CSE 440:
Introduction to HCI

05: The Design Diamond

April 9, 2024

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Overview

Course Status

- Project Sequence
- EXP Assignments

The Design Diamond

- Examining a Design Process
- Sketching and Prototypes
- Some Evidence

Design Ideation

- Notes on Form
- 2a – Prompted Ideation

Project Sequence

Assignment 2a: Project Ideation

Optional (EXP), Due Wednesday @ 8pm

Assignment 2b: Design Research Plan

Due Thursday @ 3pm

Crit & Prep in Section on Friday

Assignment 2c: Design Research Check-in

Due Monday @ 3pm!

Assignment 2b: Design Research Plan

Due Thursday @ 3pm

Two-page proposal of specific design research methods

- Consult last Thursday's Lecture for tips on methods!
- Detailed recruitment plan
- More detail regarding primary proposed method

Make sure details are concrete enough for Crit!

At least one participant required for 2c, the following Monday

Assignment 2c: Design Research Check-in

Due Monday @ 3pm

One-page: summary of first participant, + plan for remaining

- 6 “Findings”:
- Reflection on what did/didn’t work
- Plan for remaining participants

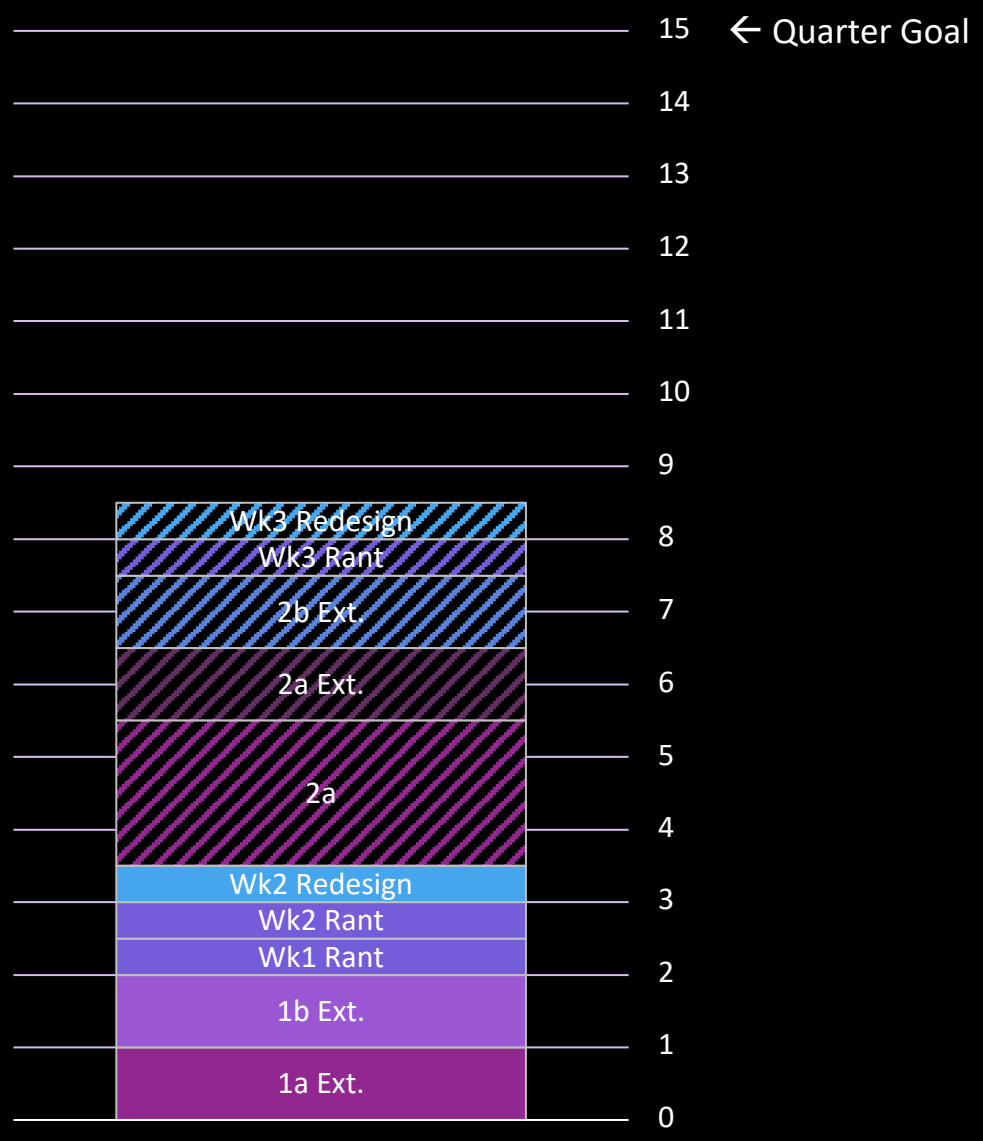
This is not science! Updating your research goals & methods is good!

EXP Check-in

So far: 3.5EXP Available

This week: 5EXP Up for grabs!

- Completing 2a: 2EXP
- 2a Extension: 1EXP
- 2b Extension: 1EXP
- Week 3 Rant: 0.5EXP
- Week 3 Redesign: 0.5EXP



Rants & Redesigns

Slightly Shifting Timelines:

Week N's Prompts posted on Week N Tuesday

Submissions for Week N's Prompt accepted until Tuesday of Week N+2 (two weeks from posting)

Currently Available Prompts:

Rant #2: Self-Critique & The Ugly Baby *(due 4/16)*

Rant #3: Design of Everyday Things: The Good, The Bad, & The Baffling *(due 4/23)*

Redesign #2: Building Better Ideas / The Cutting Room Floor *(due 4/16)*

Redesign #3: The Unexplored Path *(due 4/23)*

Assignment 2a

Today: Prompted Ideation Activity

Optional Submission (2EXP):

- Completed Ideation Activity
- Answer Reflection Q's for EACH of the 5 categories

Extension Objective (1EXP):

- Design Ideation Mad Libs

Whether you submit or not: Reflect on the Ideation Task when developing your Design Research focus!

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- **The Design Diamond**
  - The Design Diamond & The Design Process
  - Sketching and Prototypes
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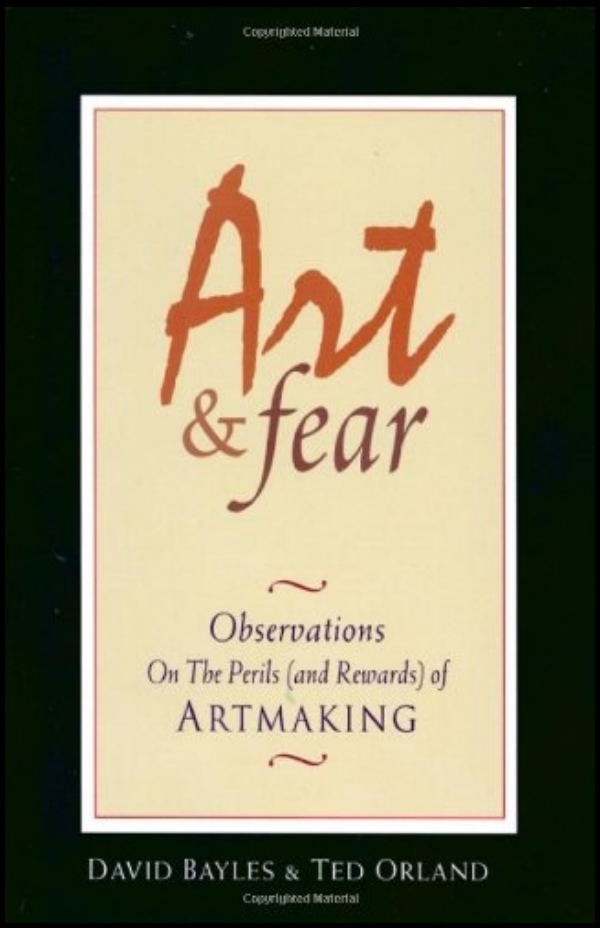
  - 2a – Prompted Ideation

Quantity versus Quality

One class told they will be graded on quality, another on quantity



Bayles and Orland, 2001

Quantity versus Quality

The quantity class produces better pots. Why?

Bayles and Orland, 2001

Quantity versus Quality

The quantity class produces better pots. Why?

"While the quantity group was busily churning out piles of work—and learning from their mistakes—the quality group had sat theorizing about perfection, and in the end had little more to show for their efforts than grandiose theories and a pile of dead clay"

Bayles and Orland, 2001

Objectives

Be able to:

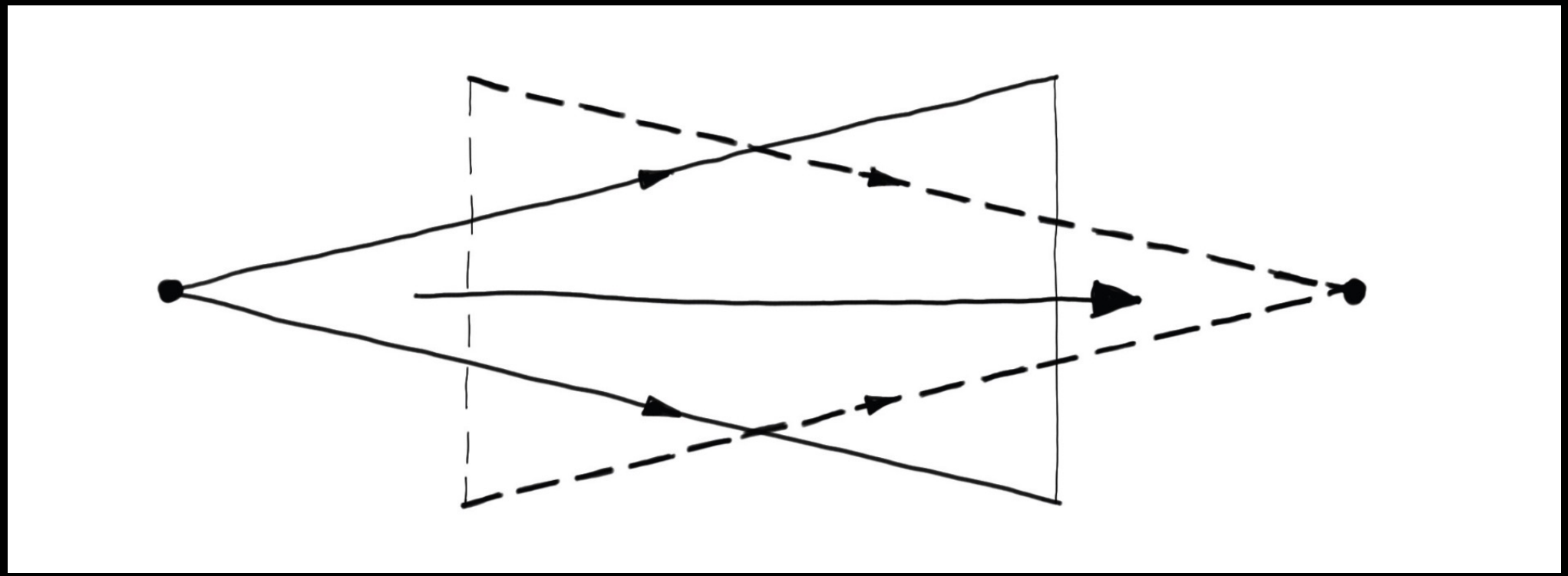
Describe an example iterative design process

Describe the design diamond model of design, its implications, and how it can break down

Describe properties of a sketch versus a prototype

Differentiate examples of sketches from prototypes

Design as Choice



Design as Choice

In the diamond, what are two openings for creativity?

Why is your design research so important?

Sketching in Design (2007)

"Design as Choice"

"the creativity that you bring to enumerating meaningfully distinct options from which to choose"

Sketching in Design (2007)

"Design as Choice"

"the creativity that you bring to defining the criteria, or heuristics, according to which you make your choices"

Design as Choice

In the diamond, what are two openings for creativity?

- Palette of choices
- Heuristics to choose

Why is your design research so important?

- What you learn directly informs both of these, shaping everything you do this entire quarter

