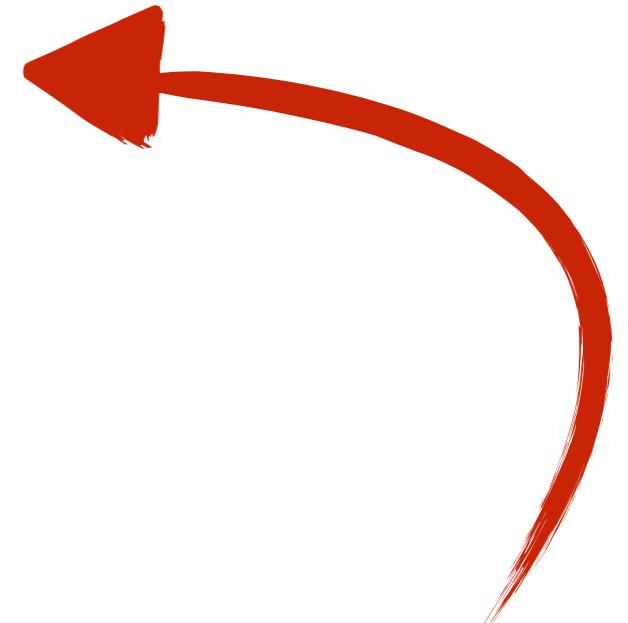


Visual Design



SWE 632, Spring 2018

With at least 30 new things you won't believe!

#10 will shock you!

(actually we hope you believe it all)

Today

- Importance of visual design: solving communication problems
- Some guidelines
- A lot of example and anti-examples

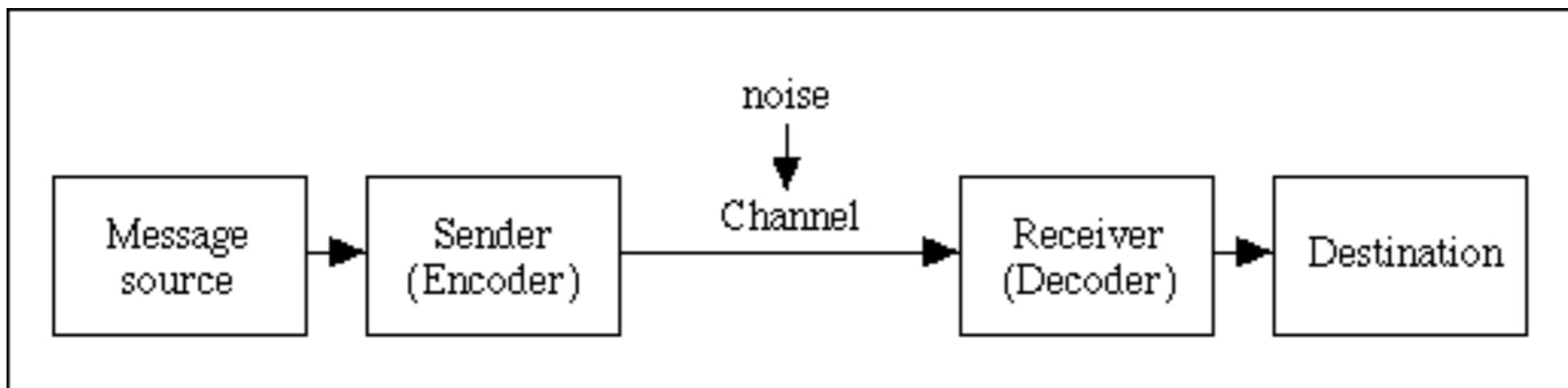
Example

Visual design

- *Solving **communications problems** in ways that are both functionally effective and aesthetically pleasing.*
- Creating a visual language containing a vocabulary of design elements characterized by
 - Visual variables—shape, size, position, orientation, color, texture, ...
 - Organizational relations between elements—balance, structure, proportion, ...
 - Visual syntax—rules for assembling elements w/in design language

Visual design as communication

- Goal: **efficiently** & accurately transmit information from system to user
- Visual variables & organization encode information



Goals for visual design

- Successfully **transmit** information
- Present coherent & consistent design that reduces ambiguity and potential confusion
- Reduce visual **search** time through layout & organization
- Create desired **emotional** reactions through aesthetic choices

Guidelines for Visual Design

Elegance & simplicity

- *Elegance*—derives from Latin eligere, to “select carefully”
- **Judicious** selection of elements and economy of expression revealing an intimate understanding of problem
- Removing & combining superfluous elements until only the necessary remains



Benefits of simplicity

- **Approachability** - rapidly understood affordances, allowing glanceable understanding of possible interactions
- **Immediacy** - greater emotional impact because interactions can be quickly understood



Marc Berthier. Tykho Radio. 1997. Synthetic rubber and other materials, 5 1/2 x 5 1/2 x 1 5/8" (14 x 14 x 4.1 cm). Manufactured by Lexon, France. The Museum of Modern Art, New York. Gift of the manufacturer.

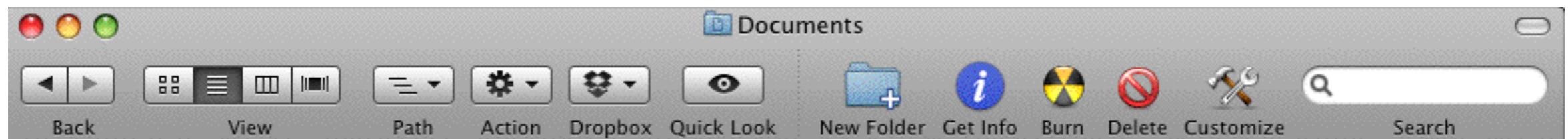
Reducing a design to its essence

- Make design simple, bold direct by removing inessential details & elements
 - Even essential elements may be suggested

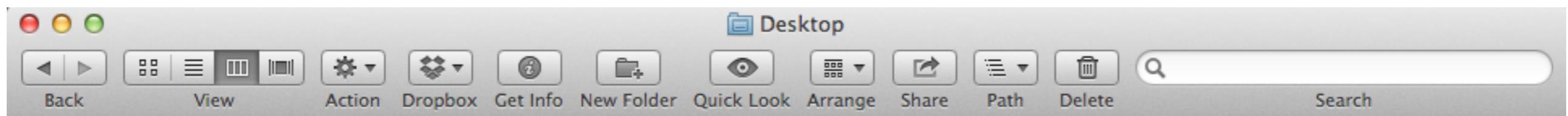
1. Determine essential qualities & information to be conveyed
2. Critically examine each element & ask how design would suffer without it.
3. Try removing elements. What happens?



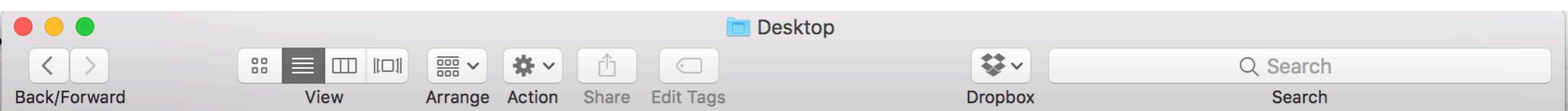
Trade-offs in Simplicity



OSX c.2010

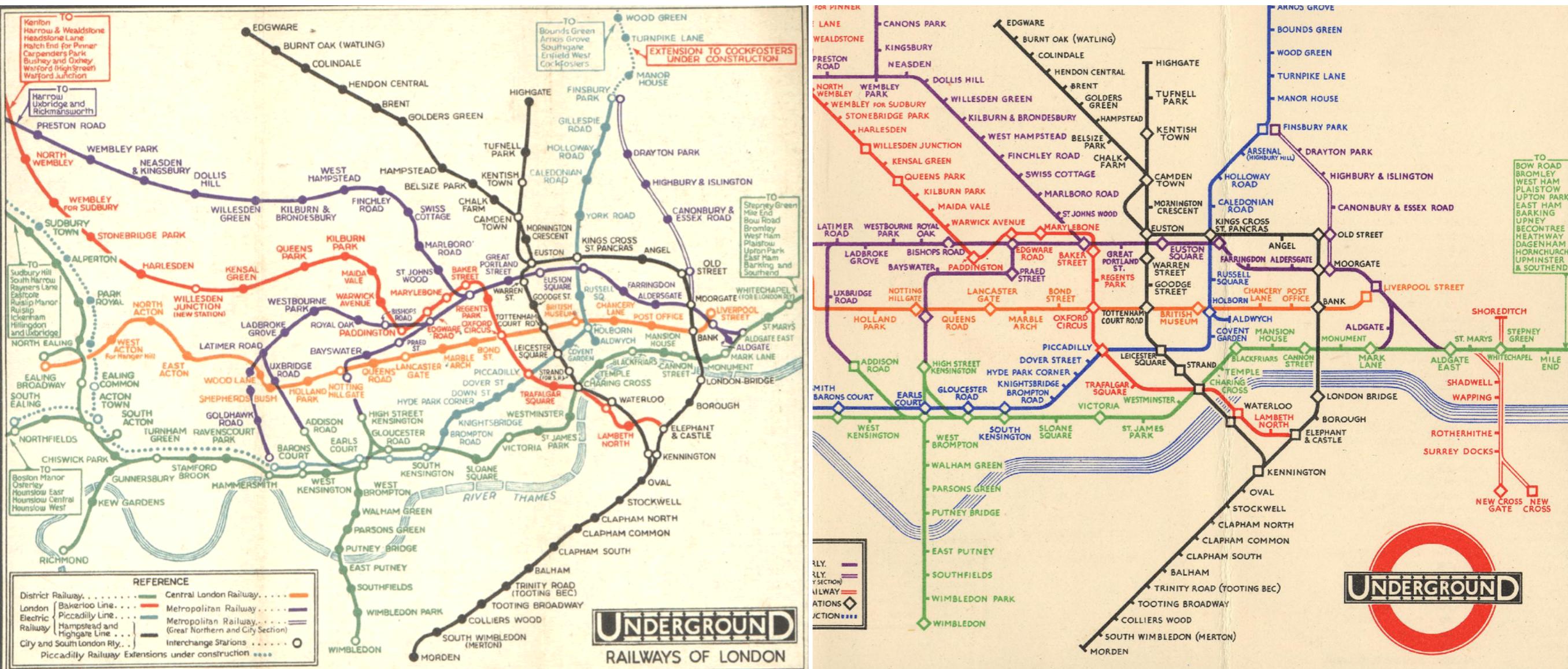


OSX c.2011



OSX c.2016

Guidelines for Visual Design



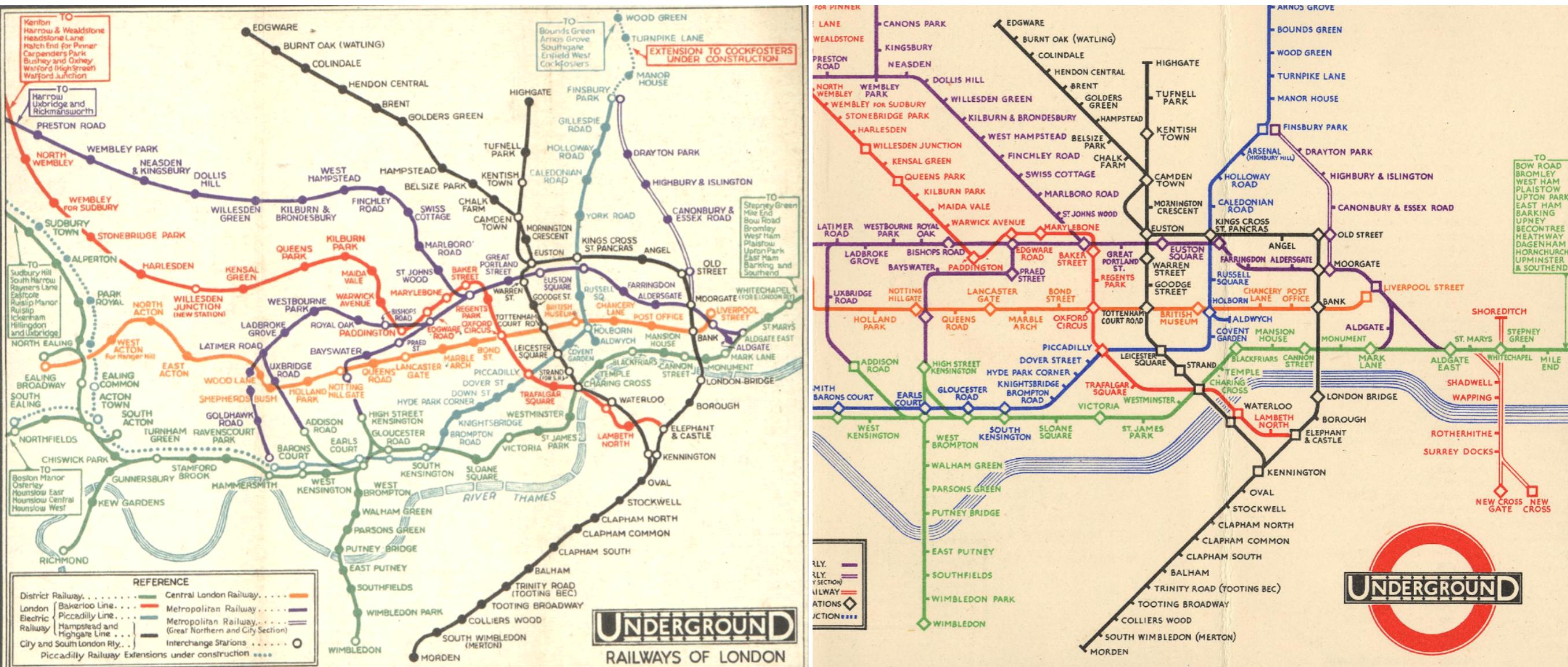
Reduction in new map: relative distances don't matter

Regularizing the elements of a design

- Reduce information by repeating elements according to a rule, principle or rhythm
- Enable user to scan ahead
- Use irregularity where needed to clarify that something is irregular!

1. Use **regular** geometric forms, simplified controls, muted colors where possible
2. If multiple similar forms required, make them identical as much as possible in size, shape, color, texture, spacing, alignment
3. Limit variation in typography to a few sizes
4. Make sure critical elements intended to stand out are **not** regularized

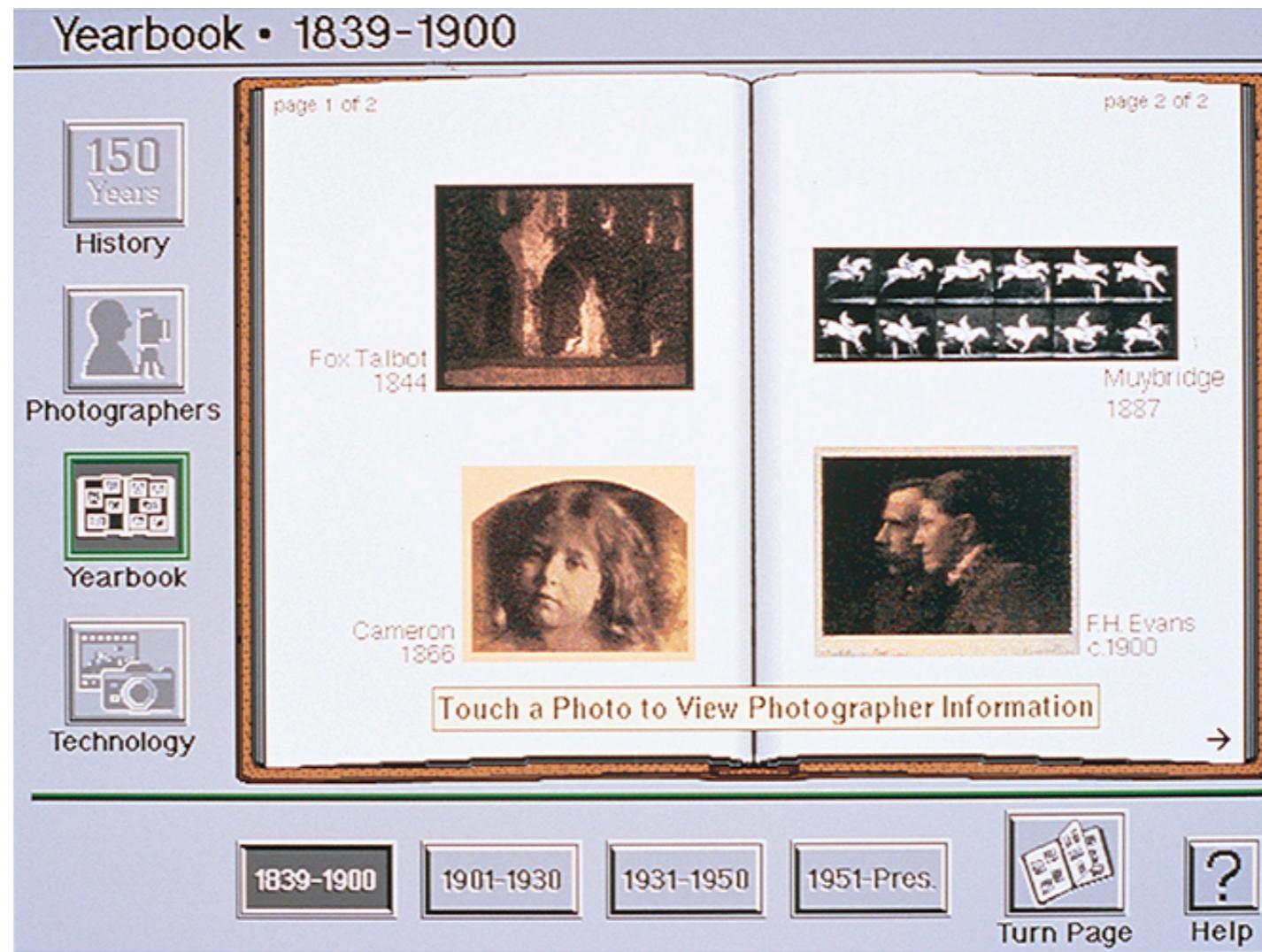
Guidelines for Visual Design



Regularization in new map: Straight lines result in station names laid out in a line, rather than bouncing around

Error - excessive skeuomorphism

- Skeuomorphism - making visual design resemble reality (like metaphors)
- Excessive skeuomorphism is distracting and wastes potential visual bandwidth that could encode meaningful information
- Trend towards "flat" interfaces



Calendars

Invitations (0)

Day

Week

Month

Year

List

Search

July 2013

Wednesday

July 3

 **Ted Faszer's Birthday**

all-day

 **Mike Yutzy's Birthday**

all-day

Thursday

July 4

 **Cherie Yvette's Birthday**

all-day

Monday

July 15

 **Allie Johnson's Birthday**

all-day

 **Dr Stoll**

8:45 AM to 9:45 AM

Thursday

July 18

 **Richard Gintowt's Birthday**

all-day

 **Jacks birthday**

11 AM to Noon

Monday

July 22

 **Alisha Campbell's Birthday**

all-day

Saturday

July 27

Ted Faszer's Birthday

Wednesday, July 3, 2013

Details

all-day events

 **Mike Yutzy's Birthday** **Ted Faszer's Birthday**

2 PM

3 PM

4 PM

5 PM

6 PM

7 PM

8 PM

9 PM

November 2016

Day Week Month Year

🔍 +

Sun	Mon	Tue	Wed	Thu	Fri	Sat
		• SWE 432 Noon				
20	21 • SWE meeting 11 AM	22 • Office Hours • SWE 432 10:30 AM Noon	23	24 • SWE 432 Noon	25	26
27	28 • Office Hours • SWE 432 10:30 AM Noon	29	30			
				Dec 1 • SWE 432 Noon	2	3
4	5 • Office Hours • SWE 432 10:30 AM Noon	6	7	8 • SWE 432 Noon	9	10
11	12 • Office Hours 10:30 AM	13	14	15	16	17

