The Iterative Design Process

Prof. Lydia Chilton
COMS 4170
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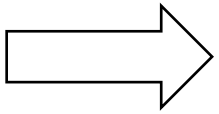
Raise your hand or type in zoom

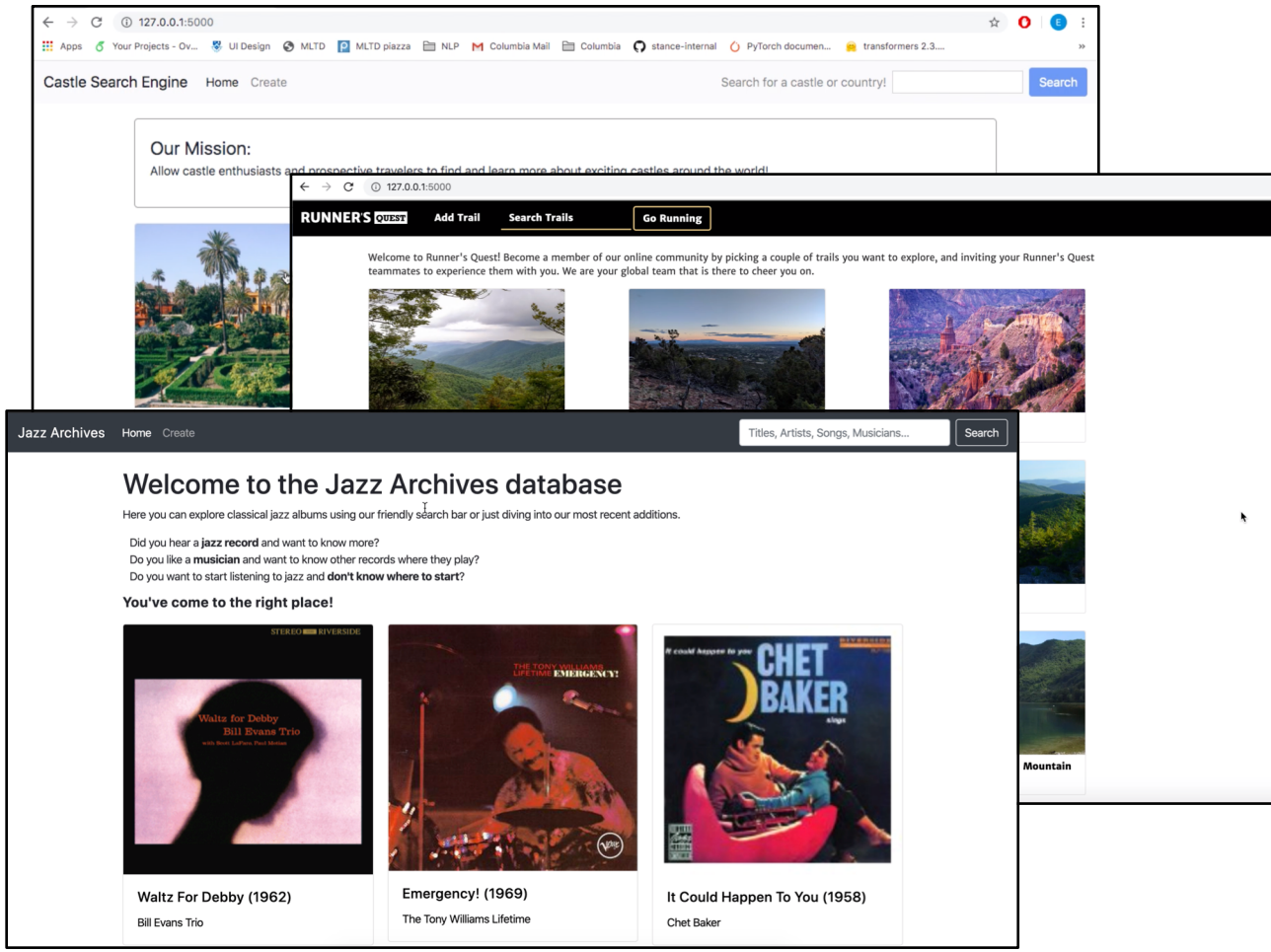
Given specifications, you can create interactions

Part 1 – Usable Functionality:

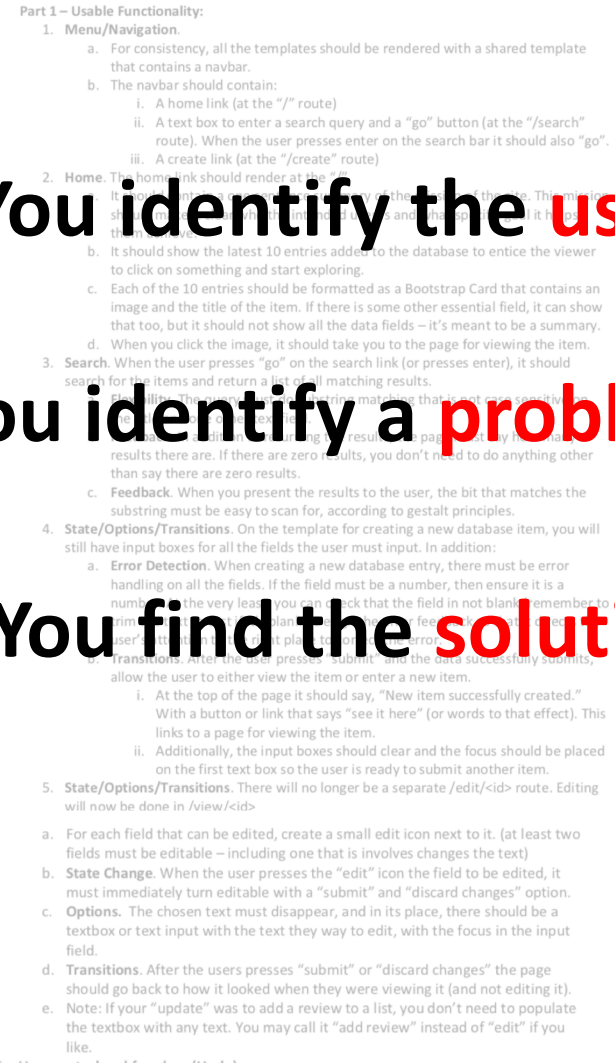
1. **Menu/Navigation**.
   a. For consistency, all the templates should be rendered with a shared template that contains a navbar.
   b. The navbar should contain:
      i. A home link (at the "/" route)
      ii. A text box to enter a search query and a "go" button (at the "/search" route). When the user presses enter on the search bar it should also "go".
      iii. A create link (at the "/create" route)
2. **Home**. The home link should render at the "/".
   a. It should contain a one sentence summary of the mission of the site. This mission should make it clear who the intended user is and what specific goal it helps them achieve.
   b. It should show the latest 10 entries added to the database to entice the viewer to click on something and start exploring.
   c. Each of the 10 entries should be formatted as a Bootstrap Card that contains an image and the title of the item. If there is some other essential field, it can show that too, but it should not show all the data fields – it's meant to be a summary.
   d. When you click the image, it should take you to the page for viewing the item.
3. **Search**. When the user presses "go" on the search link (or presses enter), it should search for the items and return a list of all matching results.
   a. **Flexibility**. The query must do substring matching that is not case sensitive on the title and one other text field.
   b. **Feedback**. In addition to returning the results, the page must say how many results there are. If there are zero results, you don't need to do anything other than say there are zero results.
   c. **Feedback**. When you present the results to the user, the bit that matches the substring must be easy to scan for, according to gestalt principles.
4. **State/Options/Transitions**. On the template for creating a new database item, you will still have input boxes for all the fields the user must input. In addition:
   a. **Error Detection**. When creating a new database entry, there must be error handling on all the fields. If the field must be a number, then ensure it is a number. At the very least, you can check that the field in not blank (remember to trim the text to test if it's blank). Design the error feedback so that it directs the user's attention to the right place to correct the error.
   b. **Transitions**. After the user presses "submit" and the data successfully submits, allow the user to either view the item or enter a new item.
      i. At the top of the page it should say, "New item successfully created." With a button or link that says "see it here" (or words to that effect). This links to a page for viewing the item.
      ii. Additionally, the input boxes should clear and the focus should be placed on the first text box so the user is ready to submit another item.
5. **State/Options/Transitions**. There will no longer be a separate /edit/<id> route. Editing will now be done in /view/<id>

   a. For each field that can be edited, create a small edit icon next to it. (at least two fields must be editable – including one that is involves changes the text)
   b. **State Change**. When the user presses the "edit" icon the field to be edited, it must immediately turn editable with a "submit" and "discard changes" option.
   c. **Options.** The chosen text must disappear, and in its place, there should be a textbox or text input with the text they way to edit, with the focus in the input field.
   d. **Transitions**. After the users presses "submit" or "discard changes" the page should go back to how it looked when they were viewing it (and not editing it).
   e. Note: If your "update" was to add a review to a list, you don't need to populate the textbox with any text. You may call it "add review" instead of "edit" if you like.
6. **User control and freedom (Undo)**.
   a. The user should no longer be able to delete entire database items from the search page.





The next step is to become a user interface designer.



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You identify the user

You identify a problem

You find the solution

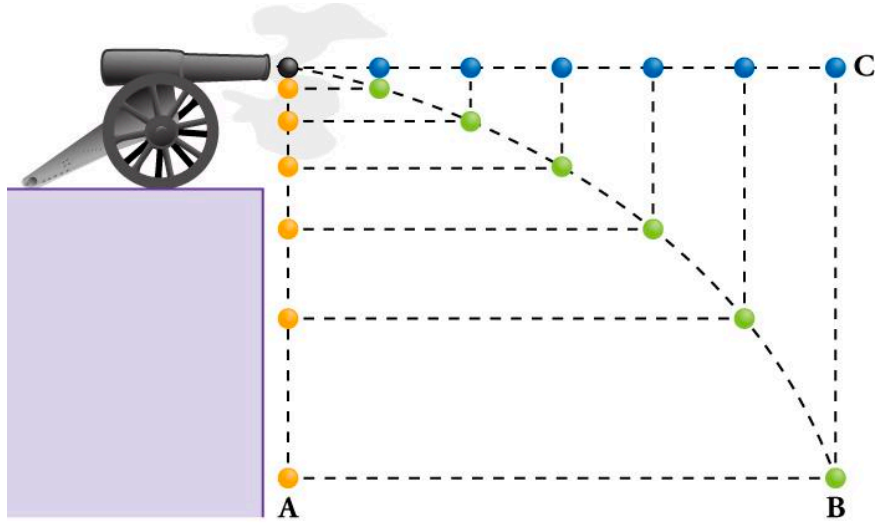
What is design?

A method for understanding & solving people's problems

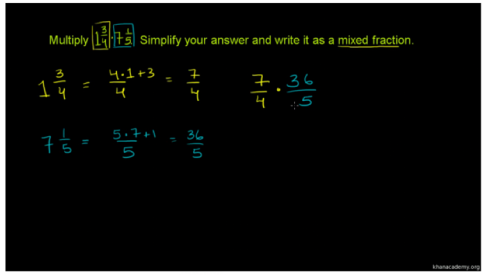
"Design is a plan for arranging elements to accomplish a particular purpose."

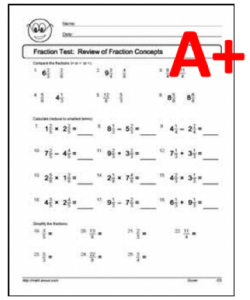
– Charles Eames

Science is a method for understanding the universe

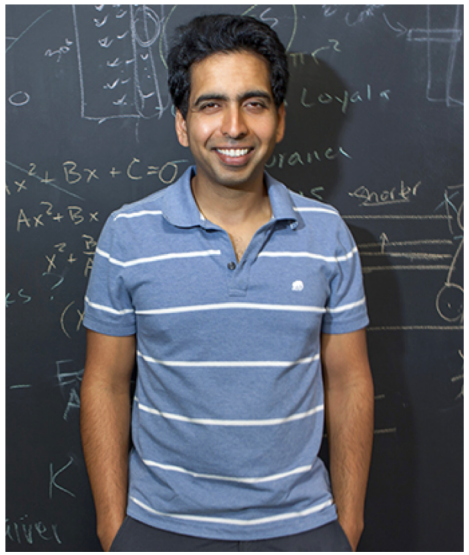


Design is a method for understanding and solving people's problems

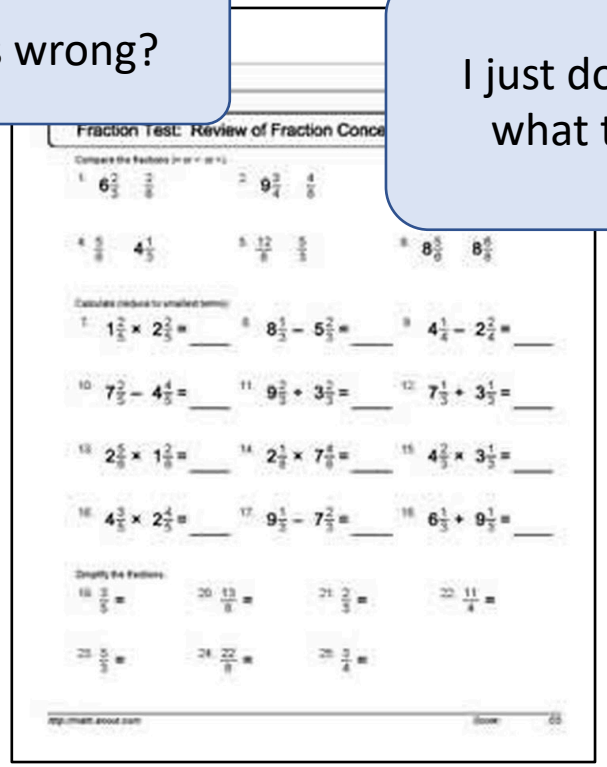




Design is a process where you work with users to understand their problems…

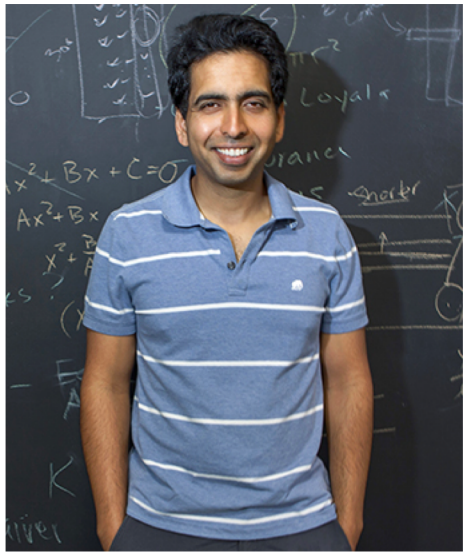


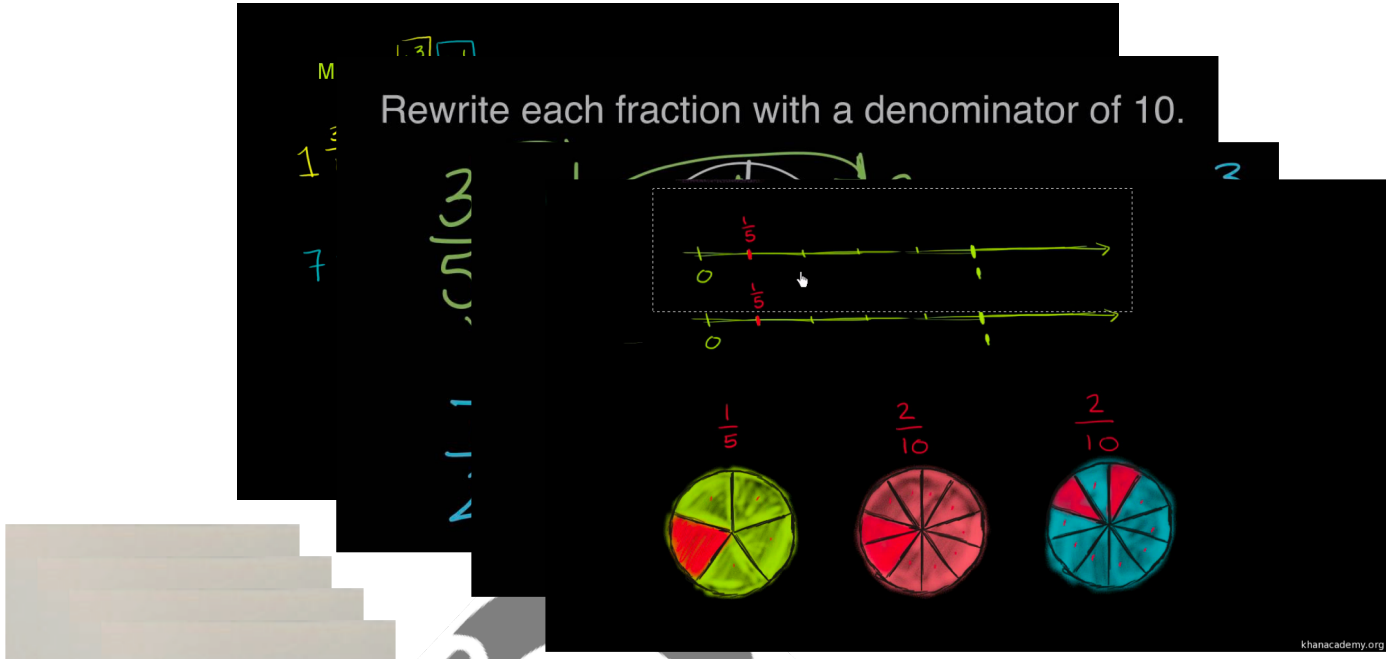
What's wrong?

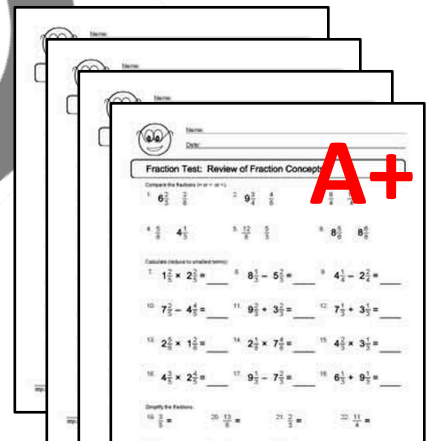


I just don't get what to do.

And test solutions with users until it solves the problem.

