

Design and Prototyping

No screens

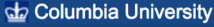


Prof. Lydia Chilton
COMS 4170
4 October 2018

Say your name



I teach UI Design (spring) and Advance Web Design Studio (fall)

Columbia University

User Interface Design
COMS 4170 · Spring 2018

Home Syllabus Assignments ▾

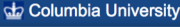
Part 1 Build websites that suit the needs and abilities of users.

Part 2 When the needs and abilities of users are uncertain, design systems by learning

INSTRUCTOR
[Prof. Lydia Chilton](#)
OH: Tuesday 3-4 pm, CEP SR 612

TAS
Tessa Hurr
OH: Thursday 9:30-11am, CS OH room
Eleanor Murguia
OH: Monday 1:30-3:30pm, CS OH room
Lucille Sui
OH: Friday 10:30am-12pm, CS OH room

Please contact staff through [Piazza](#) only

Columbia University

Advanced Web Design Studio
COMS 6998 · Fall 2018

Home Syllabus

Goals

1. Master front-end and back-end technologies for making interactive websites.
2. Discover specific user needs by developing a low-level, mechanical model of human behavior.
3. Practice iterative design to meet specific user needs.

INSTRUCTOR
[Prof. Lydia Chilton](#)
OH: Tuesdays 4-5, CEP SR 612

TAS
Katy Gero
OH: Wed 2:30-3:30, CEP SR 603
Savvas Petridis
OH: TBA, CS OH room

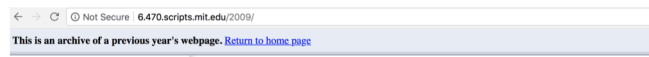
WEEKLY :
Lecture
Friday 2:10-
(also know

Please contact staff through [Piazza](#) only

TEACHING METHOD

This is a studio style class in the tradition of art and architecture. Students are expected to already know the fundamental techniques. We will practice these techniques as well as give and receive critique on a weekly basis. Attendance is mandatory. Any absence, excused or otherwise, must be made up

I've been teaching web dev for 10 years



6.470 IAP

Web Programming Competition 2009

2009 Winners

First Place - \$4000

[MusicCity](#)

Lance Collins, Rich Chan, Fan Yang
A site for creating and sharing music playlists built from YouTube content, with a unique graph visualization.

Second Place - \$3000

[FastTrag](#)

Dave Fernholz, Kevin Wang
A music playlist with a unique set of features including building a playlist automatically the Billboard Top 50

Third Place - \$2000

[MusicAgent](#)

Daniel Whitlow, Jong-moon Kim
A site for searching for music content from YouTube including user contributions for identifying the best content

Fourth Place (tie) - \$600

[TetrTunes](#)

Xiao Xiao, Scott Kovach, Justin Schmelzer
Play tetris, on TetrTunes and if you score higher than your friends, they will be forced to listen to your music

Fourth Place (tie) - \$600

[Constellations](#)

Tyler Hess, Katie Thomas, Katrina Ellison
A social interaction site for families and other close groups to keep in touch. Topics range from college activities already found a following

Honorable Mention (for impressive use of minimalist design) - \$400

[Genreize](#)

Jessica McKellar
Genreize is a simple yet effective site for exploring music through genres. It keeps a visible history so the user

Honorable Mention (for great entertainment value) - \$400

[Songbird](#)

Kathy Chen, Caroline Sun, Donna Yee
Songbird is a way to post videos of yourself performing karaoke, and to have your fans offer (hopefully) constant

[Home](#) [Syllabus](#) [Logistics](#) [Projects](#)

HCI design studio

CS 247 · Spring 2018

This class will deepen your fluency with design for interactive technology. You will engage connecting the concepts you've learned to iterative design practice. Along the way, you'll techniques.

WEEK	LECTURE	MON+TUE STUDIO A
1	APRIL 2 (WEEK 1) <i>Lecture:</i> Class intro Seeing the water <i>Announcements:</i> P0 and P1 available (class application & materials)	APRIL 2-3 Due Date <i>Sketching and Observation</i> Homework: Class application due 4/3 at noon, Start P1 by going to at least 1 lunch place and doing some sketching.

Columbia University

User Interface Design

COMS 4170 · Spring 2018

[Home](#) [Syllabus](#) [Assignments](#)

Part 1 Build websites that suit the needs of the user.
Part 2 When the needs and abilities of the user change.

INSTRUCTOR
Prof. Lydia Chilton
OH: Tuesday 3-4 pm, CEP5R 612

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Columbia University

Advanced Web Design Studio

COMS 6998 · Fall 2018

[Home](#) [Syllabus](#)

Goals

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INSTRUCTOR	TAS	WEEKLY
Prof. Lydia Chilton OH: Tuesdays 4-5, CEP5R 612	Katy Gero OH: Wed 2:30-3:30, CEP5R 603 Soroush Petridis OH: TBA, CS OH room	Lecture Friday 2:30-3:30 Office hours

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TEACHING METHOD
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2008-2010

MIT

2016-2017

Stanford

2018-present

Columbia

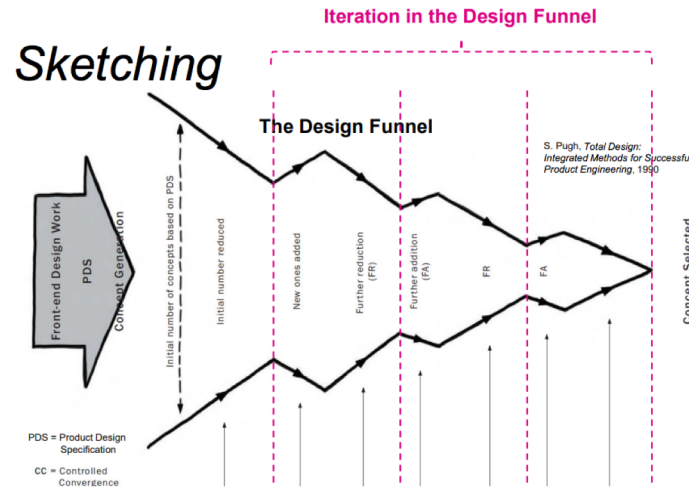
What do you already know about design?

Say your name



Iterative Design Process

- Requirements analysis
- Preliminary and detailed design
- Implementation
- Evaluation



Heuristic Evaluation

<http://www.nngroup.com/articles/how-to-conduct-a-heuristic-evaluation/>

- **Evaluators** (3–5) individually and systematically inspect the UI, comparing it with a set of general (and, optionally, domain-specific) evaluation heuristics
 - May need to document a specific task to evaluate and steps for performing it if evaluators are not familiar with the domain
 - Go through UI at least twice
 - Note each problem individually
- **Observer** may take notes
 - Eliminates note-taking burden for evaluator
 - Observer is similar to an experimenter, but
 - Records, rather than interprets (i.e., evaluator does the evaluation)
 - Provides help (especially if evaluator is not familiar with the

Persona

- Description of an archetypal user of the system
 - Each persona represents a stereotypical example of a class of prospective system users
 - Usually part of a set, covering a range of users

Use Scenario

- Description of a representative way in which system will be used
 - Each scenario tells a story
 - Often written to be rich in detail to capture re interest

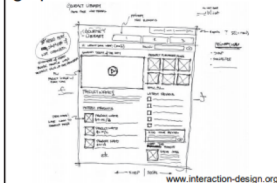
Formal vs. Informal Experiments

- Formal experiments are hard to perform, control, analyze—expensive!
- Informal experiments are often easier, more useful—cheaper!

Hi-Fi vs. Lo-Fi Prototypes

- Prototypes
 - Get/refine ideas for real system
 - Perform usability testing
 - Do advance demos
- Hi-Fi prototypes
 - Often use computer-based tools
 - Provide look & feel of a real system
 - Slow creation/turnaround
- Lo-Fi prototypes
 - Often use paper (and other low-tech material)-based tools
 - Provide rough approximation of a system

Wireframe: A design artifact that expresses the basic screen contents/layout/interactivity of a UI, typically using simplified graphics



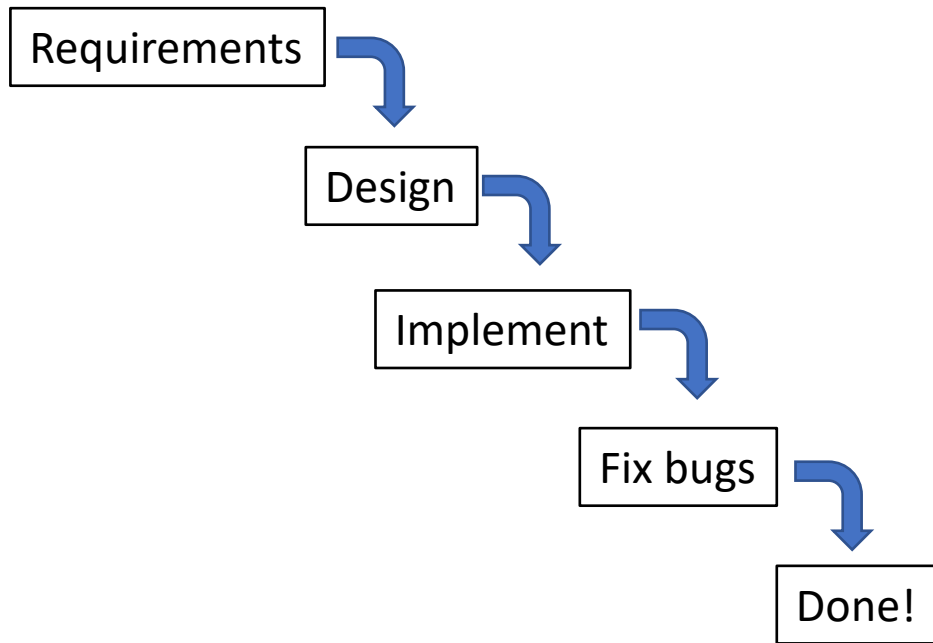
Paper Prototype Ingredients

- Paper
 - Construction paper
 - Index cards
 - Post-it notes
- Scissors
- Glue
 - Permanent
 - Temporary (e.g., 3M Scotch® Restickable Adhesive Glue Stick)
- Tape
 - Permanent
 - Single-sided temporary tape (e.g., 3M Scotch® 811 Removable Magic™ Tape)
 - Double-sided temporary tape (e.g., 3M Scotch® 667 Removable Double-Coated Tape)
- Markers
- Transparent

