

# Reefbot

## In-museum interface

Chung-Yi Chi  
Nicole Fernandez  
Mauricio Giraldo  
Spencer Sugarman  
Le Wei

# The Vision



- Underwater Robot
- Remote Controlled
- Fish Image Capture and Identification

# Why?

A photograph showing a man in a red shirt holding a young boy in a green and yellow patterned onesie. A young girl in a purple shirt stands next to them, all looking at a large aquarium tank. The tank is filled with various tropical fish swimming among rocks and coral. A sign is visible on the left side of the tank.

To educate kids  
(ages 4 to 8) about  
fish and reef  
conservation.

A photograph of two scuba divers underwater. The diver on the left is wearing a dark wetsuit with 'SCUBA' written on the shoulder and is holding a clipboard. The diver on the right is wearing a blue wetsuit with 'TUSA' on the shoulder and is holding a small tray with several compartments. They are both positioned above a vibrant coral reef. The water is clear blue.

For future use in mid-depth reef research

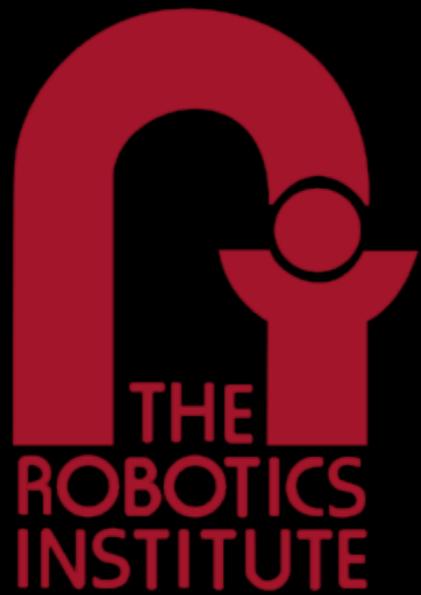
4/30/2010 11:37:03 AM

H: 323 °  
D: 3.93 m  
Temp: 26.9 °C



As PhD research in image recognition  
and machine learning

# Who is involved?



\* Funding

# Who is involved?



**Ashley**  
Zoo Contact



**Mark**  
Phd Student



**Sara**  
Console Designer



**Justine**  
Project Manager

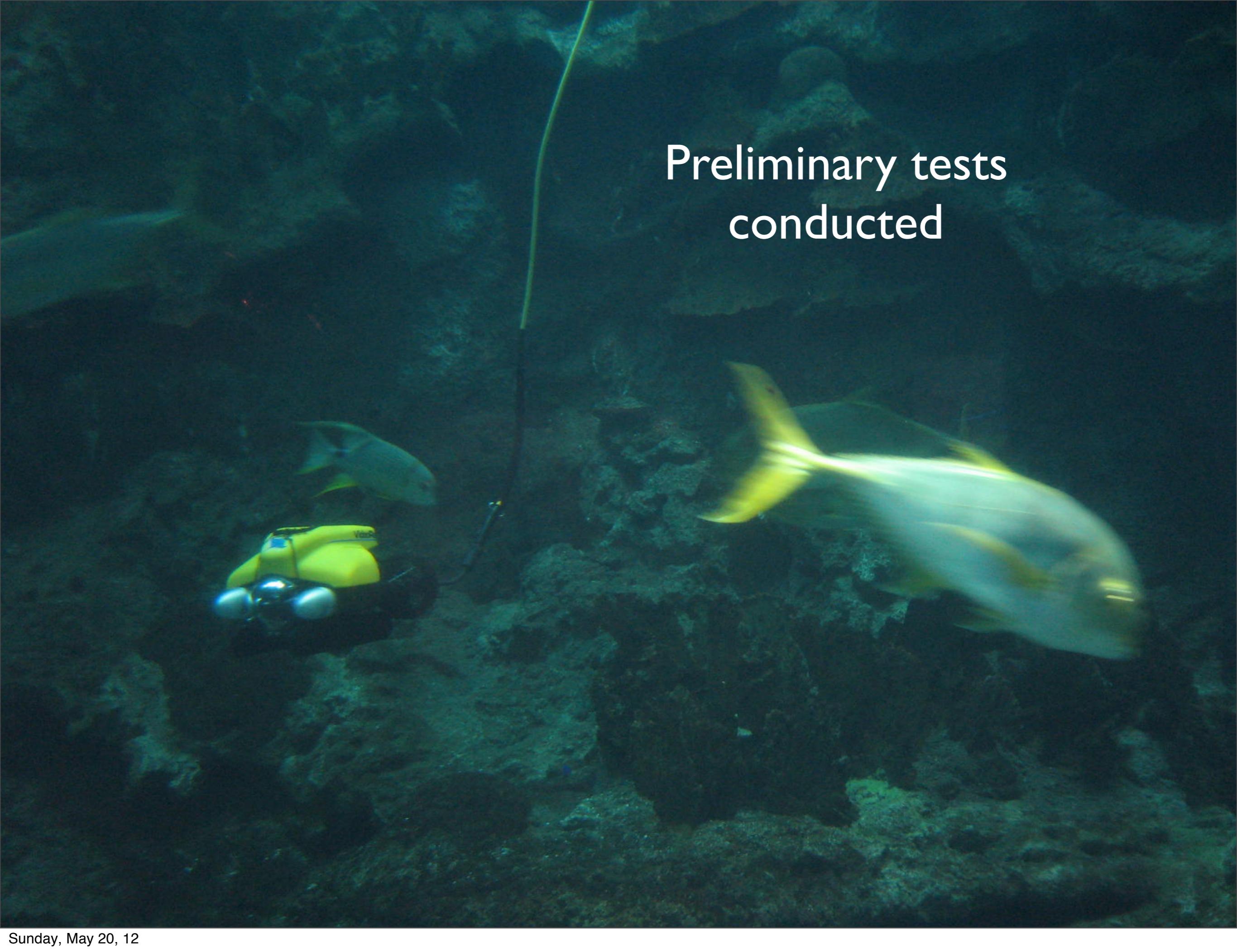


**David**  
Phd Advisor

