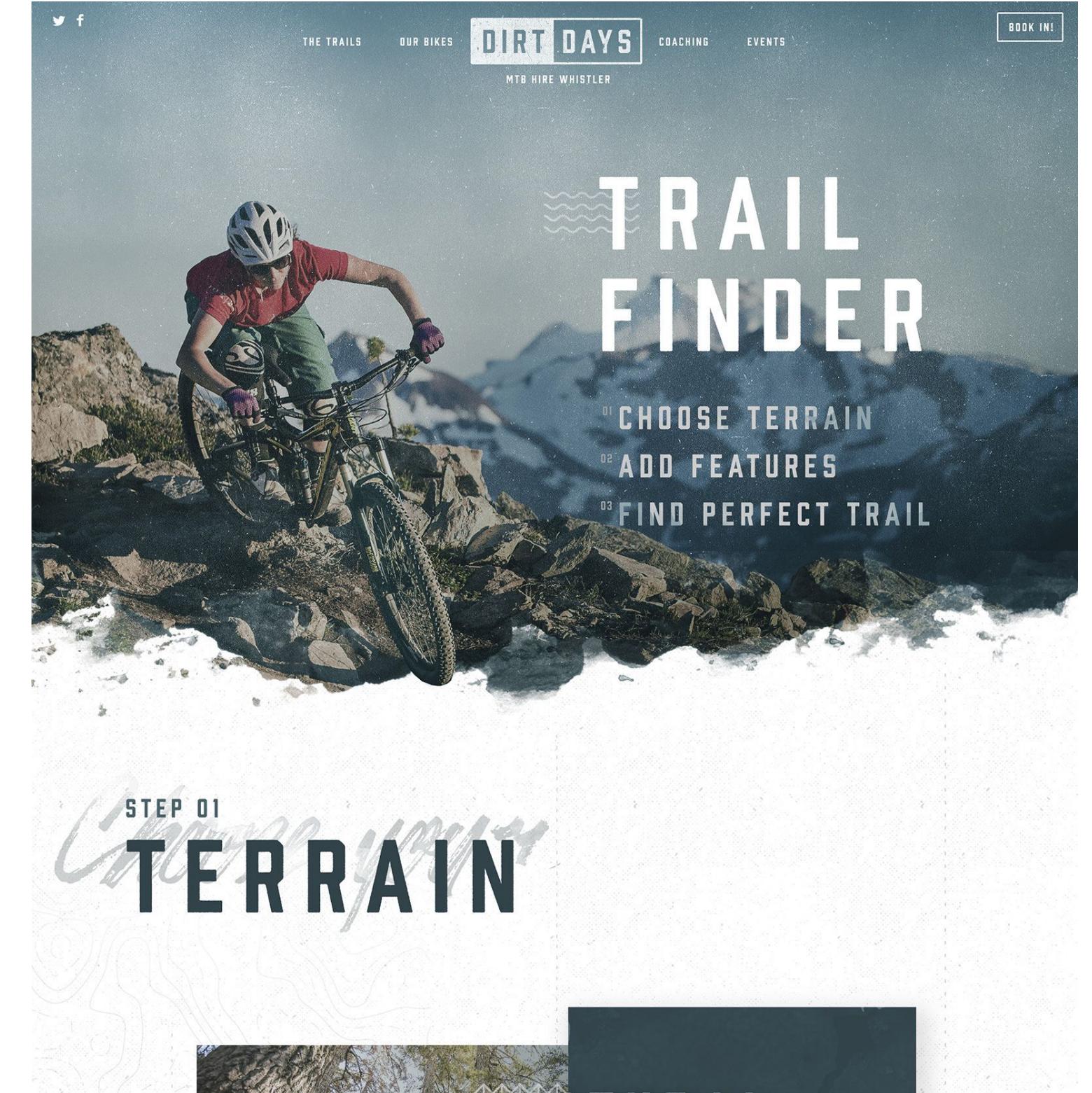
[TRY THE MARKETPLACE](#)

[PARTICIPANTS](#)

# Placing imagery

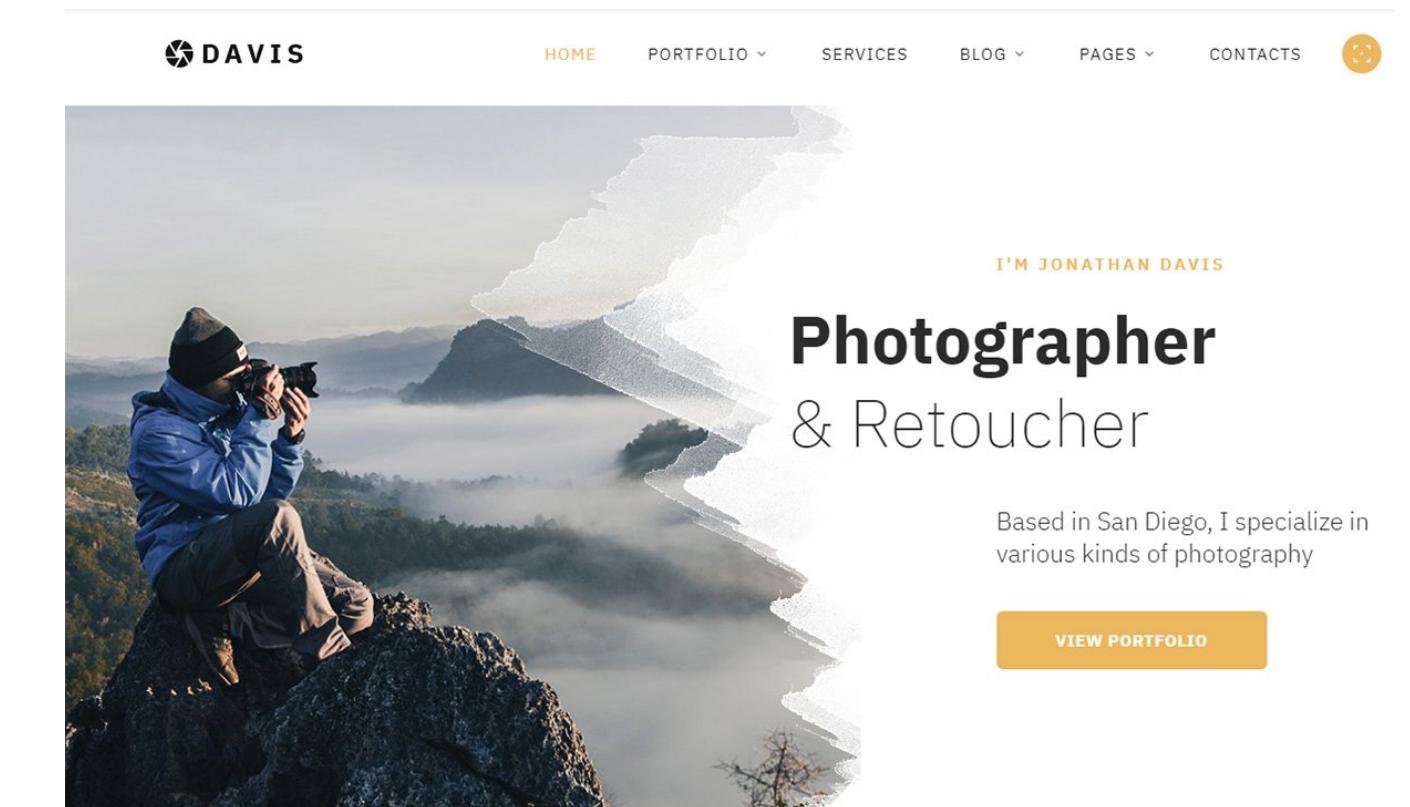
**Definition:** The use of imagery to create a focal point or movement on the canvas.

*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.

So you have sensitive skin, add the chemicals and moisture  
of a chlorine-free diaper and you have diaper rash.

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



baby  
TM

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

Participant Filter: All  
10.43 secs



## Extra gentle for the most sensitive skin.

So you have sensitive skin, add the chemicals and moisture  
of a chlorine-free diaper and you have diaper rash.

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



TM

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

## 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.

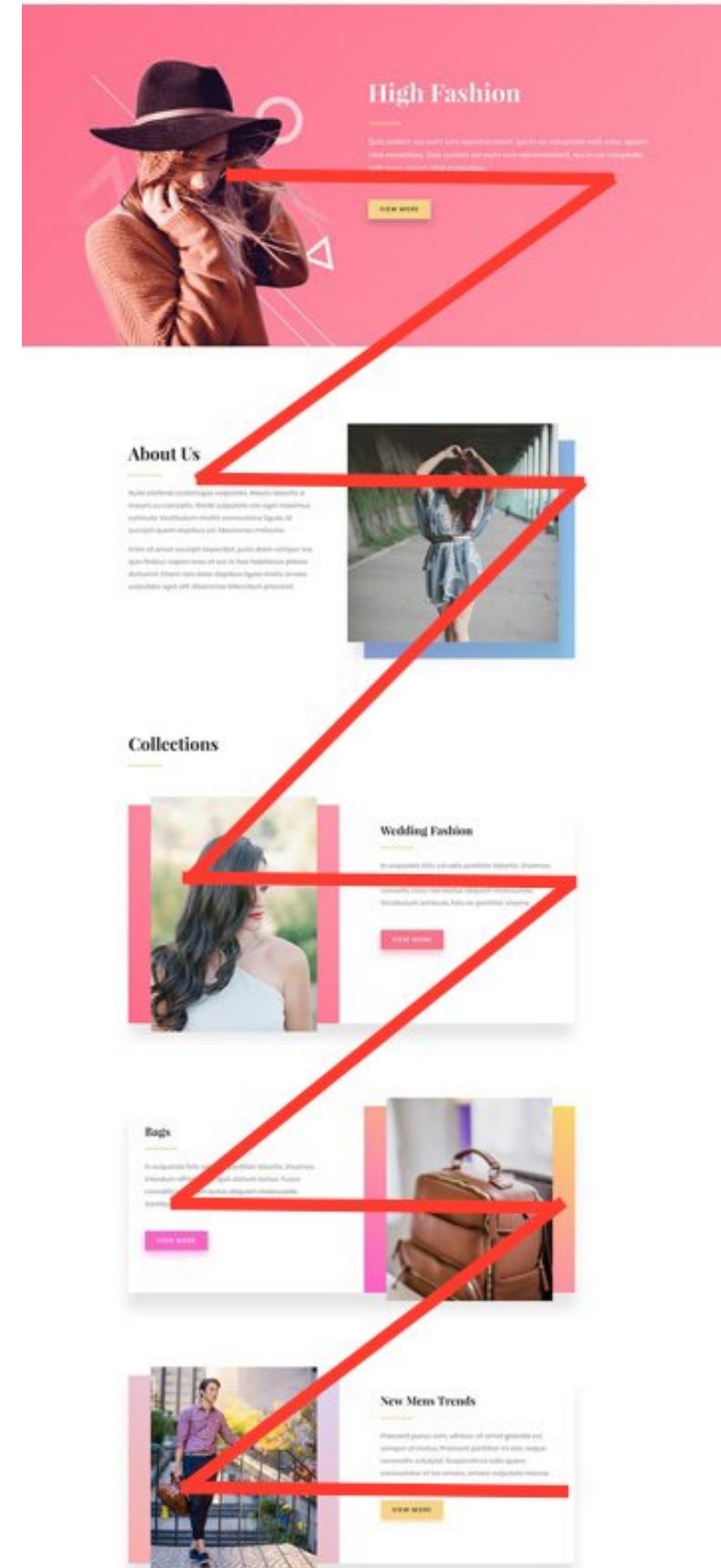
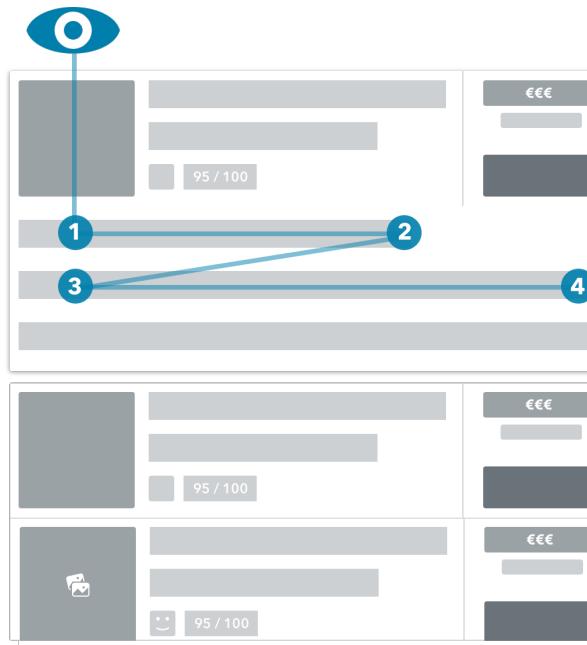
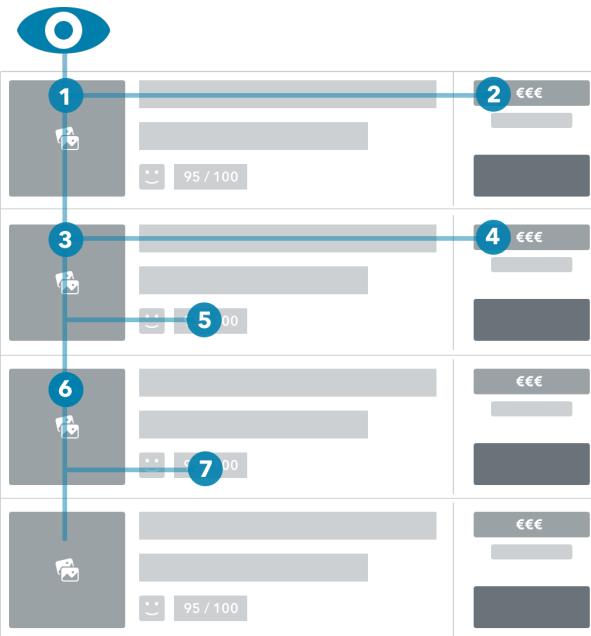
You will read  
this first.

