



FOR THE AUTO — USED DESIGN PRINCIPLES:

DISPLAY MODEL METAPHOR IDEA

MAPPING MODES MEANING MOTIVATION

CONTROL TASK SCENARIO ERROR

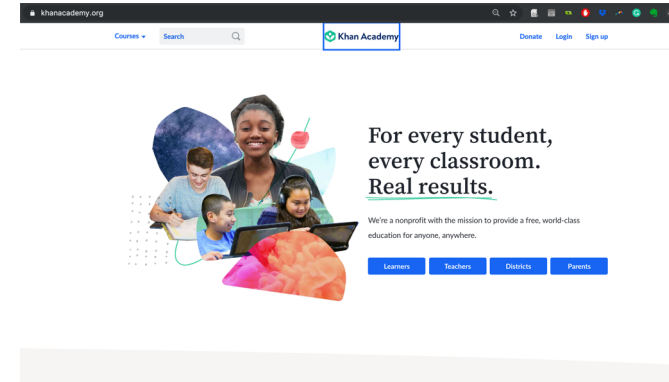
Technical Prototypes

Prof. Lydia Chilton
COMS 4170
14 April 2025

The biggest misconception about creativity

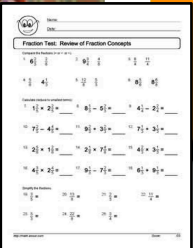


Idea

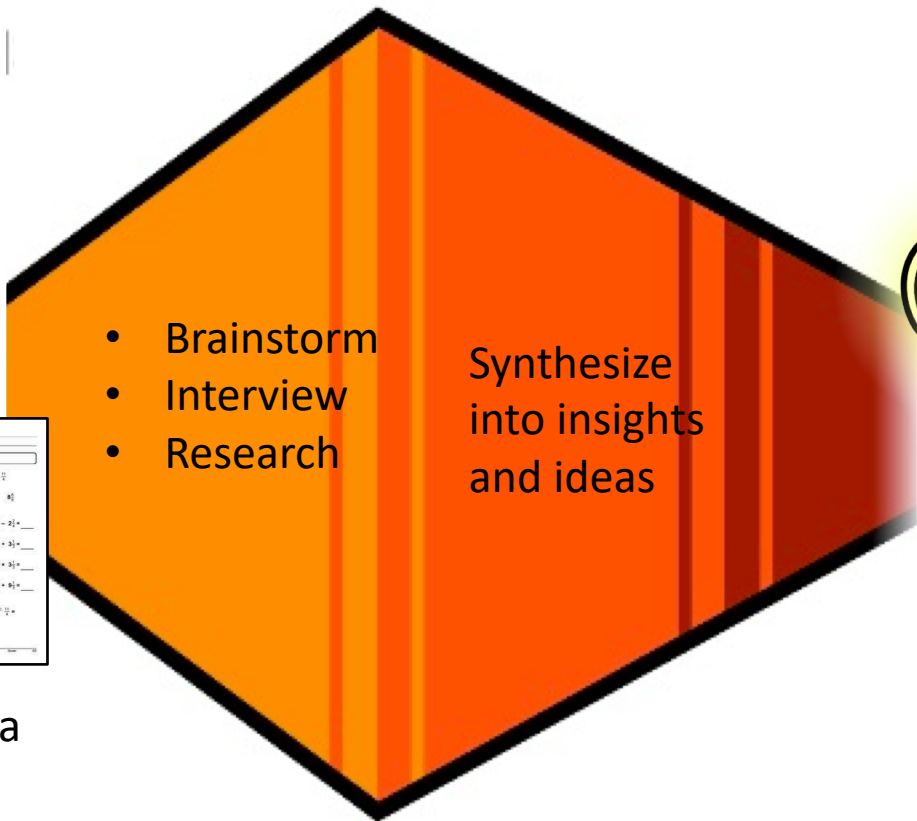


Product

Creativity is a Process



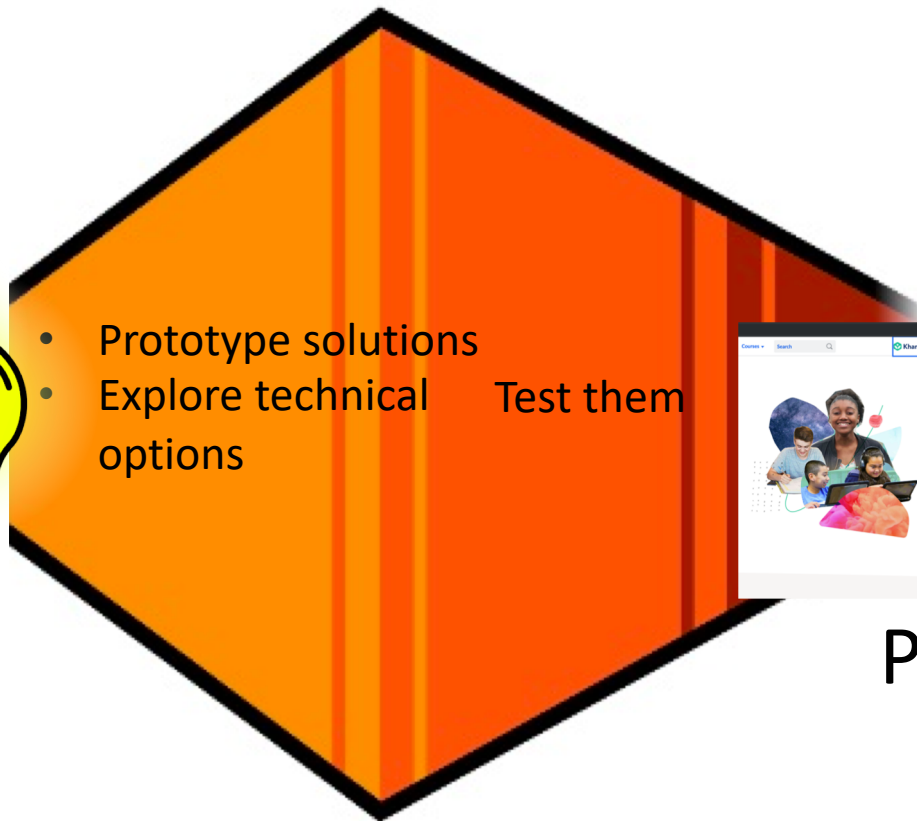
Person with a challenge



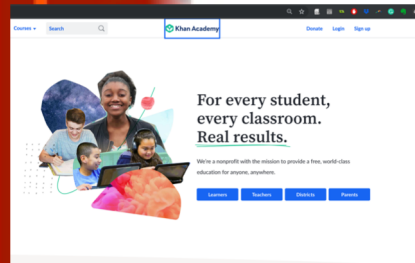
Understand the problem



Ideas



Solve the problem

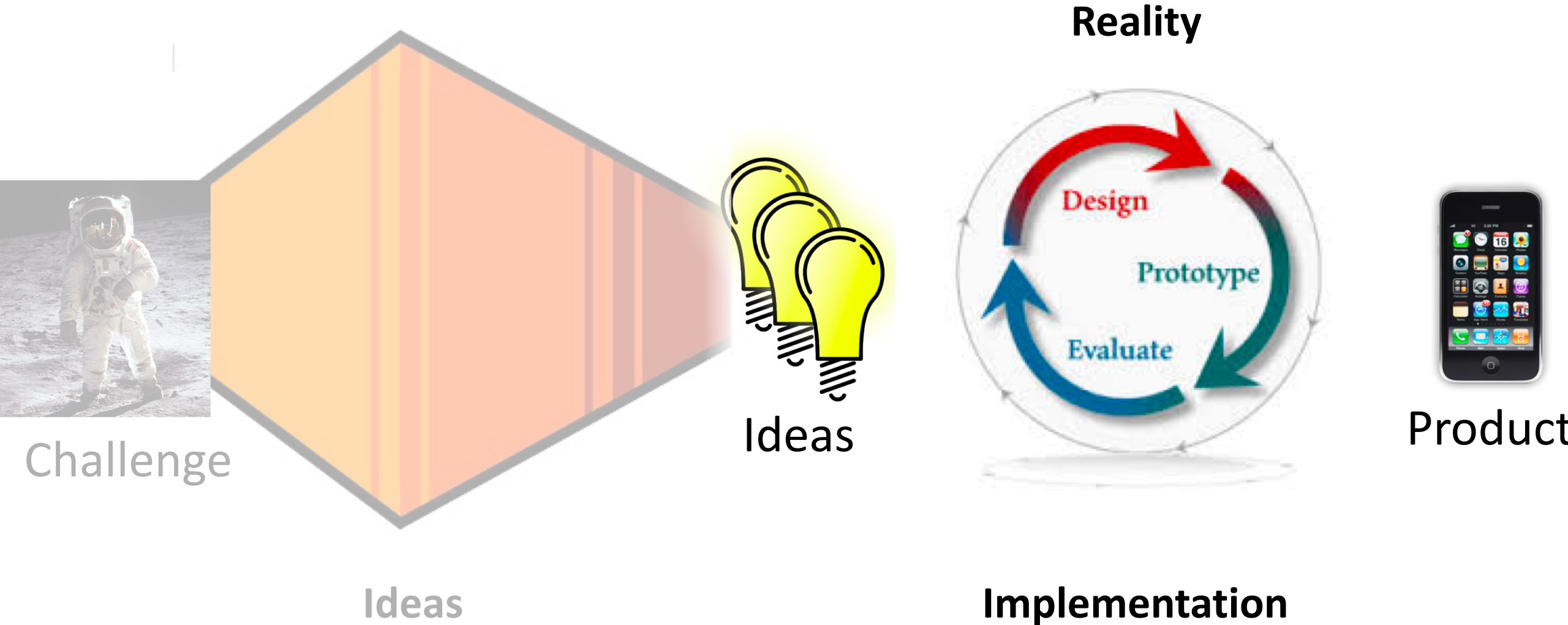


Product

Final Project:

- Design and build a **web** application
- To help a user learn an introductory topic **interactively**
- Within a **domain of your choosing**
- The interactive experience centers around **media** (image, video, audio..)
- And help them assess their learning with a **quiz**.
- And keep learning through **feedback** from the quiz.
- In under **10 minutes** total

Implementation is iterative.



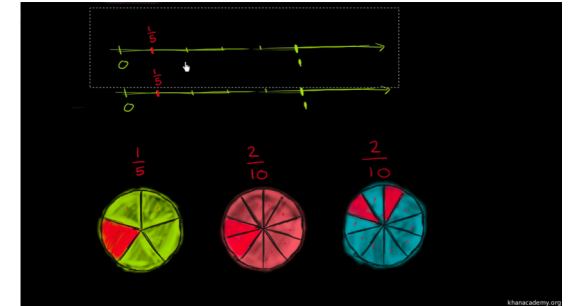
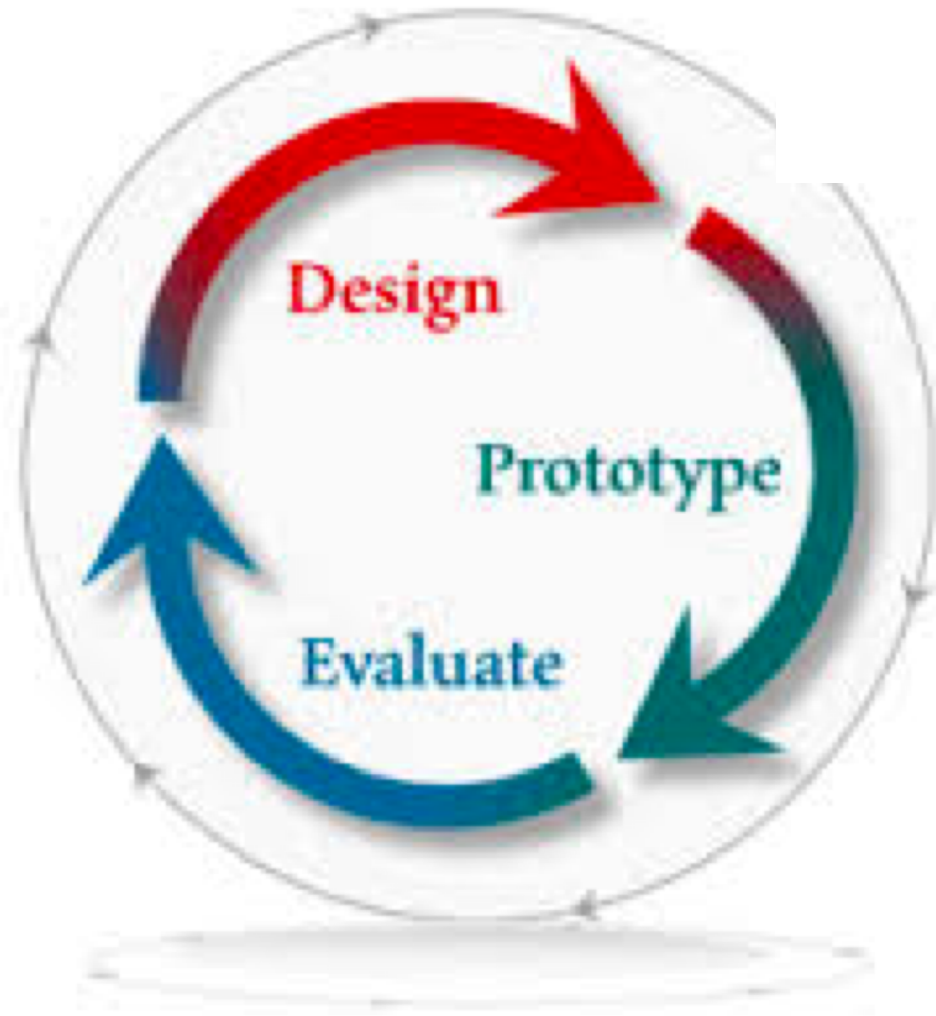
The **user** is at the center of the process



Translating an idea into a prototype is HARD.

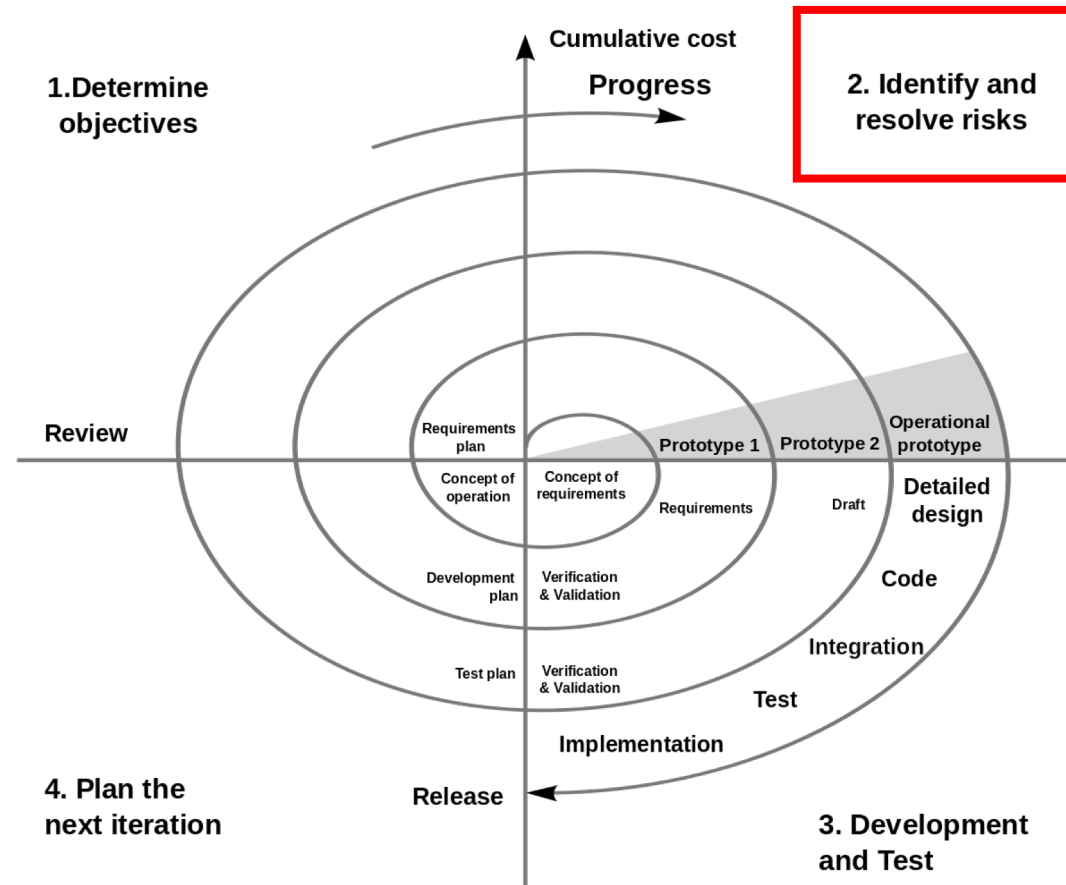


Teach fractions by working through problems slowly.