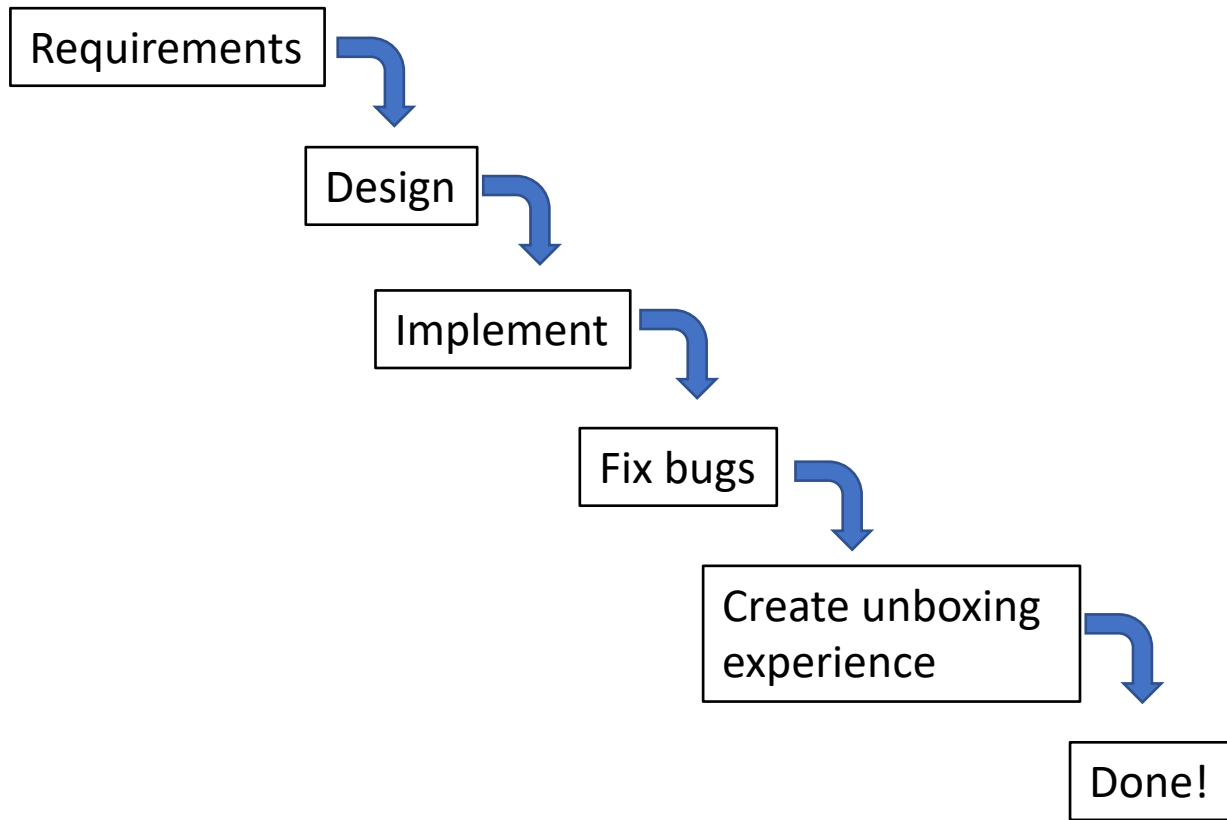


Why is design iterative?

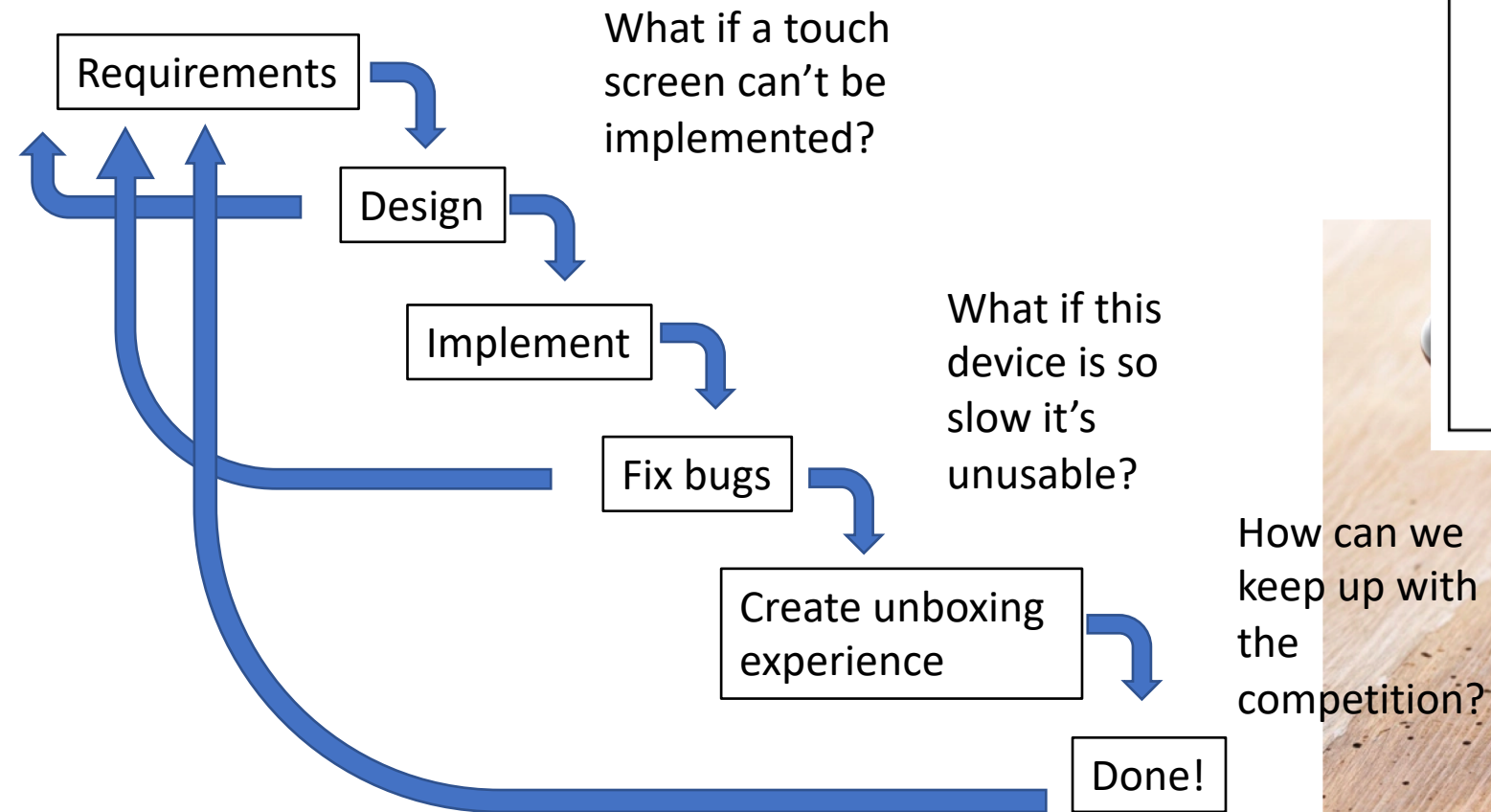
What's wrong with the waterfall model?



What's wrong with the waterfall model?