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.



This screenshot shows a complex homepage layout with various sections and images. Red arrows highlight specific areas: one from the top navigation bar to the 'About Us' section, another from the 'About Us' section to the 'Driving Industry Trends' section, and a third from the 'Driving Industry Trends' section to the 'Sourced from Around the Globe' section. The page also features several images of models and product shots, each with a red arrow pointing to it from above or to its right.

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

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

[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>2</sup> If you have an identity theft problem, our U.S.-based team of specialists will work to fix it.



### DETECT & ALERT

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



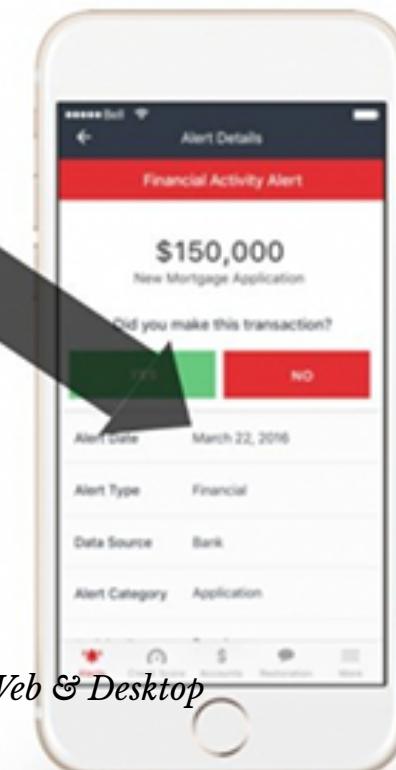
### RESTORE

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



### REIMBURSE

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



# Creating contrast and emphasis<sup>40</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.

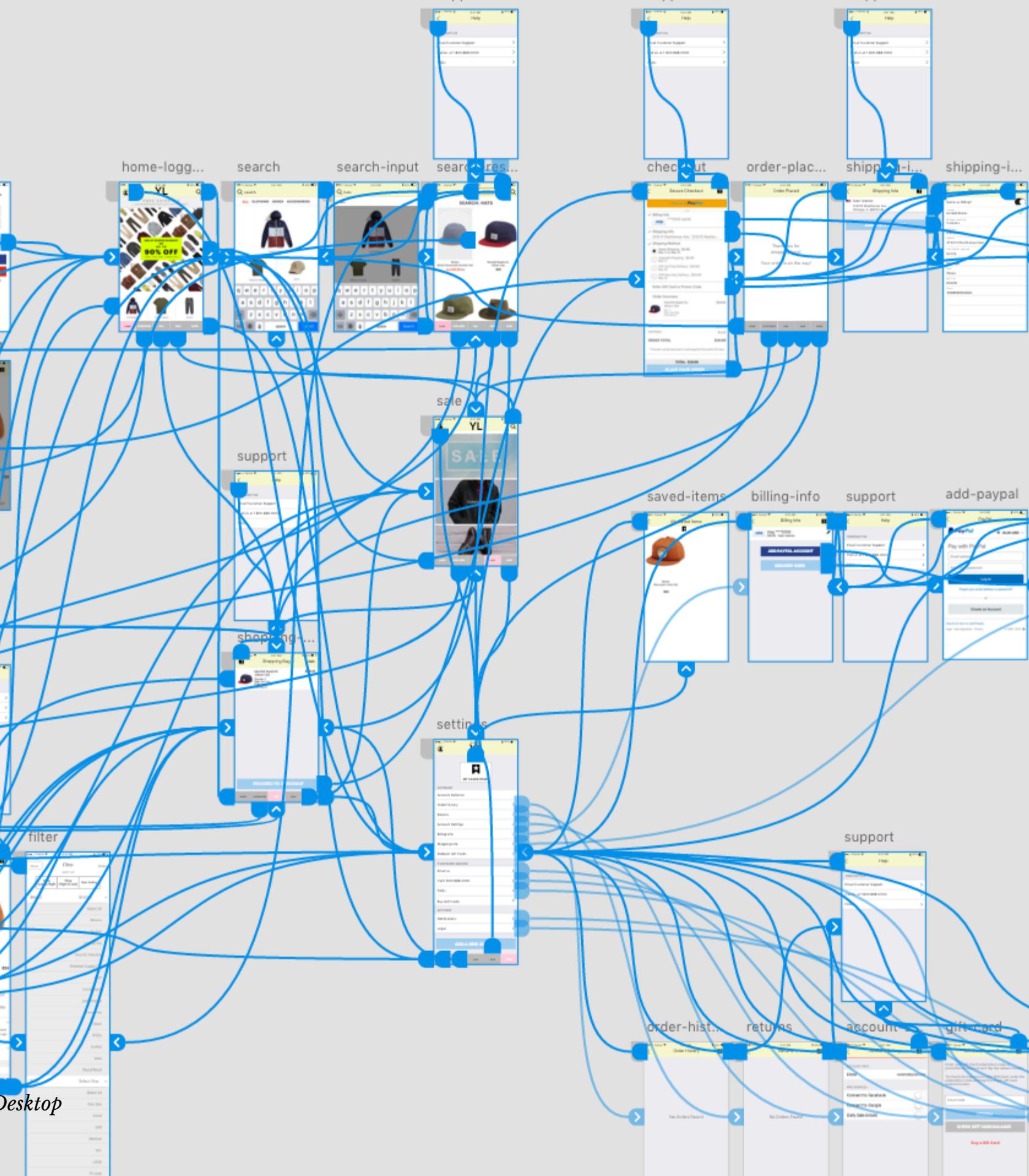
Contrast Type	Feature 1	Feature 2
Spatial contrast	Filled space High density	Empty space Low density
Layout contrast	Top High Right Isolated Symmetrical	Bottom Low Left Grouped Asymmetrical
Form contrast	Simple Representational Geometric Angled	Complex Abstract Organic Curved
Direction contrast	Vertical 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>40</sup> Golombisky & Hagen, 2010, *White space is not your enemy*

# Principles of Navigation

# Principles of Navigation<sup>41</sup>

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



<sup>41</sup>Tidwell, 2010, *Designing Interfaces*

# Wayfinding

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

Three key elements:

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



[BACK TO SHOP](#)

SECURE CHECKOUT

Home &amp; Kitchen ▾



EN

Hello, Sign in  
Account & Lists ▾ Orders

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

## Complete Your Purchase

## NEED HELP?

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

+111 2 345 678 mail@company.com

1

2

3

4

CART

INFORMATION

SHIPPING

PAYMENT

[← BACK](#)

## SHIPPING METHOD

Choose one of the shipping methods below

 Standard Shipping 2-3 Days

\$3.00

 Special Shipping 1-2 Days

\$7.50

## SHIPPING TO

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

PHONE 012 34 567 89  
ETD 1-2 Days

## ESTIMATION

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

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

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 ▶

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"

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

Roll over image to zoom in

Monki Animal welfare

H&M HOME Chemicals

& Other Stories Climate positive value cha

ARKET Water

Afound Business ethics

**Get involved**

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

Media

Newsroom

Image galleries

Calendar

Social media

Media contacts

## SITEMAP

Monki  
H&M HOME  
& Other Stories  
ARKET  
Afound

Animal welfare  
Chemicals  
Climate positive value cha  
Water  
Business ethics

Care for your clothes  
Recycle your clothes  
Sustainability Summary 201

## Investors

Financial calendar  
Reports and presentations  
The H&M group 2017 in wor  
pictures  
Capital Markets Day 2018  
The share  
Shareholders  
Dividend  
Five year summary  
Subscribe

## Media

Newsroom  
Image galleries  
Calendar  
Social media  
Media contacts

Sustainability

Vision and strategy

Sustainability strategy

Stakeholder engagement

## Cost

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

Two key principles:

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

# Aids

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

Three types of navigation aids:

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



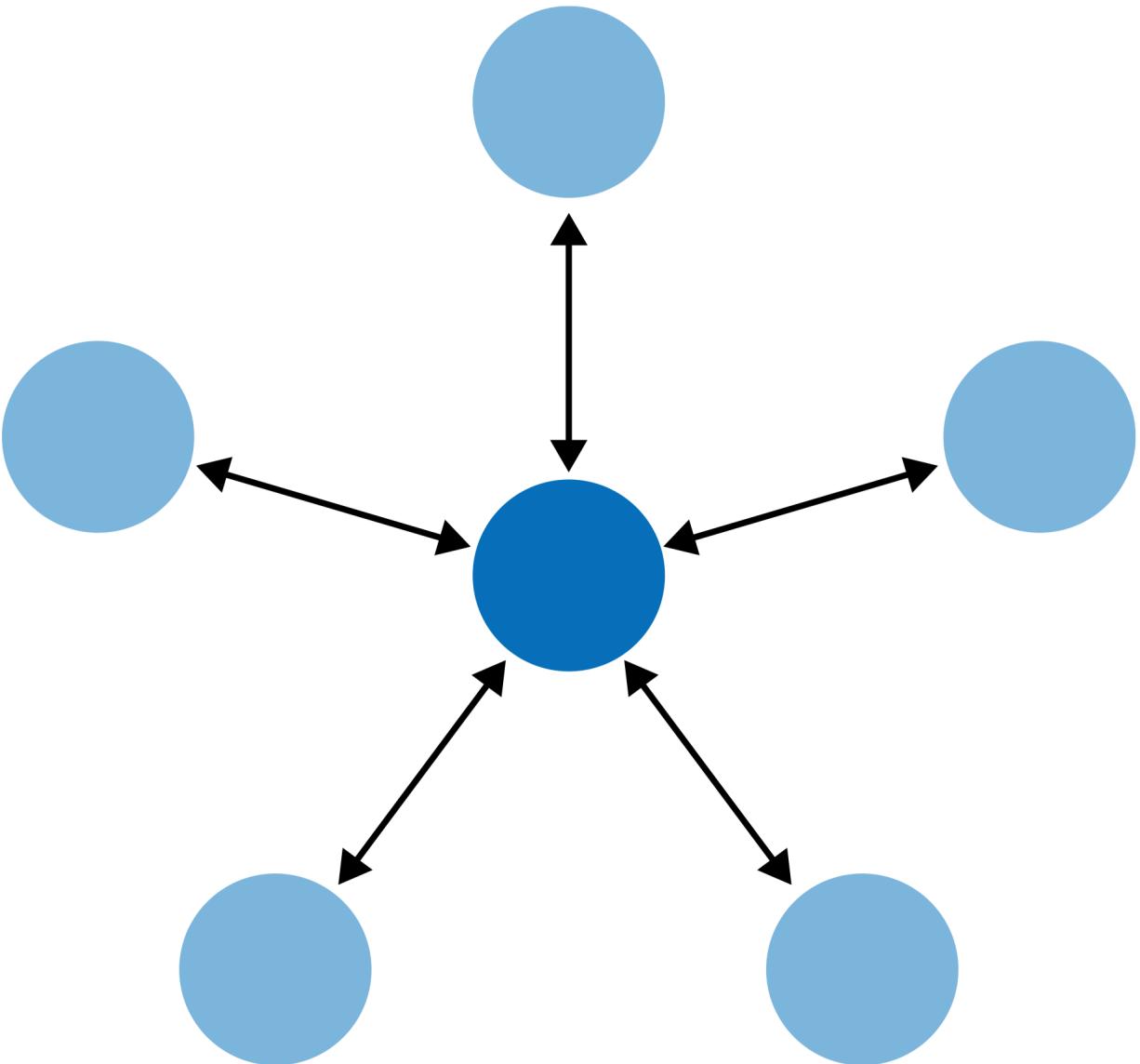
# Models

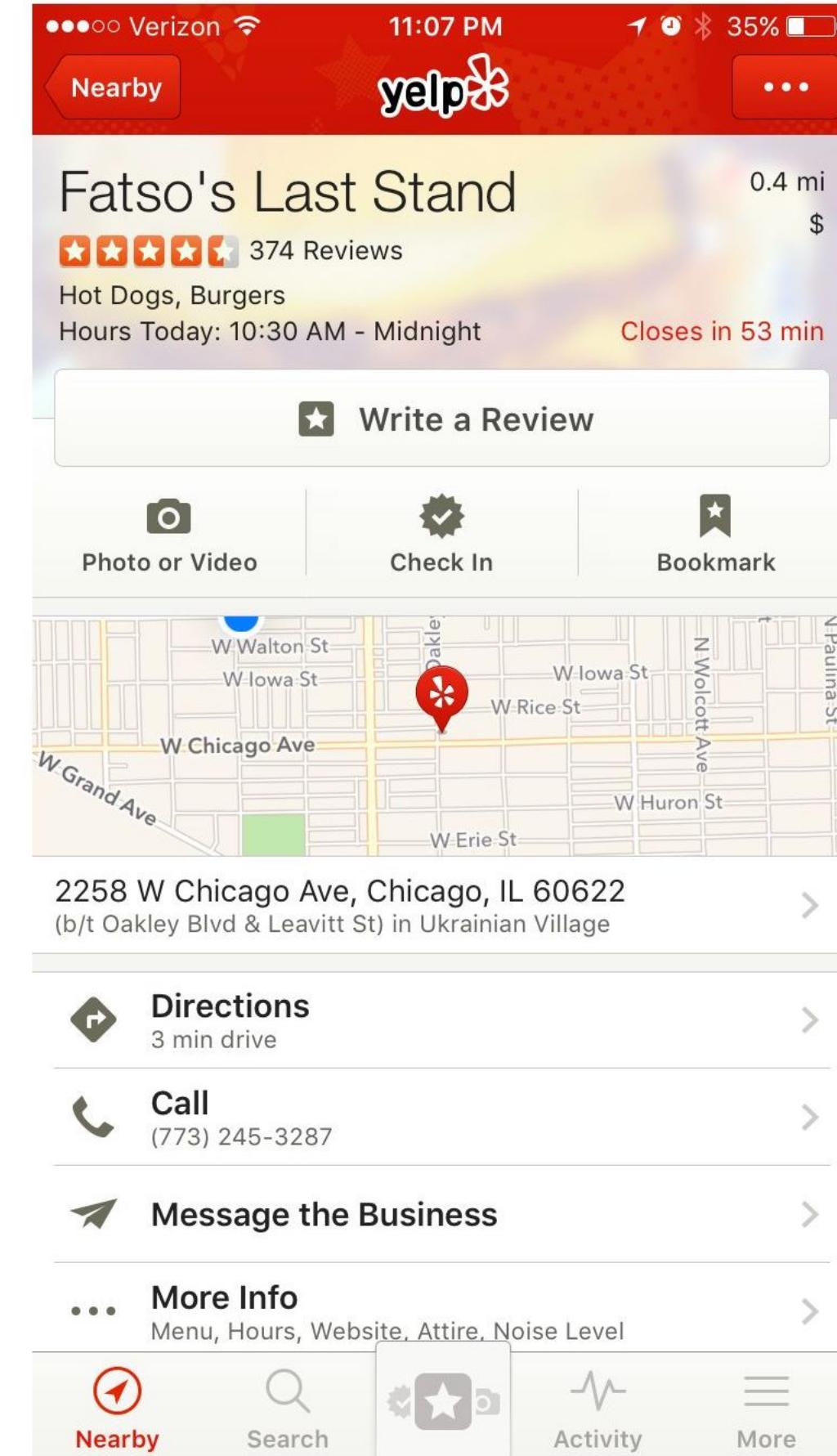
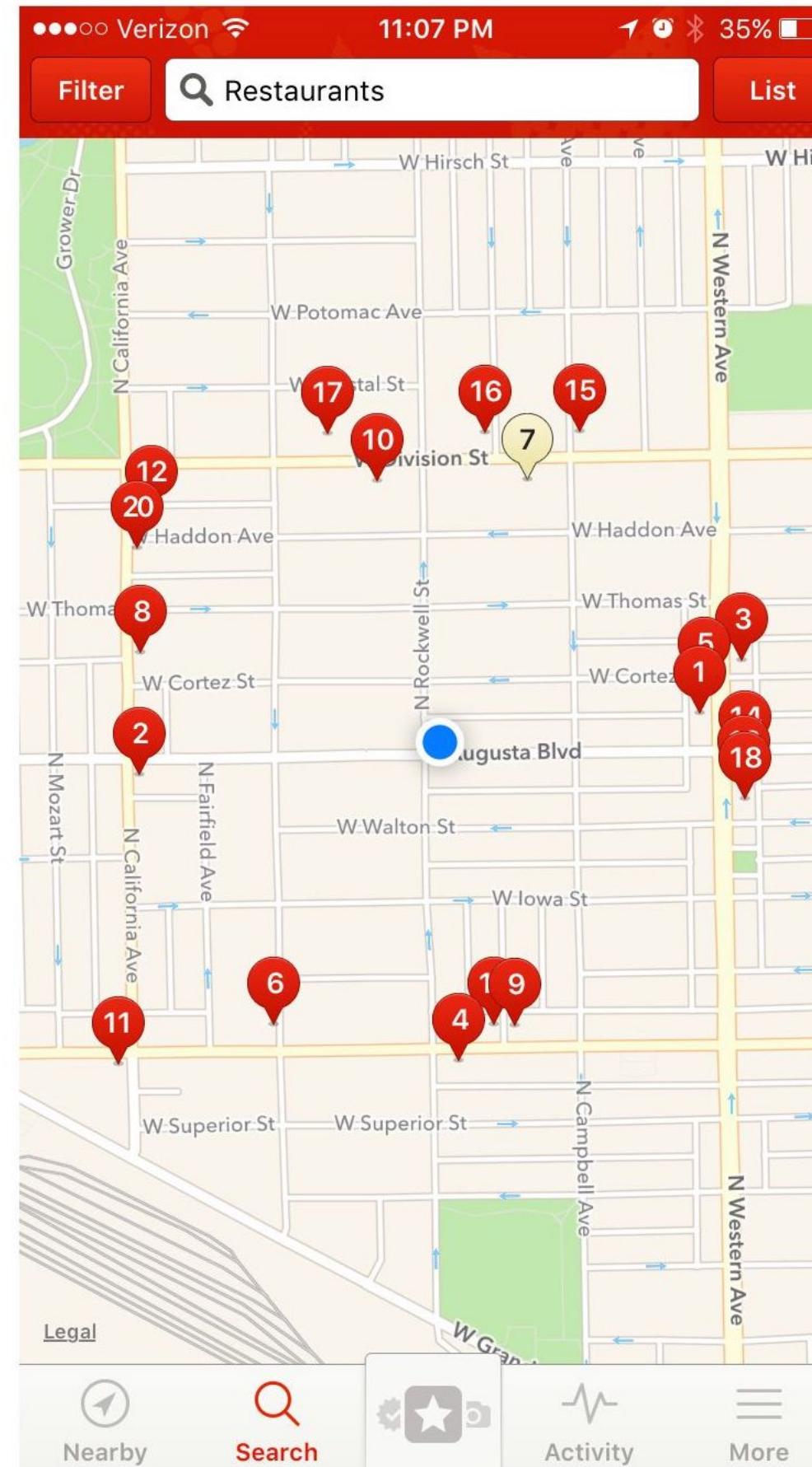
**Definition:** Commonly used patterns of navigation through interactive applications.