Scale, Contrast, & Proportion

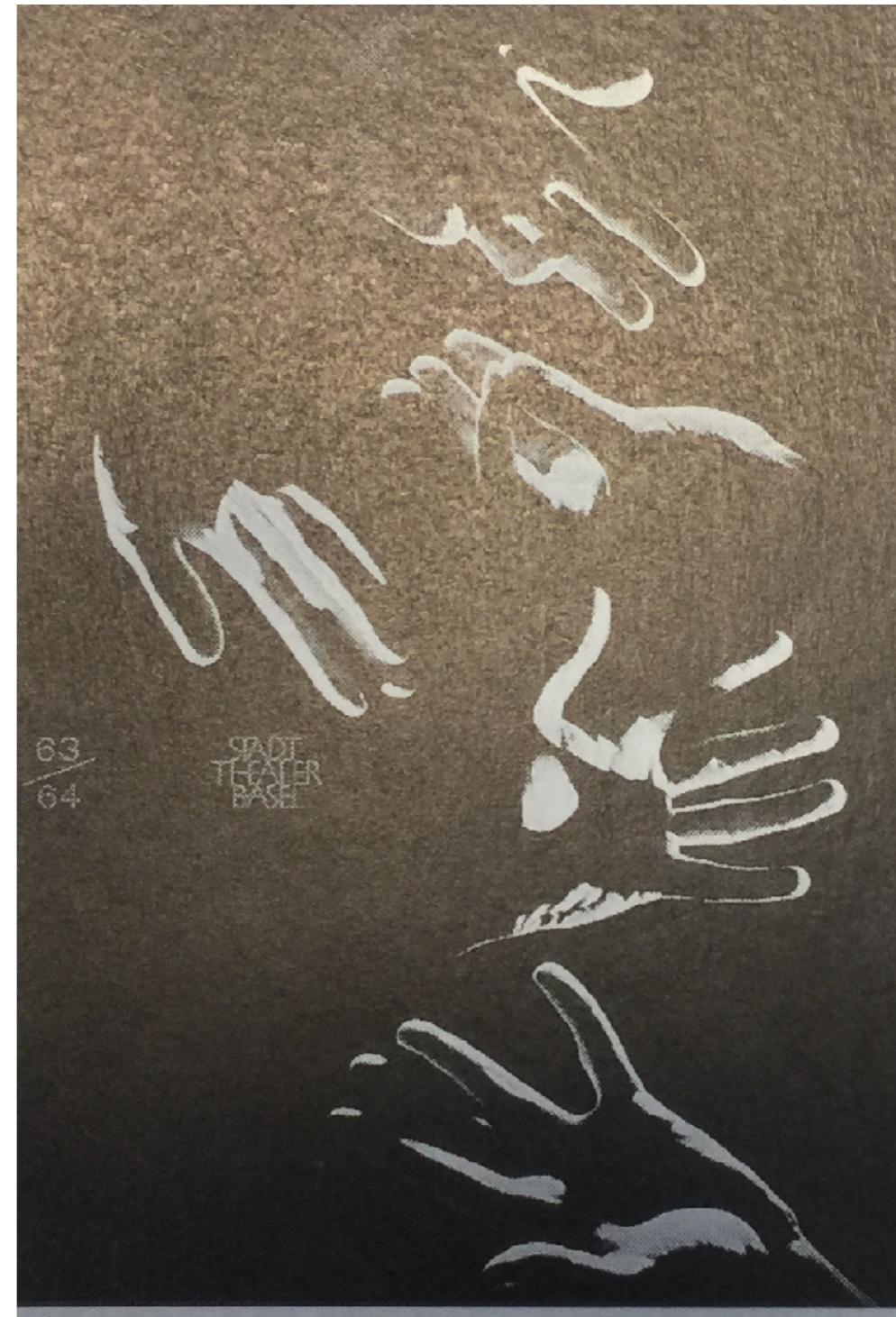
Scale, contrast, & proportion

Information consists of differences that make a difference. (Edward Tufte, Envisioning Information)

Individual visual variables of design that encode information

Terminology

- Scale - **relative** size or magnitude of element in comparison to related elements
- Contrast - visually noticeable **distinctions** along a common visual dimension
- Proportion - ratio and **balance** between elements
- Emphasis - contrasts can emphasize important elements or areas & add visual **interest** by creating tension & drama

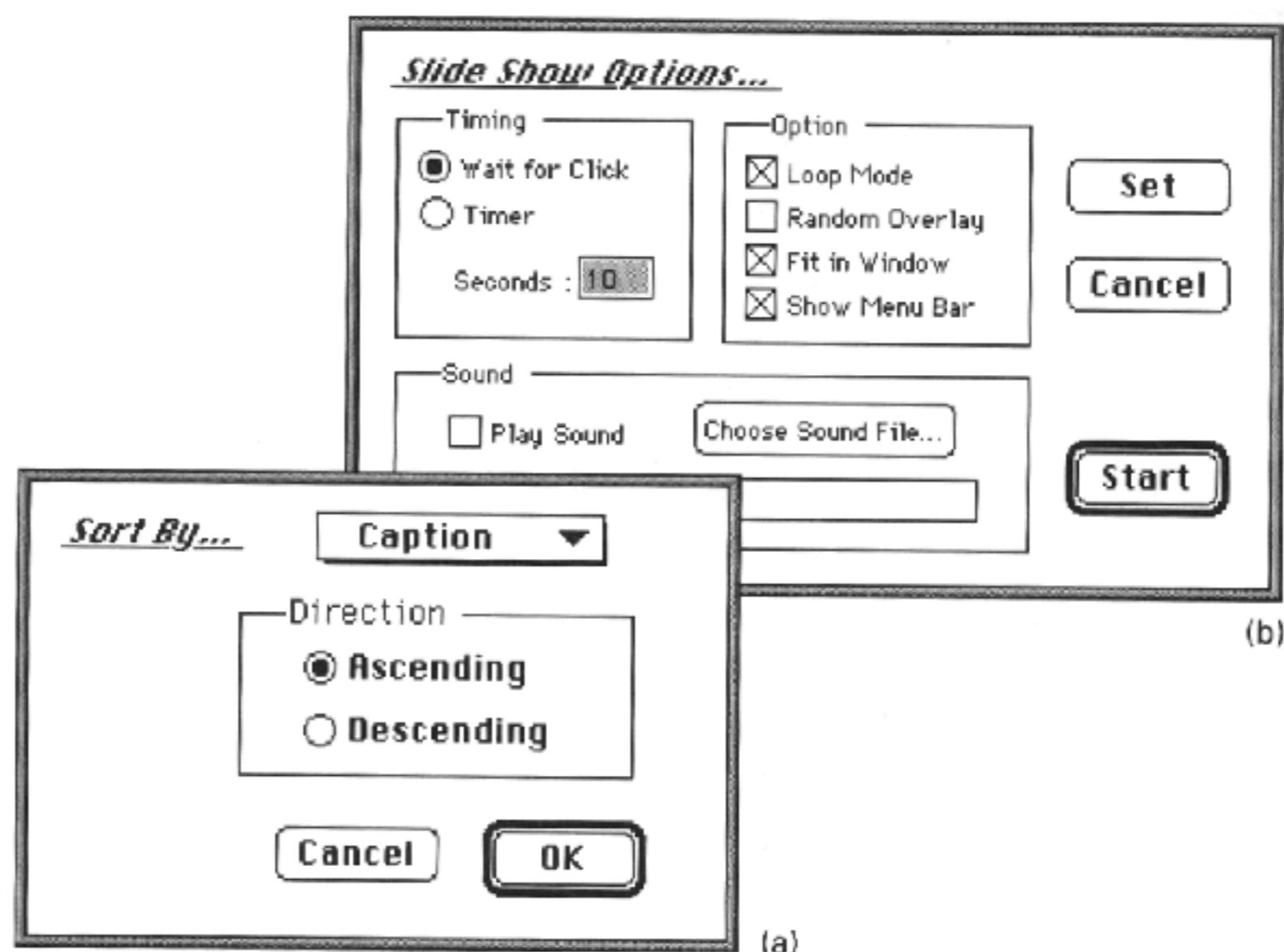


Principles

- Clarity - contrasts should be clear and easily differentiated, not slight and subtle
- Harmony - proportions and ratios should be harmonious
- Activity - use contrasts to maintain orientation & context within design
- Restraint - contrasts should be conscious, strong, few in number, and never overwhelming

Error - excessive typographic contrasts

5 different types sizes in 3 different fonts (!!)



Layers

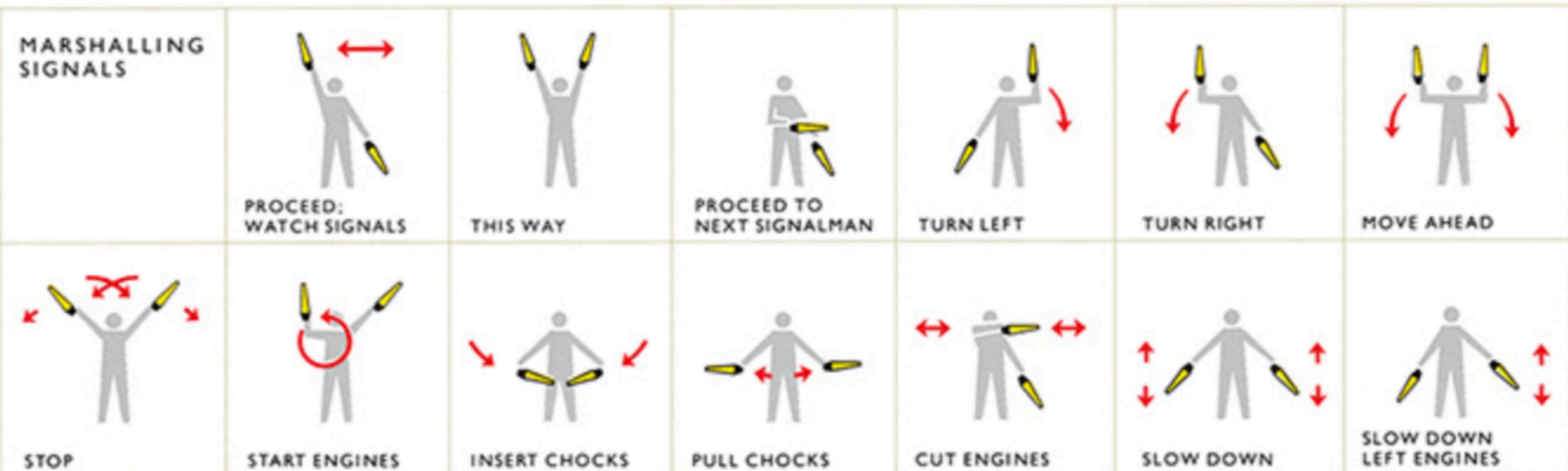
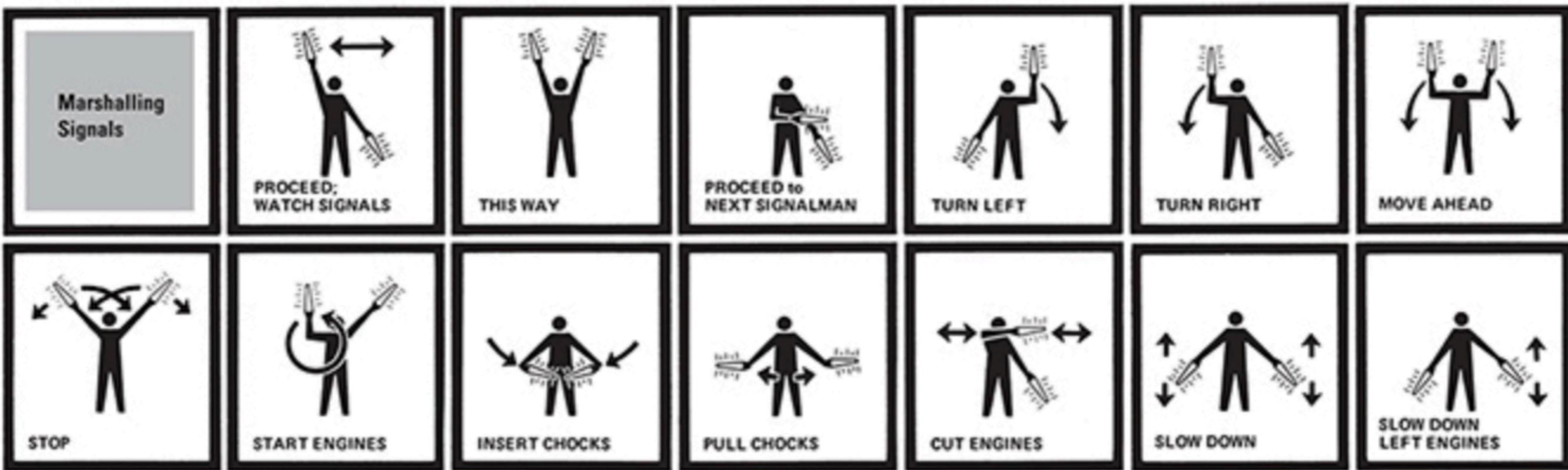
- Contrasting color, value, texture can segregate information into separate layers
- Supports **overlapping** information in displays, allowing selective processing of specific sets of elements
- Allows different layers to be read and interpreted **separately**



Creating layers

1. Group items into categories based on intended use
2. Determine rank & importance of groups
3. Use perceptual variables (size, value, hue, etc.) to establish layering effect
4. Maximize differences between groups while minimizing differences within groups
5. Use squint test to ensure elements in group retain together but visually separated

Layers



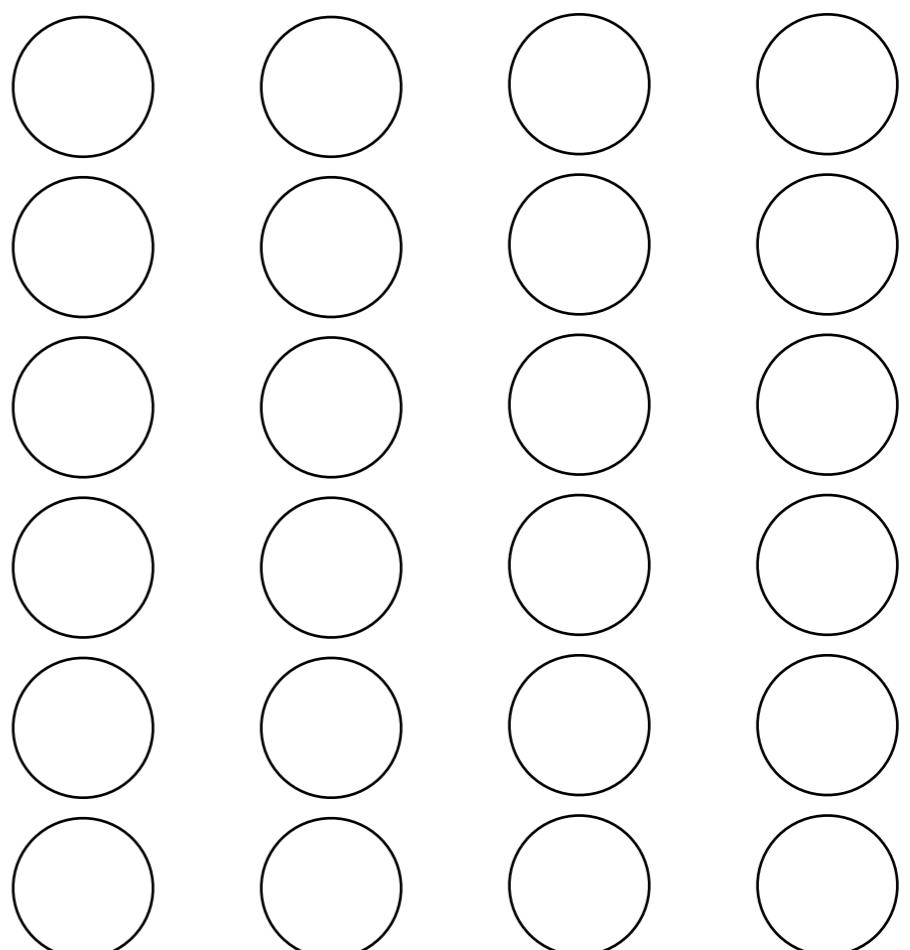
Organization & Structure

Organization & structure

- Organization needs to be **designed**
- Benefits
 - Unity - ties together related elements so that they work **together**
 - Integrity & readability - offers structure that helps user to easily scan & make comparisons
 - Control - determines where user will focus **attention** in the design
- Gestalt -> psychology of perception

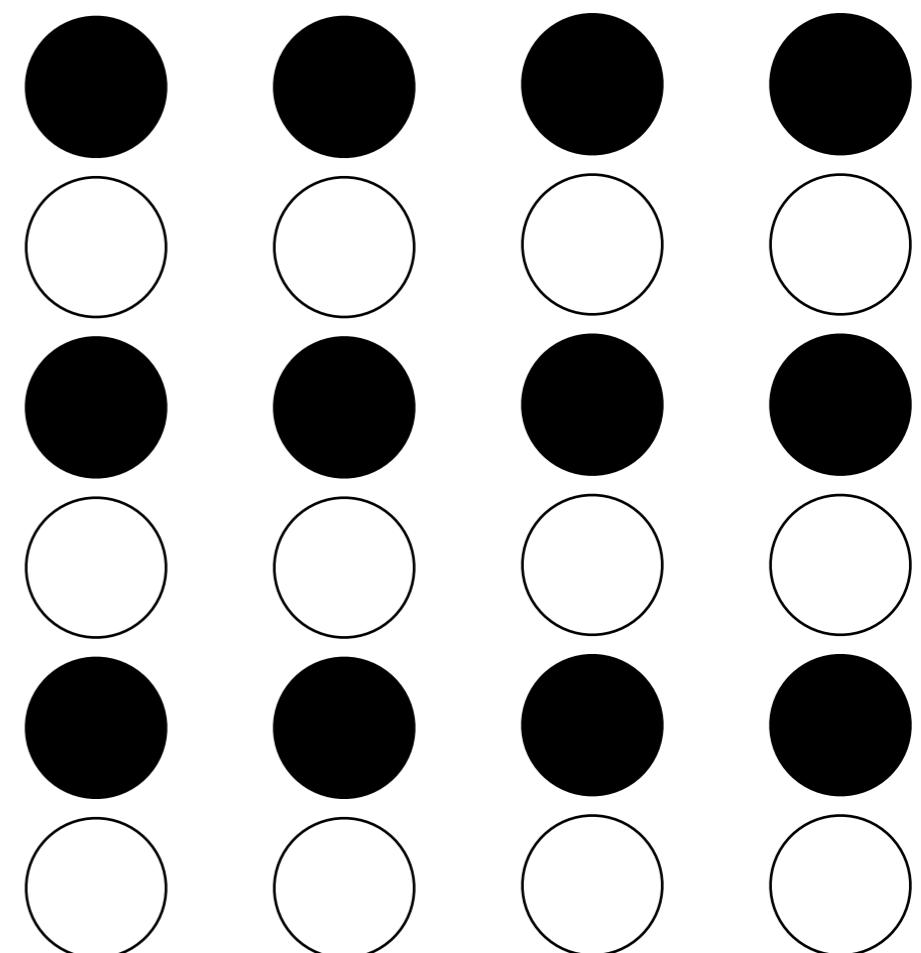
Gestalt principle - Proximity

- Elements associated MOST strongly w/ nearby elements
- parsed as 4 columns based on close vertical spacing
- then parsed as two sets of two columns based on spacing



Gestalt principle - Similarity

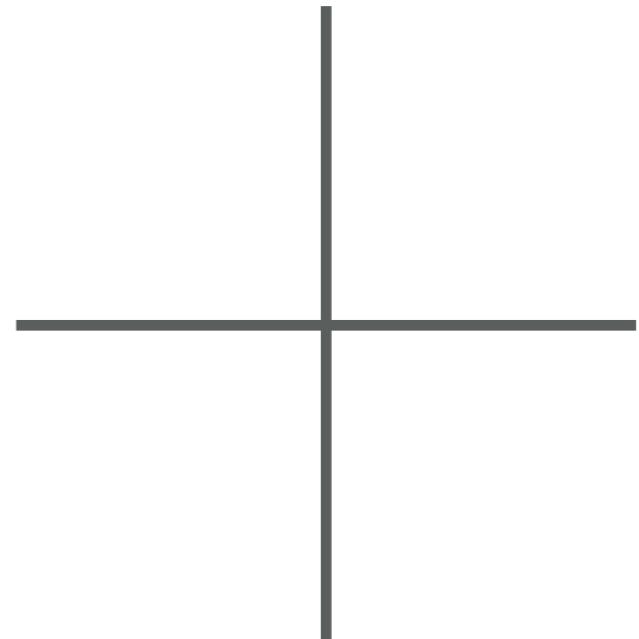
- Elements associated more strongly when share common visual attributes than when they differ
- parsed as rows based on fill similarity, despite closer column spacing