# When we started...



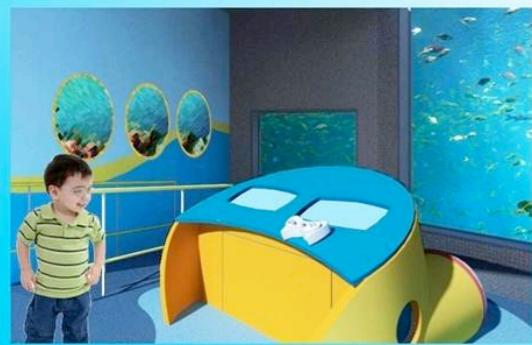
Robot built,  
controlled with  
PS3 controller

A photograph taken underwater showing a diver in a yellow and blue wetsuit swimming towards the left. A large shark, possibly a tiger shark, is swimming towards the right. The water is dark and textured.

Preliminary tests  
conducted



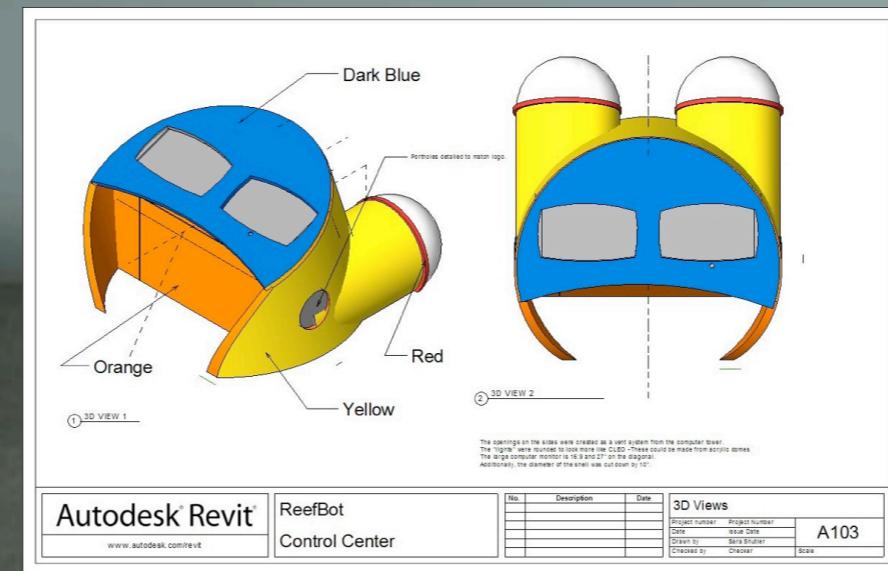
ReefBot  
An Underwater Adventure



FLOOR PLAN

Space adjacent to the Big Ocean Tank.

ReefBot Control Center from the perspective height of an eight year old child.



REEF  
AN UNDERWATER ADVENTURE  
BOT

Console  
and  
exhibit  
designed



# What needed to be done?

- New control design
- Console interface

# Methods Used

- Observations
- Interviews
- Think Alouds
- Contextual Inquiry
- Cogtool

# Observations

- Children's Museum
- Aquarium

# Children's Museum







**Touch the screen to begin.**



**Toca la pantalla para empezar.**

Curious George television series merchandise © Universal Studios. Curious George and related characters, created by Margret and H. A. Rey, are copyrighted and trademarked by Random House Company and used under license. Licensed by Universal



# Zoo & Aquarium



# What we found

- Controls need to be at child's level and completely obvious how to use
- Parents help children understand exhibits and how they work
  - Motivates child participation
- We need to draw attention to the space