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

## Models: Hub & spoke

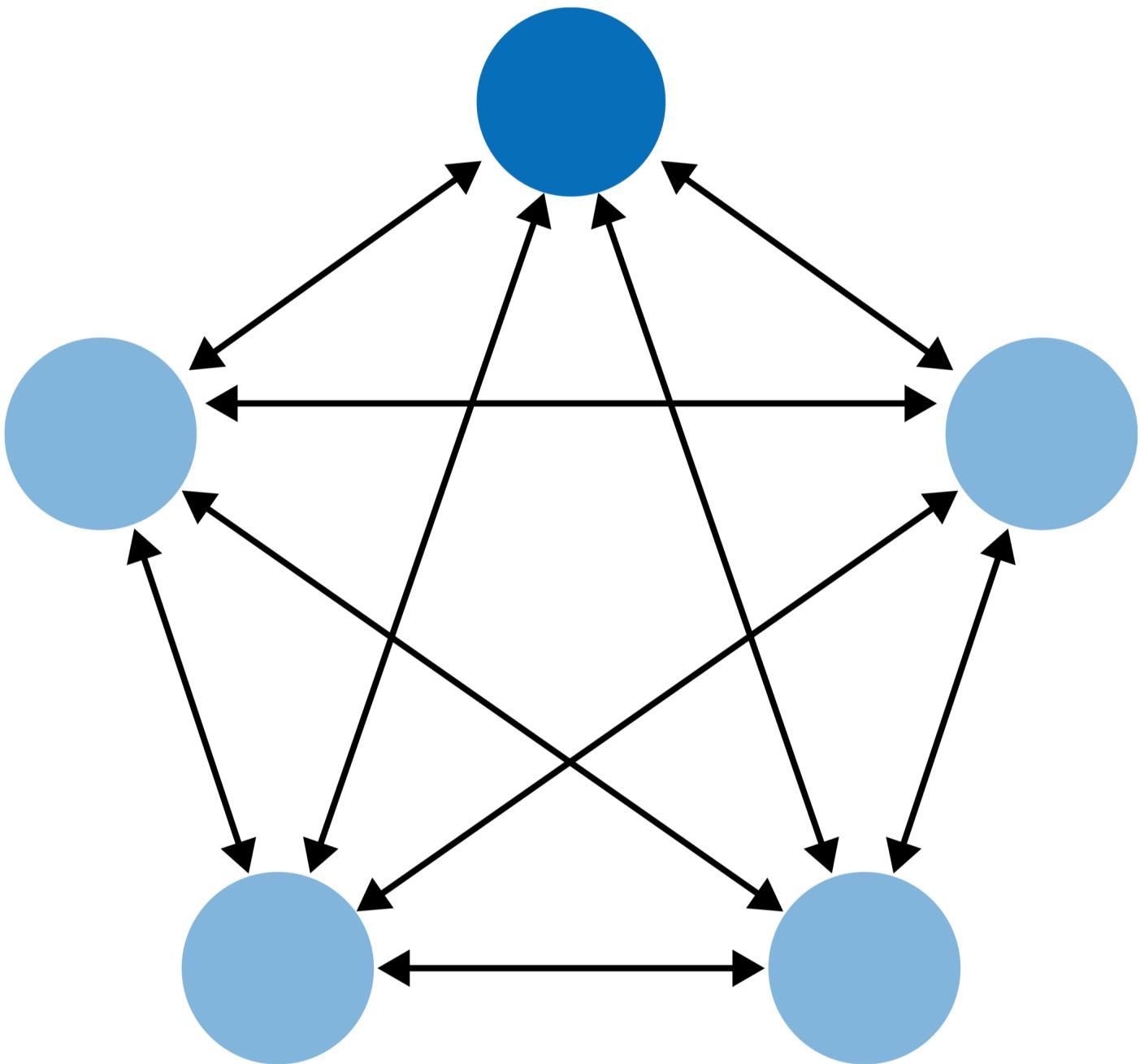
**Definition:** Involves a central hub, e.g., a home screen, that provides transitions to and from several specialized components.





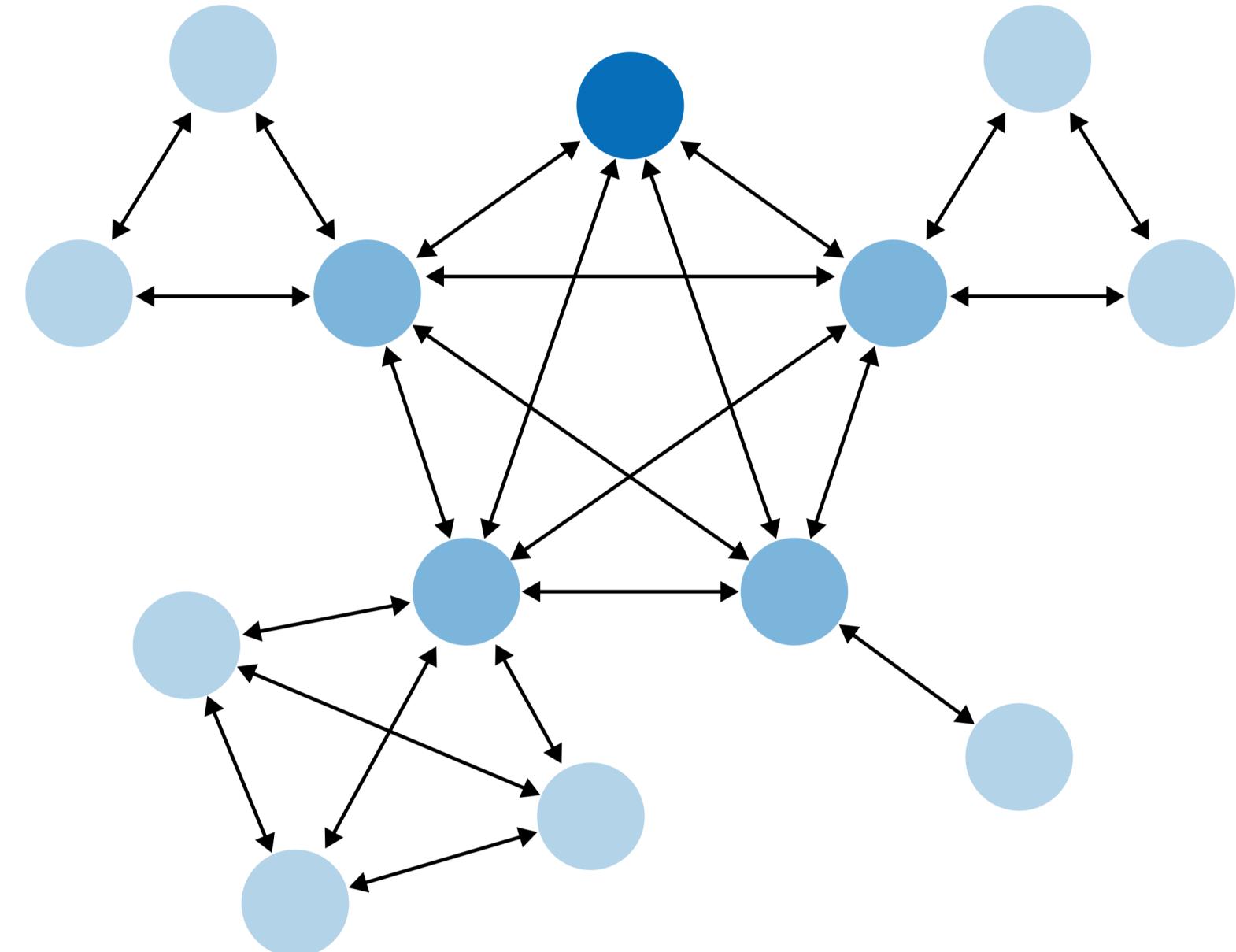
## Models: Fully connected

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



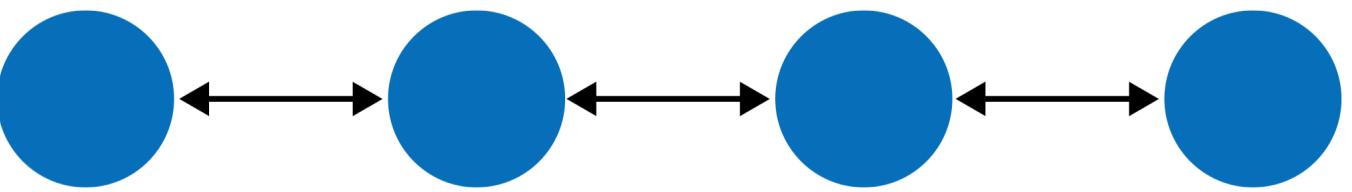
## Models: Multi-level

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



## Models: Stepwise

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





## Set up your Amazon selling account

Have the following available:



**Business name &  
address**



**Mobile or  
telephone number**



**Chargeable credit  
card & valid bank  
account**



**Tax information  
account**

### Legal name

[What is a legal name? ›](#)

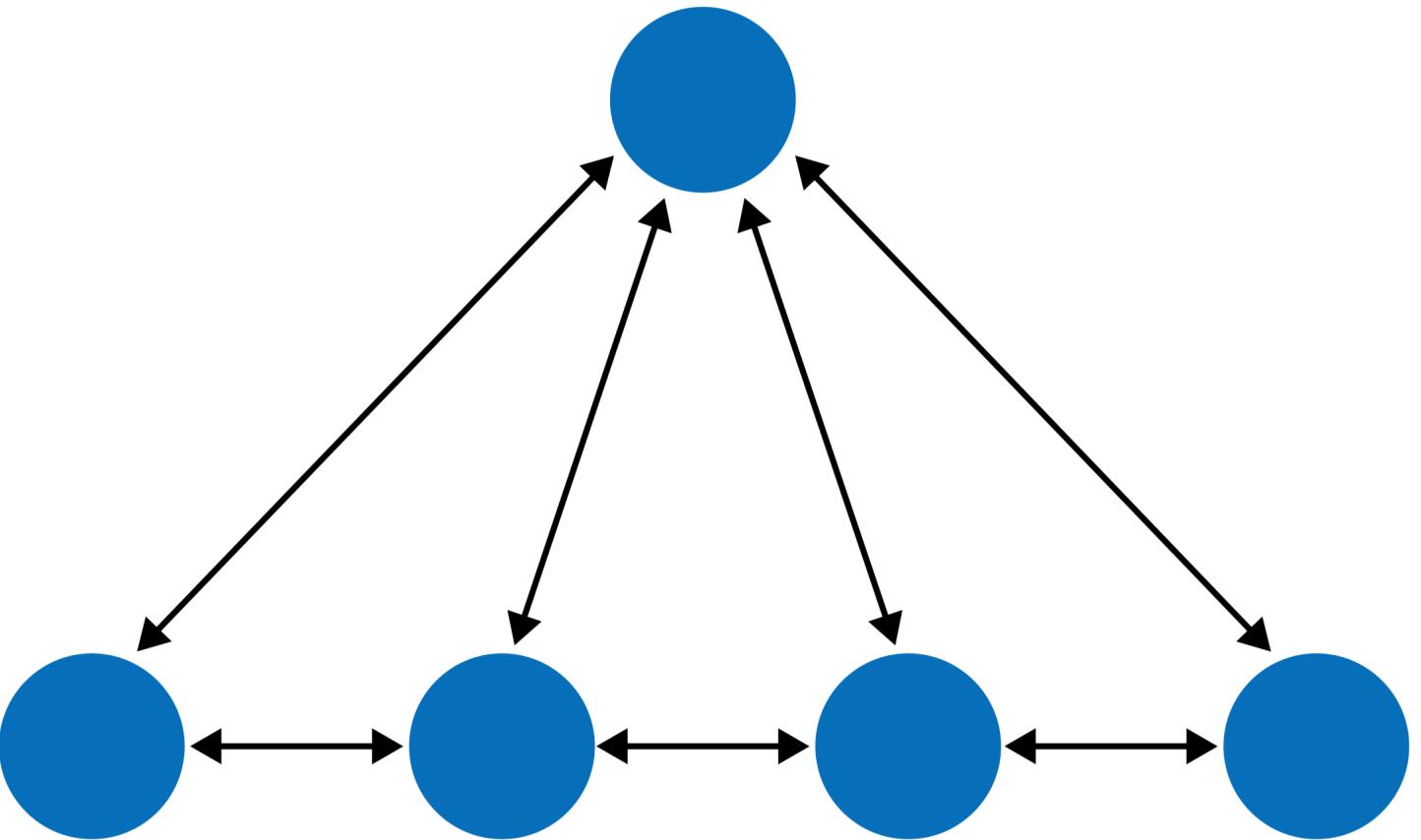
### Seller agreement

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

Please Leave Feedback

## Models: Pyramid

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



TurboTax Online

intuit **turbotax** Federal Free Edition

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:

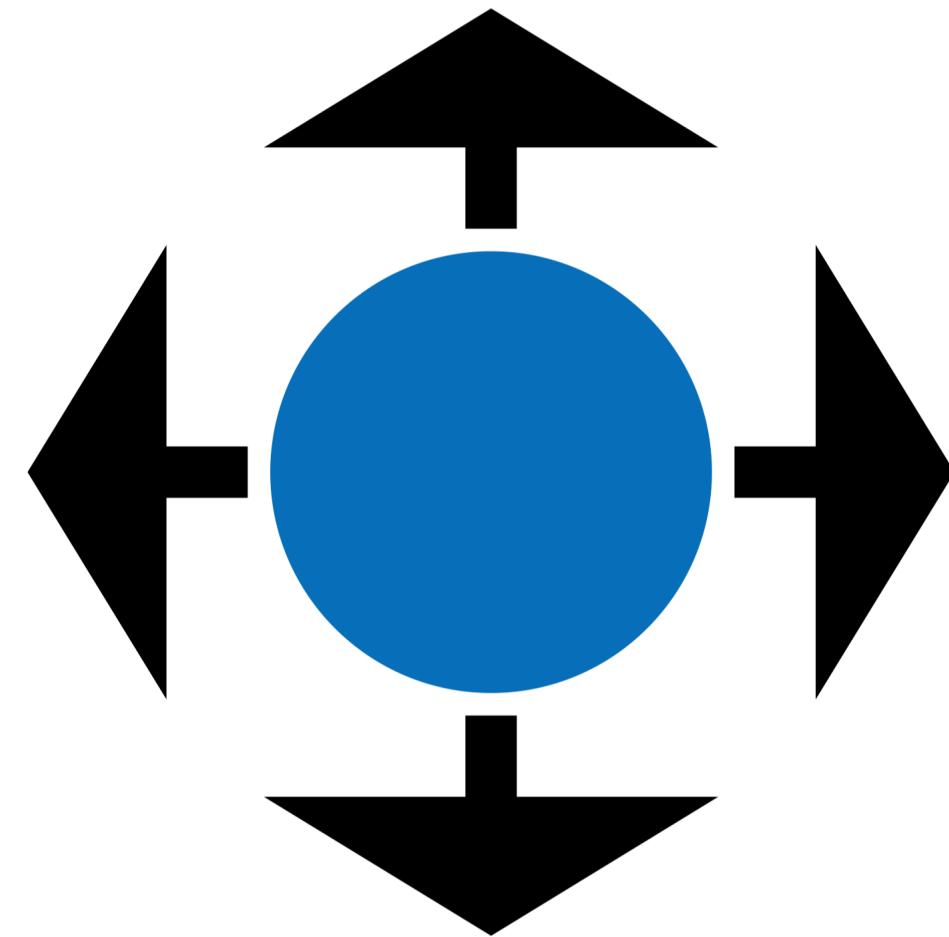
- We'll cover your state requirements
- We'll search for state tax breaks
- We'll help ensure your taxes are accurate

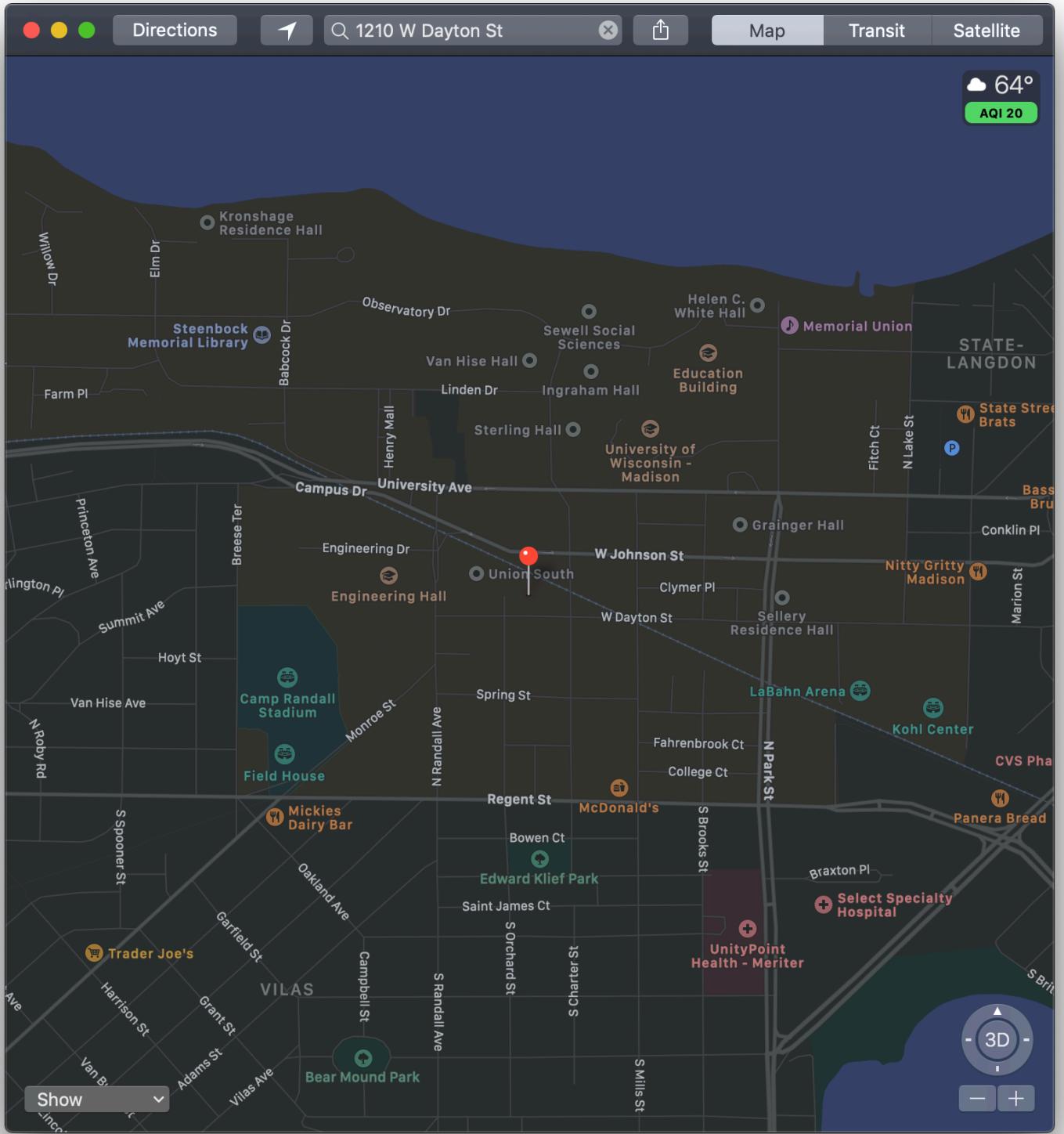
< Back Continue

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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.

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.

Drafts / Untitled

Share

32%

Frame

Welcome

START NOW

iPhone X

Welcome

START NOW

VIDEO

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 clear that they should scroll down further. 😊

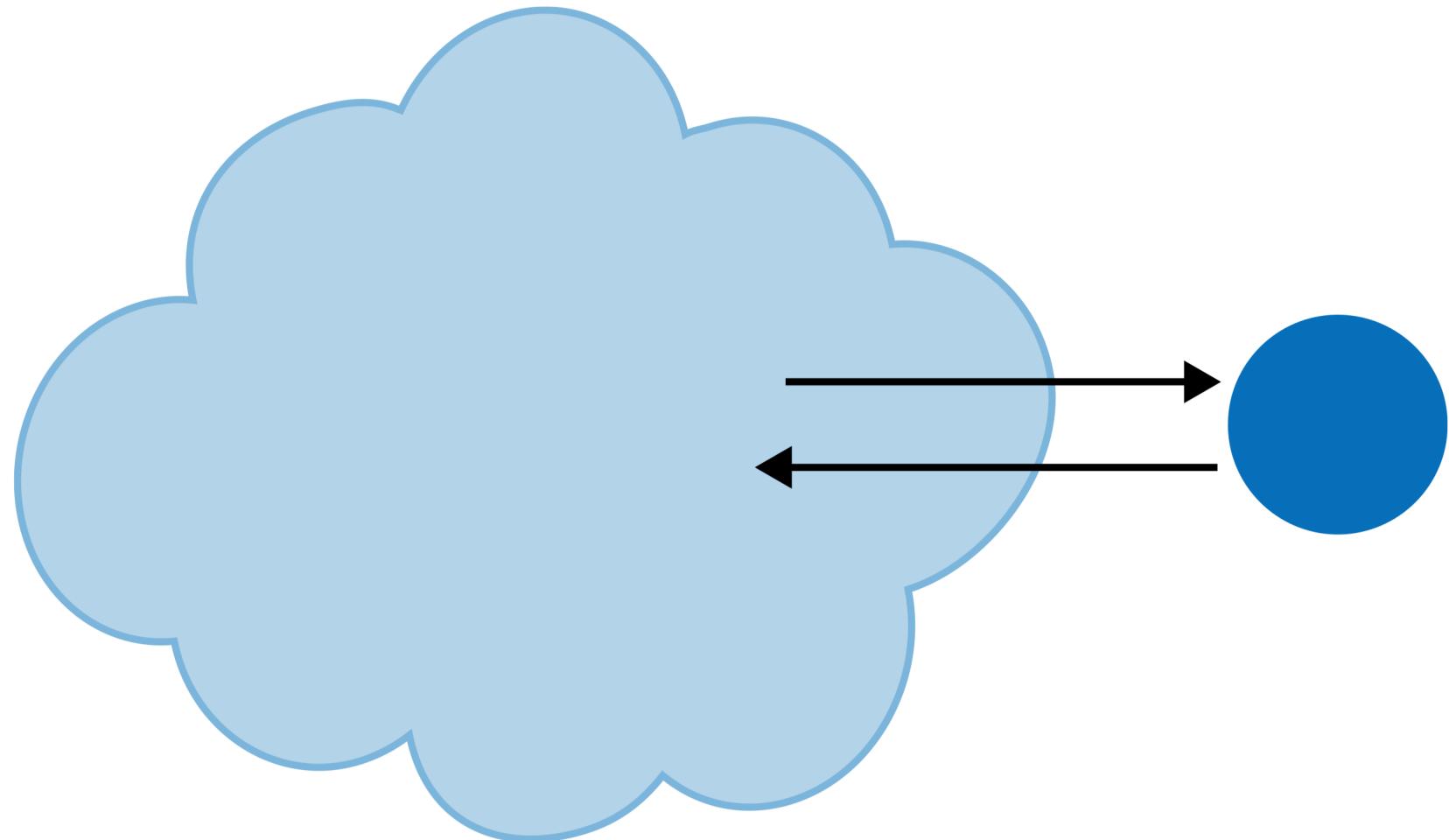
2 Maria, 26 minutes ago This is cool.