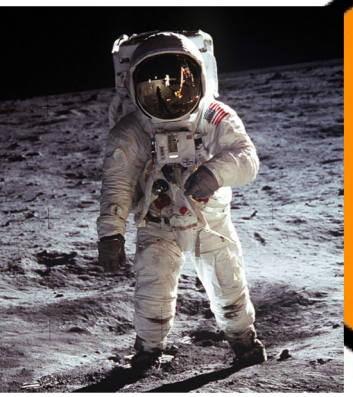






Flare and Focus

The Double Diamond Process



Challenge

- Brainstorm
- Interview
- Research

Synthesize into insights and ideas

Ideas

- Prototype solutions
- Explore technical options

Test them

Product

Understand the problem

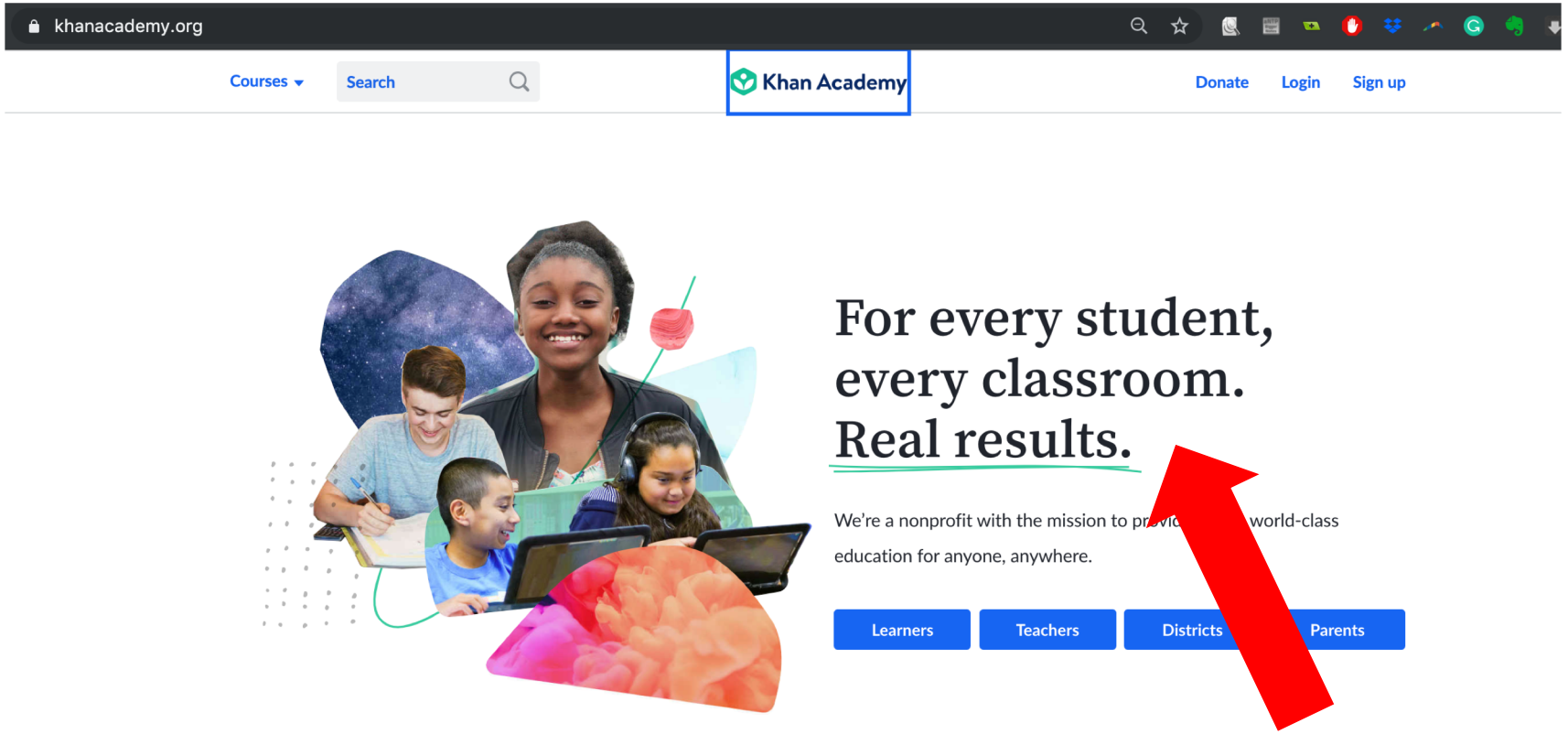
Solve the problem

The three massive mistakes in the design process

1. Starting big.
2. Assuming you understand the problem
3. Assuming the process is linear.

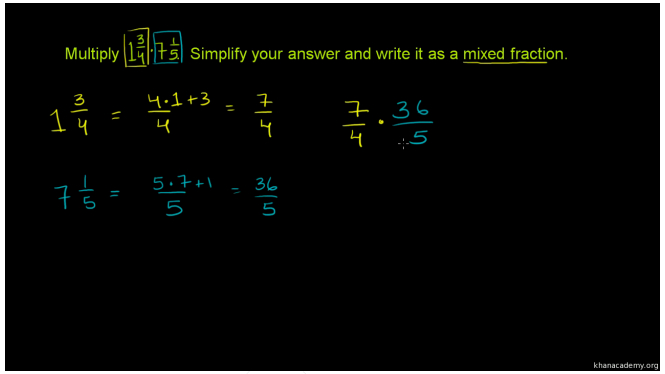
Don’t start big. Start small.

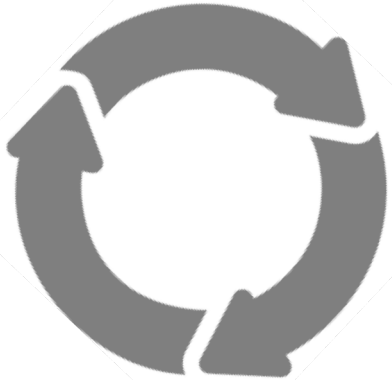
These videos became Khan Academy.

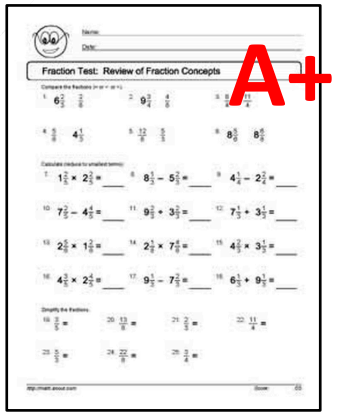


Very general problem

But it started by helping a **person** with a **problem,** and lot of **iteration**







What are the kinds of things Politicians, Beauty Queens, and Silicon Valley *say* they will solve?

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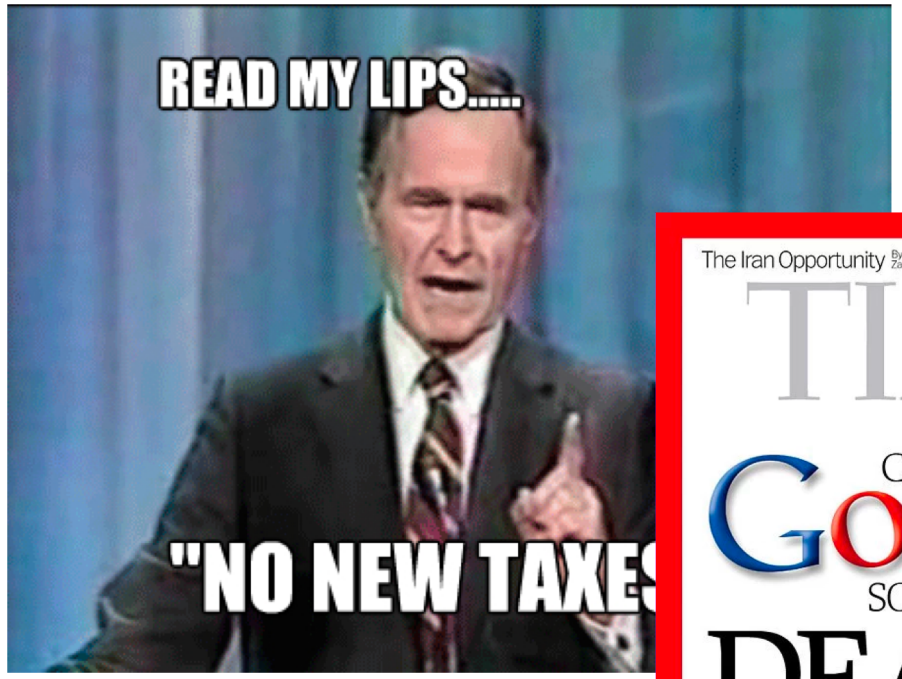
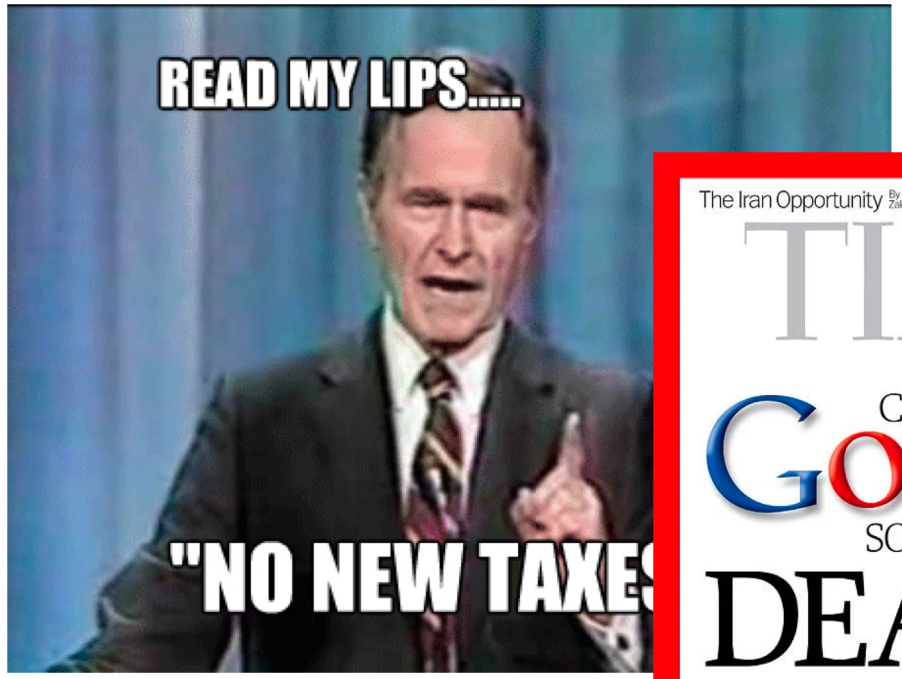


What's appealing about general goals?



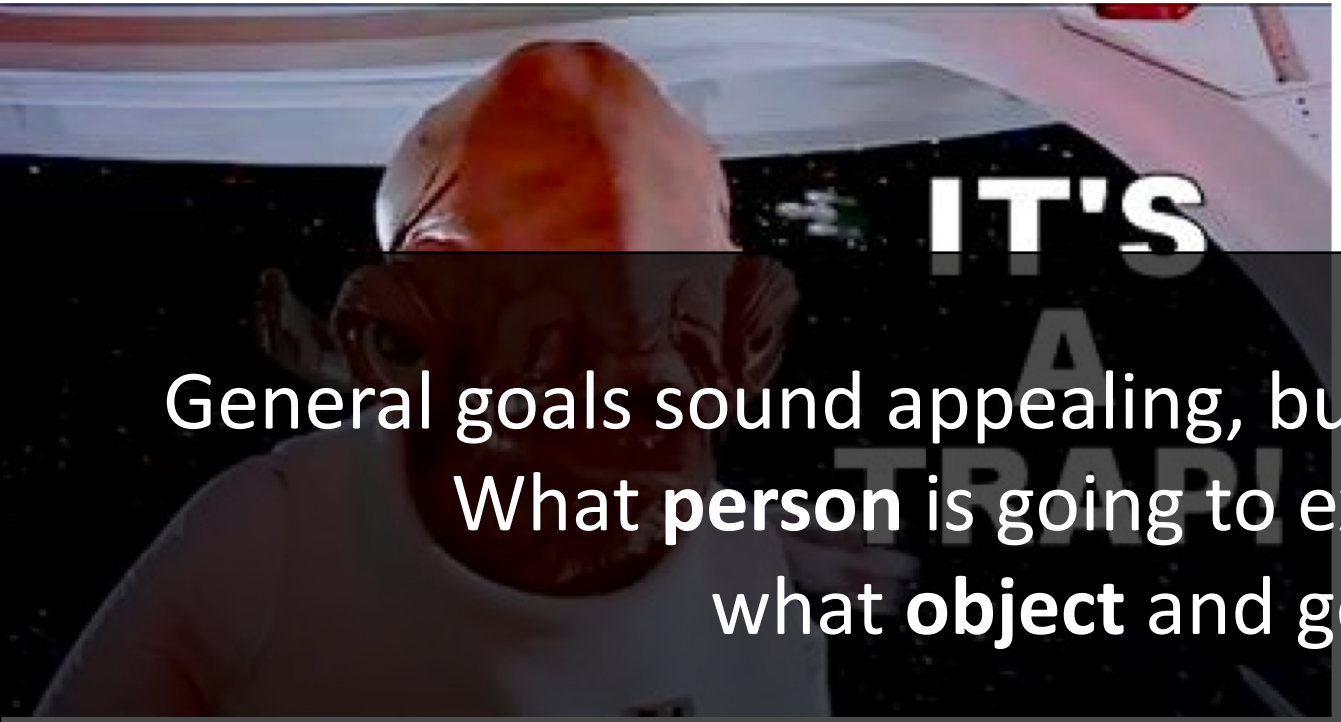
What’s the problem with general goals?

They aren’t actionable.

General Vs. Specific Goals

Goal 1:
“Clean the house.”

Goal 2:
“Fold that basket of laundry.”



General goals sound appealing, but specific goals are actionable:
What **person** is going to execute what **action** on
what **object** and get what **value**?

General goals are actually Domains

Domain:
"Clean the house"

Specific goal:
"Fold that basket of laundry."

What’s the risk with a specific goal?

“Fold that basket of laundry.”

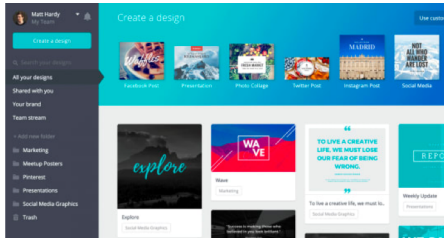
Specific goals can be trivial.

But, if you start specific,
you can usually generalize

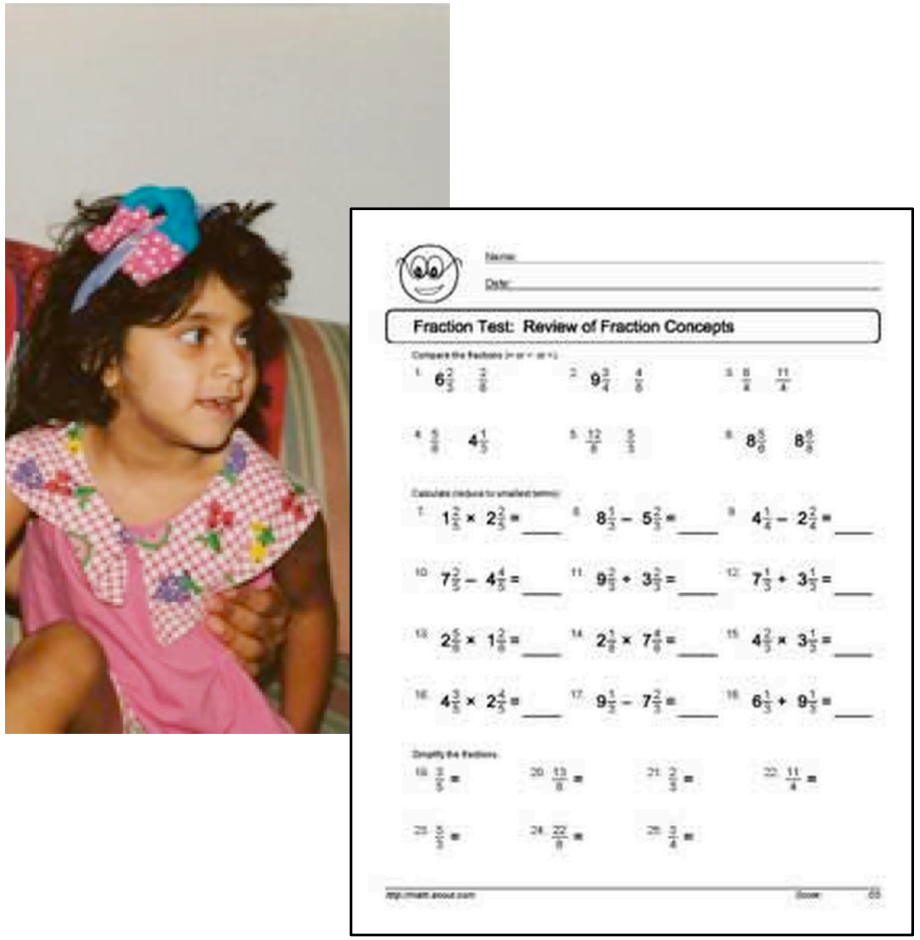
If you start specific, you can usually generalize later.