Design involves risks



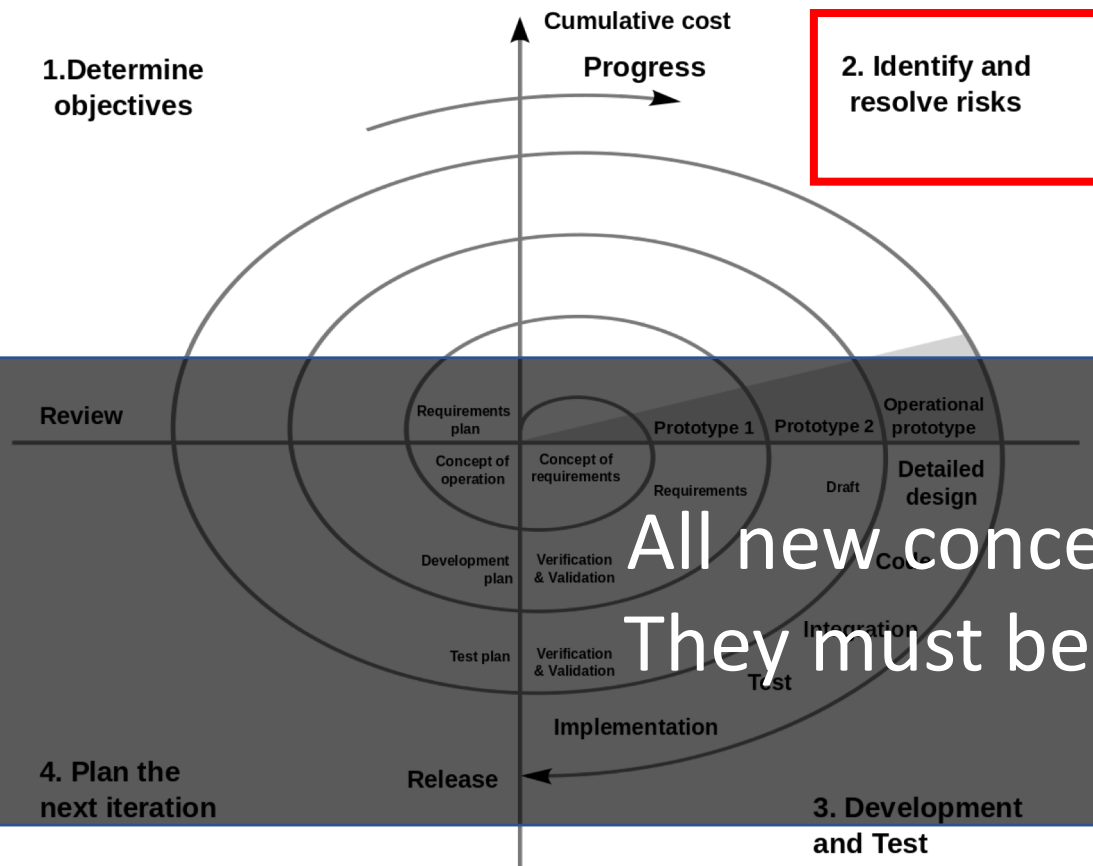
Iterative Design Process

- Requirements analysis
- Preliminary and detailed design
- Implementation
- Evaluation



Spiral Model of Software engineering

Barry Boehm, 1988



Every iteration should experiment with the next biggest risk.

How to achieve the perfect gradient on app icons?

Does touch work?

All new concepts are risks.
They must be prototyped?



In this video,
what are new concepts?

Write them down now, we will list them together after the video

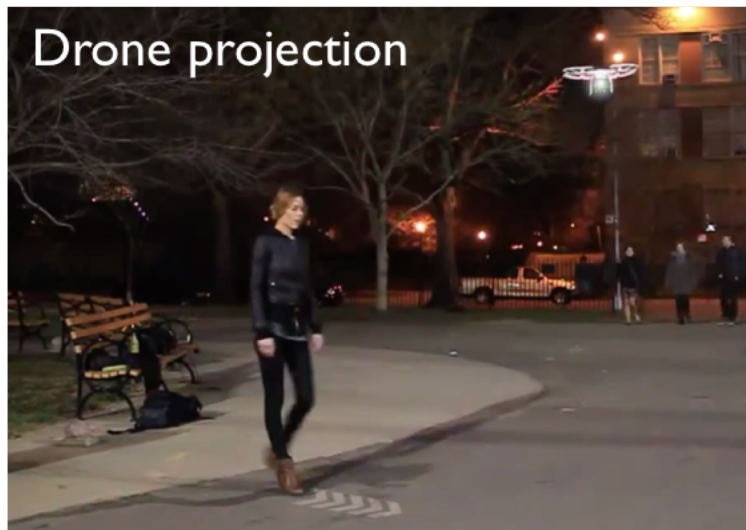
What new concepts should we prototype?



Initial Prototype:
What did they prototype and
how?



What new concepts did they prototype?



How did they prototype them?

Can the drone carry the stuff?



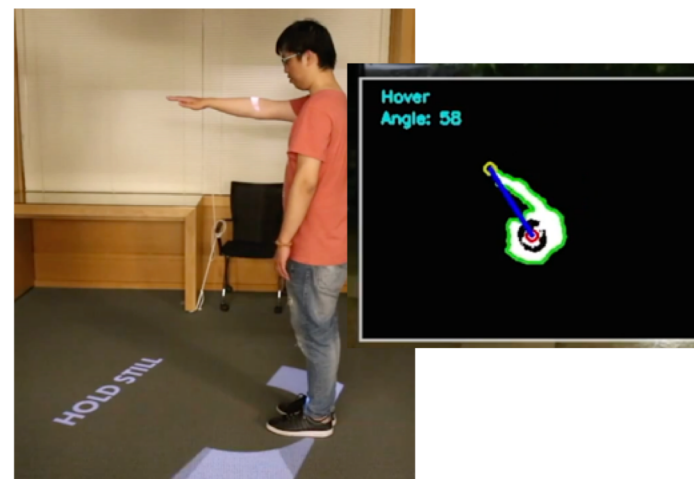
Can users select from menu?



Can users select symbols?



Can the drone detect hand position?



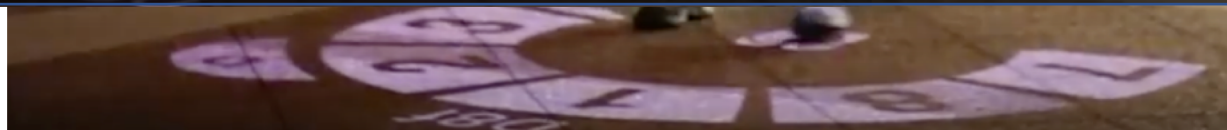
Can users select outdoors?



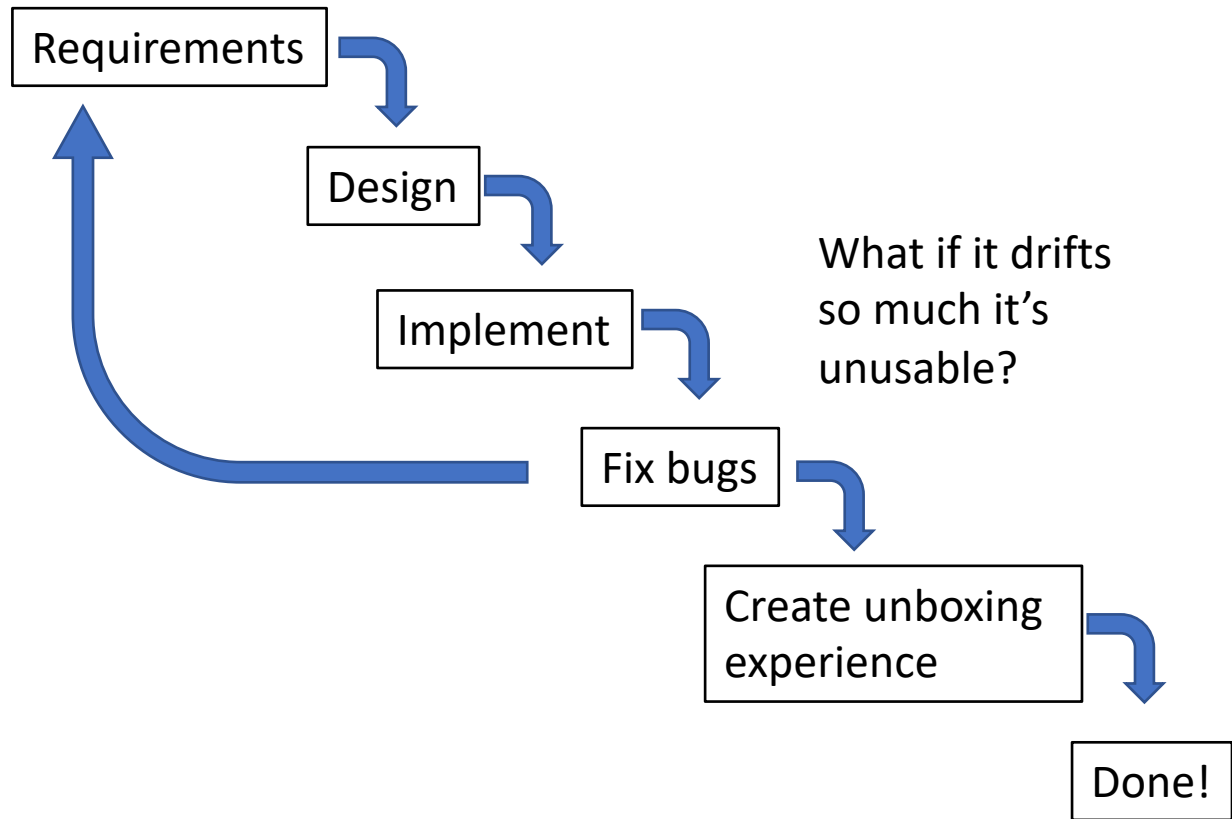
What was the biggest new risk they discovered during prototyping?