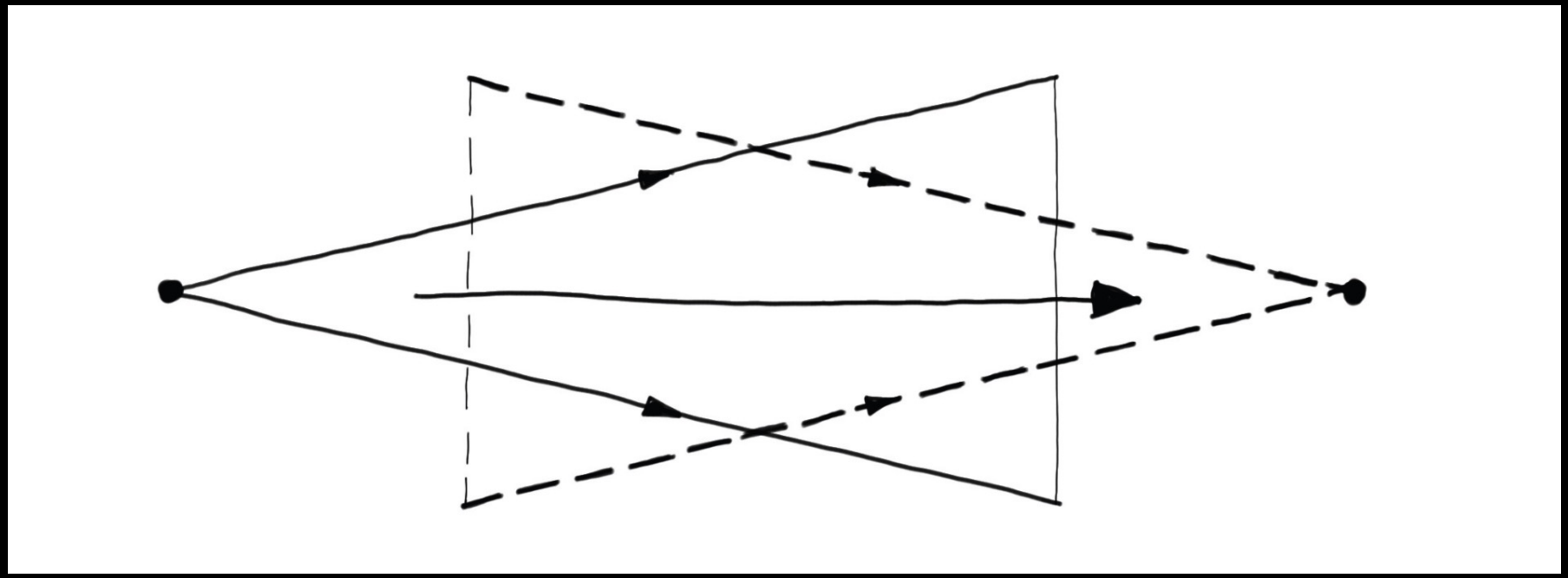
Design as Choice

Elaboration

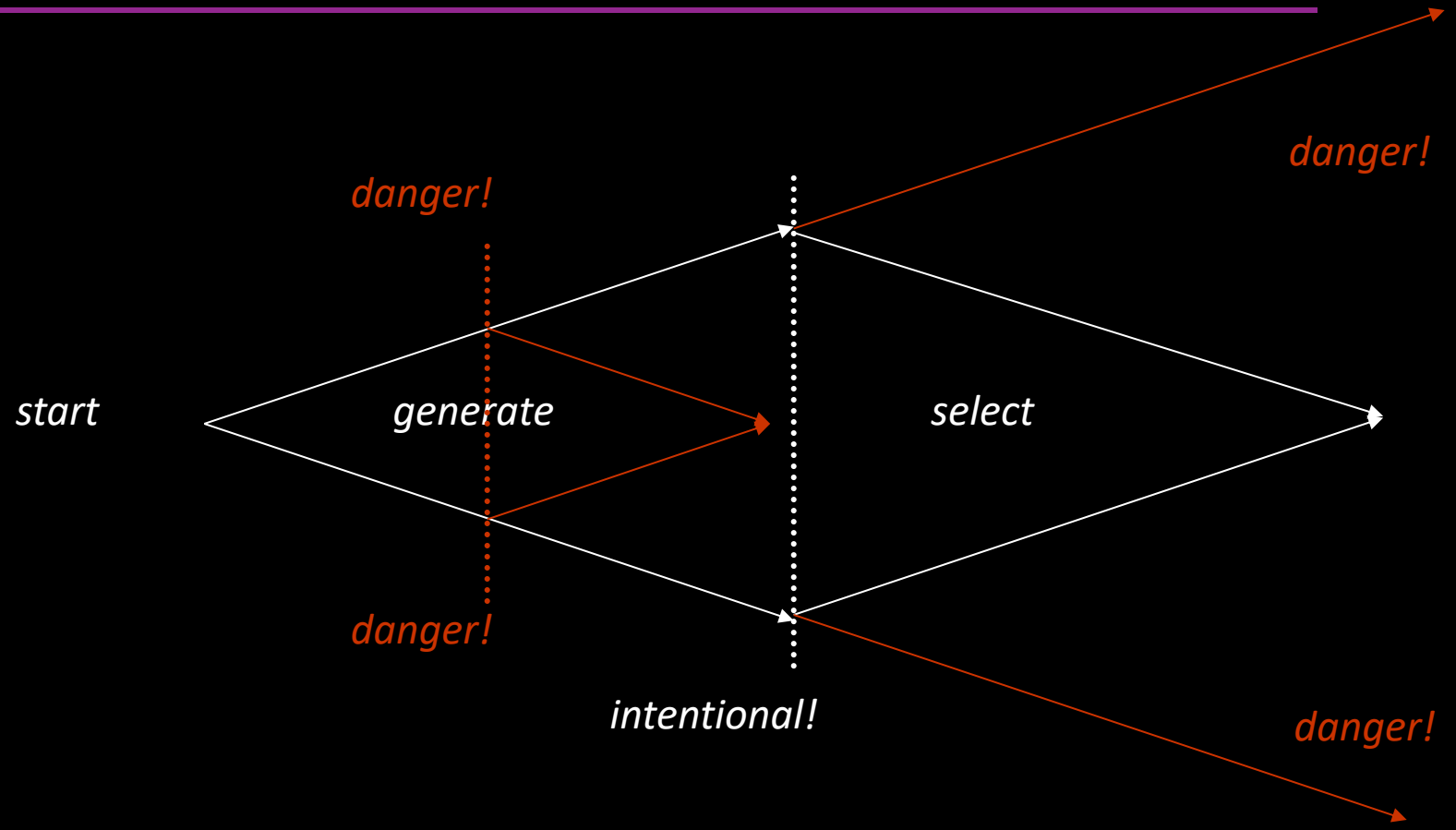
palette of choices

Reduction

heuristics to choose



A *Medium-Sized* Diamond



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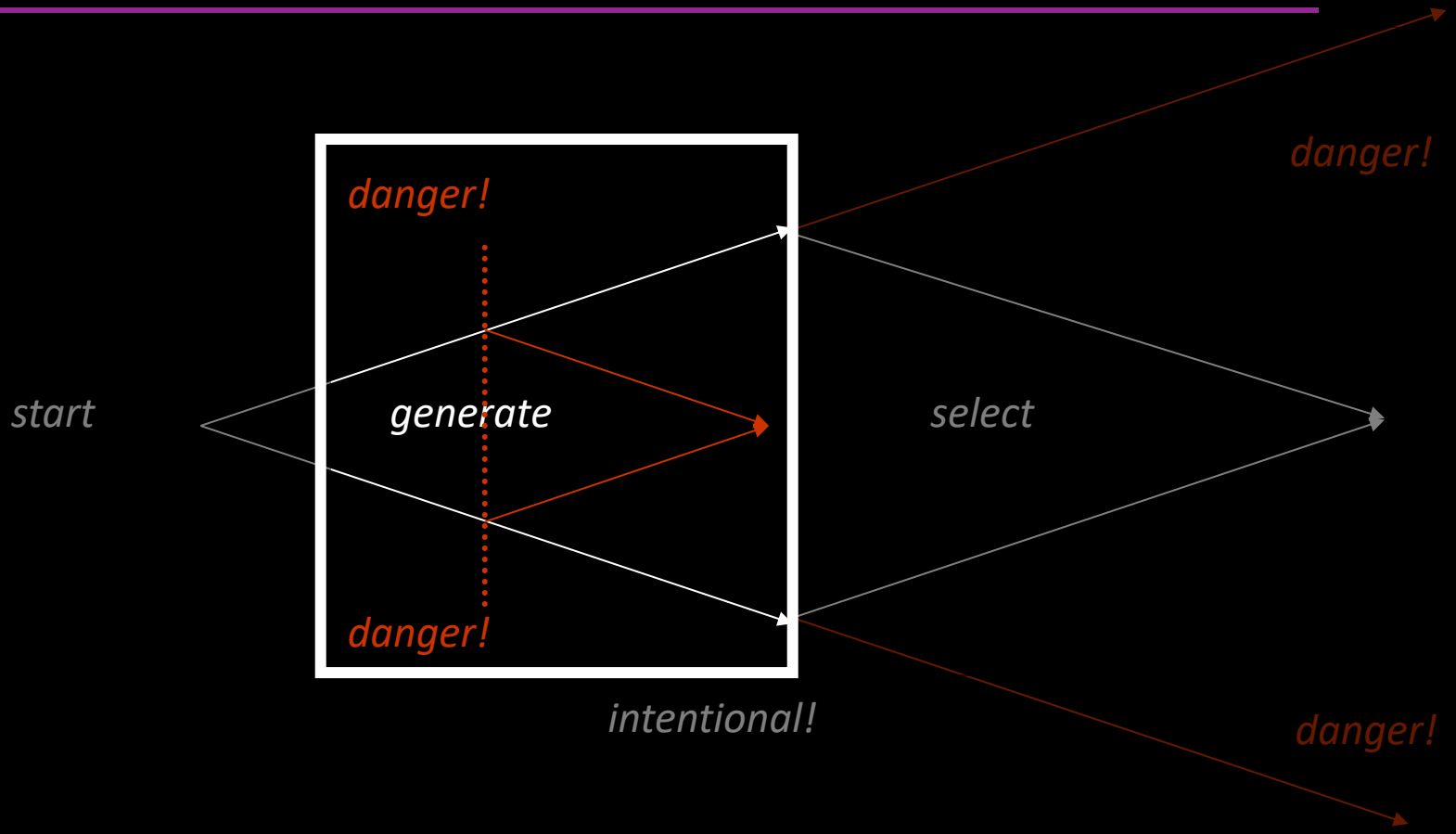

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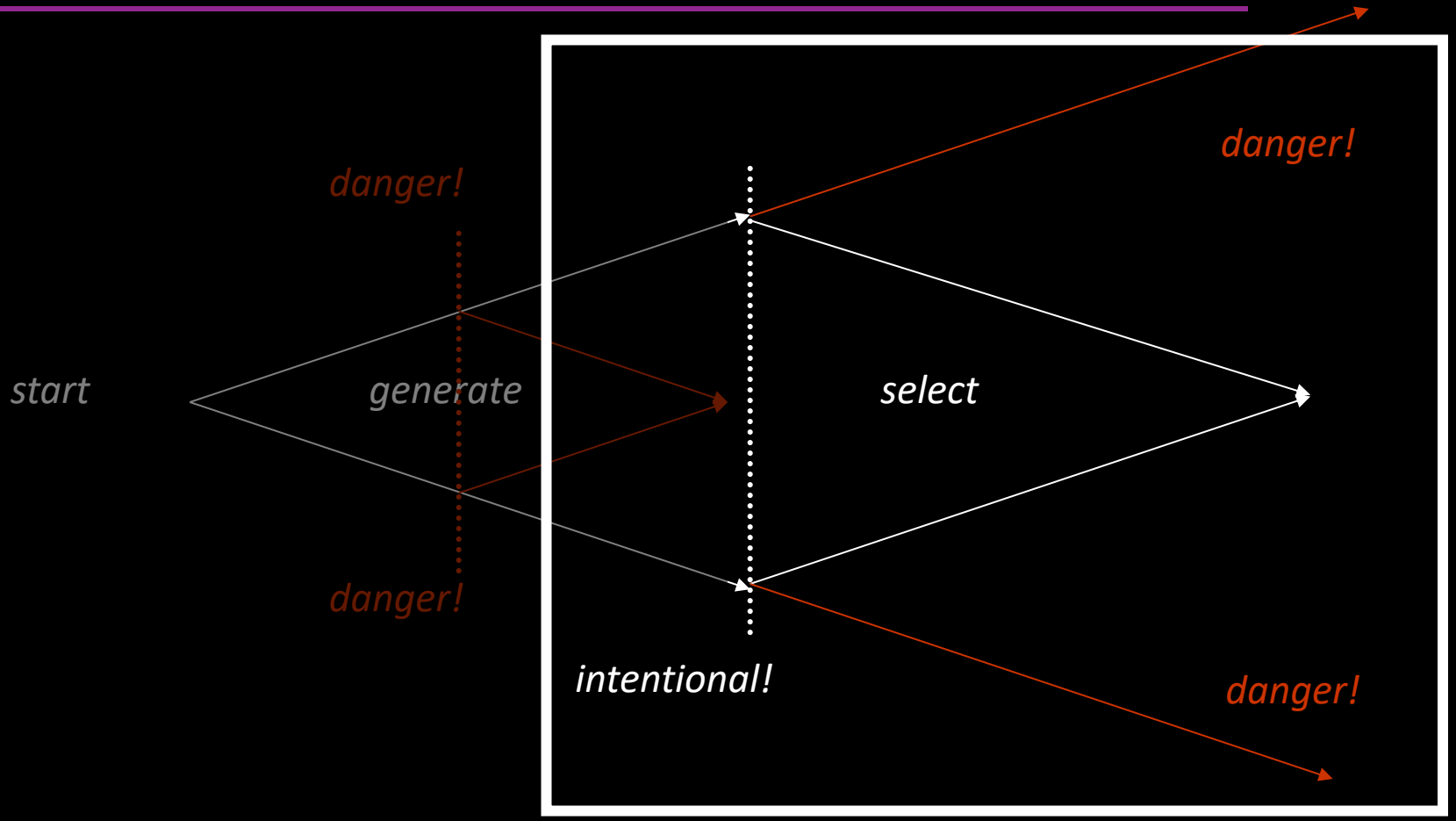
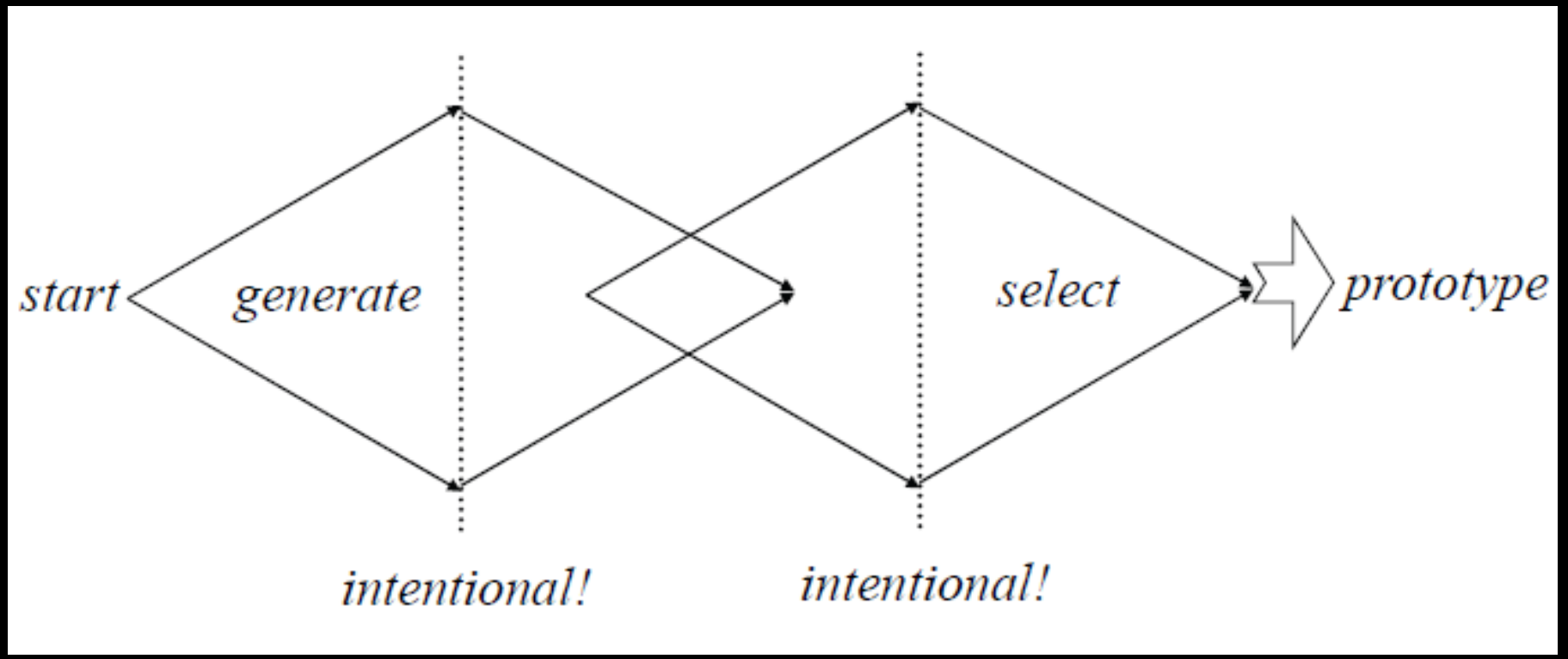


Idea Oscillation



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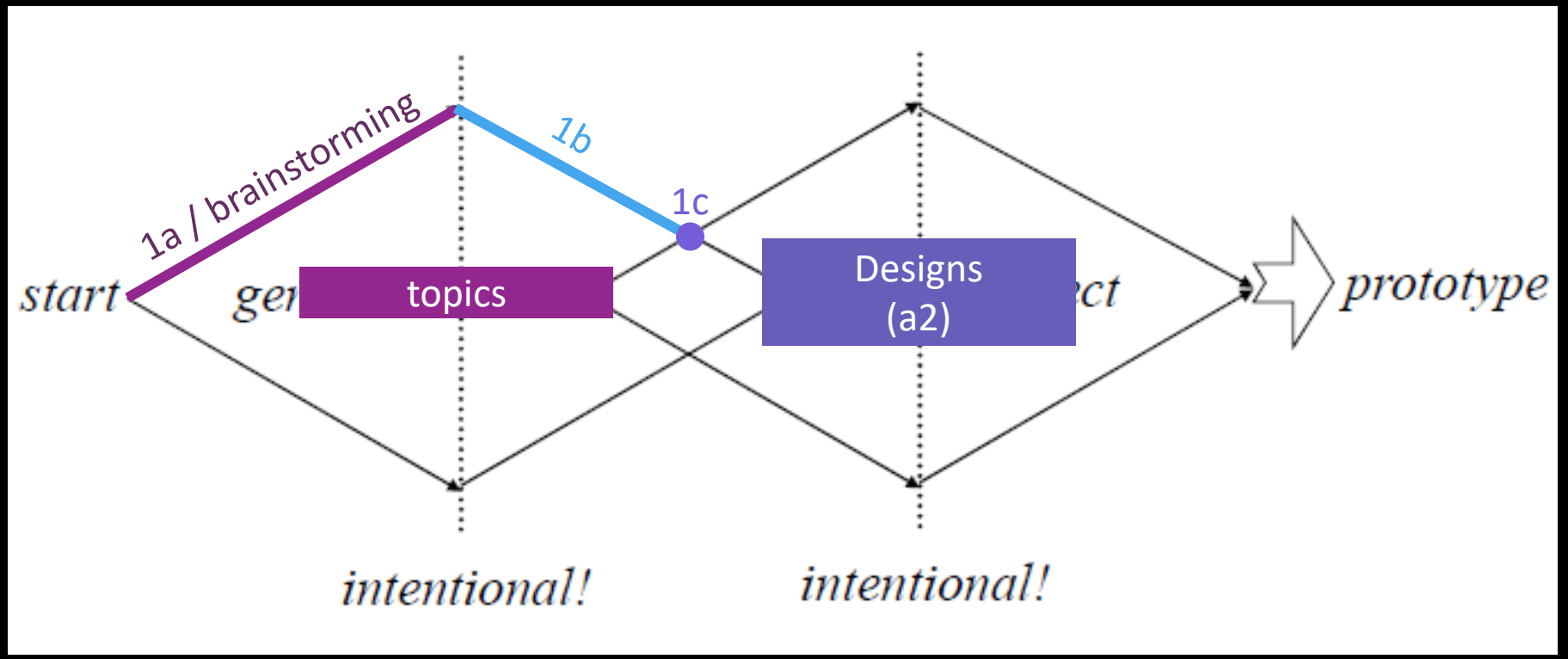
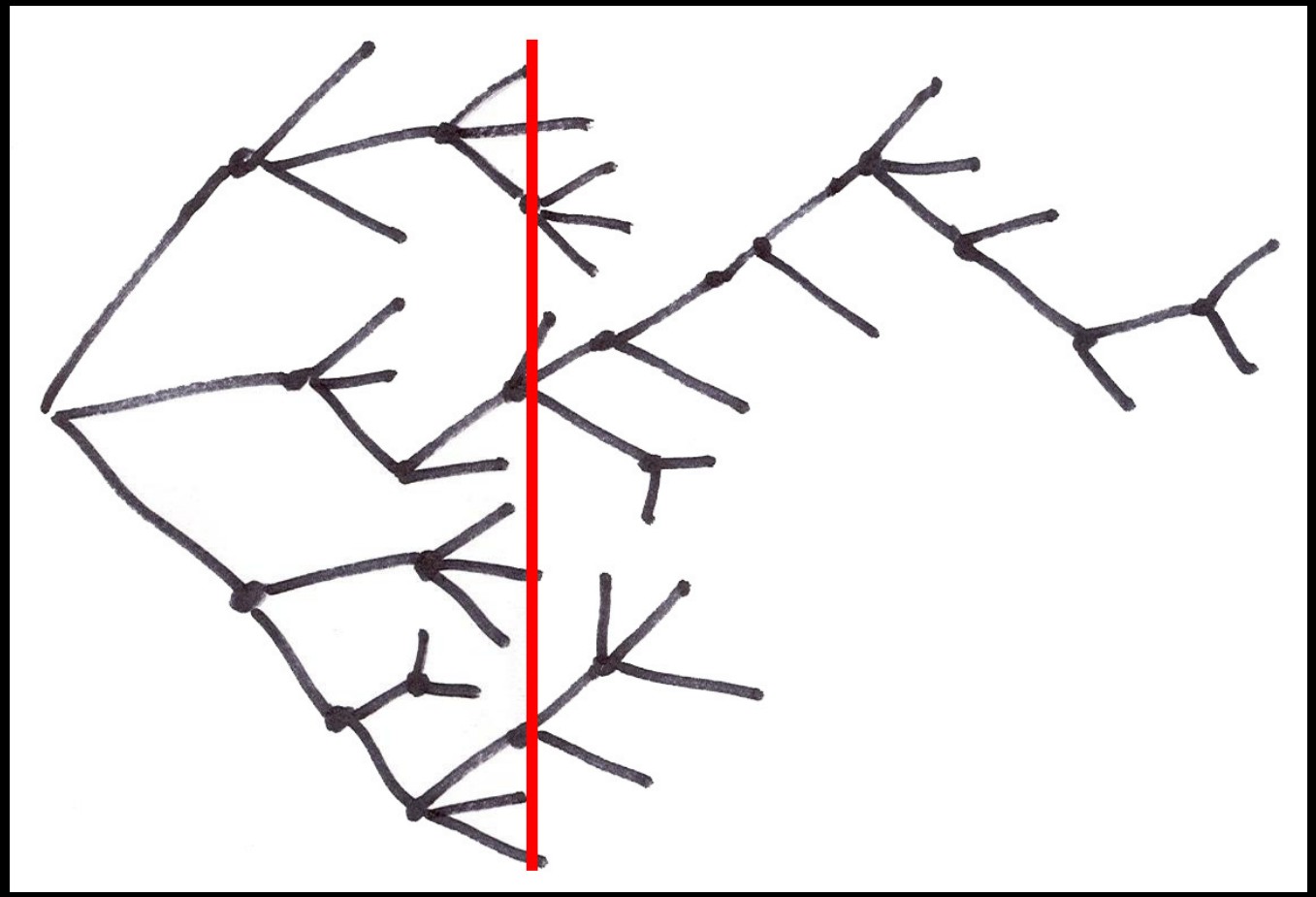