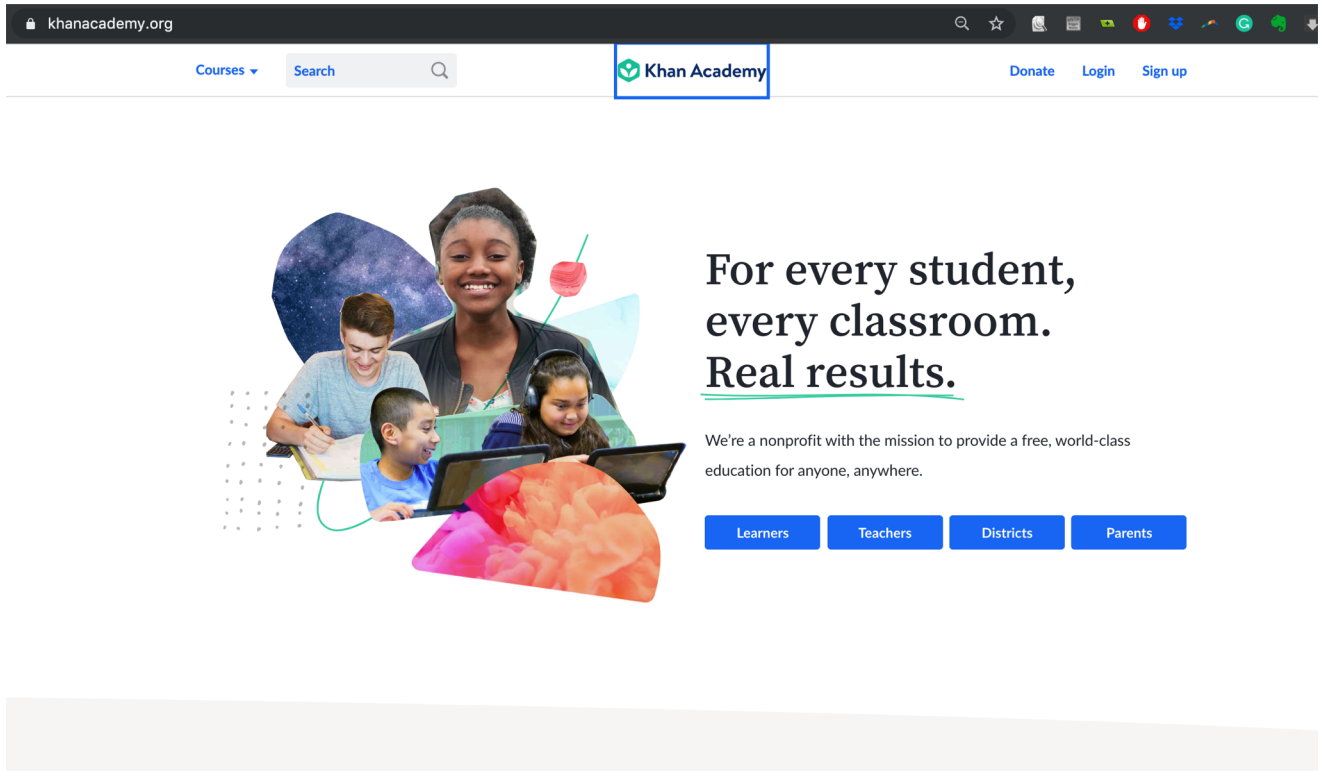
	Domain	Specific Need	Generalized to
amazon	Online shopping	Uncommon books	Clothes,Food, Amazon Fresh Other sellers
facebook	Social Networking	Harvard students looking up dorm, classes, relationship status	Ivy League US Colleges Everybody
Gmail	Read/send Email	No page reload Never Delete	Chat GDrive
Canva	Graphic Design For novices	High School Yearbooks	Posters, flyers, ads

If you start specific, you can usually generalize.



Starting with a specific person and problem allows you to understand the problem and test various solutions.

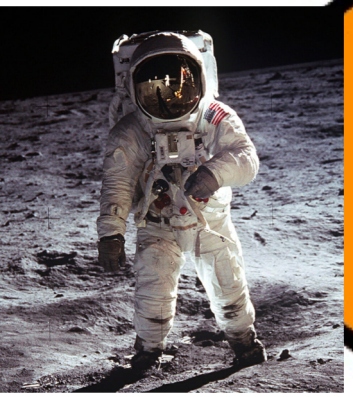




Don’t assume the problem.
Research it.

Flare and Focus

The Double Diamond Process



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Phase 1: Understand the Problem

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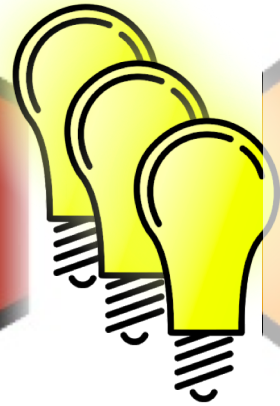

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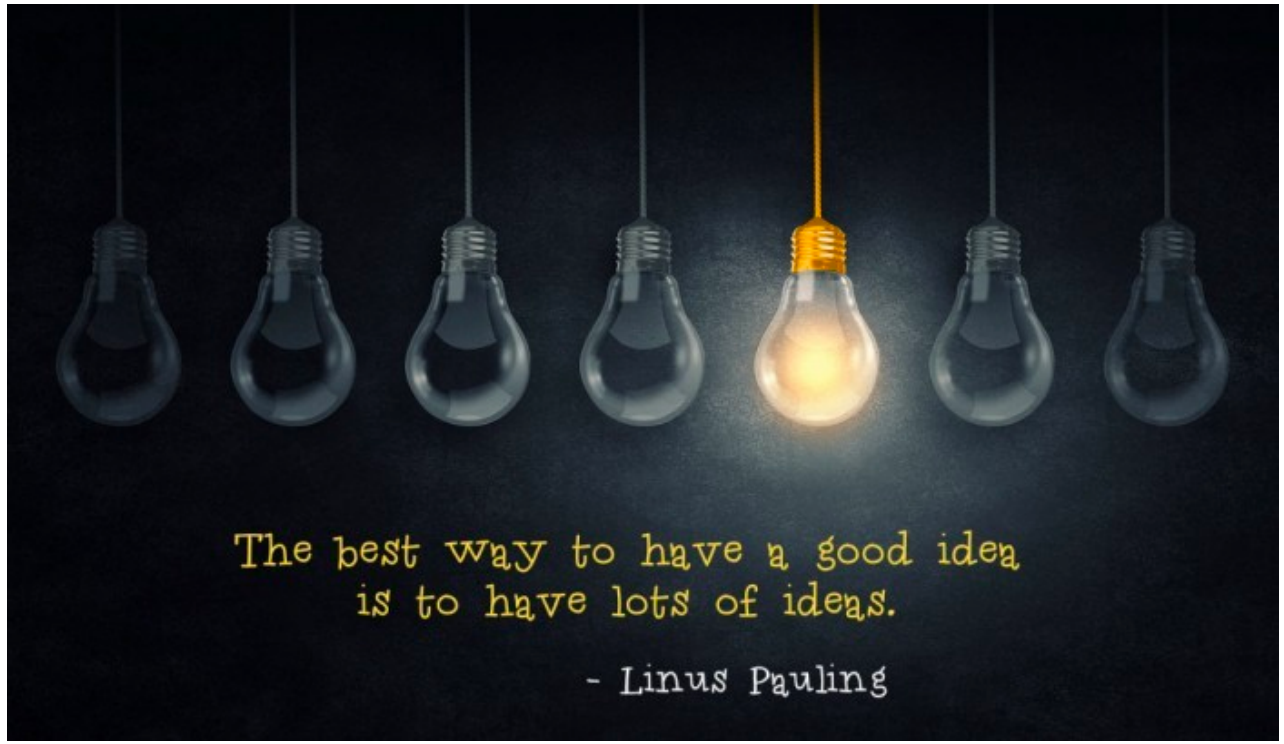
Brainstorm to understand the space of possibilities. What problems might I solve?

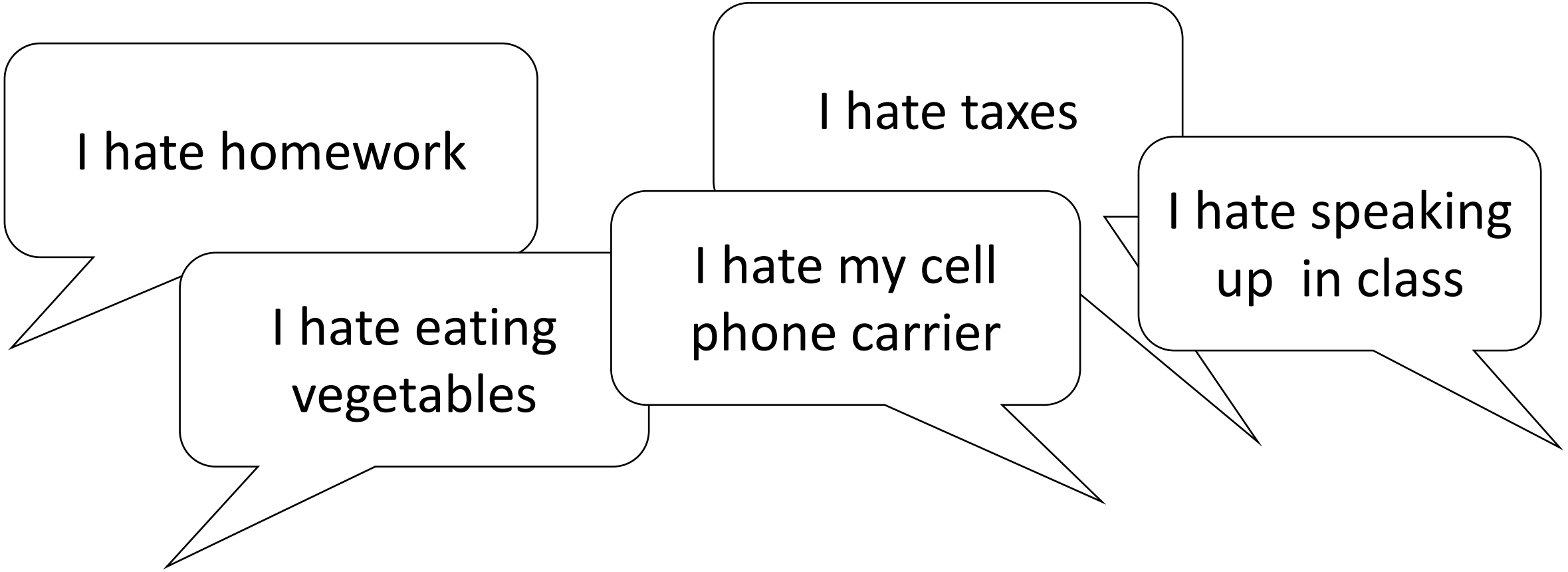


- Cooking
  - Is meat cooked?
  - How prepare sashimi
  - How to fold dumplings!
  - Vegan meat substitutes
  - How to tell if fruit is fresh
- Programming
  - Regular Expressions
  - How to rebase
  - Latex functions
  - GET vs. POST requests in AJAX
- Basketball
  - What's a pick and roll
  - How to shoot a free throw
  - Roles of positions
  - What does the GM do?

Phase 1: Understand the problem

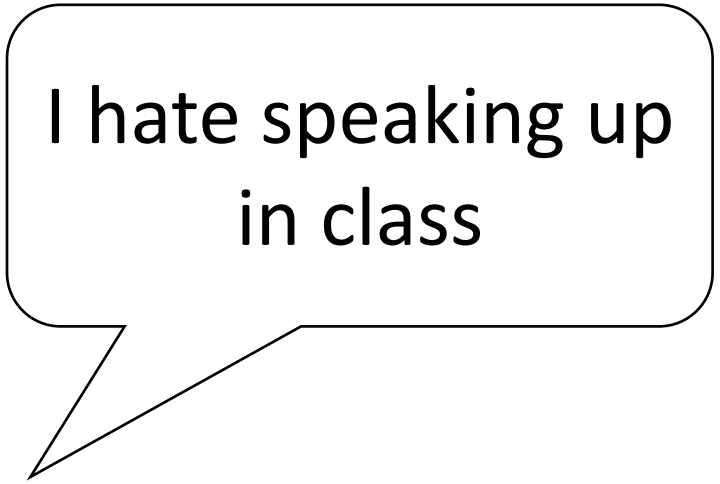
Talk to Users

If you ask “What are your problems?” you get things like this.



These answers doesn’t provide us with the details we need to understand the problem.

To find insights and opportunities to help users, we need to dig into the details of their experience.



What’s the experience of speaking up in class?

Step 1.
Find a real person who has done this recently.

Caroline – a student in User Interface design who is shy, but is forced to participate in class and fill out a form after class to record her participation

Step 2.
Ask them about a **specific time** they did it.

When was the last time you spoke up in class?

- What did you say?
- Why did you decide to speak up then?
- What did it feel like. Easy? Hard? Scary?
- What happened after you spoke up?
- What did you think/feel/say/do?
- Then what?

Don’t ask broad questions like “why don’t you like speaking up in class?”
People are better at accurately recalling a specific incident and reasoning about it.

Student answers to: “Tell me about the last time you participated in class?”

I’m worried my accent won’t be understood

I only saw something if I’m 100% sure of the answer. I don’t like to guess

I’m so nervous about participating that I don’t pay attention

It takes me a few seconds to think of something, and by then you’ve called on someone in the front row.

I always forget to fill out the participation form.

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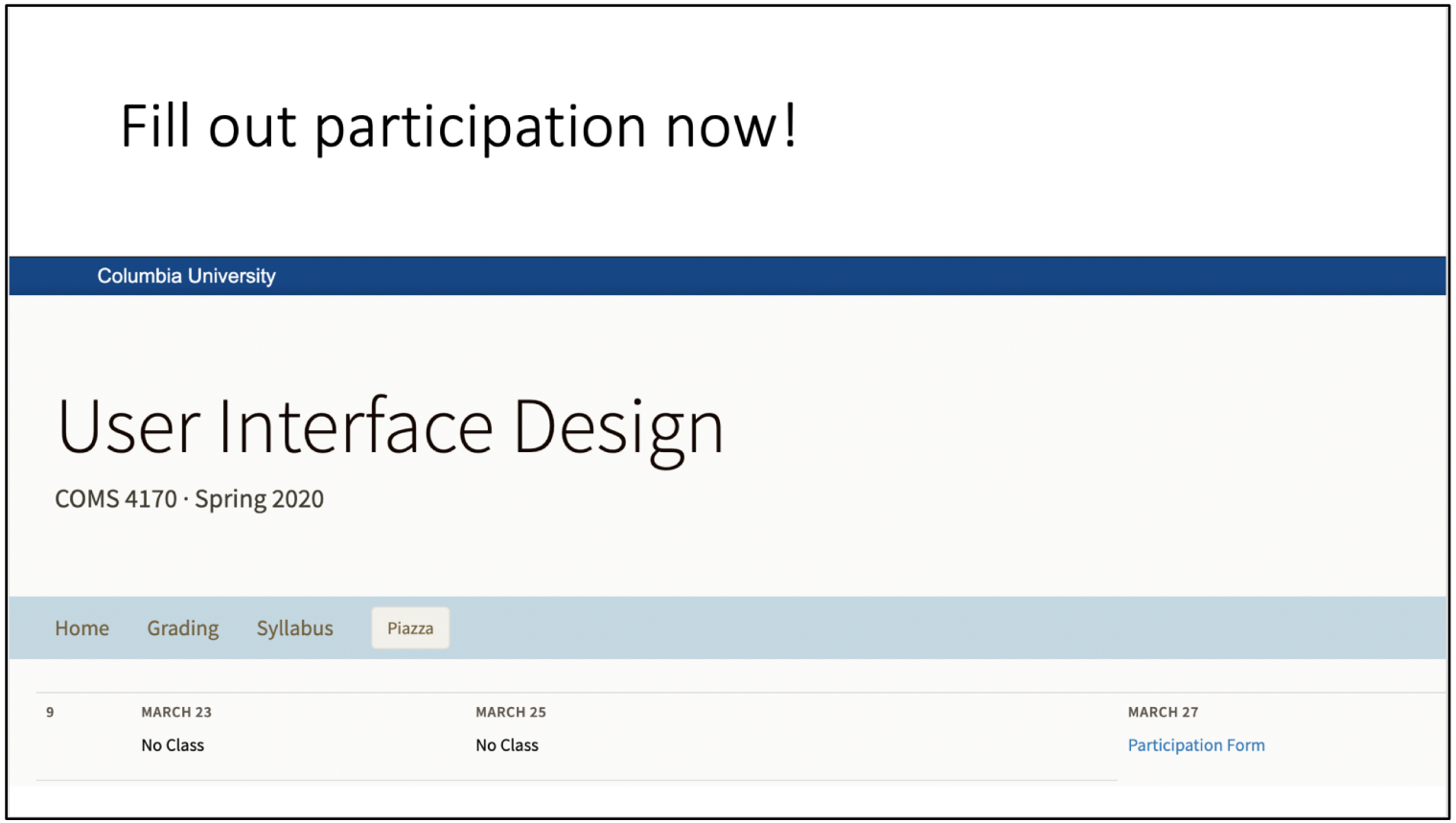
But why is filling the form so hard????



I remind you right after class.
Don't you pull out your phone after class anyway???

There is other stuff to check on my phone that I get sucked into.

I'm running to my next class, and my mind switches tasks

I need a computer to fill it out because I have to be logged in.

I didn't know there was a deadline to fill them out by!!!!!

I fill it out after I go home

Can't I just put it on the homework.

Step 5.
Identify insights, opportunities and metrics.

- Have people just write their participation on the homework.

Homework

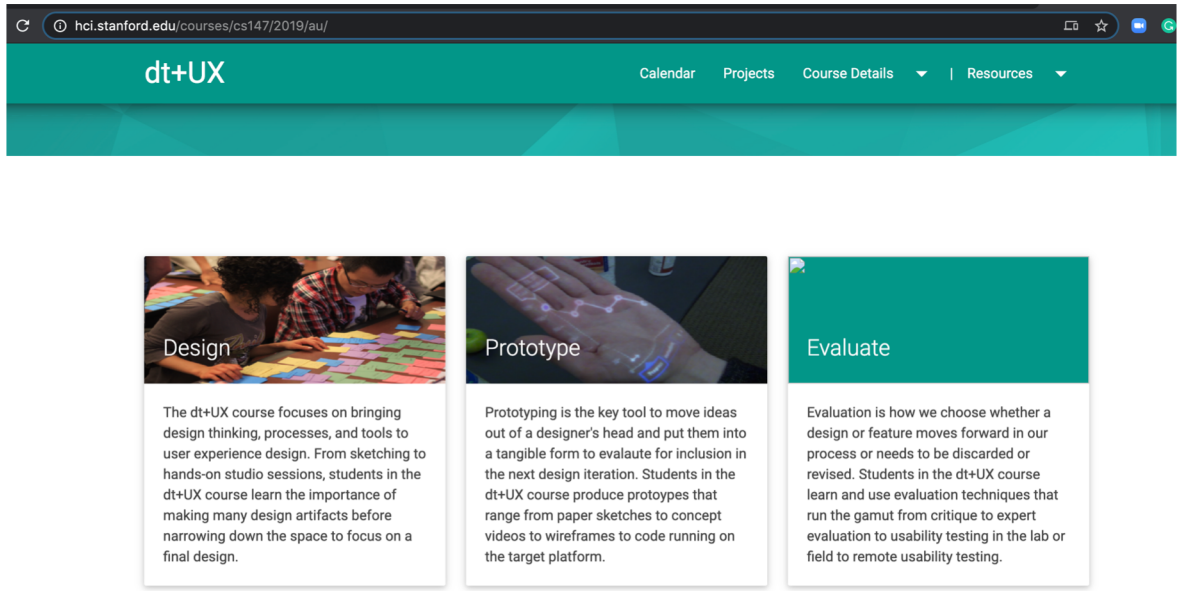
Individual. User Interview: For one of the domains you are considering teaching, find a target user and interview them for ~10-20 minutes.