Low-Fi Prototype

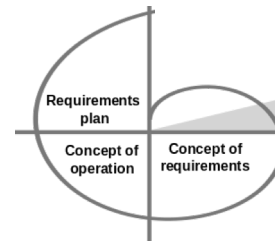
Iterative Design is good because it minimizes risk



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

1. Determine objectives

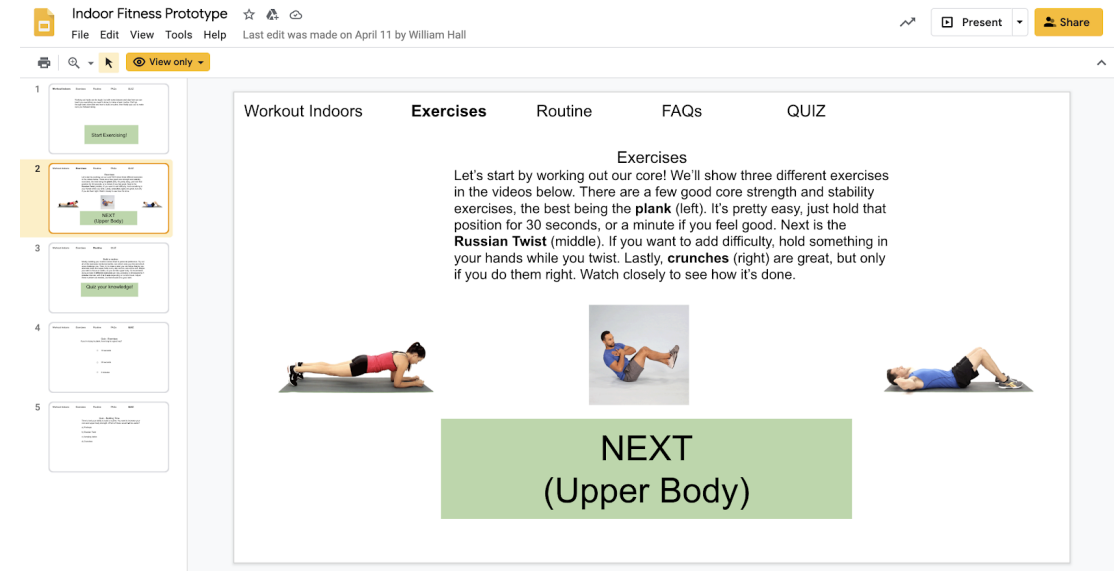
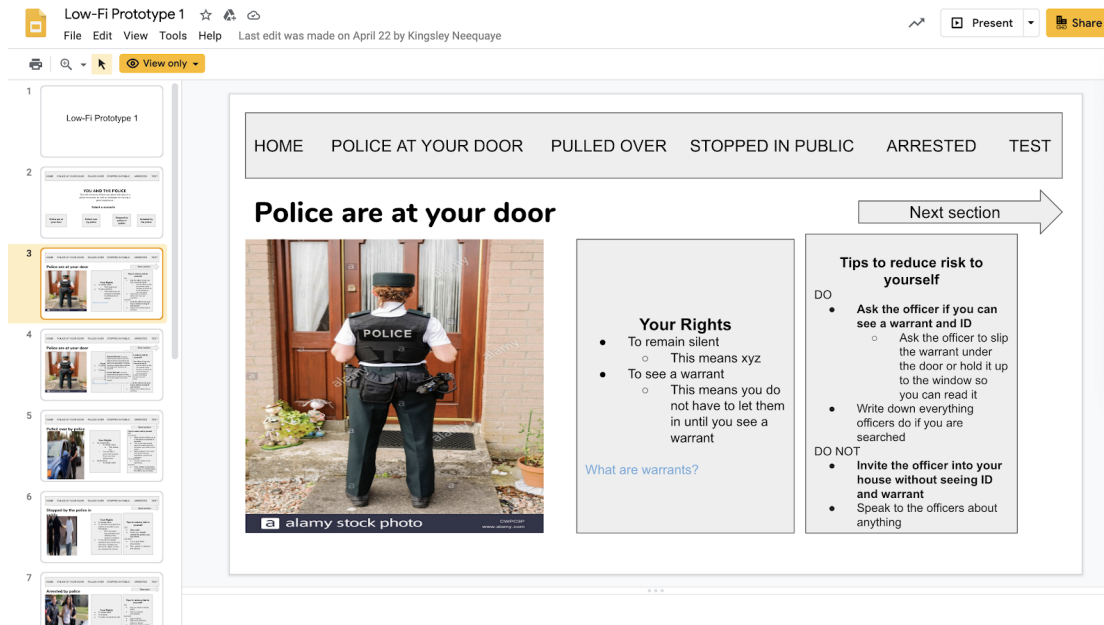
2. Identify and resolve risks



4. Plan the next iteration

3. Development and Test

Low-Fi Prototypes in Google Slides



With feedback from TA's and user tests

Now you're ready to start
implementing

But we're going to do it iteratively

HW10: Technical Prototype

Warm up due Friday at 11:59pm (grace period until 8am the following day)

Main due Wednesday at 1pm (or otherwise before your section starts) on Courseworks (no grace period – feedback will be given in class)

Note: if your TA feedback meetings are not Wednesdays 1-2:30, then you may have slightly different deadlines. Please turn in assignments according to instructions given by your TA.

Warm-up:

1. **Group.** Which prototype will you continue to iterate on for the rest of the semester?
Note: You must get this approved by your TA.
2. **Group.** Do any final iterations on your prototype that you need to before you start implementing it. Make sure you have all the media/data you need to complete it.
 - Include a PDF of the final Google Slides
 - Some groups might have a lot of iteration to do on the prototype. You can continue to work on this during the week, but be sure to turn in some substantial changes for the warm-up.
3. **Group.** Set up a github repo for your project. Include all your group members and your TA.
 - Submit a screenshot of the name and members of the repo.
4. **Group.** Job assignments. List the roles you plan to have and the names of the people assigned to them. Since you have less than 6 people in your group some people will have to be named twice. See below.

HW10: Technical Prototype

General Goal: Figure out what's the biggest technical risks, and create a prototype to test it.

Your HW 11 Goal: Program and end-to-end experience that allows the user to get through the application.
(no graphic design, little interactivity)

What counts as a technical risk?

Anything new.

Anything that has never been done before.

Anything **you** have never been done before.

Let's watch a concept video for a new technology.

Which features need to be prototyped?
(List EVERYTHING remotely risky)



What tech need to be prototyped?

Drones following you!
And projecting



Menu selection on the ground



Menu selection on the hand



Multi user interaction



Menu selection on the wall



Now we're going to watch a video of the things they prototyped

- Which risks did they prototype?
 - How?
- Which risks did they **not** prototype?