Gestalt principle - Continuity

- Preference for **simplest** physical explanation of complex figure

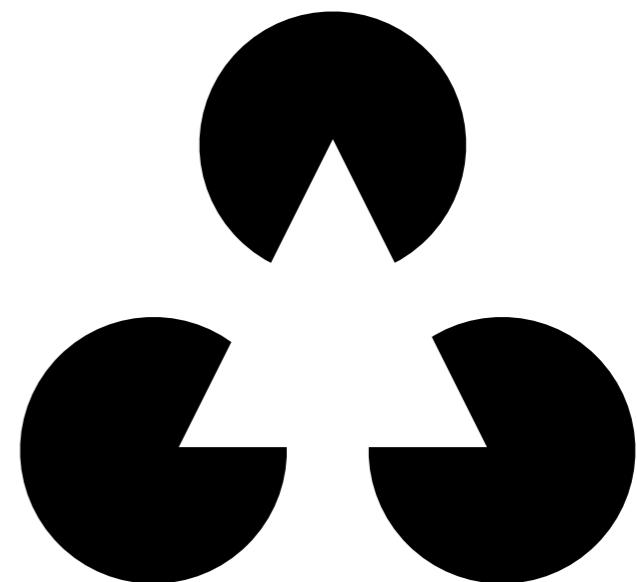
parsed as two lines, rather than
4 separate lines or 4 opposing
angles



Gestalt principle - Closure

- Preference to interpret figures as complete, even when missing information

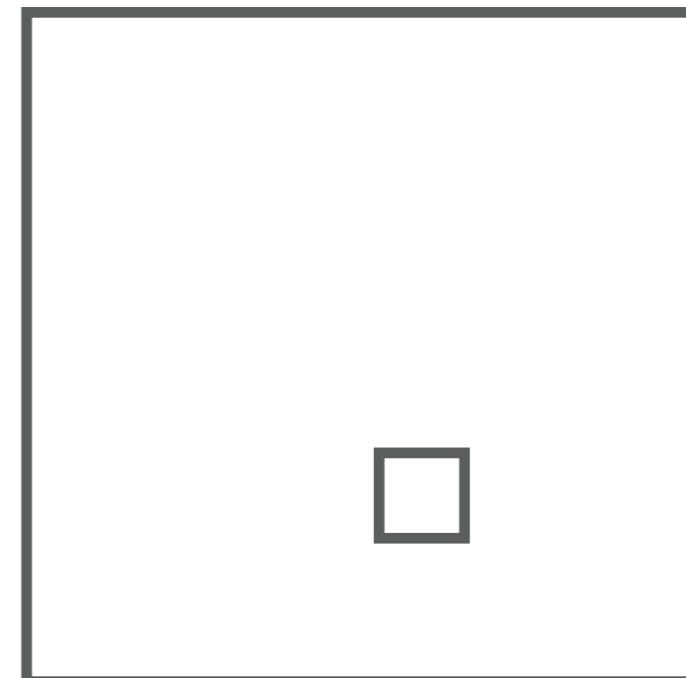
Parsed as triangle
superimposed on 3 complete
circles, even though none of
these is actually present



Gestalt principle - Area

- Preference to interpret smaller overlapping elements as figure, larger as ground

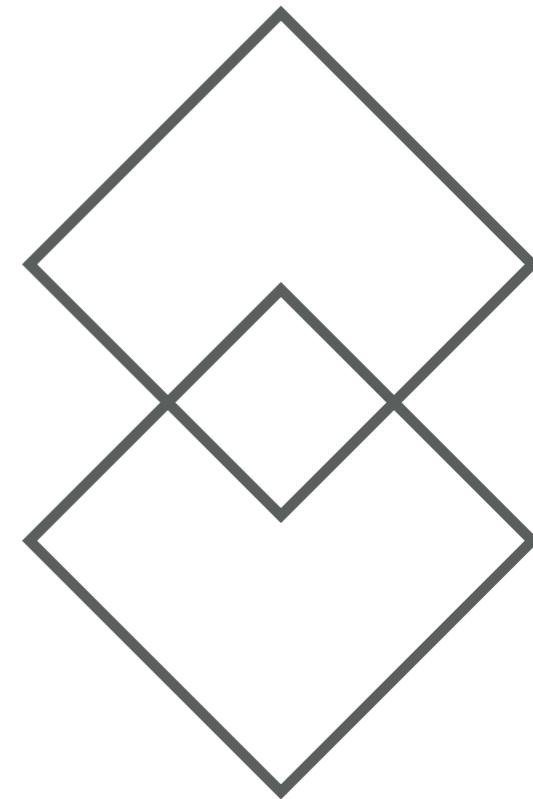
Small rectangle parsed
as small rectangle on top
of larger, rather than hole



Gestalt principle - Symmetry

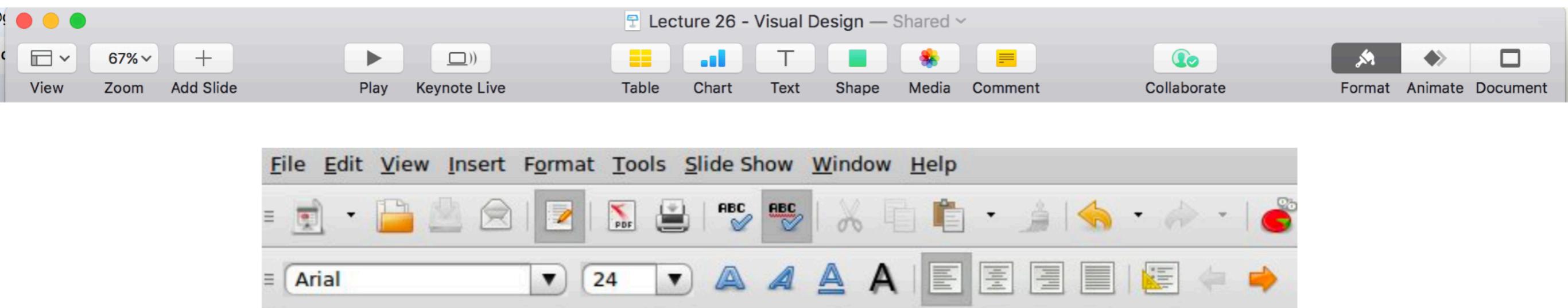
- Preference to interpret ambiguous form as multiple symmetric elements

Parsed as two overlapping objects rather than 3 separate shapes



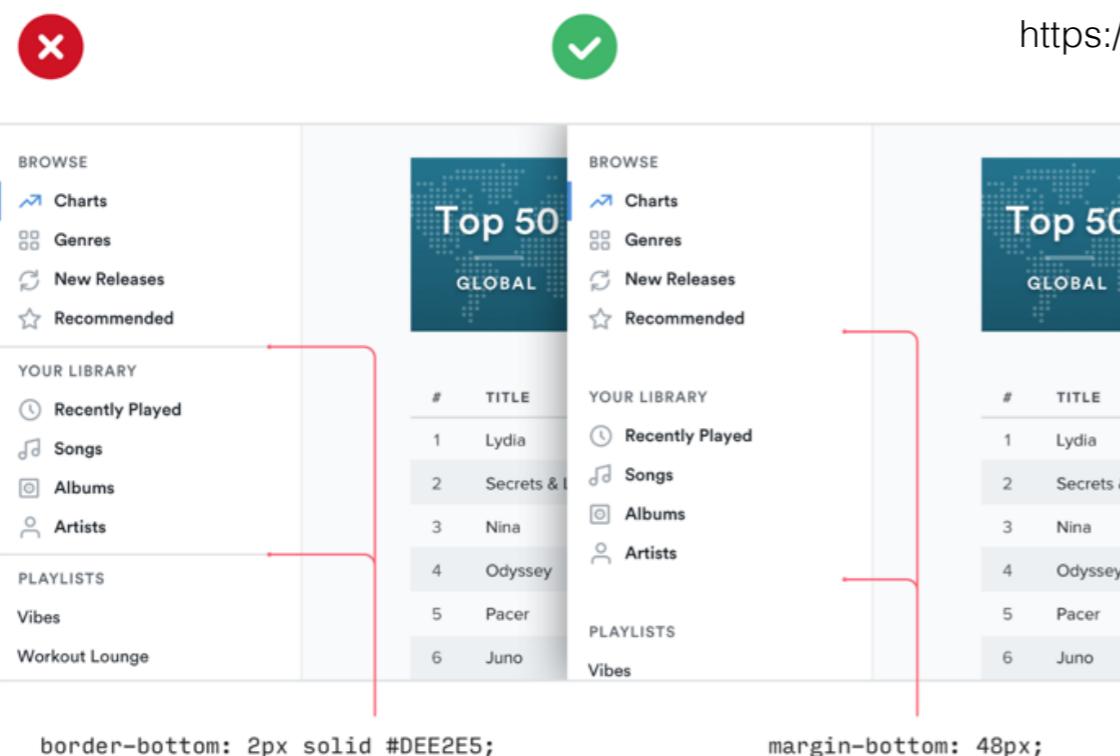
Grouping

- Binding UI elements tightly together while distinguishing them from surrounding controls
- “Showing” note “telling”
- Can be achieved through
 - Bounding boxes (not recommended)
 - Negative space & contrasts
 - Arrangement & alignment

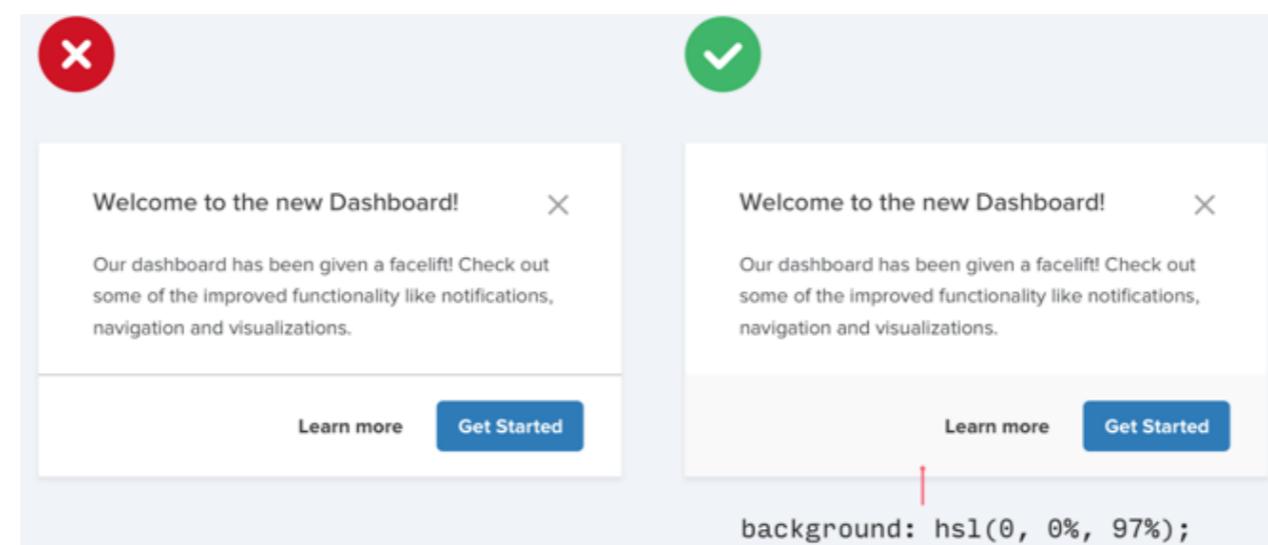
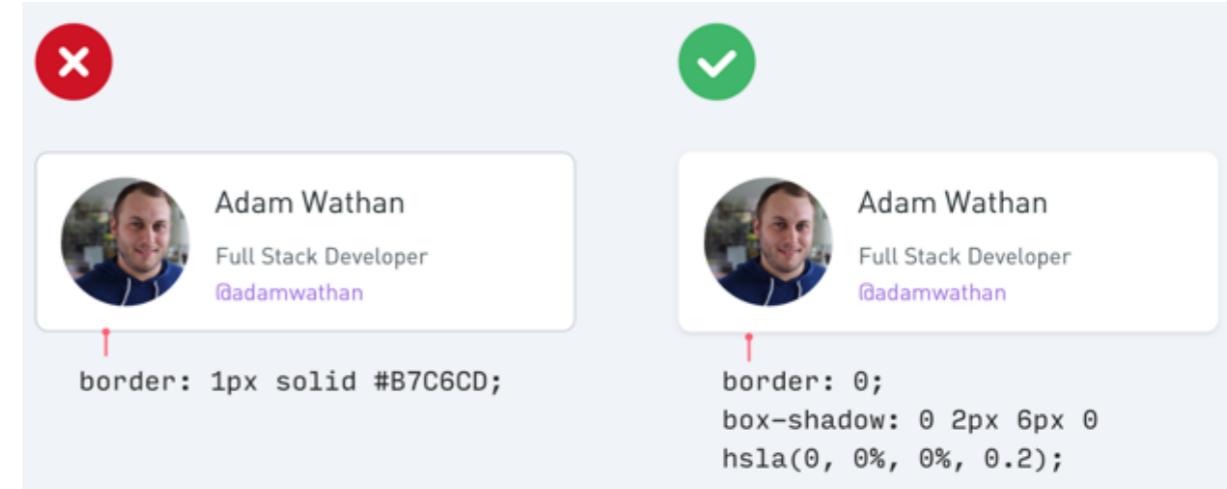


Use fewer borders

- Many alternatives



<https://medium.com/refactoring-ui/7-practical-tips-for-cheating-at-design-40c736799886>



different backgrounds

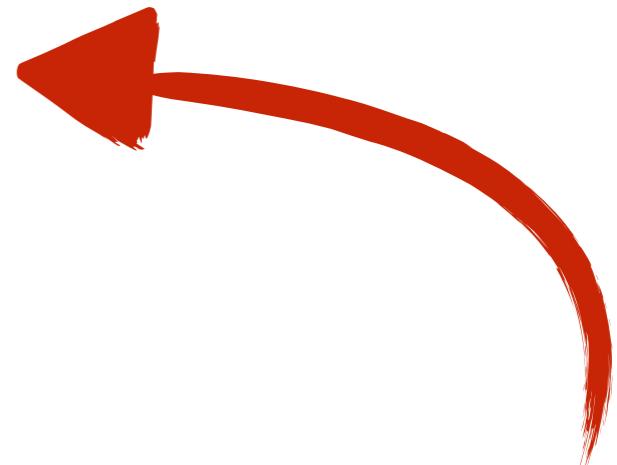
Hierarchy

Order groups based on perceptual prominence corresponding to intended reading sequence

Can help solve “skimming” problems

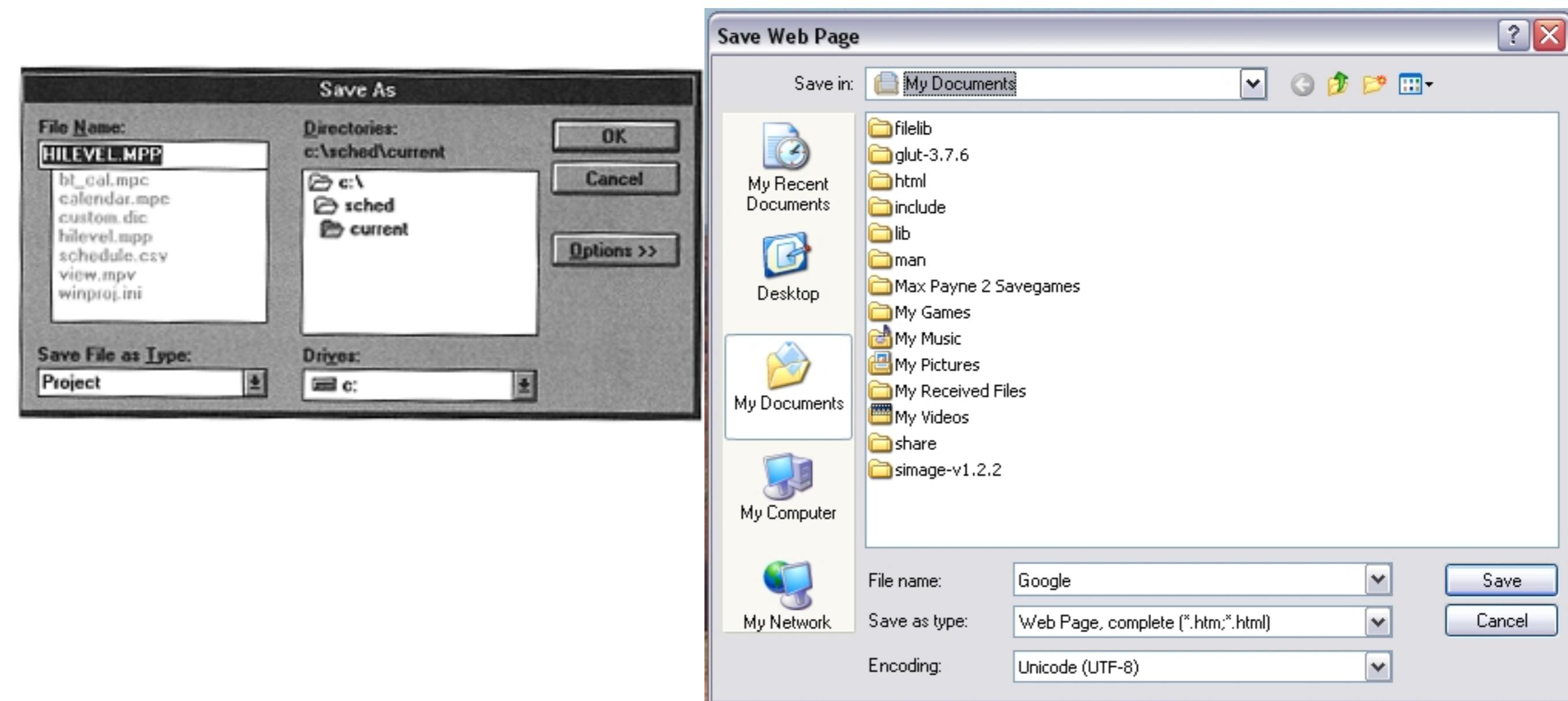
Structure can help people focus attention on key parts