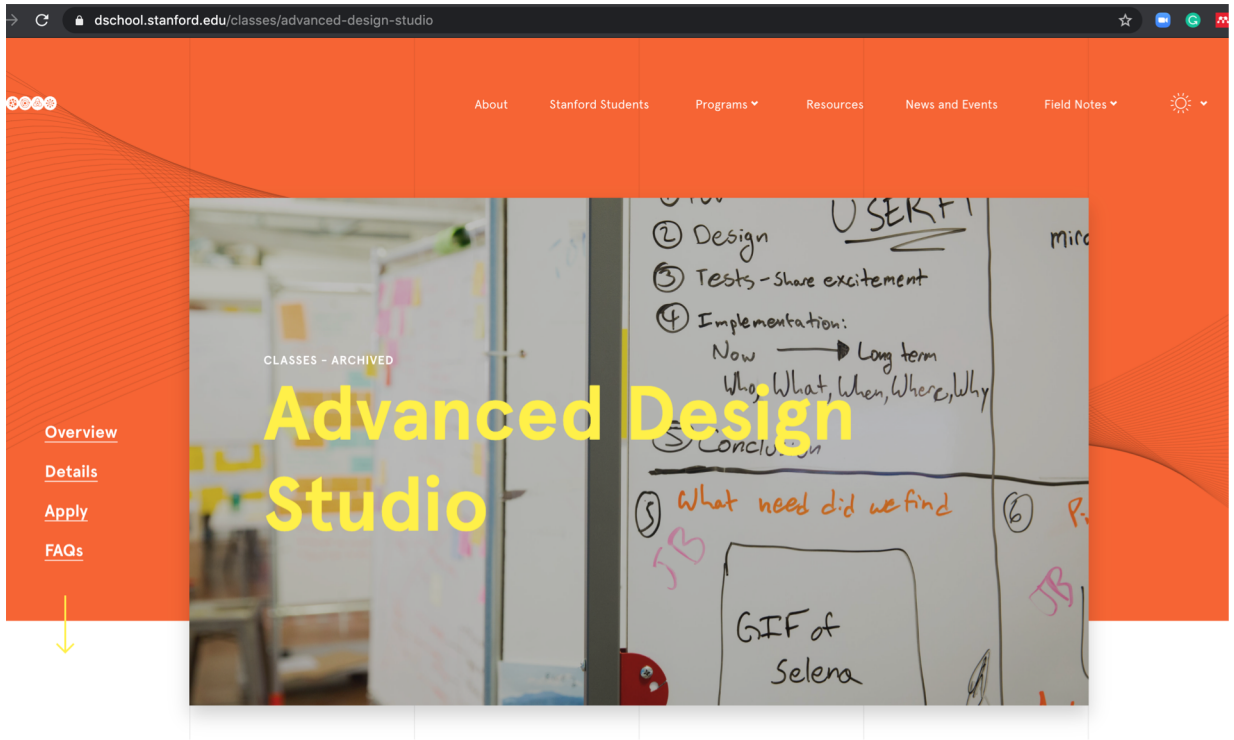
- Get a sense of **what they already know about the topic**,
  - What's hard about it?
  - What might they might be interesting in learning?
- Then, ask them about a **really good learning experience** they had in the past.
- Ask them to describe the **experience**
- Reflect on **what they liked**.
- **Why** did they like it?

Phase 1: Understand the problem

Competitor Analysis

Near Competitors
(other ways of teaching 4170)





Far competitors (other teaching tools)

Khan Academy

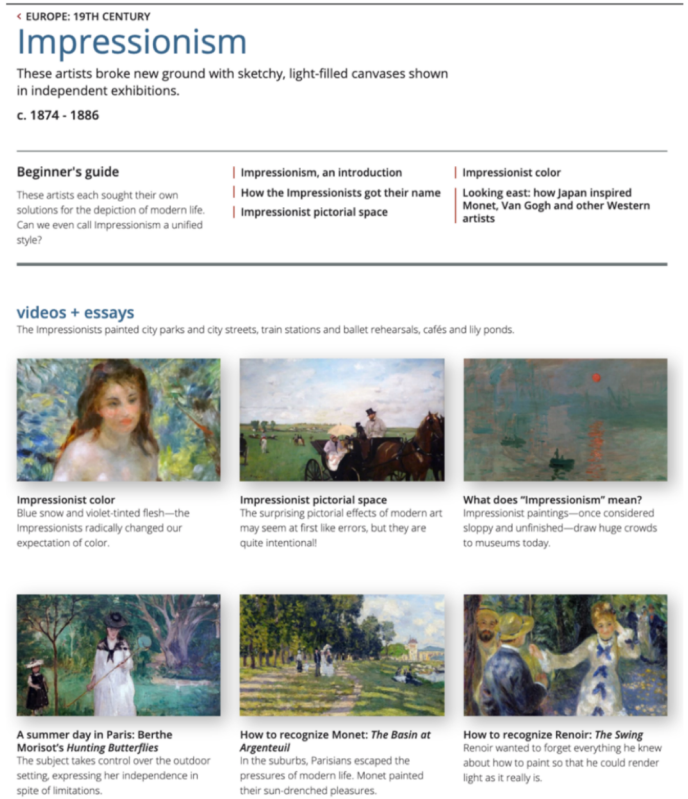
```
1  noStroke();
2  background(79, 45, 214);
3
4  // face
5  fill(255, 242, 0);
6  ellipse(202, 208, 300, 300
7
8  // eyes
9  fill(0, 0, 0);
10 ellipse(157, 151, 40, 40);
11 ellipse(304, 142, 40, 40);
12
13 // mouth
14 fill(255, 0, 0);
15 ellipse(257, 240, 120, 136);
16
17 // headband
18 stroke(191, 0, 255);
19 strokeWeight(37);
20 line(80, 115, 270, 75);
21
```

Homework

1. **Individual. Competitor Analysis**: What are 5 existing products that allow you to learn with interactions, and feedback.
    1. What topic does it teach?
    2. Who is the target?
    3. What media does it use to help people learn?
    4. What is a major way it uses interaction to help people learn
    5. What are **3 things you like** about it?
    6. What are **3 things that could be better?**

Competitors for teaching people to differentiate impressionism from post-impressionism

ii.



‹ EUROPE: 19TH CENTURY

Impressionism

These artists broke new ground with sketchy, light-filled canvases shown in independent exhibitions.

c. 1874 - 1886

Beginner's guide

These artists each sought their own solutions for the depiction of modern life. Can we even call Impressionism a unified style?

- Impressionism, an introduction
- How the Impressionists got their name
- Impressionist pictorial space
- Impressionist color
- Looking east: how Japan inspired Monet, Van Gogh and other Western artists

videos + essays

The Impressionists painted city parks and city streets, train stations and ballet rehearsals, cafés and lily ponds.

Impressionist color
Blue snow and violet-tinted flesh—the Impressionists radically changed our expectation of color.

Impressionist pictorial space
The surprising pictorial effects of modern art may seem at first like errors, but they are quite intentional!

What does "Impressionism" mean?
Impressionist paintings—once considered sloppy and unfinished—draw huge crowds to museums today.

A summer day in Paris: Berthe Morisot's *Hunting Butterflies*
The subject takes control over the outdoor setting, expressing her independence in spite of limitations.

How to recognize Monet: *The Basin at Argenteuil*
In the suburbs, Parisians escaped the pressures of modern life. Monet painted their sun-drenched pleasures.

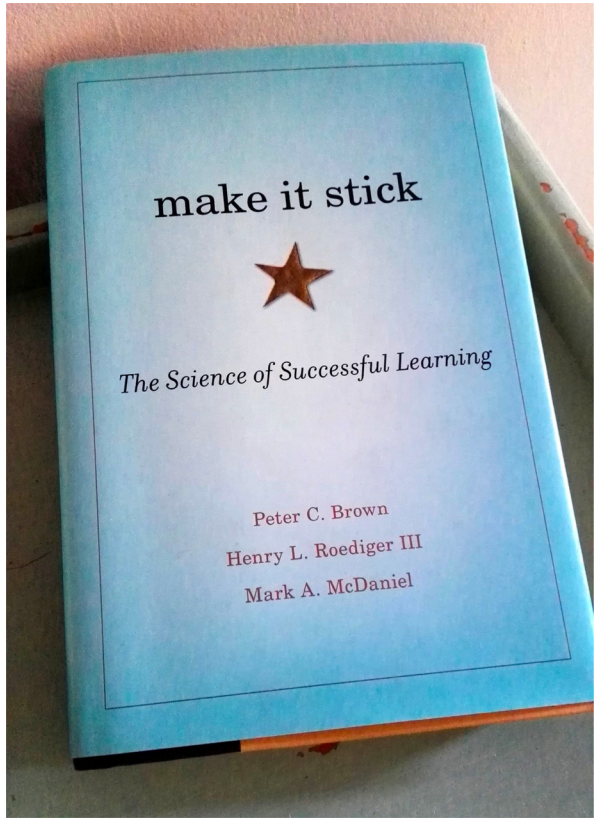
How to recognize Renoir: *The Swing*
Renoir wanted to forget everything he knew about how to paint so that he could render light as it really is.

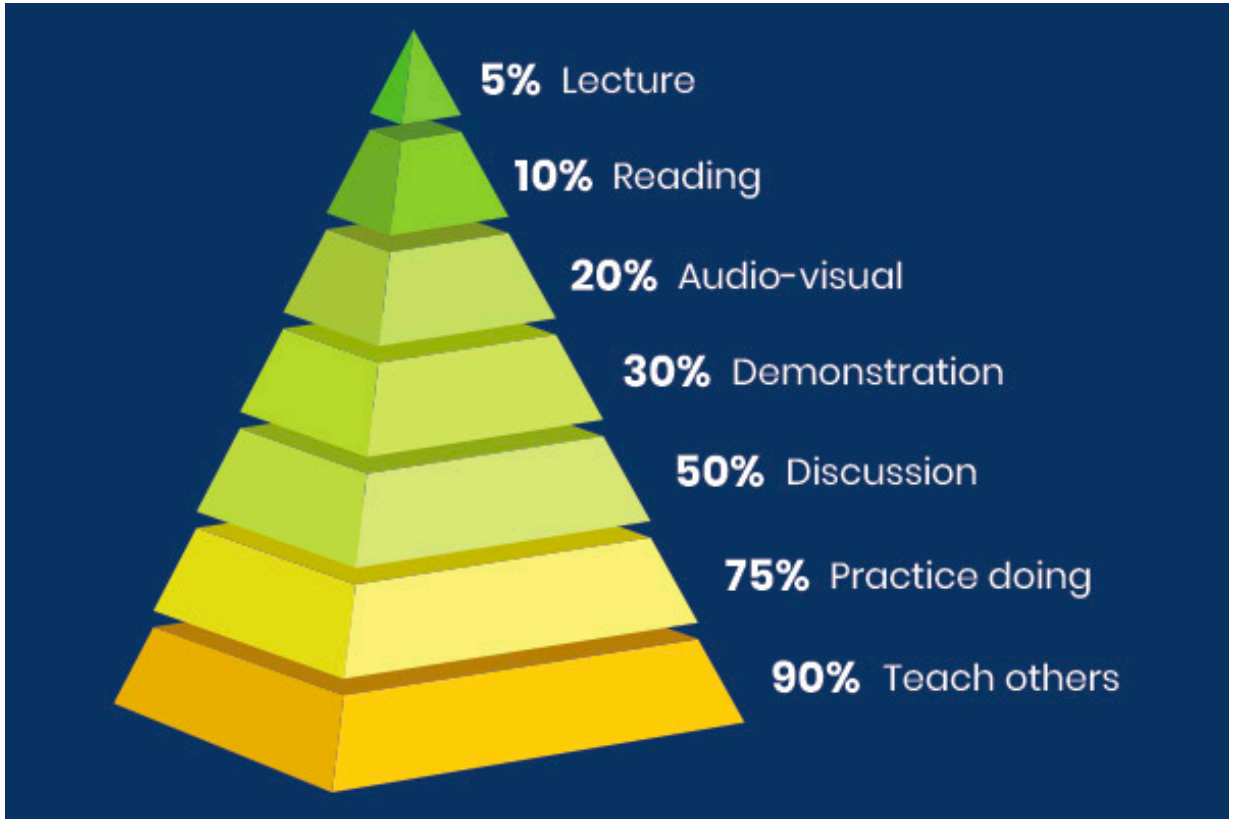
iii. I like how the site lists paintings and explains the aspects that make it impressionist or post-impressionist, not just the general biography/context of the work, which really helps when trying to distinguish between styles. I also like the layout and how there key points and example paintings are all in one place for each movement, making the learning easier to navigate.

Phase 1: Understand the problem

Academic Research

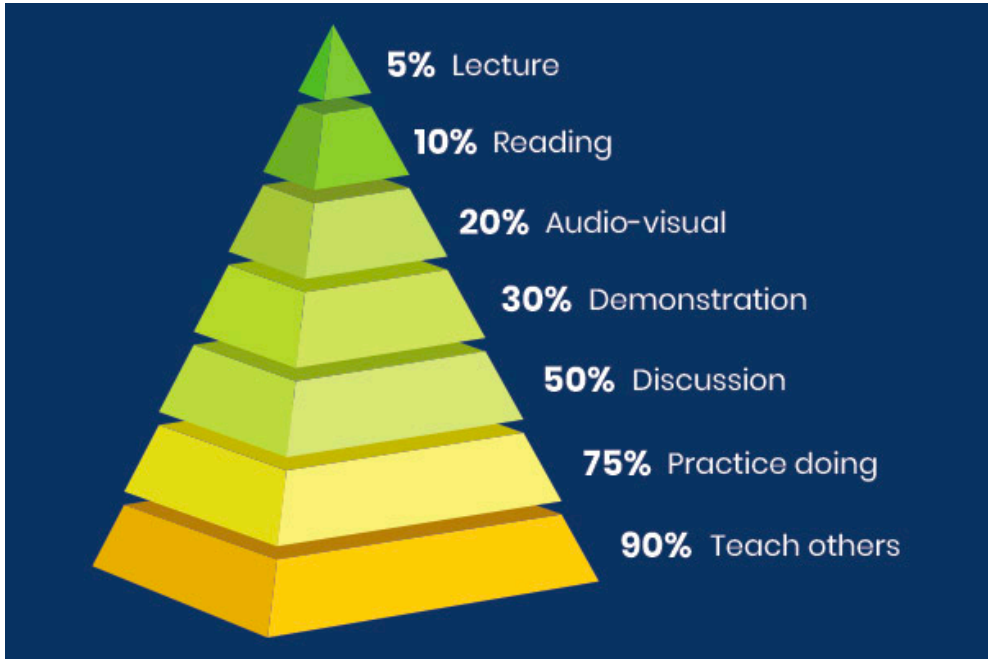
Read books, papers, theories, scientific evidence to get insights into the problem.





Educational insight #1:

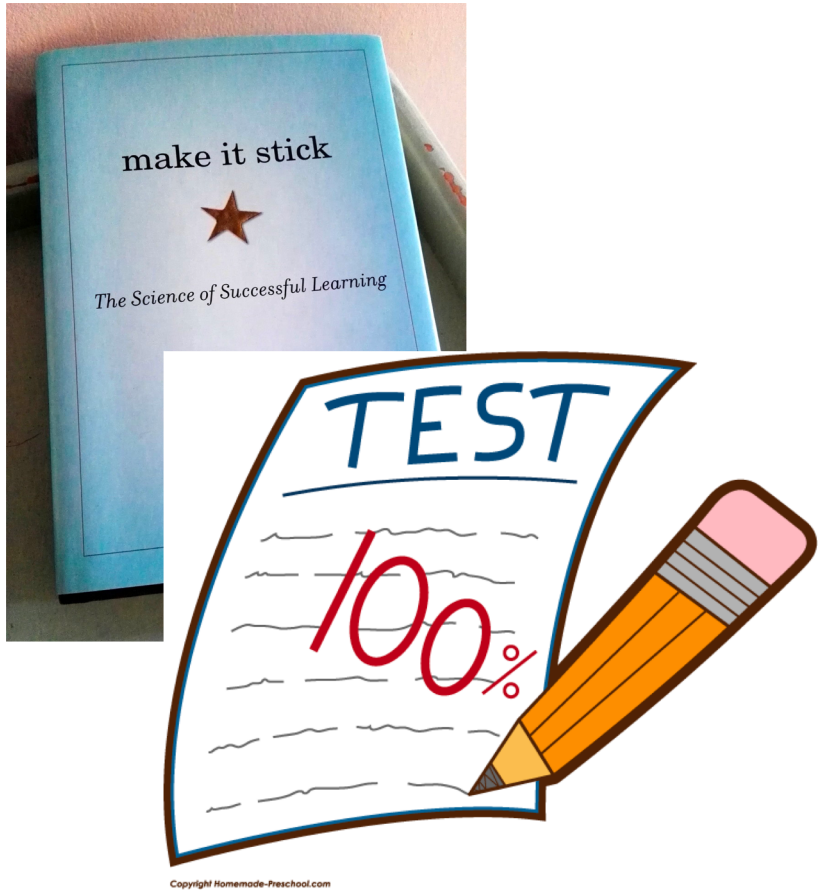
Reading textbooks is boring. Nobody learns from that. People learn by practicing - from doing something and getting feedback.



- Design and build a **web** application
- That allows a user to **interact** with media
- Within a **domain of your choosing**
- To help a user learn an introductory topic **interactively**
- And help them assess themselves with a **quiz**.
- And keep learning through **feedback** from the quiz.
- In under **10 minutes** total

Educational insight #2:

Students are terrible at assessing their learning. They need tools to assess themselves.



- Design and build a **web** application
- That allows a user to **interact** with media
- Within a **domain of your choosing**
- To help a user learn an introductory topic **interactively**
- And help them assess themselves with a **quiz**.
- And keep learning through **feedback** from the quiz.
- In under **10 minutes** total

Insights and opportunities can come from anywhere. Just observe and ask why?

In academic studies

Why didn't Aristotle try any of his theories like Galileo did?

During everyday activities

How do baristas manage to serve all these assholes?

In the things you find fun

How does Popovic always construct a playoff team and the Knicks can't win shit?

Everyday activity: changing the thermostat?

Why do I have to set this stupid thing constantly?

Real ideas behind applications you use.

Problem	Idea
Teaching fractions	Workbooks suck. I'm going to show people how I think through them problem.
Making yearbooks	Photoshop is HARD, and sharing resources is annoying. Maybe some online templates can make this easier.
Social network for photos.	People take crappy photos and are not too eager to share them. What if filters made every photo beautiful?