Exploration of Alternatives



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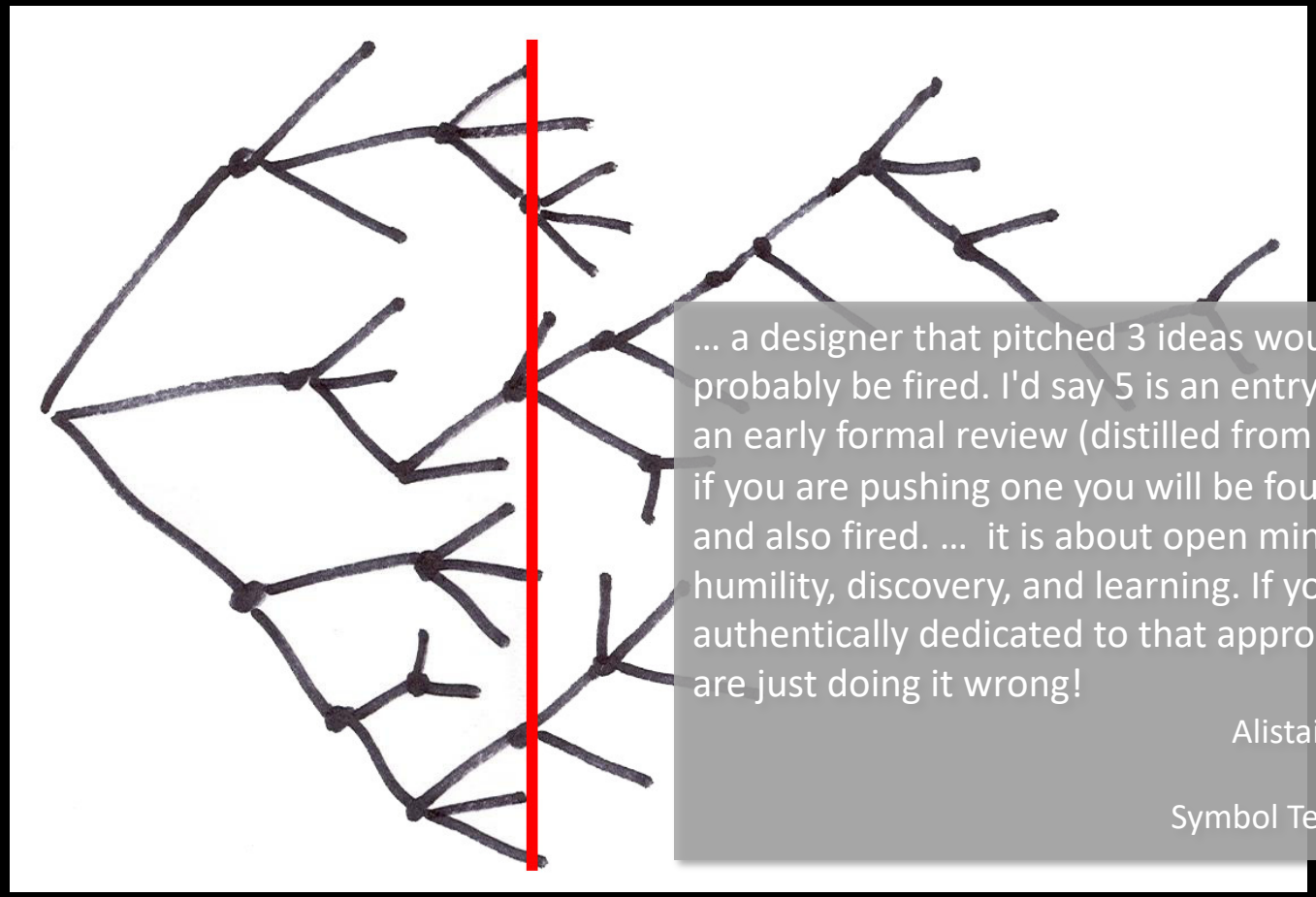
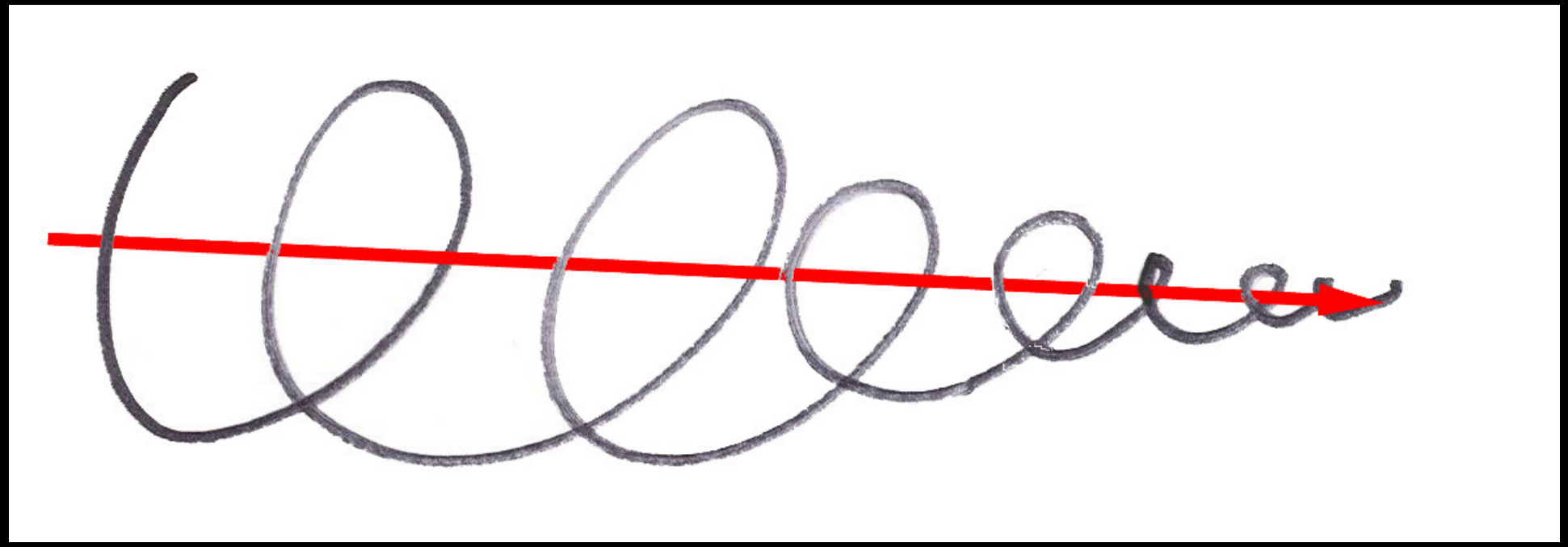


… a designer that pitched 3 ideas would probably be fired. I'd say 5 is an entry point for an early formal review (distilled from 100's). … if you are pushing one you will be found out, and also fired. … it is about open mindedness, humility, discovery, and learning. If you aren't authentically dedicated to that approach you are just doing it wrong!

Alistair Hamilton
VP Design
Symbol Technologies

The Converging Path



Sketching

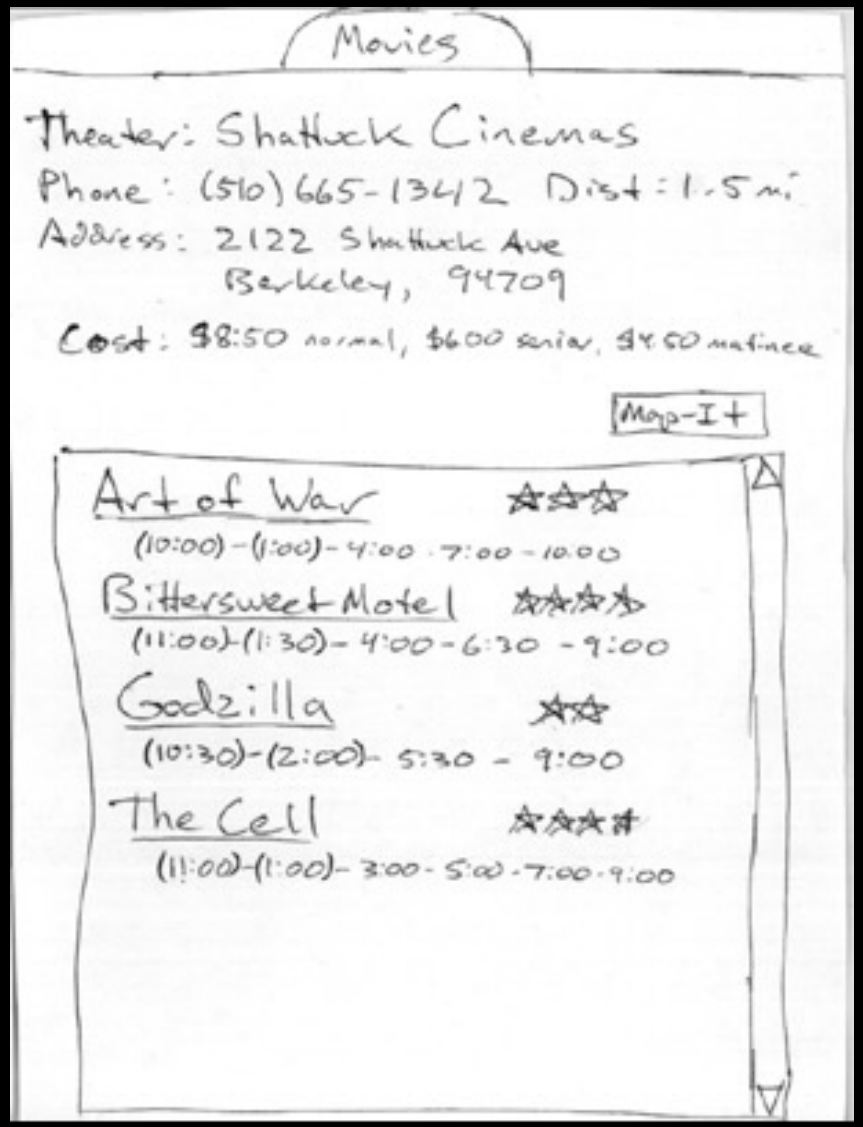
A process that enables you to

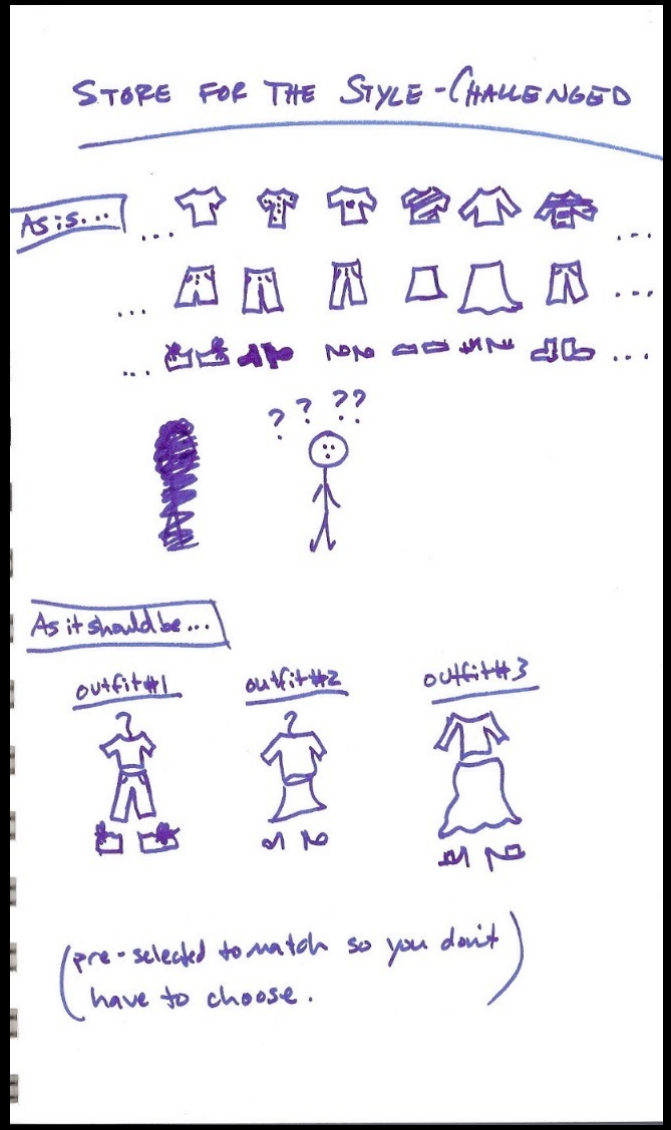
think through ideas and

convey design ideas to others

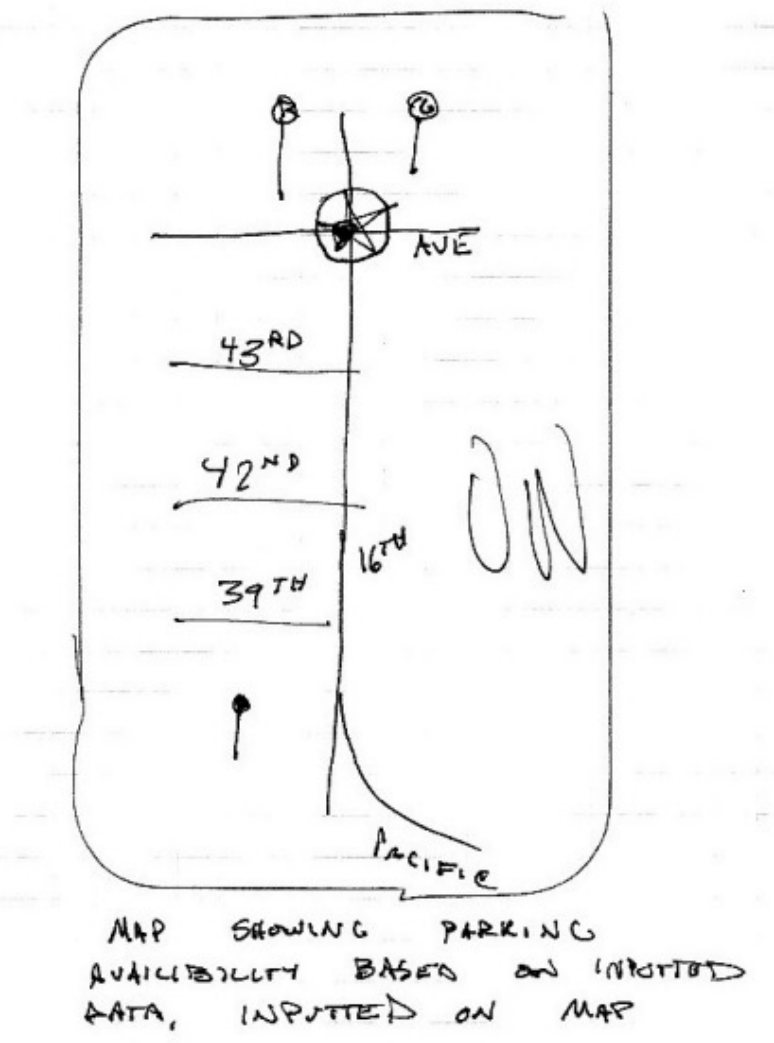
very early in the design phase

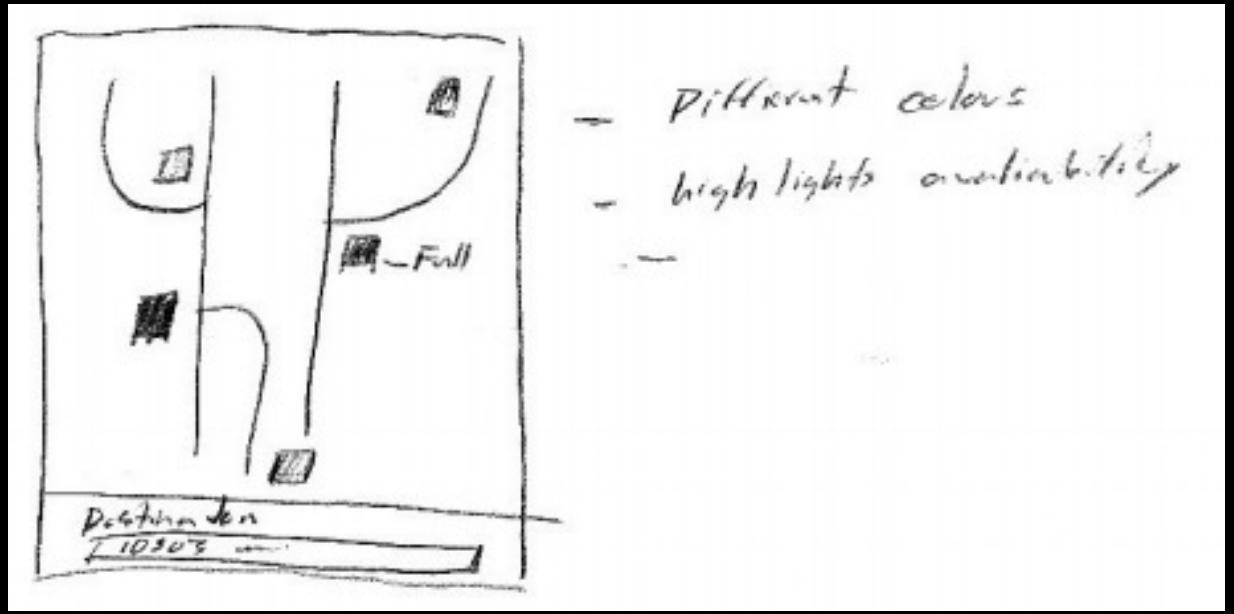
Sketching


Movies
Theater: Shattuck Cinemas
Phone: (510) 665-1342 Dist: 1.5 mi
Address: 2122 Shattuck Ave
Berkeley, 94709
Cost: $8:50 normal, $6.00 senior, $4.50 matinee
Map-It
Art of War
(10:00)-(1:00)-4:00-7:00-10:00
Bittersweet Motel
(11:00)-(1:30)-4:00-6:30-9:00
Godzilla
(10:30)-(2:00)-5:30-9:00
The Cell
(11:00)-(1:00)-3:00-5:00-7:00-9:00

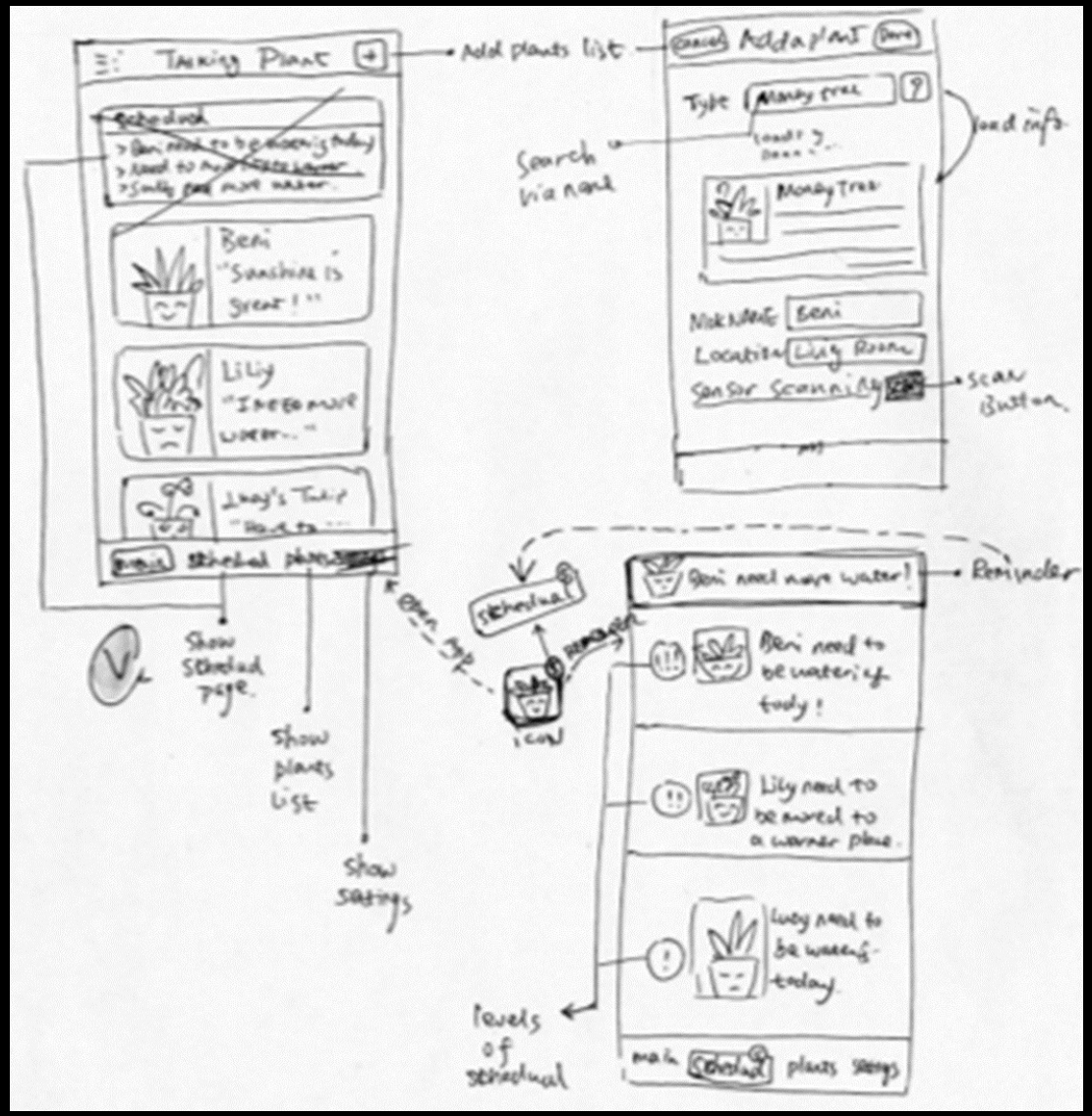

Store for the Style-Challenged
As is...
As it should be...
outfit#1
outfit#2
outfit#3
(pre-selected to match so you don't have to choose.)

