Design and Prototyping

Lydia Chilton
COMS 4170
What have you already learned about the design process?
The Waterfall Model

- Requirements
- Design
- Implement
- Fix some bugs
- Done!
Iterative Design

Design

Evaluate

Prototype
Why do we iteratively design and test prototypes?

- Design is risky.
- There are lots of unknowns.
- Low-fidelity prototypes help discover unknowns quickly and cheaply.
- **Iterative design mitigates risk.**
Requirements
Design
Implement
Fix some bugs
Done!

Design
Prototype
Evaluate

6
Every new concept is a risk. Every risk needs to be prototyped.
Every new concept is a risk. Every risk needs to be prototyped.

What new concepts are in your design?
In the video:

What were the new concepts that we would need to prototype?
In the video:

What were the new concepts that we would need to prototype?
Every new concept is a risk.
Every risk needs to be prototyped.
What concepts did they prototype (and how)?
What concepts did they prototype (and how)?
What new risks were learned from instantiation?
Drift: How do you think the prototypers felt?
Iterative Design mitigates risk

Idea

Observations

Instantiation
Part II: Studying the Iterative Design Process
VisuaBlends

Prof. Lydia Chilton  chilton@cs.columbia.edu

COLUMBIA ENGINEERING
The Fu Foundation School of Engineering and Applied Science
The Media's Risky Love Affair With Leaks

First Words

By JOHN BERMAN  FEB. 6, 2017

In January, BuzzFeed News published a dossier full of sensational and unverified claims compiled by a former British intelligence agent, which described extensive connections between President Trump and the Russian government. Trump responded, as expected, with a tweet. Harold Ram
Brazil takes off
ABSOLUT FASHION
Proud sponsor of New Zealand Fashion Week
Enjoy with ABSOLUT responsibility
Definition of a Visual Blend

1. Two objects are integrated into one object
2. Both objects are individually identifiable
How do we make Visual Blends?
Earth + Melting
Tabasco + Hot
Turn off + Cell Phone
TURN IT OFF!
Both the sound and the glow of mobile devices distract moviegoers.
Please turn your devices off now and enjoy the show!
Scaffolding the Iterative Design Process
Starbucks + Summer
Inputs: Two Concepts

Starbucks

Summer
<table>
<thead>
<tr>
<th>Inputs: Two Concepts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Starbucks</strong></td>
</tr>
<tr>
<td>store, frappuccino</td>
</tr>
<tr>
<td><strong>Summer</strong></td>
</tr>
<tr>
<td><strong>Brainstorm associations</strong></td>
</tr>
<tr>
<td>-----------------------------</td>
</tr>
<tr>
<td>store, frappuccino</td>
</tr>
<tr>
<td>Find images of objects</td>
</tr>
<tr>
<td>Brainstorm associations</td>
</tr>
<tr>
<td>-------------------------</td>
</tr>
<tr>
<td>Find images of objects</td>
</tr>
<tr>
<td>Annotate shapes</td>
</tr>
</tbody>
</table>
**Inputs:** Two Concepts

<table>
<thead>
<tr>
<th>Brainstorm associations</th>
<th>Starbucks</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Find</strong> images of objects</td>
<td><img src="#" alt="Starbucks Store" /> <img src="#" alt="Frappuccino" /></td>
<td><img src="#" alt="Starbucks Store" /> <img src="#" alt="Frappuccino" /></td>
</tr>
<tr>
<td><strong>Annotate</strong> shapes</td>
<td><img src="#" alt="Starbucks Logo" /></td>
<td><img src="#" alt="Frappuccino" /></td>
</tr>
<tr>
<td><strong>Annotate</strong> coverage</td>
<td><em>All of object</em></td>
<td><em>Part of object</em></td>
</tr>
</tbody>
</table>
**Inputs:** Two Concepts

<table>
<thead>
<tr>
<th>Brainstorm associations</th>
<th>Starbucks</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>beach, sun, swim</td>
<td></td>
</tr>
</tbody>
</table>
**Inputs:** Two Concepts

<table>
<thead>
<tr>
<th></th>
<th>Starbucks</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brainstorm associations</td>
<td></td>
<td>beach, sun, swim</td>
</tr>
<tr>
<td>Find images of objects</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Inputs: Two Concepts