Phase 2: Solve the Problem

Challenge

- Brainstorm
- Interview
- Research

Synthesize into insights and ideas

Ideas

- Prototype solutions
- Explore technical options

Test them

Product

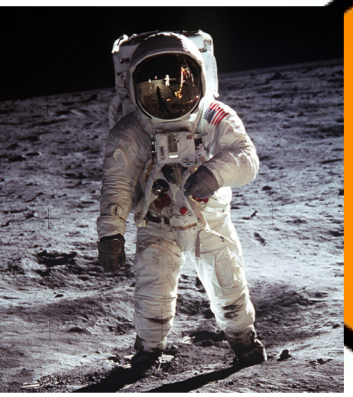
Understand the problem

Solve the problem

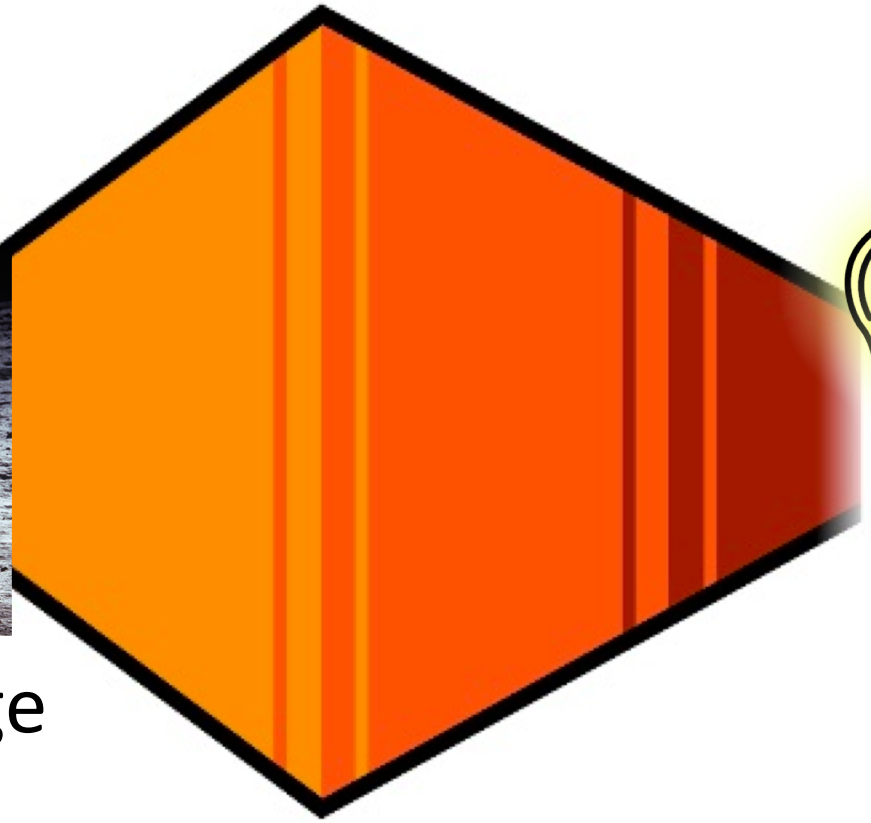
Design isn’t linear. It’s iterative.

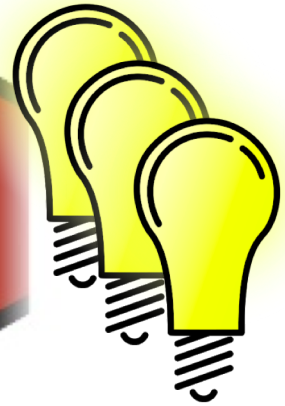
People expect implementation to be linear

Expectation



Challenge





Ideas

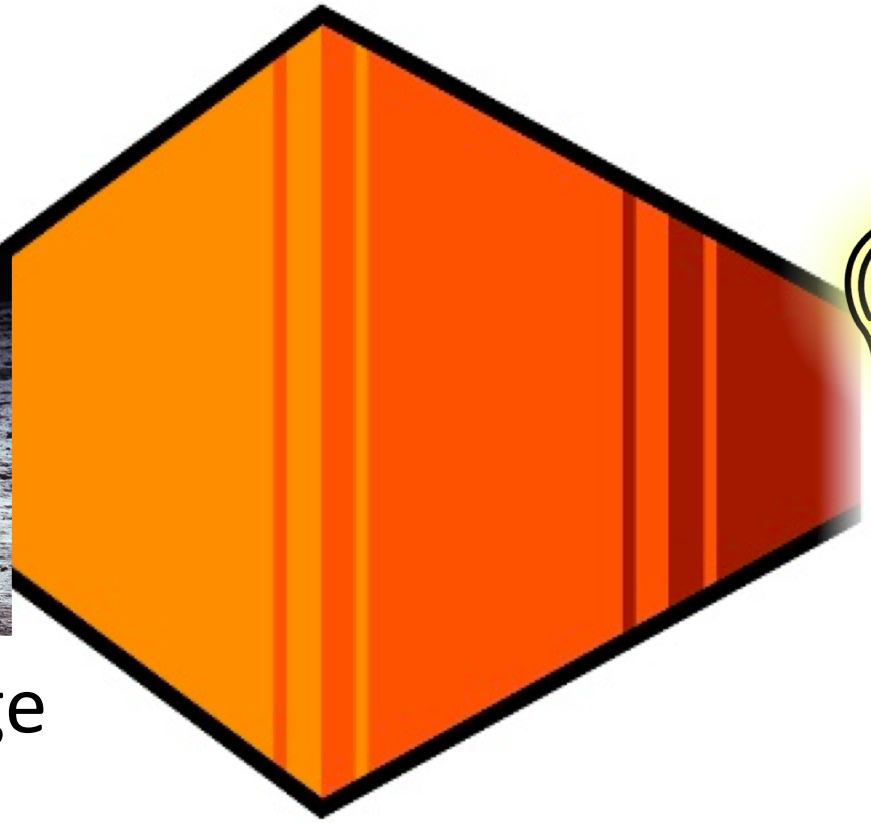
Product

Ideas

Implementation

Instead, implementation is iterative.

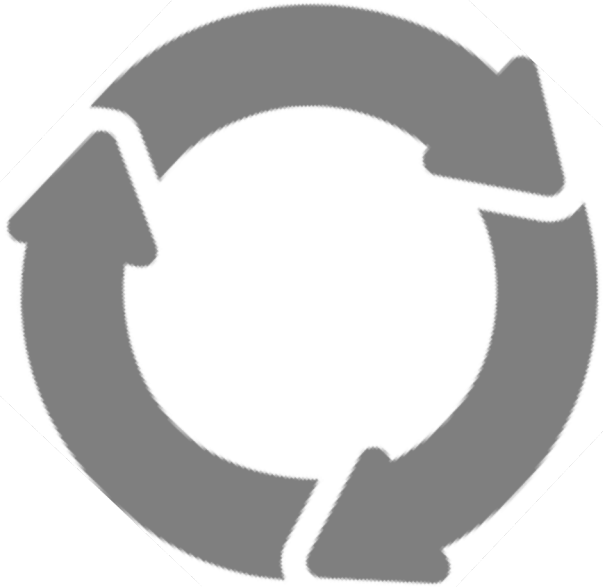
Challenge



Ideas

Ideas

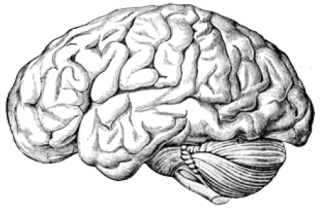
Reality



Implementation

Product

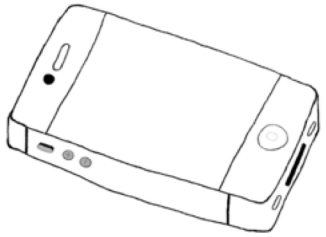
The Waterfall Model of software design



Idea

Requirements

- One button
- Touch screen
- Soft keyboard



Design

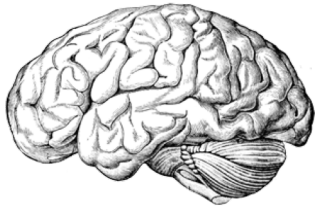
Implement

Fix bugs

Ship it

Product

The Waterfall Model: What's good about it?



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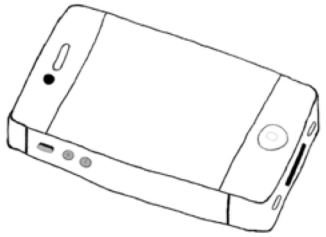


Design

Implement

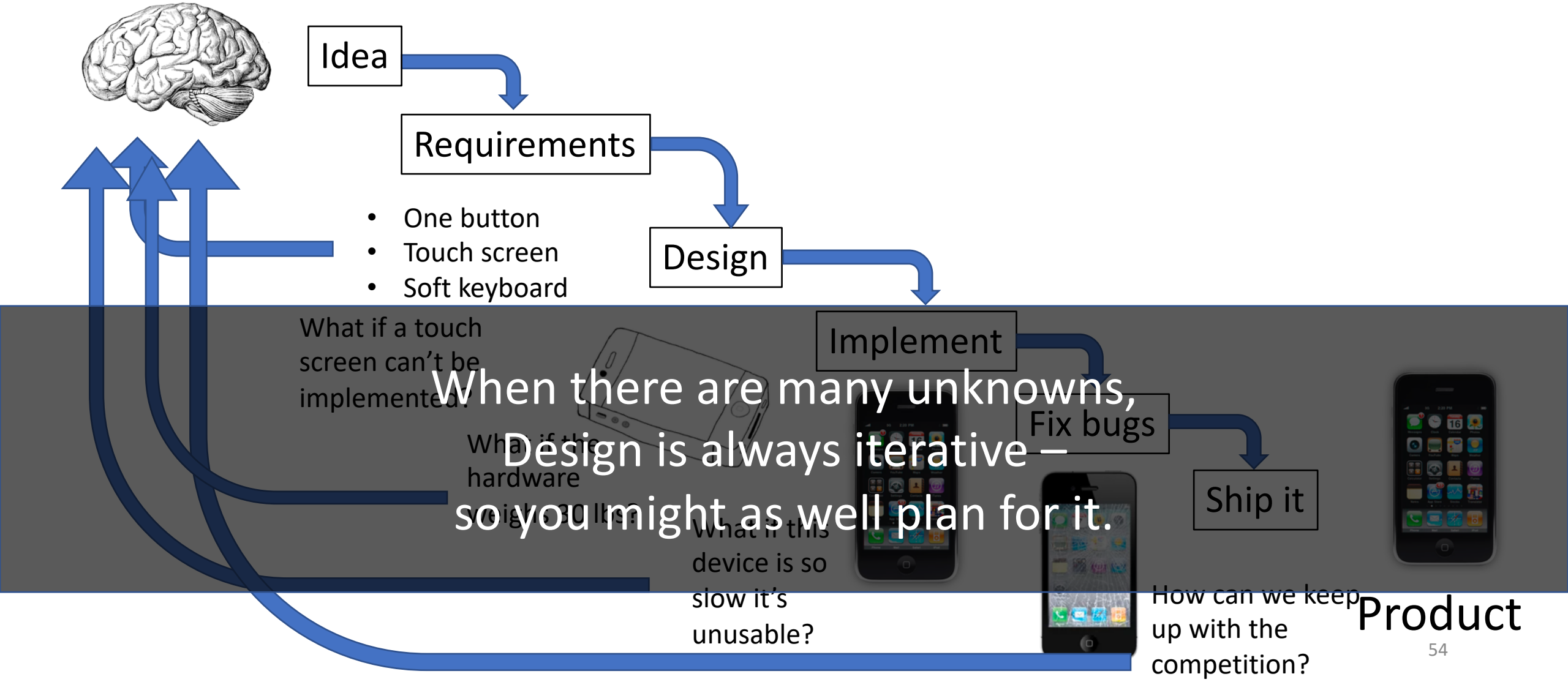
Fix bugs

Ship it

Product

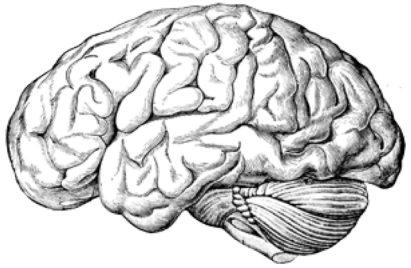
It's simple, linear, and the steps are certain

The Waterfall Model: What could go wrong?

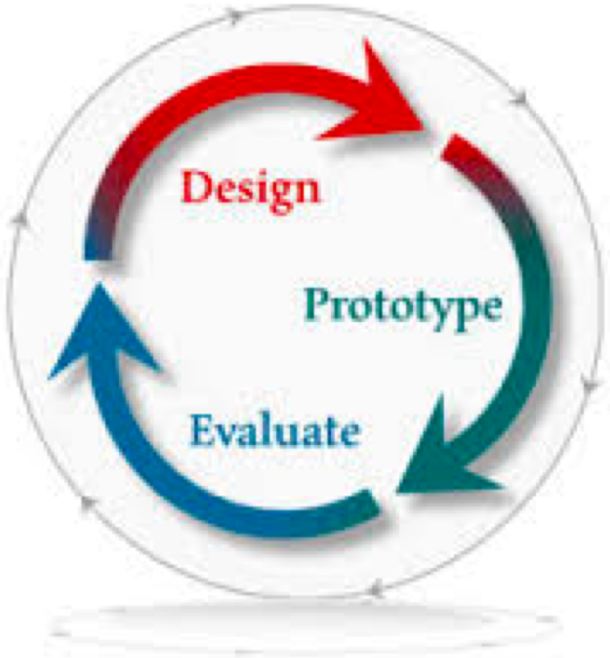


When there are many unknowns,
Design is always iterative –
so you might as well plan for it.

Iterative Design

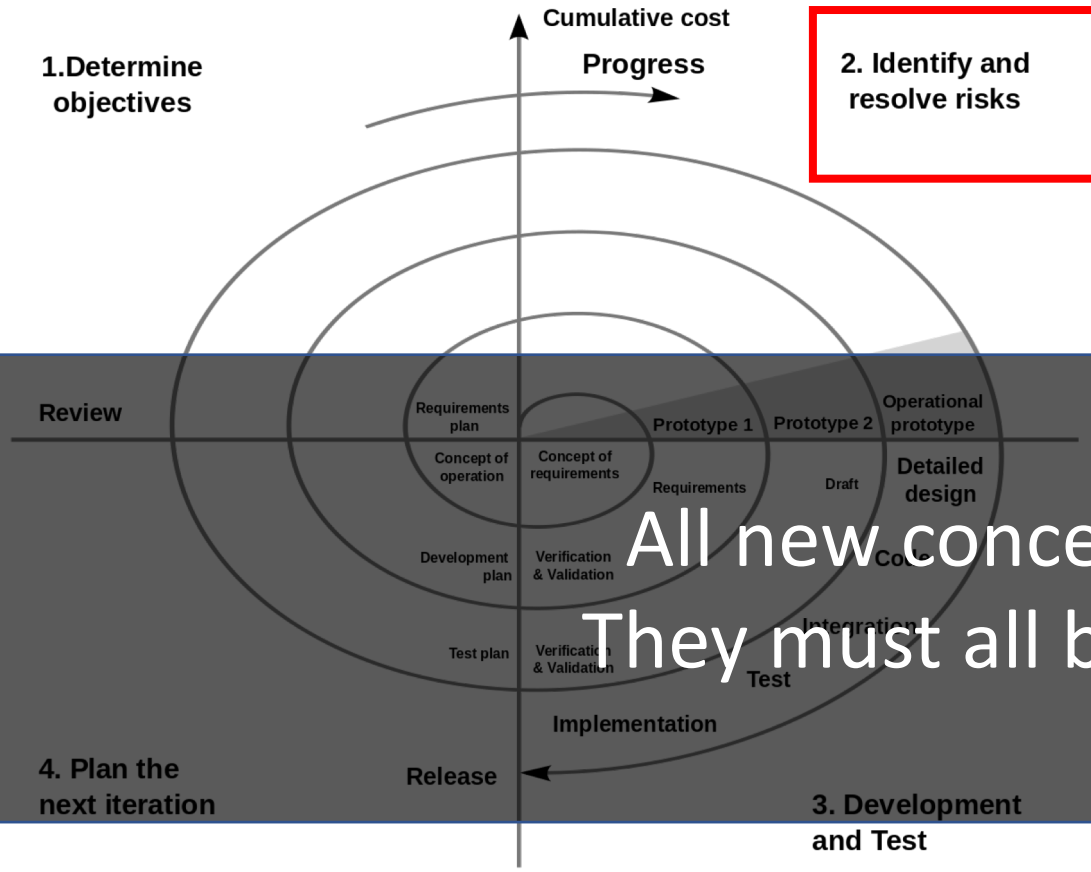


Idea



Product

Iterative Design origins:
Spiral Model of software engineering (Barry Boehm, 1988)

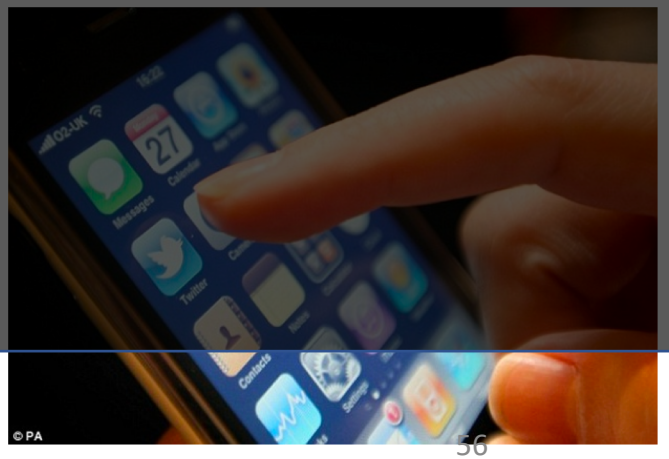


Every iteration should experiment with the next biggest risk.

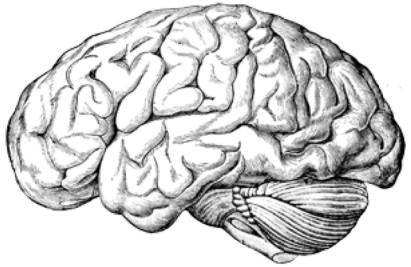
How to achieve the perfect gradient on app icons?

Does touch work?

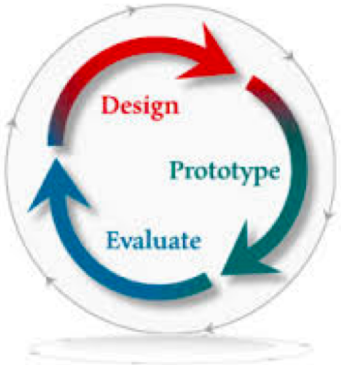
All new concepts are risks.
They must all be prototyped.



