05: The Design Diamond

April 9, 2024
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

CSE 440 – Introduction to HCI
Today: “The Design Diamond”
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!
Overview

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EXP Assignments

The Design Diamond

The Design Diamond & The Design Process
Sketching and Prototypes
Some Evidence

Design Ideation

Notes on Form
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”
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
A Medium-Sized Diamond

- start
- generate
- intentional!
- select
- danger!
A Medium-Sized Diamond

start  \rightarrow  generate  \rightarrow  select  \rightarrow  intentional  \rightarrow  danger!

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Today: “The Design Diamond”
Idea Oscillation

Diagram:

- **Start** → **Generate** → **Select** → **Prototype**
- **Intentional!**

Today: “The Design Diamond”
Idea Oscillation
Exploration of Alternatives
Exploration of Alternatives

... 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.
Today: “The Design Diamond”

Sketching
Sketching

Map showing parking availability based on inputted data, inputted on map.

- Different colors
- Highlights availability

The Design Diamond
Sketching

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Today: “The Design Diamond”
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"

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

<table>
<thead>
<tr>
<th>Quick</th>
<th>Distinct Gesture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timely</td>
<td>Minimal Detail</td>
</tr>
<tr>
<td>Inexpensive</td>
<td>Appropriate Refinement</td>
</tr>
<tr>
<td>Disposable</td>
<td>Suggest and Explore</td>
</tr>
<tr>
<td>Plentiful</td>
<td>Ambiguous</td>
</tr>
<tr>
<td>Clear Vocabulary</td>
<td></td>
</tr>
</tbody>
</table>
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
Minimal Detail

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

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

**Mind**
knowledge, new knowledge

**Sketch**
representation

Create

Interpret

Requires ambiguity

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Today: “The Design Diamond”
## Sketch vs. Prototype

<table>
<thead>
<tr>
<th>Sketch</th>
<th>Prototype</th>
</tr>
</thead>
<tbody>
<tr>
<td>Invite</td>
<td>Attend</td>
</tr>
<tr>
<td>Suggest</td>
<td>Describe</td>
</tr>
<tr>
<td>Explore</td>
<td>Refine</td>
</tr>
<tr>
<td>Question</td>
<td>Answer</td>
</tr>
<tr>
<td>Propose</td>
<td>Test</td>
</tr>
<tr>
<td>Provoke</td>
<td>Resolve</td>
</tr>
<tr>
<td>Tentative, noncommittal</td>
<td>Specific Depiction</td>
</tr>
</tbody>
</table>

The primary differences are in the intent.
ABC News and IDEO’s Deep Dive

And the four mock-ups are ready for showing.
ABC News and IDEO’s Deep Dive

And the four models are ready for showing...
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
Sketching the Mouse

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Today: “The Design Diamond”

Making the Macintosh: http://www-sul.stanford.edu/mac/index.html
Physical Sketching
WirePrint (2014)

WirePrint
Fast 3D Printed Previews

Stefanie Mueller
Sangha Im
Serafima Gurevich
Alexander Teibrich
Lisa Pfisterer
François Guimbretière
Patrick Baudisch
WirePrint (2014)

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Today: “The Design Diamond”

Mueller, WirePrint, UIST 2014
Physical Sketching

traditional workflow

low-fi fabrication

3D model

3D model

low-fi fabricated

low-fi fabricated

hi-fi fabricated

hi-fi fabricated

Mueller, WirePrint, UIST 2014
Physical Sketching
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?
Is this a sketch? Why or why not?
Is this a sketch? Why or why not?
Is this a sketch? Why or why not?
Is this a sketch? Why or why not?
Is this a sketch? Why or why not?
Is this a sketch? Why or why not?
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.
Feedback in Parallel or Serial

Parallel condition

Serial condition

Dow et al. TOCHI 2010.
Procedure

serial prototyping condition

parallel prototyping condition

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Dow et al. TOCHI 2010.
Parallel: more diverse, better, more clicks

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Today: “The Design Diamond”

Dow et al. TOCHI 2010.
Share one or share your best?

- Share multiple condition
- Share best condition
- Make one condition
Share Multiple: better, more clicks

Expert quality rating (0-7)

Clicks per million impressions

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

A gentle, loving note to computer scientists everywhere:
A gentle, loving note to computer scientists everywhere:

NOT EVERYTHING NEEDS TO BE AN APP
Why I Hate Apps

oh yeah lemme just open my song picker app so that I can go to my Pandora app and play the song to post about it on my Facebook app so that my friends text me on my text app about how cool they think I am because I have so many f%#*ing apps

There’s an App For That

I WISH THERE WASN’T!!!
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.)*
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