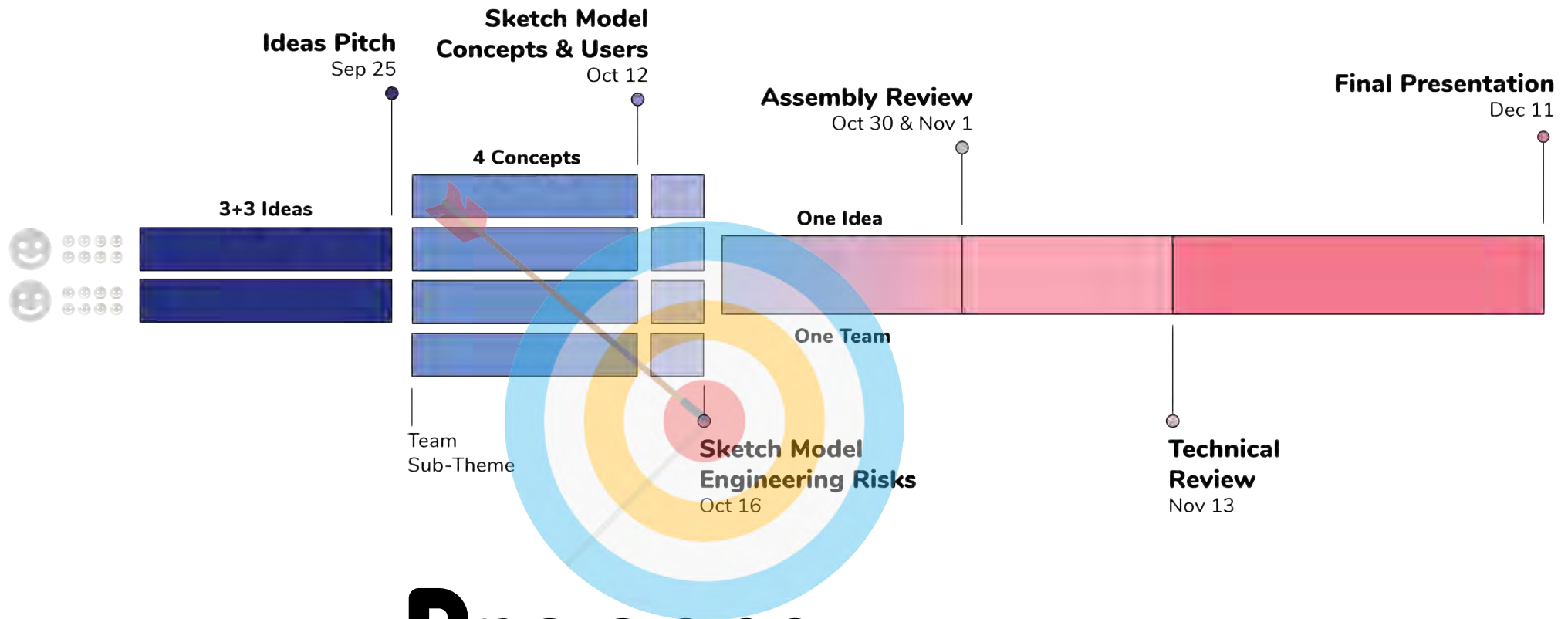


Steve Jobs, 1955-2011

work hard to get your thinking clean to
make it simple





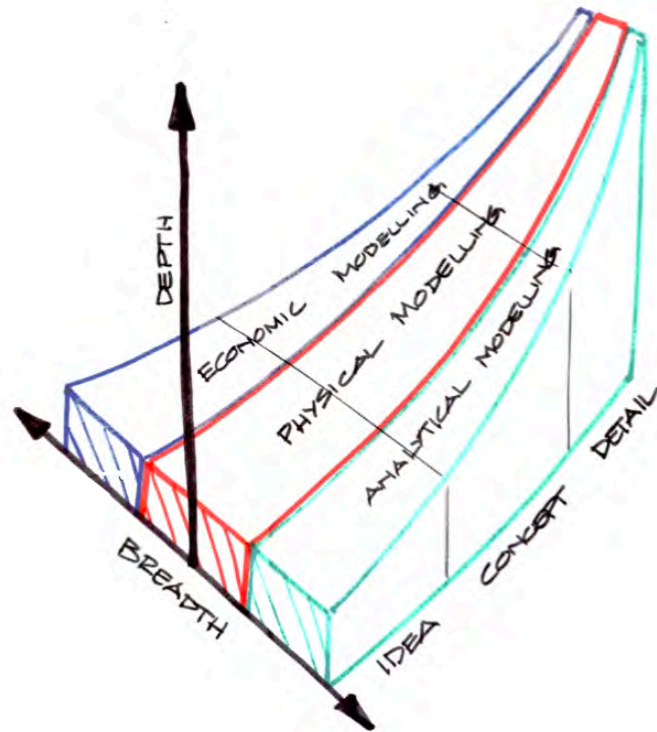


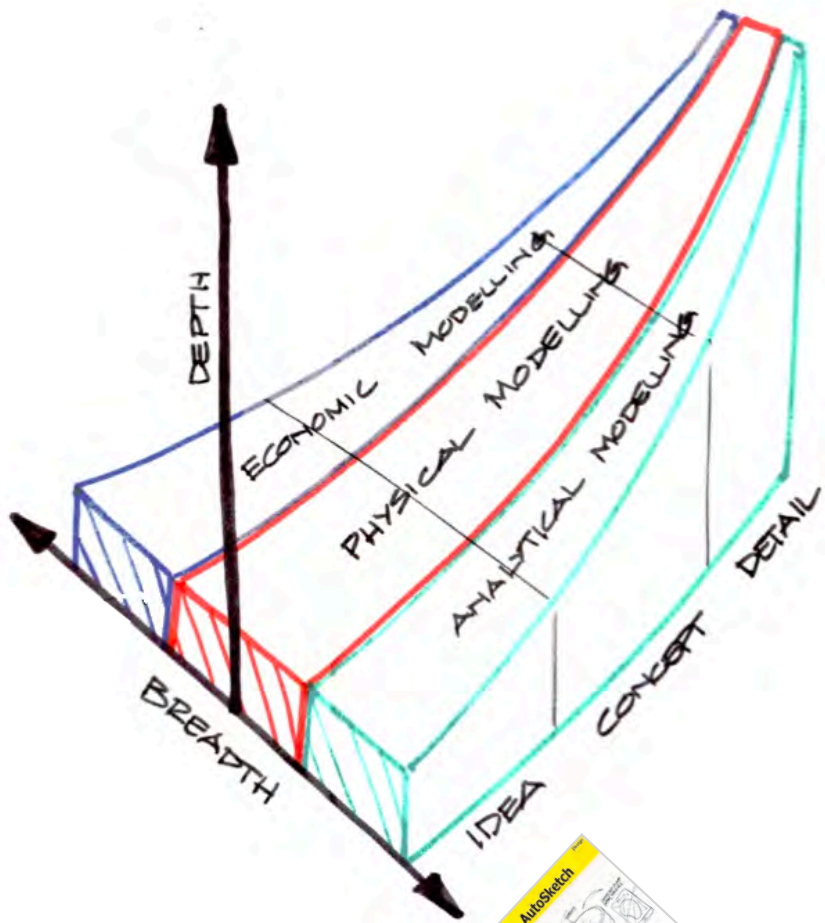
Process

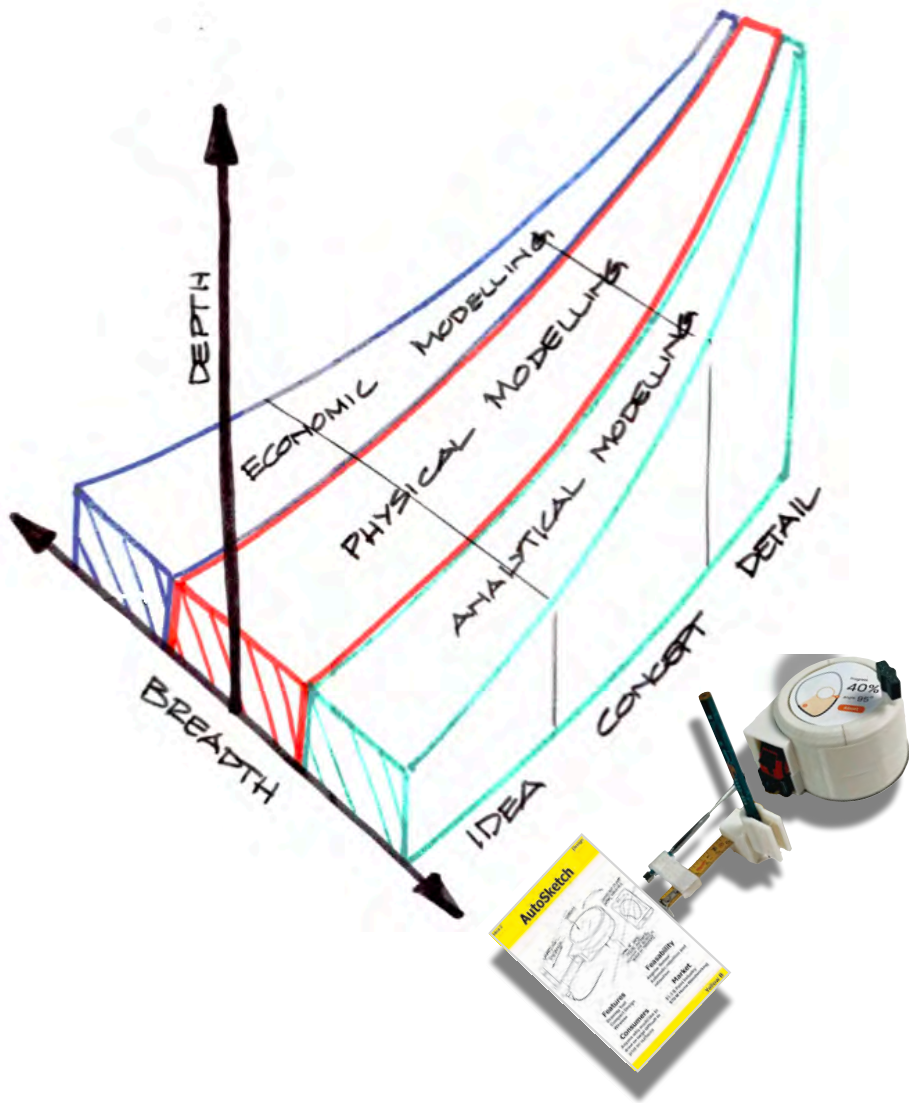
concept generation

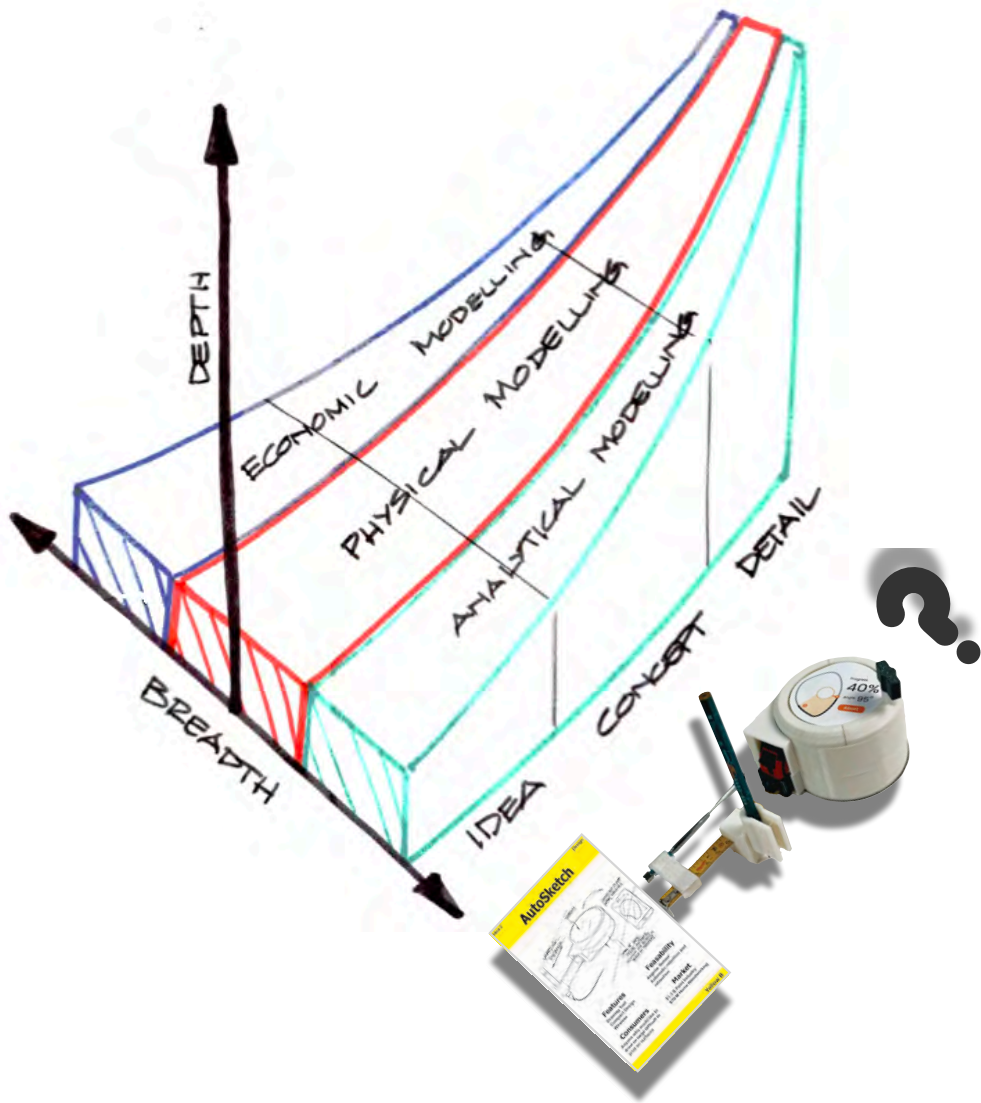
lecture #3

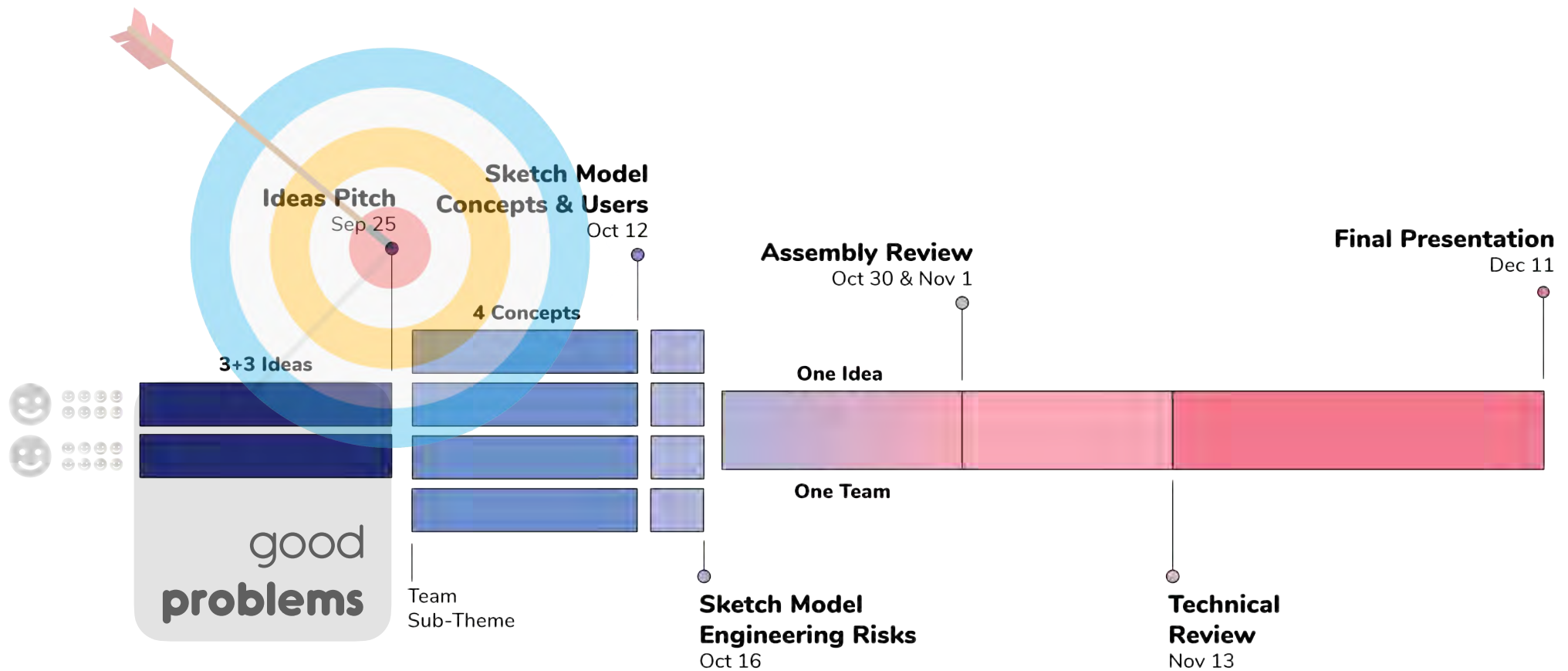
rigor in breadth
and depth











Process

opportunity identification

good
products

**Sketch Model
Concepts & Users**

Oct 12

4 Concepts

Ideas Pitch

Sep 25

3+3 Ideas

Assembly Review

Oct 30 & Nov 1

One Idea

Final Presentation

Dec 11

One Team

**Sketch Model
Engineering Risks**

Oct 16

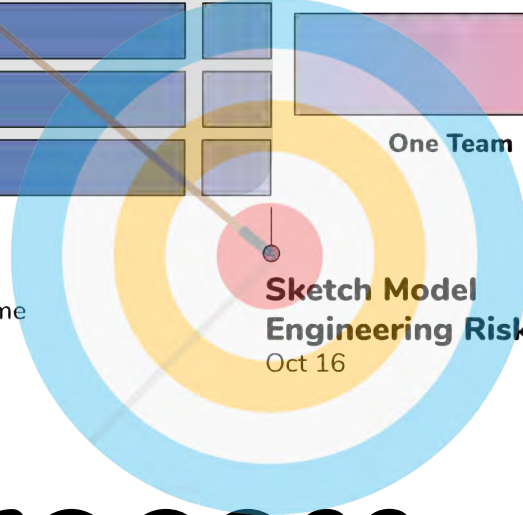
**Technical
Review**

Nov 13

Team
Sub-Theme

Process

concept generation





research users

research users

user persona

Nurse

- Overworked
- Takes **5-30 min** to rotate patient
- May require additional help to rotate patient
- Sees **multiple patients every hour**

Patient

- Ages 50-70+
- Has **difficulty moving**
- Gets **bed sores** from staying immobile
- Needs to be **rotated every two hours**



purple revolve

research users

User Persona
"Dorothy"

"I want to take out the trash by myself!"

Scenario:
"I value my independence, but I find taking out the trash to be difficult due to my mobility issues. It's hard for me to tip the can backwards and roll it on my gravel driveway."

Struggles Rolling Trashcan to the Curb

Mobility Issues

City-Issued Trash Can

Takes Out the Trash weekly

Values Autonomy

patient
ty moving
res from
obile
rotated
ours



pink waste can walker

research

benchmarking

research

benchmarking

Competitive Products

blue
muscle sensing belt

	Visual Cues in Physical Therapy				Better Belt
Ease of Use	+	+	-	-	+
Cost	+	-	-	+	+
Accuracy	-	+	+	-	+
Movement Compatible	-	+	+	-	+