Key points might **get lost though.**



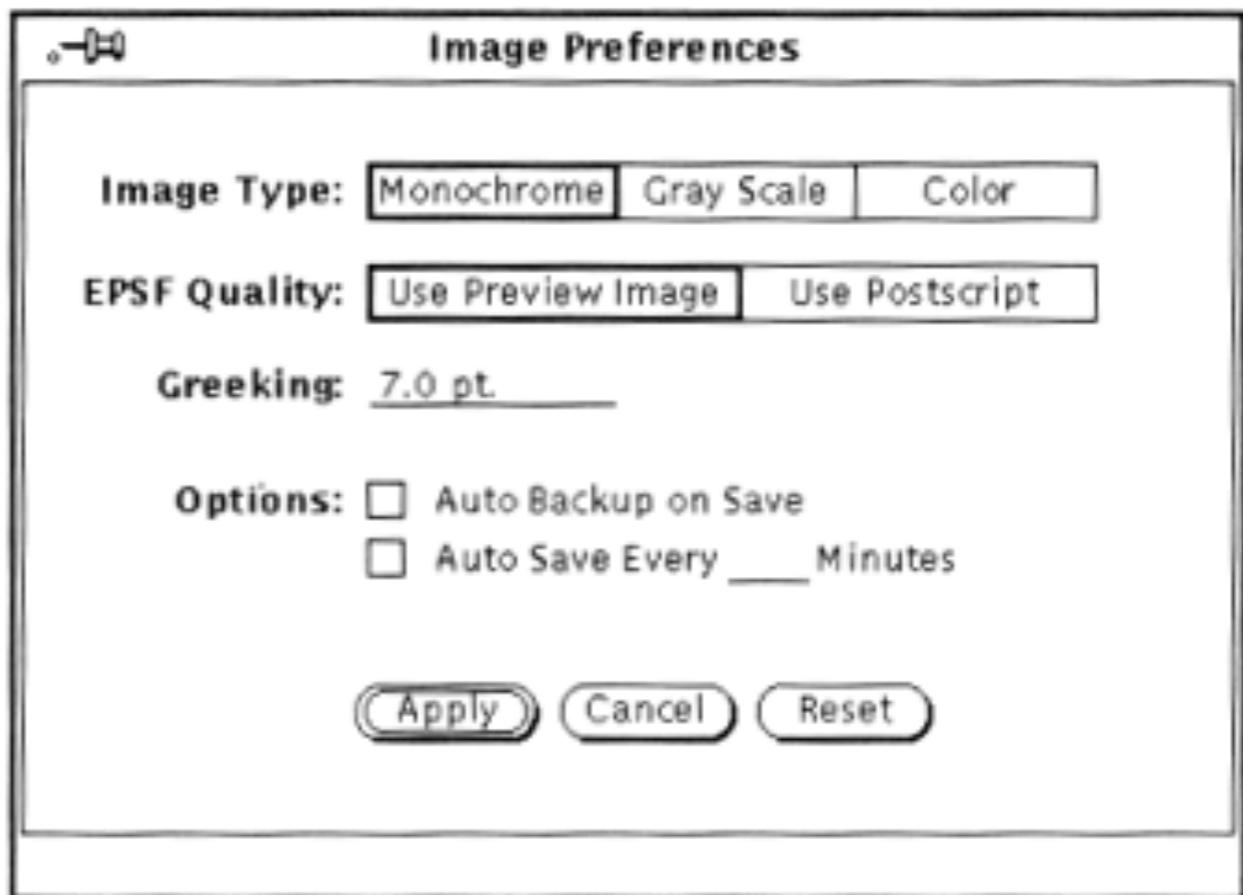
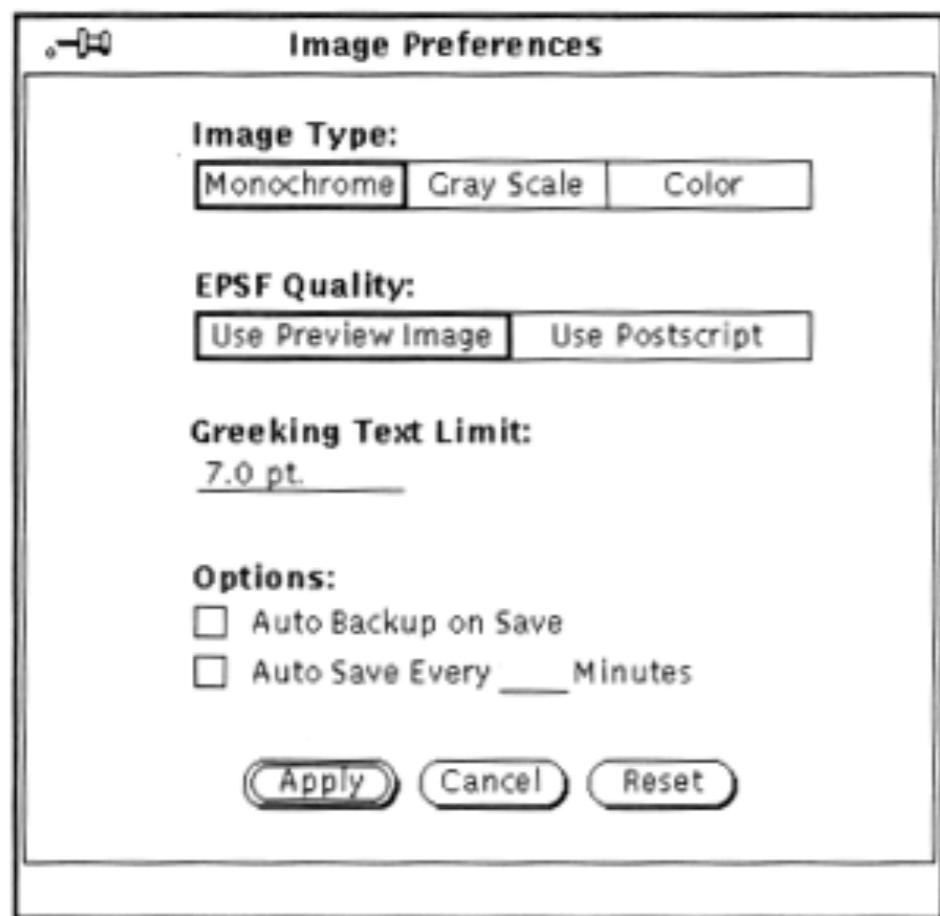
But bolding helps! Plus this obnoxious red arrow and text in a totally different font!

Hierarchy in UIs



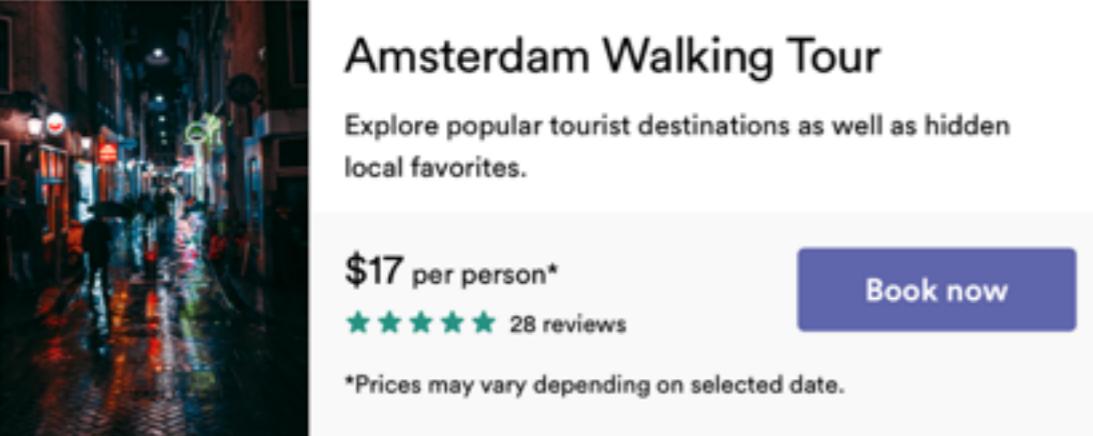
Use negative space

- Directs **attention** to critical regions of display
 1. Review design, prioritizing groups
 2. Add extra **space** to ensure spatial separation & emphasis, particularly for important elements



Creating hierarchy: Color and weight instead of size

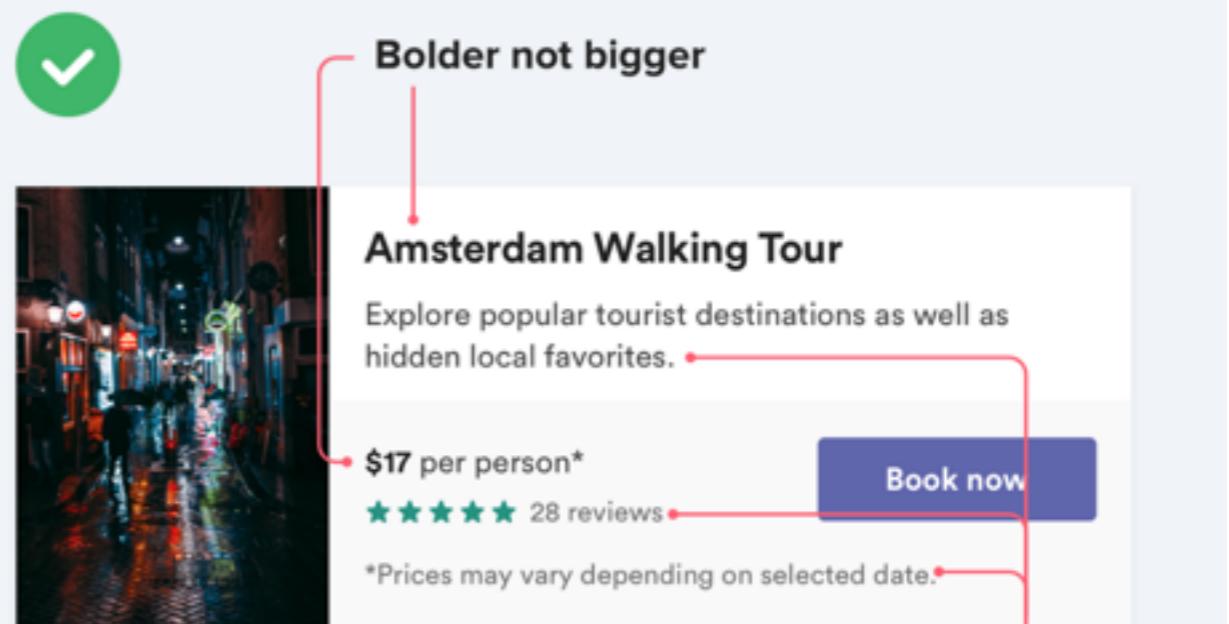
X



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Explore popular tourist destinations as well as hidden local favorites.
\$17 per person*
★★★★★ 28 reviews
*Prices may vary depending on selected date.

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Explore popular tourist destinations as well as hidden local favorites.
\$17 per person*
★★★★★ 28 reviews
*Prices may vary depending on selected date.

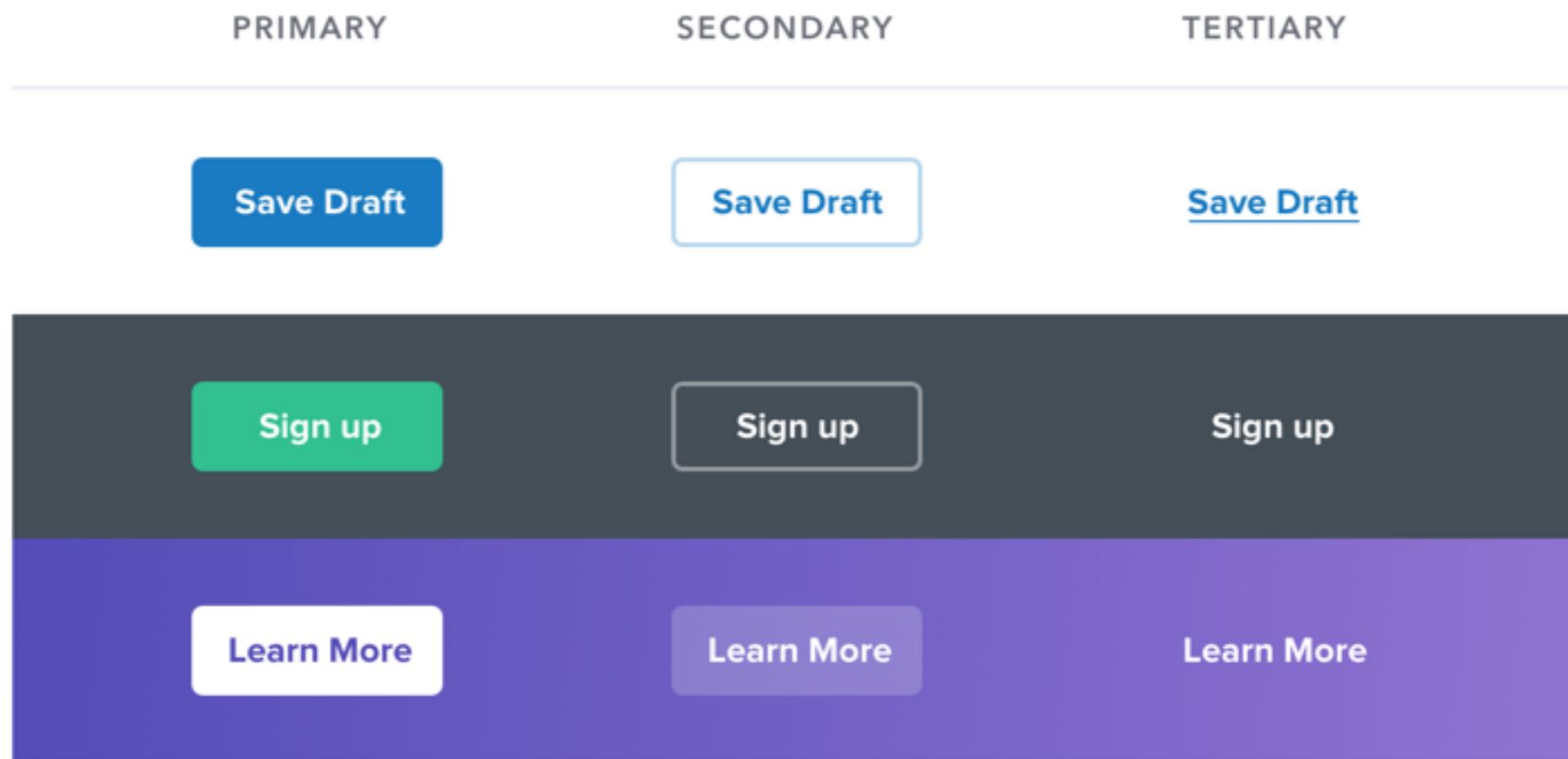
Book now

Bolder not bigger

Lighter not smaller

<https://medium.com/refactoring-ui/7-practical-tips-for-cheating-at-design-40c736799886>

Signal importance of action



<https://medium.com/refactoring-ui/7-practical-tips-for-cheating-at-design-40c736799886>

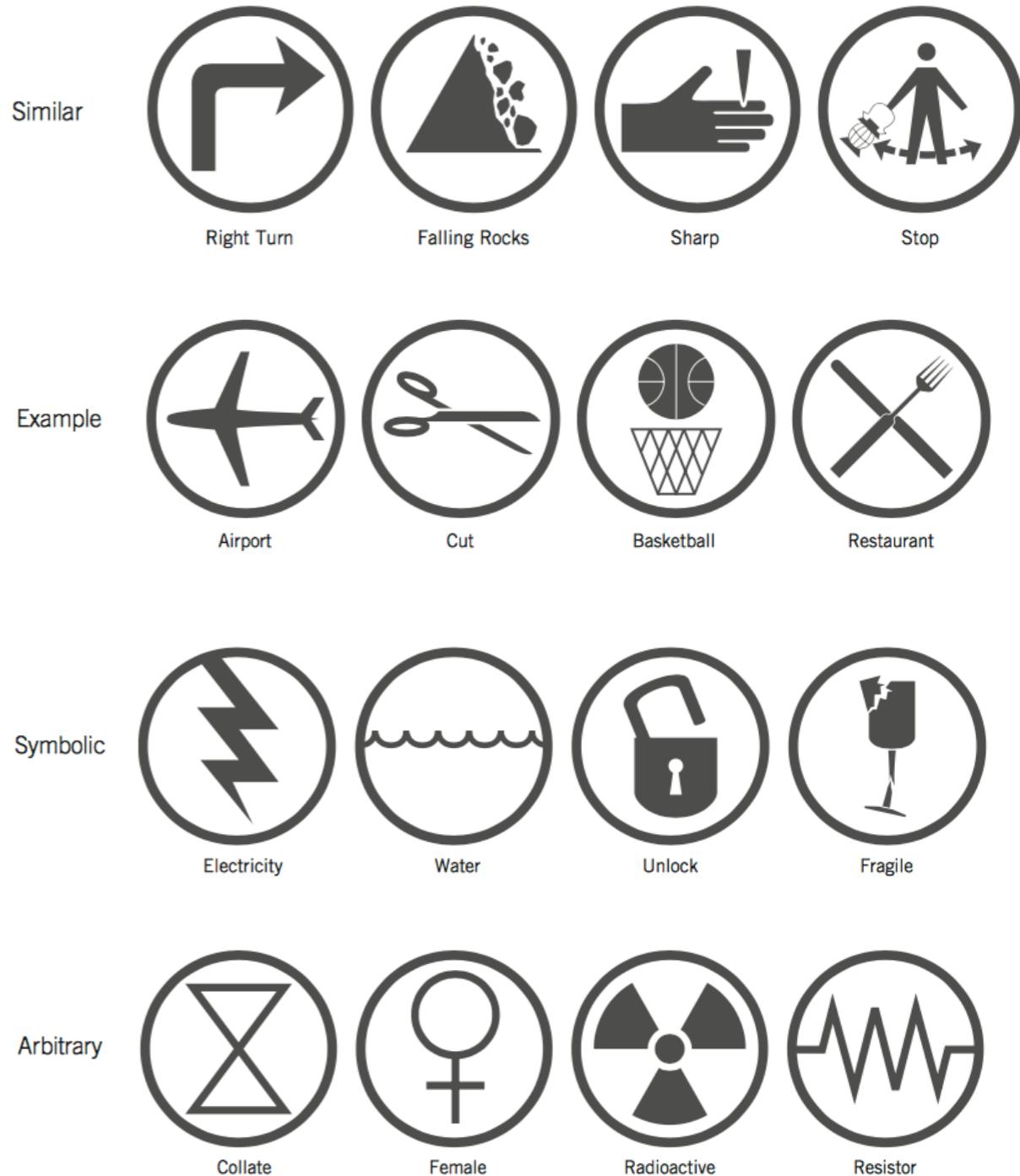
Images & Icons

Images & Icons

- Benefits
 - Identification - images are easy to recognize
 - Expression - breadth of artistic expression that can make design more engaging & enjoyable

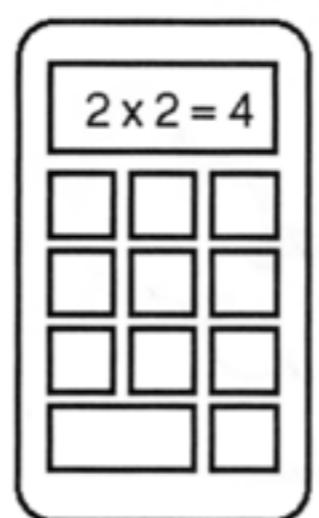
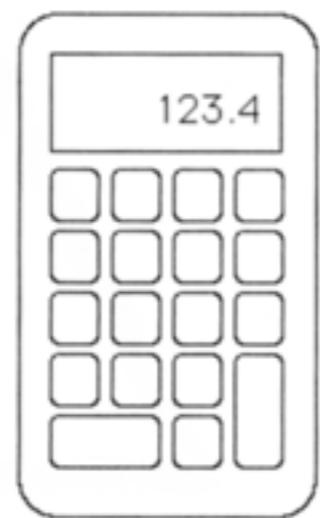
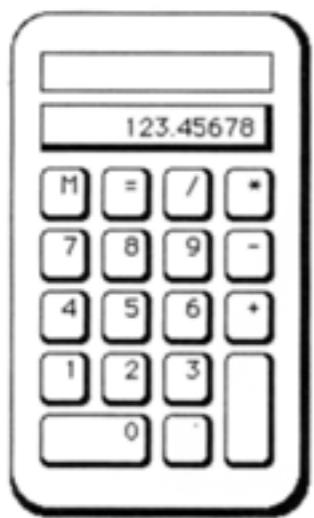
Types of iconic representation

- Similar - visually **analogous** to action, object, concept
- Example - things that exemplify or are commonly associated
- Symbolic - represent concept at higher level of **abstraction**
- Arbitrary - little or no relationship to concept, must be learned through **standard**



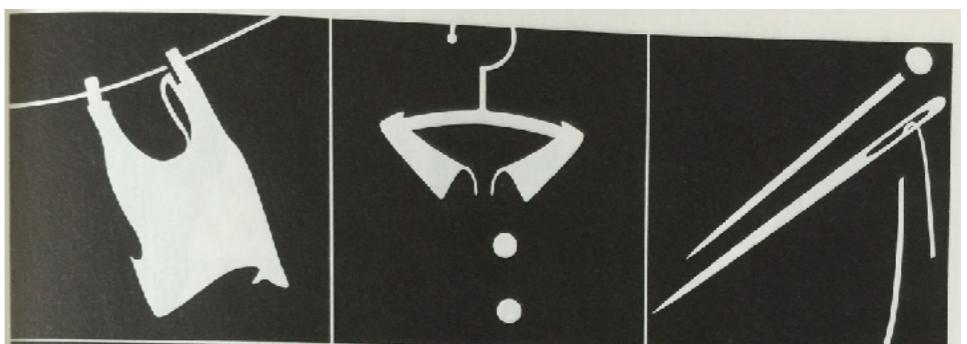
Use of abstraction

- Simplifying highly concrete, realistic representations makes them easier to interpret up to the point at which further abstraction obscures icon's semantics
 - Makes icon more generic, more canonical, less complex



Principles of icon design

- Immediacy - can be perceived effortlessly & involuntarily by being **bold**, clear, balanced
- Generality - represents a **class** of items, rather than an individual element, by removing details that may vary
- Cohesiveness - set of icons that function **together** by sharing visual variables
- Characterization - call to mind one or more **distinctive** features