DRIFT



Design involves risks

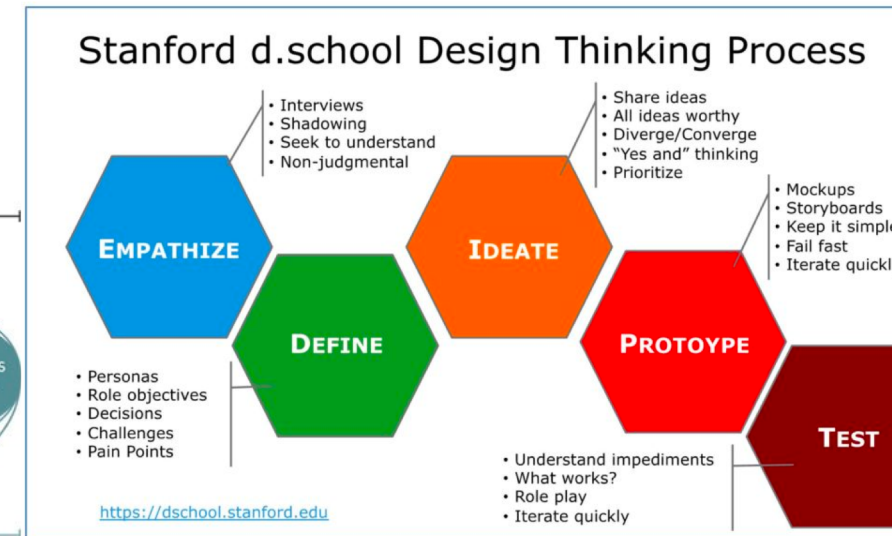
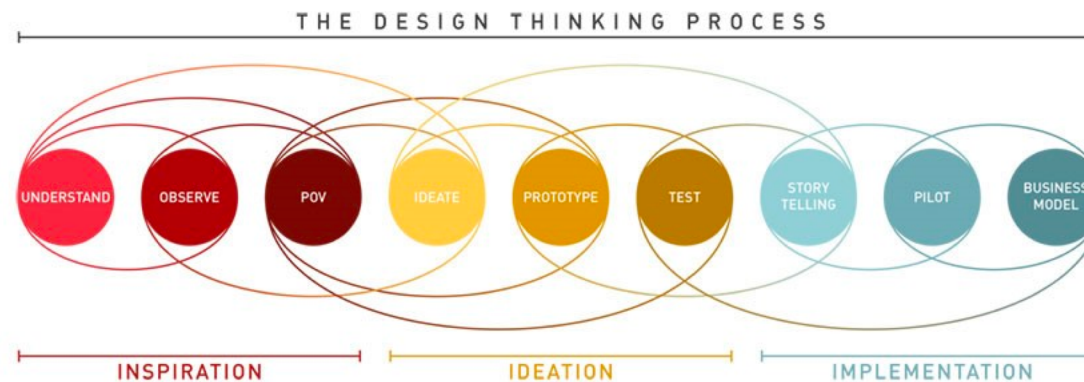
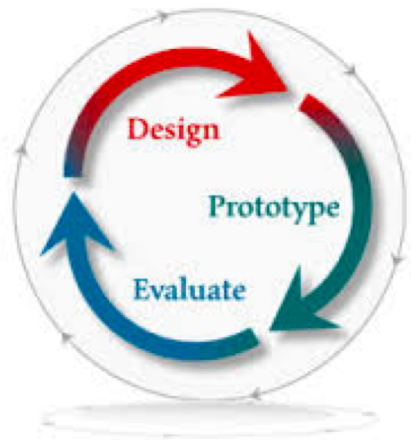
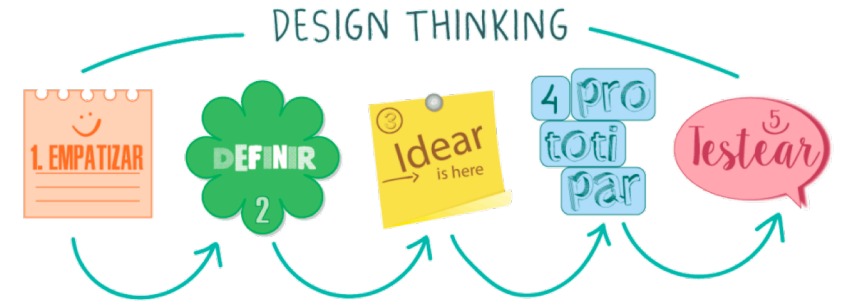
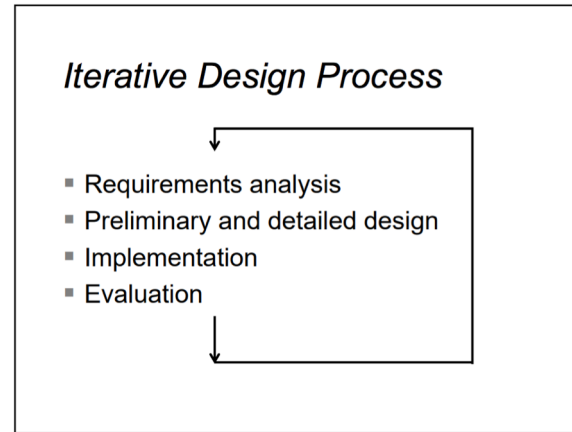
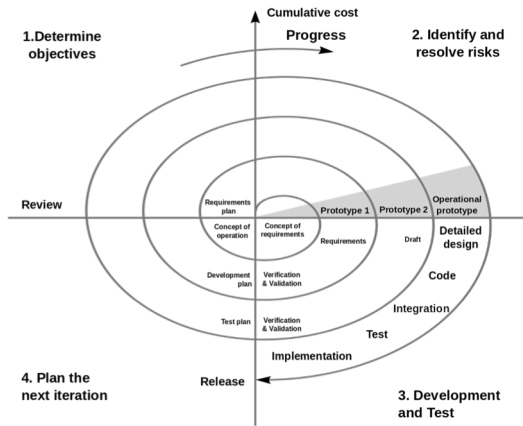


My Research:

How does the iterative design
process work at a mechanical level?

Iterative Design empirically.

But the models we have of it are too high-level



An Interactive Pipeline for Creating **VisuaBlends**



Lydia Chilton
Savvas Petridis

COLUMBIA | ENGINEERING
The Fu Foundation School of Engineering and Applied Science

Brazil + Takes Off



News

Tabasco + Hot



Advertisements

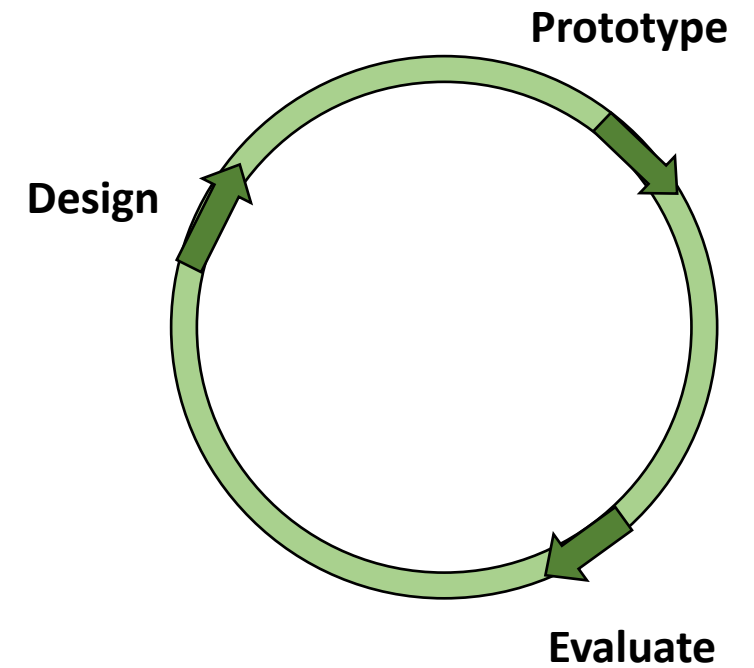
Earth + Melt



Public Service Announcements

We want to help people create visual blends for their own messages.

How can we decompose the **iterative design process** to make visual blends in independent microtasks?