product vision

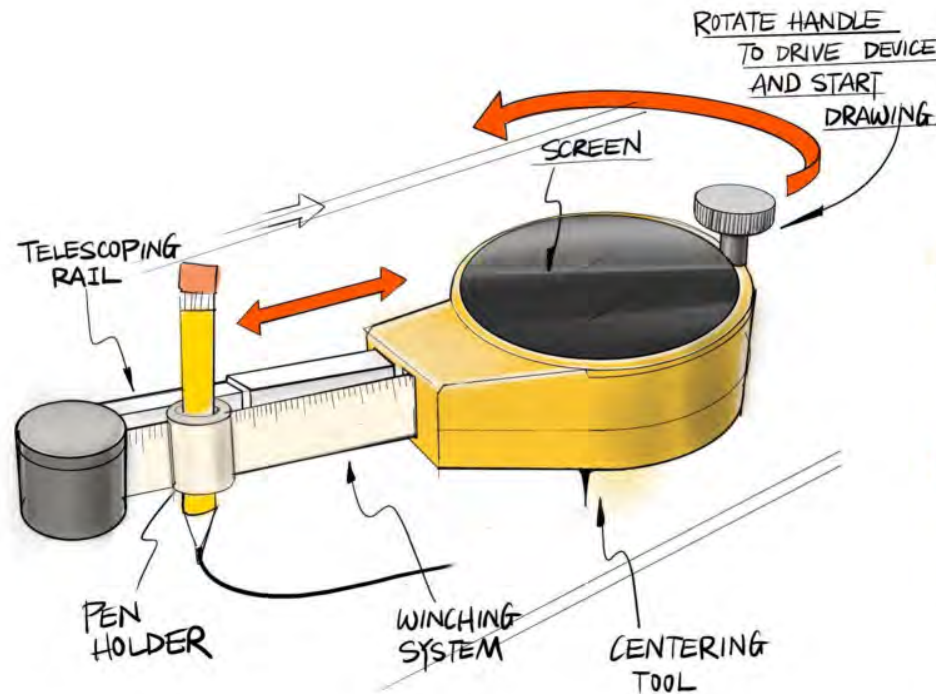
product vision

red anti-kickback saw

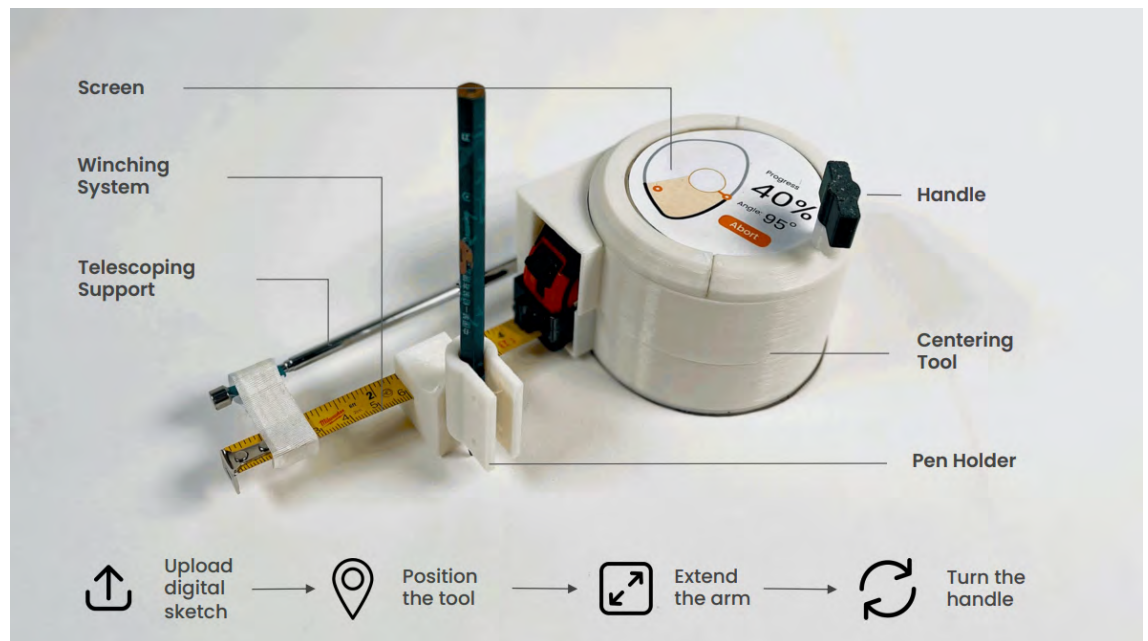


product vision

yellow guided sketcher



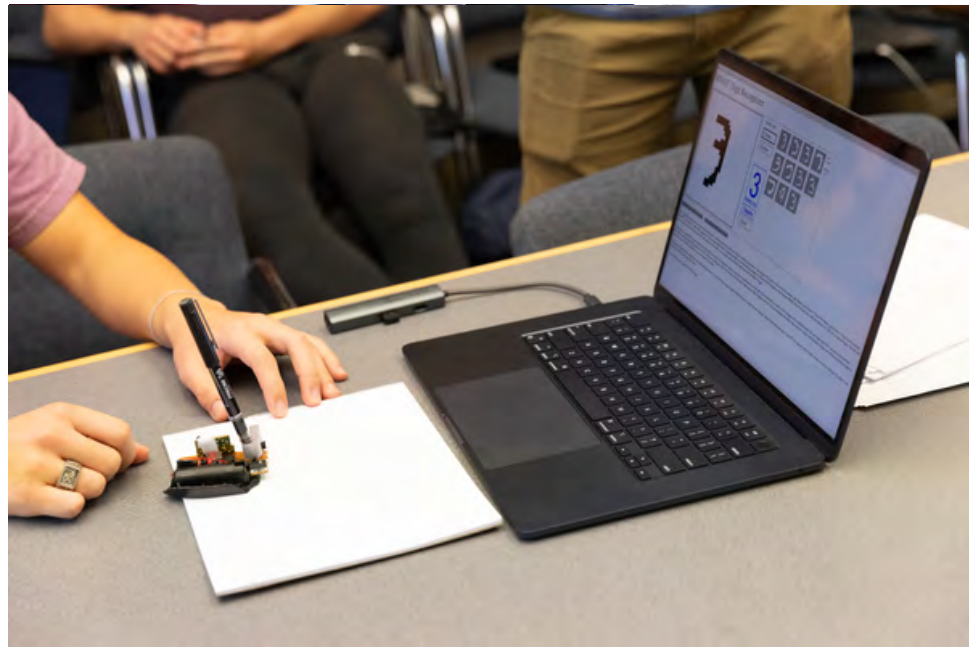
product vision



yellow guided sketcher

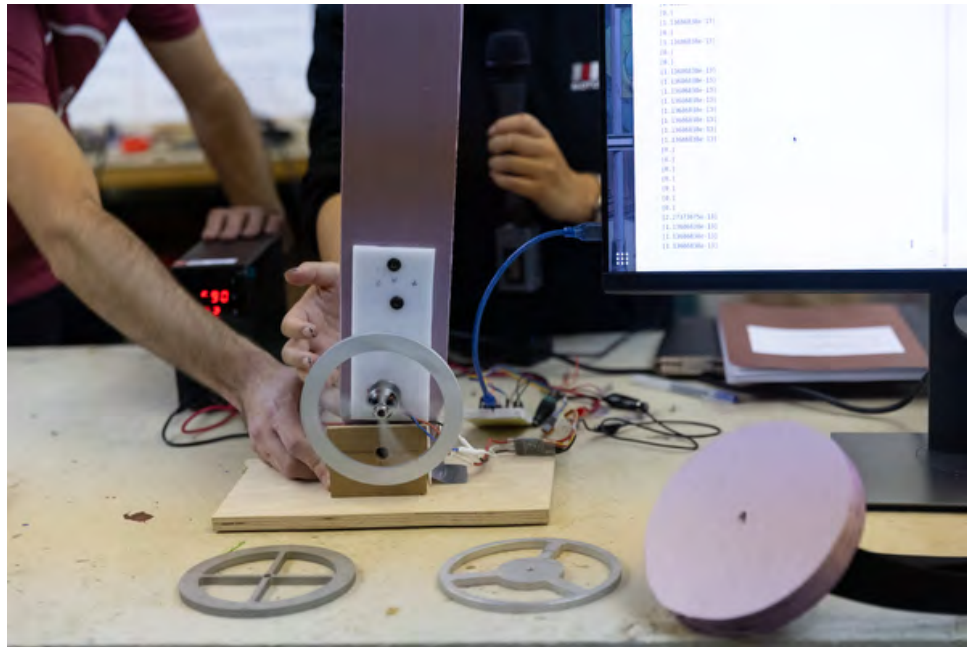
model learning

model learning



purple handwriting

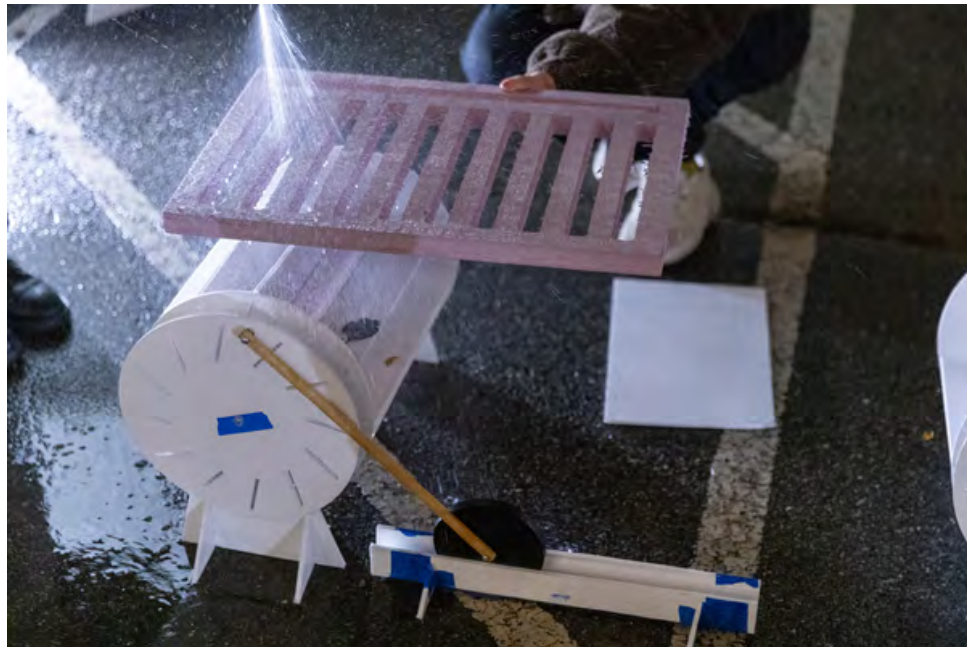
model learning



red inertia belt

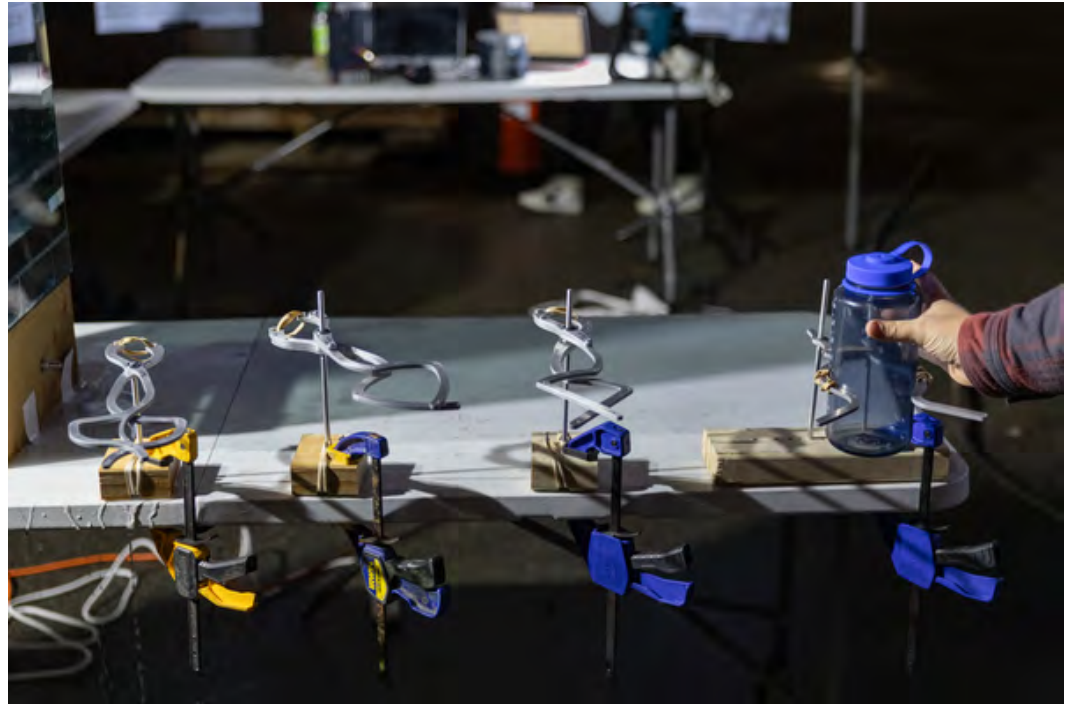
model learning

green grate guard



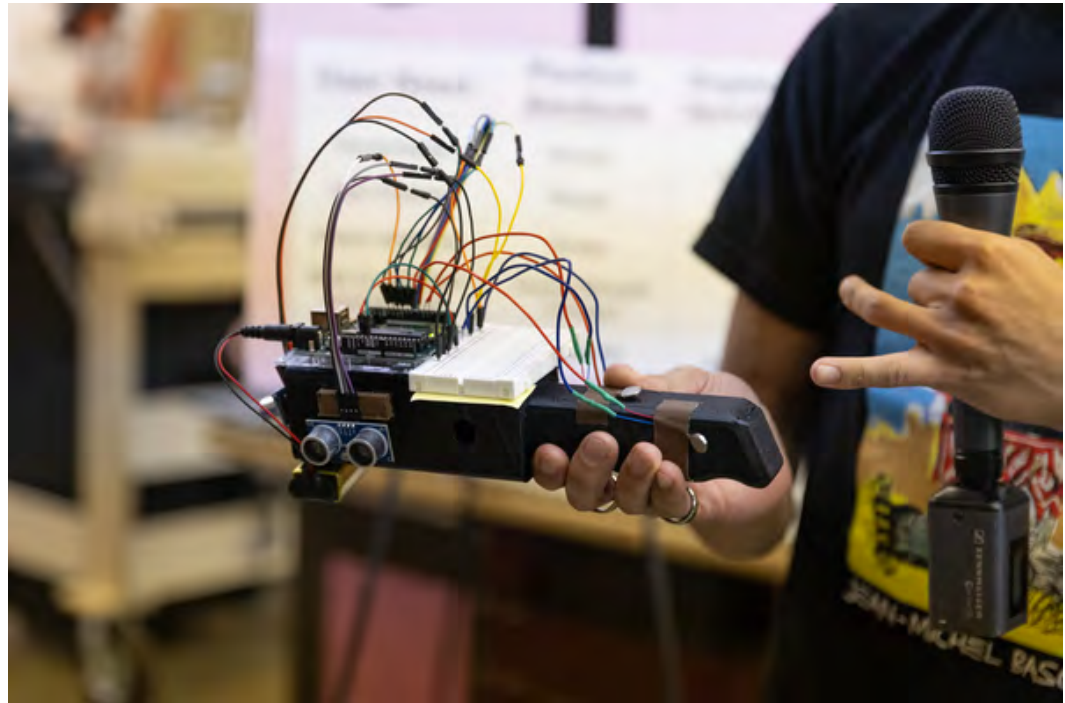
model execution

model execution



blue safe2sip