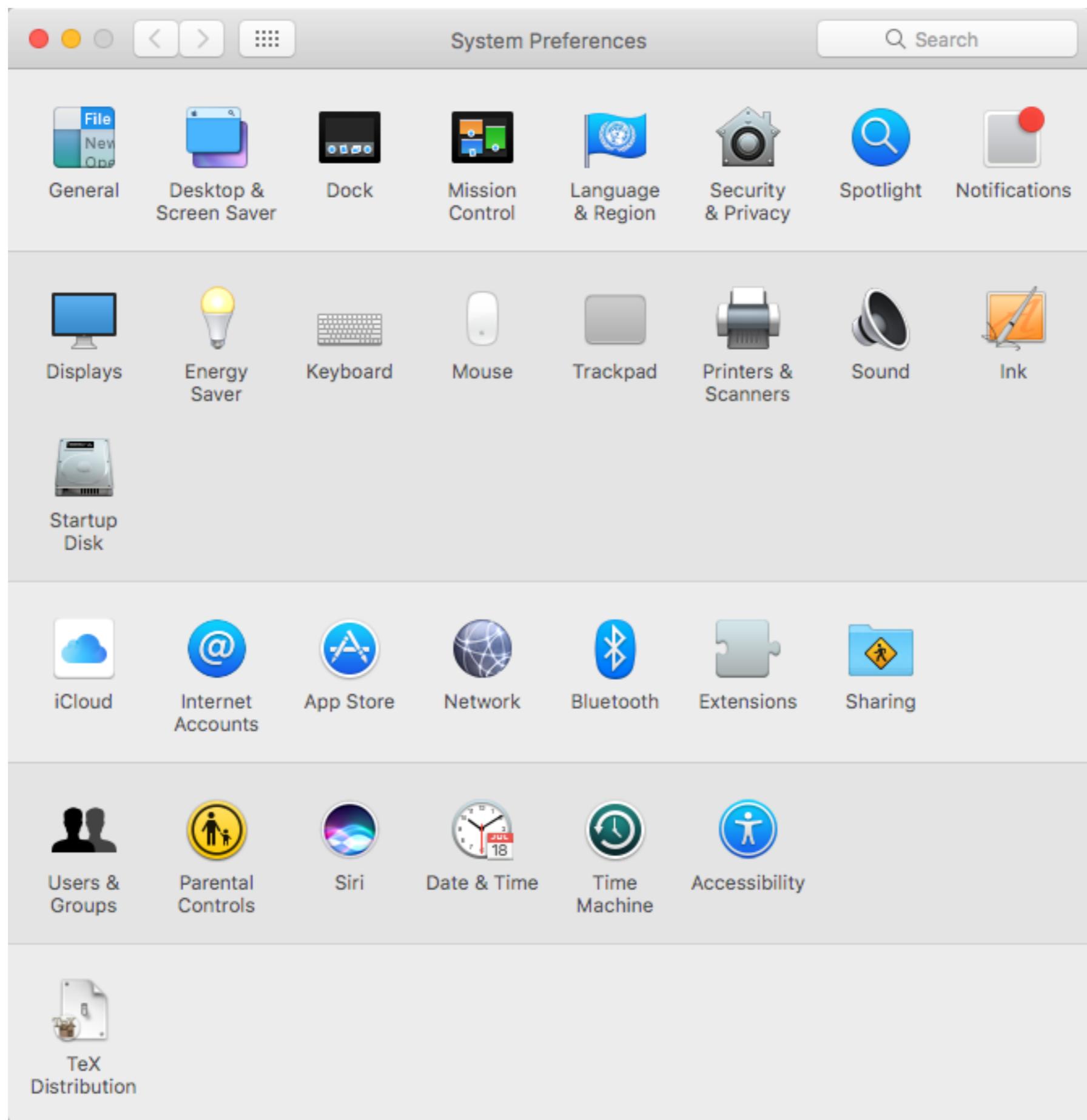
Selecting the right type of icon

- If concept is concrete, familiar, tangible, use similar or example icon
- If concept will be used repeatedly, consider using more symbolic or arbitrary icon based on convention
- If concept is abstract process or subtle, use textual label

Activity: OS 10.2 Preferences Icons



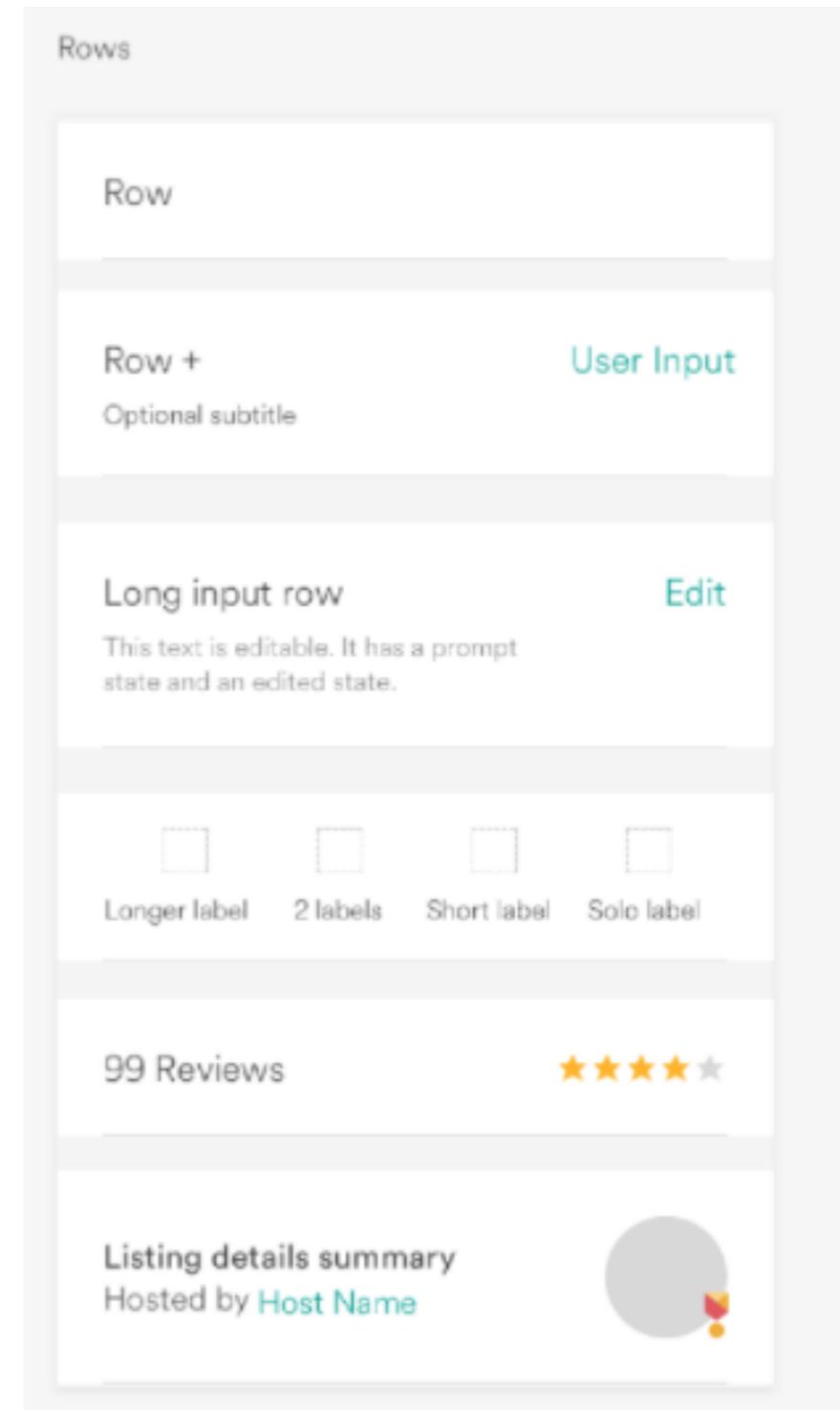
Best 3, worst 3 and why? Then: How to make worst 3 better?



Design languages

Design languages

- Many, **many** choices about visual variables and syntax of composition
 - How do you ensure choices are made consistently across web app?
- Solution: design language
 - Describes how to express ideas and concepts in the interface
 - May be communicated through Human Interface Guideline documentation
 - (Example of consistency and standards)



Example: Elements, Google 2004

Images Groups News Froogle [more](#) [All sizes](#) - [Large](#) - [Medium](#) - [Small](#) [view](#)

1 2 3 4 5 6 7 8 9 10
Sorted by relevance [Sort by date](#)

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[where](#)

New York Times - www.cmu.edu/ Oct 1, 1996 by Andy Harper [source](#)

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[Move to Inbox](#) [Search News](#) [I'm Feeling L](#) [Go](#) [Archive](#) [action](#)

[Invite 7 frie](#) [New Featu](#) [New!](#) Never lose ai [act now](#)

Example: Syntax, Google 2004

task

Find results
with **all** of the words
with the **exact phrase**
with **at least one** of
without the words



Results Window

C

Loading...

placeholder

list

- star** (unknown sender) (no subject) - Received: from image
- star** (unknown sender) (no subject) - Received: from image
- star** (unknown sender) (no subject) - Received: from image
- star** (unknown sender) (no subject) - Received: from image
- star** (unknown sender) (no subject) - Received: from image
- Thomas LaToza » FW: Bb F04-17651: My apologies
- star** (unknown sender) (no subject) - Received: from image



Search and browse 4,500 news sources updated continuously.



latoza@
Search Mail Search the Web
Show search options
Create a filter

toolbar



Carnegie Mellon University
Prospective Students Faculty Visitors Researchers General Visitors Corporate Visitors
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www.cmu.edu - 19k - Oct 18, 2004 - Cached - Similar pages

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... For a more interactive version of the CMU home page, please enable JavaScript in your browser window and reload this page. Otherwise ...
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Software Engineering Institute (SEI) Home Page
... services, courses, and events, contact Software Engineering Institute Carnegie Mellon University Pittsburgh, PA 15213-3890 412-268-5800 http://www.sei.cmu.edu...
www.sei.cmu.edu - 20k - Cached - Similar pages

RhymeZone rhyming dictionary and thesaurus
RhymeZone...
www.rhymezone.com - 10k - Oct 18, 2004 - Cached - Similar pages

SCHOOL OF COMPUTER SCIENCE/Carnegie Mellon University
... Half Full SCS Calendar Submit an event! Seminar Series CMU Calendar Academic Calendar, Home SCS Home website @ cs.cmu.edu ARCHIVES:
www.cs.cmu.edu - 35k - Oct 18, 2004 - Cached - Similar pages

Welcome to Lycos!
Search: The Web Shopping News Pictures: People Search; Yellow Pages; Search Advertising; Advanced Search. Fun Search: Cast Instant Love ...
lycos.cs.cmu.edu - 19k - Oct 18, 2004 - Cached - Similar pages

The Robotics Institute
... RI Seminar Novel Core Technologies Jay Goudy & Rob MacLachlan, SAIC & CMU, Oct 15, 2004, 3:30 PM, NSH 1305. ... This page maintained by robotwebmaster@ri.cmu.edu.
www.ri.cmu.edu - 46k - Oct 18, 2004 - Cached - Similar pages

Collegiate Leadership Program initiated at CMU
The Tartan, PA - Oct 18, 2004
by Louisa Kinoshi, by Louisa Kinoshi. Carnegie Mellon is currently sponsoring a free one-month trial of the USA Today Collegiate Leadership ...
John Kerry, Condoleezza Rice to appear on campus The Tartan From the desk: Student government always seeks to respond to you The Tartan all 2 related >

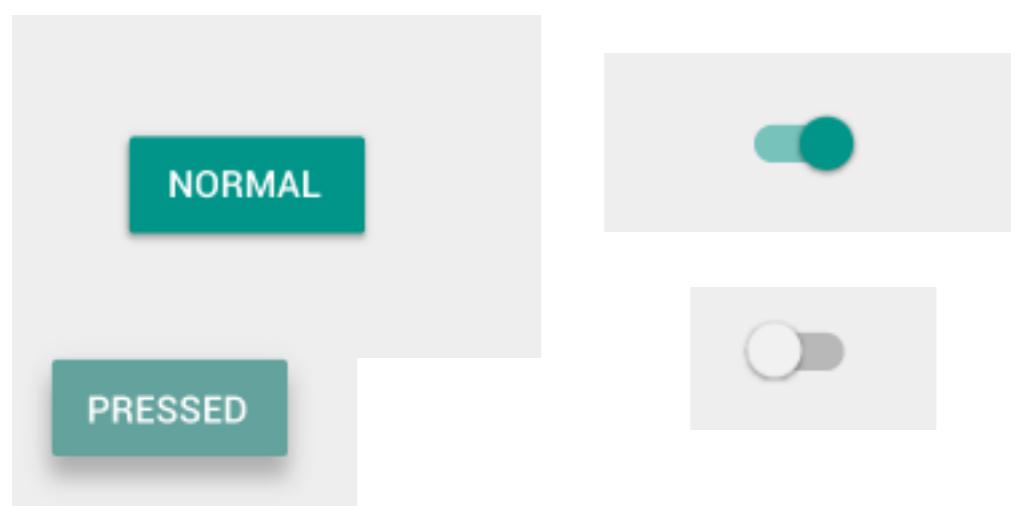
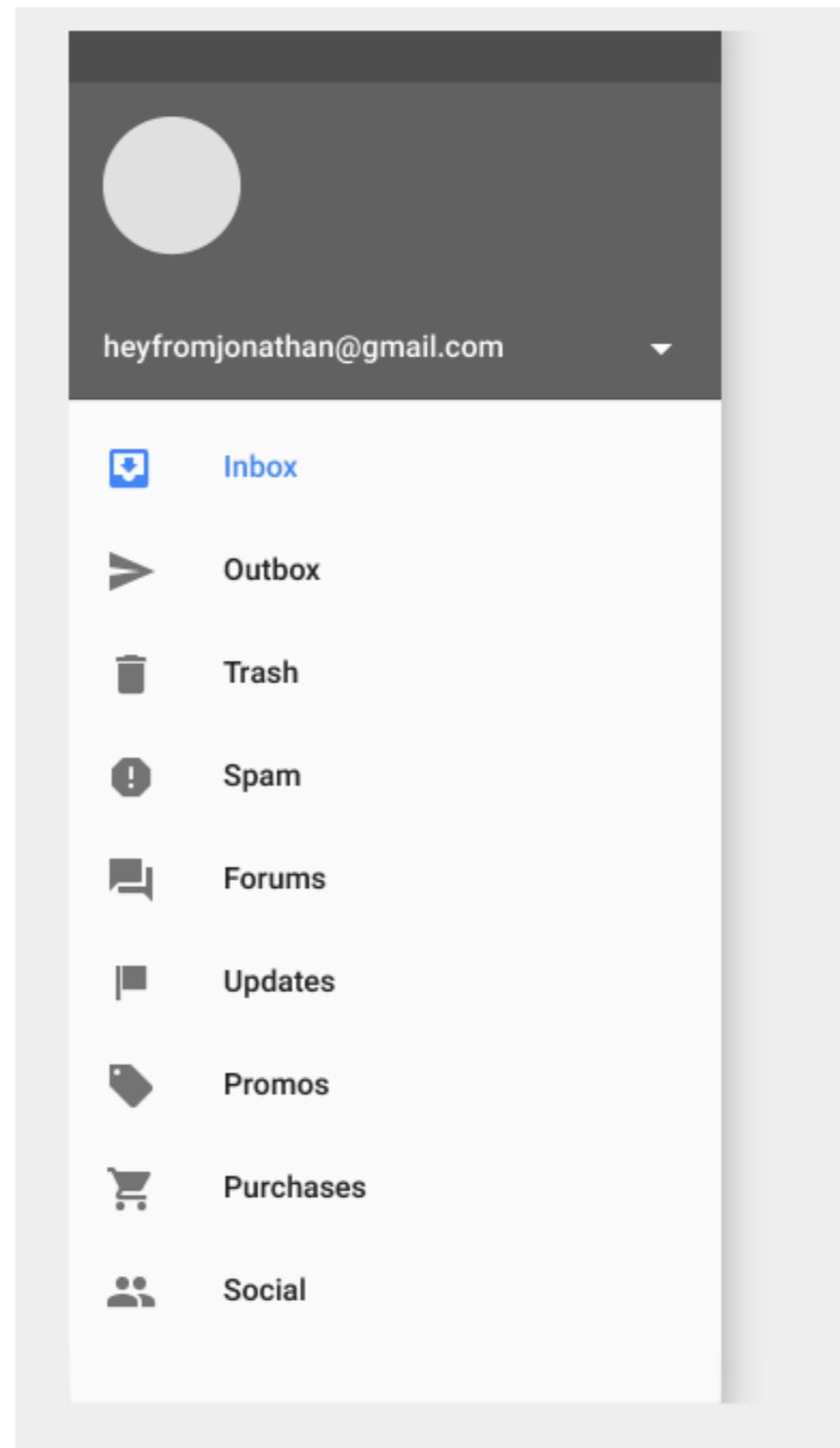
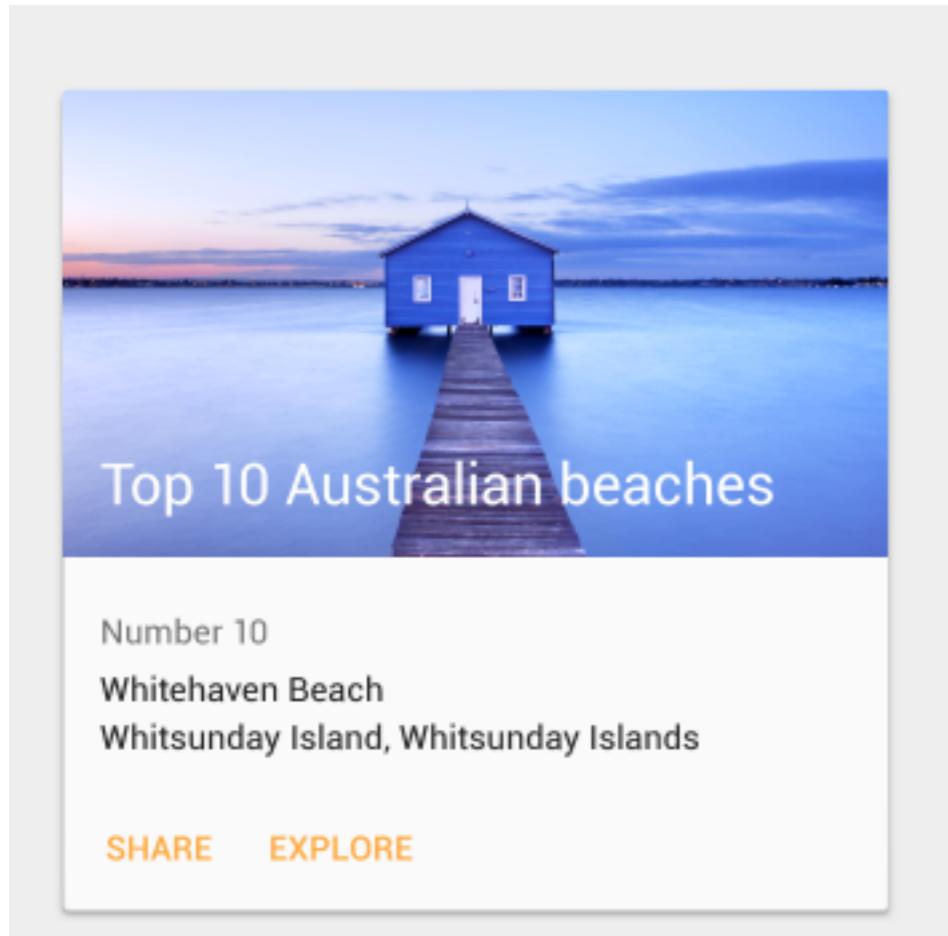
Huskie talkback Wolfe darts to second MAC Player of the Week title
Dekalb Daily Chronicle, IL - 11 hours ago
... Central Michigan. "The offensive line and our tight ends did a great job (blocking)," Wolfe said after the CMU Huskies won with MAC POW award Northern Star Online An all-access pass to the NIU locker room Northern Star Online Northern Illinois pounds CMU 42-10 DelNews.com Northern Star Online - Northern Star Online - all 31 related >

CMU students prepare for Solar Decathlon
The Tartan, PA - Oct 18, 2004
by Ann Wootton, by Ann Wootton. Carnegie Mellon students are leading the Pittsburgh Synergy team designing and building a solar house ...
Frisco turns on the heat at the Chili Cook-off The Carnegie Pulse all 2 related >