Brazil + Takes Off



News

Tabasco + Hot



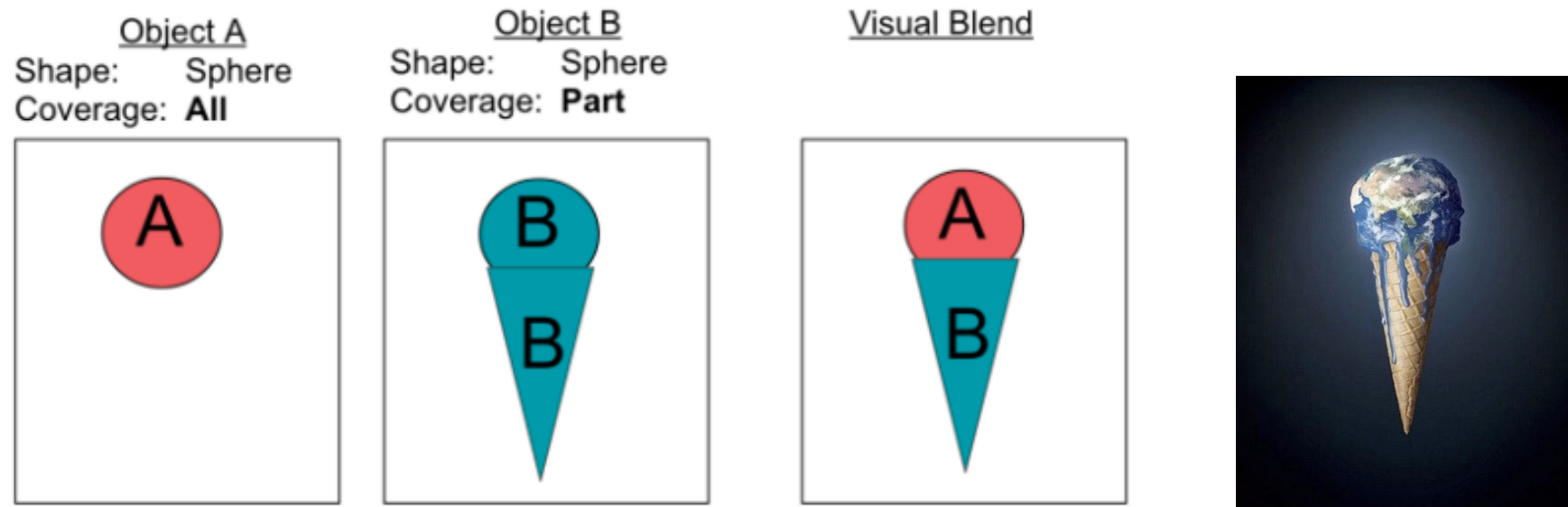
Advertisements

Earth + Melt



Public Service Announcements

Design Pattern: Single Shape Mapping



1. Two objects are integrated into one object
2. Both objects are individually identifiable

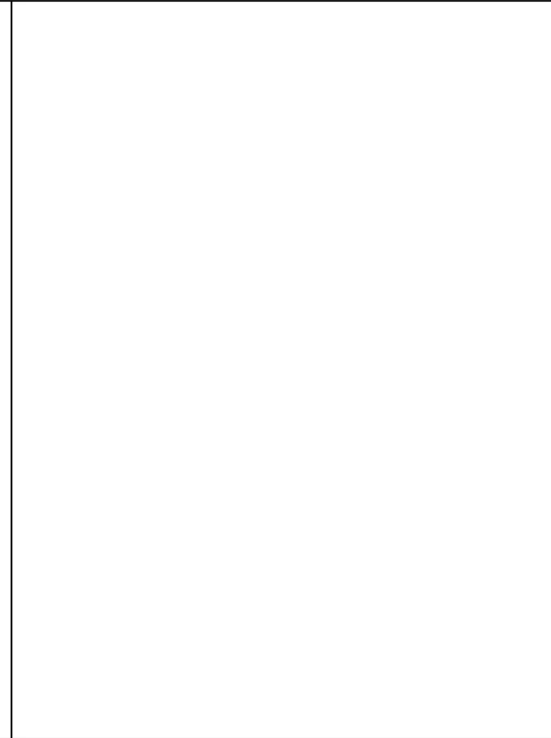
Tabasco



Hot



Tabasco + Hot



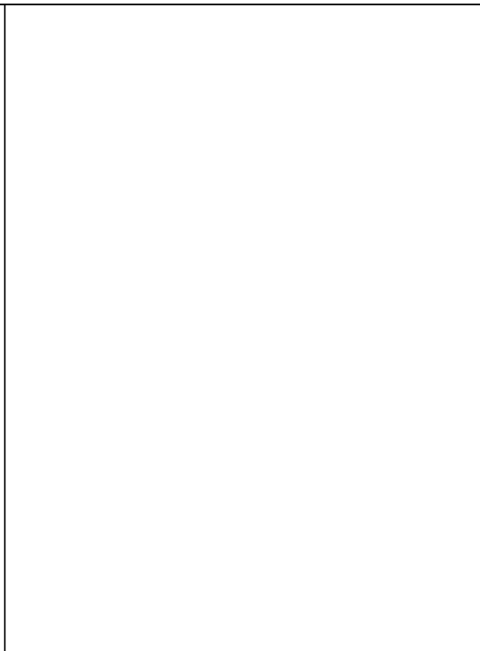
Turn off



Cell phone



Turn off + Cell phone



Starbucks + Summer

Inputs: Two Concepts

Starbucks

Summer

Inputs: Two Concepts

Starbucks

Summer

Brainstorm
associations

store, frappuccino

Inputs: Two Concepts

Starbucks

Summer

Brainstorm
associations

store, frappuccino

Find images
of objects



Inputs: Two Concepts

Starbucks

Summer

Brainstorm
associations

store, frappuccino

Find images
of objects



Annotate
shapes



Inputs: Two Concepts

Starbucks

Summer

Brainstorm
associations

store, frappuccino

Find images
of objects



Annotate
shapes



Annotate
coverage

All of
object

Part of
object

Inputs: Two Concepts

Starbucks

Summer

Brainstorm
associations

beach, sun, swim

Inputs: Two Concepts

Starbucks

Summer

Brainstorm
associations

Find images
of objects

beach, sun, swim



Inputs: Two Concepts

Starbucks

Summer

Brainstorm
associations

beach, sun, swim

Find images
of objects



Annotate
shapes



Annotate
coverage

Part of
object

Part of
object

Inputs: Two Concepts

Starbucks

Summer

Brainstorm
associations

store, frappuccino

beach, sun, swim

Find images
of objects



Annotate
shapes



Annotate
coverage

All of
object

Part of
object

Part of
object

Part of
object

Inputs: Two Concepts

Starbucks

Summer

Brainstorm
associations

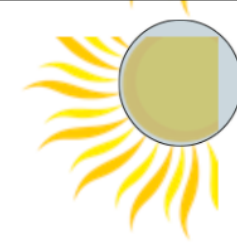
store, frappuccino

beach, sun, swim

Find images
of objects



Annotate
shapes



Annotate
coverage

All of
object

Part of
object

Part of
object

Part of
object

Inputs: Two Concepts

Starbucks

Summer

Brainstorm
associations

store, frappuccino

beach, sun, swim

Find images
of objects



Annotate
shapes



Annotate
coverage

All of
object

Part of
object

Part of
object

Part of
object

Prototype
blend



Inputs: Two Concepts

Starbucks

Summer

Brainstorm
associations

store, frappuccino

beach, sun, swim

Find images
of objects



Annotate
shapes



Annotate
coverage

All of
object

Part of
object

Part of
object

Part of
object

Prototype
blend

Evaluate
prototype



- ✓ Two objects are integrated into one object
- ✓ Both objects are identifiable

Inputs: Two Concepts

Starbucks

Summer

Brainstorm
associations

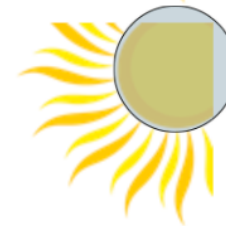
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Annotate
shapes



Annotate
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All of
object

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Prototype
blend

Evaluate
prototype



Output:
A visual blend



- ✓ Two objects are integrated into one object
- ✓ Both objects are identifiable

Inputs: Two Concepts

Starbucks

Summer

Brainstorm
associations

store, frappuccino

beach, sun, swim

Find images
of objects



Annotate
shapes



Annotate
coverage

All of
object

Part of
object

Part of
object

Part of
object

Prototype
blend

Evaluate
prototype



Output:
A visual blend



Iterate

- ✓ Two objects are integrated into one object
- ✓ Both objects are identifiable

Study 1: Independent Microtasks

Bicycle + Fall



McDonald's + Energy



McDonald's + Healthy



NYC + Fashion



First iteration: 11 of 16 blends

Study 1: Independent Microtasks

Bicycle + Fall



McDonald's + Energy



McDonald's + Healthy



NYC + Fashion



First iteration: 11 of 16 blends

Second iteration: 16 of 16 blends

Study 2: Blends for Messages

Public Service Announcement

“Wash your hands.
It’s the smart move.”

Concept Pair:

Hand-washing + Smart



Study 2: Blends for Messages

Advertisement

“Joe’s Coffee: Open Late”

Concept Pair:

Joe’s Coffee + Night



Study 2: Blends for Messages

Advertisement

“Panel Discussion: Women in
Computer Science”

Concept Pair:

Women + Computer Science

Panel discussion
Women in CS



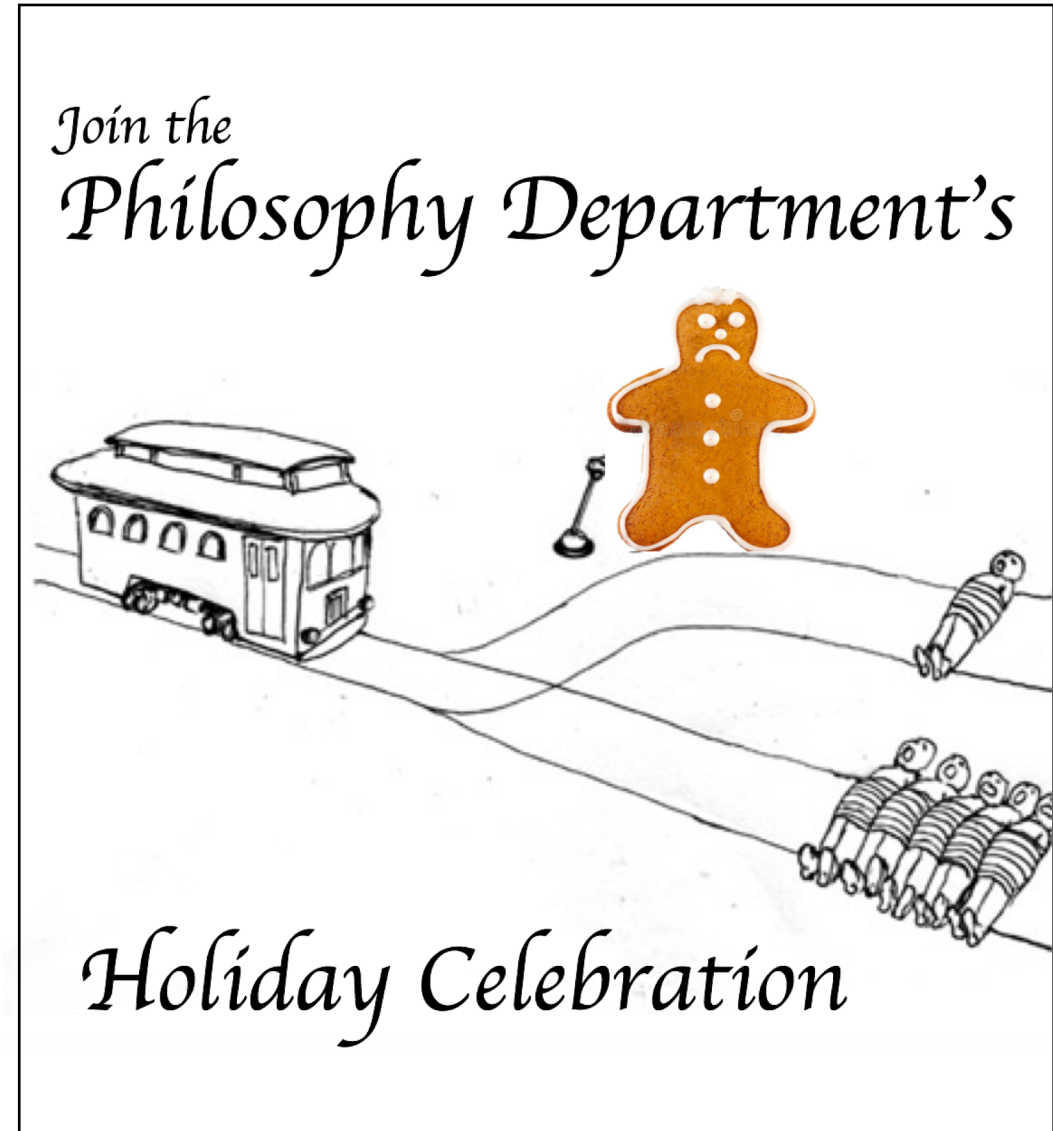
Study 2: Blends for Messages

Advertisement

“Join the Philosophy
Dept’s Holiday Celebration”