Sketching


AVE
43RD
42ND
16TH
39TH
PACIFIC
MAP SHOWING PARKING AVAILIBILITY BASED ON INPUTTED DATA, INPUTTED ON MAP

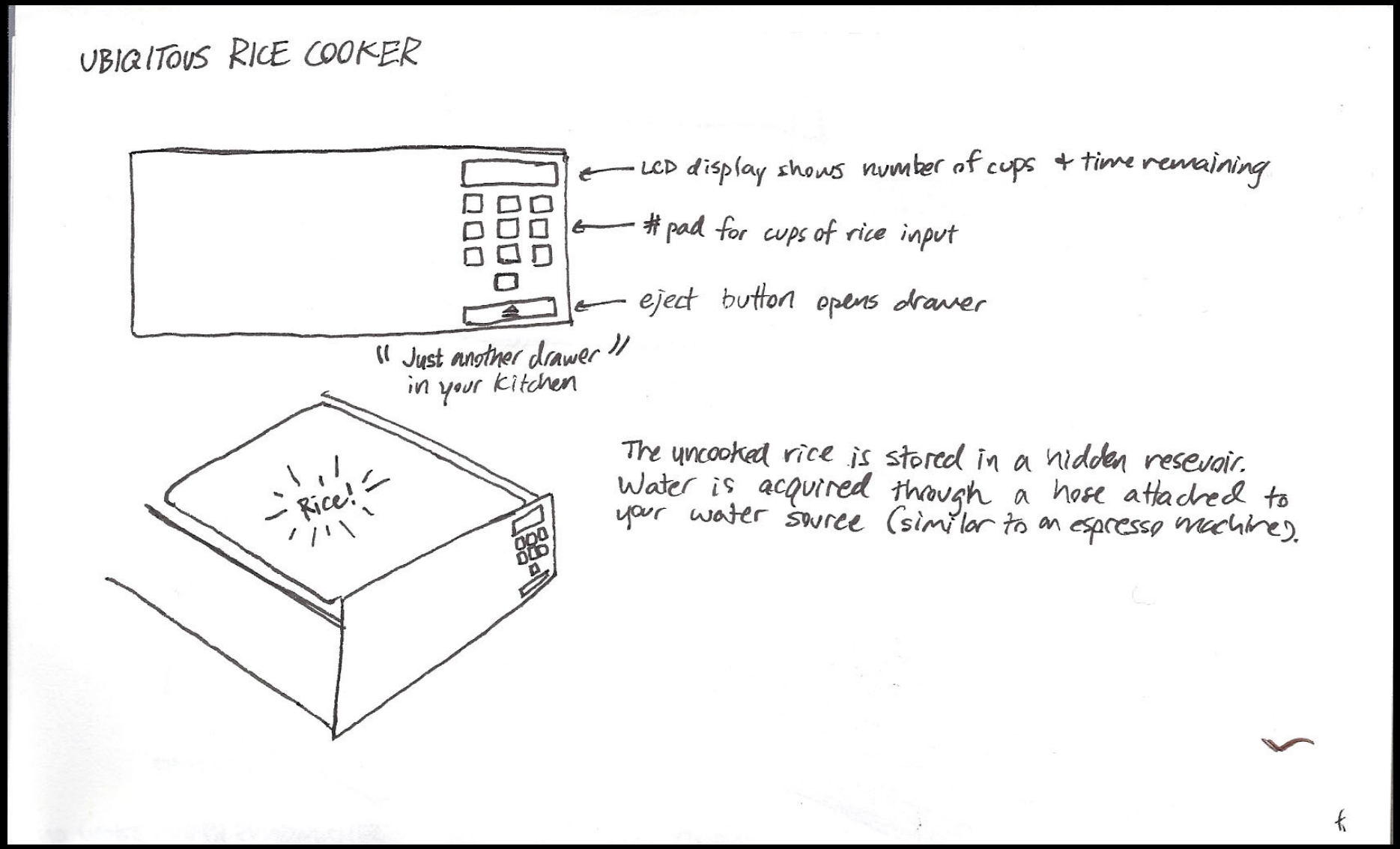

- Different colors
- high lights availability
-
Full

Sketching

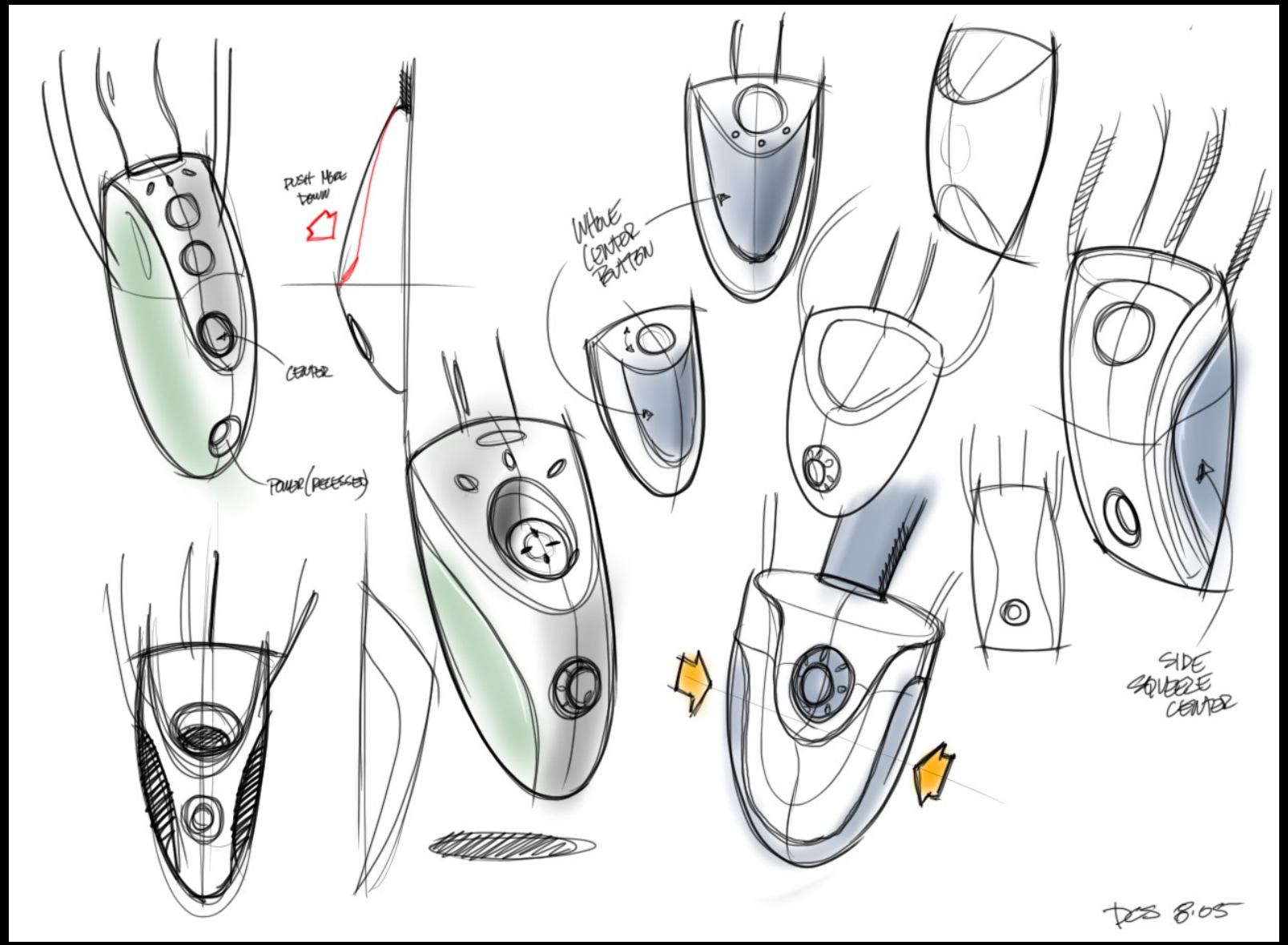


Add plants list
Add a plant
Type
Money tree
Search via name
Beni
"Sunshine is great!"
Lily
Lucy's Tulip
Show Schedual page
Show plants list
Show settings
Schedual
Beni need more water!
Reminder
Beni need to be watering today!
Lily need to be moved to a warmer place.
Lucy need to be watering today.
levels of schedual
main
plants
settings

Sketching


UBIQITOUS RICE COOKER
LCD display shows number of cups + time remaining
pad for cups of rice input
eject button opens drawer
" Just another drawer in your kitchen
Rice!
The uncooked rice is stored in a hidden reservoir. Water is acquired through a hose attached to your water source (similar to an espresso machine).

Quintessential Activity of Design



Sketching

A process that enables you to

think through ideas and

convey design ideas to others

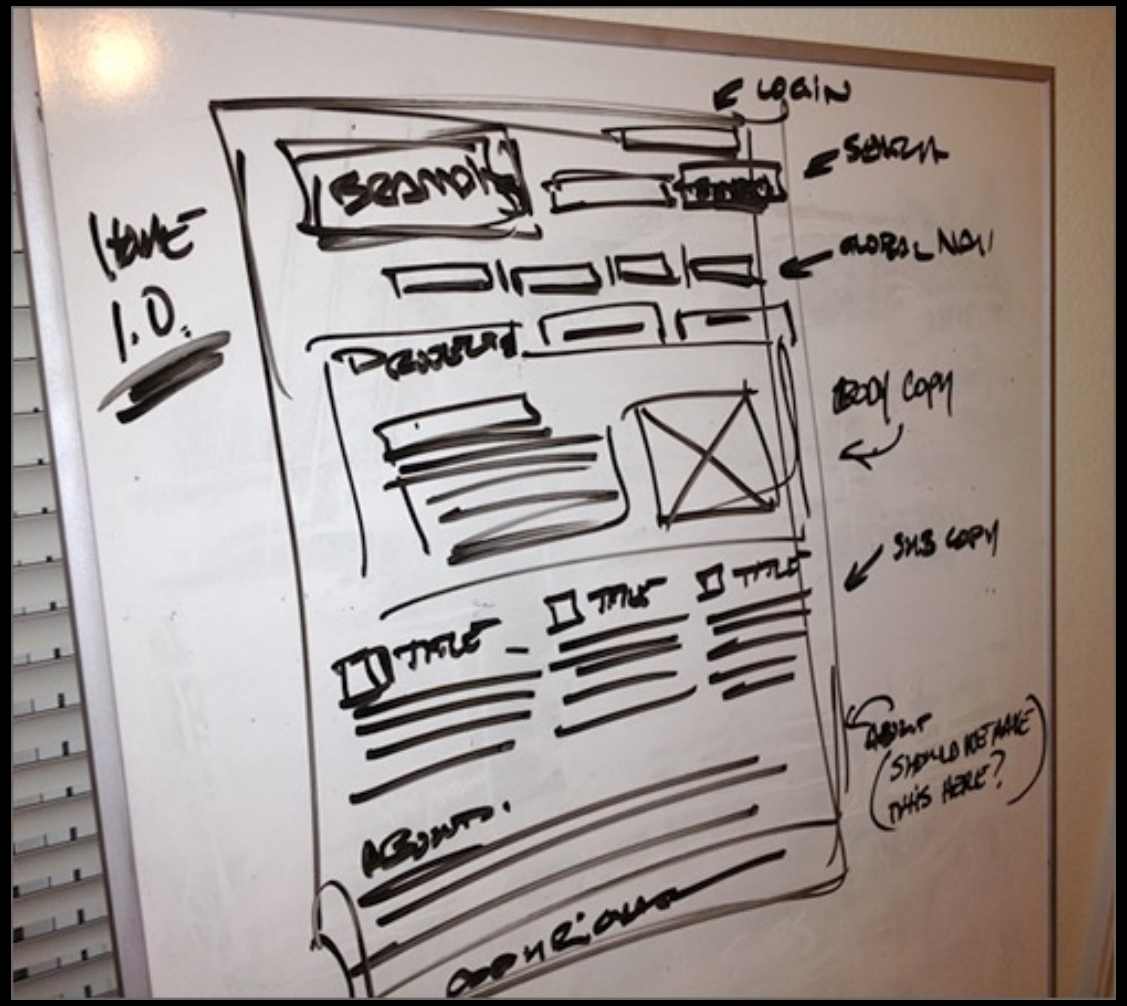
very early in the design phase

Properties of Sketches

- Quick
- Timely
- Inexpensive
- Disposable
- Plentiful
- Clear Vocabulary
- Distinct Gesture
- Minimal Detail
- Appropriate Refinement
- Suggest and Explore
- Ambiguous

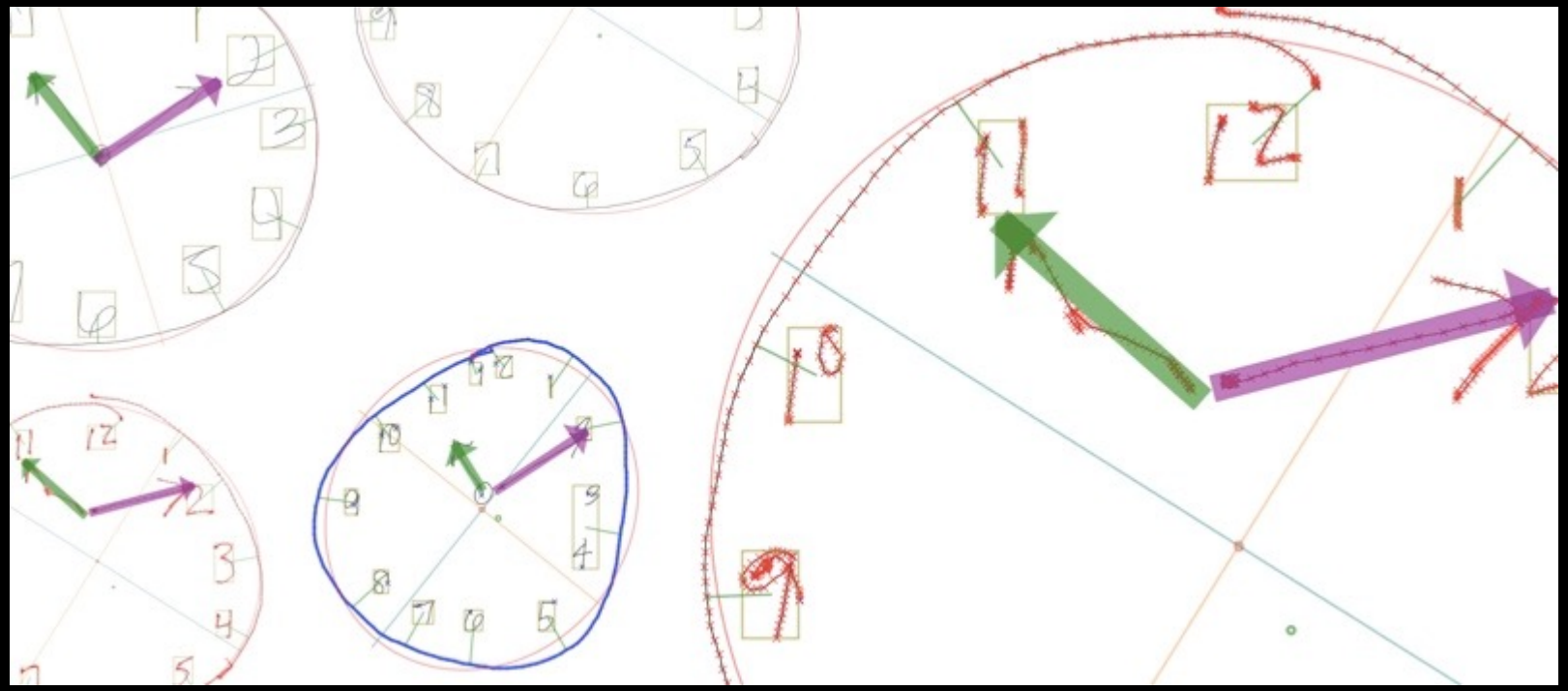
Quick

A sketch is quick to make,
or at least gives that impression



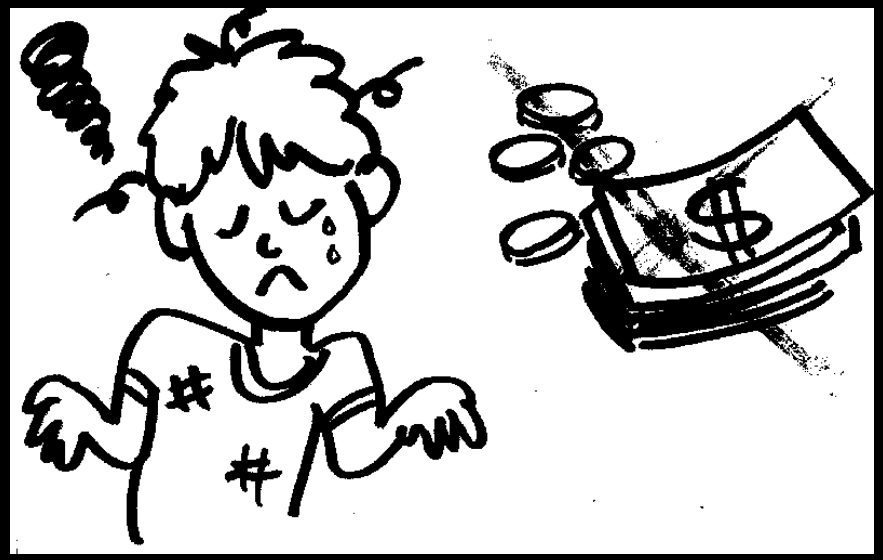
Timely

A sketch can be provided when needed



Inexpensive

Cost must not inhibit the ability to explore a concept, especially early in design



Disposable

If you cannot afford to throw it away, then it is not a sketch

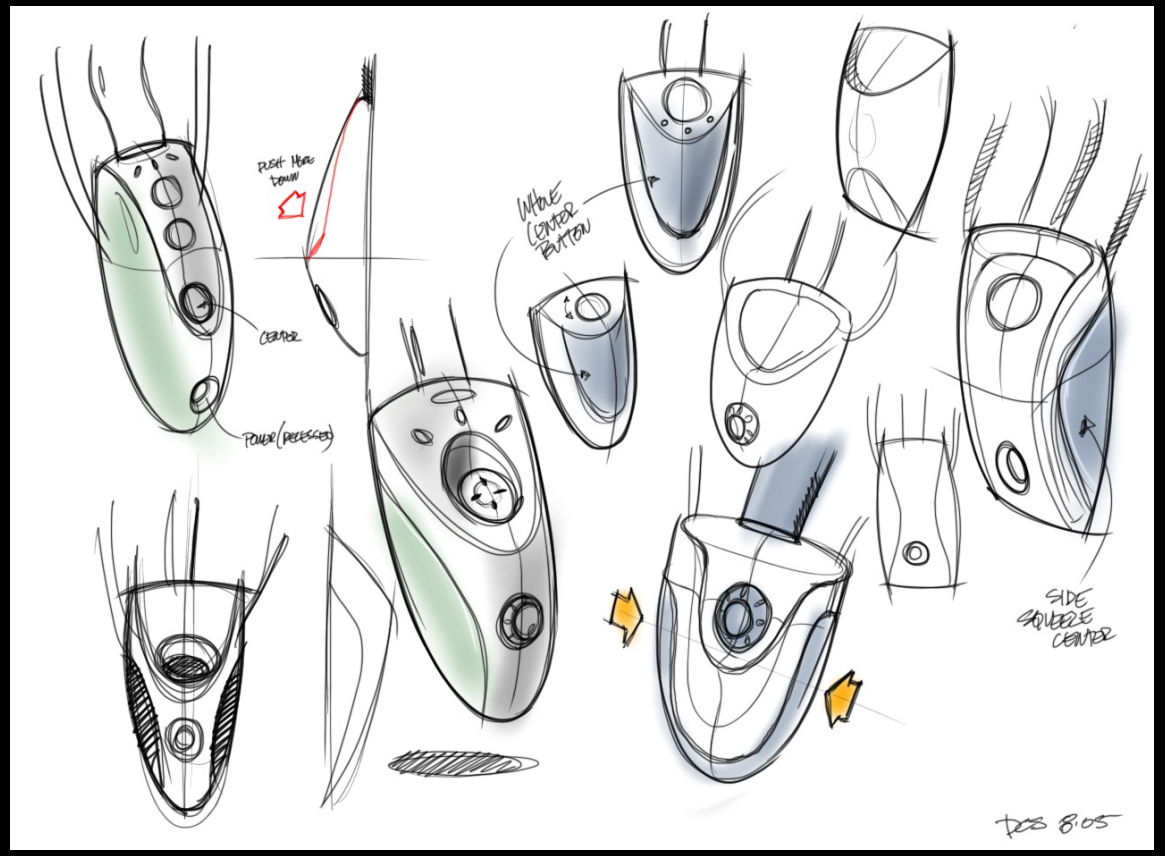
Investment is in the process, not the physical sketch