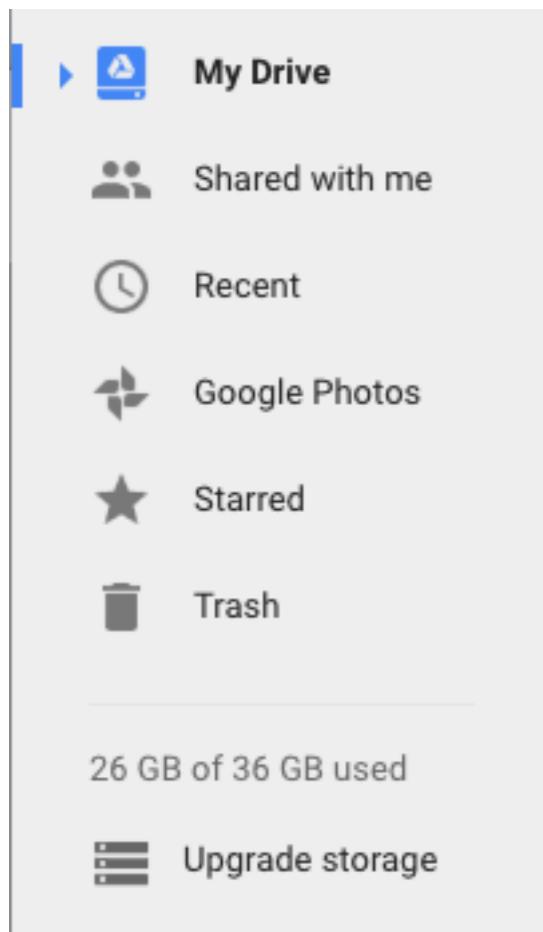
Rocker to Rally for Kerry at CMU
KDKA, PA - Oct 18, 2004
Pittsburgh (KDKA) For the second time in six months, singer Jon Bon Jovi will perform in Pittsburgh for a political cause. The Video From The CMU Robotics Institute Showcase

Slashdot - Oct 18, 2004
mpost4 writes "This last week the CMU Robotics Institute showed off some of the stuff they were doing. They were showing the new stuff they were working on. ...
Northern Illinois Rolls by CMU, 42-10
Giglett.com - Oct 18, 2004
... The win dropped CMU's record to 2-4 for the season and 1-2 in MAC action. NIU is now 4-0 in the league and

Examples: Google 2016

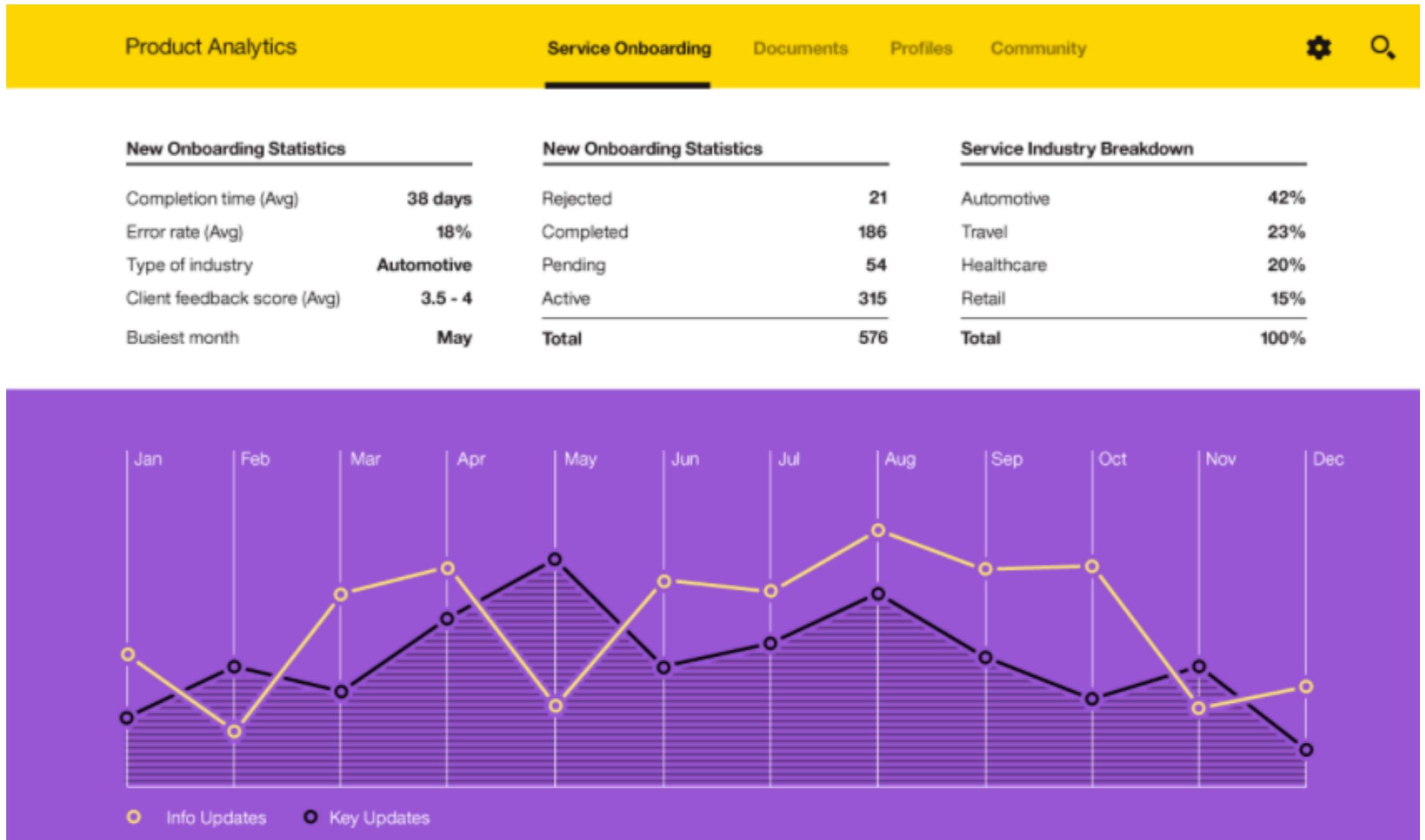


Examples: Google 2016

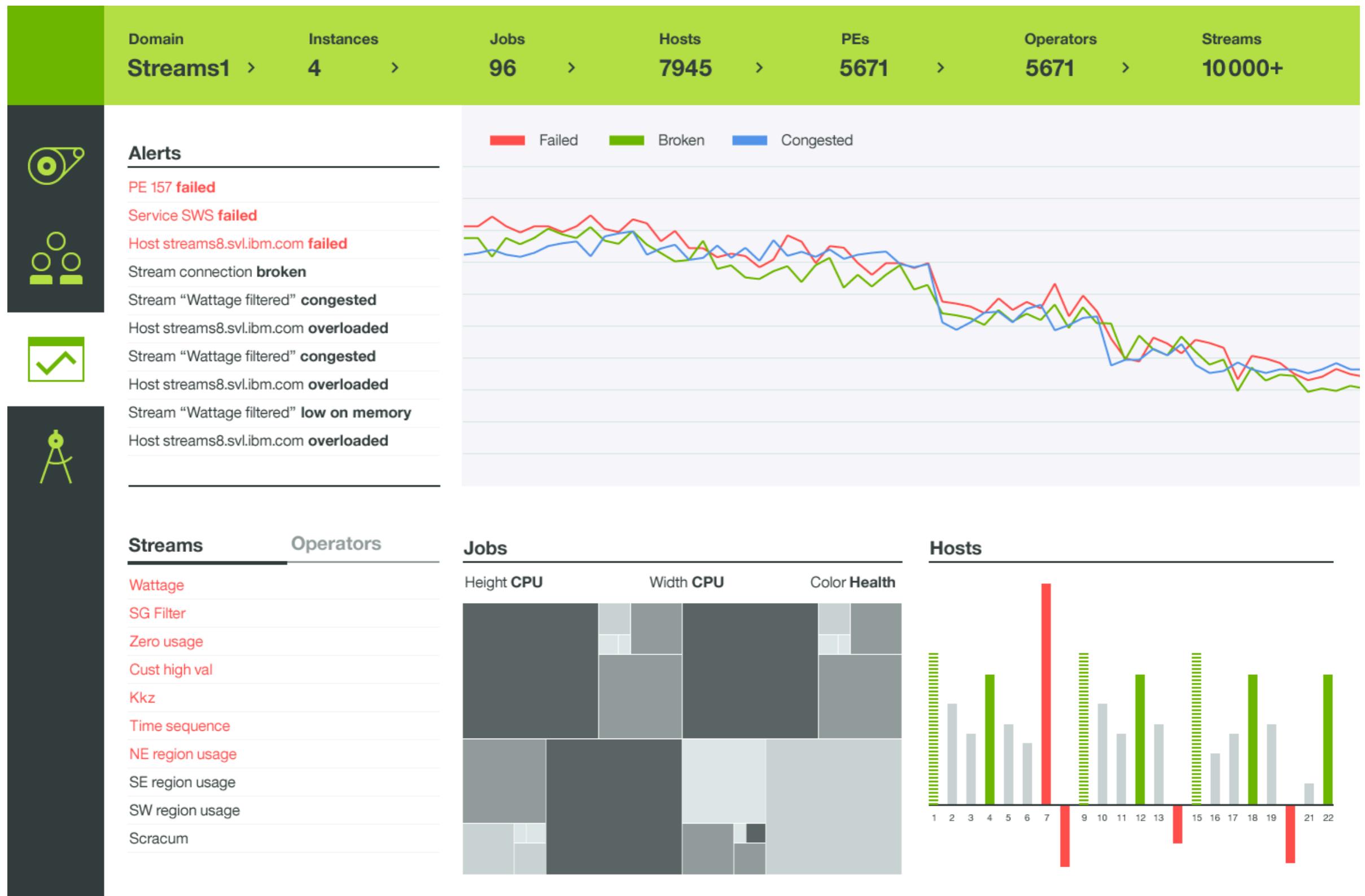


Two side-by-side screenshots. The left one is the 'App Engine' dashboard with a list of management options: Services, Versions, Instances, Task queues, Security scans, Quotas, Blobstore, Memcache, Search, and Settings. The right one is the 'Google Merchandise Store' dashboard in Google Analytics, showing reports for 'REAL-TIME', 'AUDIENCE', 'ACQUISITION', 'BEHAVIOR', and 'CONVERSIONS'. A red circle with the number '1' is overlaid on the 'Dashboards' link in the navigation sidebar.