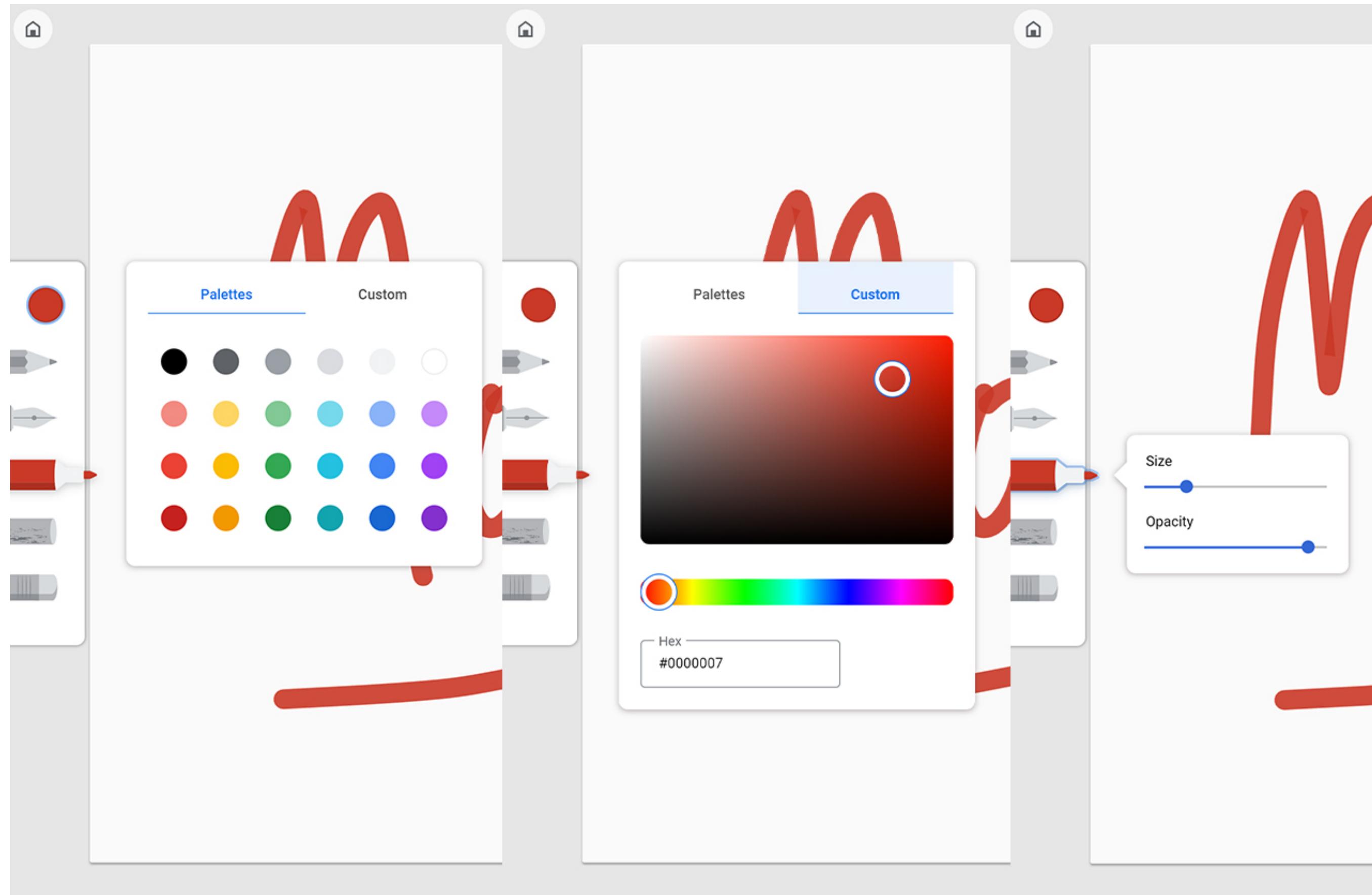
1 Maria, 39 minutes ago This should be a color-branded button

?

## Models: Modal panel

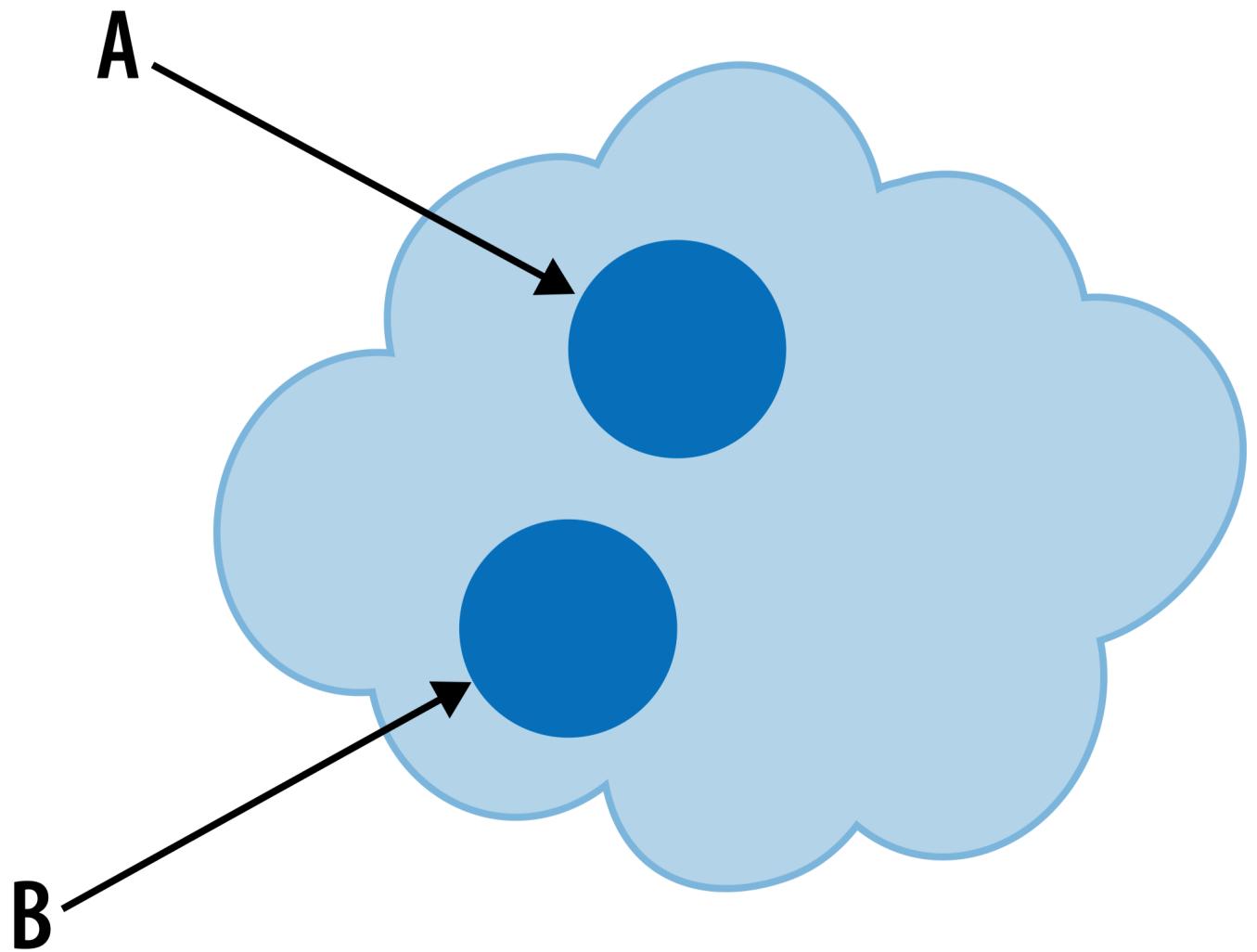
**Definition:** Follows the flat navigation model except for modal dialogs that are temporarily overlaid on the canvas to help the user perform specific functions.