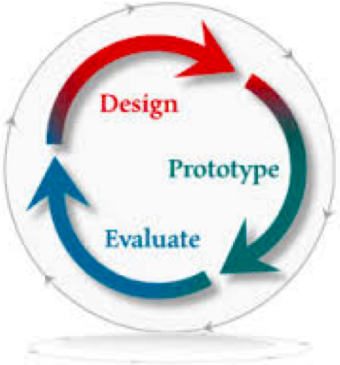
To minimize risk on novel designs, Use iteration on each risky aspect of the design



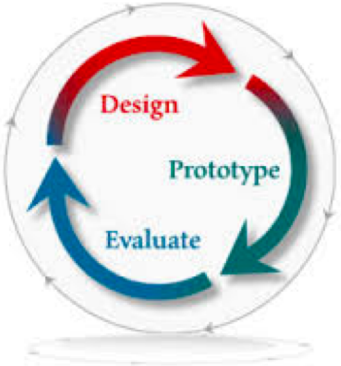
Idea



Touch screen



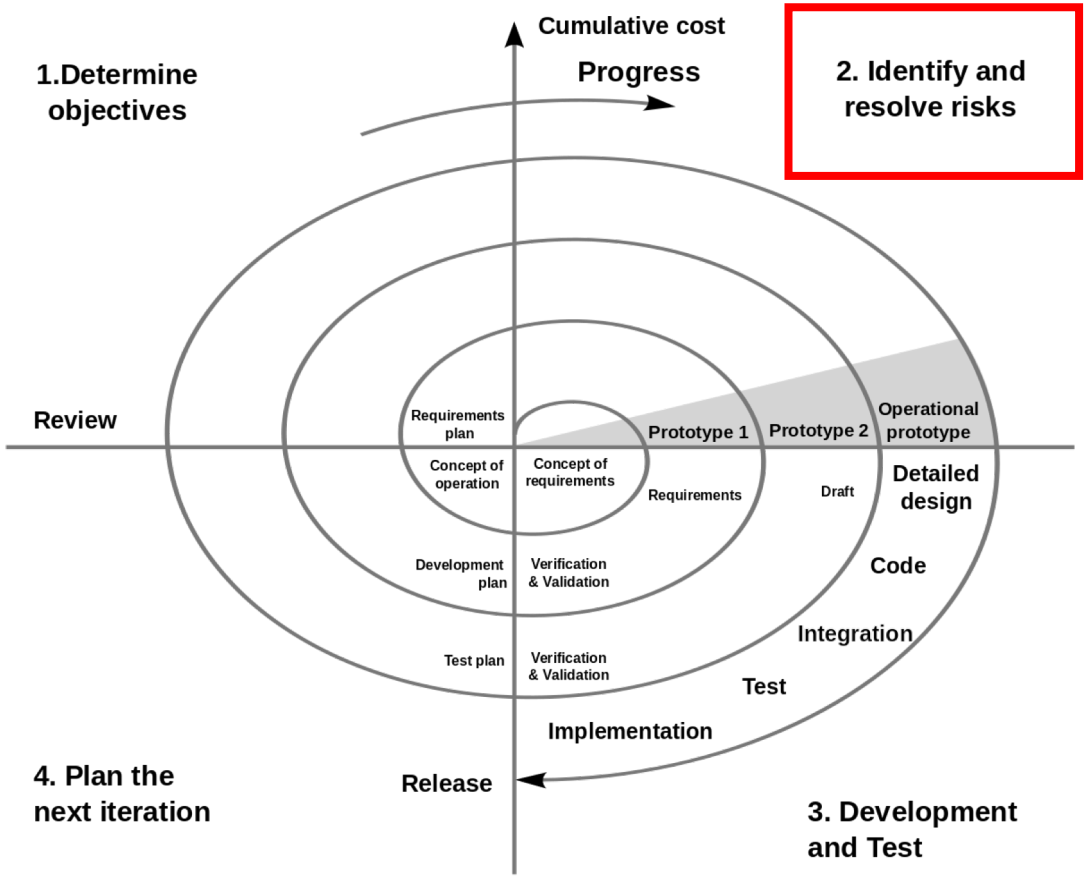
Soft keyboard



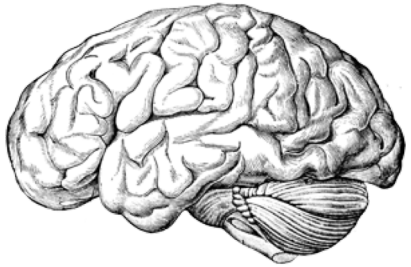
One button

Product

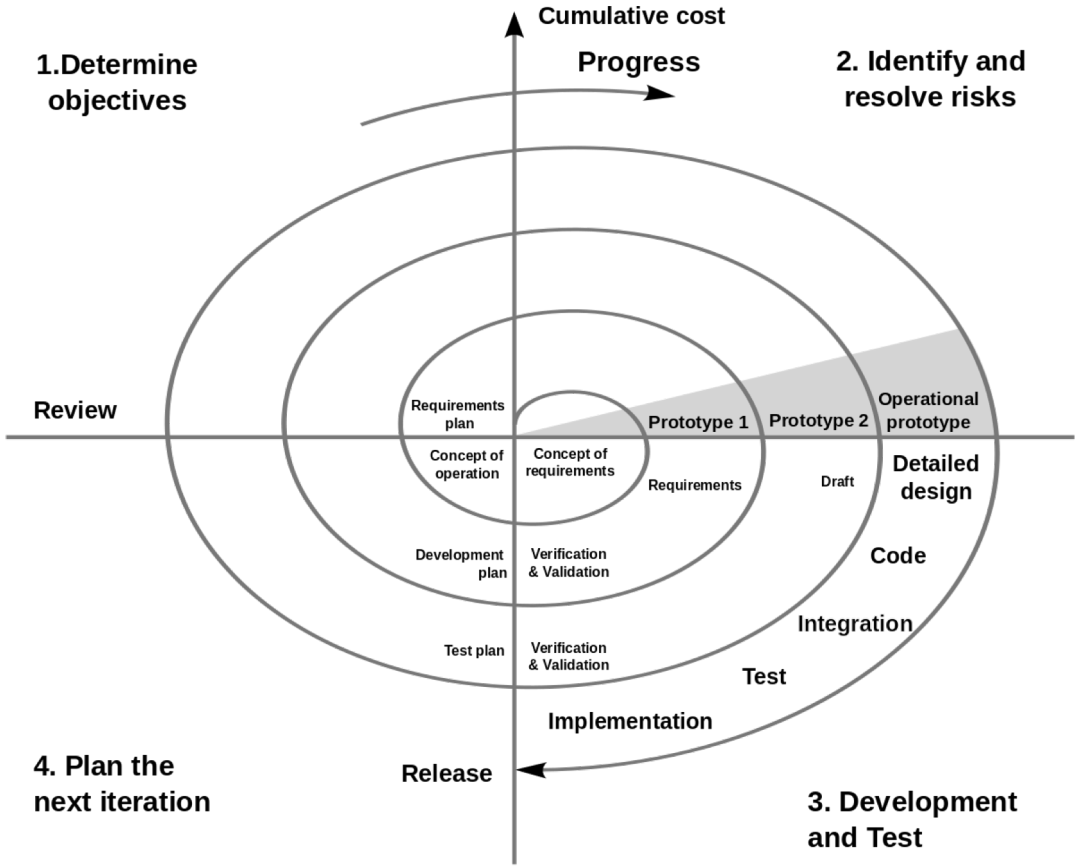
Iterative Design is good because it minimizes risk



Iterative Design: what's hard about it?



Idea

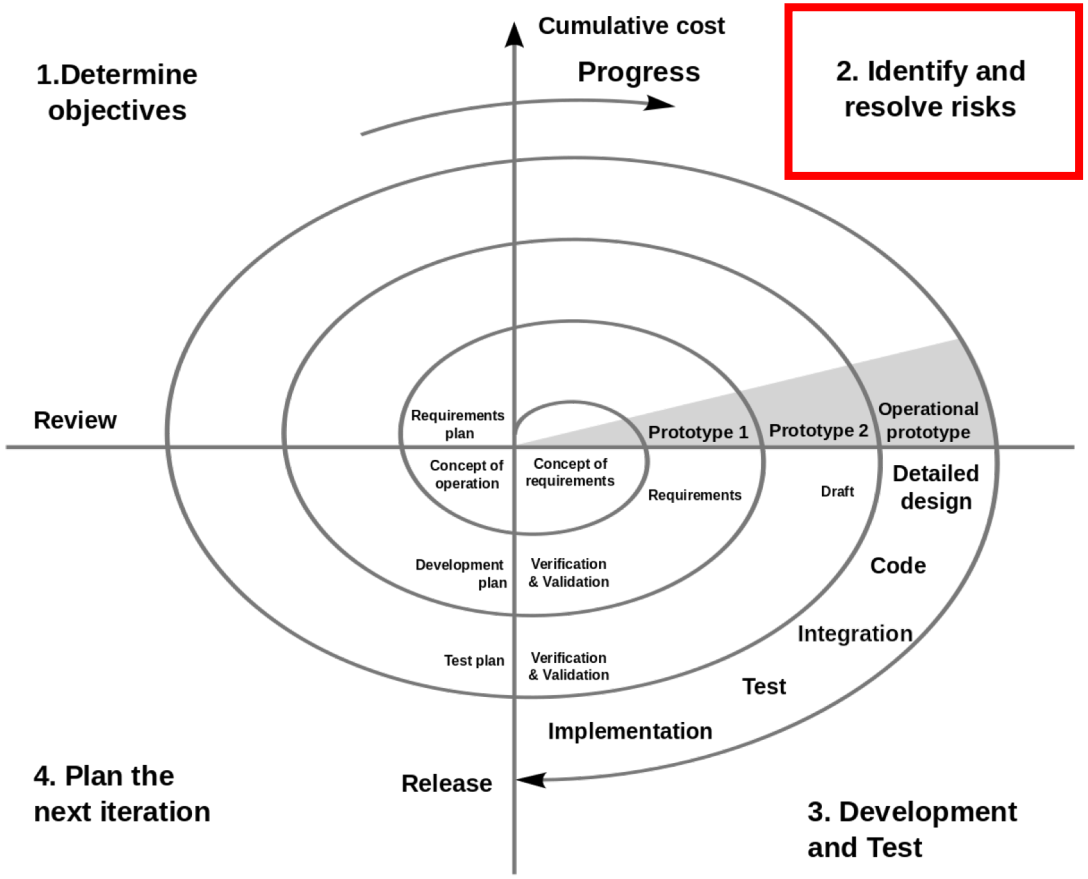


Product

The steps aren't certain from the start.

Low-Fidelity Prototypes

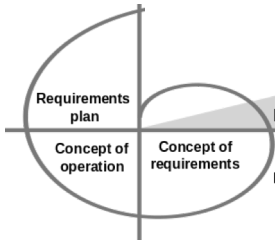
Iterative Design is good because it minimizes risk



The first iteration should be as **low-fidelity** as possible

1.Determine objectives

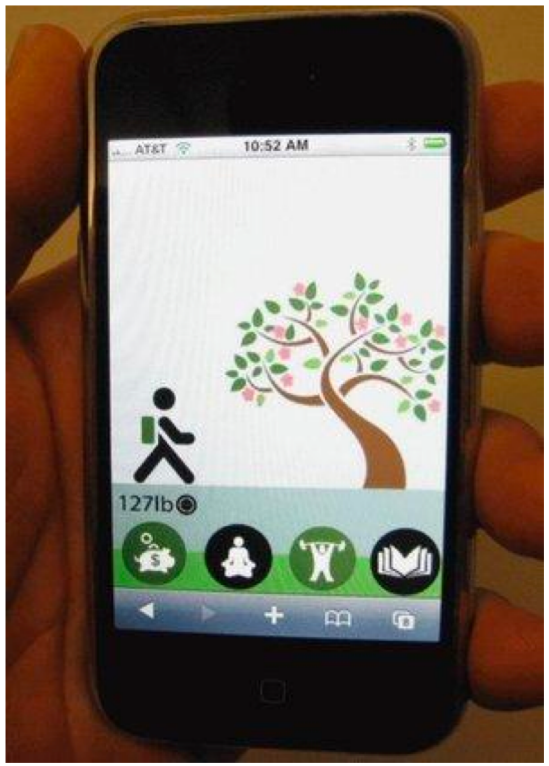
2. Identify and resolve risks



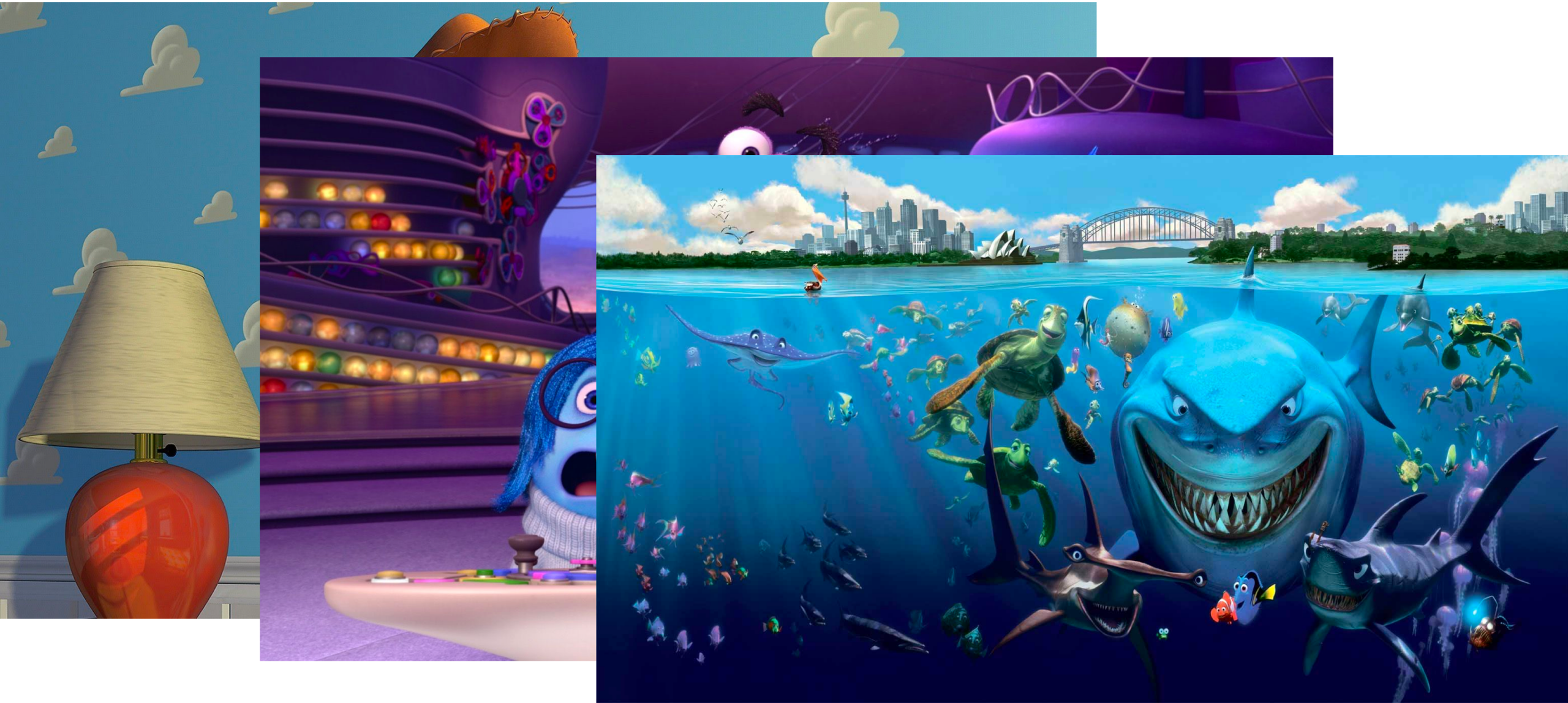
4. Plan the next iteration

3. Development and Test

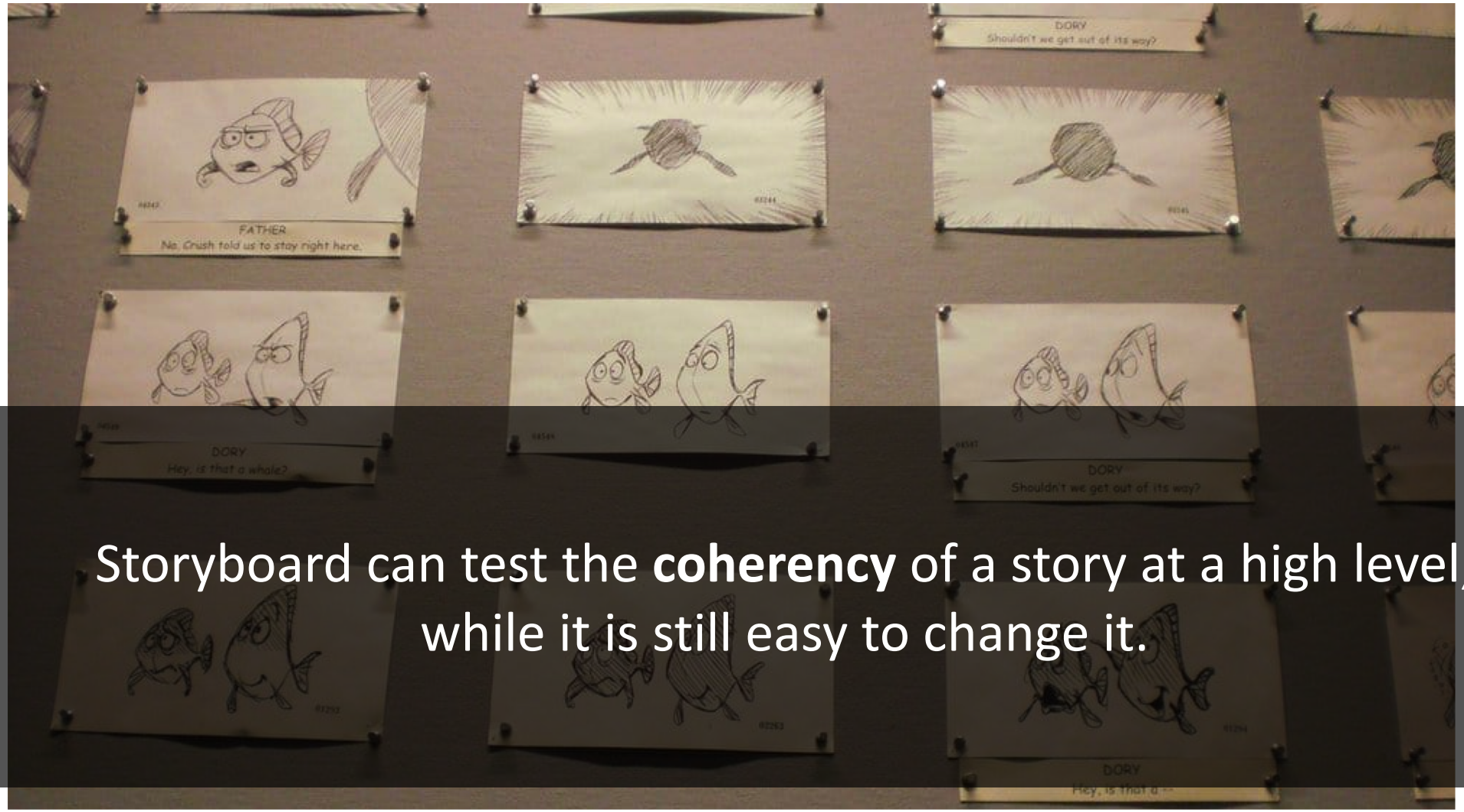
Start with a **paper** prototype. Why?



