Visual Design

SWE 432, Fall 2018
Web Application Development

With at least 30 new things you won’t believe!
#10 will shock you!
(actually we hope you believe it all)
HW4 Discussion

Go to:
b.socrative.com, Click student login
Room name: SWE432
Student ID: Your G-number (Including the G)

Reminder: Survey can only be completed if you are in class. If you are not in class and do it you will be referred directly to the honor code board, no questions asked, no warning.
Today

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

Plus a ton of practical visual guidelines!
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—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
• Reduce visual **search** time through layout & organization
• Create desired **emotional** reactions through aesthetic choices
• Present coherent & consistent design that reduces ambiguity and potential confusion
Guidelines for Visual Design

Besides using “Marker Felt thin” for callouts!
Guidelines for Visual Design

Consider: Two Subway Maps
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
Guidelines for Visual Design

Simplicity in new map: Abstract Geographic Details
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
Original (1920’s?) Underground Map
Beck’s 1933 Underground Map
Today’s Underground Map
Tokyo Metro Map
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
It's the City Journal Books Podcast: 21st century conversations for 19th century attention spans.

I'm Joel Mathis, contributing editor to Philadelphia Magazine online.

(Ben)

AND we're joined today by Erica GREEDER. She's a senior editor at Texas Monthly—formerly, she was the southwest correspondent for The Economist. Her work has also appeared in the New York Times, the New York Sun, The Spectator (UK), and More Intelligent Life. And she is currently the author of BIG HOT CHEAP AND RIGHT: WHAT AMERICA CAN LEARN FROM THE STRANGE GENIUS OF TEXAS. Welcome to the podcast.

What CAN America learn from the strange genius of Texas?

In fact, kind of the underlying thesis is that the quote-unquote "TEXAS MODEL" works, "incontrovertibly" you say at the end of the book. So a two-part question: What exactly is the Texas Model? It's not quite simply unfettered free enterprise is it?

The second part of the question is: Who is the model working for? I know you're familiar with the "Texas on the Brink" booklet put out by the state's Democrats in 2011, but let me kind of go through the quick litany here: Texas ranks 50th among the states in the percentage of its population 25 or older.
Ted Faszer’s Birthday
Wednesday, July 3, 2013

All-day events

- Mike Yutzy’s Birthday
- Ted Faszer’s Birthday
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
Train Tables: Which is Better?

| Train No. | XM | 3301 | 3801 | A | 67 | 3 | 3803 | 3 | 3201 | A3 | 51 | 3703 | 3 | 3807 | 3 | 3203 | A3 | 61 | 3809 | 3 | 3901 | 3 | 3811 | 3 | 3813 | 3 | 3815 | 3 | 3817 | 3 | 3819 | 3 | 3821 | 3 | 3823 | 3 | 3825 | 3 | 3827 | 3 | 3829 | 3 | 3831 |
|-----------|----|------|------|---|---|---|------|---|------|---|----|------|---|------|---|------|---|----|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|
| North Elizabeth | 13:31 | 1:03 | 1:51 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Linden | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| North Rahway | 12:40 | 1:11 | 2:00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rahway | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Edison | 12:51 | 2:11 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| New Brunswick | 12:55 | 2:15 | 5:35 | 7:05 | 7:21 | 7:35 | 7:28 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Jersey Avenue | 1:02 | 2:18 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Train No. | XM | 3301 | 3801 | A | 67 | 3 | 3803 | 3 | 3201 | A3 | 51 | 3703 | 3 | 3807 | 3 | 3811 | 3 | 3813 | 3 | 3815 | 3 | 3817 | 3 | 3819 | 3 | 3821 | 3 | 3823 | 3 | 3825 | 3 | 3827 | 3 | 3829 | 3 | 3831 |
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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: Lack of Clarity
Error - excessive typographic contrasts

5 different types sizes in 3 different fonts (!!)
Show and tell - highlighting visual features

What is (or not) important to the customer and is (or not) visually highlighted?

**Good**: add to cart/buy buttons; prime logo

**Bad**: Screencap taken on Weds Nov 14 (“free prime option” is >7 days!)
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
No Layers, Confusing

- Marshalling Signals
- Proceed: Watch Signals
- Proceed to Next Signalman
- Turn Left
- Turn Right
- Move Ahead
- Stop
- Start Engines
- Insert Chocks
- Pull Chocks
- Cut Engines
- Slow Down
- Slow Down Left Engines
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
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
Error - Haphazard layout

![Image of haphazardly structured software interfaces]

1. **Category**: 
   - **Subcategory**: 
   - **Severity**: 
   - **Resp Mgr**: 
   - **State**: 

2. **Synopsis**: 
   - **Description**: 
   - **Work around**: 
   - **Suggested fix**: 
   - **Comments**: 
   - **Public summary**: 

3. **State triggers**: 
   - **Evaluation**: 
     - Commit to fix in releases... 
     - Fixed in releases... 
     - Integrated in releases... 
     - Verified in releases... 
     - Closed because... 
     - Incomplete because... 

4. **Root cause**: 
   - **Fix affects docs**: 

5. **Duplicate of**: 
   - **Interest list**: 
   - **Patch Id**: 
   - **See also (bugids)**: 

6. **History**: 
   - **Submitter**: 
   - **Date**: 

7. **Generic CVE4 problem?**: 
   - **Yes**: 
   - **No**: 

8. **Dispatch operator**: 
   - **Date**: 

9. **Evaluator**: 
   - **Date**: 

10. **Commit operator**: 
    - **Date**: 

11. **Fix operator**: 
    - **Date**: 

12. **Bug ID**: 
    - **Type**: 
      - **Category**: 
      - **Subcategory**: 
      - **Release**: 
      - **Status**: 
      - **Priority**: 
      - **Severity**: 

13. **Pub Summary**: 
14. **Interest List**
15. **Description**
16. **Work Around**
17. **Suggested Fix**
18. **Comments**
19. **Evaluation**
20. **Root Cause**: 
    - documentation-confusing
21. **Same as**: 
22. **Resp Mgr**: 
23. **Resp Engr**: 
24. **Flags**: 
   - **Fix Affects Documentation**
   - **Generic CVE4 Problem**
25. **Hook 1**: 
26. **Hook 2**: 

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**GMU SWE 432 Fall 2018**

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**Bell**
Error - Ambiguous internal relationships

Groups are aligned, contents are not
Error - Excessive display density

tiny font, tons of dead space.
fixed by breaking into separate panes
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
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
Misleading Syntax
Cultural Errors: Airplane Exit Signs

“Please be aware that the nearest exit may be located behind you.”
New Airbus Exit Sign
New Airbus Exit Sign
Error - Cultural or language dependence
Activity: OS 10.2 Preferences Icons

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