Examples: IBM

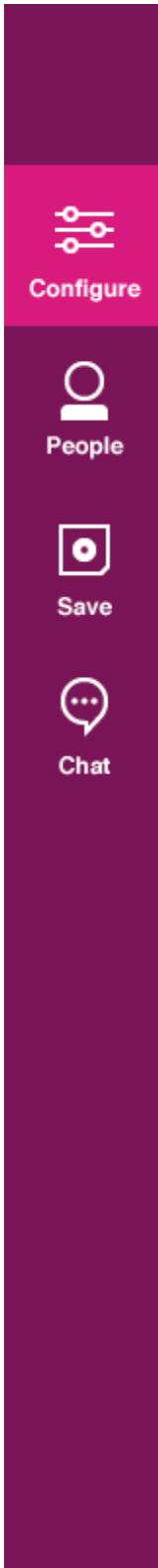


Examples: IBM

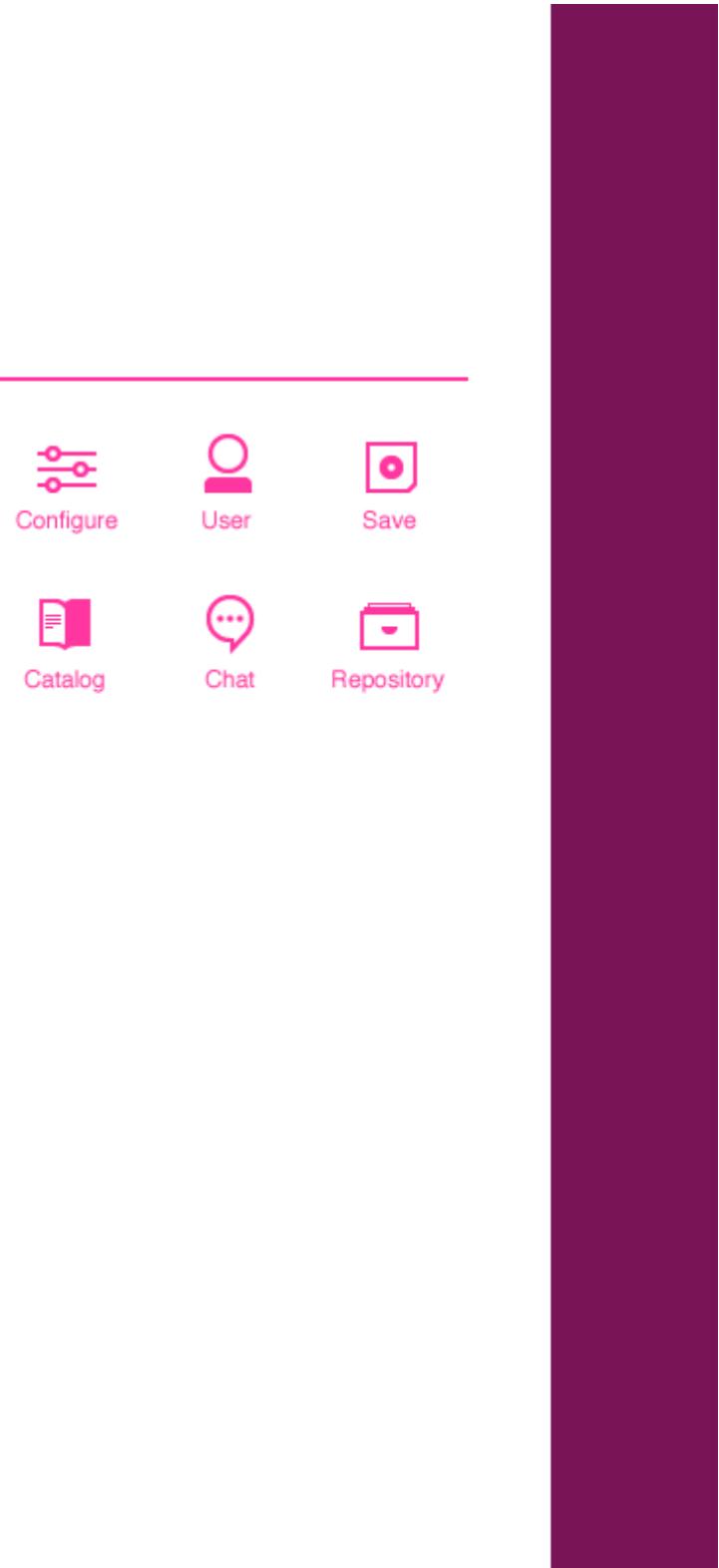


Examples: IBM

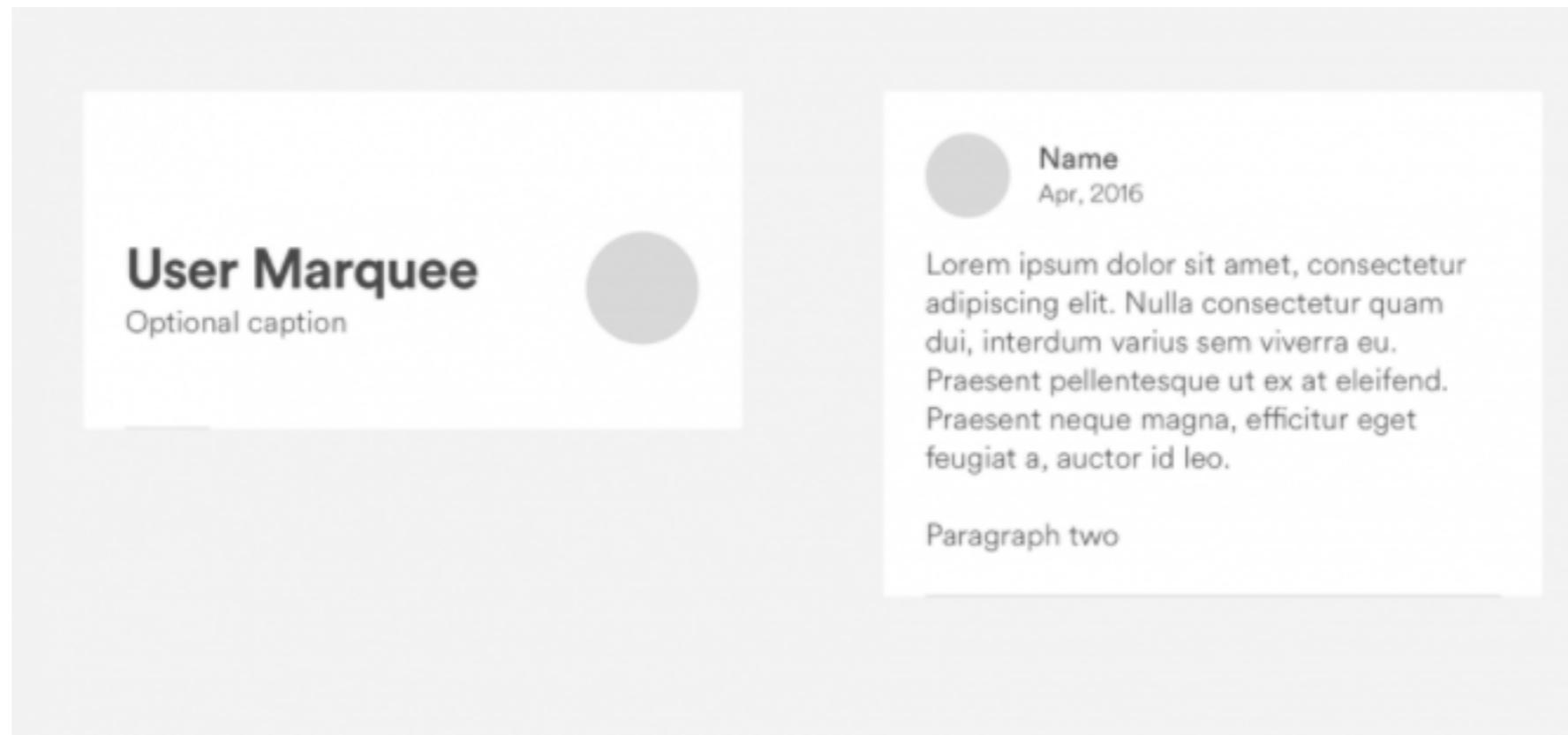
Application data



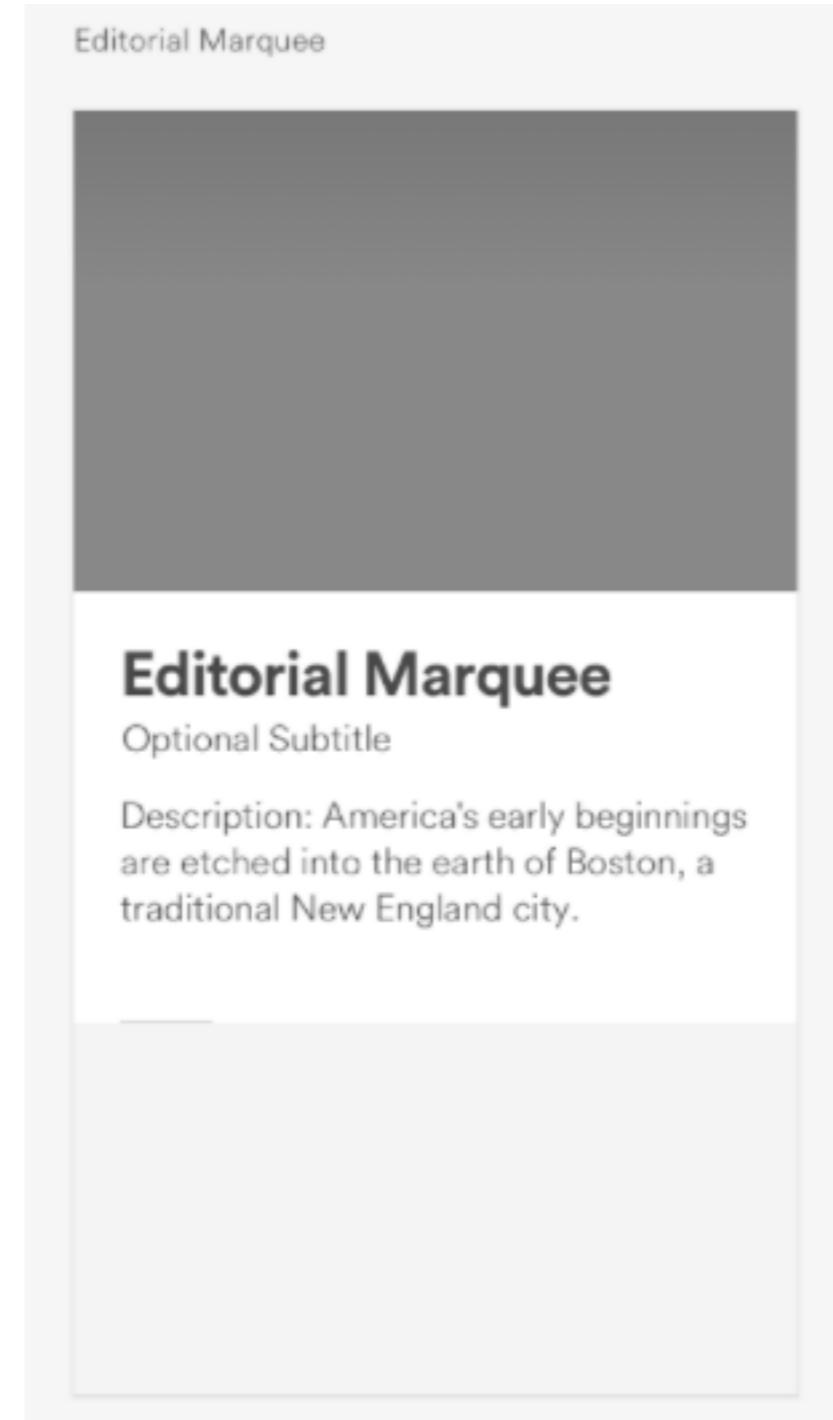
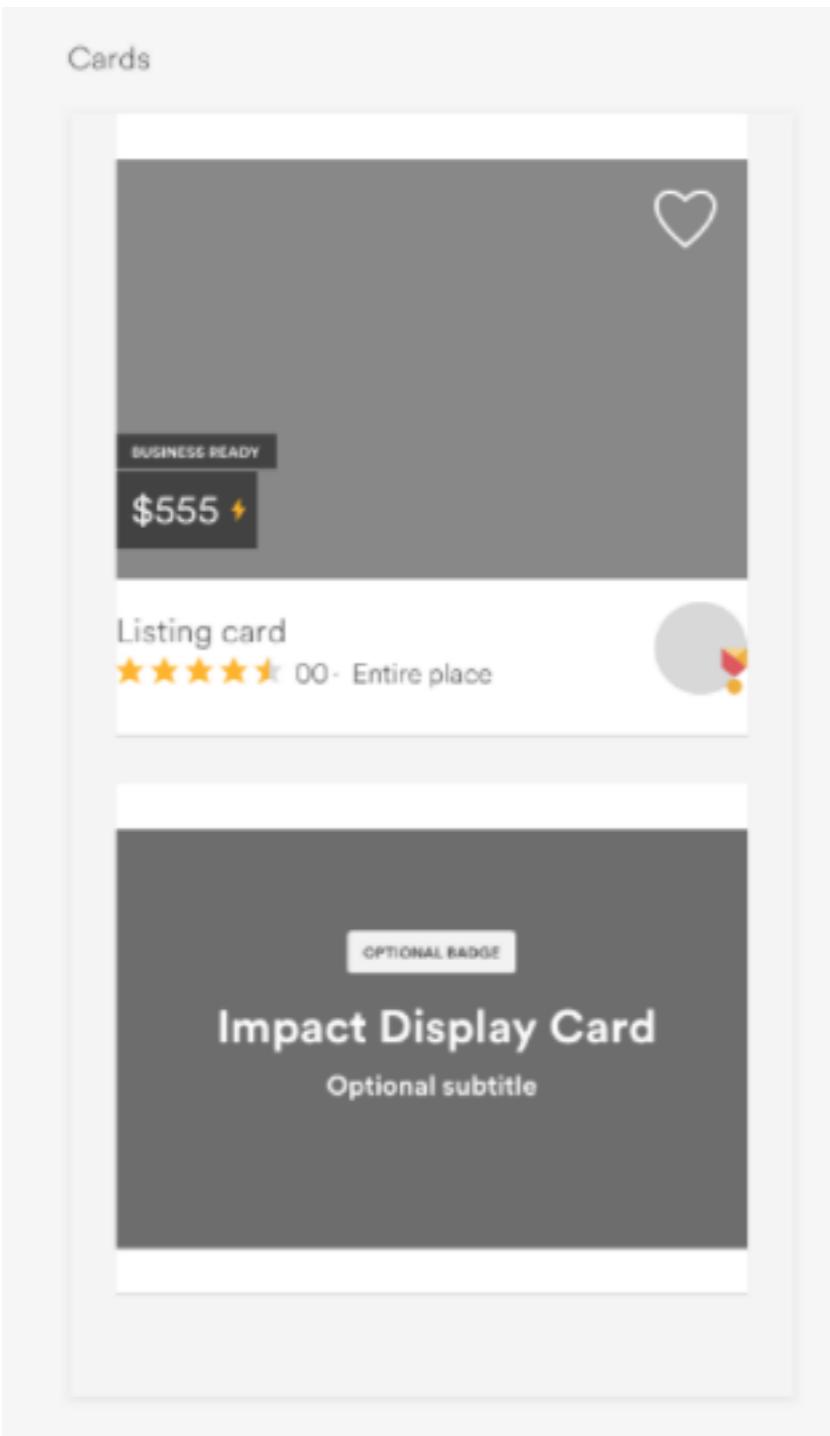
Title	Title	Value	Date	Value
Imperial	true	9 456 234	21. Feb 2014	9 456 234
Hard	false	987 345	21. Feb 2014	987 345
Cider	false	43 567	21. Feb 2014	43 567
Anaerobic	true	324 543	21. Feb 2014	324 543
Cold filter	false	432 456	20. Feb 2014	432 456
Barrel hand	true	32 432	20. Feb 2014	32 432
Pump wort	true	4 567	20. Feb 2014	4 567
Dry hopping	false	34 567	20. Feb 2014	34 567
Carbonation	true	434 567	20. Feb 2014	434 567
Mash tun	false	9 456 234	20. Feb 2014	9 456 234
Bittering hops	true	987 345	20. Feb 2014	987 345
Heat exchanger	false	43 567	19. Feb 2014	43 567
Lauter aerobic	false	324 543	19. Feb 2014	324 543
Abbey seidel	true	432 456	19. Feb 2014	432 456
Brewhouse	false	32 432	19. Feb 2014	32 432
Brewpub adjunct	true	4 567	19. Feb 2014	4 567
Dextrin seidel	true	34 567	19. Feb 2014	34 567
Aau beer	false	434 567	19. Feb 2014	434 567
Krug abv	true	434	19. Feb 2014	434



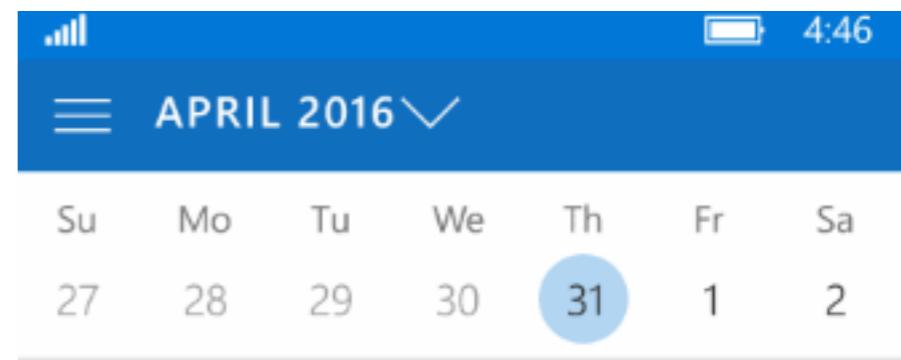
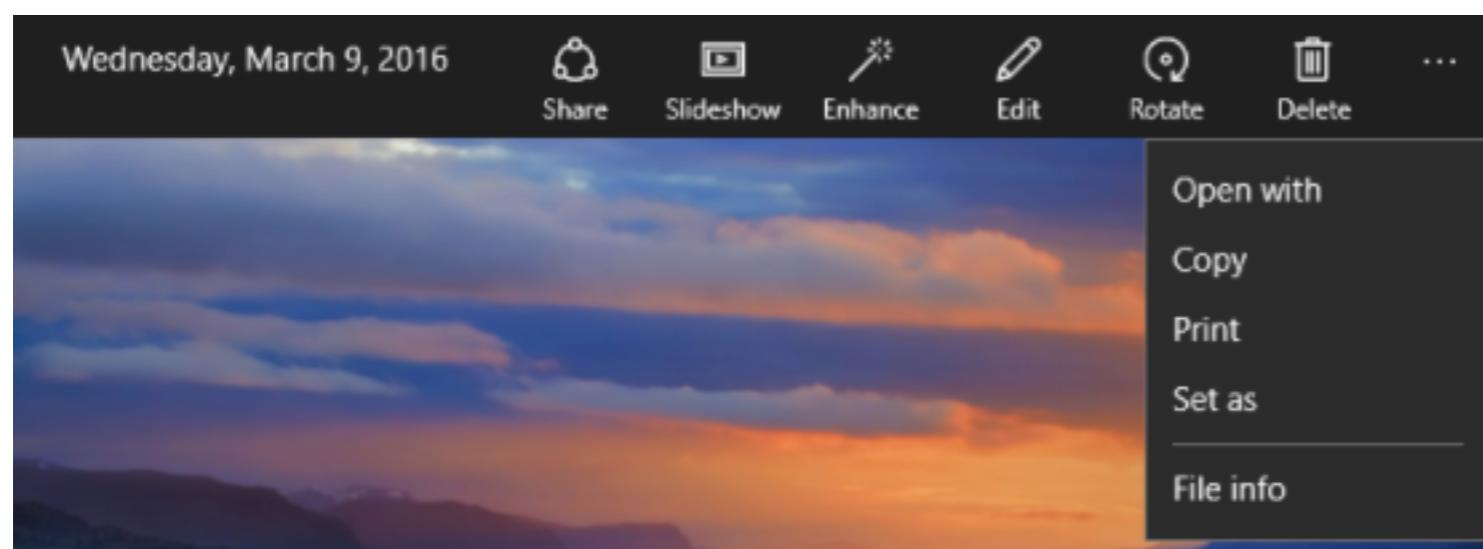
Examples: AirBnb



Examples: AirBnb



Examples: Microsoft



Thursday 31

Friday 1

Saturday 2

Sunday 3

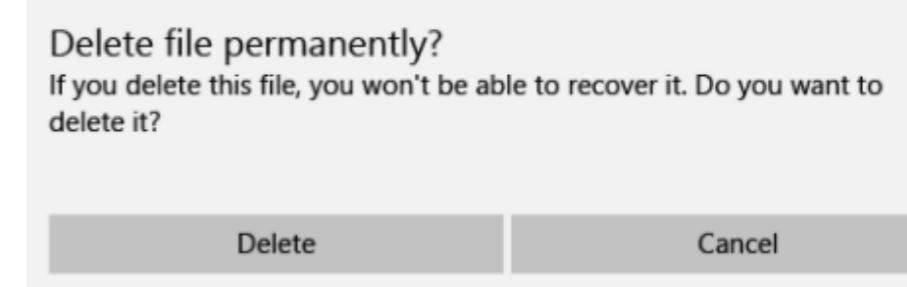
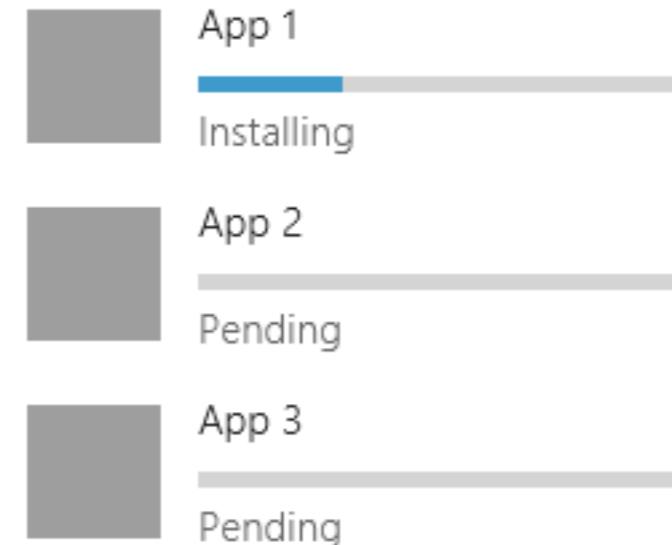
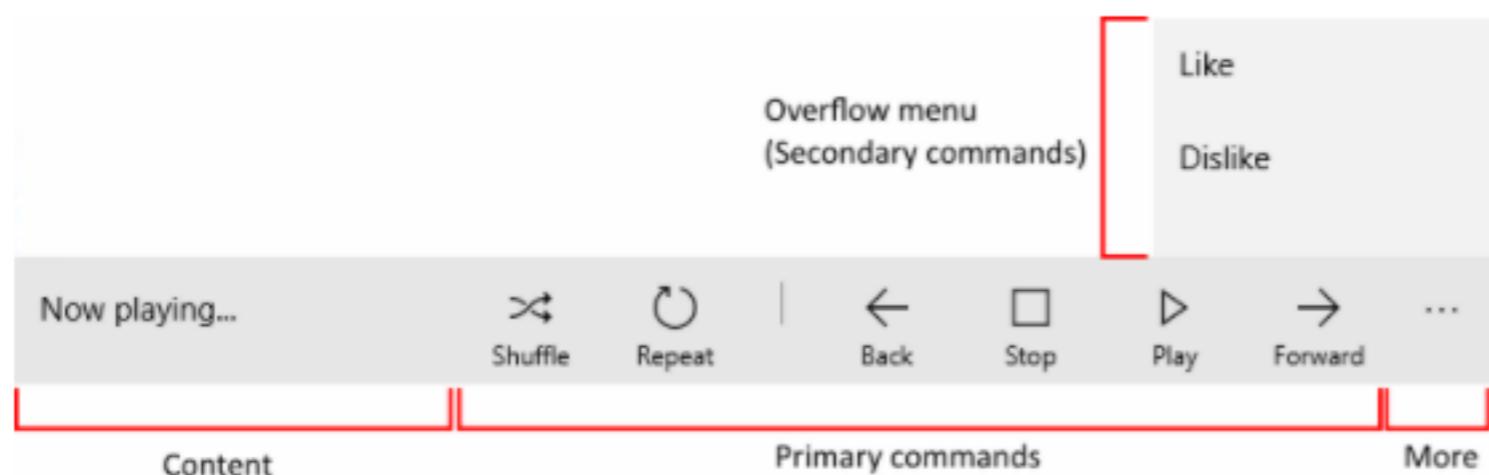
Monday 4

Tuesday 5

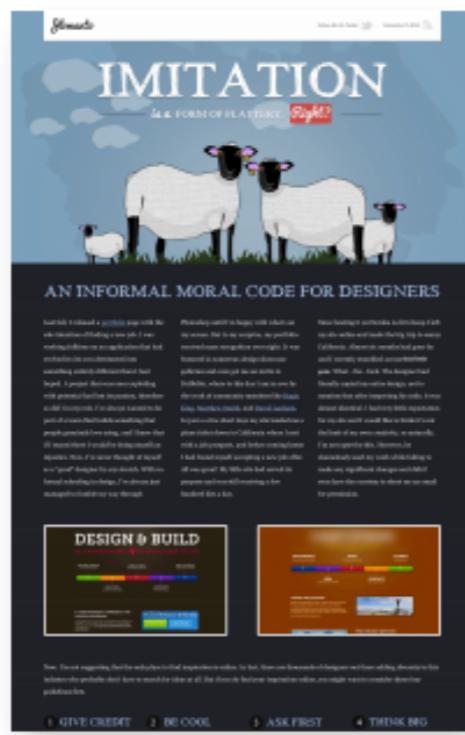
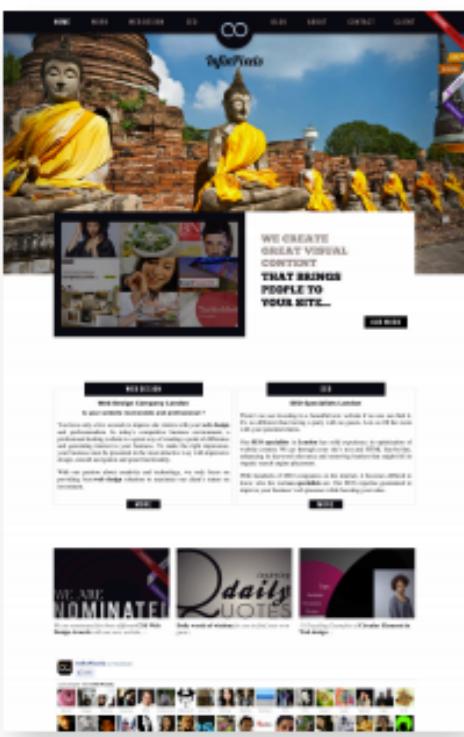
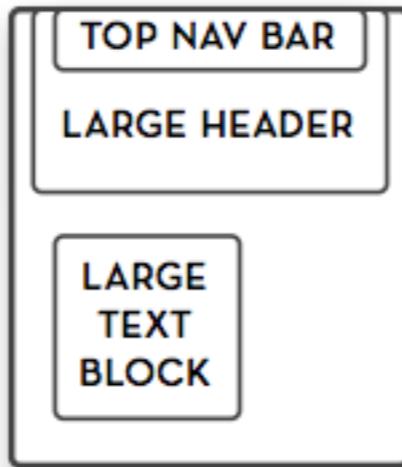
Wednesday 6



Examples: Microsoft



Example: Header with text blocks layout

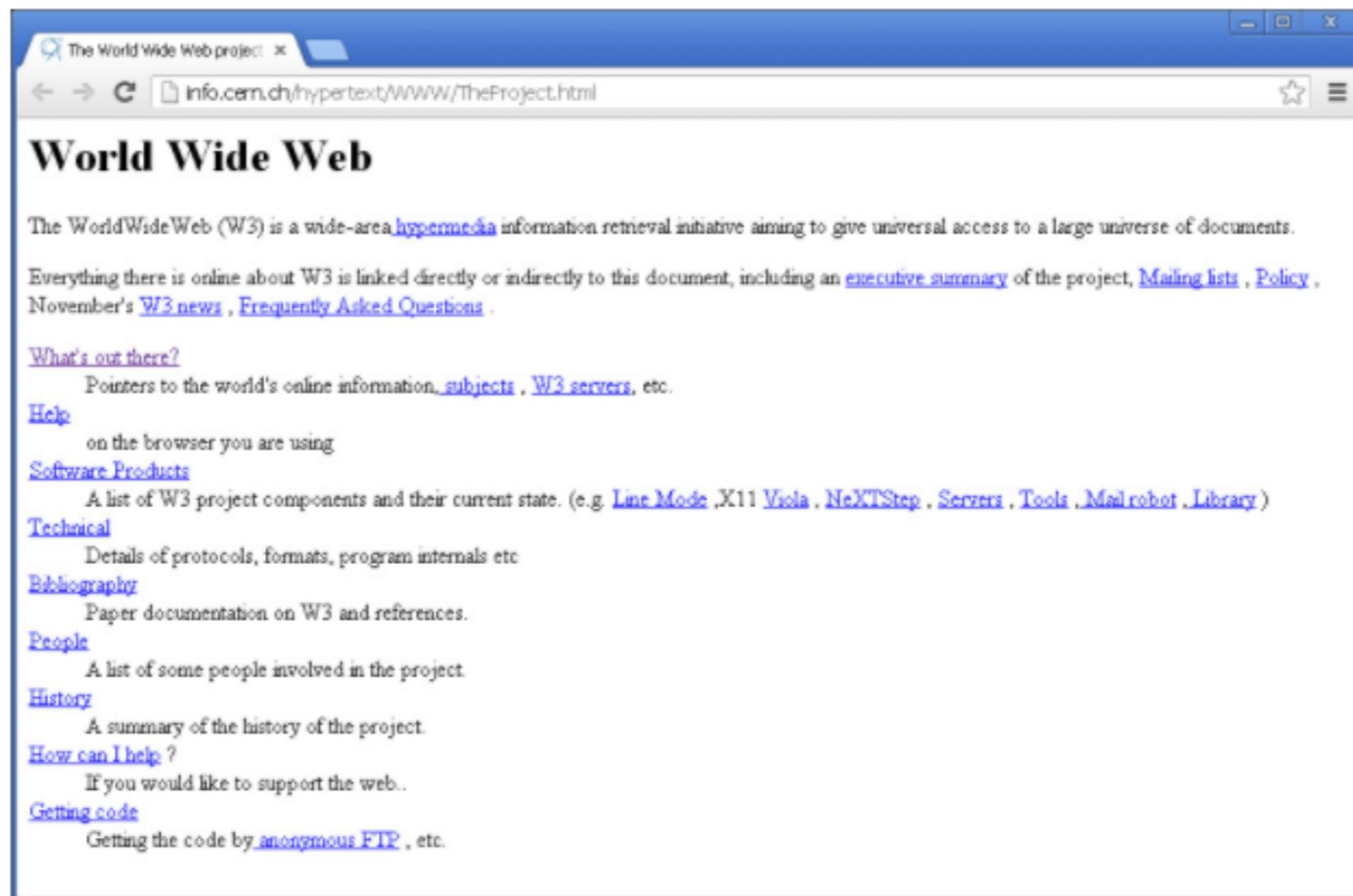


<http://ranjithakumar.net/resources/webzeitgeist.pdf>

Position encodes meaning and function



Web design languages over time



<https://blog.hubspot.com/marketing/look-back-20-years-website-design#sm.00000ip14jejk1d51u53crk6cwrns>