<table>
<thead>
<tr>
<th>Brainstorm associations</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Starbucks</td>
<td>beach, sun, swim</td>
</tr>
<tr>
<td>Find images of objects</td>
<td></td>
</tr>
<tr>
<td>Annotate shapes</td>
<td></td>
</tr>
<tr>
<td>Brainstorm associations</td>
<td>Summer associations</td>
</tr>
<tr>
<td>------------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>Starbucks</td>
<td>beach, sun, swim</td>
</tr>
<tr>
<td>Find images of objects</td>
<td></td>
</tr>
<tr>
<td>Annotate shapes</td>
<td></td>
</tr>
<tr>
<td>Annotate coverage</td>
<td>Part of object</td>
</tr>
<tr>
<td>Inputs: Two Concepts</td>
<td></td>
</tr>
<tr>
<td>----------------------</td>
<td></td>
</tr>
<tr>
<td><strong>Brainstorm</strong> associations</td>
<td></td>
</tr>
<tr>
<td>Starbucks: store, frappuccino</td>
<td></td>
</tr>
<tr>
<td>Summer: beach, sun, swim</td>
<td></td>
</tr>
<tr>
<td><strong>Find</strong> images of objects</td>
<td></td>
</tr>
<tr>
<td><img src="image" alt="Starbucks" /> <img src="image" alt="Frappuccino" /></td>
<td></td>
</tr>
<tr>
<td><img src="image" alt="Summer" /> <img src="image" alt="Sun" /></td>
<td></td>
</tr>
<tr>
<td><strong>Annotate</strong> shapes</td>
<td></td>
</tr>
<tr>
<td><img src="image" alt="Starbucks" /> <img src="image" alt="Frappuccino" /></td>
<td></td>
</tr>
<tr>
<td><img src="image" alt="Summer" /> <img src="image" alt="Sun" /></td>
<td></td>
</tr>
<tr>
<td><strong>Annotate</strong> coverage</td>
<td></td>
</tr>
<tr>
<td>All of object</td>
<td></td>
</tr>
<tr>
<td>Part of object</td>
<td></td>
</tr>
<tr>
<td>Part of object</td>
<td></td>
</tr>
<tr>
<td>Part of object</td>
<td></td>
</tr>
</tbody>
</table>
**Inputs:** Two Concepts

### Starbucks
- **Brainstorm associations:** store, frappuccino
- **Find images of objects:**
  - [Starbucks logo](#)
  - [Starbucks drink](#)
- **Annotate shapes:**
  - All of object
  - Part of object

### Summer
- **Brainstorm associations:** beach, sun, swim
- **Find images of objects:**
  - [Ice cream](#)
  - [Sun](#)
- **Annotate shapes:**
  - Part of object
**Inputs:** Two Concepts

<table>
<thead>
<tr>
<th>Brainstorm associations</th>
<th>Starbucks</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>store, frappuccino</td>
<td>beach, sun, swim</td>
</tr>
</tbody>
</table>

**Find images of objects**

<table>
<thead>
<tr>
<th>Annotate shapes</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Starbucks" /> <img src="image2" alt="Frappuccino" /> <img src="image3" alt="Beach" /> <img src="image4" alt="Sun" /></td>
</tr>
</tbody>
</table>

**Annotate coverage**

<table>
<thead>
<tr>
<th>Starbucks coverage</th>
<th>Summer coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>All of object</td>
<td>Part of object</td>
</tr>
<tr>
<td>Part of object</td>
<td>Part of object</td>
</tr>
</tbody>
</table>

**Prototype blend**

![Blended Image]
<table>
<thead>
<tr>
<th>Brainstorm associations</th>
<th>Starbucks</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>store, frappuccino</td>
<td>beach, sun, swim</td>
</tr>
<tr>
<td>Find images of objects</td>
<td><img src="image" alt="Starbucks" /> <img src="image" alt="Frappuccino" /></td>
<td><img src="image" alt="Ice Cream" /> <img src="image" alt="Sun" /></td>
</tr>
<tr>
<td>Annotate shapes</td>
<td><img src="image" alt="Starbucks" /> <img src="image" alt="Frappuccino" /></td>
<td><img src="image" alt="Ice Cream" /> <img src="image" alt="Sun" /></td>
</tr>
<tr>
<td>Annotate coverage</td>
<td>All of object</td>
<td>Part of object</td>
</tr>
<tr>
<td>Prototype blend</td>
<td><img src="image" alt="Starbucks" /> <img src="image" alt="Sun" /></td>
<td><img src="image" alt="Ice Cream" /> <img src="image" alt="Sun" /></td>
</tr>
</tbody>
</table>