# Interviews

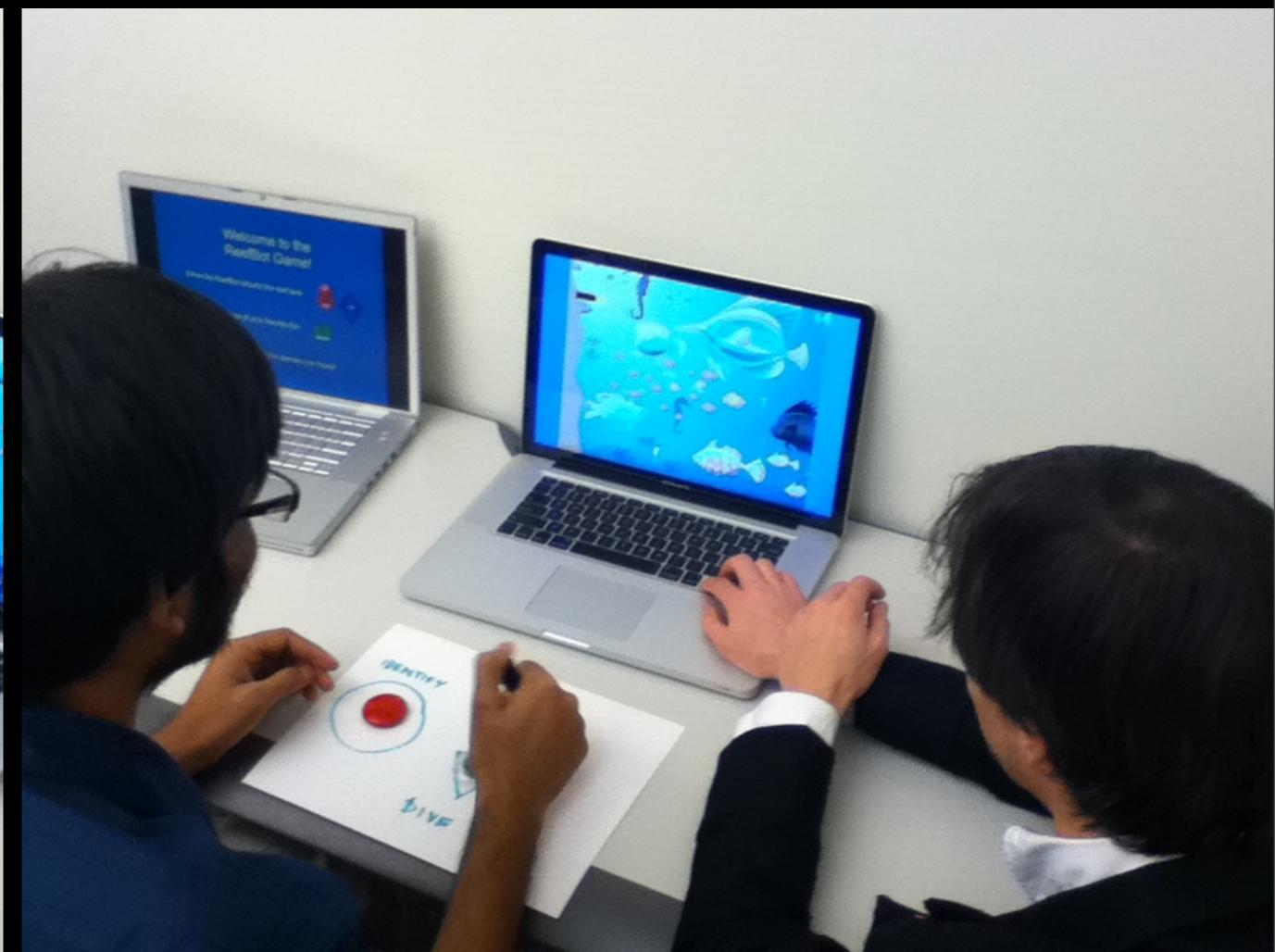
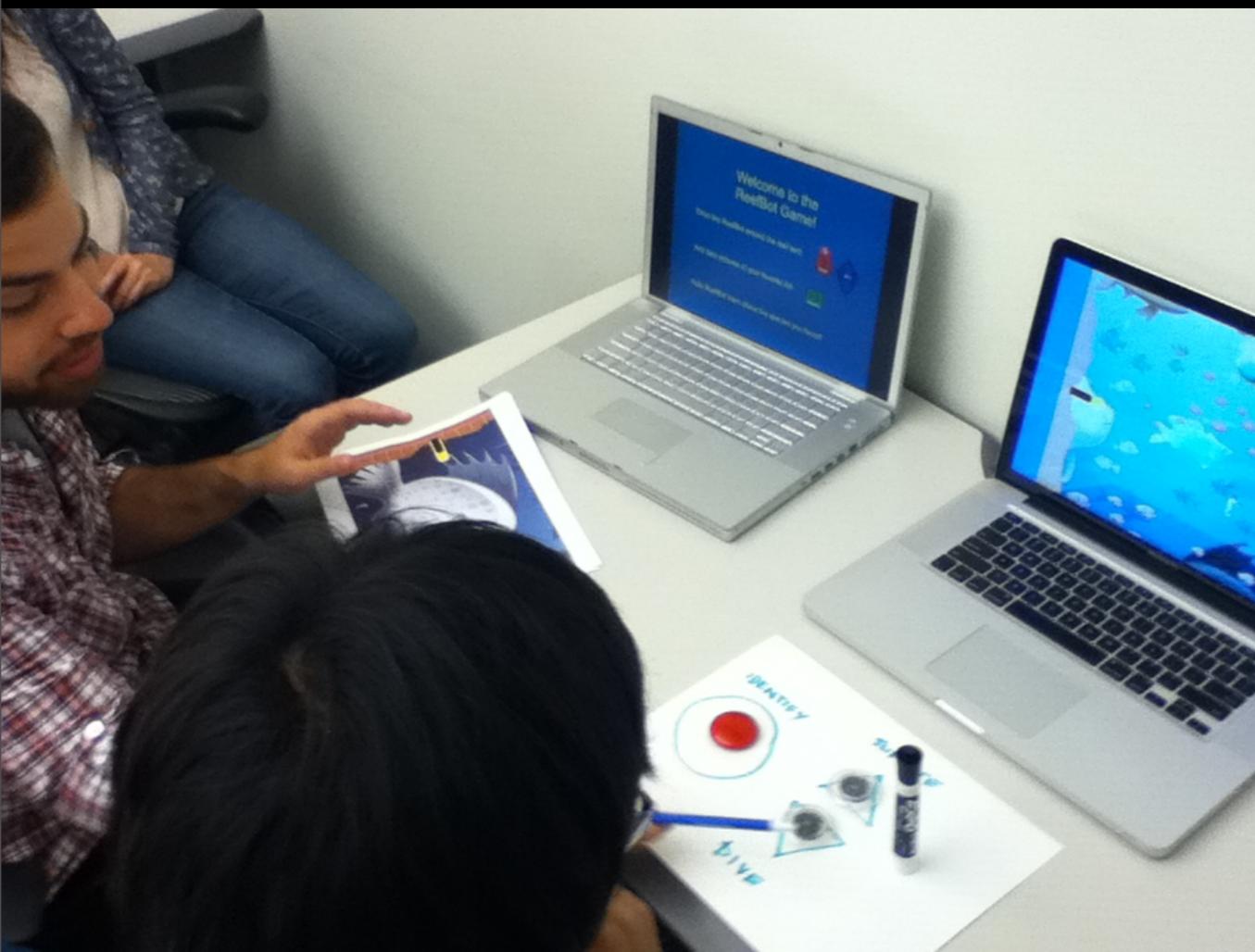
- 5 interviews, done at the aquarium
- Focused on:
  - How children find more information about an animal
  - What they do with that information when they go home