But they are not "worthless"

Plentiful

Sketches do not exist in isolation

Meaning and relevance is in the context of a collection or series

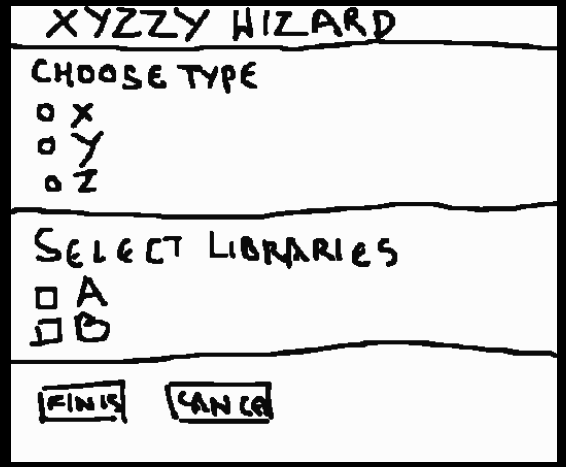


Clear Vocabulary

The way it is rendered makes it distinctive that it is a sketch (e.g., style, form, signals)

Could be how a line
extends through endpoints

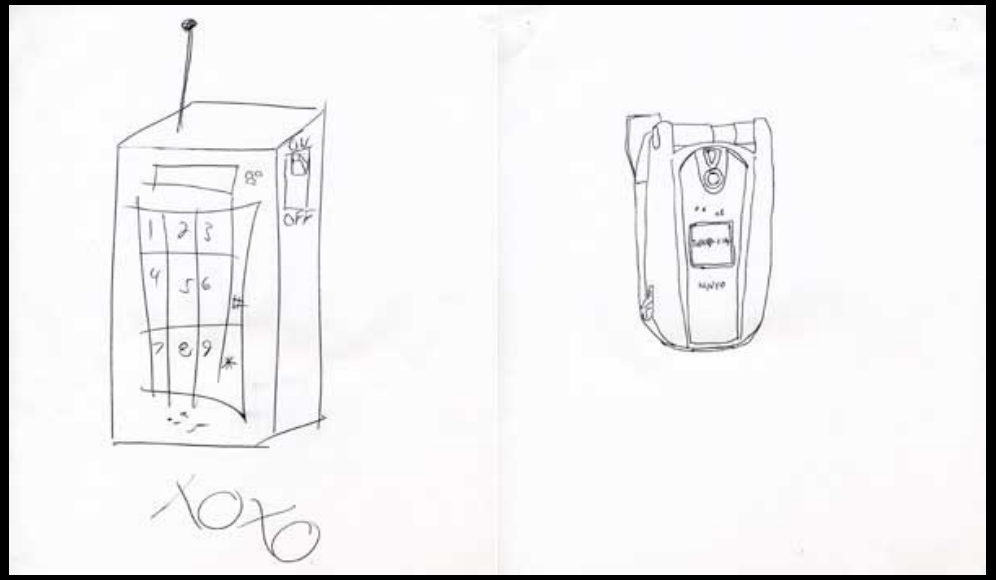
Physical sketches have
their own vocabulary



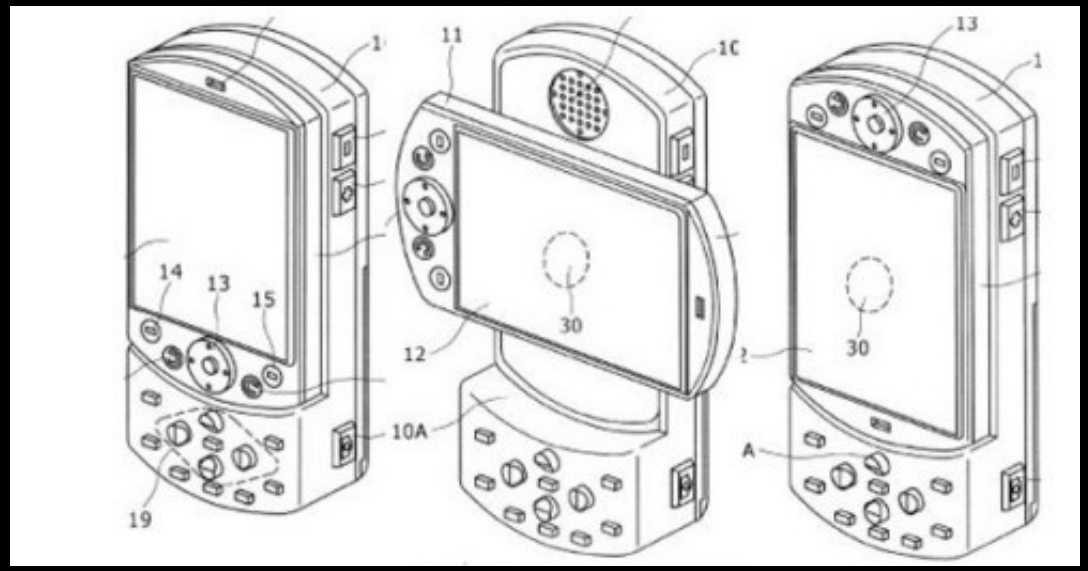
Distinct Gesture

Fluidity of sketches gives them a sense of openness and freedom

Opposite of engineering drawing, which is tight and precise

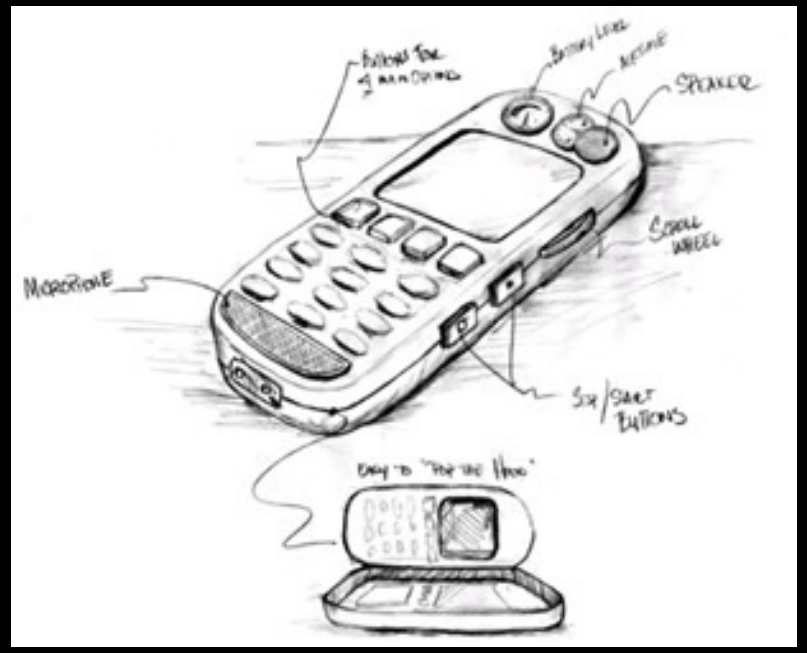


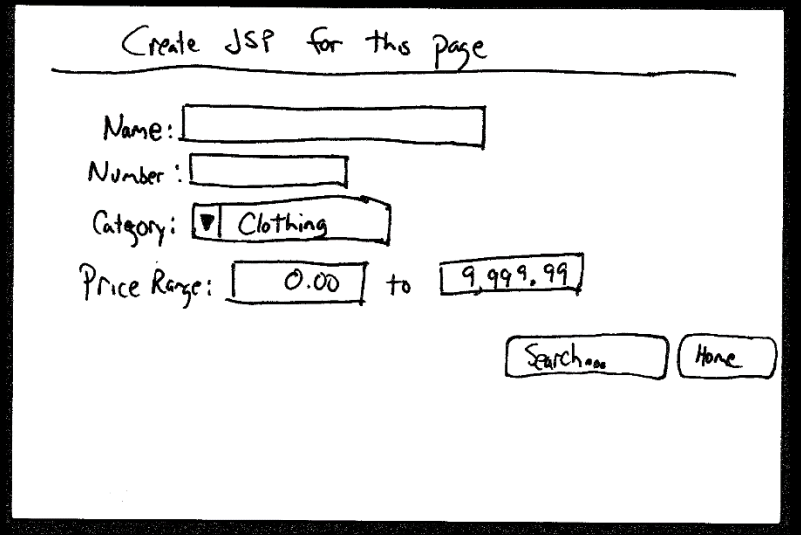
vs.



Minimal Detail

Include only what is required
to render the intended purpose or concept





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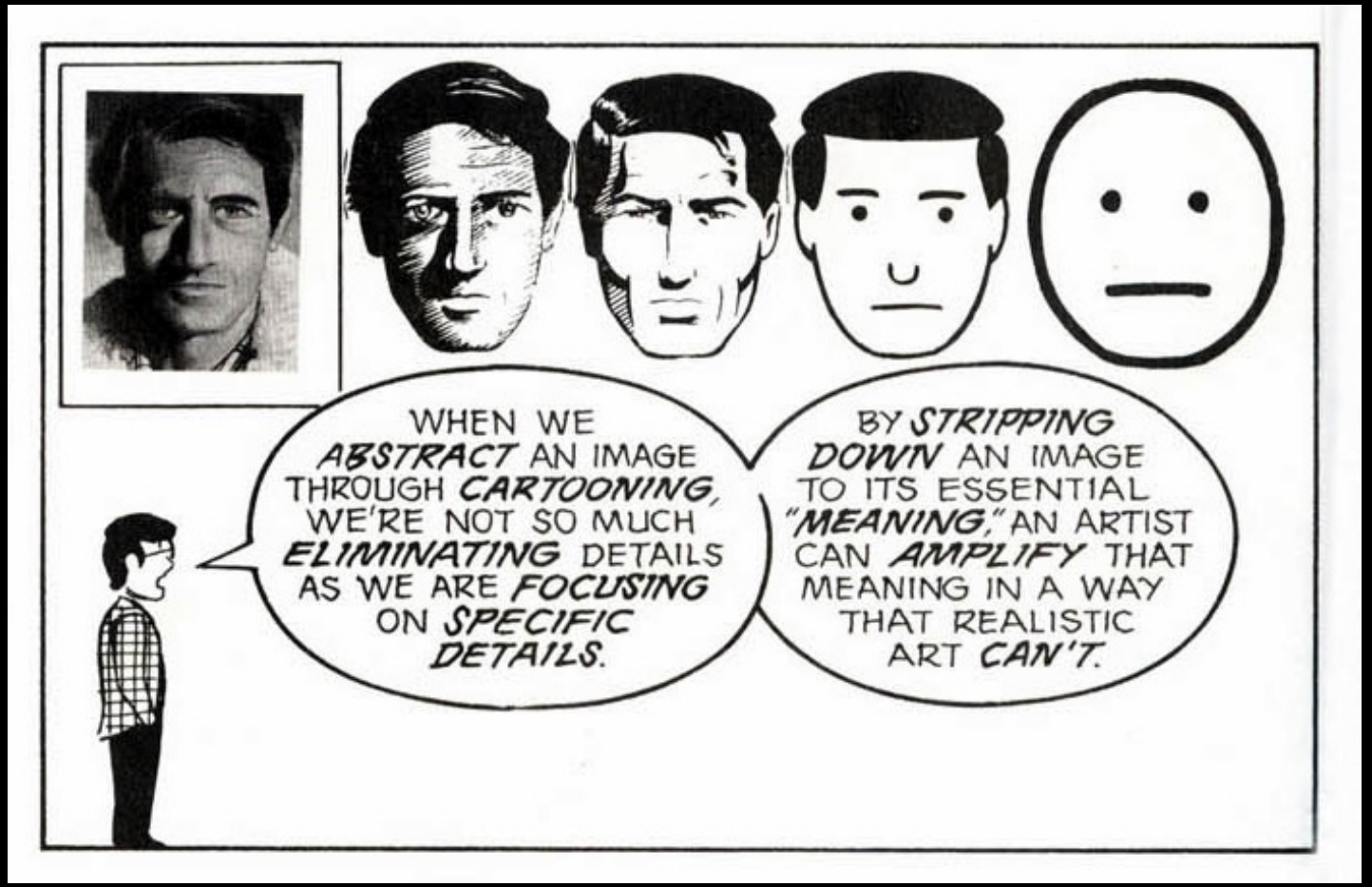
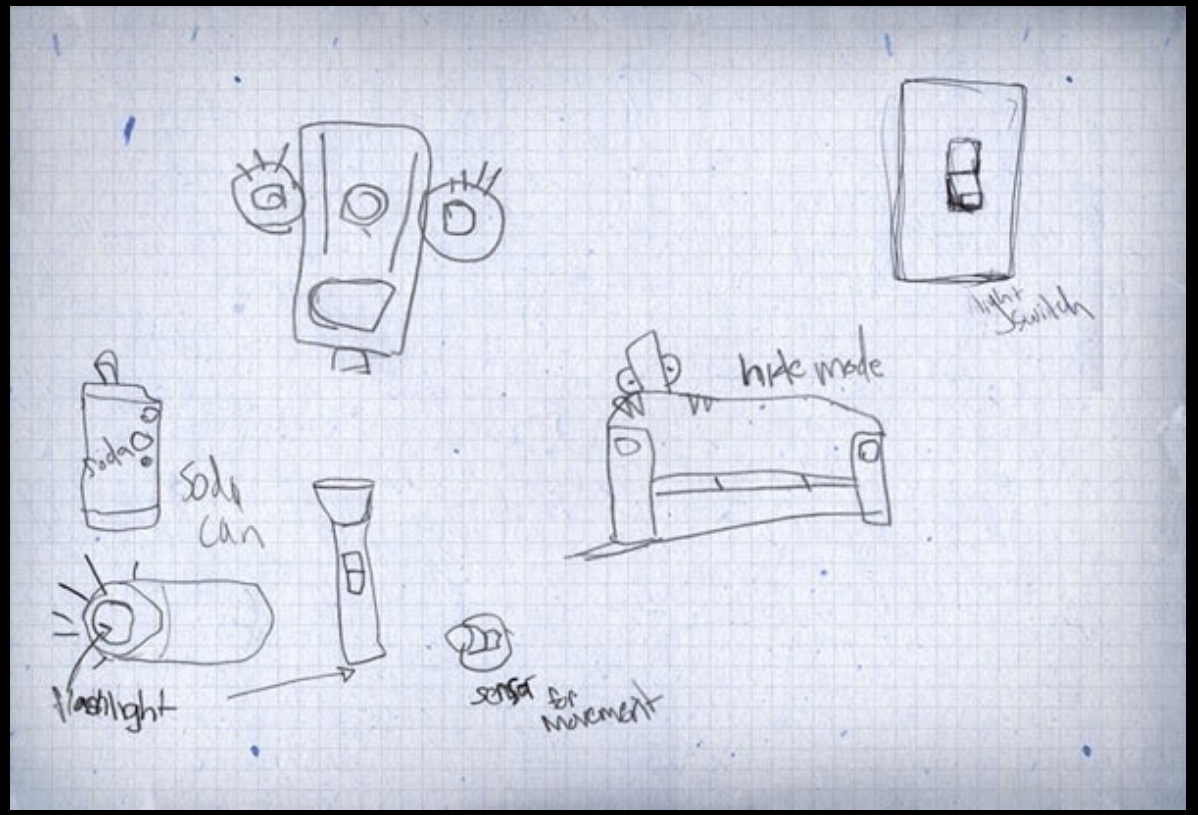


Appropriate Degree of Refinement

Make the sketch as refined as the idea

If you have a solid idea, make the sketch look more defined

If you have a hazy idea, make the sketch look rougher and less defined



Suggest and Explore Rather than Confirm

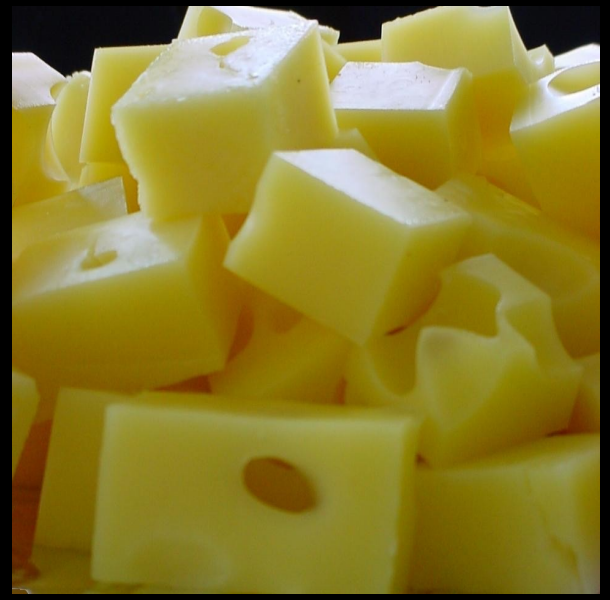
Sketch should act as a catalyst
to the desired and appropriate
behaviors, conversations, and interactions