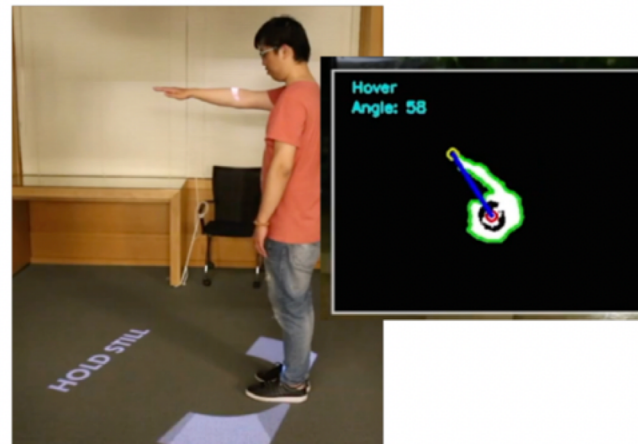
What did they prototype? How?



Can it project visibly?



Can the camera detect arm position?



Can users select from menu?

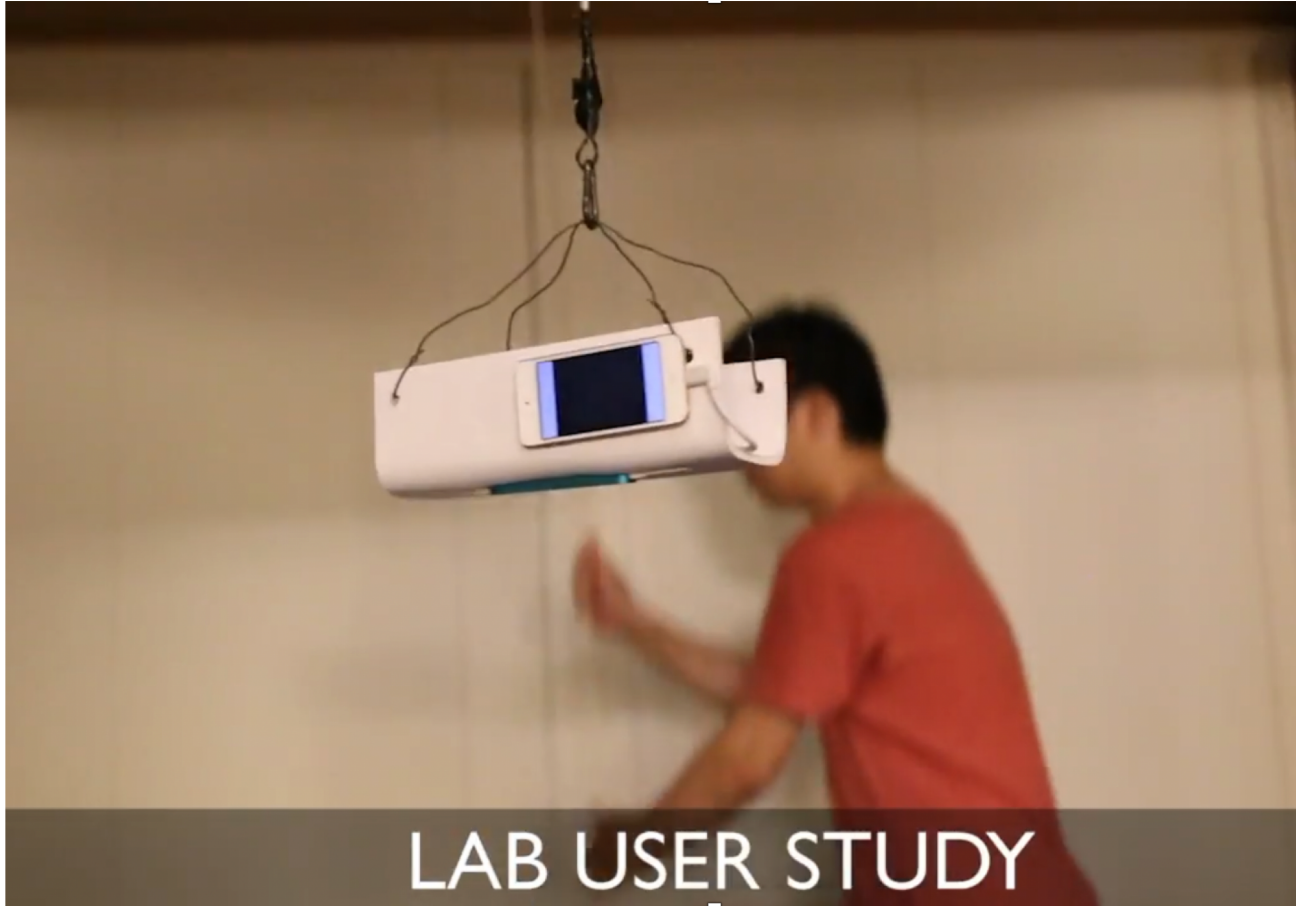


Can users select outdoors?

During the outdoor test,
what new risk did they discover?



How could they have mitigated this risk?



They probably should have tested projecting in flight outdoors before implementing the menu.

Everything in the end-to-end process is a risk

Drone can
carry stuff

Drone can
project a menu

Can detect
hand motions

Can do menu
selection in real time
with low latency



But not outdoors

HW 10: Technical Prototypes

Your biggest risk is having an end-to-end working system.

Start lesson

Do lesson

Next lesson logic

Start quiz

Quiz Logic

Quiz Score



On IMDB, are there 100,000 static HTML pages sitting around?

 Find Movies, TV shows, Celebrities and more... All

Movies, TV & Showtimes Celebs, Events & Photos News & Community Watchlist

FULL CAST AND CREW TRIVIA USER REVIEWS IMDbPro MORE SHARE



+ The Big Chill (1983)

R | 1h 45min | Comedy, Drama | 30 September 1983 (USA)

★ 7.2¹⁰
28,073

☆ Rate This



2:02 | Trailer

1 VIDEO | 76 IMAGES

 Watch Now
With Prime Video

 WATCH NOW

 ON DISC

A group of seven former college friends gather for a weekend reunion at a South Carolina winter house after the funeral of one of their friends.

Director: [Lawrence Kasdan](#)

Writers: [Lawrence Kasdan](#), [Barbara Benedek](#)

Stars: [Tom Berenger](#), [Glenn Close](#), [Jeff Goldblum](#) | [See full cast & crew »](#)

62 Metascore
From [metacritic.com](#)

Reviews
186 user | 61 critic


 Popularity
4,222 (♦ 509)

Nominated for 3 Oscars. Another 3 wins & 5 nominations. [See more awards »](#)

 Find Movies, TV shows, Celebrities and more... All

Movies, TV & Showtimes Celebs, Events & Photos News & Community Watchlist

FULL CAST AND CREW TRIVIA USER REVIEWS IMDbPro MORE SHARE



+ The Big Lebowski (1998)

R | 1h 57min | Comedy, Crime | 6 March 1998 (USA)


★ 8.2¹⁰
609,031

☆ Rate This



0:31 | Trailer

9 VIDEOS | 141 IMAGES

 Watch Now
From \$2.99 (SD) on Prime Video

 ON DISC

"The Dude" Lebowski, mistaken for a millionaire Lebowski, seeks restitution for his ruined rug and enlists his bowling buddies to help get it.

Directors: [Joel Coen](#), [Ethan Coen](#) (uncredited)

Writers: [Ethan Coen](#), [Joel Coen](#)

Stars: [Jeff Bridges](#), [John Goodman](#), [Julianne Moore](#) | [See full cast & crew »](#)

69 Metascore
From [metacritic.com](#)

Reviews
1,075 user | 257 critic

 Popularity
515 (♦ 32)

Top Rated Movies #167 | 4 wins & 17 nominations. [See more awards »](#)

 Find Movies, TV shows, Celebrities and more... All

Movies, TV & Showtimes Celebs, Events & Photos News & Community Watchlist

FULL CAST AND CREW TRIVIA USER REVIEWS IMDbPro MORE SHARE



+ The Big Short (2015)

R | 2h 10min | Biography, Comedy, Drama | 23 December 2015 (USA)

★ 7.8¹⁰
274,582

☆ Rate This



2:05 | Trailer

39 VIDEOS | 128 IMAGES

 Watch Now
From \$2.99 (SD) on Prime Video



In 2006-7 a group of investors bet against the US mortgage market. In their research they discover how flawed and corrupt the market is.