model execution



pink sonar cane

facts

honesty

facts honesty

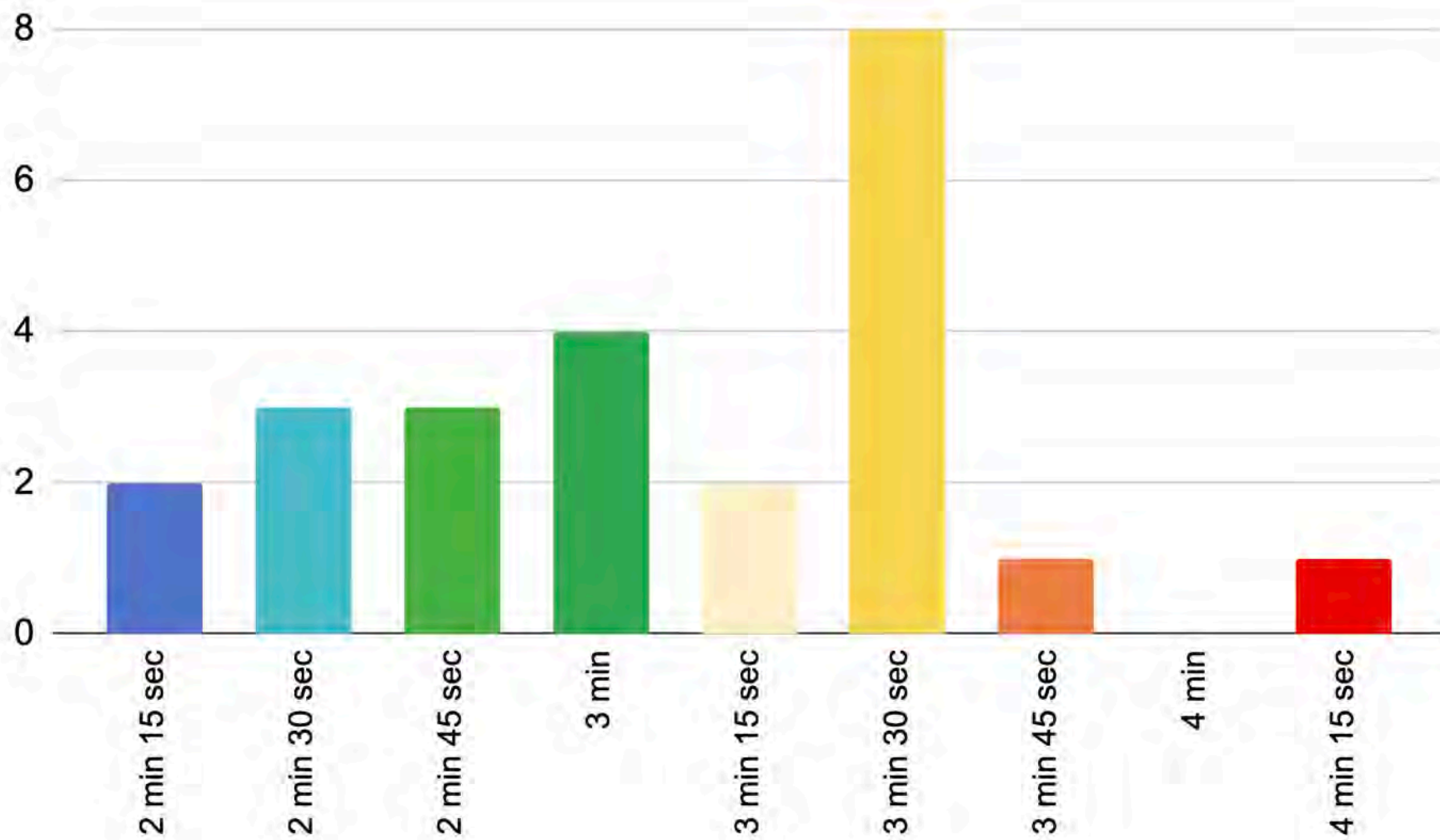


blue safe2sip

factor **negatively**
correlated with t
performance?















good
products

**Sketch Model
Concepts & Users**

Oct 12

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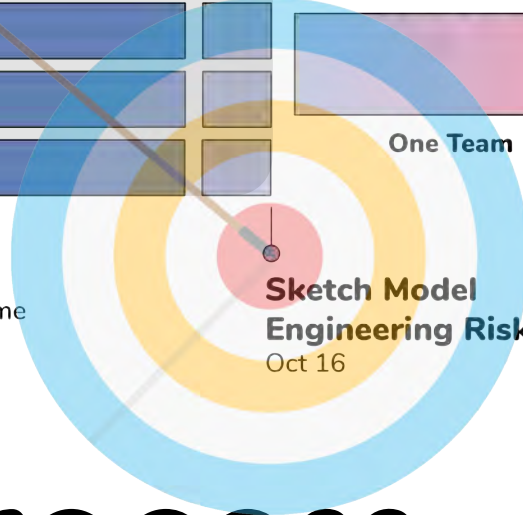
**Technical
Review**

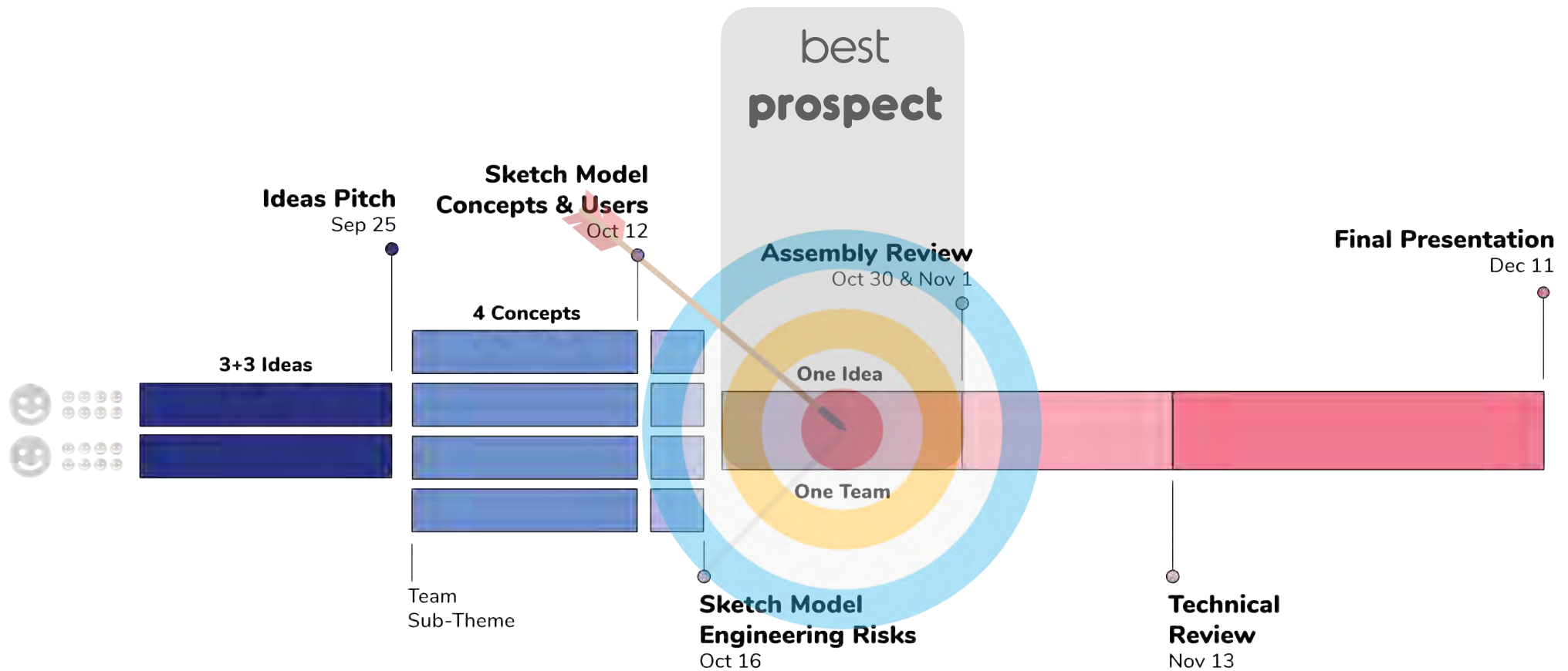
Nov 13

Team
Sub-Theme

Process

concept generation





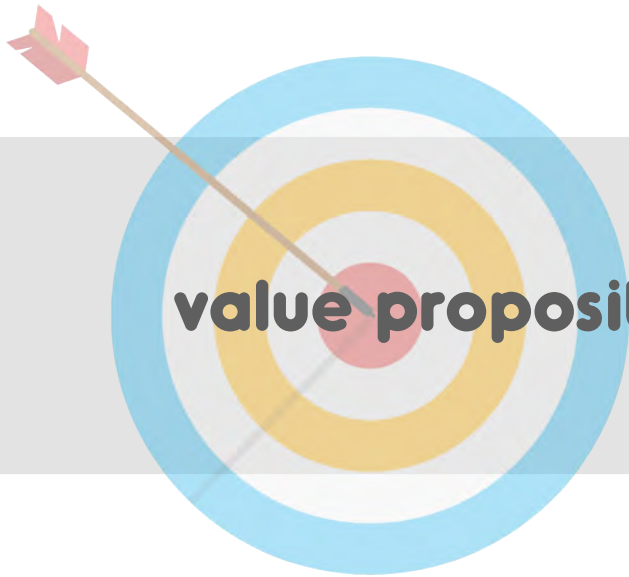
Process

detail design



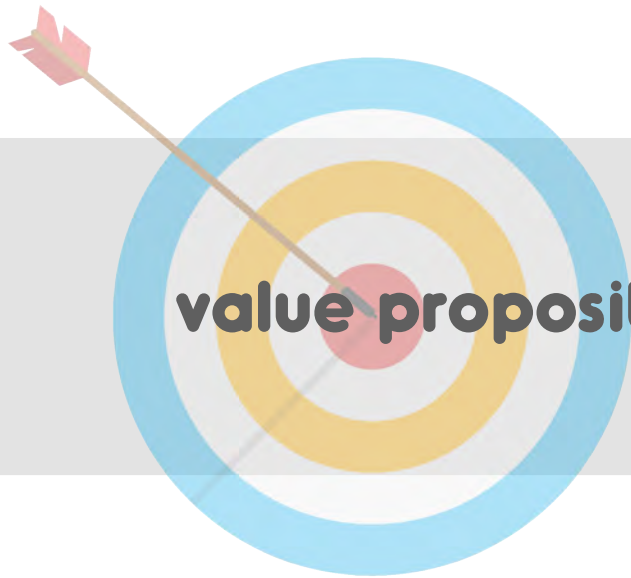
real users: persons that can give you feedback