Ambiguity

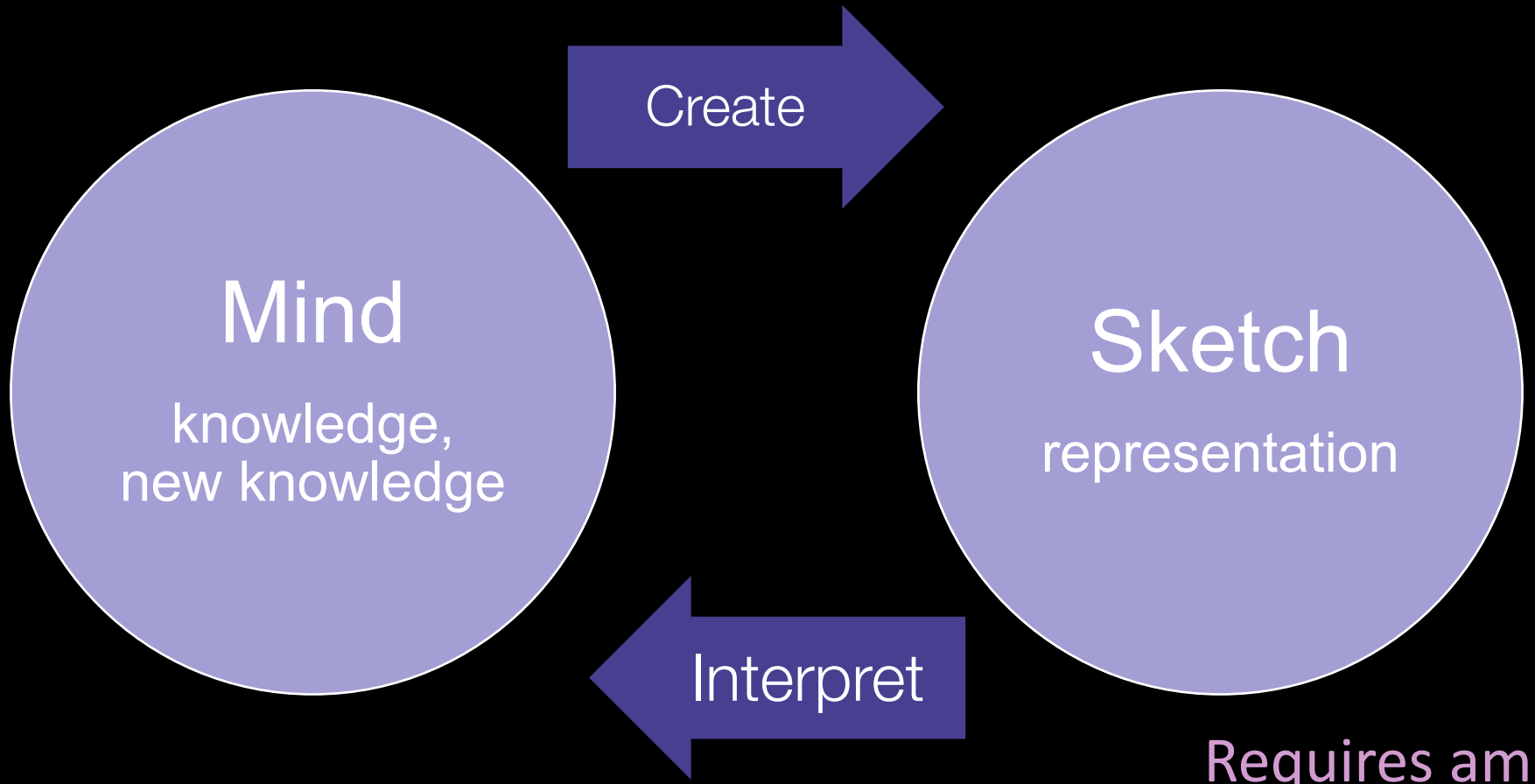
Intentionally ambiguous

Value comes from being
able to be interpreted
in different ways, even by
the person who created them

Sketches have holes



Sketching as Conversation



Requires ambiguity

Sketch vs. Prototype

Sketch	Prototype
Invite	Attend
Suggest	Describe
Explore	Refine
Question	Answer
Propose	Test
Provoke	Resolve
Tentative, noncommittal	Specific Depiction

The primary differences are in the intent

ABC News and IDEO's Deep Dive

ABC News and IDEO's Deep Dive

Sketching is Not Defined by Ink

Although sketching can often be done in ink,
these properties can be found in other forms

Those other forms are therefore sketches

Sketching the Mouse

Making the Macintosh:
http://www-sul.stanford.edu/mac/index.html

Sketching the Mouse

Making the Macintosh:
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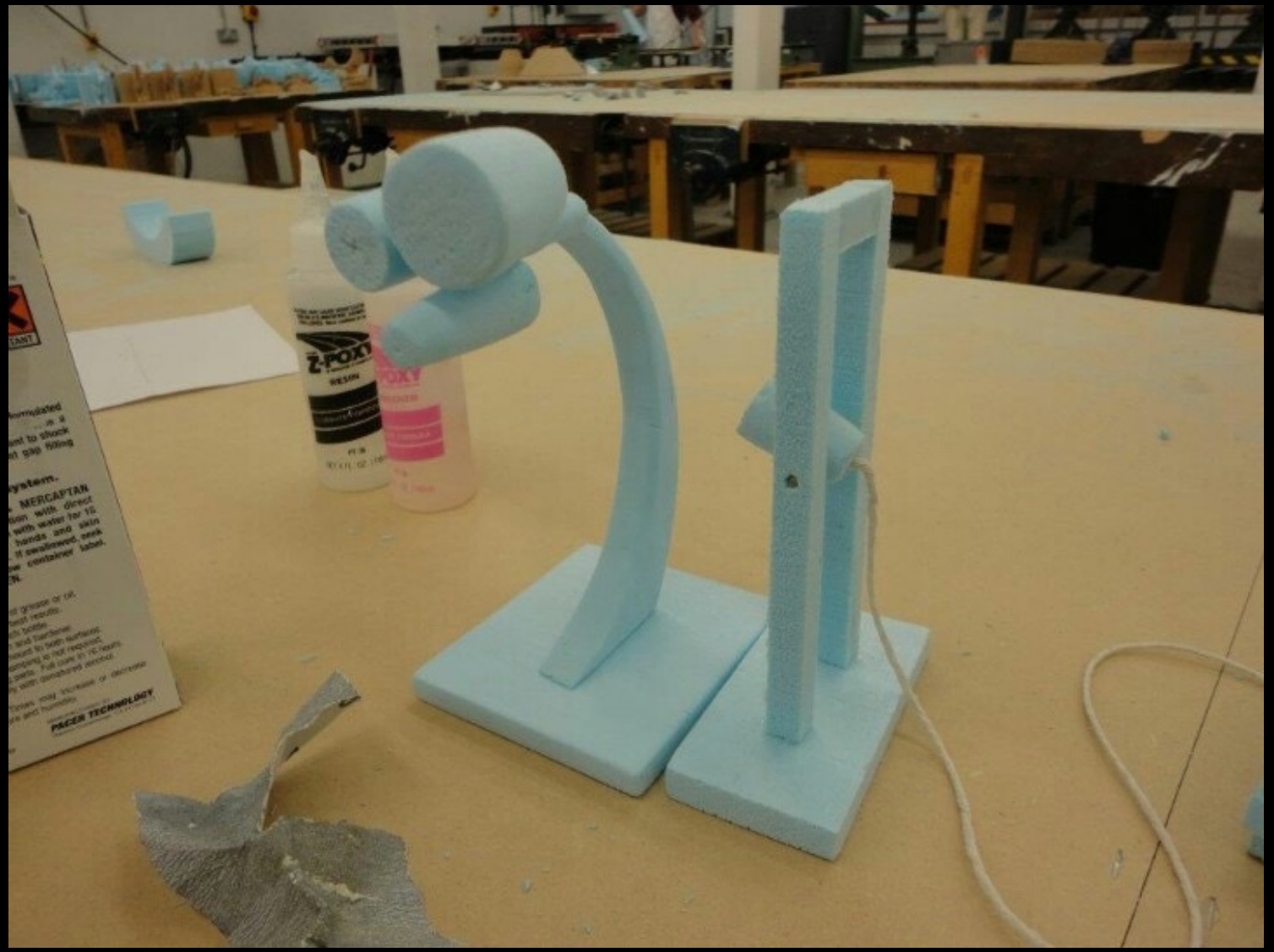
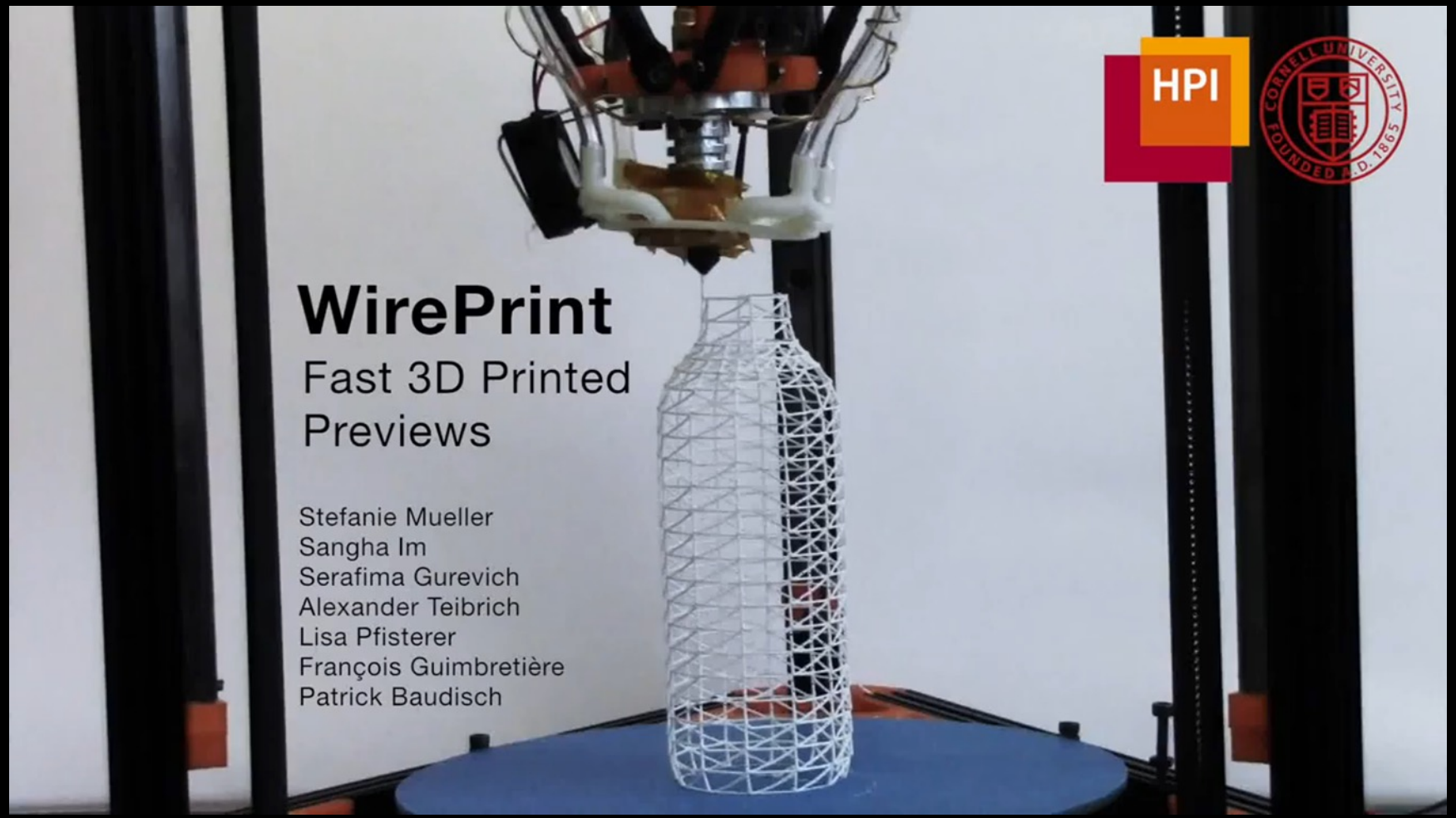
Physical Sketching

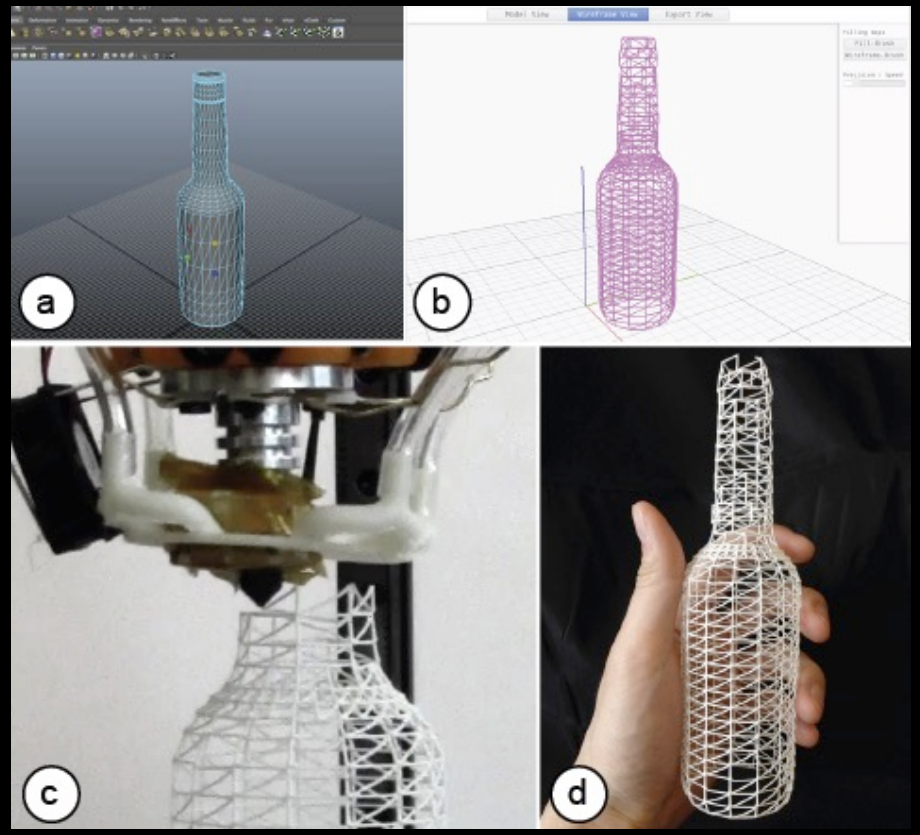


WirePrint (2014)



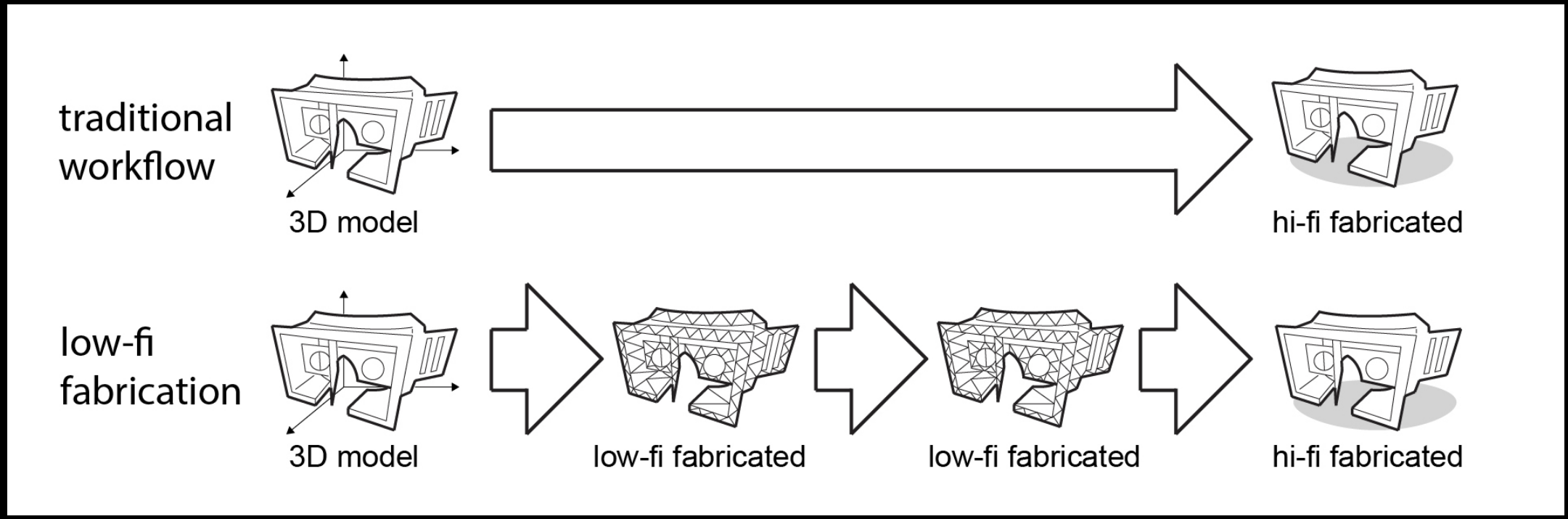
Mueller, WirePrint, UIST 2014

WirePrint (2014)



Mueller, WirePrint, UIST 2014

Physical Sketching



Mueller, WirePrint, UIST 2014

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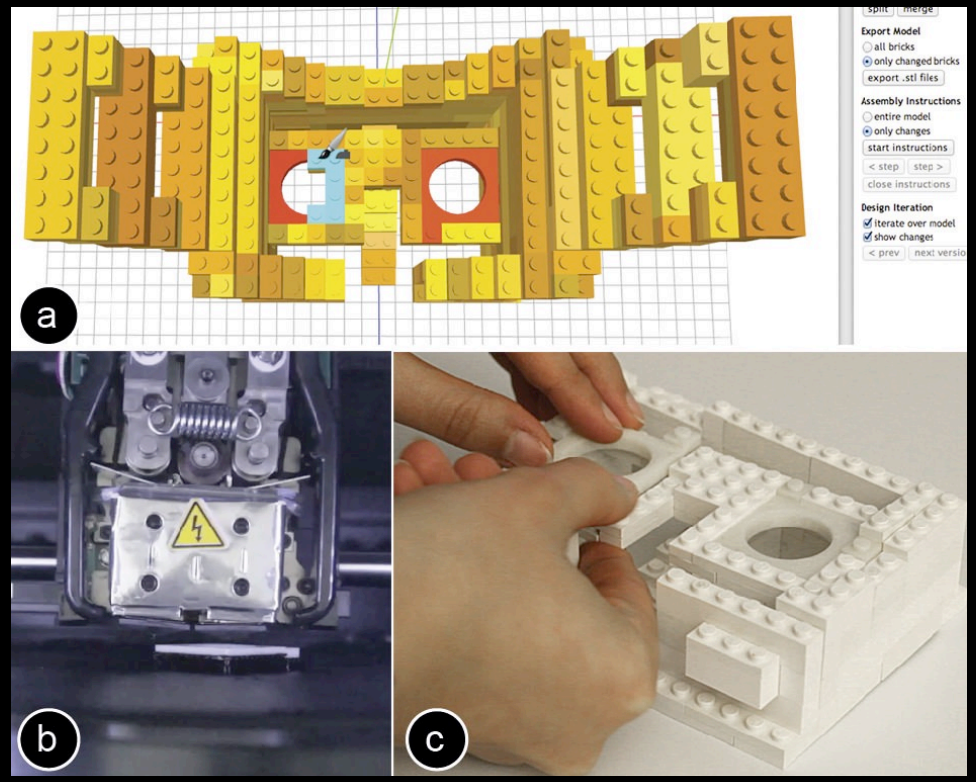
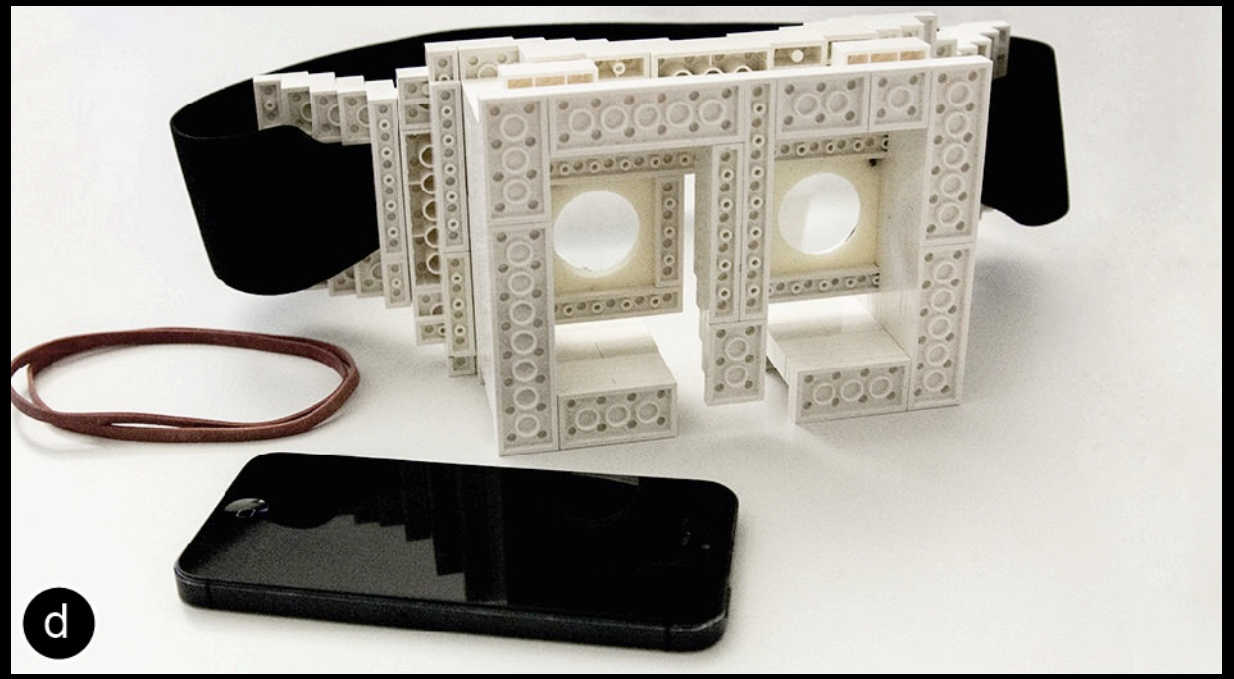