Director: [Adam McKay](#)

Writers: [Charles Randolph](#) (screenplay), [Adam McKay](#) (screenplay) | [1 more credit »](#)

Stars: [Christian Bale](#), [Steve Carell](#), [Ryan Gosling](#) | [See full cast & crew »](#)

81 Metascore
From [metacritic.com](#)

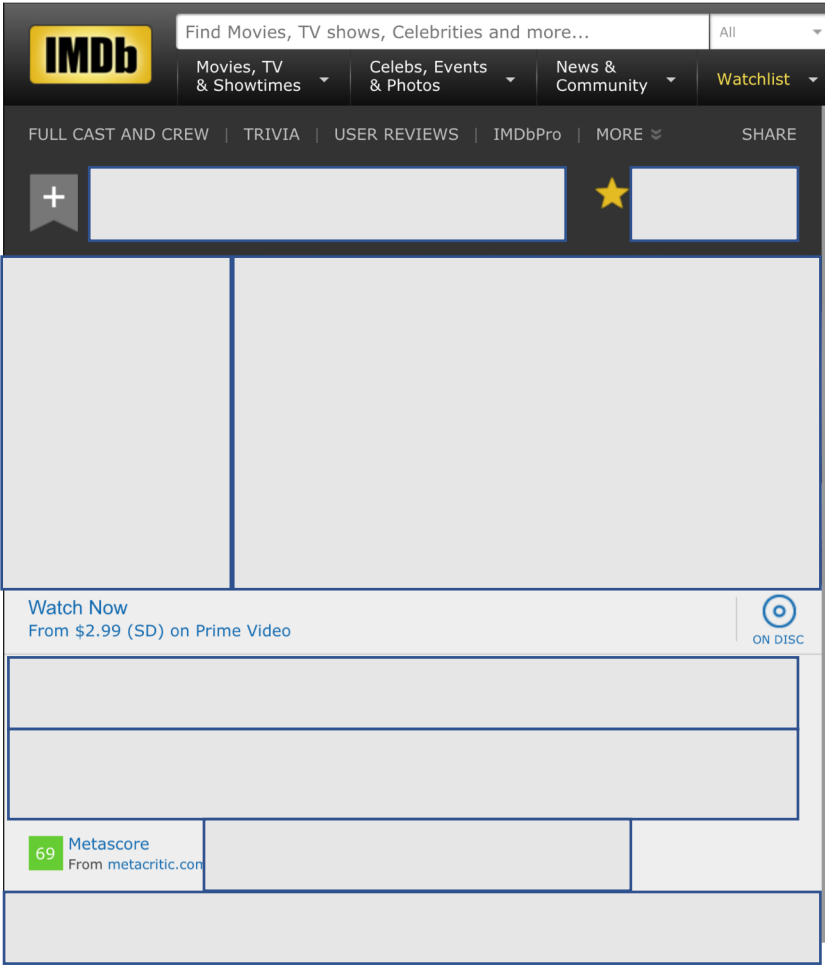
Reviews
428 user | 454 critic

 Popularity
434 (♦ 47)

Won 1 Oscar. Another 37 wins & 79 nominations. [See more awards »](#)

IMDB uses a template and a database...


And fills in the data dynamically on pageload



Title	Plot summary	poster	year
The Big Lebowski	"The dude" Lebowski, mistaken...	Lebowski.jpg	1998
The Big Short	In 2006-7 a group of investors...	Big_short.jpg	2015
The Big Chill	A group of 7 former roommates	Big_chill.jpg	1983



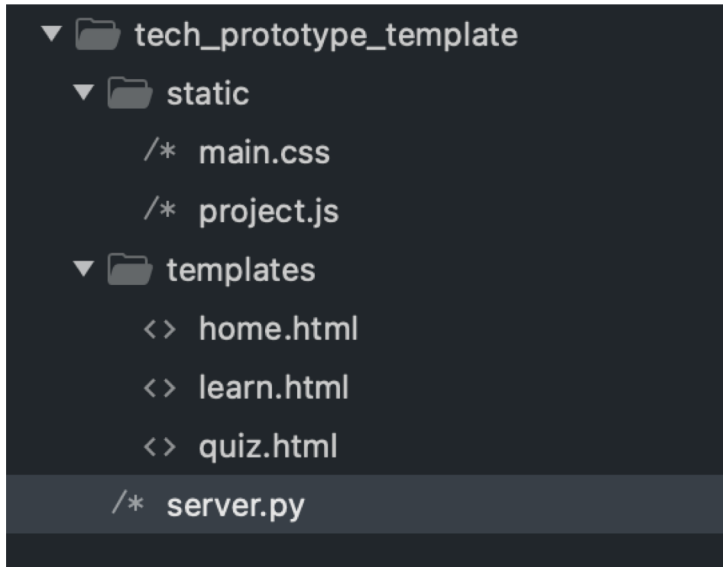
IMDB Template

		<input type="text" value="Find Movies, TV shows, Celebrities and more..."/>		<div>All</div>	
<div>Movies, TV & Showtimes</div>		<div>Celebs, Events & Photos</div>		<div>News & Community</div>	
<div>Watchlist</div>					
FULL CAST AND CREW TRIVIA USER REVIEWS IMDbPro MORE					
SHARE					
<div>+ {{movie.title}}</div>		<div>★ {{movie.star}}</div>			
<div>< img src=“{{movie.poster}}”></div>		<div><video src=“{{movie.trailer}}”></div>			
<div>Watch Now</div>					
<div>From \$2.99 (SD) on Prime Video</div>					
<div>ON DISC</div>					
<div>{{movie.plot_summary}}</div>					
<div>{{movie.main_creatives}}</div>					
<div>{{movie.reviews}}</div>					
<div>{{movie.awards}}</div>					

Why are static pages so bad?

- They are very hard to change.

Represent your data in JSON (server.py)



```
1 from flask import Flask
2 from flask import render_template
3 from flask import Response, request, jsonify
4 app = Flask(__name__)
5
6
7 lessons = {
8     "1":{
9         "lesson_id": "1",
10        "title": "Say Hello in Serbian",
11        "video": "https://media4.giphy.com/media/f4IitLXgceg0BzXUDe/200w.gif?cid=
12        "text": "Zdravo",
13        "next_lesson":"2"
14    },
15    "2":{
16        "lesson_id": "2",
17        "title": "Say Goodbye in Serbian",
18        "video": "https://c.tenor.com/6zCJ2mbdXg4AAAAC/ciao.gif",
19        "text": "Ciao",
20        "next_lesson":"end"
21    }
22 }
23
24
25 quiz_questions = {
26     "1":{
27         "quiz_id": "1",
28         "english": "hello",
29         "serbian": "zdravo",
30         "next_question":"2"
31     },
32     "2":{
33         "quiz_id": "2",
34         "english": "goodbye",
35         "serbian": "ciao",
36         "next_question":"end"
37     }
38 }
39
```


Render learning and quizzing templates with correct data

▼ tech_prototype_template

▼ static

/* main.css

/* project.js

▼ templates

<> home.html

<> learn.html

<> quiz.html

/* server.py

```
1 from flask import Flask
2 from flask import render_template
3 from flask import Response, request, jsonify
4 app = Flask(__name__)
5
6
7 lessons = {
8     "1":{
9         "lesson_id": "1",
10        "title": "Say Hello in Serbian",
11        "video": "https://media4.giphy.com/media/f4IitLXgceg0BzXUDe/200w.gif?cid=82a1493bcb6xt",
12        "text": "Zdravo",
13        "next_lesson": "2"
14    },
15    },
16    "2":{
17        "lesson_id": "2",
18        "title": "Say Goodbye in Serbian",
19        "video": "https://c.tenor.com/6zCJ2mbdXg4AAAAC/ciao.gif",
20        "text": "Ciao",
21        "next_lesson": "end"
22    }
23 }
24
25
41 @app.route('/')
42 def home():
43     return render_template('home.html')
44
45 @app.route('/learn/<lesson_id>')
46 def learn(lesson_id):
47     lesson = lessons[lesson_id]
48     return render_template('learn.html', lesson = lesson)
49
50 @app.route('/quiz/<quiz_id>')
51 def quiz(quiz_id):
52     question = quiz_questions[quiz_id]
53     return render_template('quiz.html', question = question)
54
55 if __name__ == '__main__':
56     app.run(debug = True)
```


On each page, show the correct data.