Two objects are integrated into one object
Both objects are identifiable
<table>
<thead>
<tr>
<th><strong>Brainstorm associations</strong></th>
<th><strong>Find images of objects</strong></th>
<th><strong>Annotate shapes</strong></th>
<th><strong>Annotate coverage</strong></th>
<th><strong>Prototype blend</strong></th>
<th><strong>Evaluate prototype</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Starbucks</td>
<td>beach, sun, swim</td>
<td>Starbucks</td>
<td>All of object</td>
<td>Starbucks</td>
<td>2 objects integrated into one object</td>
</tr>
<tr>
<td>store, frappuccino</td>
<td></td>
<td>store, frappuccino</td>
<td>Part of object</td>
<td>store, frappuccino</td>
<td>Both objects identifiable</td>
</tr>
</tbody>
</table>
Two objects are integrated into one object.
Both objects are identifiable.
Examples
Orange + Winter

Object 1  Object 2  Blend Prototype  Visual Blend
Starbucks + Summer

Object 1  Object 2  Blend Prototype  Visual Blend
Starbucks + Winter

Object 1  Object 2  Blend Prototype  Visual Blend
Lego + Summer

Object 1

Object 2

Blend Prototype

Visual Blend
When do we need iteration?
Iteration Example #1
Lego + Valentine’s Day

Lego

Valentine’s Day

Brainstorm associations
Find images of objects
Annotate shapes
Annotate coverage
Synthesize blends
Evaluate

Improve
Lego + Valentine’s Day

Are both objects identifiable?

Are two objects integrated into one object?

Brainstorm associations
Find images of objects
Annotate shapes
Annotate coverage
Synthesize blends
Evaluate

Are both objects identifiable?
Are two objects integrated into one object?
Lego + Valentine’s Day

Are both objects identifiable?

Are both objects integrated into one object?
Lego + Valentine’s Day

Brainstorm associations
Find images of objects
Annotate shapes
Annotate coverage
Synthesize blends
Evaluate

Lego

Valentine’s Day

Are both objects identifiable?
Are both objects integrated into one object?
Iteration Example #2
NYC + healthy

NYC

Healthy

Brainstorm associations
Find images of objects
Annotate shapes
Annotate coverage
Synthesize blends
NYC + healthy

No Matches :(  

Brainstorm associations  
Find images of objects  
Annotate shapes  
Annotate coverage  
Synthesize blends
NYC + healthy

NYC

Healthy

Brainstorm associations

Find images of objects

Annotate shapes

Annotate coverage

Synthesize blends

Improve
NYC + healthy

NYC

Healthy

Brainstorm associations
Find images of objects
Annotate shapes
Annotate coverage
Synthesize blends

Improve
Blends

Visual Blends

Inputs: Two Concepts

Starbucks

- Brainstorm associations: store, frappuccino
- Find images of objects
- Annotate shapes
- Annotate coverage: All of object
- Synthesize blends

Summer

- Brainstorm associations: beach, sun, swim
- Find images of objects
- Annotate shapes
- Annotate coverage: Part of object
- Synthesize blends

Improve

Evaluate

Objects are integrated
Both objects are identifiable

Output: A visual blend
Design and Prototyping

LYDIA CHILTON
COMS 4170
The Waterfall Model

Requirements → Design → Implement → Fix some bugs → Done!
Iterative Design

- Design
- Evaluate
- Prototype
Why do we iteratively design and test prototypes?

- Design is risky.
- There are lots of unknowns.
- Low-fidelity prototypes help discover unknowns quickly and cheaply.
- **Iterative design mitigates risk.**
Prototype all the new concepts

Iterative to solve unexpected problems