Mueller, Fabrickation, CHI 2014

Critiquing Sketches is Important

Ideas are both good and bad

- Both are useful in design
- By making clear what is a bad design, we can avoid actually implementing it
- Bad ideas help you justify your good ideas

Feedback can turn a good idea into a great idea

Sketching generates too many ideas to implement

Time for everyone's favorite game show…

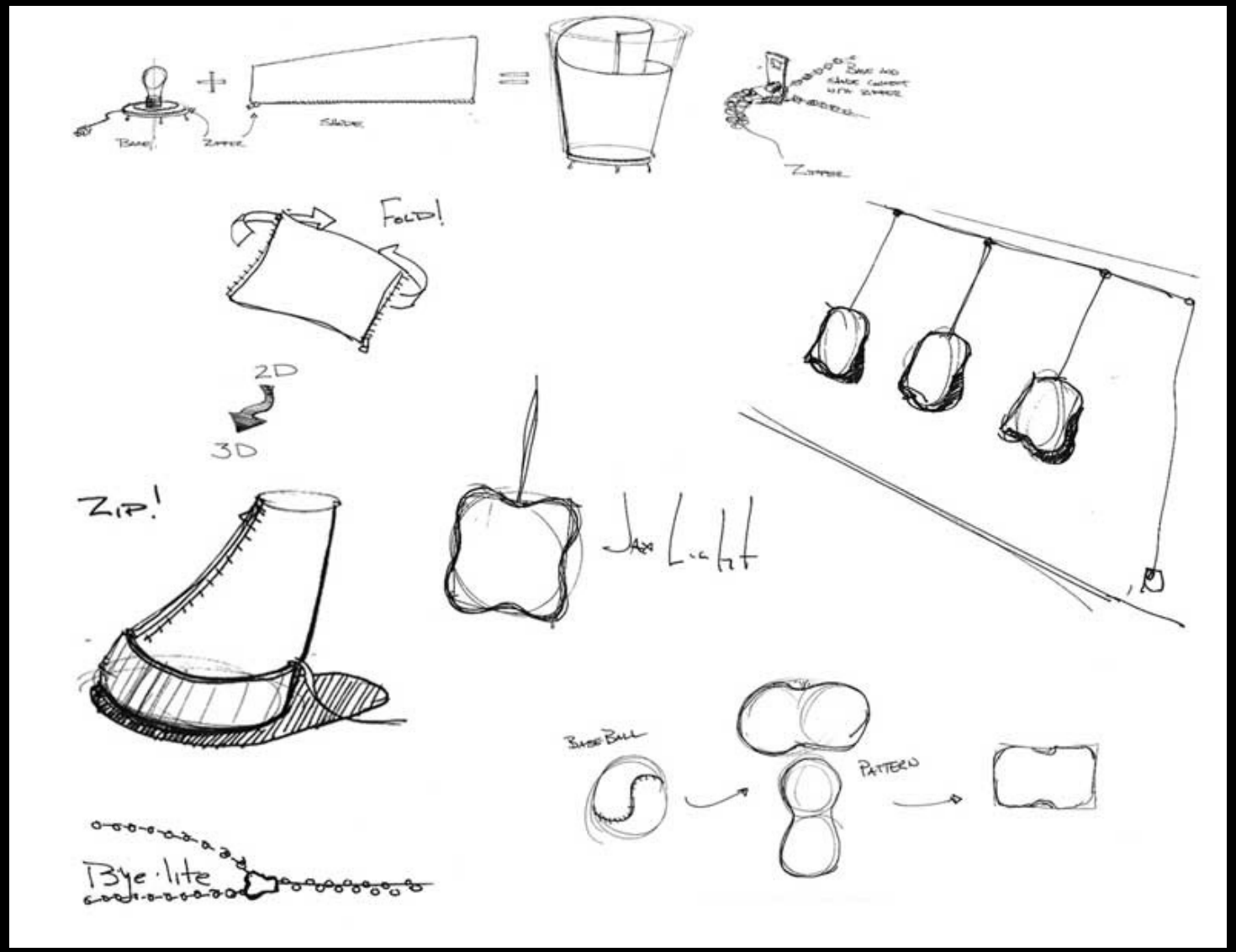
PROTOTYPE

PROTOTYPE

OR

PROTOTYPE OR SKETCH????

Is this a sketch? Why or why not?



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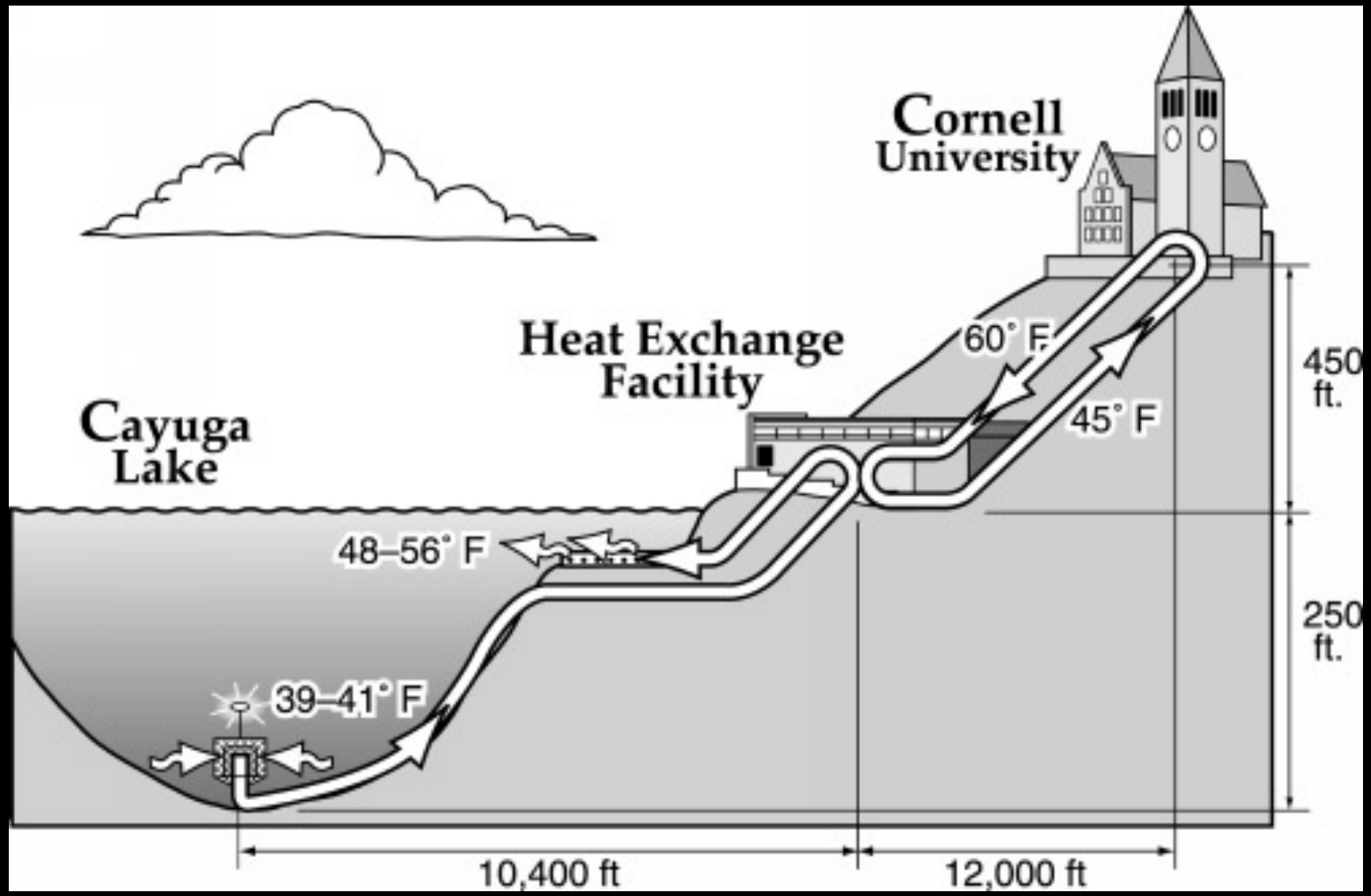

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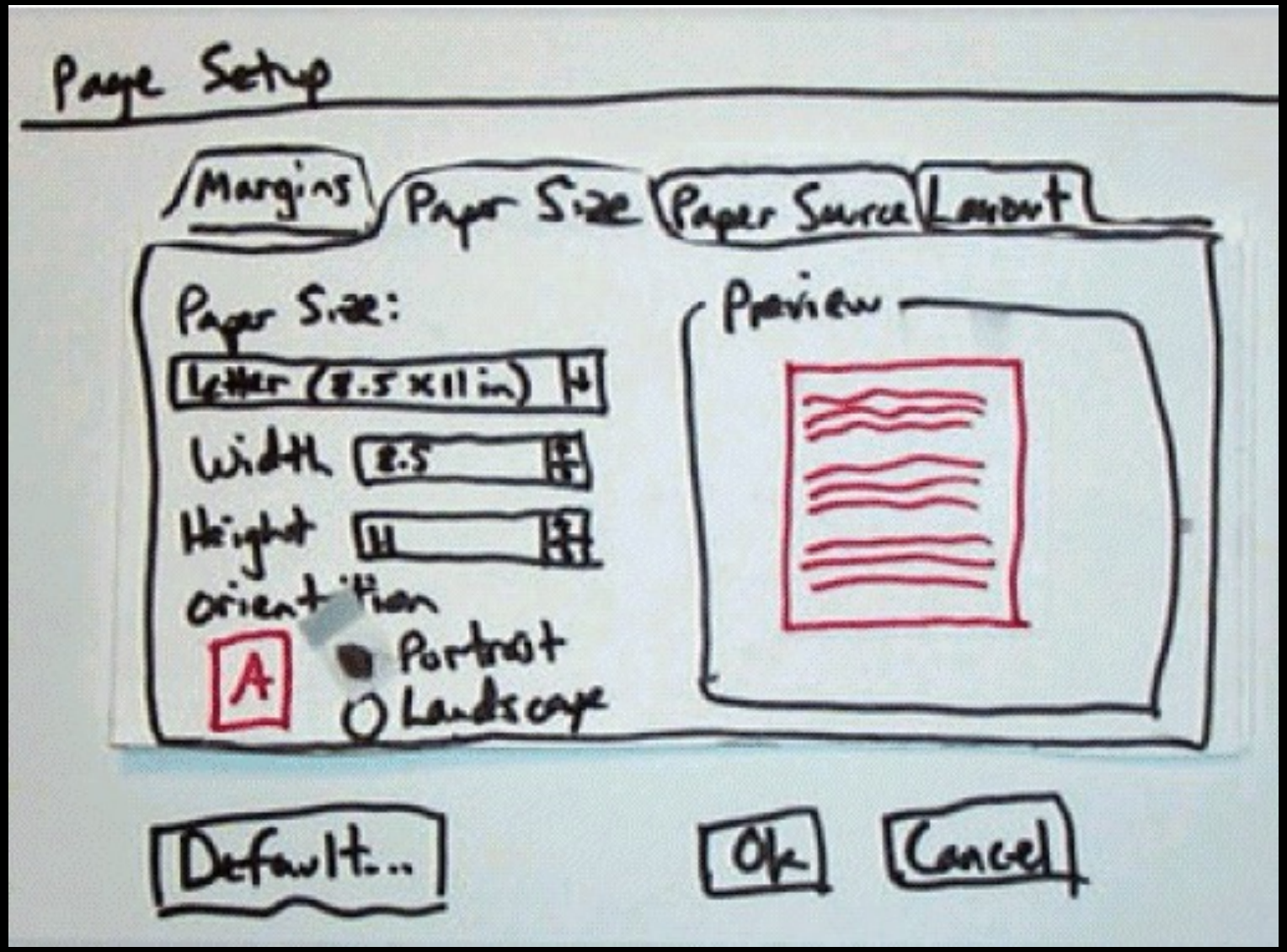

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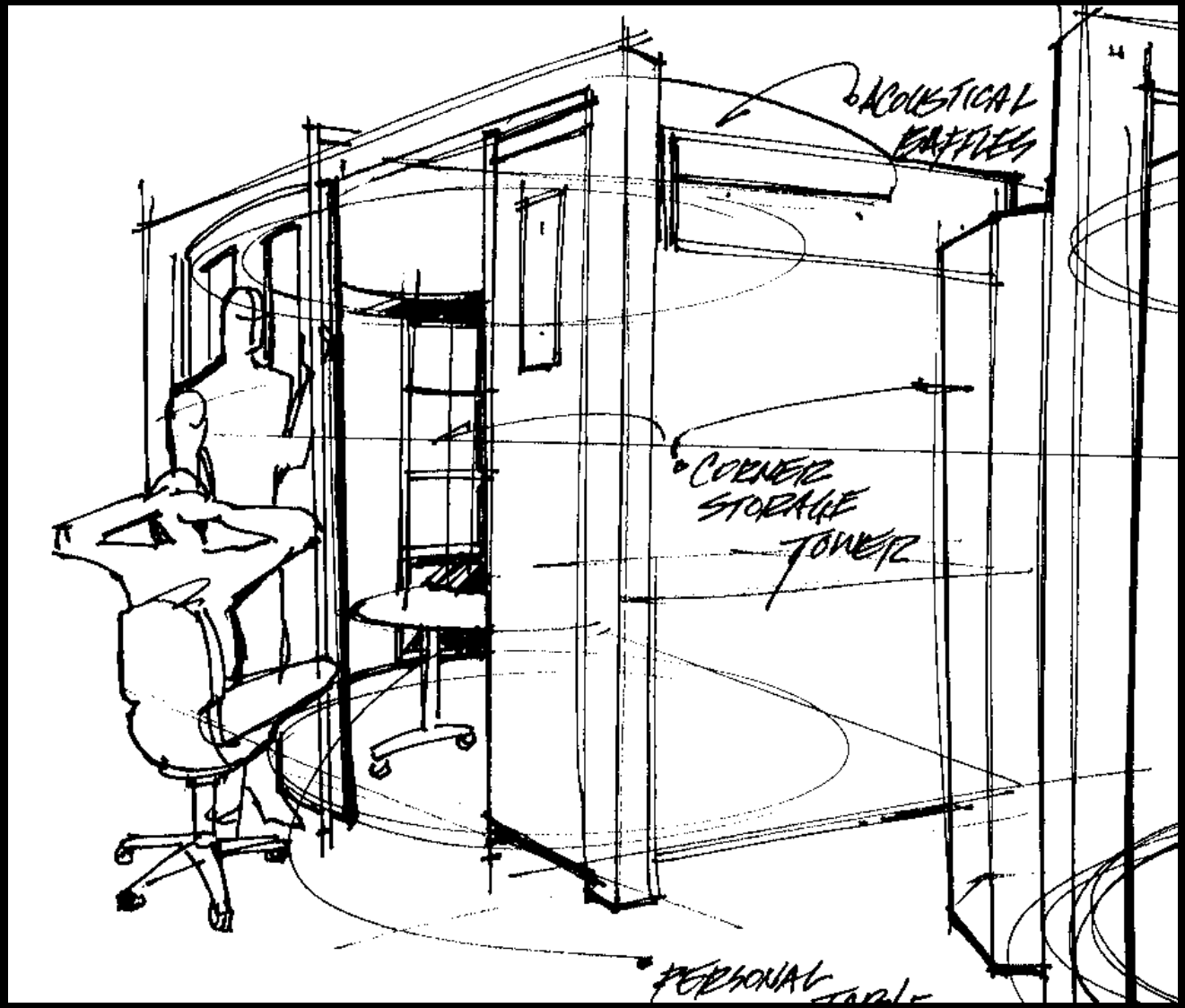


Is this a sketch? Why or why not?

Sketching and the Design Diamond

The design diamond is fundamental
to understanding what you are doing here

- Much of your education, including in CSE,
  has taught you to focus on having the right answer

- Here it matters what you do long before the end

Most ideas get thrown out, including yours

- Better ideas are great criticism,
  and frequently would never have come about otherwise

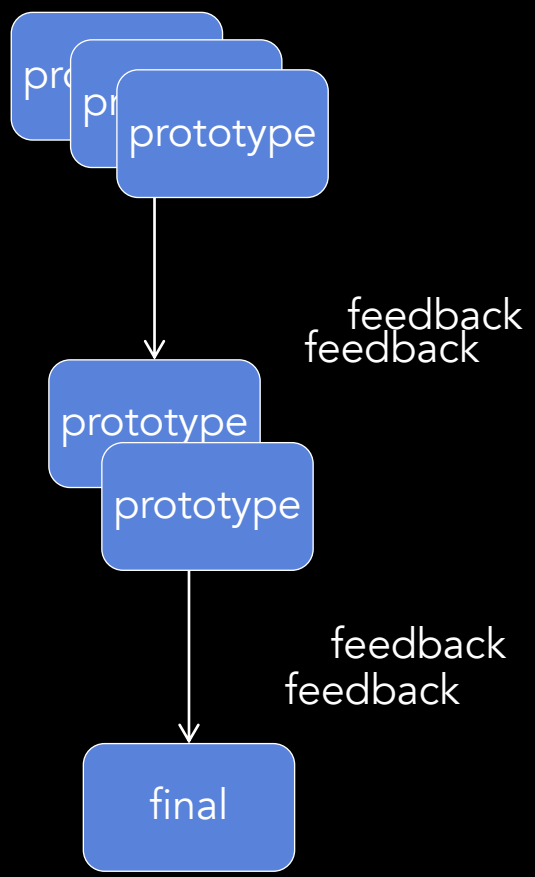
Some Evidence

Task:

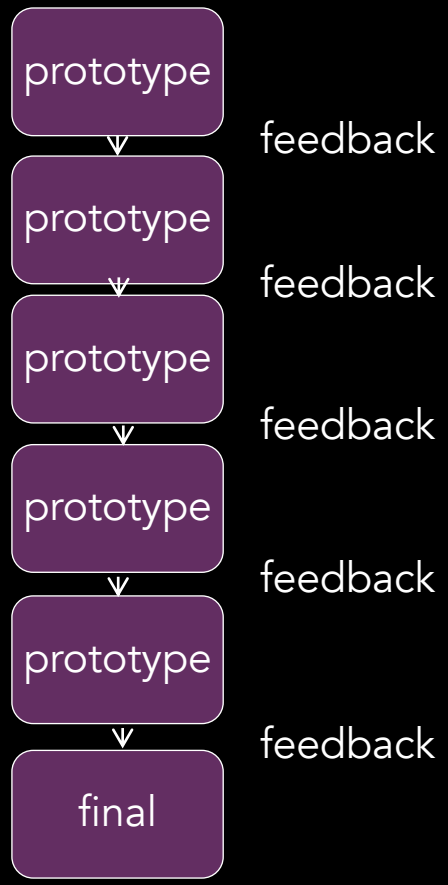
Create a web banner ad for Ambidextrous magazine.