Learn.html template



Say Hello in Serbian

Serbian: Zdravo

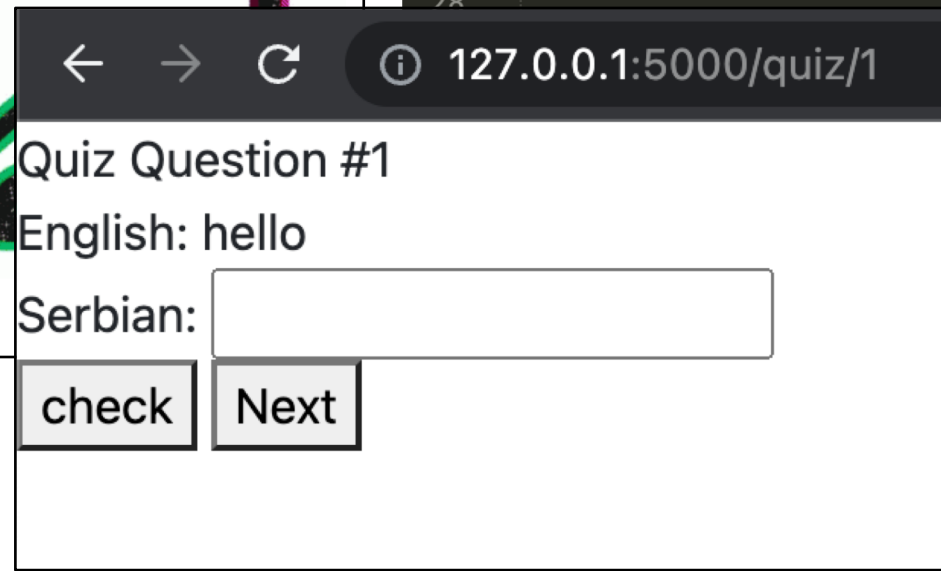
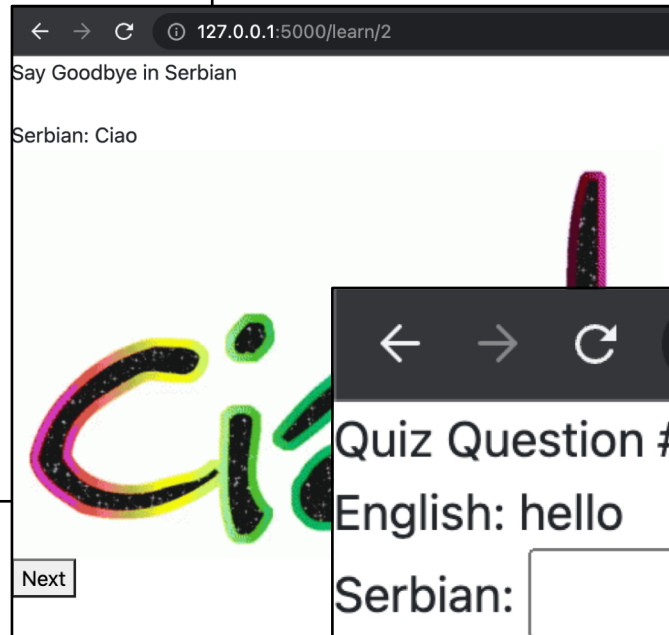
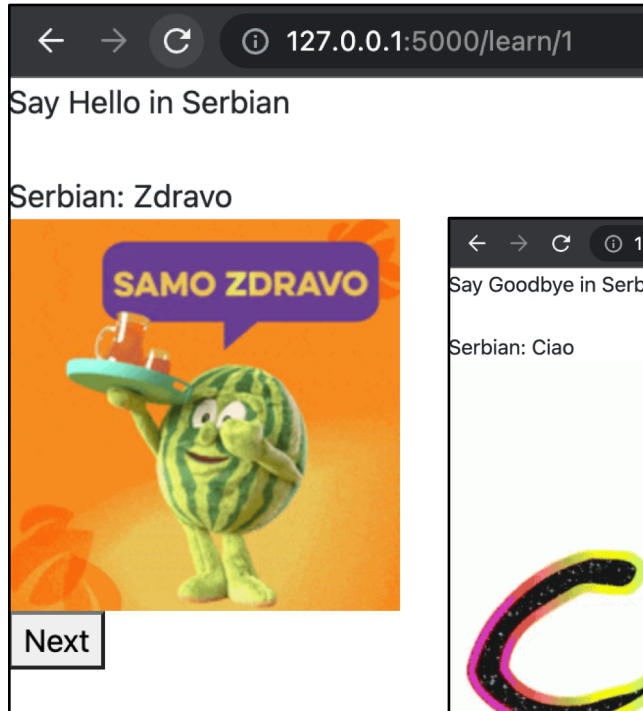


Next

```
15 <body>
16 <script type="text/javascript">
17   let lesson = {{lesson|tojson}}
18
19   $( document ).ready(function() {
20     $("#next_button").click(function(){
21       if("{{lesson.next_lesson}}" == "end"){
22         window.location.href = "/quiz/1"
23       }else{
24         window.location.href = "/learn/{{lesson.next_lesson}}"
25       }
26     })
27   })
28
29 </script>
30
31 {{lesson.title}}<br>
32 <br>
33 Serbian: {{lesson.text}}<br>
34 <br>
35
36 <button id="next_button"> Next </button>
37
38
39 </body>
```


On each page, have logic that advances to the next state.

Learn.html template



```
15 <body>
16 <script type="text/javascript">
17   let lesson = {{lesson|tojson}}
18
19   $( document ).ready(function() {
20     $("#next_button").click(function(){
21       if("{{lesson.next_lesson}}" == "end"){
22         window.location.href = "/quiz/1"
23       }else{
24         window.location.href = "/learn/{{lesson.next_lesson}}"
25       }
26     })
27   })
28
```

```
</br>
o}}"><br>
"> Next </button>
```


Why is representing your application in data (rather than in HTML) so good?

Easy to change **content**

```
6
7 lessons = {
8   "1":{
9     "lesson_id": "1",
10    "title": "Say Hello in Serbian",
11    "video": "https://media4.giphy.com/
12    "text": "Zdravo",
13    "next_lesson": "2"
14
```

Easy to change **logic**

```
6
7 lessons = {
8   "1":{
9     "lesson_id": "1",
10    "title": "Say Hello in Serbian",
11    "video": "https://media4.giphy.com/
12    "text": "Zdravo",
13    "next_lesson": "2"
14
```

```
16 <script type="text/javascript">
17   let lesson = {{lesson|tojson}}
18
19   $( document ).ready(function() {
20     $("#next_button").click(function(){
21       if("{{lesson.next_lesson}}" == "end"){
22         window.location.href = "/quiz/1"
23       }else{
24         window.location.href = "/learn/{{lesson.next_lesson}}"
25       }
26     })
27   })
28
29 </script>
30
```


Your biggest risk is having an end-to-end working system.

Start lesson

Do lesson

Next lesson logic

Start quiz

Quiz Logic

Quiz Score



Unless you have some huge risky interactive feature!
If do you, contact your TA at once, and we'll modify HW10 for you.

Divide up work with roles

- **Learning portion** roles:
 - Architecting the data
 - Implementing the UI
 - Testing that you can click through the app. (this cannot be done by the learning UI implementer)
- **Quiz portion** roles:
 - Architecting the data
 - Implementing the UI
 - Testing that you can click through the app. (this cannot be done by the quiz UI implementer)

If this does not work out for your group, contact your TA immediately.

HW10: Technical Prototype

Warm up due Friday at 11:59pm (grace period until 8am the following day)

Main due Wednesday at 1pm (or otherwise before your section starts) on Courseworks (no grace period – feedback will be given in class)

Note: if your TA feedback meetings are not Wednesdays 1-2:30, then you may have slightly different deadlines. Please turn in assignments according to instructions given by your TA.