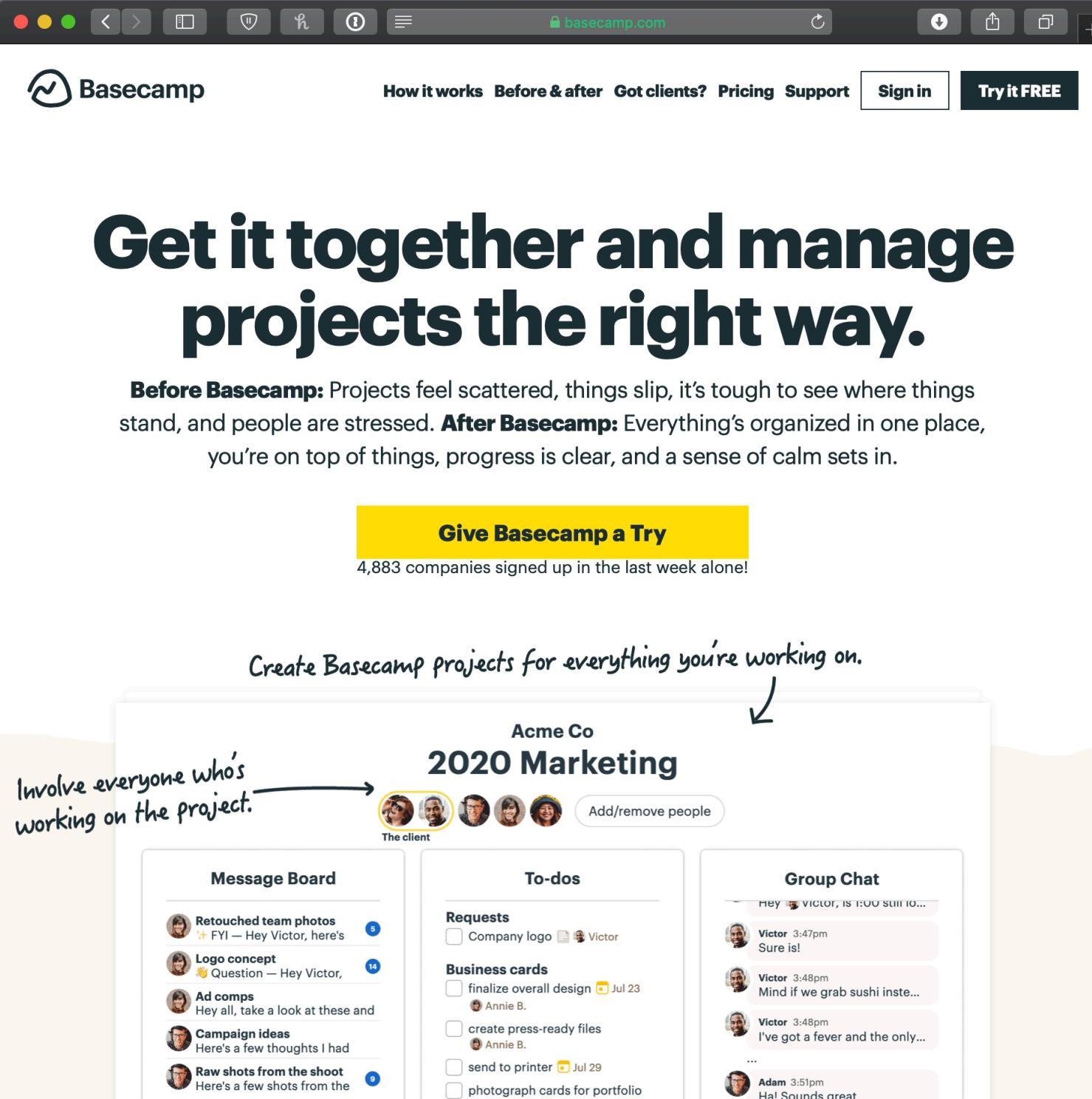


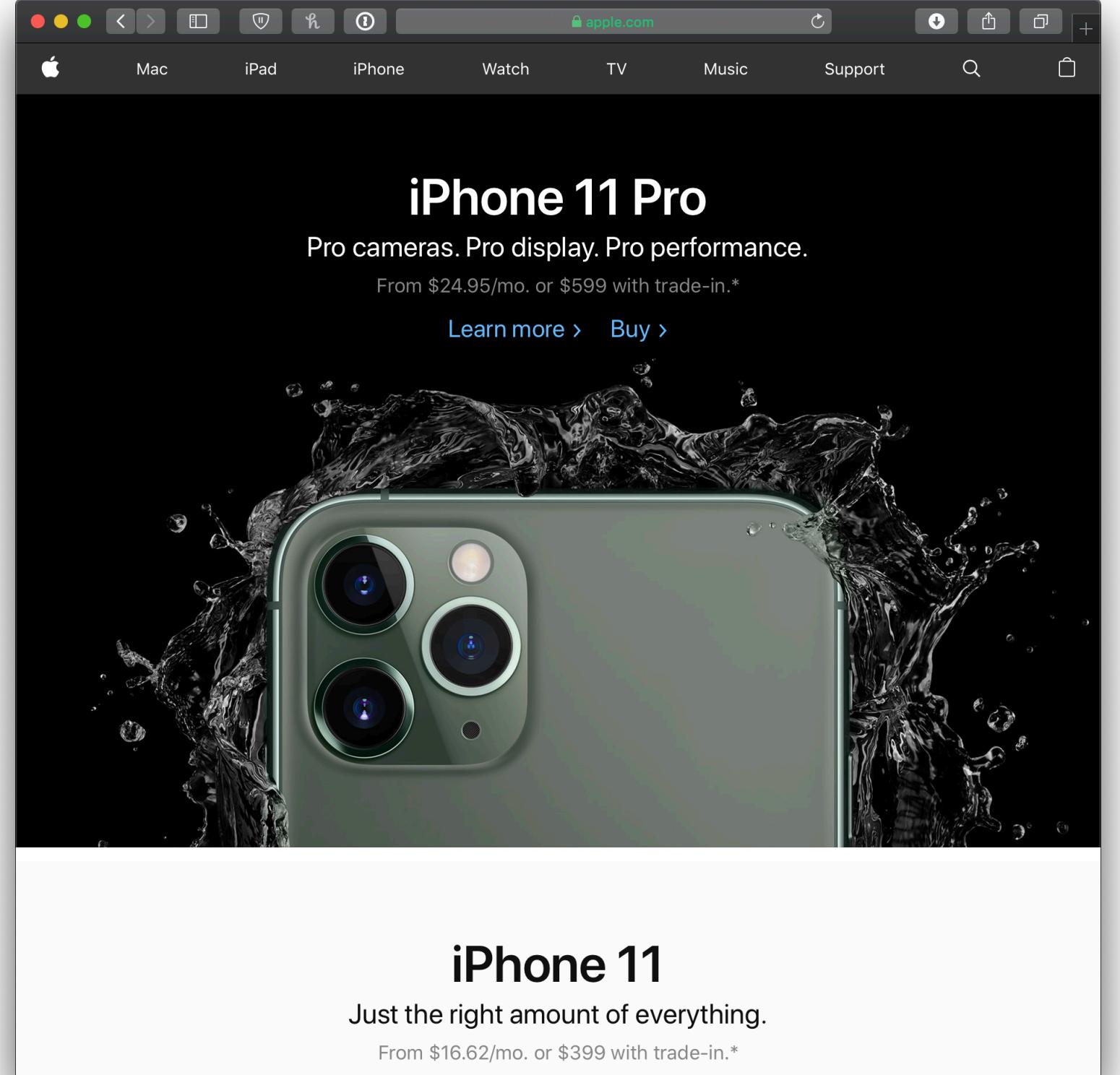


## Models: Clear entry points

**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.



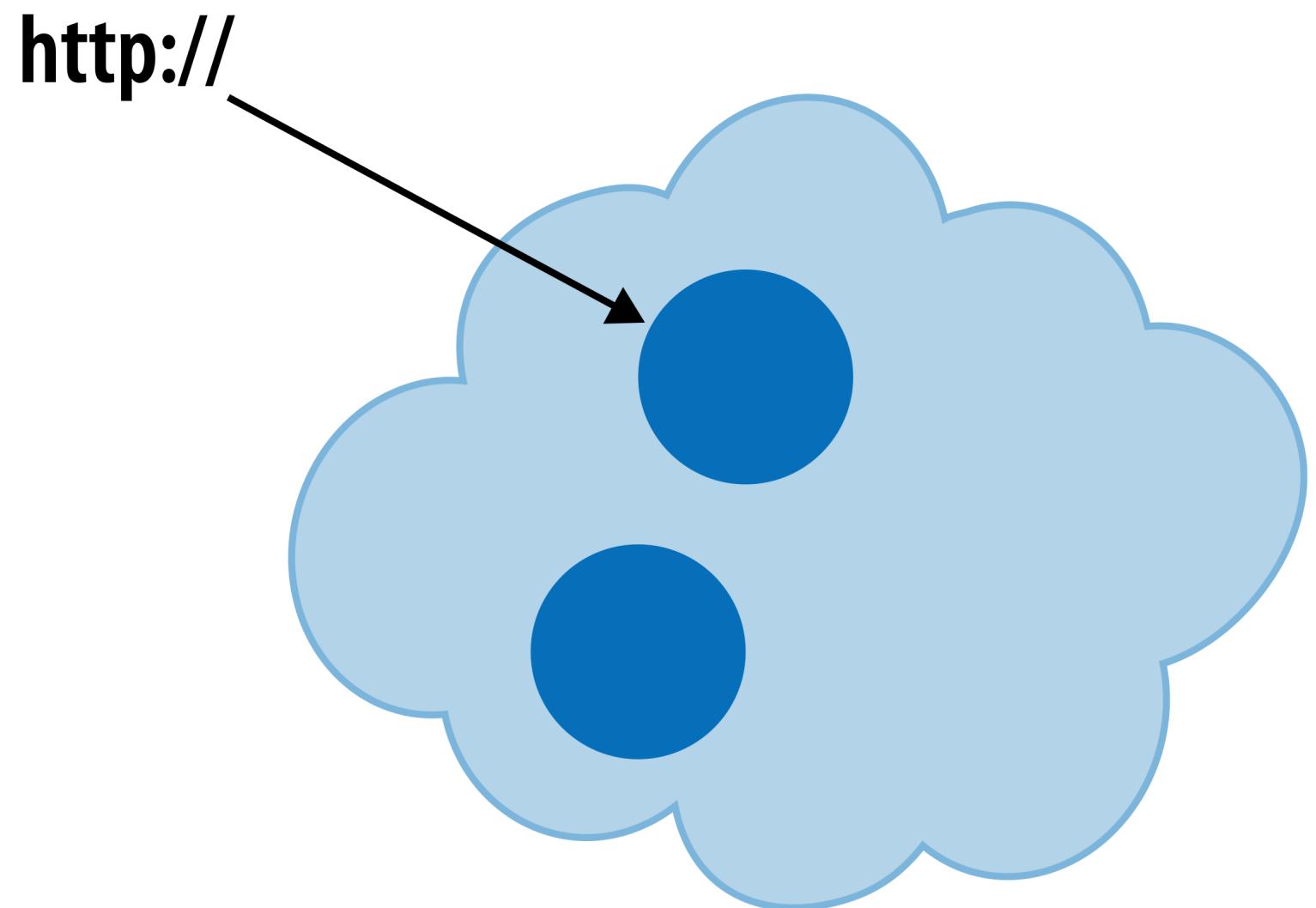
The screenshot shows the Basecamp website homepage. At the top, there's a navigation bar with links for "How it works", "Before & after", "Got clients?", "Pricing", "Support", "Sign in", and a prominent "Try it FREE" button. Below the header, a large section features the headline "Get it together and manage projects the right way." in bold dark blue text. A subtext explains the difference between "Before Basecamp" (scattered projects) and "After Basecamp" (organized projects). A yellow button labeled "Give Basecamp a Try" is followed by a statistic: "4,883 companies signed up in the last week alone!". Below this, a callout box highlights the feature "Create Basecamp projects for everything you're working on." with a handwritten-style note: "Involve everyone who's working on the project." An arrow points from this note to a screenshot of a project page titled "Acme Co 2020 Marketing". The project page displays a message board with several messages, a "To-dos" section with a list of tasks like "Company logo", and a "Group Chat" window showing a conversation between team members.