# What we found

- Kids often ask the parents or other adult who is with them
- Some kids will go home and look up the fish on the internet
- Many interviewees come multiple times a year (members)
- Signs and screens are often ignored
- Kids love interactive exhibits (i.e. zoo keys)

# Think Alouds

- Going to classes didn't happen :(
- MHCI lab instead
- 4 think alouds



# UARs

Number: CC-TA-01

Name: User Interface is not clear enough for the user to choose a fish.

Evidence: The user moved the joystick up and down instead of left and right to choose a fish.

Number: CC-TA-02

Name: User Interface is not intuitive enough for the user to move forward/backward and up/down.

Evidence: The user tried to move the robot up/down by moving the joystick up/down instead of pressing the Surface/Dive buttons.

Number: CC-TA-03

Name: User Interface is not intuitive enough for the user to move forward/backward and up/down.

Evidence: The user moved the robot up/down by pressing the Surface/Dive buttons at the first time, but moving the joystick up/down at the second time.

Number: CC-TA-04

Name: User Interface is not intuitive enough for the user to move forward/backward and up/down.

Evidence: The user moved the robot up/down by pressing the Surface/Dive buttons, but expressed confusion about how to do that.

Number: CC-TA-05

Name: The label "No Match? Try Again." misleads the user.

Evidence: The user wanted to go back to take another picture when he saw the label "No Match? Try Again." which is one of the options rather than a message.

Number: CC-TA-06

Name: User interface is not clear enough for the user to go back on the fish identification page.

Evidence: The user said "How to go back?" when he wanted to go back and take another picture.

# What we found

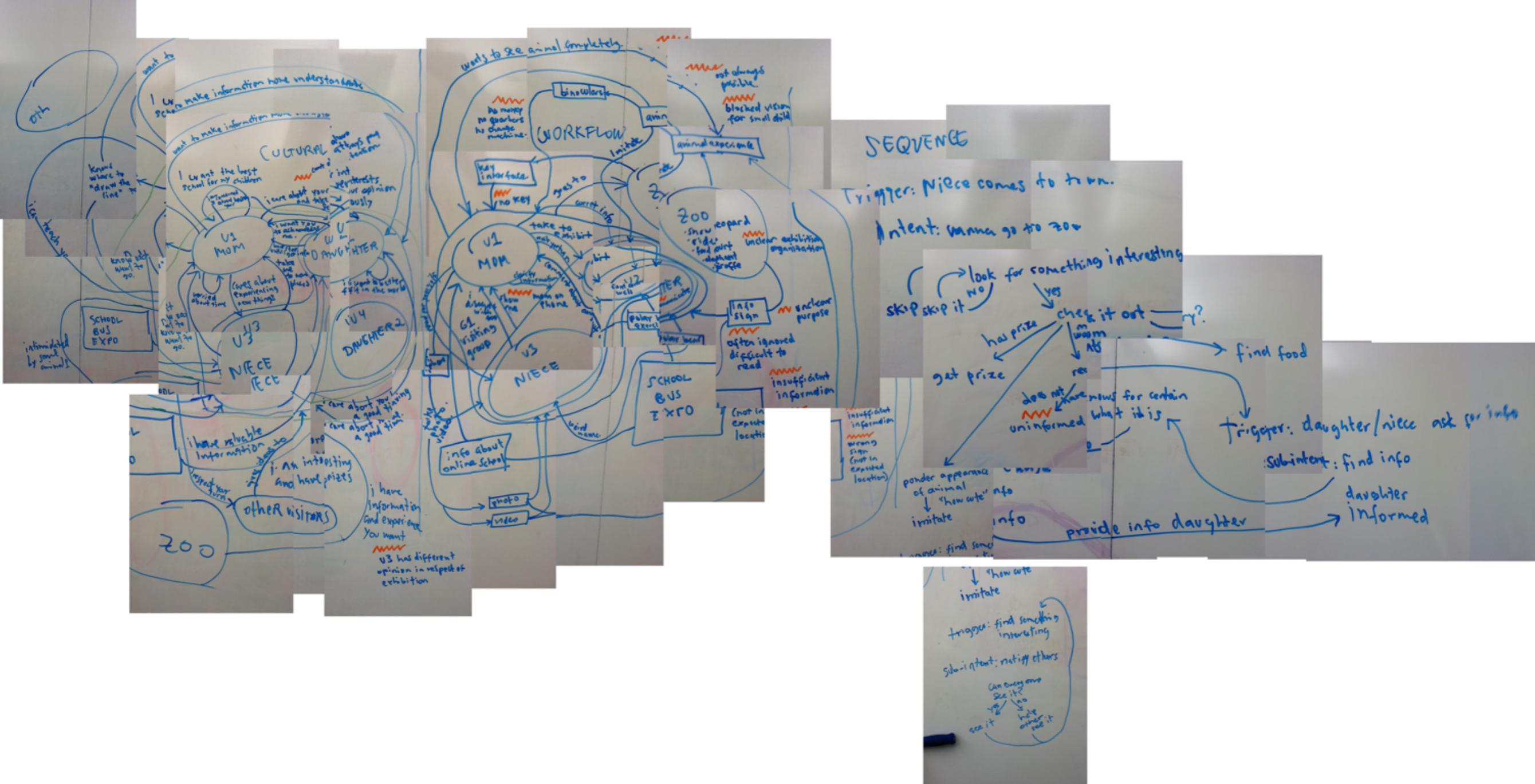
- Wrote up UARs
- Confusion about what moving the joystick forward and back means
- Mockup contained confusing language
- Fish selection wasn't intuitive