Warm-up:

1. **Group.** Which prototype will you continue to iterate on for the rest of the semester?
Note: You must get this approved by your TA.
2. **Group.** Do any final iterations on your prototype that you need to before you start implementing it. Make sure you have all the media/data you need to complete it.
 - Include a PDF of the final Google Slides
 - Some groups might have a lot of iteration to do on the prototype. You can continue to work on this during the week, but be sure to turn in some substantial changes for the warm-up.
3. **Group.** Set up a github repo for your project. Include all your group members and your TA.
 - Submit a screenshot of the name and members of the repo.
4. **Group.** Job assignments. List the roles you plan to have and the names of the people assigned to them. Since you have less than 6 people in your group some people will have to be named twice. See below.

HW10: Technical Prototype

Warm up due Friday at 11:59pm (grace period until 8am the following day)

Main due Wednesday at 1pm (or otherwise before your section starts) on Courseworks (no grace period – feedback will be given in class)

Note: if your TA feedback meetings are not Wednesdays 1-2:30, then you may have slightly different deadlines. Please turn in assignments according to instructions given by your TA.

Warm-up:

1. **Group.** Which prototype will you continue to iterate on for the rest of the semester?

Note: You must get this approved by your TA.

2. **Group.** Do any final iterations on your prototype that you need to before you start implementing it. Make sure you have all the media/data you need to complete it.

- Include a PDF of the final Google Slides

3. **When your GitHub repo has more drama than your dating life.**
4. **crack'd says...**

assigned to them. Since you have less than 6 people in your group some people will have to be named twice. See below.

HW10: Technical Prototype

Warm up due Friday at 11:59pm (grace period until 8am the following day)

Main due Wednesday at 1pm (or otherwise before your section starts) on Courseworks (no grace period – feedback will be given in class)

Note: if your TA feedback meetings are not Wednesdays 1-2:30, then you may have slightly different deadlines. Please turn in assignments according to instructions given by your TA.

Warm-up:

1. **Group.** Which prototype will you continue to iterate on for the rest of the semester?
Note: You must get this approved by your TA.
2. **Group.** Do any final iterations on your prototype that you need to before you start implementing it. Make sure you have all the media/data you need to complete it.

substantial changes for the warm-up.

Group. Set up a github repo for your project. Include all your group members and TA.

crack'd says...

You call that a group project? More like solo work with extra steps.

Group. Job assignments. List the roles you plan to have and the names of the people assigned to them. Since you have less than 6 people in your group some people will have to be named twice. See below.

assigned to them. Since you have less than 6 people in your group some people will have to be named twice. See below.

HW10: Technical Prototype

Warm up due Friday at 11:59pm (grace period until 8am the following day)

Main due Wednesday at 1pm (or otherwise before your section starts) on Courseworks (no grace period – feedback will be given in class)

Note: if your TA feedback meetings are not Wednesdays 1-2:30, then you may have slightly different deadlines. Please turn in assignments according to instructions given by your TA.

Warm-up:

1. **Group.** Which prototype will you continue to iterate on for the rest of the semester?
Note: You must get this approved by your TA.
2. **Group.** Do any final iterations on your prototype that you need to before you start implementing it. Make sure you have all the media/data you need to complete it.

substantial changes for the warm-up.

3. **Group.** Set up a github repo for your project. Include all your group members and your TA.

crack'd says...

Your document is so organized, it must be hiding a dark secret.

4. **Group.** Job assignments. List the roles you plan to have and the names of the people assigned to them. Since you have less than 6 people in your group some people will have to be named twice. See below.

assigned to them. Since you have less than 6 people in your group some people will have to be named twice. See below.

HW10: Technical Prototype

Warm up due Friday at 11:59pm (grace period until 8am the following day)

Main due Wednesday at 1pm (or otherwise before your section starts) on Courseworks (no grace period – feedback will be given in class)

Note: if your TA feedback meetings are not Wednesdays 1-2:30, then you may have slightly different deadlines. Please turn in assignments according to instructions given by your TA.

Warm-up:

1. **Group.** Which prototype will you continue to iterate on for the rest of the semester?

Not continue to work on this during the week, but be sure to turn in some substantial changes for the warm-up.

Group. Set up a github repo for your project. Include all your group members and TA.

crack'd says...

That warm-up section is just a sneak peek into your panic mode.

Group. Job assignments. List the roles you plan to have and the names of the people assigned to them. Since you have less than 6 people in your group some people will have to be named twice. See below.

- Submit a screenshot of the name and members of the repo.
4. **Group.** Job assignments. List the roles you plan to have and the names of the people assigned to them. Since you have less than 6 people in your group some people will have to be named twice. See below.



LAB USER STUDY

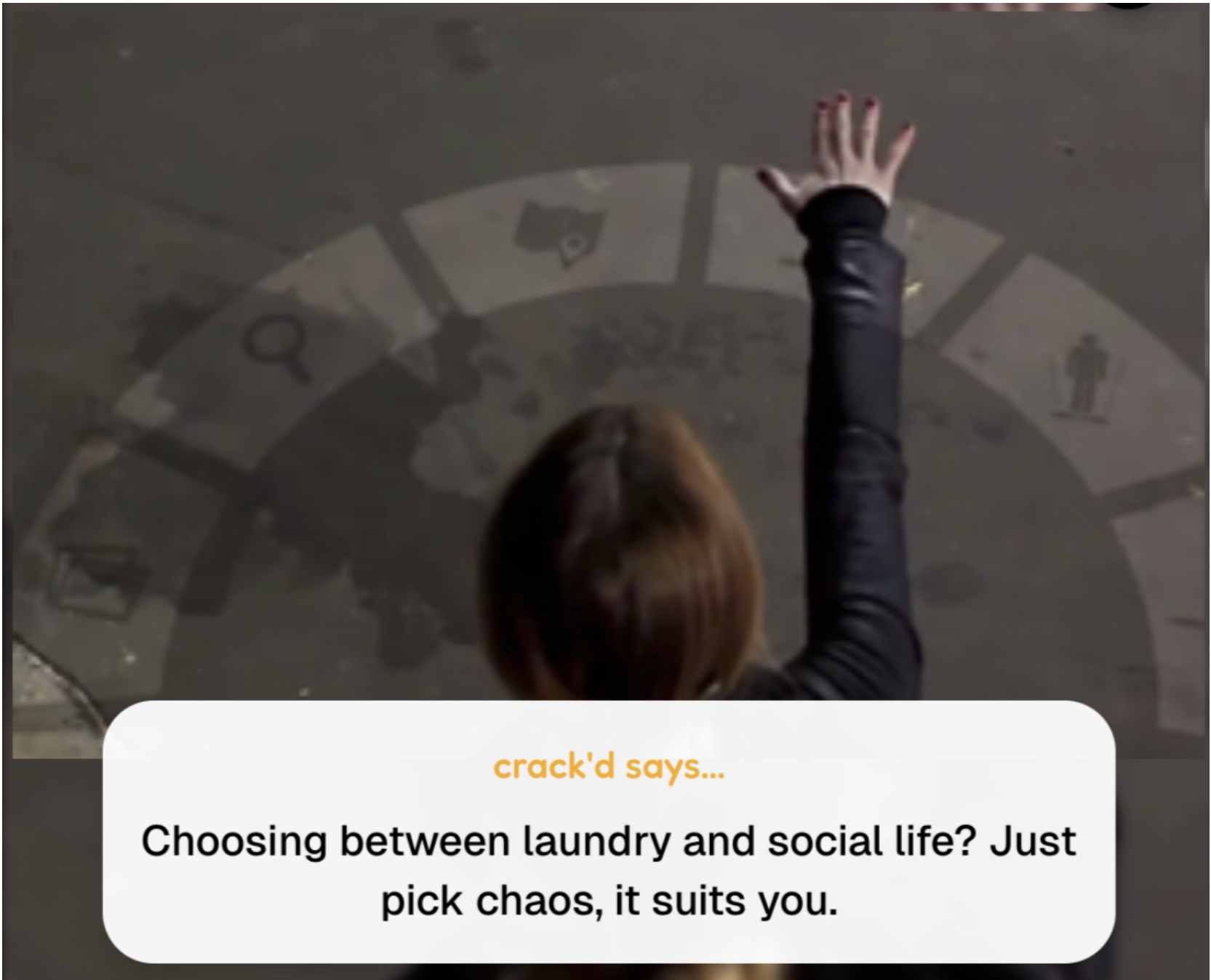
crack'd says...