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

## 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

otah 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

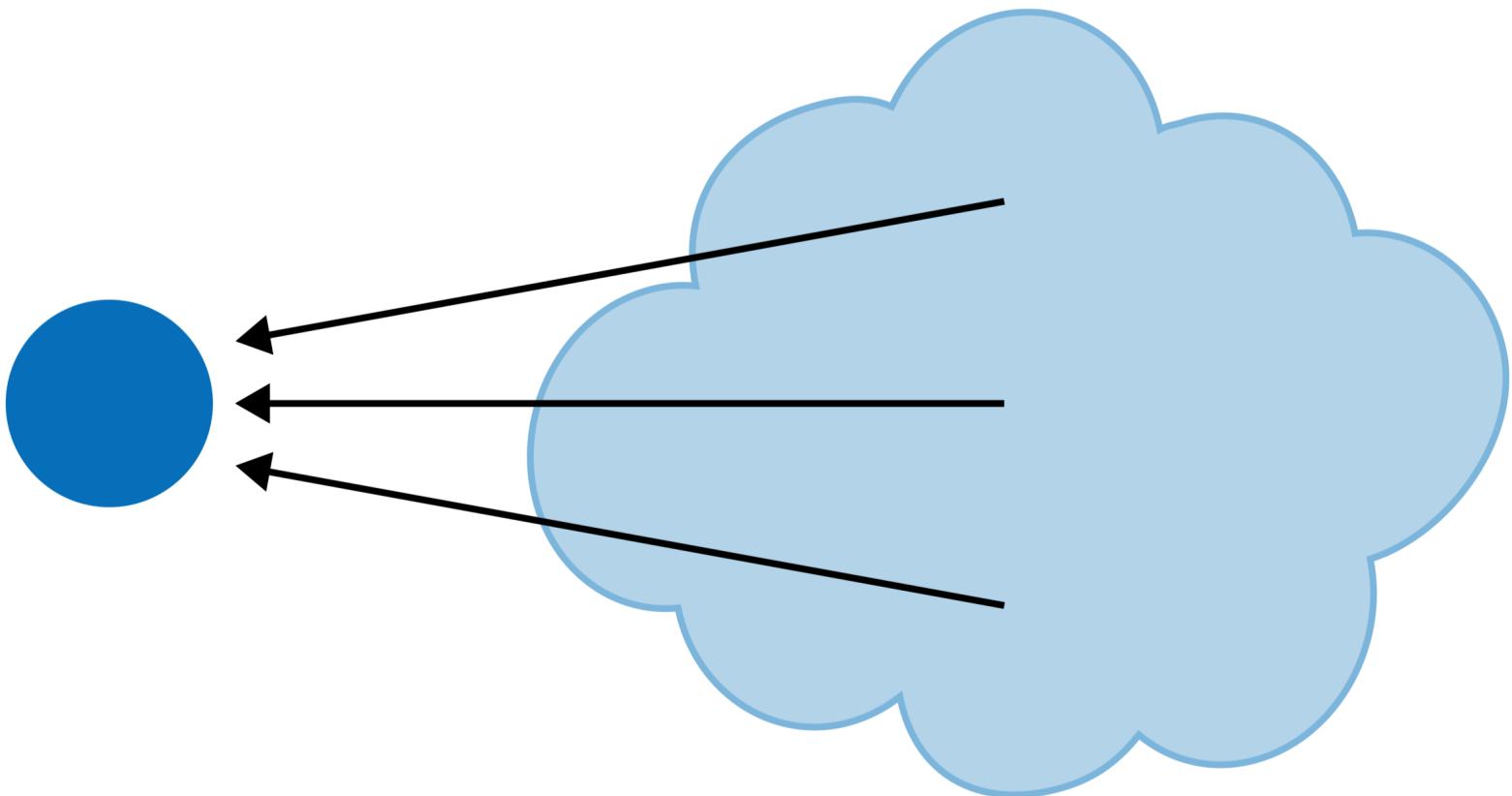
The screenshot shows a digital book reader interface with a vertical sidebar on the right containing navigation links: Table of contents, Bookmarks, Highlights, and Notes. The main area displays a list of highlighted text snippets with their timestamps and counts:

- 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)

At the bottom of the screen, there is a black banner with the text "Votre Artisan 24H/7J" and a navigation bar with icons for back, forward, and search.

## 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.



amazon.com

All 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**

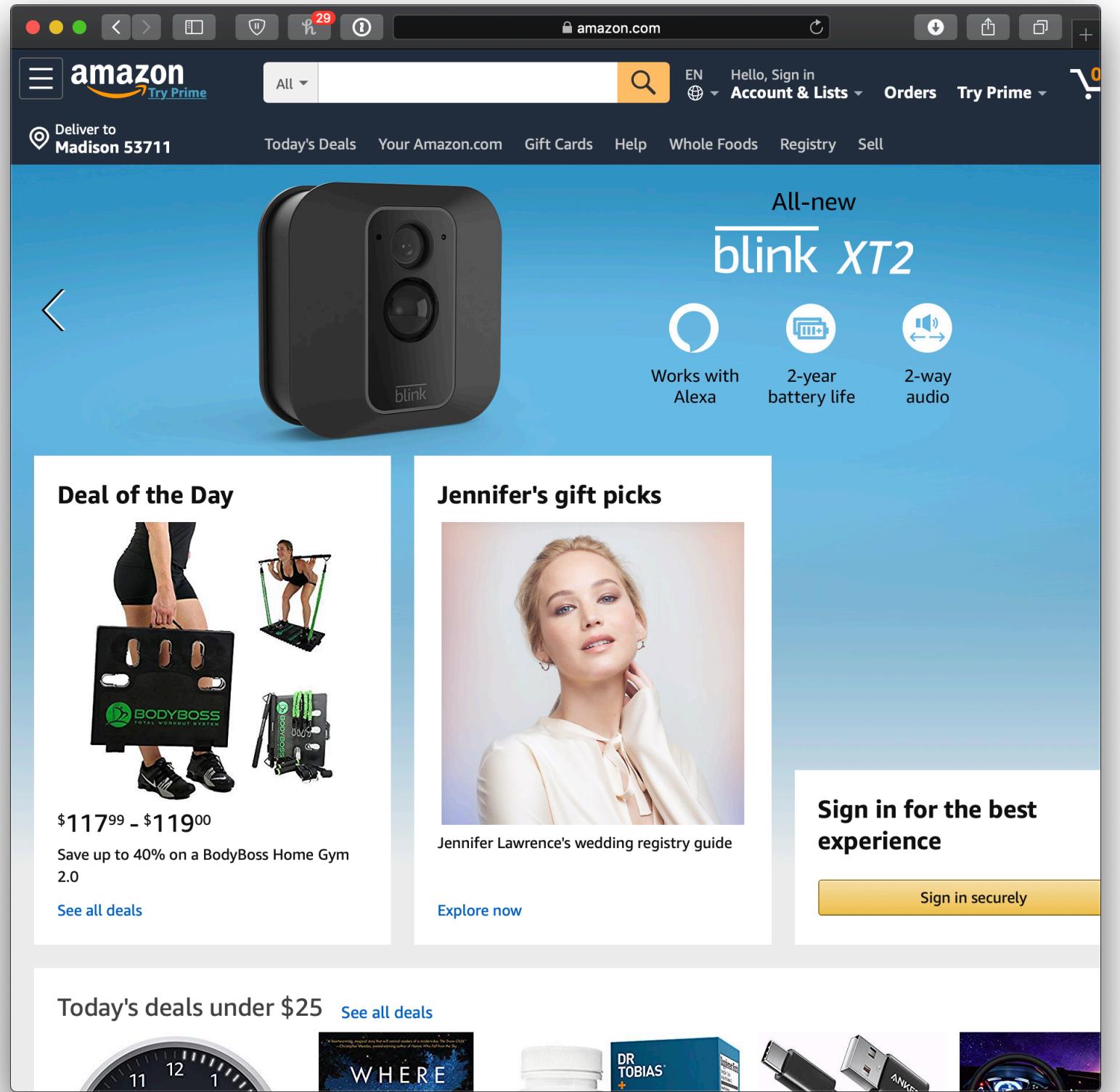
\$117<sup>99</sup> - \$119<sup>00</sup>  
Save up to 40% on a BodyBoss Home Gym 2.0  
[See all deals](#)

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 [See all deals](#)



apple.com

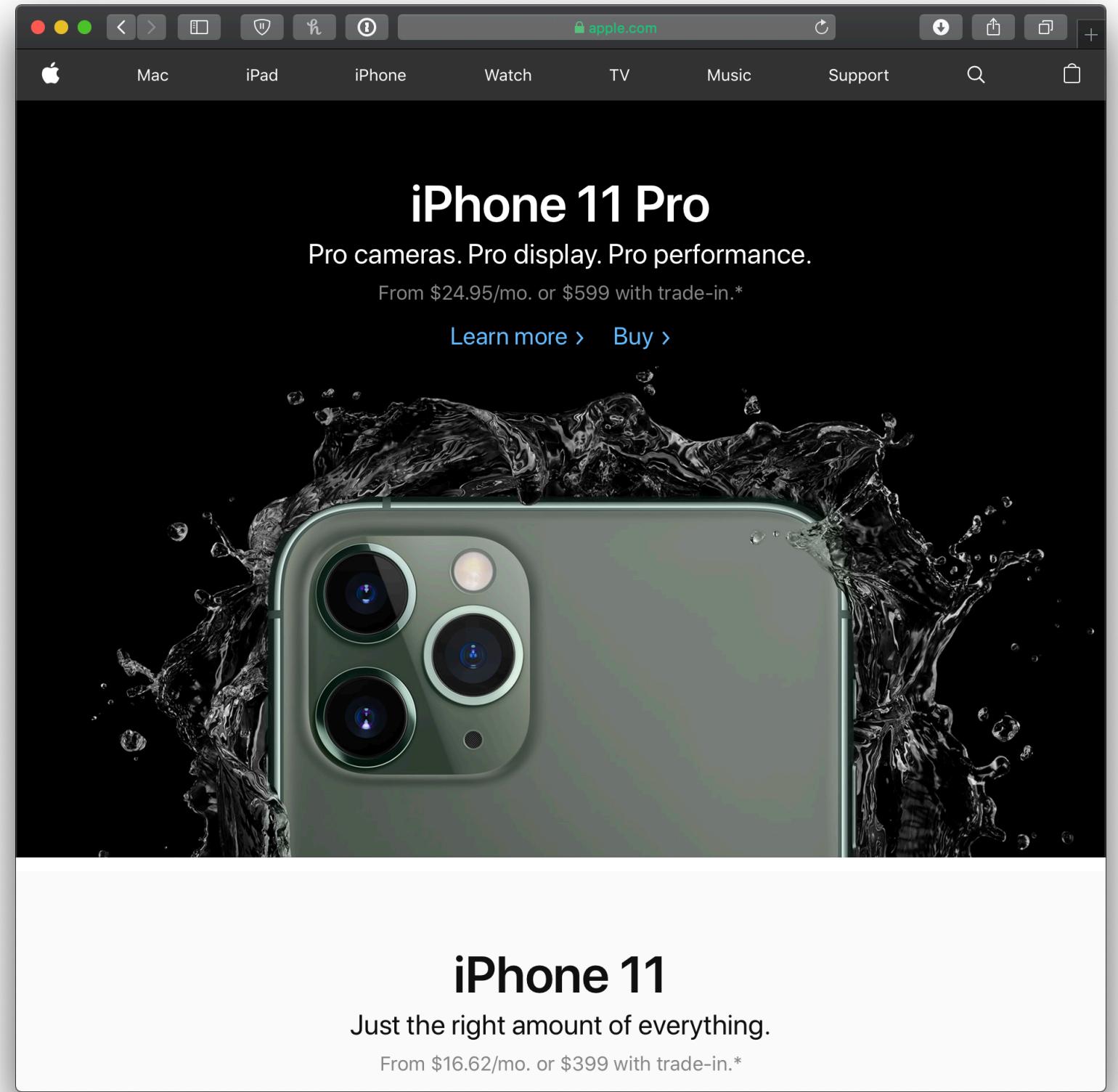
Mac iPad iPhone Watch TV Music Support

# 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.\*

# What did we learn today?

- Know of the history of UI development.
- Explain the similarities and differences of WIMP and Web design
- Understand interaction design fundamentals
- Utilize techniques of driving user interaction
- Conceptualize navigation into different models

# Questions?