good
prospects

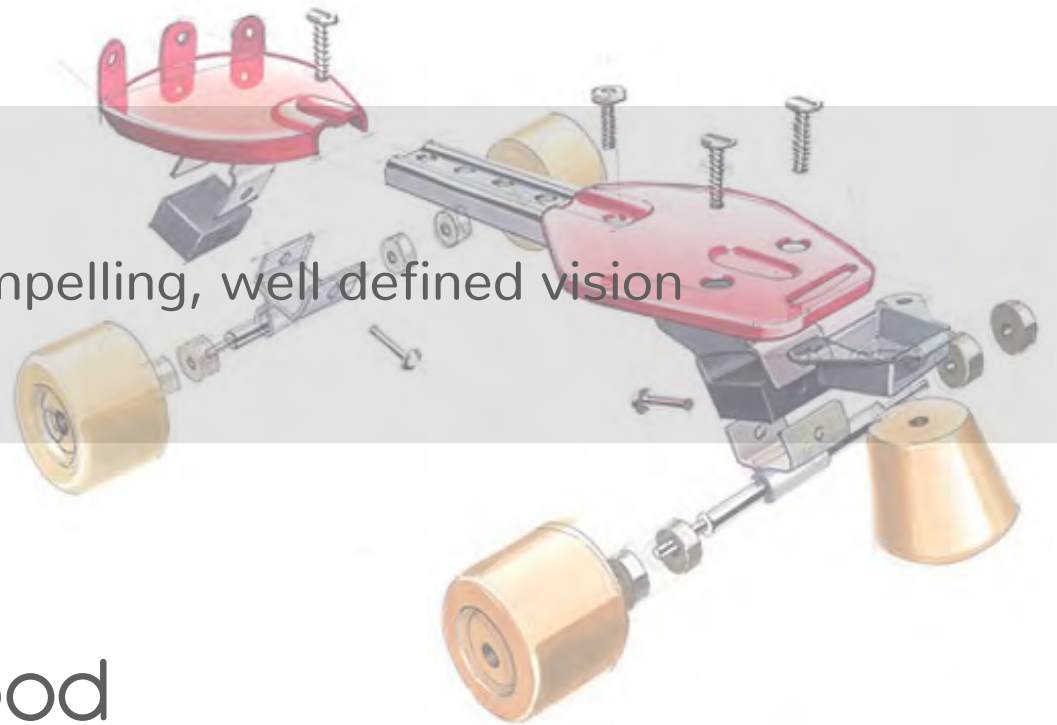


value proposition: compelling, well defined vision

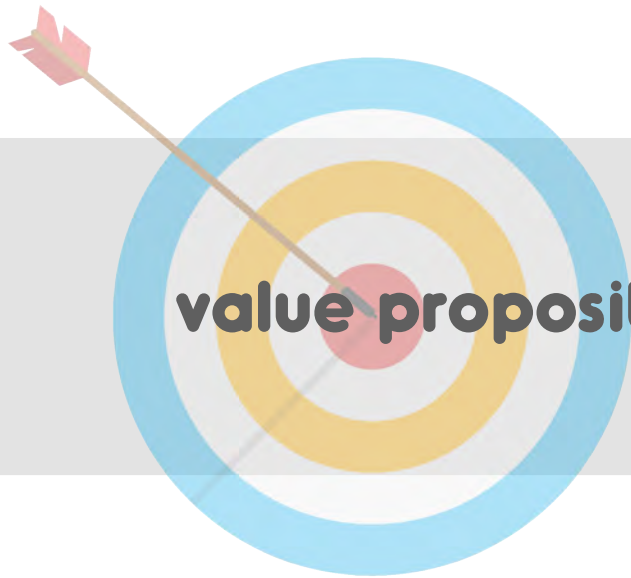
good
prospects



value proposition: compelling, well defined vision

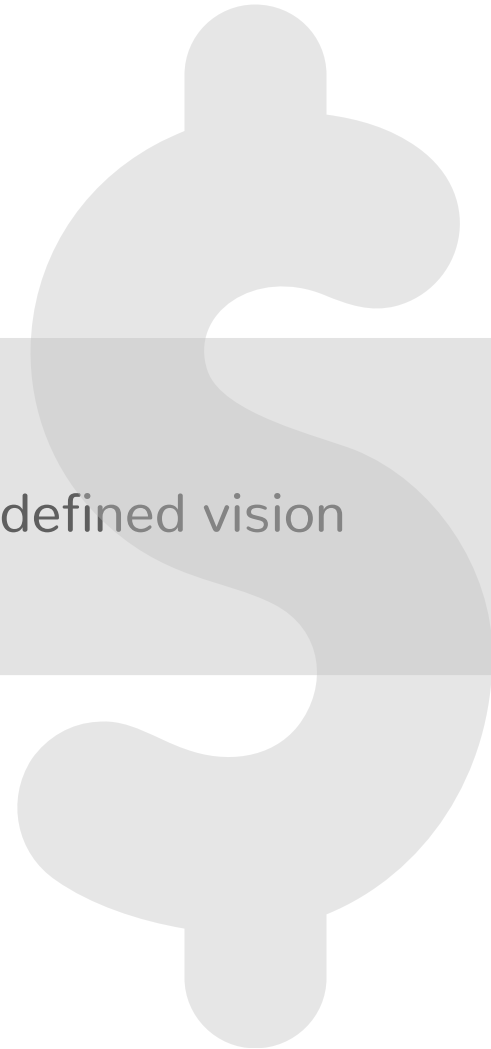


good
prospects



value proposition: compelling, well defined vision

good
prospects





technology: ambitious, innovative but not overly R&D

good
prospects



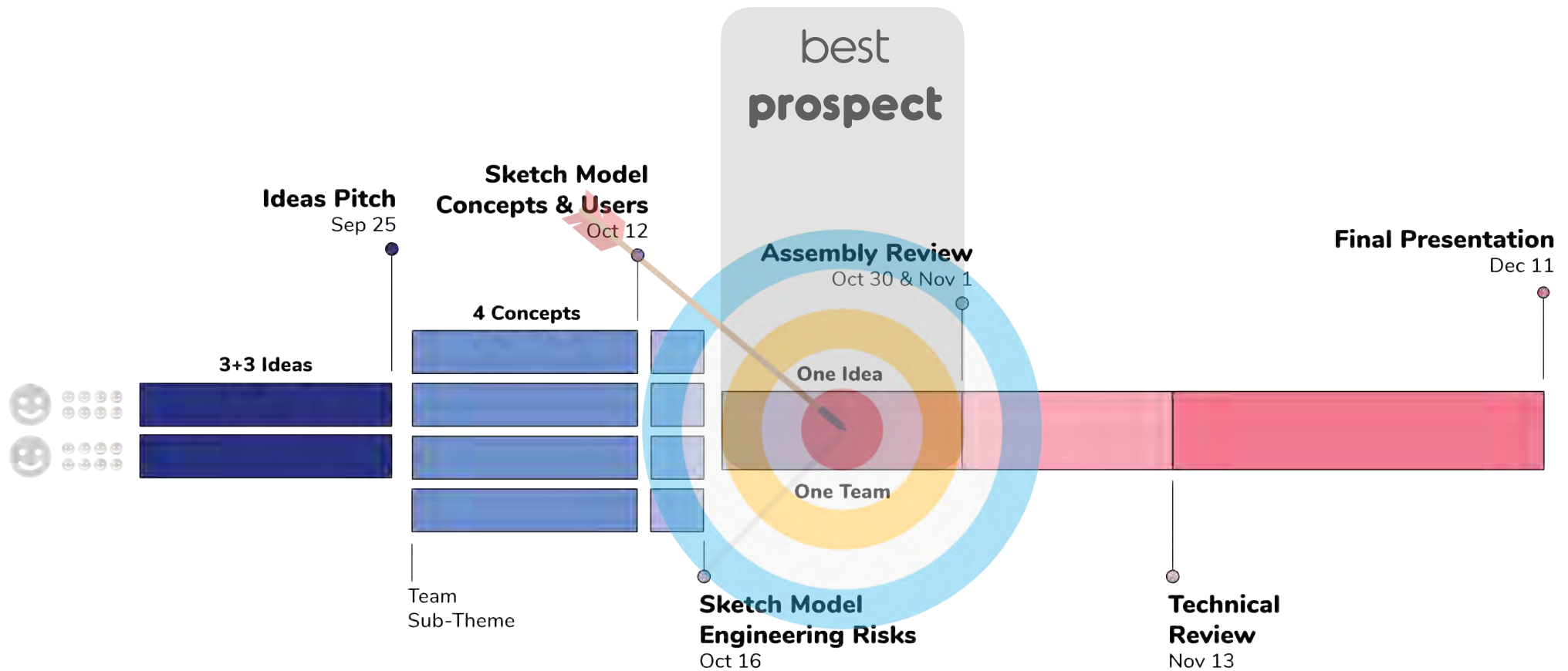
finances: competitive, adequate budget

good
prospects



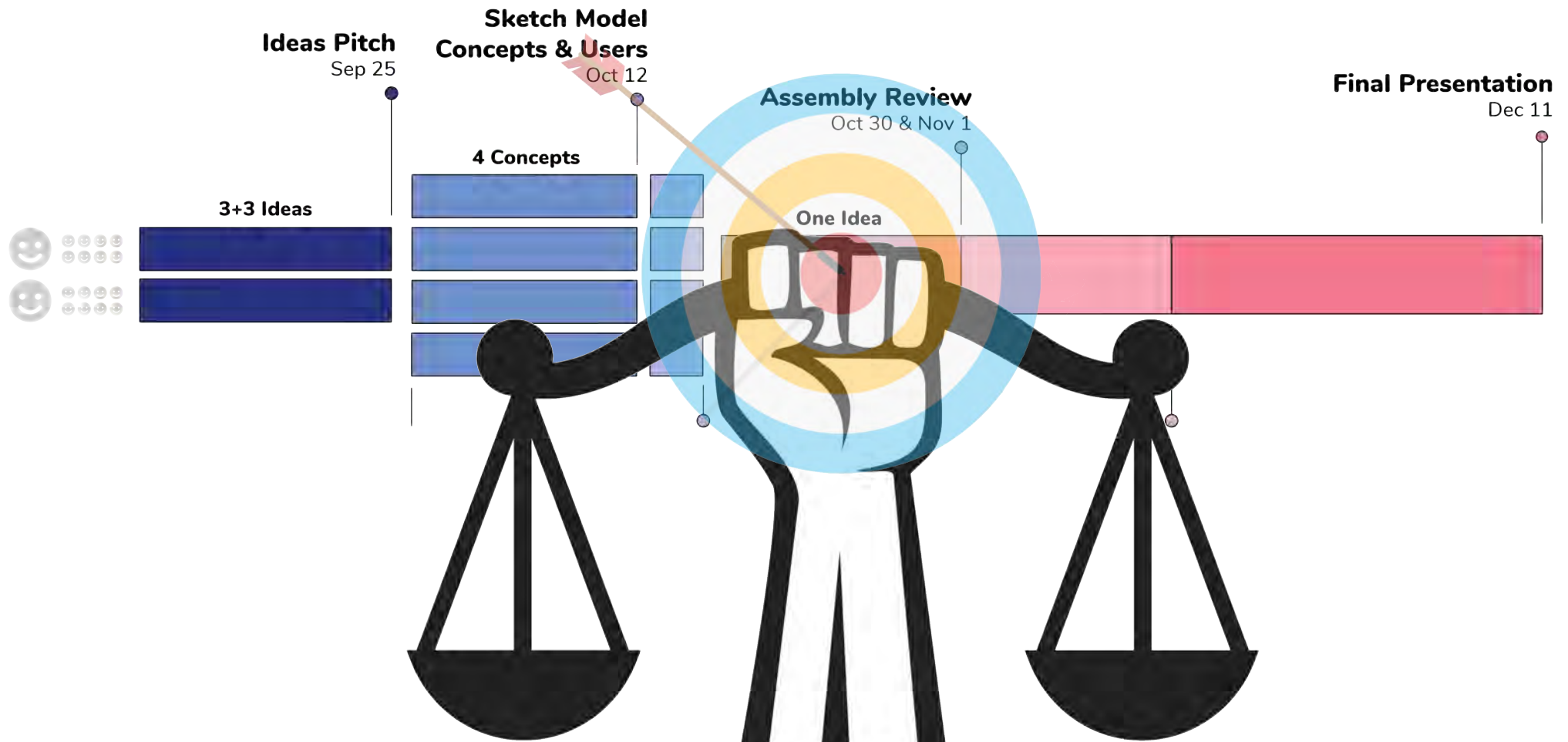
testing: ability to test realistically and iterate

good
prospects



Process

detail design



FNAP

Facts. Not assertions. Please!

the action of stating
something or
exercising authority
confidently and
forcefully.



GOINVO

CODE OF ETHICS 2023

SPEAK THE TRUTH

We will be honest and objective. We will be transparent, and provide insight into our thinking and work.

MAKE THE WORLD USEFUL, BEAUTIFUL, AND DELIGHTFUL

We exercise the discipline to produce ideas and things that are useful to and beautiful in the world.

LEARN, BUILD, AND SHARE

We are curious, open creators who welcome new ideas and the input of others.

COMMIT TO COMMUNITY

We protect the public by holding paramount the safety, health, welfare, and rights of human beings.

GO LIKE HELL

We are driven and committed to what we do, putting extra effort in our quest for exceptional results.