Pixar makes detailed and beautiful films

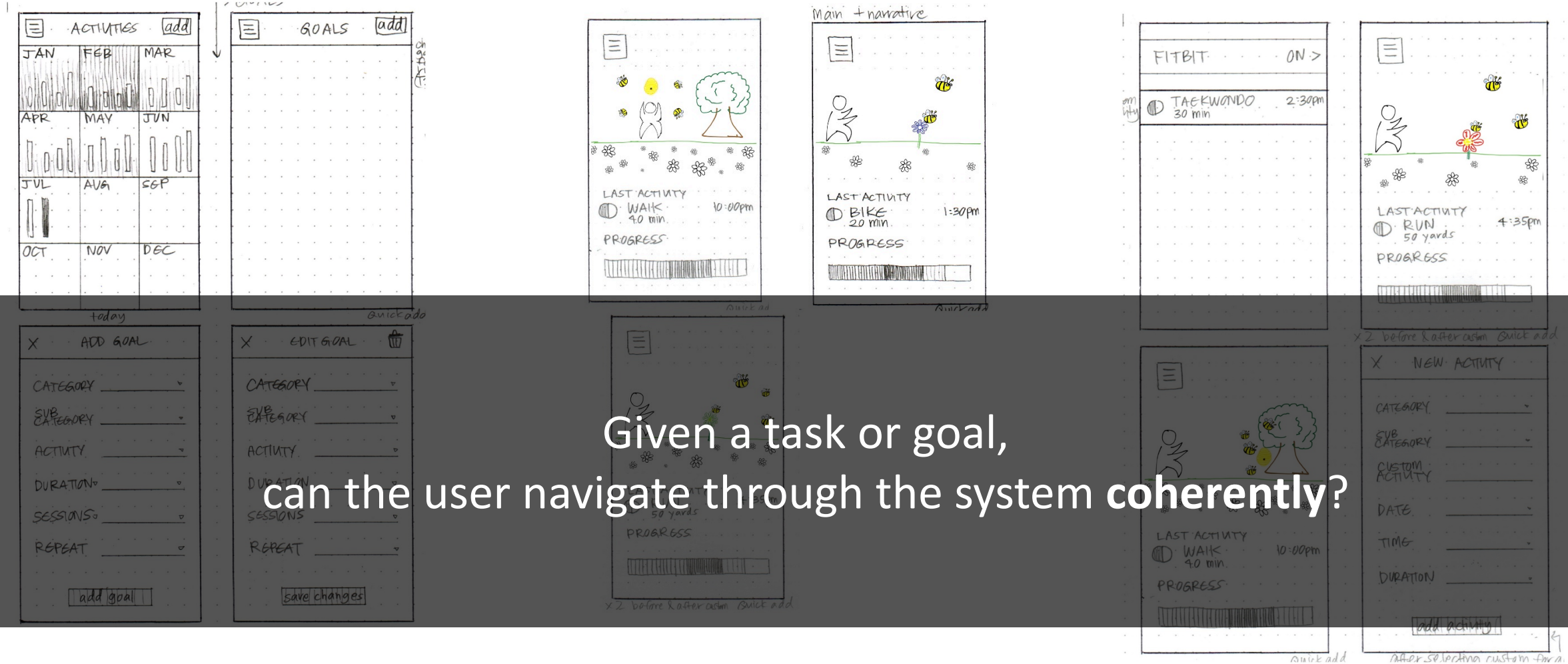


They always start with a **storyboard**. Why?



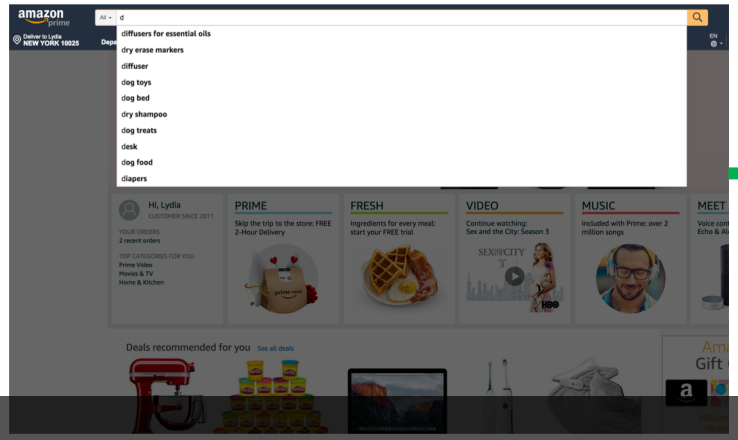
Storyboard can test the **coherency** of a story at a high level, while it is still easy to change it.

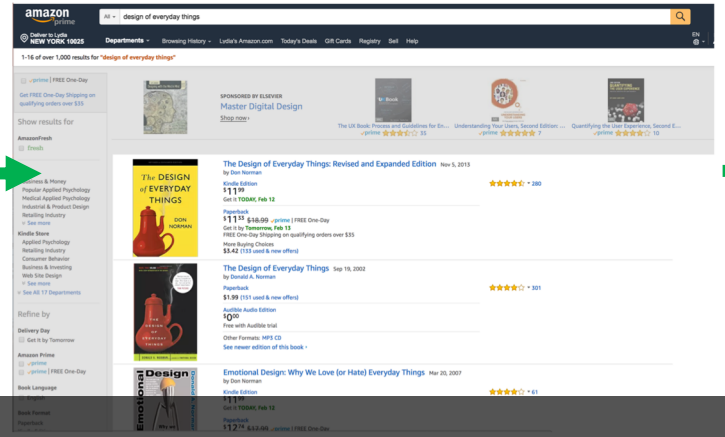
Storyboards are also good for prototyping software interactions

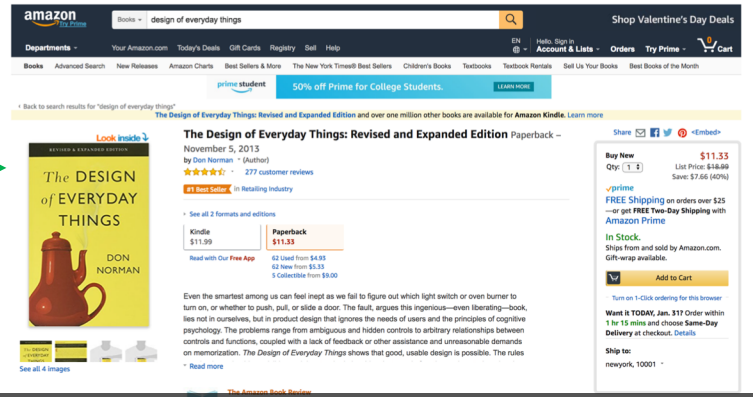


Given a task or goal,
can the user navigate through the system **coherently**?

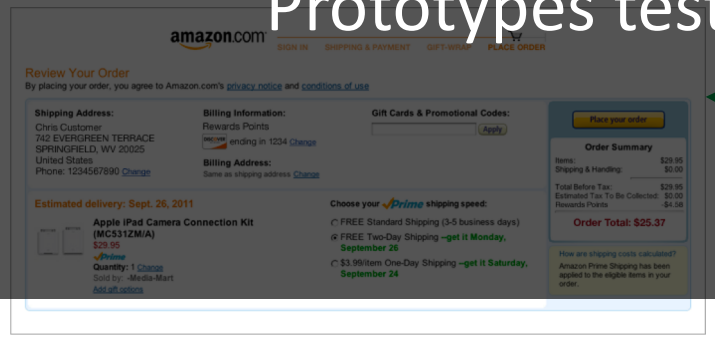
For complex goals, break the task into **states**, **options**, and **transitions** to new states.

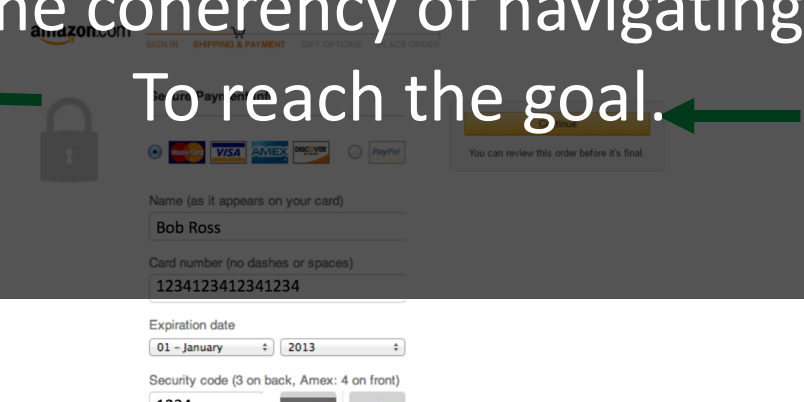


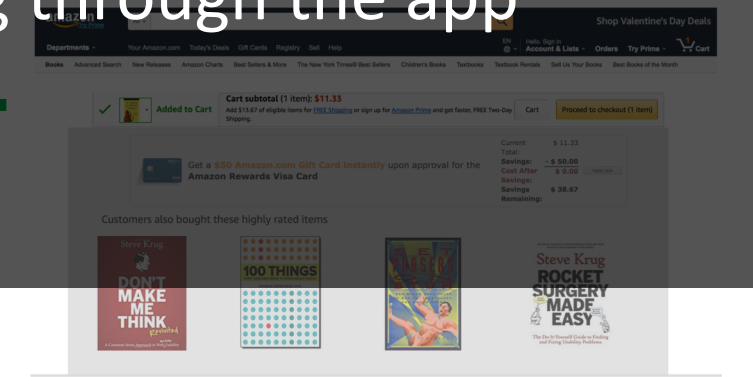




Prototypes test the coherency of navigating through the app
To reach the goal.

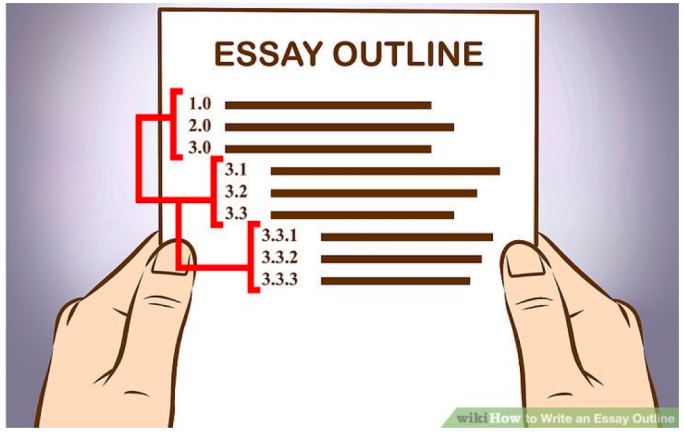






Other domains with low-fi prototypes

Essays: outlines

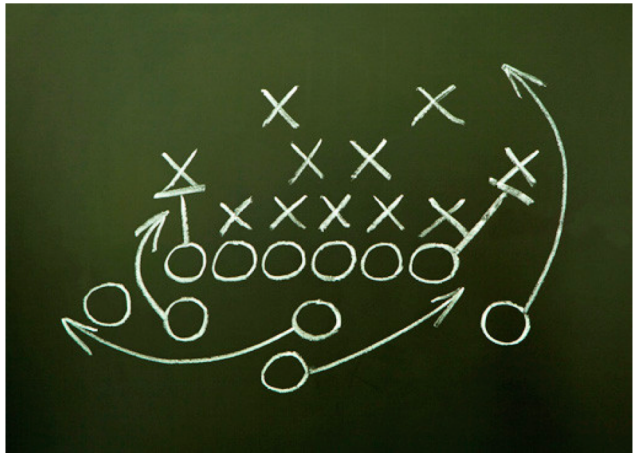


Acting: Table reads

Painting: Sketches

Fashion: Sketches

Sports: Diagram “plays”



HW9: Low-Fidelity Prototypes in Google Docs

1 Low-Fi Prototype 1
2
3
4
5
6
7

HOME | POLICE AT YOUR DOOR | PULLED OVER | STOPPED IN PUBLIC | ARRESTED | TEST

Police are at your door

Next section

Your Rights

- To remain silent
  - This means xyz
- To see a warrant
  - This means you do not have to let them in until you see a warrant

What are warrants?

Tips to reduce risk to yourself

DO

- **Ask the officer if you can see a warrant and ID**
  - Ask the officer to slip the warrant under the door or hold it up to the window so you can read it
- Write down everything officers do if you are searched

DO NOT

- **Invite the officer into your house without seeing ID and warrant**
- Speak to the officers about anything

1
2
3
4
5

Workout Indoors **Exercises** Routine FAQs QUIZ

Exercises

Let's start by working out our core! We'll show three different exercises in the videos below. There are a few good core strength and stability exercises, the best being the **plank** (left). It's pretty easy, just hold that position for 30 seconds, or a minute if you feel good. Next is the **Russian Twist** (middle). If you want to add difficulty, hold something in your hands while you twist. Lastly, **crunches** (right) are great, but only if you do them right. Watch closely to see how it's done.

NEXT
(Upper Body)

Summary

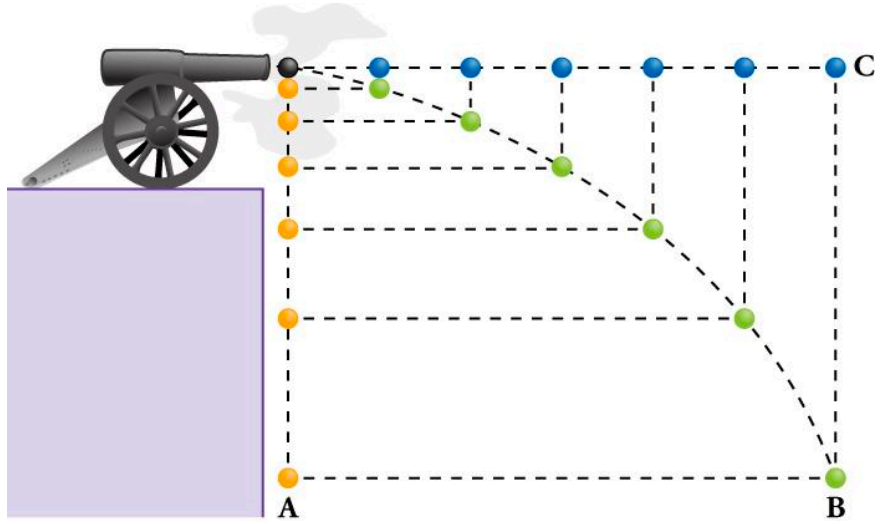
What is design?

A method for understanding & solving people's problems

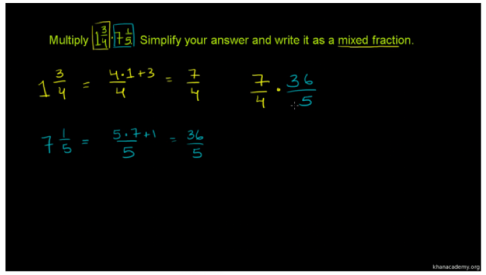
"Design is a plan for arranging elements to accomplish a particular purpose."