Web design languages over time

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Web design languages over time



Web design languages over time

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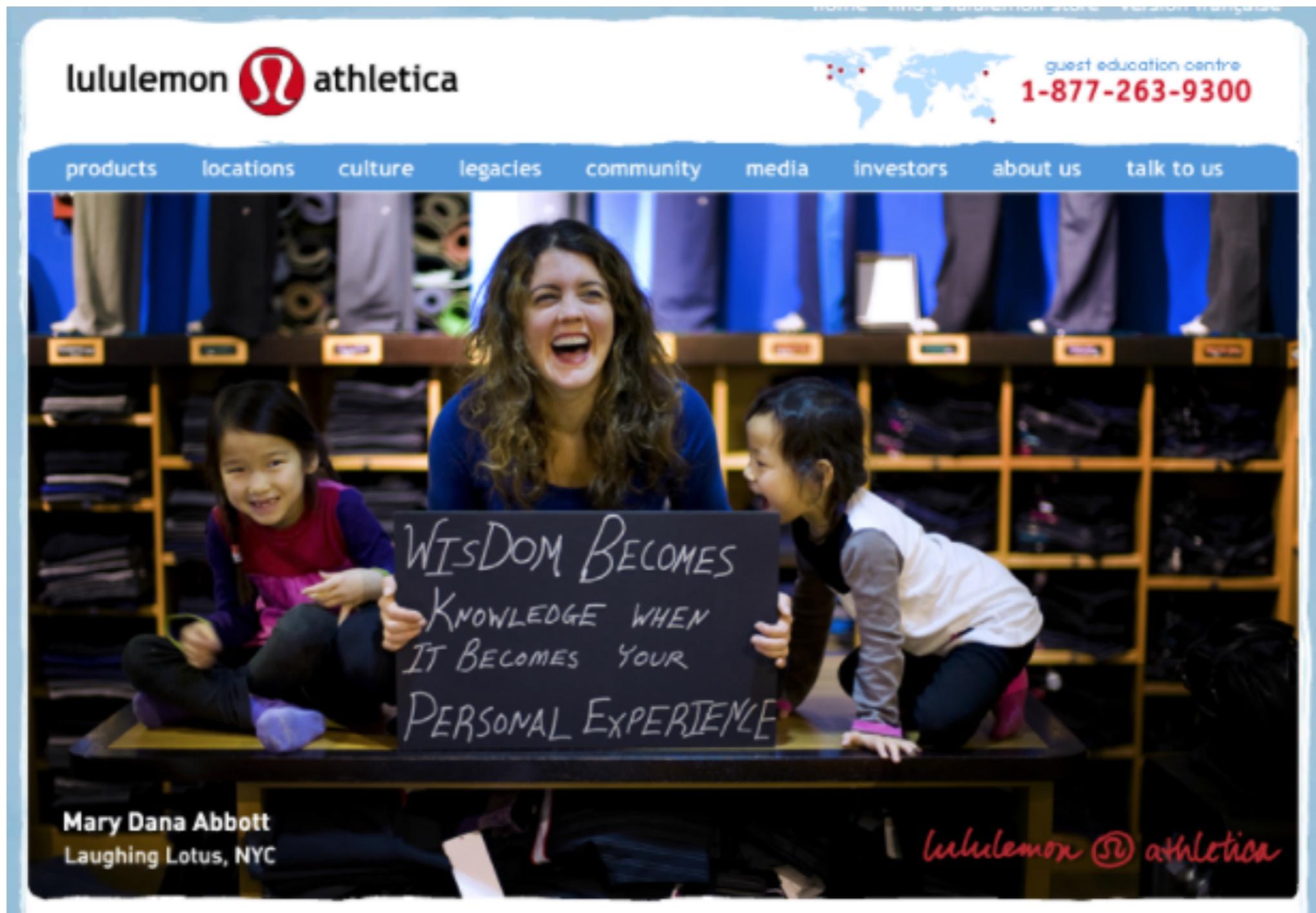
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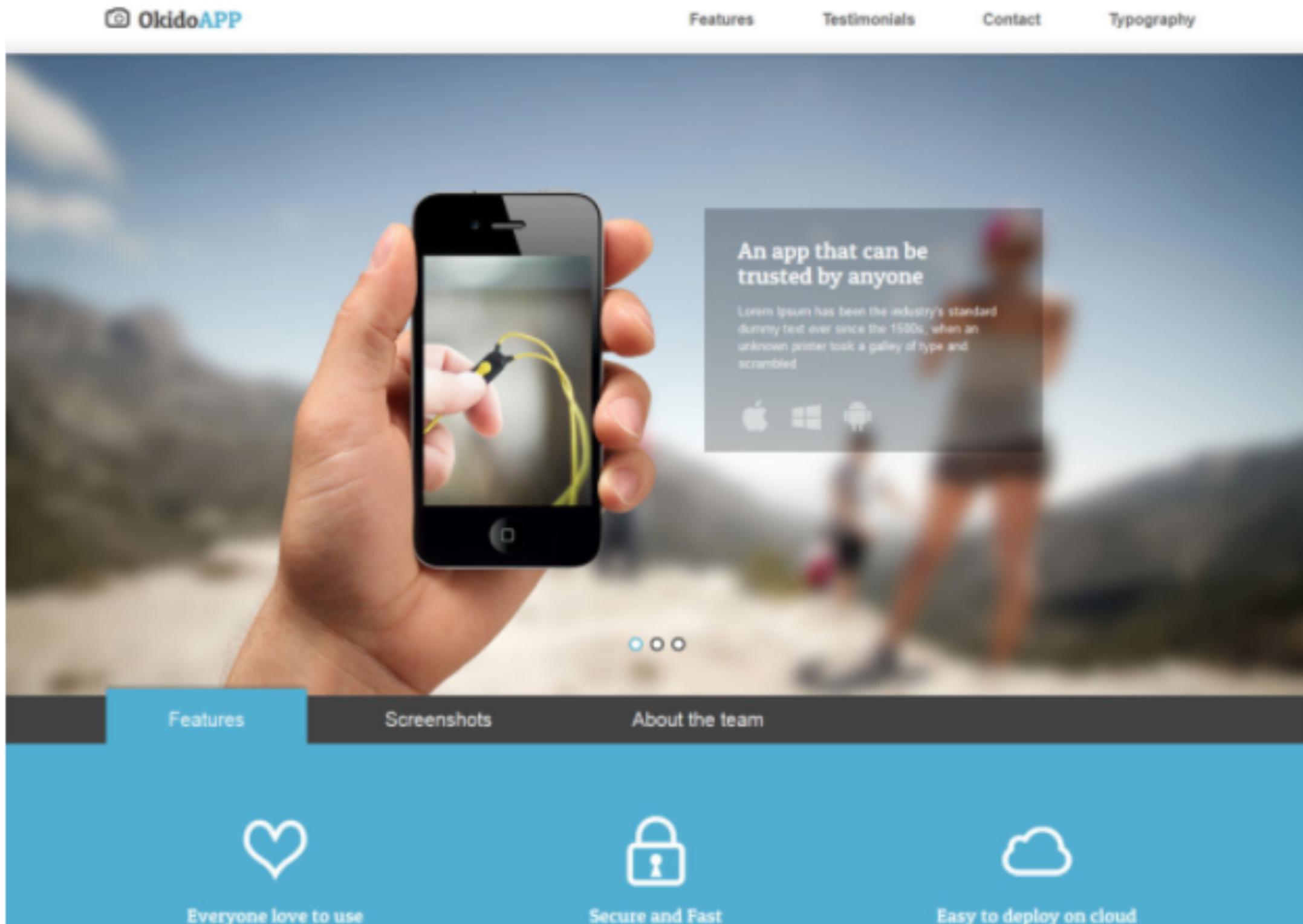
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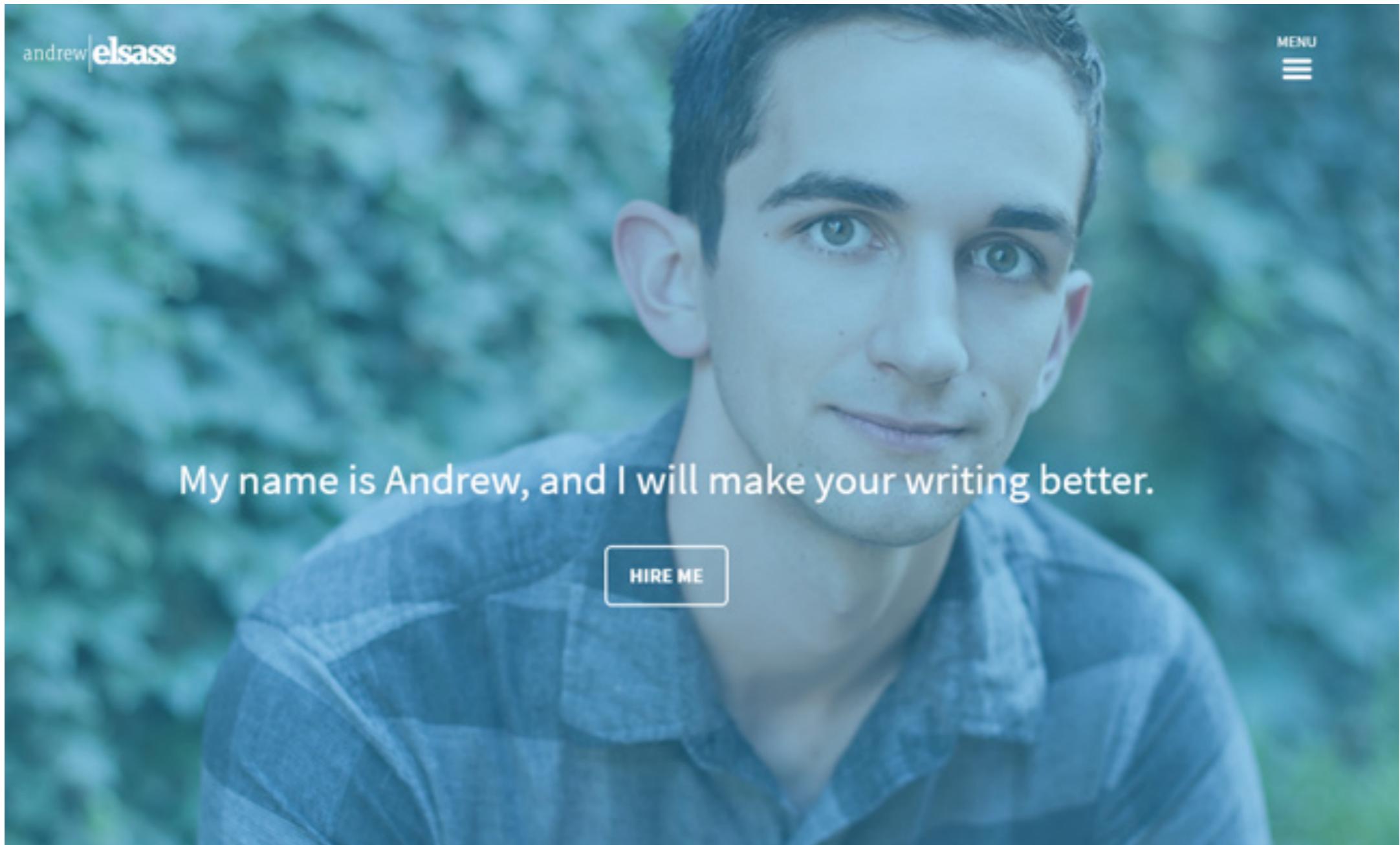
Web design languages over time



Web design languages over time

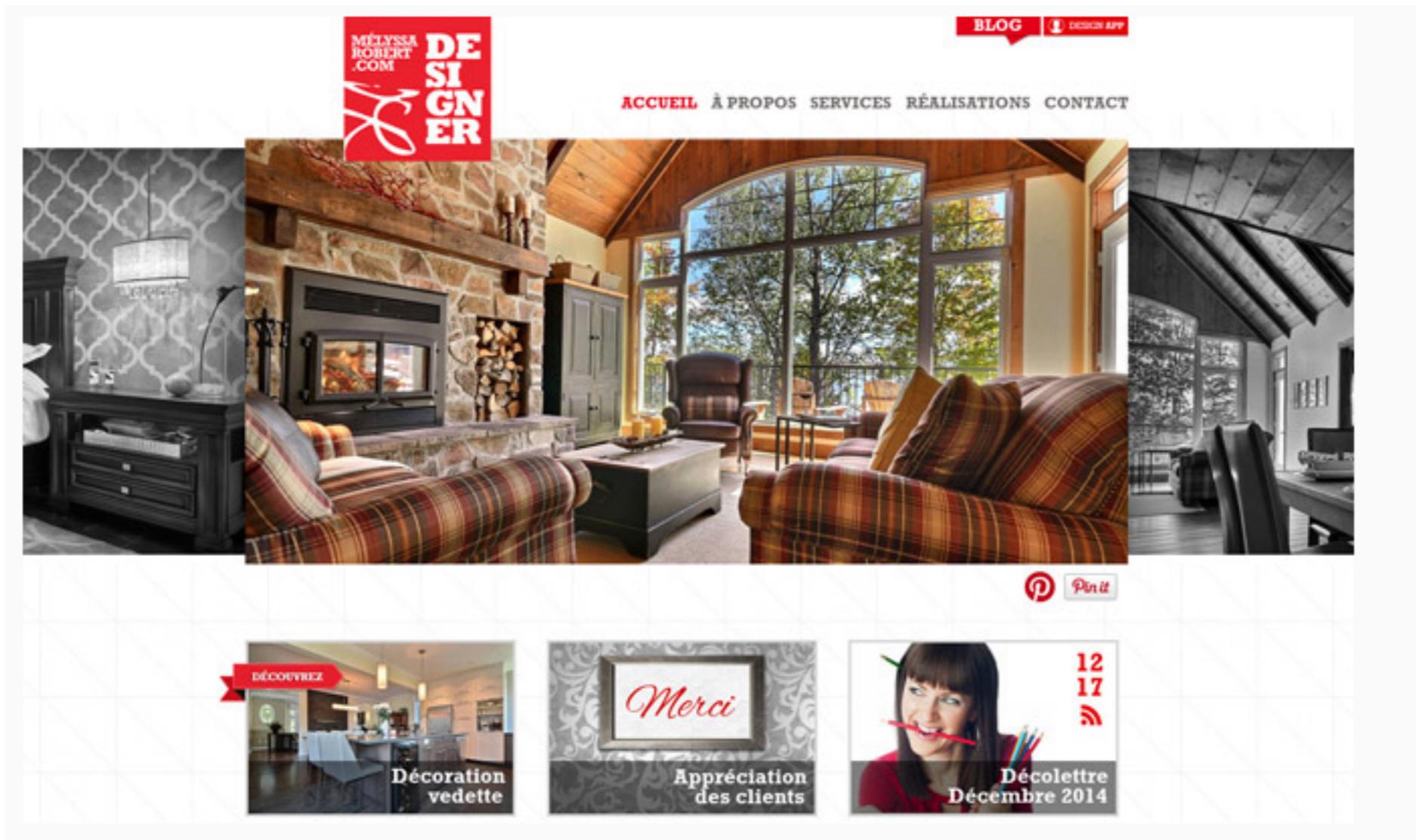


Common visual idioms, circa 2016



- Hero images: large attractive header image
- <https://envato.com/blog/exploring-hero-image-trend-web-design/>

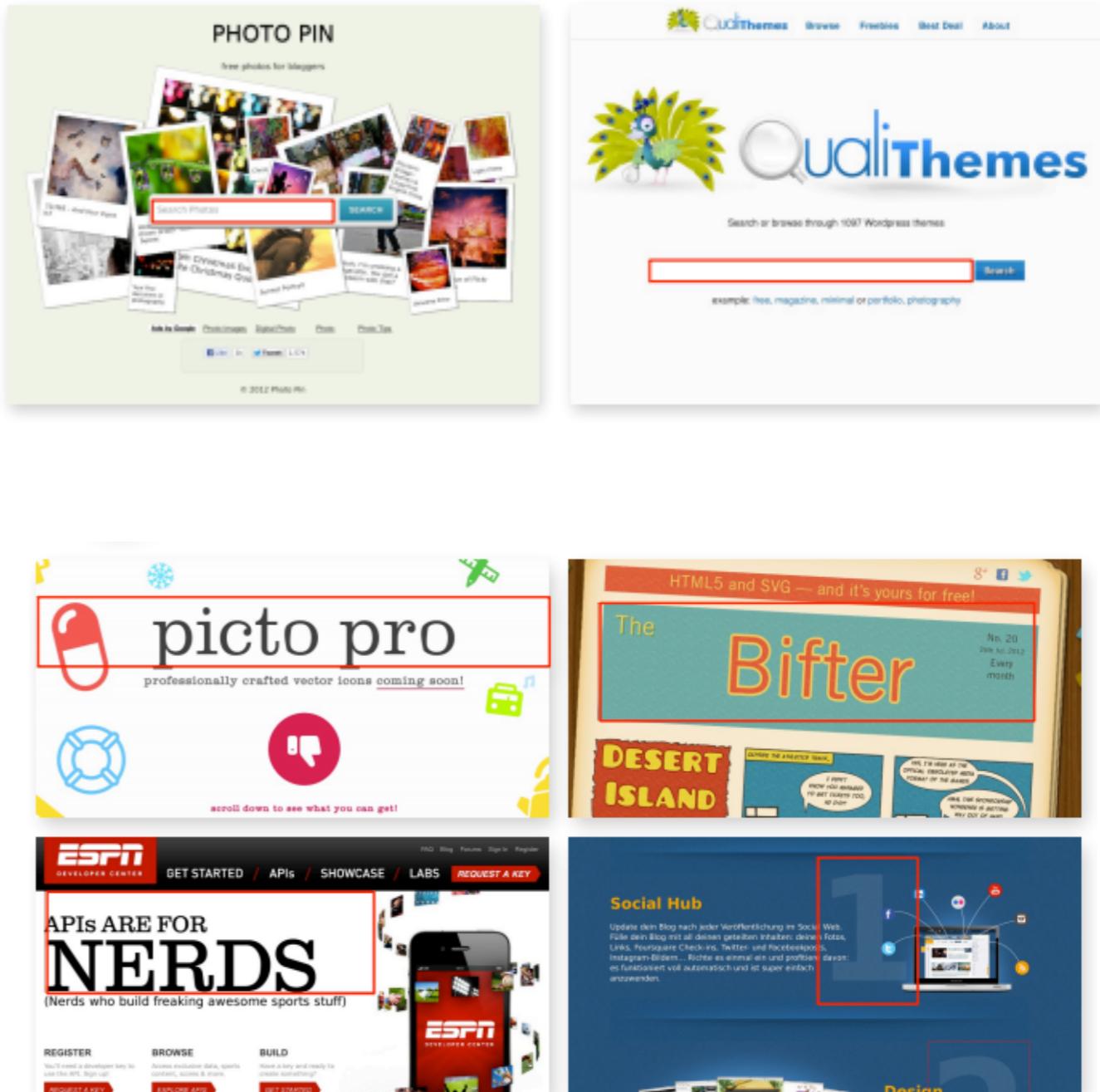
Common visual idioms, circa 2016



- Rotating image galleries (carousels)
- <https://envato.com/blog/exploring-hero-image-trend-web-design/>

Why it matters

- Users will have idioms they expect to see, particularly if suggested by other related elements
- Branding: Users will see your website and have particular associations based on what it exemplifies



Goals in designing a design language

- Offer guidance and options on
 - Colors: examples of color palettes
 - Typography: justification, sizes, fonts, different heading levels
 - Organization
- Support different resolutions, devices
- Support universal design
 - Visually impaired, color blind users

In-Class Activity

Activity: Design a Design Language

- In groups of two or three:
 - Design a design language.
 - Identify key design language elements.
 - For each element you identify
 - What differentiates it?
 - What does it mean?
 - In what situations can it be used?