# Contextual Inquiry

- 3 CI's
- 1 in the zoo - Craigslist
- 2 in the aquarium - Spontaneous signup

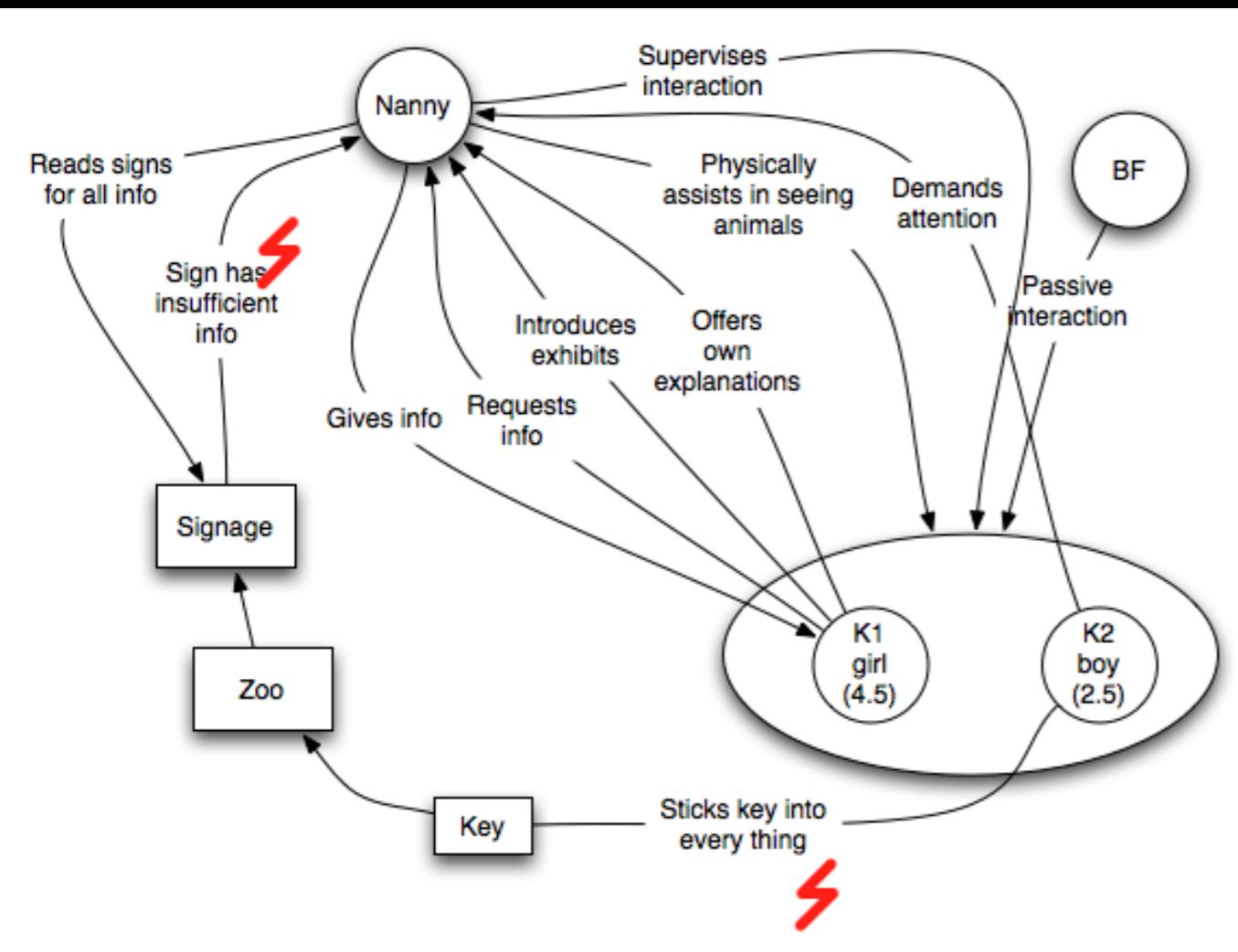