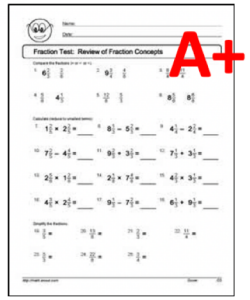
– Charles Eames

Science is a method for understanding the universe

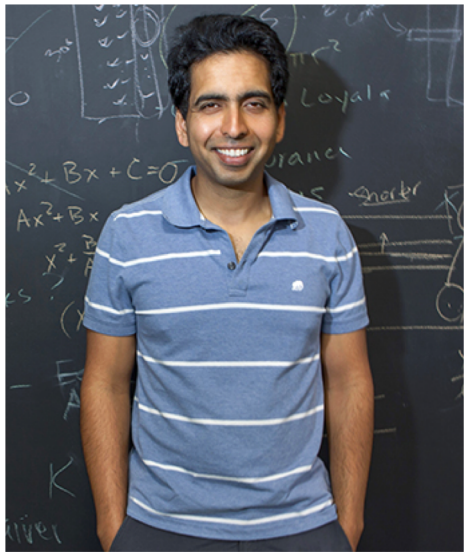


Design is a method for understanding and solving people's problems

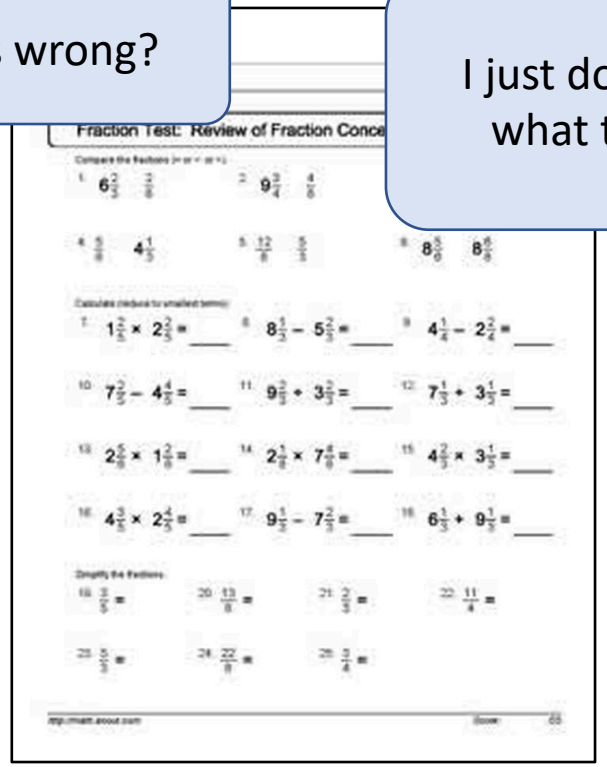




Design is a process where you work with users to understand their problems…

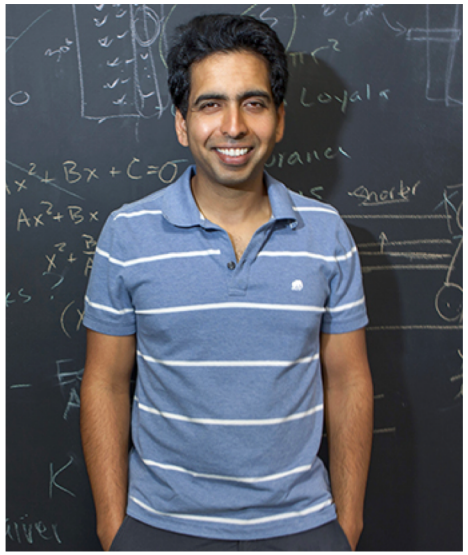


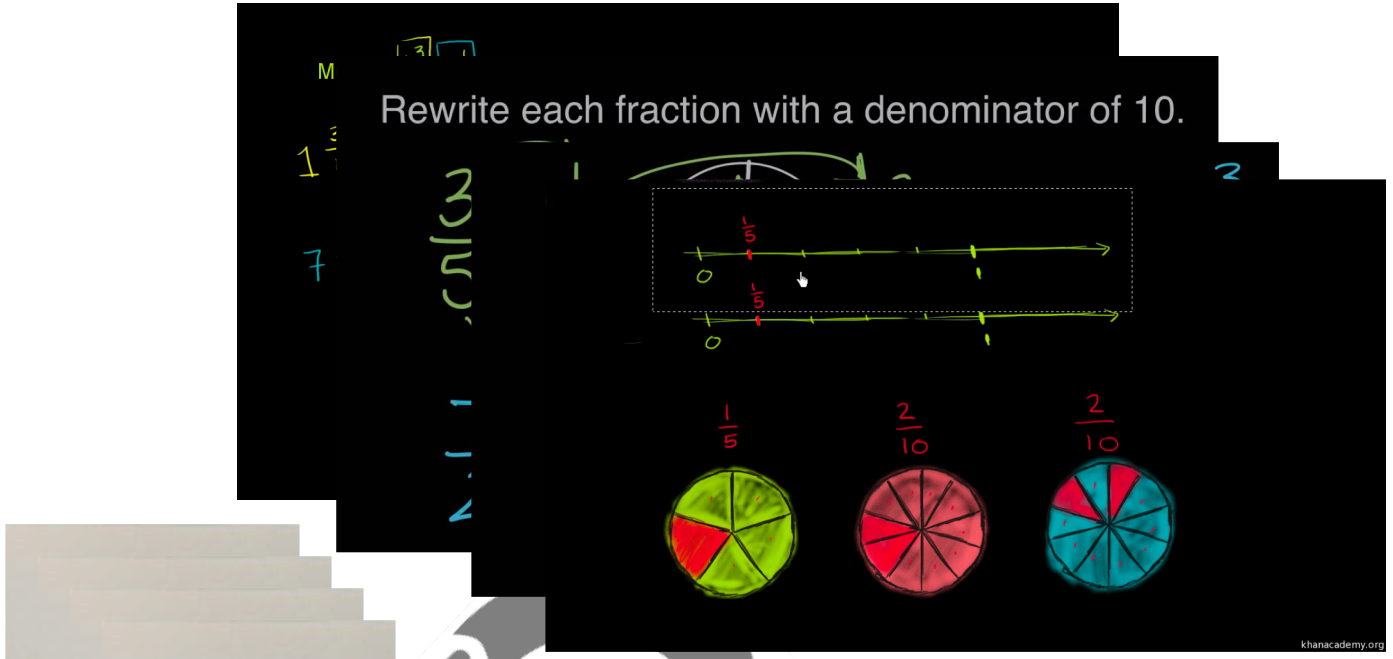
What's wrong?

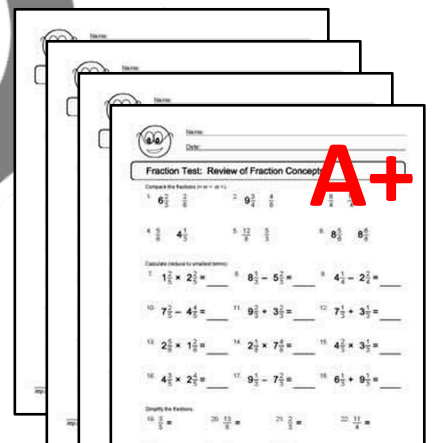


I just don't get what to do.

And test solutions with users until it solves the problem.

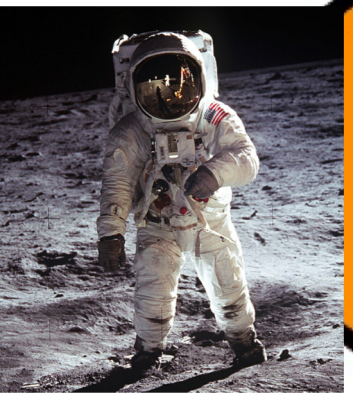






Flare and Focus

The Double Diamond Process



Challenge

- Brainstorm
- Interview
- Research

Synthesize into insights and ideas

Ideas

- Prototype solutions
- Explore technical options

Test them

Product

Understand the problem

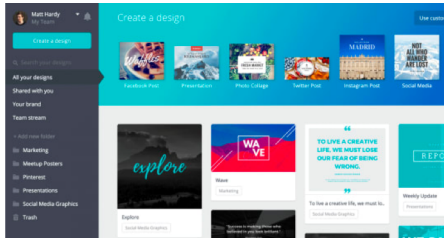
Solve the problem

Don’t start big. Start small.

If you start specific, you can usually generalize later.

	Domain	Specific Need	Generalized to
amazon	Online shopping	Uncommon books	Clothes,Food, Amazon Fresh Other sellers
facebook	Social Networking	Harvard students looking up dorm, classes, relationship status	Ivy League US Colleges Everybody
Gmail	Read/send Email	No page reload Never Delete	Chat GDrive
Canva	Graphic Design For novices	High School Yearbooks	Posters, flyers, ads

If you start specific, you can usually generalize.



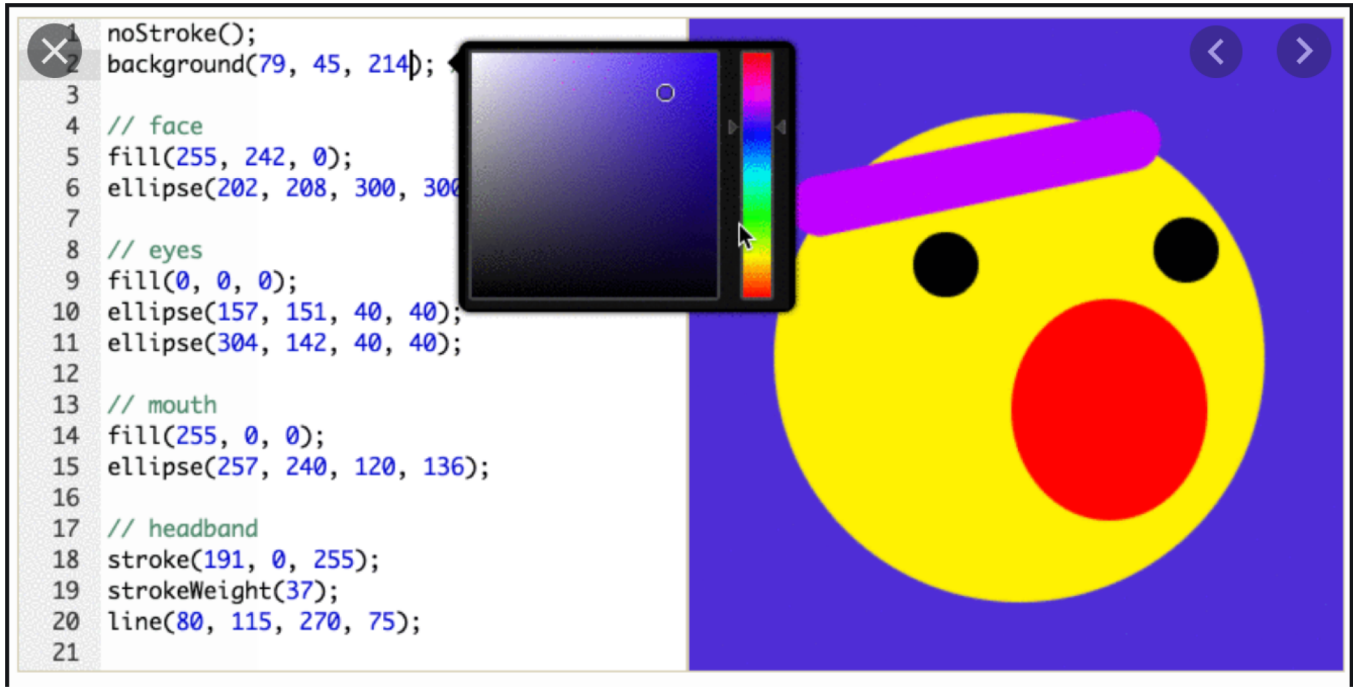
Don’t assume the problem.
Research it.

Talk to users

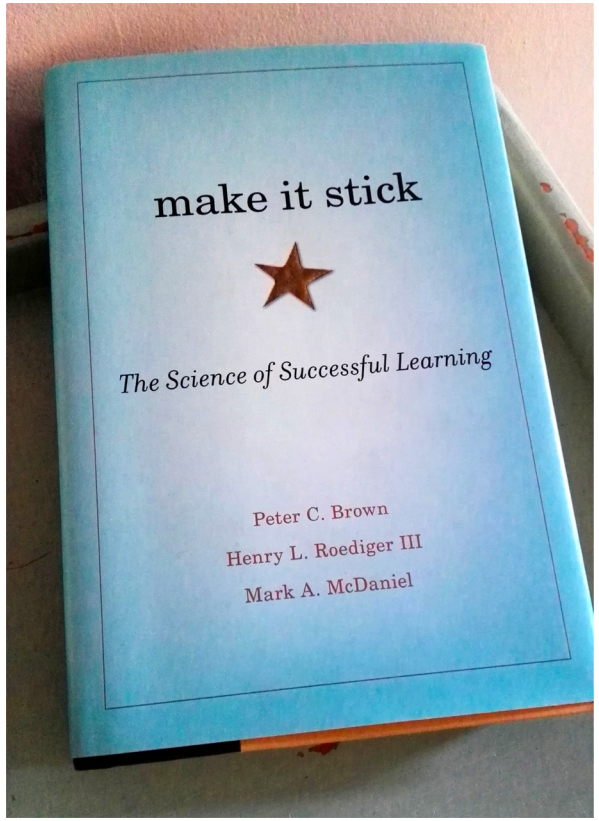
Caroline – a student in User Interface design who is shy, but is forced to participate in class and fill out a form after class to record her participation

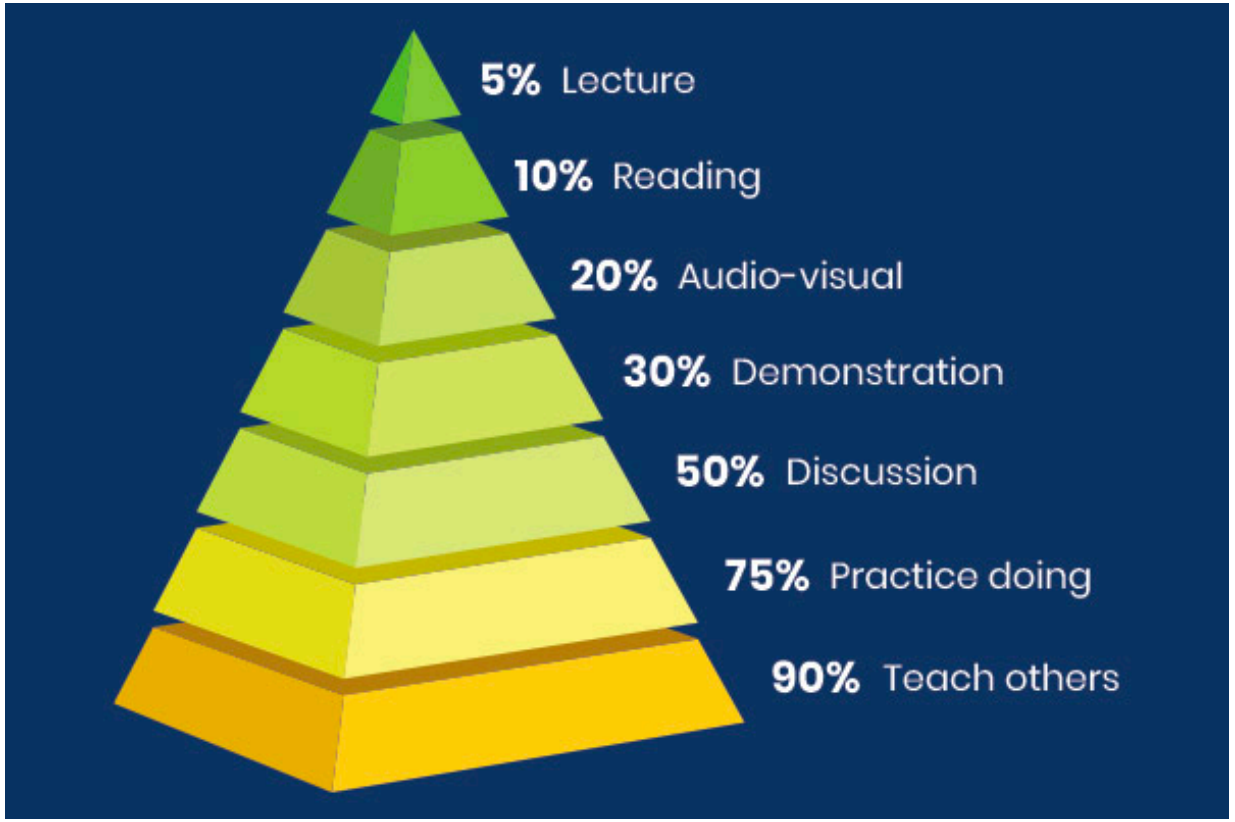
Research Competitors

Khan Academy



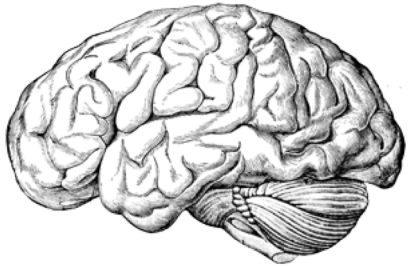
Read books, papers, theories, scientific evidence to get insights into the problem.



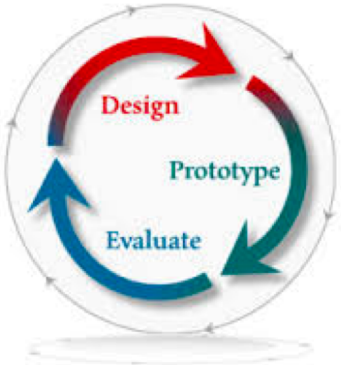


Design isn’t linear. It’s iterative.

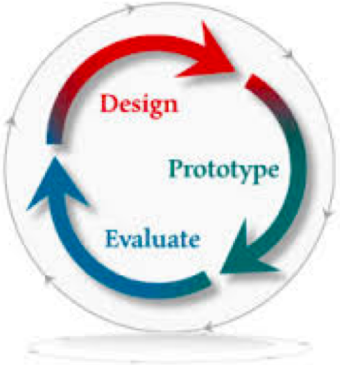
To minimize risk on novel designs, Use iteration on each risky aspect of the design



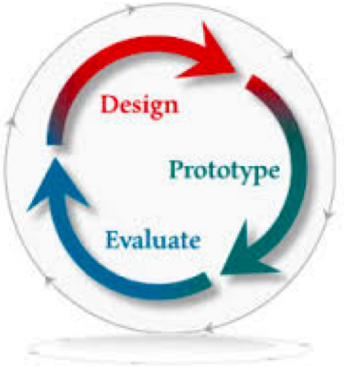
Idea



Touch screen



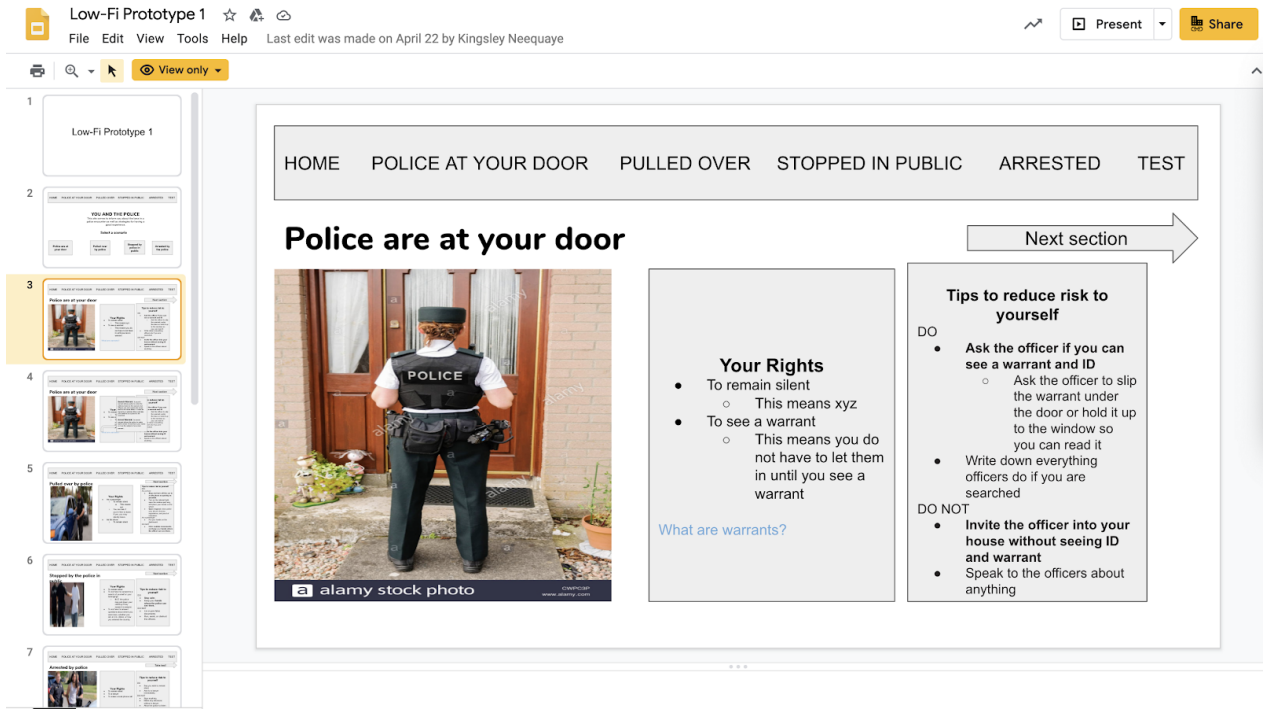
Soft keyboard



One button

Product

Start with low-fidelity prototypes.



Test ideas quickly.