Dow et al. TOCHI 2010.

Feedback in Parallel or Serial



Parallel condition



Serial condition

Dow et al. TOCHI 2010.

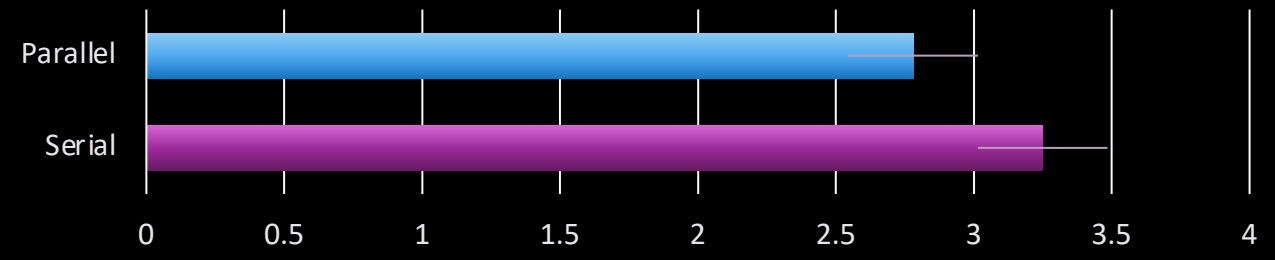
Procedure

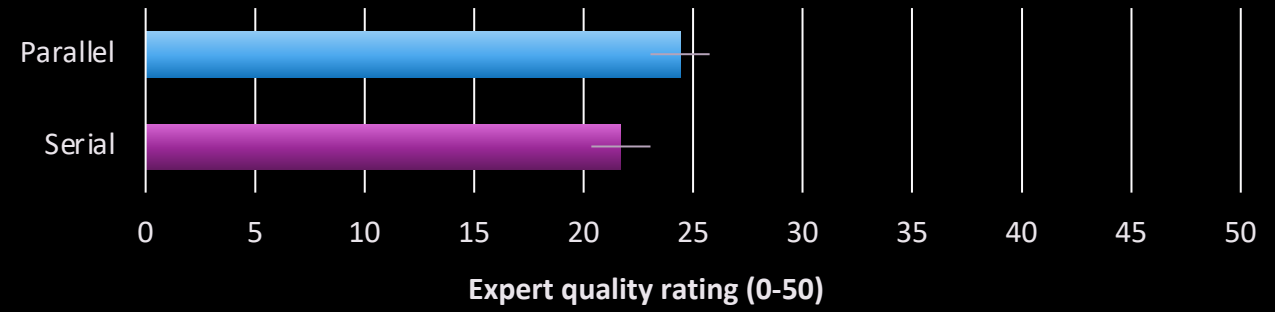
serial prototyping condition

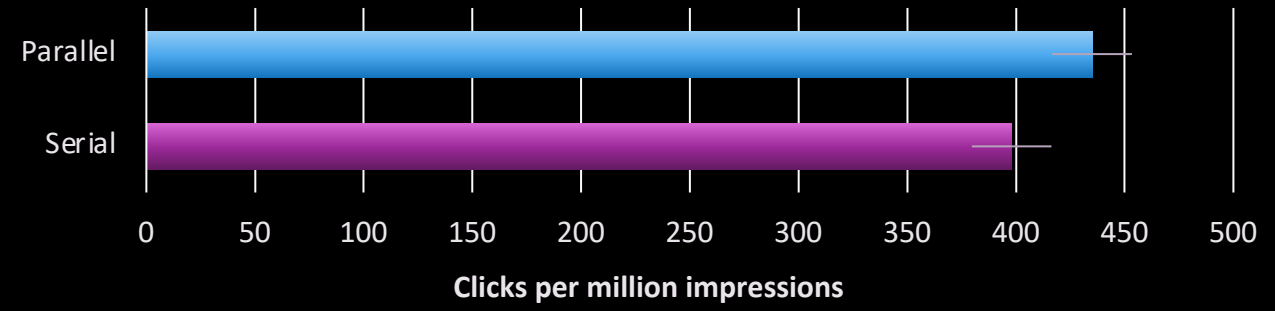
parallel prototyping condition

Dow et al. TOCHI 2010.

Parallel: more diverse, better, more clicks

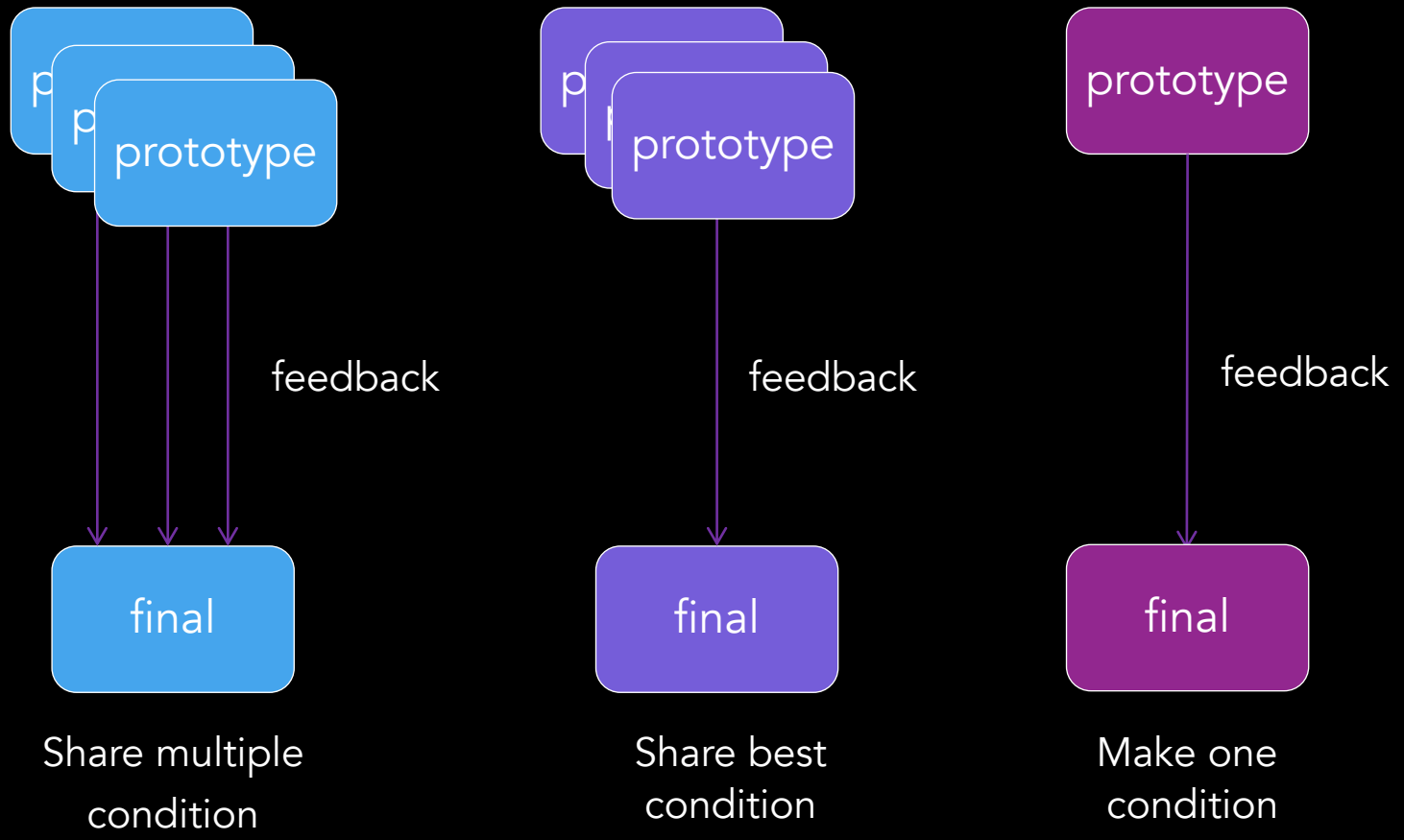






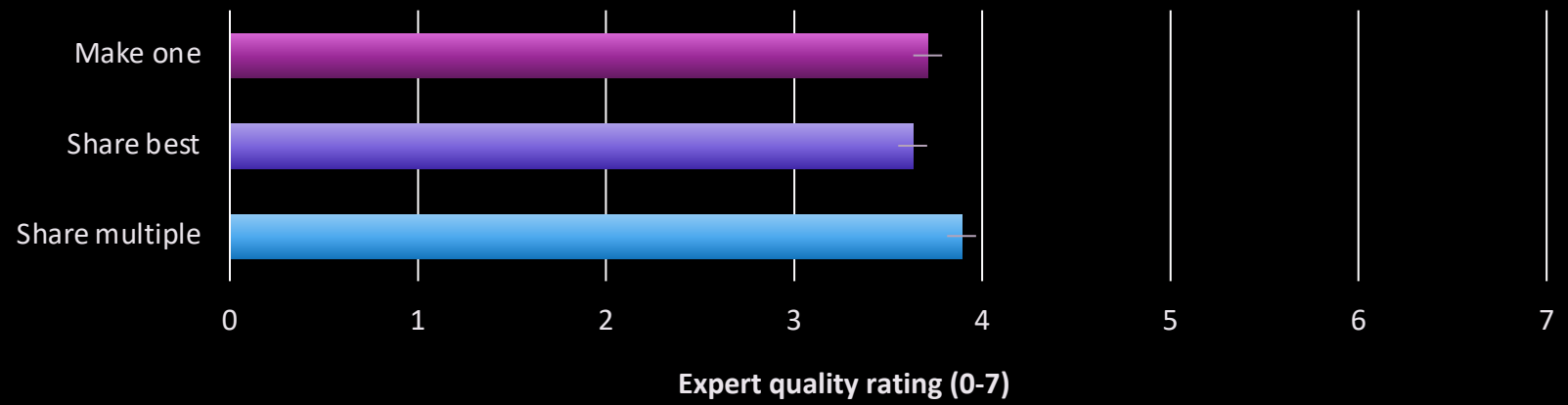
Dow et al. TOCHI 2010.

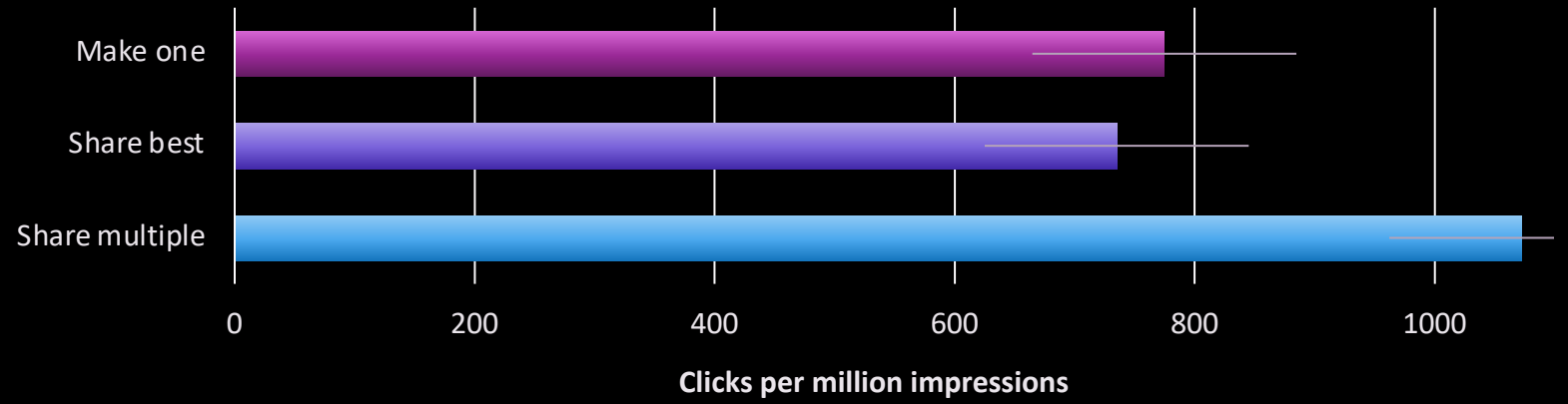
Share one or share your best?



Dow et al. TOCHI 2010.

Share Multiple: better, more clicks





Dow et al. TOCHI 2010.

Some Evidence

Greater divergence in designs

- Prevents sticking with the first idea
- Allows mashing ideas together

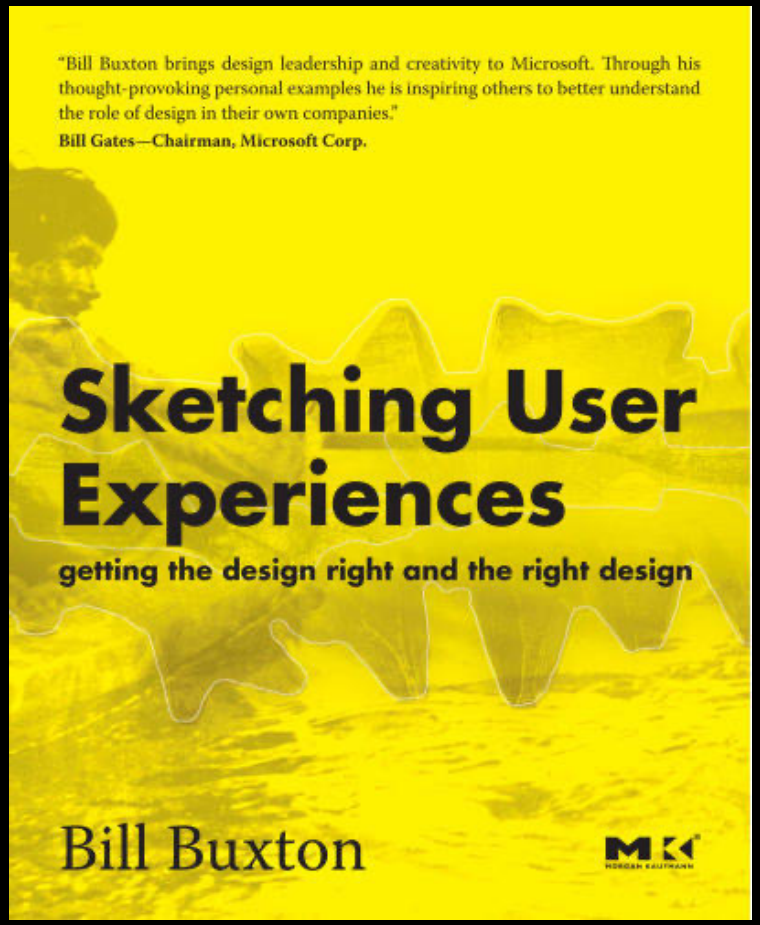
Alternatives facilitate feedback

- Enable comparison
- Can improve tone of critique

"Since parallel participants received feedback on multiple ideas simultaneously, they were more likely to read and analyze critique statements side-by-side. Direct comparison perhaps helped parallel participants better understand key design principles and led to more principled choices for subsequent prototypes."

Dow et al. TOCHI 2010.

Additional Reading



Speaks to the C-Suite, to design as a process

For example, the iPod was not the overnight success that many imagine in hindsight

Overview

- Course Status
  - Project Sequence
  - EXP Assignments
- The Design Diamond
  - Examining a Design Process
  - Sketching and Prototypes
  - Some Evidence
- **Design Ideation**
  - Notes on Form
  - 2a – Prompted Ideation

[And now comes the part where Jesse rants about Form.]

On Form

A gentle, loving note to computer scientists everywhere:

On Form

A gentle, loving note to computer scientists everywhere:

NOT EVERYTHING NEEDS TO BE AN APP

Why I Hate Apps

Why I Hate Apps

There are too many of them

“I wish I had more apps on my phone!” – no one, ever

Why I Hate Apps

There are too many of them

They don't meaningfully engage with context

> *"You know how Facebook & Amazon can use your phone to figure out exactly what you're doing at any given moment and give you hyper-targeted content? Yeah, no, you're not gonna be able to do any of that. Maybe you can get permission to use location data, if you're lucky."*

Why I Hate Apps

There are too many of them

They don't meaningfully engage with context

There's no such thing as "lightweight" interaction

> *"It's so easy! You just take out your phone, get distracted by all the notifications you missed, respond to a couple texts, remember what you were going to do, look for where you put the app on your home screen, give up looking and just search for it instead, open it, find out it needs an update, go to the app store, click the download button, try to remember your AppleID login, get it right on the third attempt, wait for the app to download, and… hello? You still there?"*

Why I Hate Apps

There are too many of them

They don't meaningfully engage with context

There's no such thing as "lightweight" interaction

They're deeply entangled with existing systems

> *"I'm trying to spend less time on my phone. Better download an app to help me track how much time I spend on my phone!"*

On Form

When designing technology,
there are so many options for Form:

- Wearables!
- Tangibles!
- IoT / Smart Devices!
- Smart Environments!
- Distributed Systems!
- *…and yeah, apps too, I GUESS*

When designing technology, make sure you
pick the right tool for the job

Wearables

Pros:

- Actual opportunities for lightweight interaction
- Decent connection to context
- Meaningful opportunities for passive bio-sensing

Cons:

- "One More Device"
- Limitations on device interface/output
  - (…which is why these often use phone apps as fallback)

IoT / Smart Objects

Variation or extension of an existing object

Pros:

- Leverage user's existing knowledge of a system
- STRONG connection to context

Cons:

- Constrained by all of the above

Tangibles

Computing device with a novel physical form

Pros:

- So much freedom to design a new interaction

Cons:

- Learning curve with novel devices

Distributed System

A combination of multiple components that act as one device

Pros:

- Not limited by any one device's constraints

Cons:

- Interaction is often confusing / steep learning curve

Smart Environment

Space that combines sensors & smart devices

Pros:

- So much control over what happens in an interaction
- There is so much data you can work with

Cons:

- A lot of “suppose all these things exist and also work and also people don’t have a problem with them”

The part where Jesse admits there's *technically* nothing wrong with apps

Pros:

- Presumed "available" to most users
- SOME interesting data you can use
- Interaction is generally understood

Cons:

- (see previous rant)

Which form is best for me?

It's all a bunch of tradeoffs!

Key takeaway: **be intentional in your choice of form**

- If you don't have a reason for your form, you're probably missing out on a good form's features

Genuinely, an app will probably be the best choice for some of you.

- But be prepared to explain WHY it's the best choice!!

2a: Design Ideation

Goal: generate 10 design ideas in each of the following categories

- Forms: *types of technology on which a design might be developed.*
- Data: *types of data a design might track or utilize in some way.*
- Tasks: *what a person might accomplish with a design.*
- Features: *a specific capability a design might have.*
- Interaction scenarios: *contexts where someone might interact with a design related to your proposal (e.g., physical environments, social settings, related activities they might be performing, etc.).*

CSE 440:
Introduction to HCI

05: The Design Diamond

April 9, 2024

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