Concept Pair:

Philosophy + Christmas



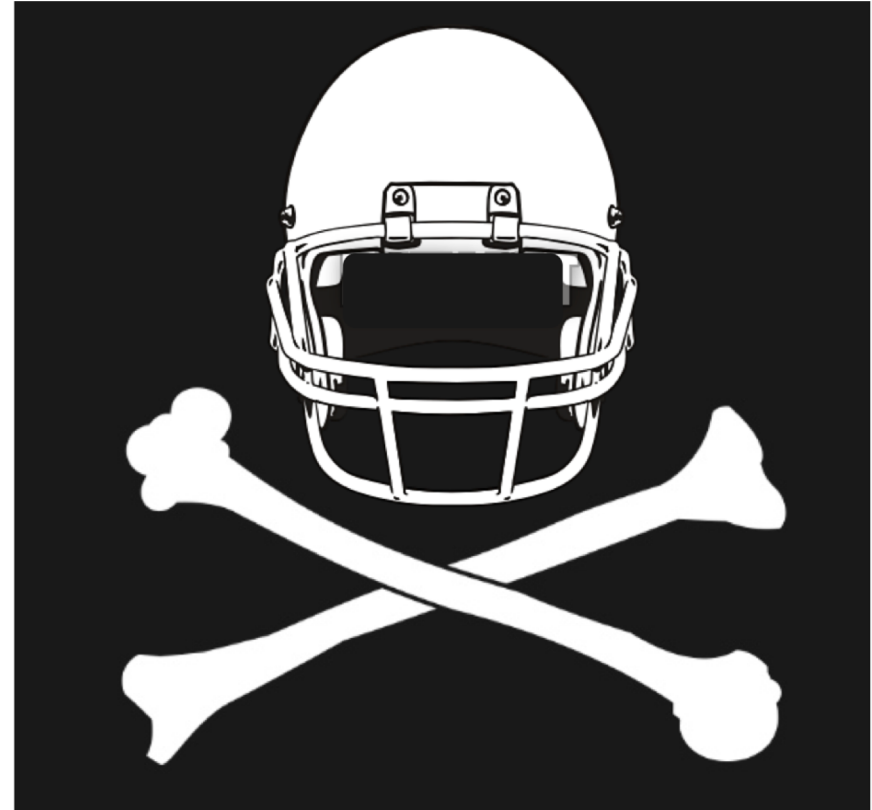
Study 2: Blends for Messages

News

“Football linked to lasting brain damage.”

Concept Pair:

Football + Dangerous



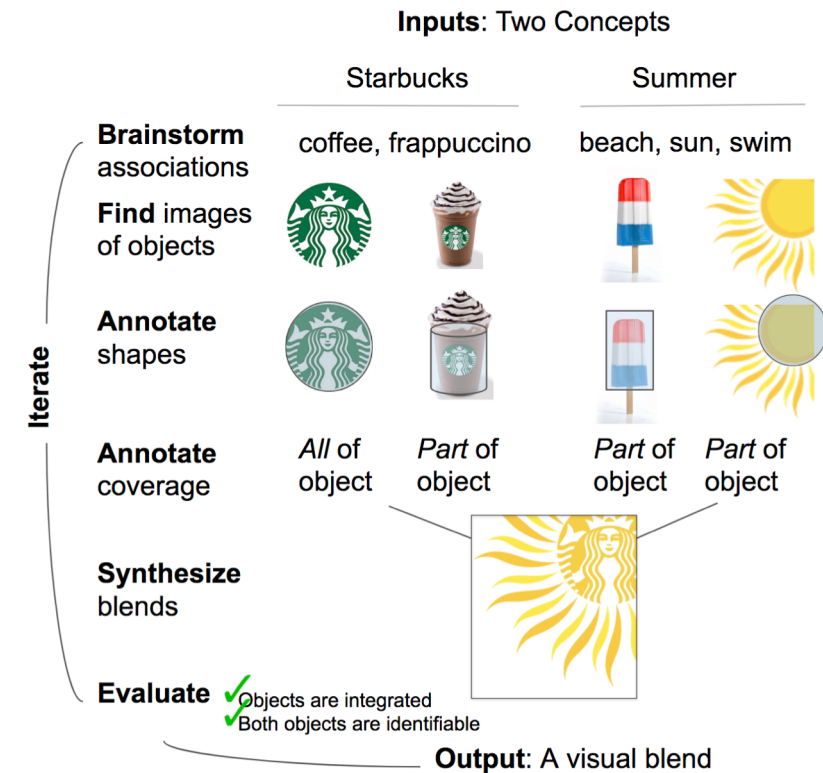
Football Linked to Lasting Brain Damage

DALLAS, Tex. – Reports show an increasing number of retired NFL players who have suffered concussions have developed cognitive issues

An Interactive Pipeline for Creating VisuaBlends



Visual blends are images that help convey a message.



The pipeline decomposes the iterative design process into independent microtasks.

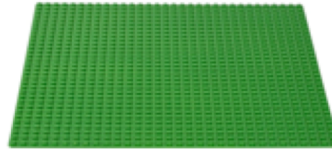
Why do we need to
iterate in the design process?

Lego + Valentine's Day

Lego

Brainstorm
associations

Find Images
of objects



Annotate
shapes



Annotate
shape coverage

Shape covers
All of object

Blend

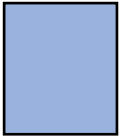
Evaluate



Are both objects identifiable?

Are two objects integrated into one object?

Valentine's Day



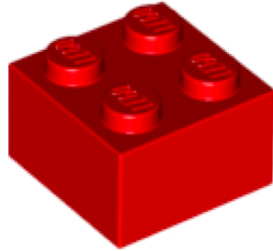
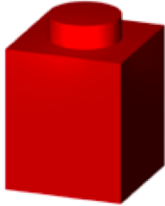
Shape covers
Part of object



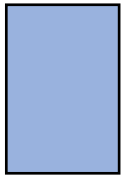
Lego

Brainstorm
associations

Find Images
of objects



Annotate
shapes



Annotate
shape coverage

Shape covers
All of object

Blend

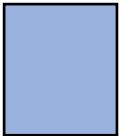
Evaluate



Are both objects identifiable?

Are two objects integrated into one object?

Valentine's Day



Shape covers
Part of object



Football + Dangerous

Football

Brainstorm
associations

Find Images
of objects

Annotate
shapes

Annotate
shape coverage

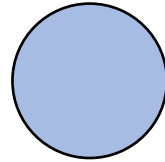
Blend

Evaluate



Are both objects identifiable?

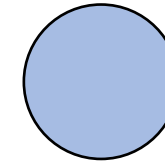
Are two objects integrated into one object?



Shape covers
All of object



Dangerous



Shape covers
Part of object

Football

Brainstorm
associations

Find Images
of objects

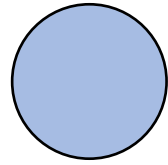
Annotate
shapes

Annotate
shape coverage

Blend

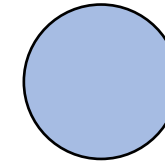
Evaluate

- ✓ Are both objects identifiable?
- ✓ Are two objects integrated into one object?

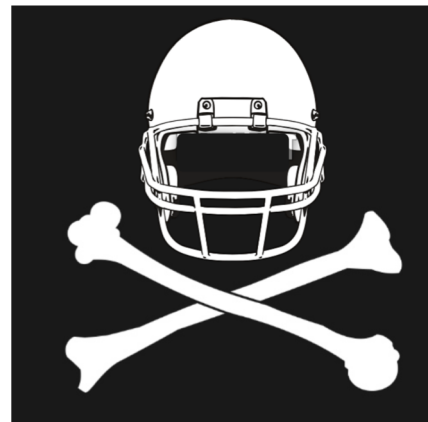


Shape covers
All of object

Dangerous



Shape covers
Part of object



NYC + Healthy

NYC

Healthy

Brainstorm
associations

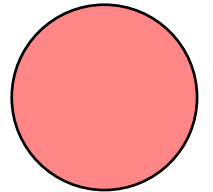
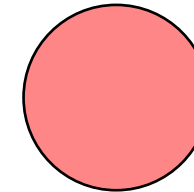
Find Images
of objects

Annotate
shapes

Annotate
shape coverage

Blend

Evaluate



No shape matches

NYC

Healthy

Brainstorm
associations

Find Images
of objects

Annotate
shapes

Annotate
shape coverage

Blend

Evaluate



Are both objects identifiable?

Are two objects integrated into one object?