# Model Making...

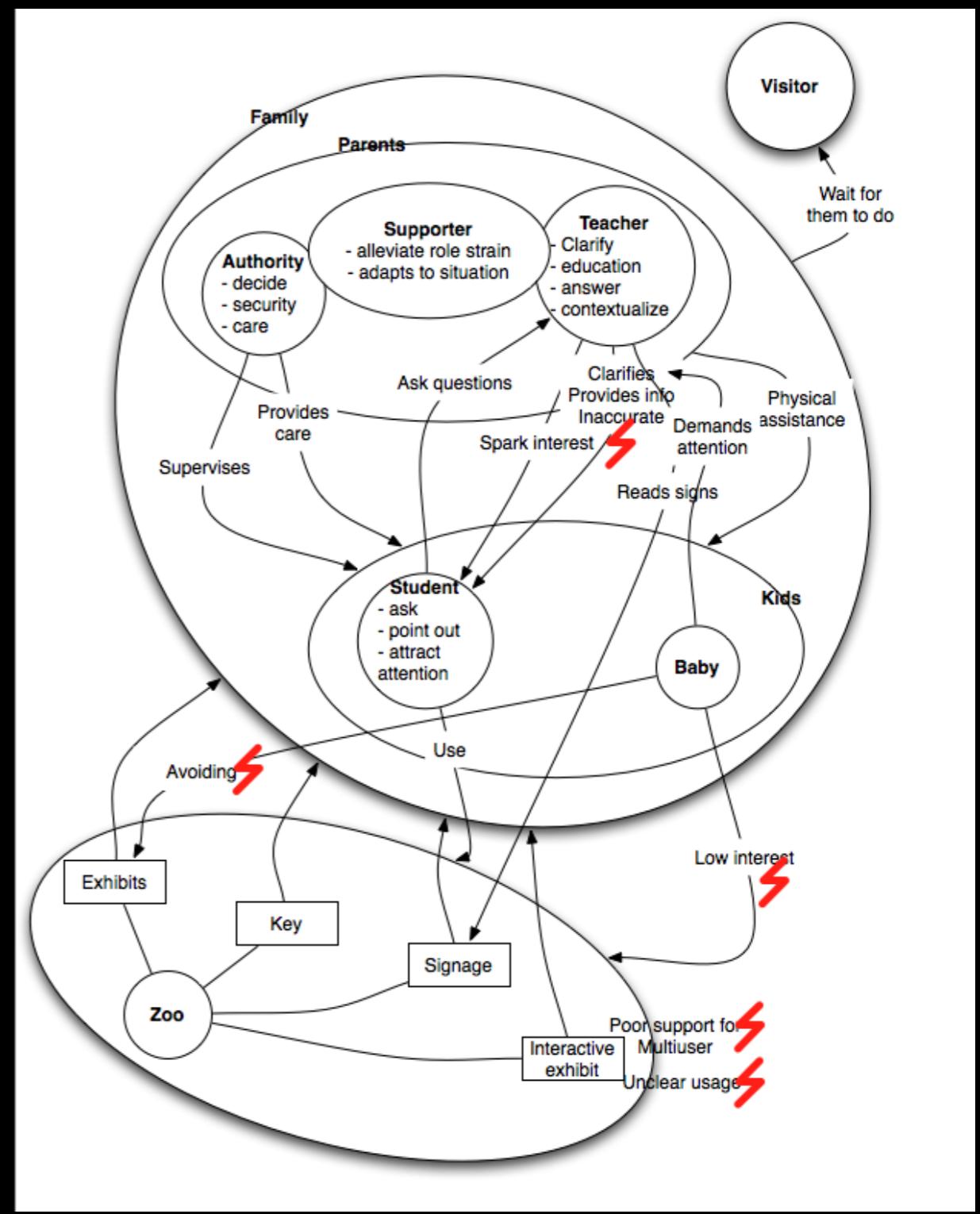
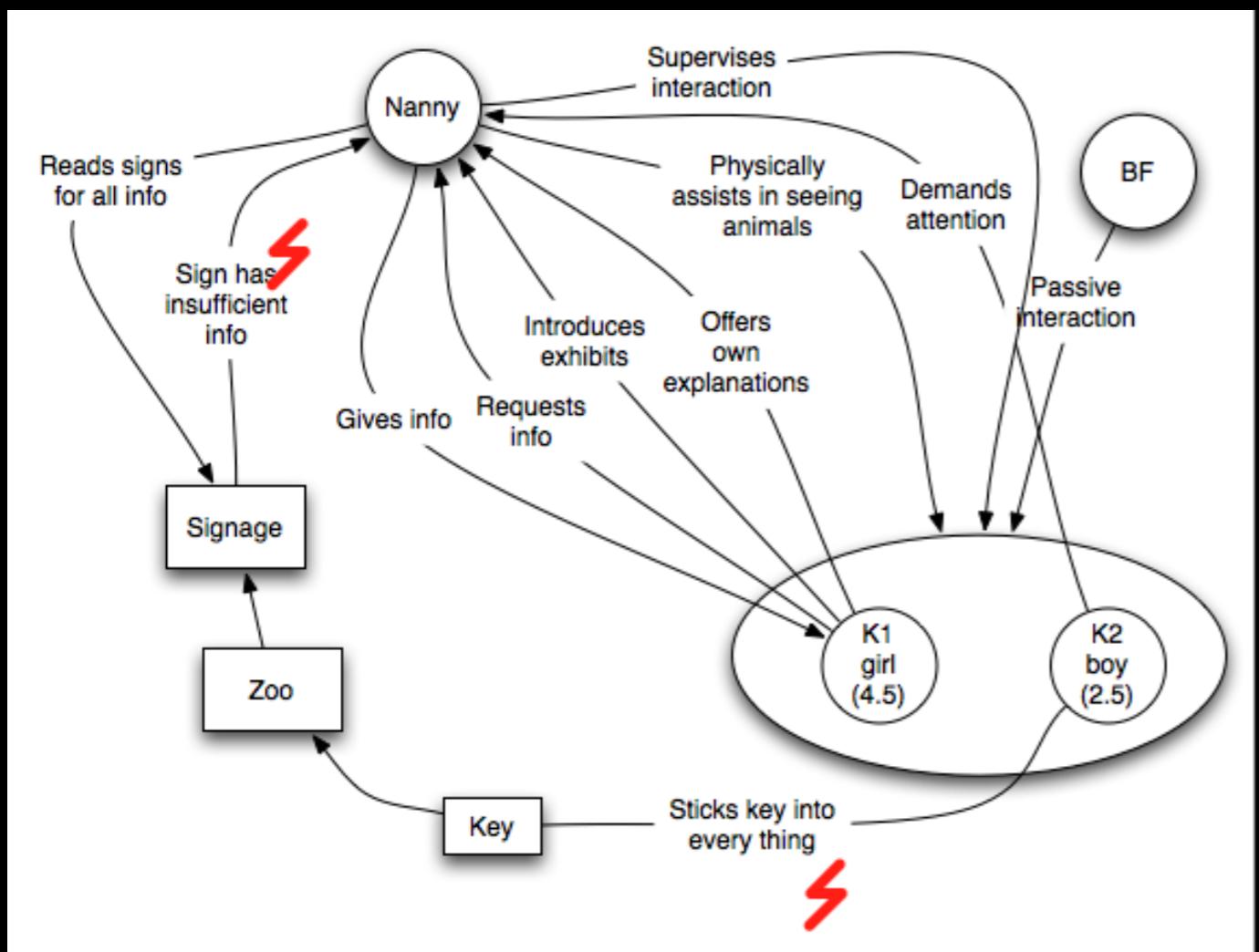