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a code of **behavior** or conduct justified according to a reasoned **value system**

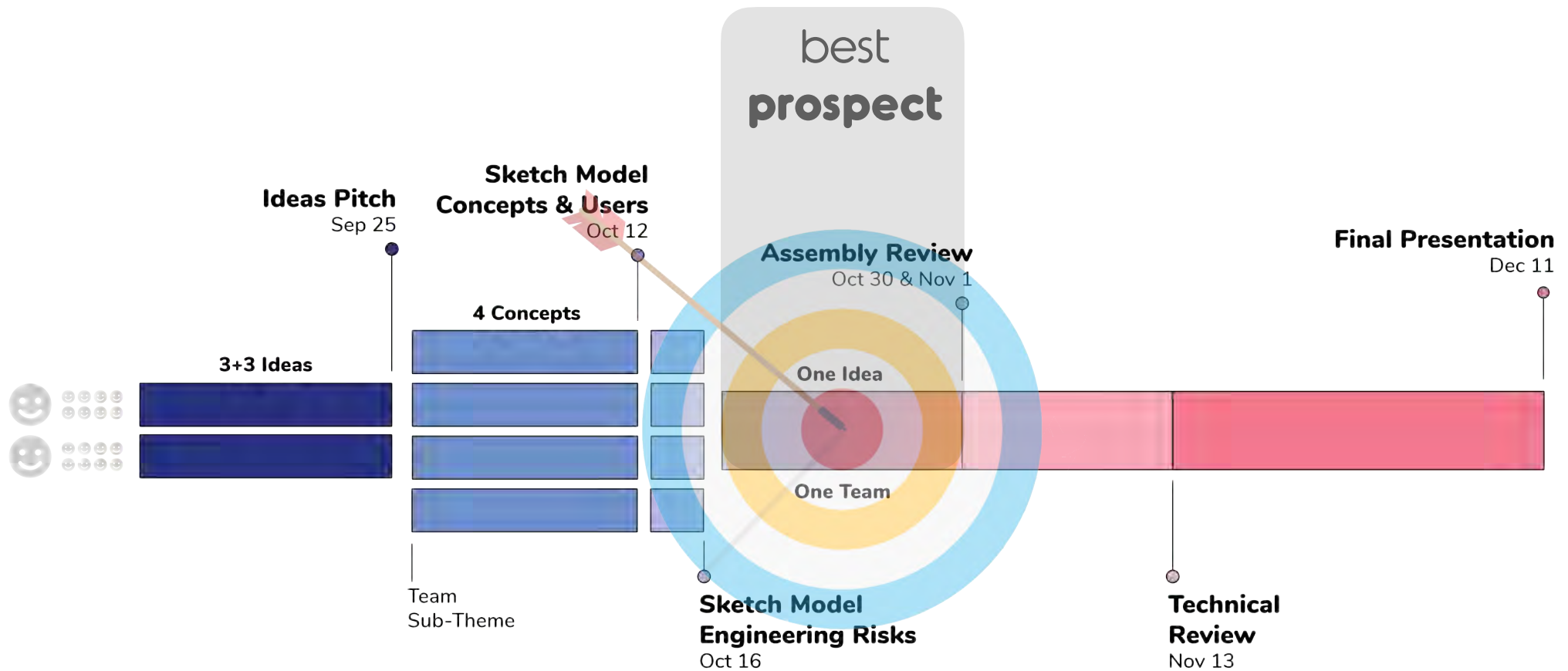
mini quizz

G'DAY

what does this stand for?

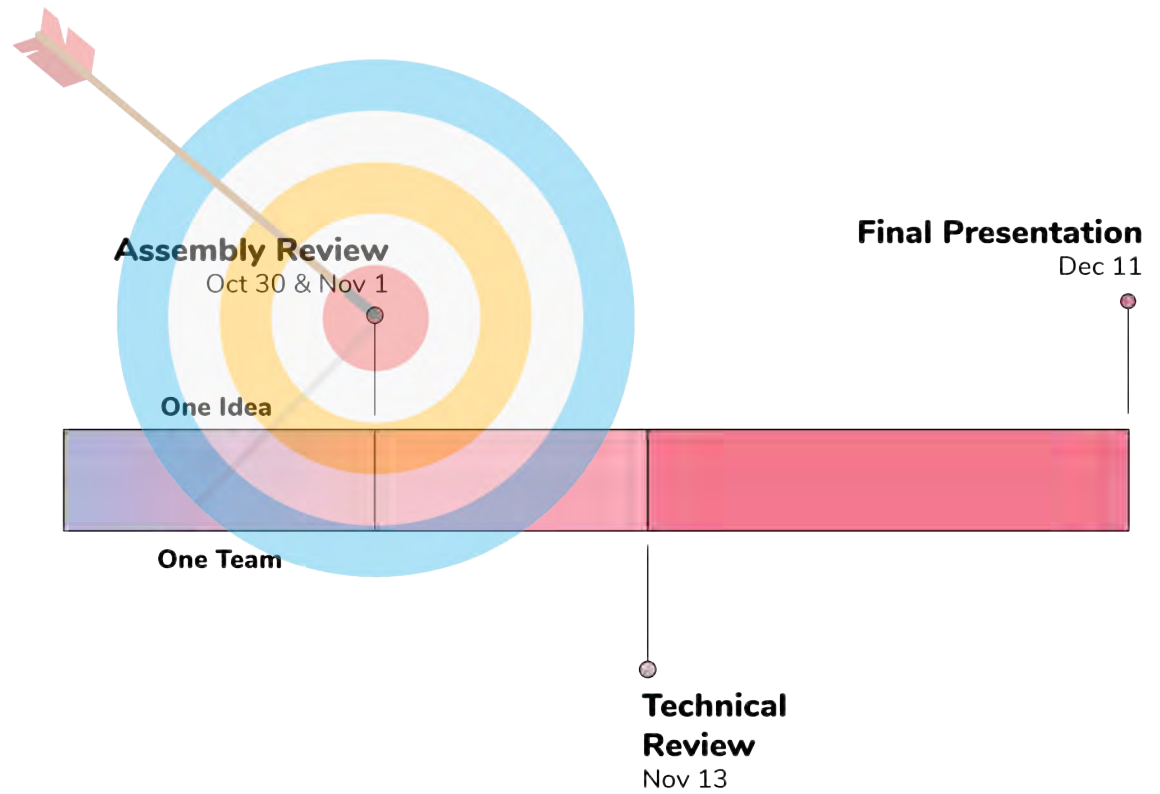
G'DAY

give. decide. accept. yo-wup!