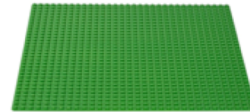
Lego + Healthy

Lego

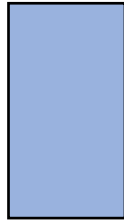
Healthy

Brainstorm
associations

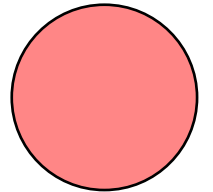
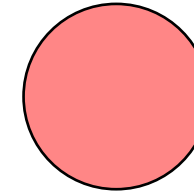
Find Images
of objects



Annotate
shapes



Annotate
shape coverage



Blend

No shape matches

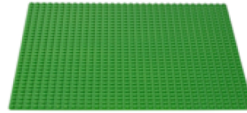
Evaluate

Lego

Healthy

Brainstorm
associations

Find Images
of objects



Annotate
shapes



Annotate
shape coverage

Blend

Evaluate



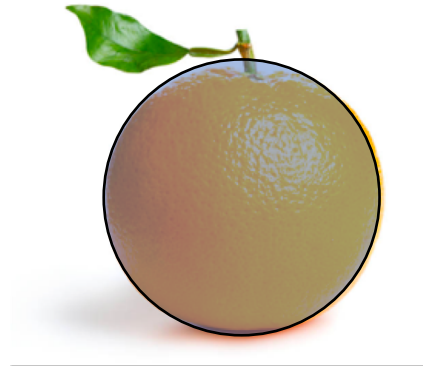
Are both objects identifiable?

Are two objects integrated into one object?



Orange + Healthy

Orange



Brainstorm
associations

Find Images
of objects

Annotate
shapes

Annotate
shape coverage

Shape covers
Part of object

Healthy



Shape covers
All of object

Blend



Evaluate



Are both objects identifiable?

Are two objects integrated into one object?

Orange

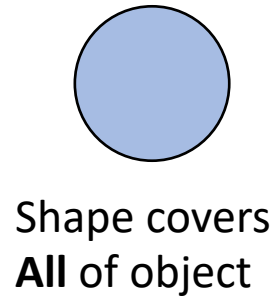


Brainstorm
associations

Find Images
of objects

Annotate
shapes

Annotate
shape coverage

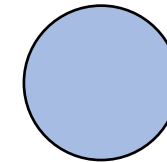


Shape covers
All of object

Healthy



Exercise equipment



Shape covers
Part of object

Blend

Evaluate

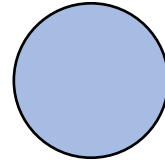
Orange



Brainstorm
associations

Find Images
of objects

Annotate
shapes

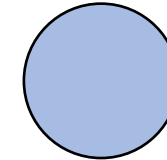


Shape covers
All of object

Annotate
shape coverage

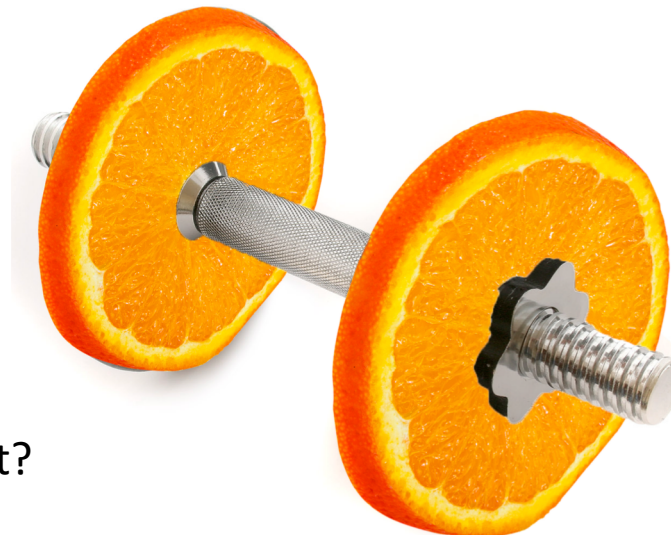
Healthy

Exercise equipment



Shape covers
Part of object

Blend



Evaluate

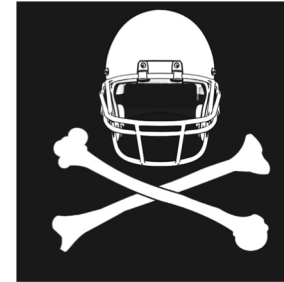


Are both objects identifiable?

Are two objects integrated into one object?

When do we need to iterate?

Improve object fit



**Within same search space,
meet other constraints.**

Find versions of an object
with different
color, style, aspect ratio

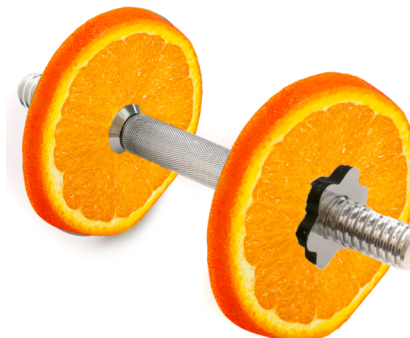
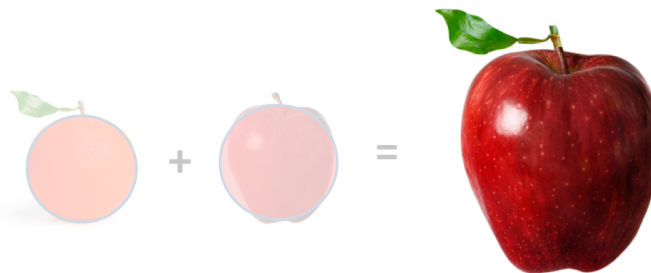
No matches