Your phone deserves better friends than you.



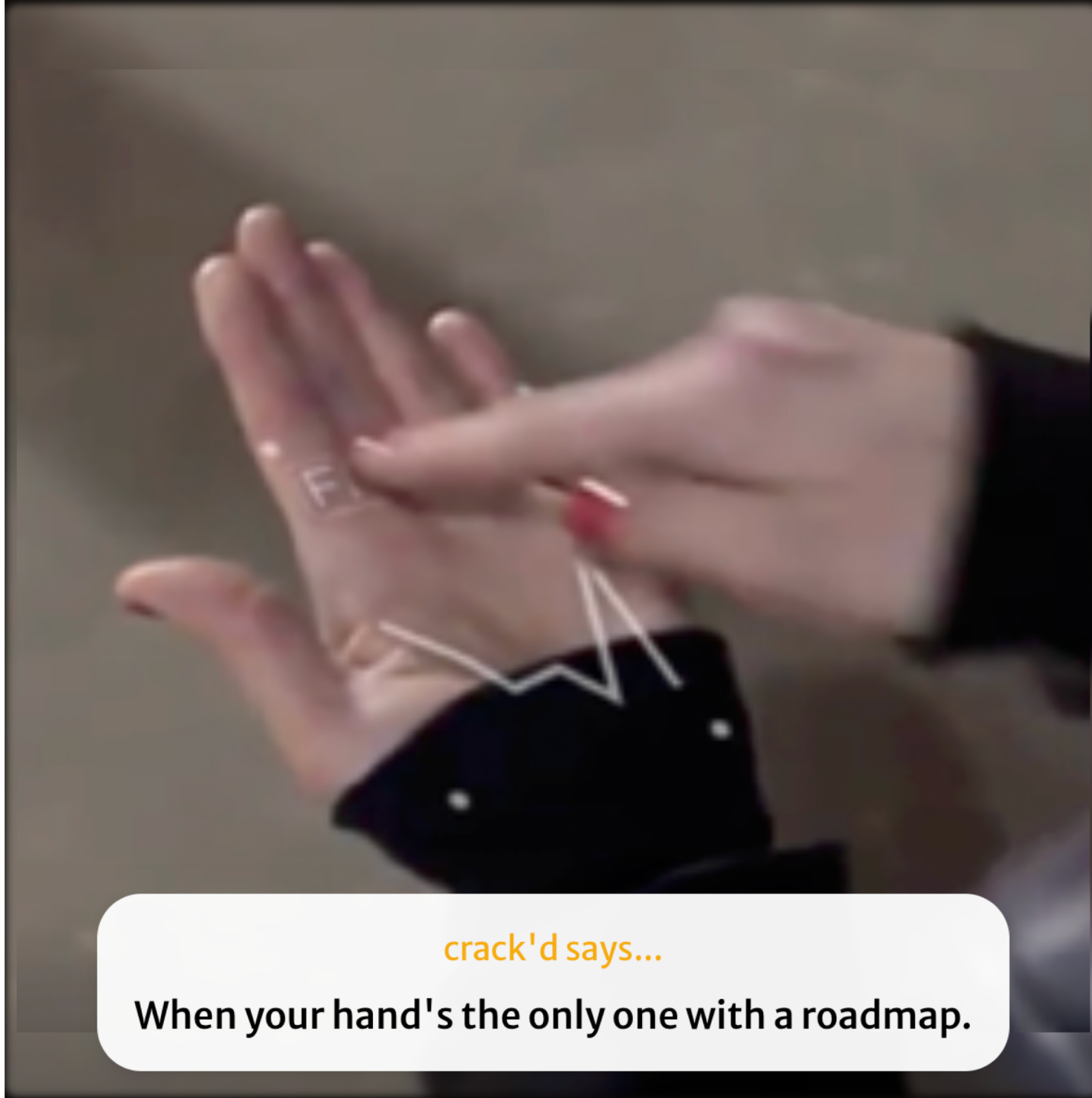
crack'd says...

Ah yes, glow papers, the latest in procrastination
tech.



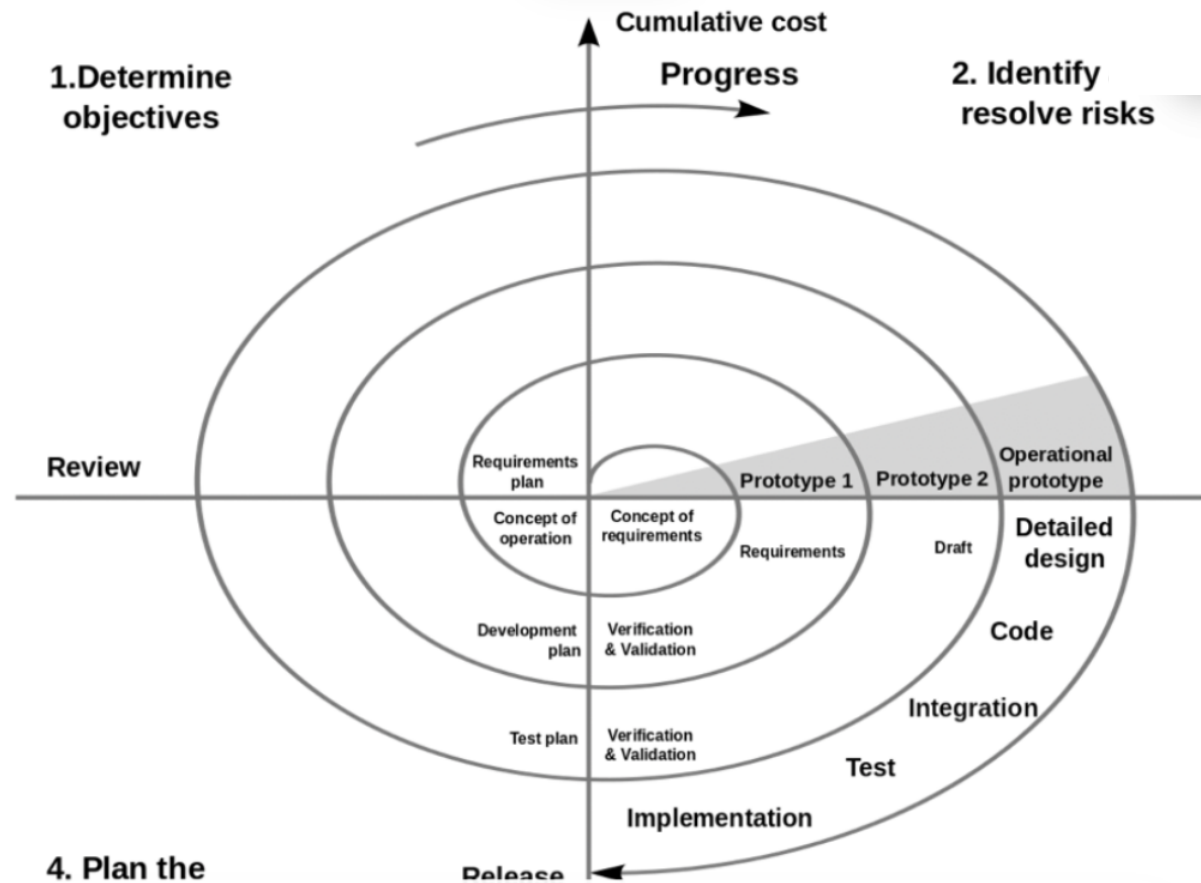
crack'd says...

Choosing between laundry and social life? Just
pick chaos, it suits you.



crack'd says...

When your hand's the only one with a roadmap.



crack'd says...

Your project management skills are as useful as
a screen door on a submarine.



Crack'd says...

That statue's judging your choices harder than
your parents.



How to Build our Future Robot Overlords

Going from 0→1 with
Robotics at the Edge