Process

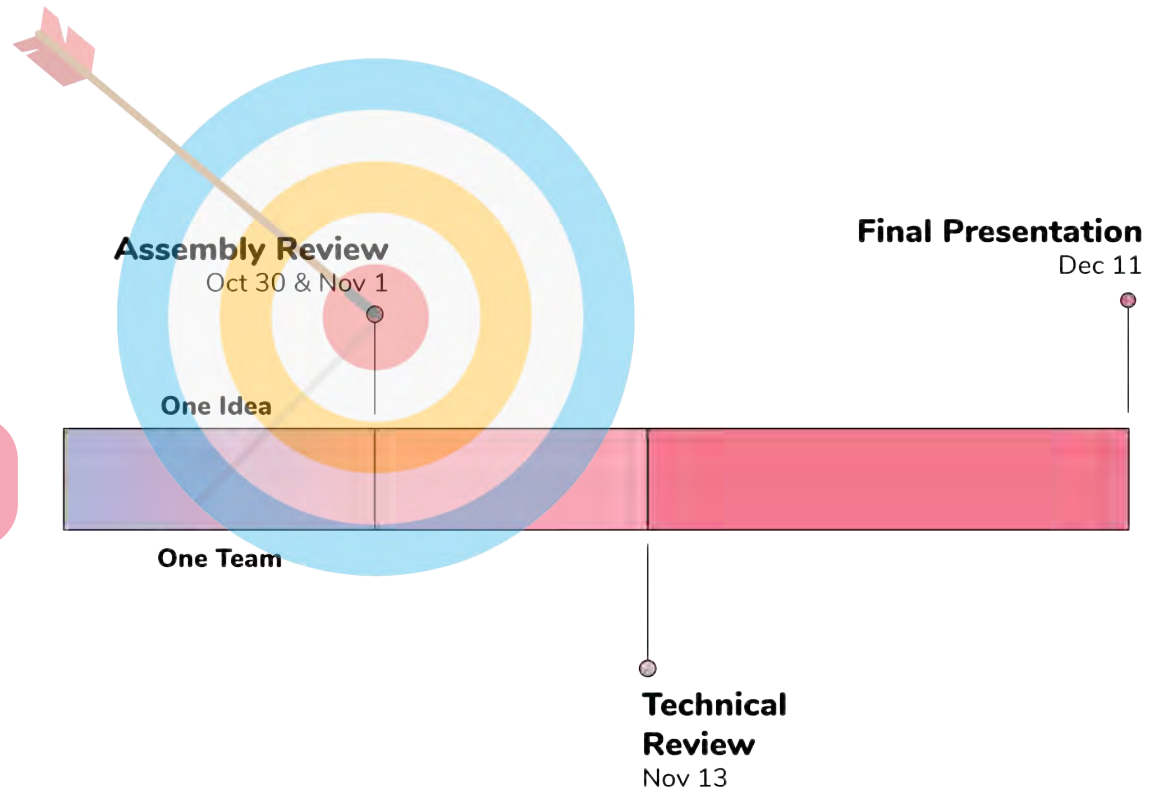
detail design



Process

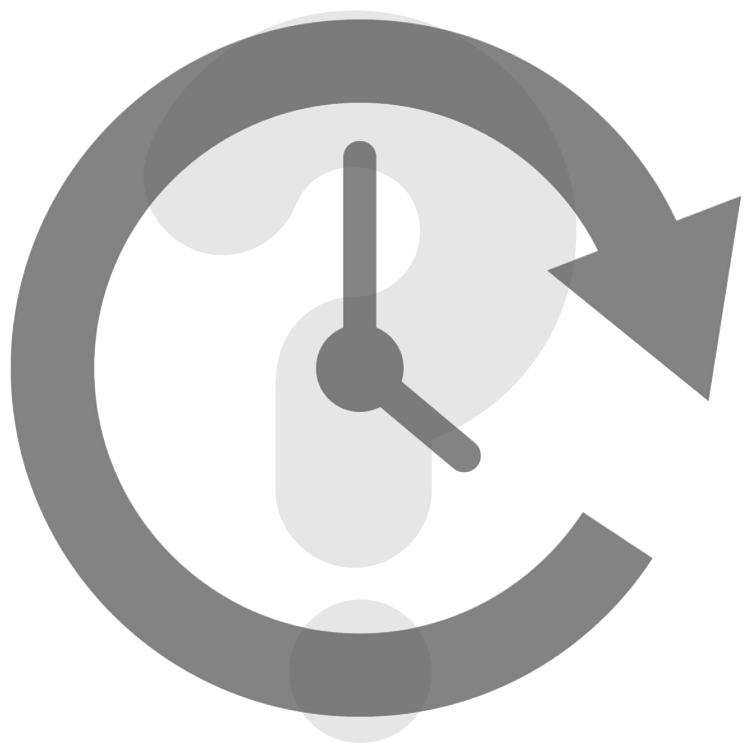
detail design

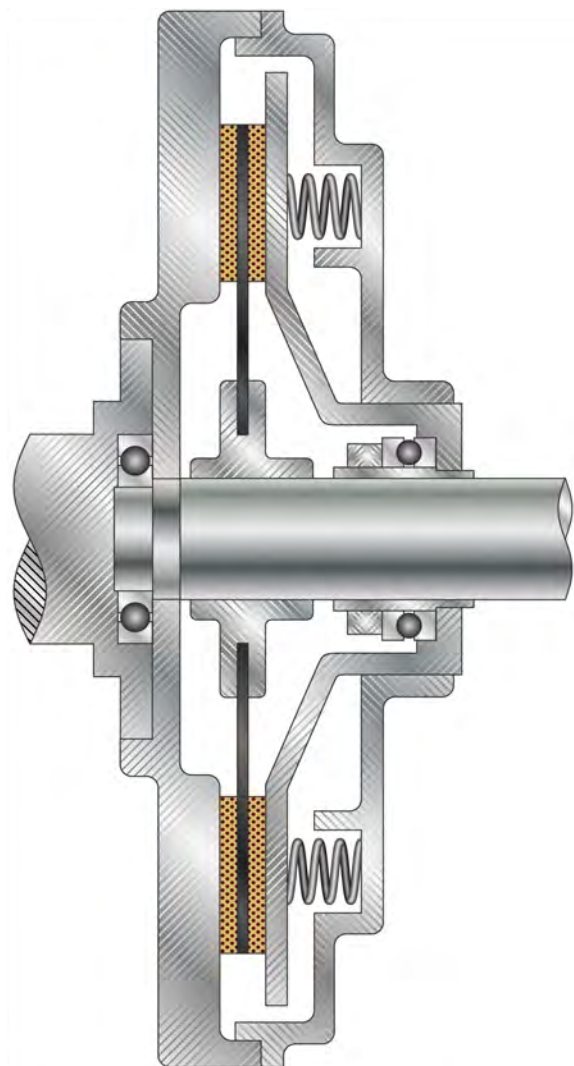
October 30

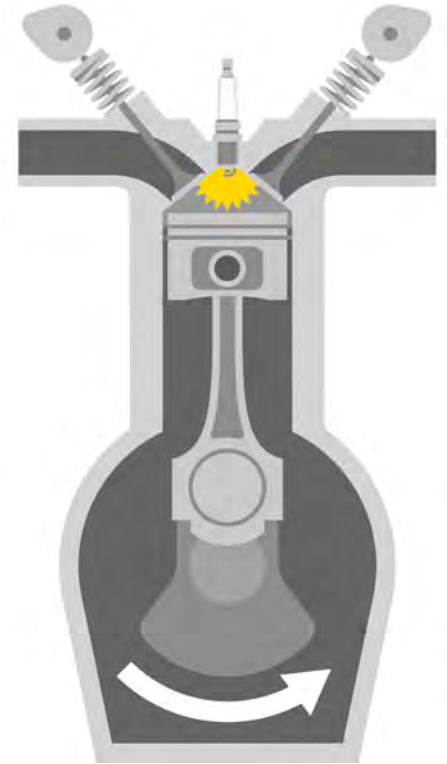
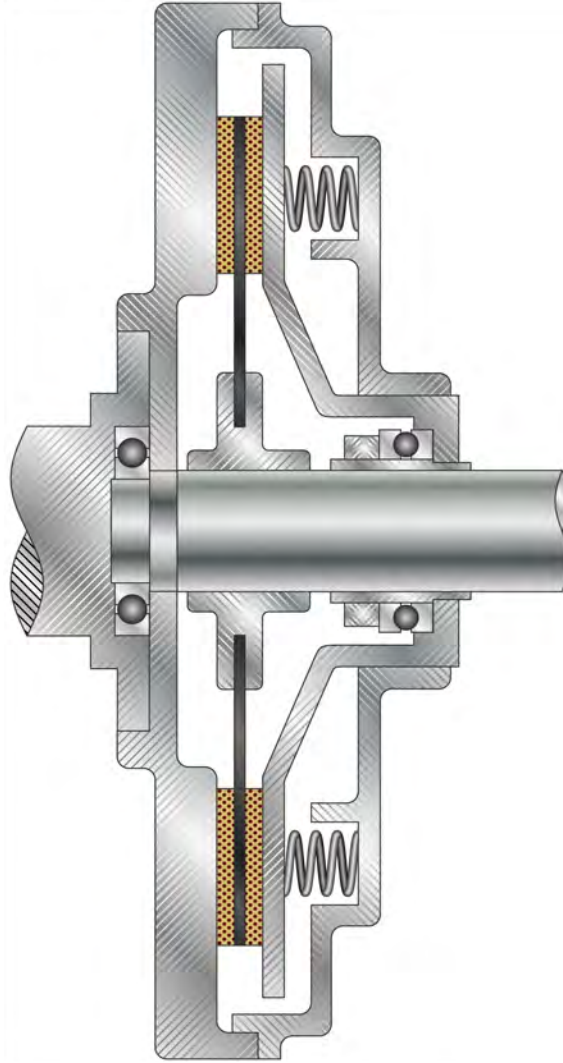


Process

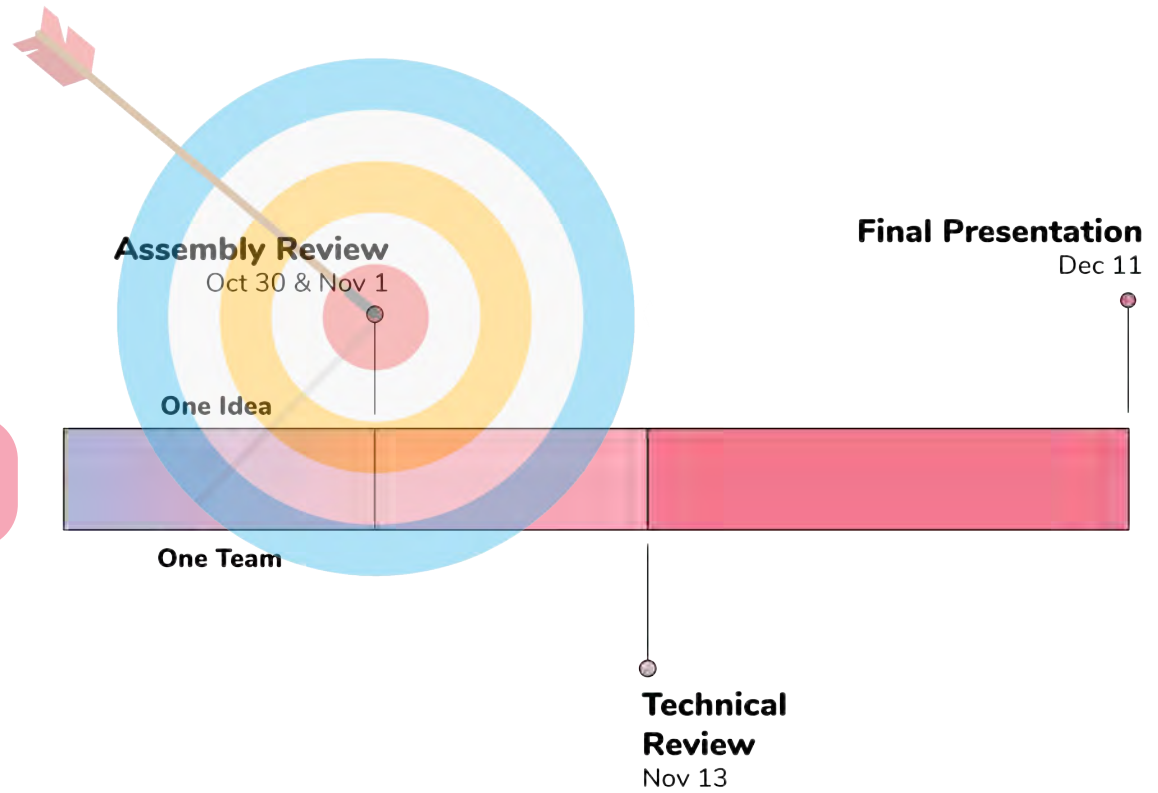
detail design







October 30



Process

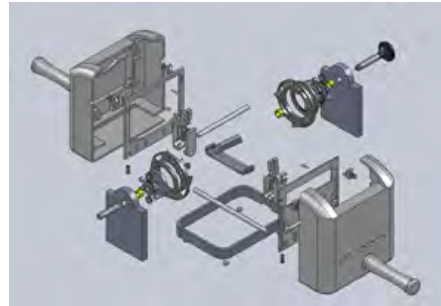
detail design

product contract: value proposition, up-to-date user, and key needs, attributes and specifications

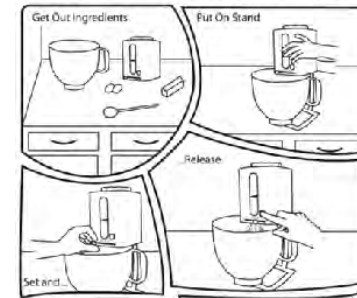
assembly review

design variations: vision, web-viewable assembly, exploded assembly, use storyboard...

assembly review

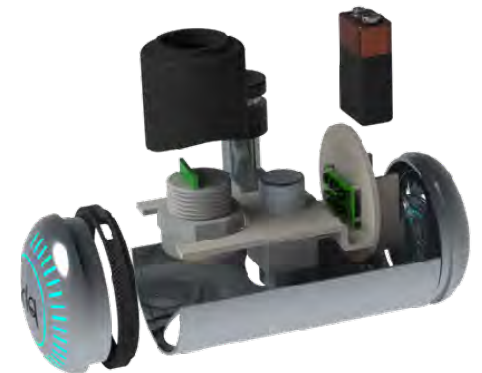
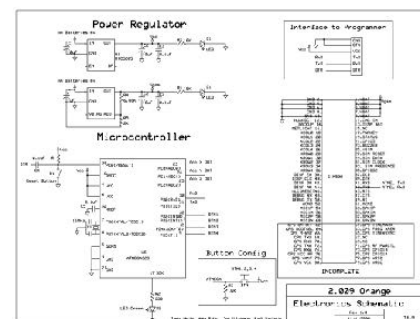


The Flour Pot



design variations: vision, web-viewable assembly, exploded assembly, use storyboard...

assembly review



who-did-what: all team-members contribute to the deliverable. You may work in pairs

assembly review

design time!



design time!

design time!

product architecture

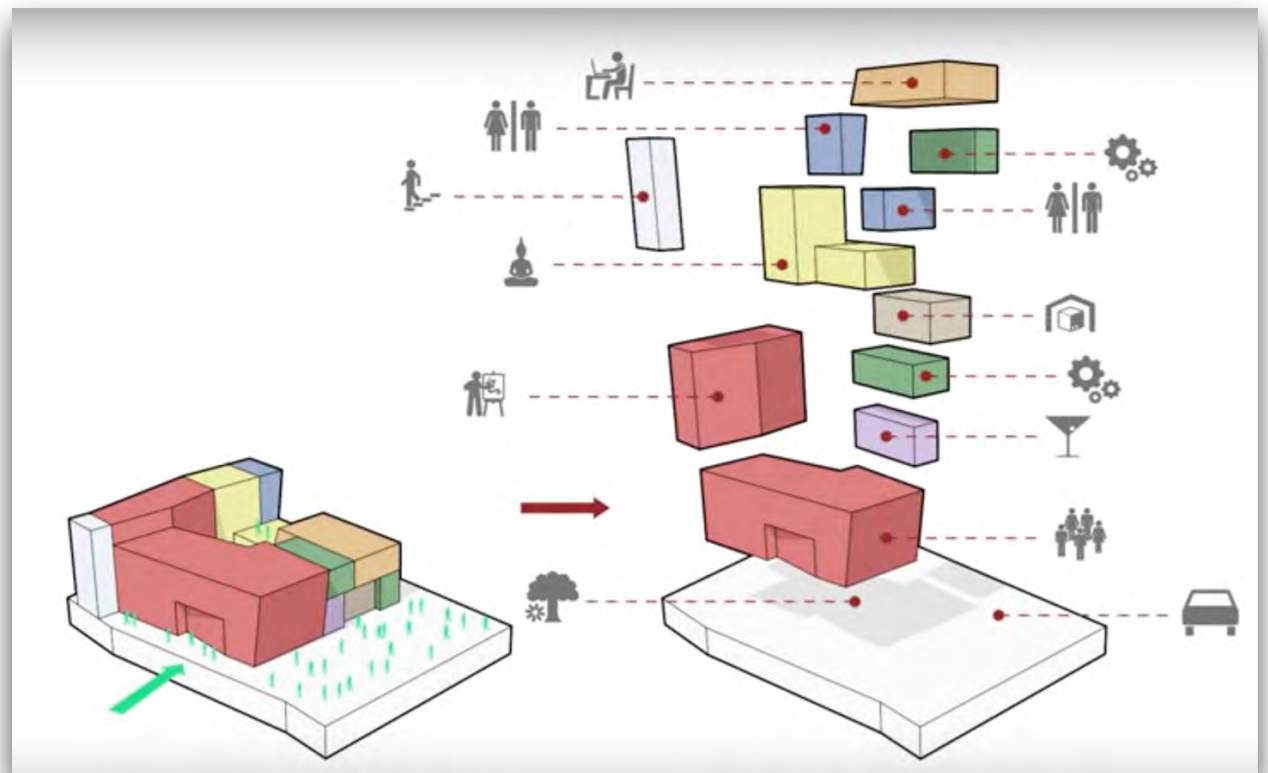
product architecture

how to structure your product?