**Focus on meeting a
specific constraint:**

Find symbols with
a different shape

Objects are
not identifiable

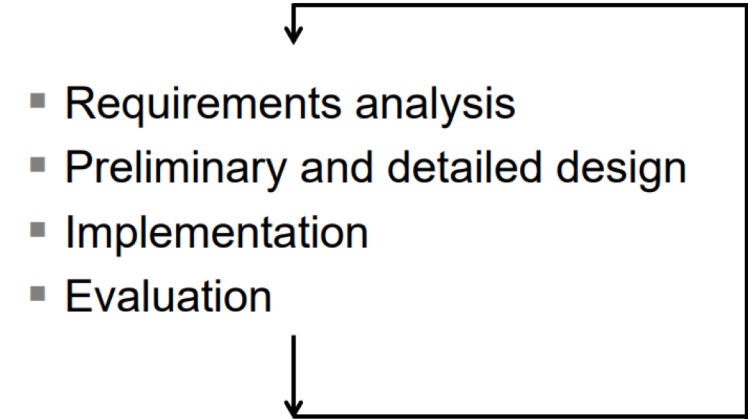


**Search in a new
subspace**

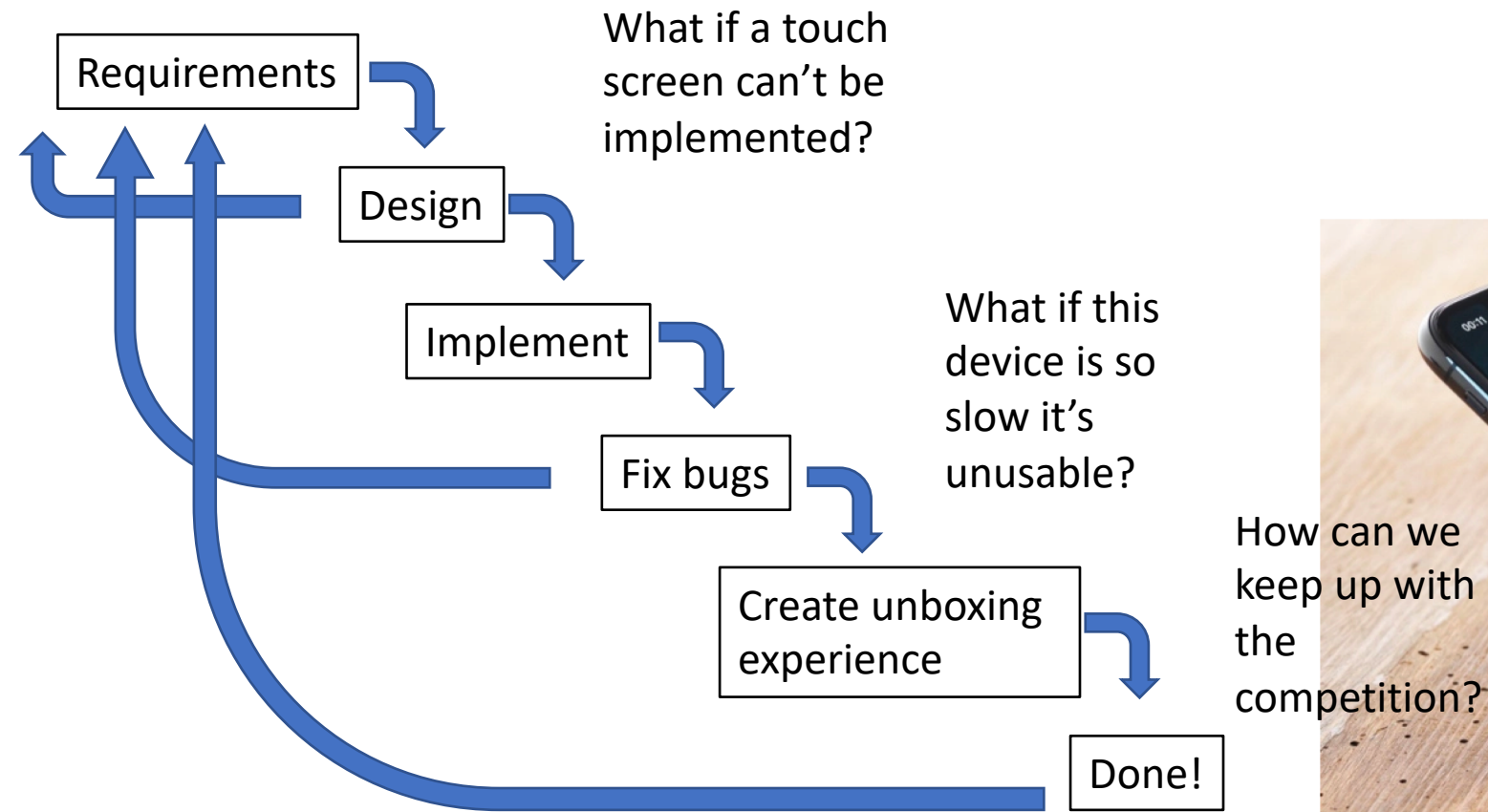
Find symbols with
a different shape

Summary

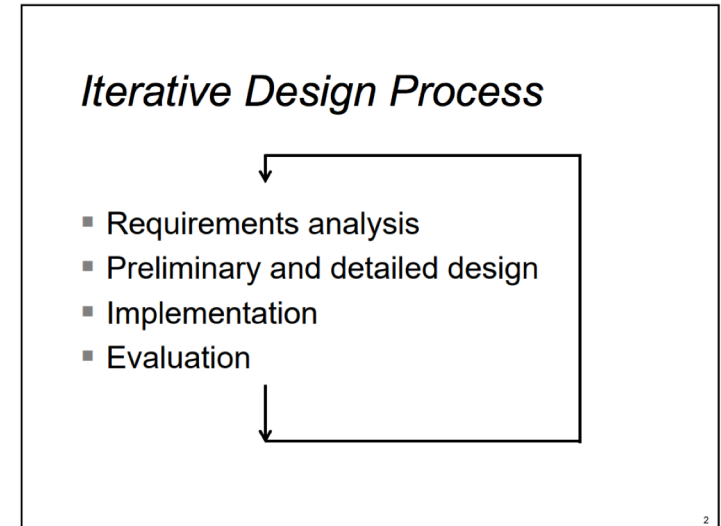
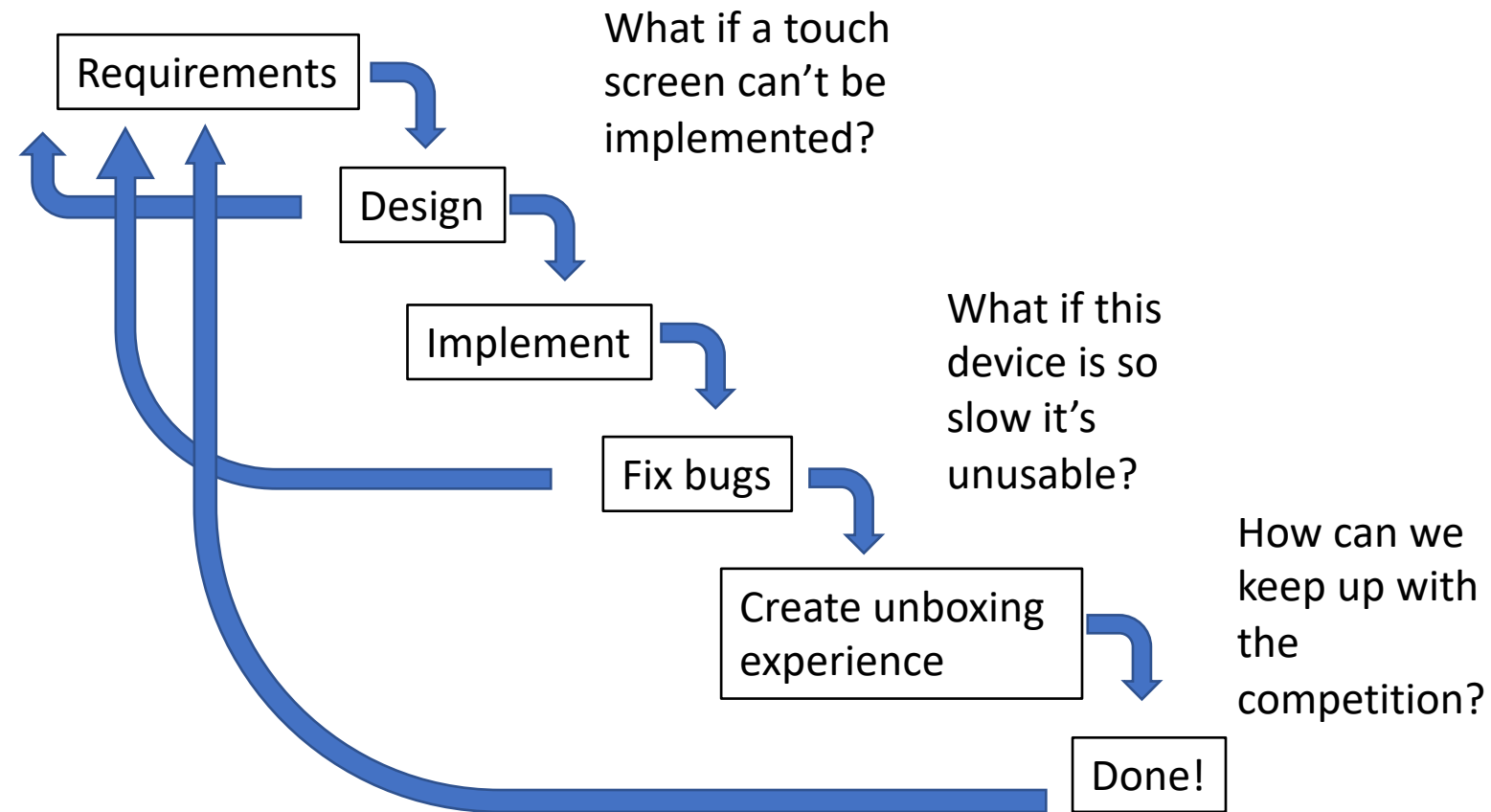
Iterative Design Process

- 
- ```
graph TD; A[Requirements analysis] --> B[Preliminary and detailed design]; B --> C[Implementation]; C --> D[Evaluation]; D --> A;
```
- Requirements analysis
  - Preliminary and detailed design
  - Implementation
  - Evaluation

# Design involves risks



# Mitigate risk by iteratively prototyping the riskiest elements



**Does touch work?**



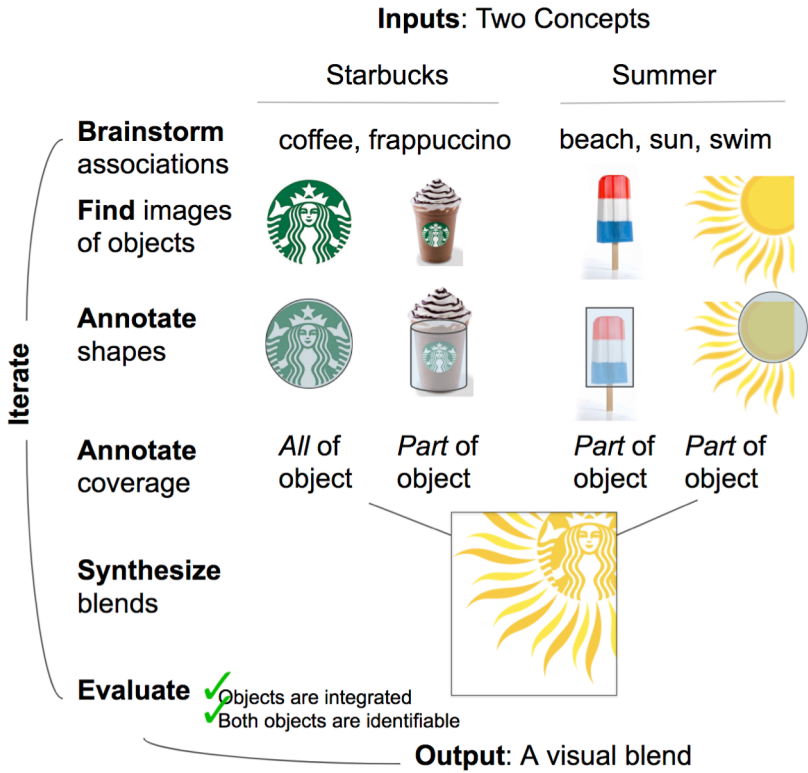
How to get perfect gradients?



Although the iterative design process is vague,  
It does work, and researchers are making the process more concrete.




Visual blends are images that help convey a message.



The pipeline decomposes the iterative design process into independent microtasks.

# Iterative Design is best taught by practice

 Columbia University

Advanced Web Design Studio

COMS 6998 · Fall 2018

Home Syllabus

## Goals

1. Master front-end and back-end technologies for making interactive websites.
2. Discover specific user needs by developing a low-level, mechanical model of human behavior.
3. Practice iterative design to meet specific user needs.

|                                                                                                                                                         |                                                                                                                         |                                                                                                                        |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|
| <b>INSTRUCTOR</b><br><a href="#">Prof. Lydia Chilton</a><br>OH: Tuesdays 4-5, CEPSR 612<br><br>Please contact staff through <a href="#">Piazza</a> only | <b>TAS</b><br><br><b>Katy Gero</b><br>OH: Wed 2:30-3:30, CEPSR 603<br><br><b>Savvas Petridis</b><br>OH: TBA, CS OH room | <b>WEEKLY SCHEDULE</b><br><br><b>Lecture</b><br>Friday 2:10–4pm in Mudd 337<br>(also known as the Engineering Terrace) |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|

**TEACHING METHOD**

This is a studio style class in the tradition of art and architecture. Students are expected to already know the fundamental techniques. We will practice these techniques as well as give and receive critique on a weekly basis. Attendance is mandatory. Any absence, excused or otherwise, must be made up