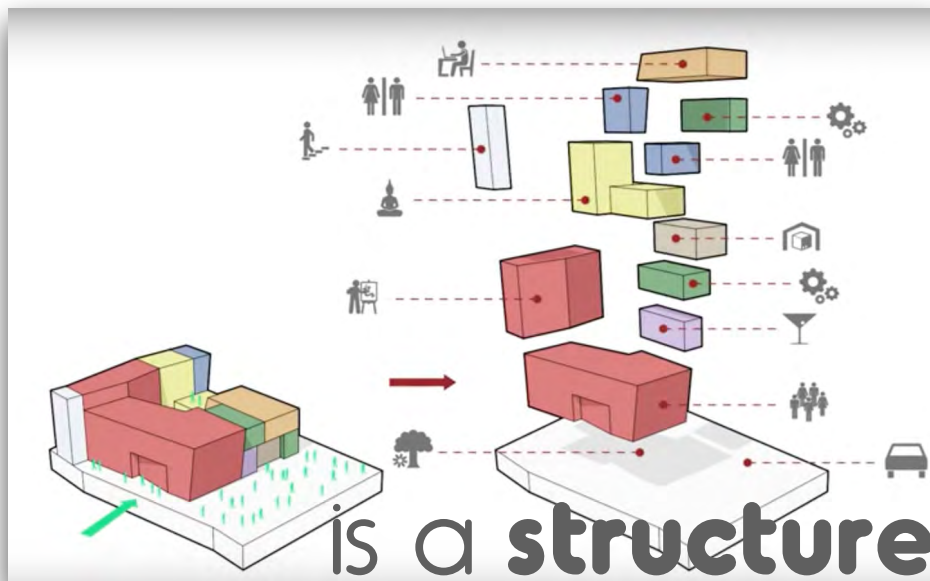
functional and physical decomposition:

the organization or chunking of a product's functional elements,
and the definition of the interfaces between these elements

product architecture



product architecture



is a **structure** for your team!

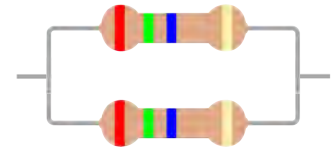
task forces are organized by your product architecture

[illegible]

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	
'Ad., B-pil. roof rail'	1	■	1																																				
'Body side'	2	1	■				1	1	1	1			1		1	1							1		1					1						1	1		
'Front header'	3			■																																			
'Rear header'	4				■																																		
'Rear pan. In. Upp.'	5		1				■											1																1				1	
'Roof bow'	6		1																																				
'Roof panel'	7		1	1	1	1	1	1	■																														
'Roof rail'	8	1	1	1				1	1																														
'Channel'	9									■	1				1	1																							
'Dash cross mem.'	10							1	■																														
'Floor panel'	11		1								■			1	1																						1	1	
'Front side rail'	12											■																											
'R. side rail center'	13												1	1																								1	
'Seat crossm. fr.'	14		1						1																													1	
'Seat crossm. rear'	15		1							1																												1	
'Back panel'	16																																						
'Back panel side'	17																																						
'Back panel upper'	18					1																																1	
'Rear floor side'	19																																					1	
'Rear side rail'	20																																					1	
'Spare wheel well'	21																																					1	
'Ad. A-pil. roof rail'	22		1						1																														
'A-pillar inner'	23											1																										1	
'A-pillar reinforce'	24		1																																			1	
'Cowl'	25																																						
'Dash panel'	26						1	1	1	1																													
'Front susp. Hous.'	27											1																											
'Shotgun'	28																																						
'B-Pillar'	29	1	1																																				
'Crosstr. rear floor'	30																																						
'Heelkick'	31								1		1																												
'Rear floor panel'	32																																						
'R. panel in. lower'	33		1			1																																	
'Rear side floor'	34																																						
'Rear side rail frt'	35										1		1																										
'Reinf. rocker rear'	36		1																																				
'Rocker'	37		1								1		1	1	1																								
'Wheelhouse'	38				1																																		

product architecture

2

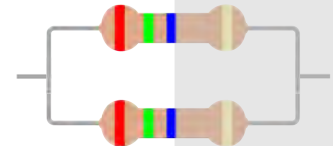


modular
integral



product architecture

tools for a customer segment



modular
integral



product architecture

tools for a customer segment

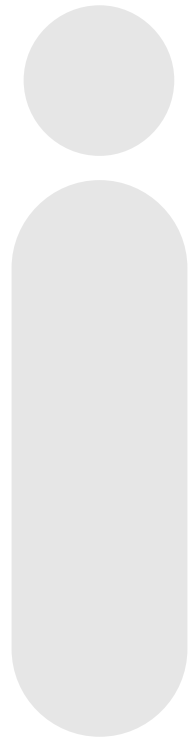
reverse engineering exercise!

name on top of index card

draw a circuit diagram for the drill

4 minutes

work independently



product architecture

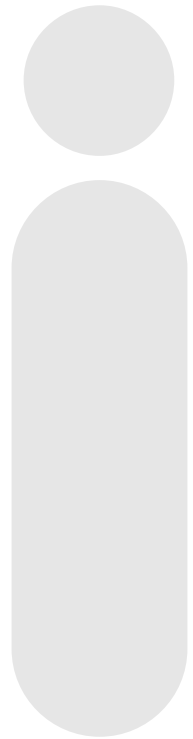
tools for a customer segment

modular product architecture

components separated with well defined interfaces

lots of space

commodity, high production volume components



product architecture

tools for a specific user segment

modular product architecture

components separated with well defined interfaces

lots of space

commodity, high production volume components



product architecture

tool for a specific user segment

integral product architecture

modules are tightly integrated
modules specialized for the application
little empty space. High packing density



performance comparison

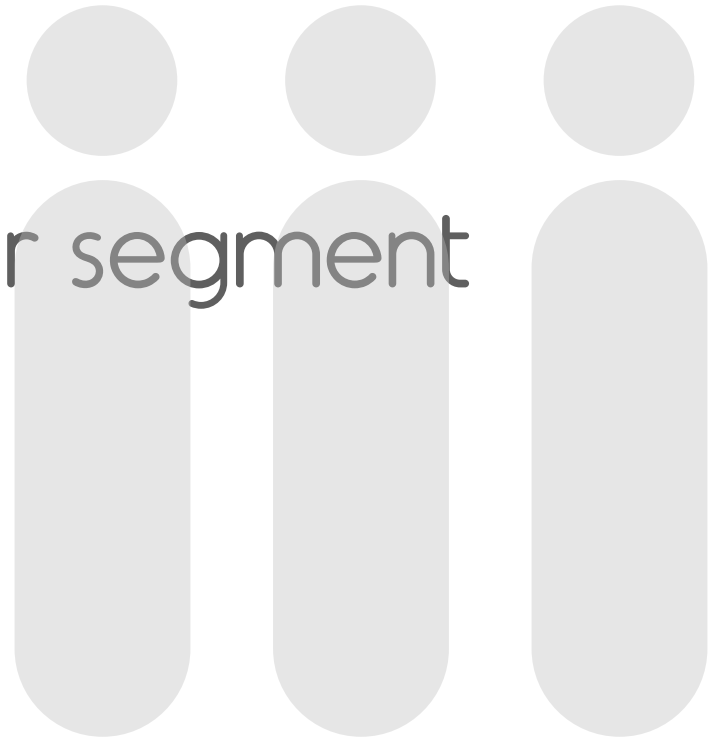
integral vs modular

characteristic	integral/modular
weight	1.2
charge time	0.2
power/weight	2.5
purchase price	~ 8-10

product architecture

tools for a customer segment

modular product architecture



modular architecture

mostly independent chunks

advantages

- task allocation and out-sourcing
- easy to develop product variations
- economies of scale on parts
- maintenance

integral architecture

highly interdependent chunks

advantages

performance! You can optimize the system.

nothing's for free!



integral



modular
performance sacrifices,
especially related to size, shape, mass



what type of architecture?

your product will tell you!

innovation by architecture



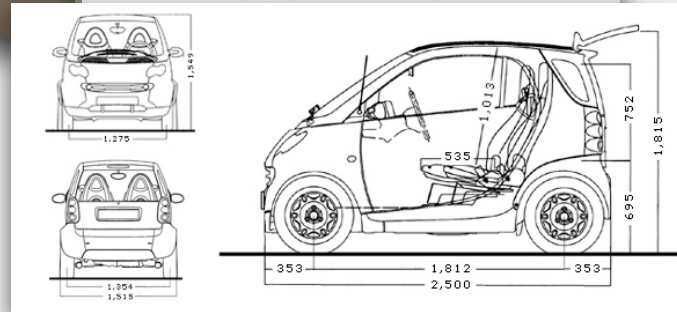
1998!

\$10,000

1800 lb.

0-37 mph in 6 seconds, 80 mph max.

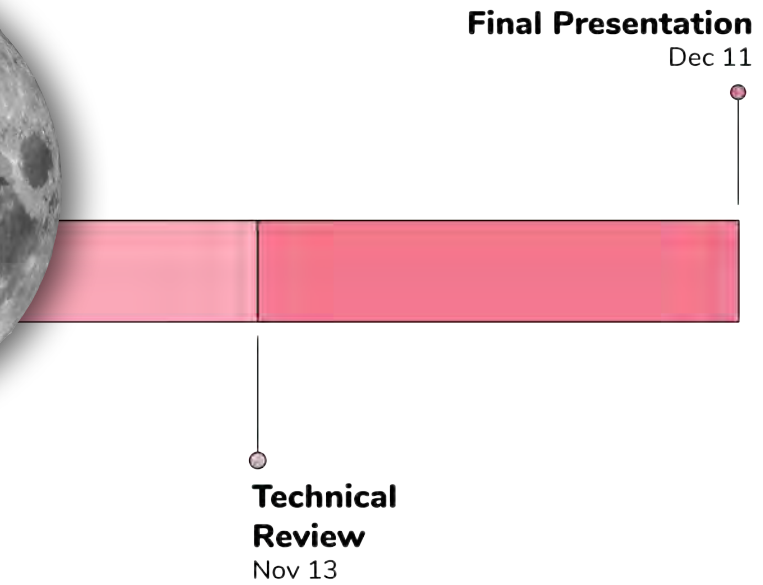
40 mpg combined



swatch+
OFFICIAL TIMEKEEPER

DAIMLERCHRYSLER

tonight



tonight



≡ 2.009

Time Entry

Start Date

09/17/2023



Start Time

08:22 PM



End Time

08:45 PM



Time Elapsed

00h 23m

Description of what you did
optional

Sketching Idea Propellor Concept



Select all tags that describe what you did

X sketching ideas

generating design concepts

selecting design concepts or details

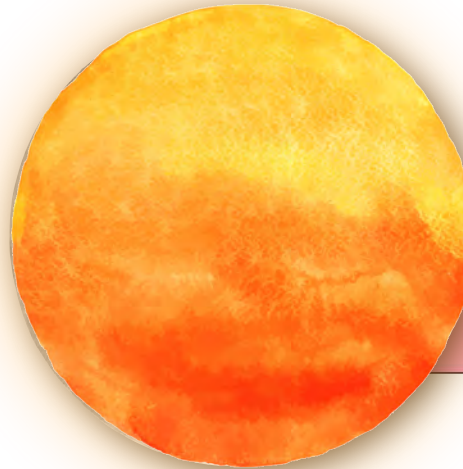
sketching ideas

CAD modeling

09/17/2023 8:22am

Click to start timer

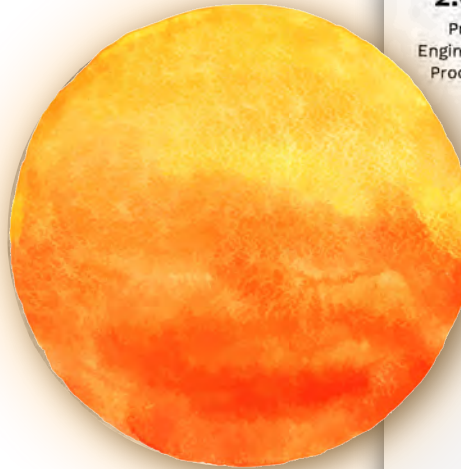
today



Final Presentation
Dec 11




**Technical
Review**
Nov 13

today






2.009
Product
Engineering
Processes

Please review the [OBTAINING INFORMATION](#) before completing this form.

Do More	Do Less	Keep Doing
<div></div>	<div></div>	<div></div>

Bonus: Allocated 0 / 2000 points

Do More	Do Less	Keep Doing
<div></div>	<div></div>	<div></div>

Bonus: Allocated 0 / 2000 points

[Submit my peer review!](#)

thursday