# Flow Models

# Flow Models

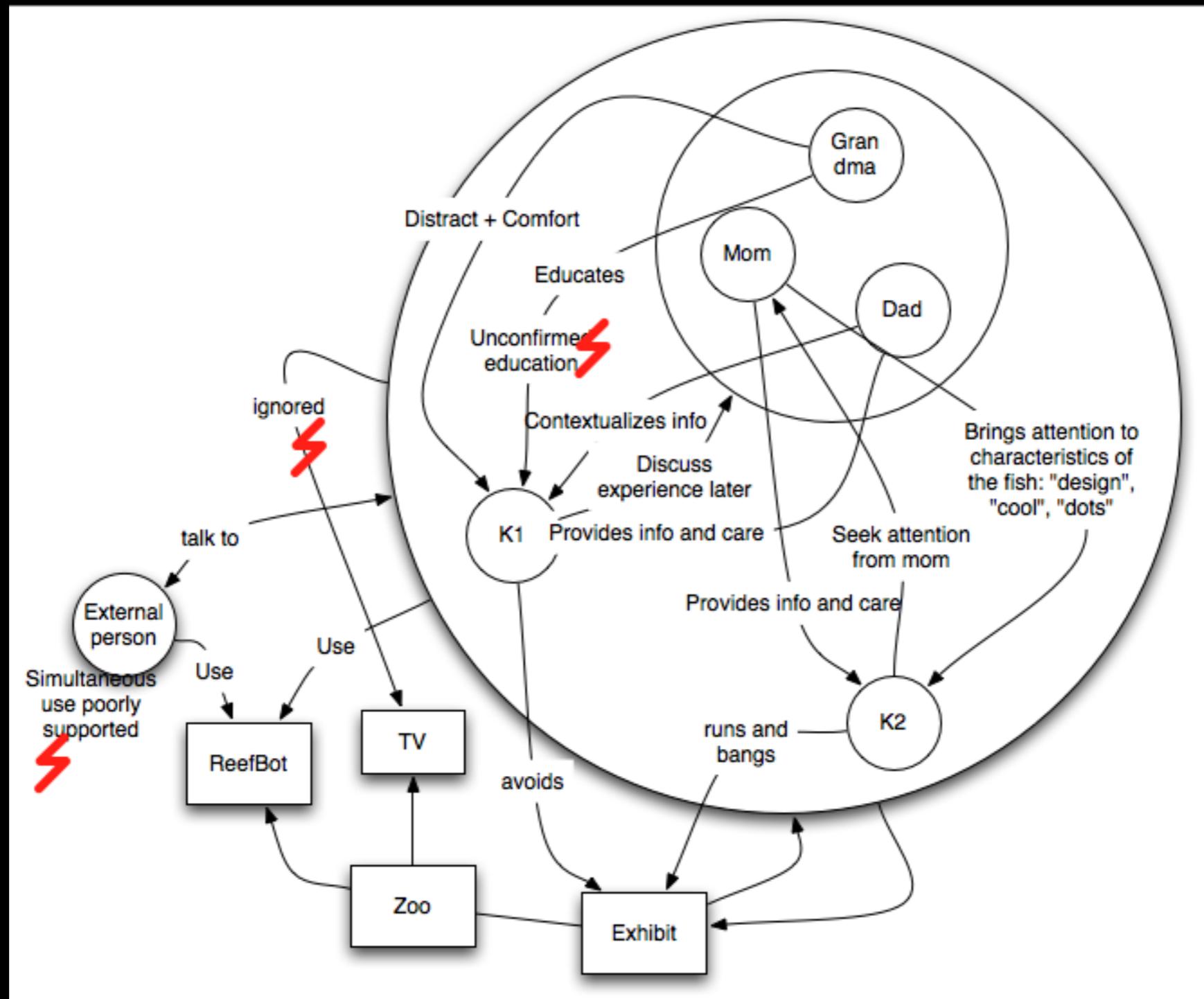


# Flow Models

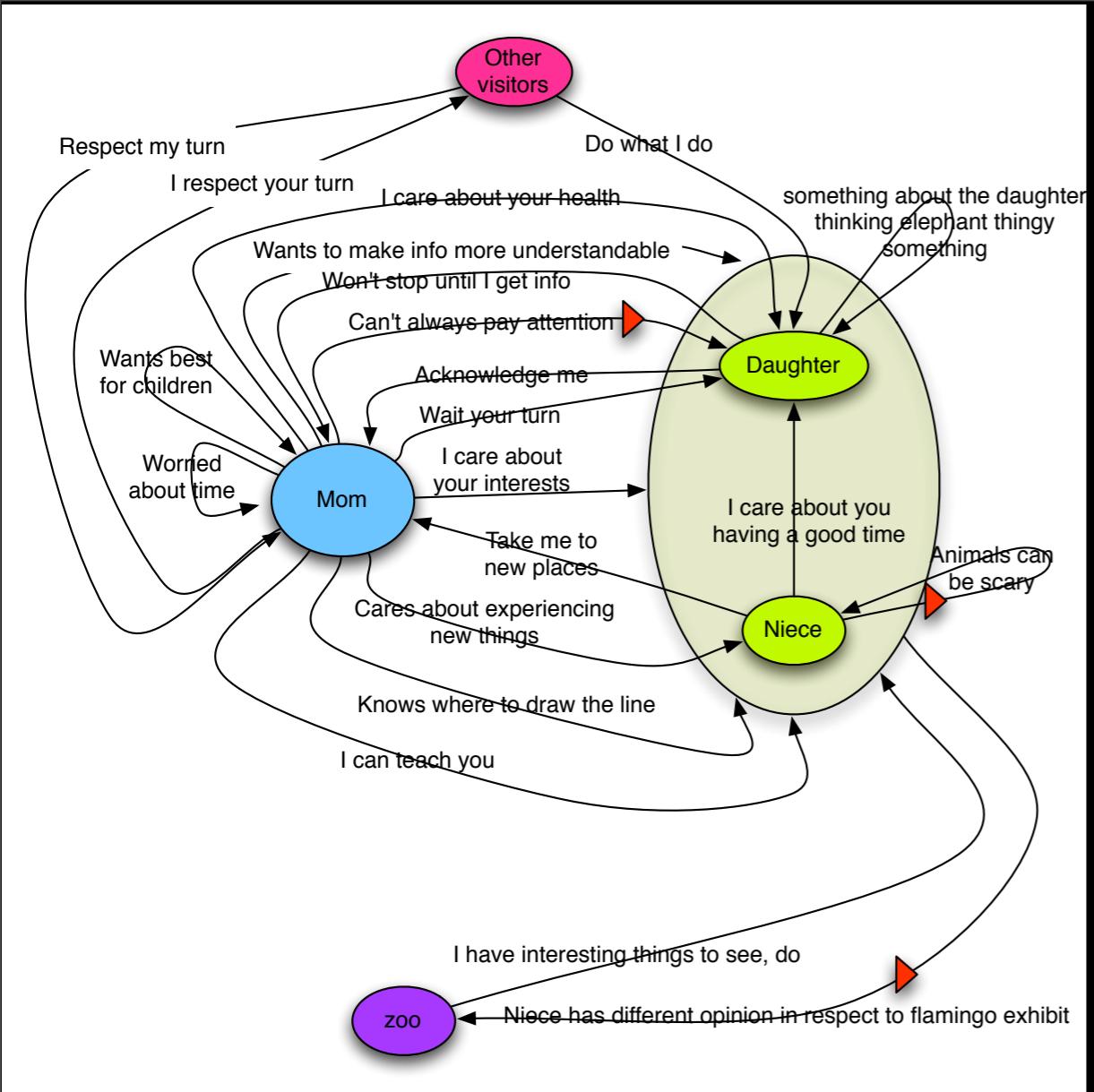


# Flow Models (cont.)

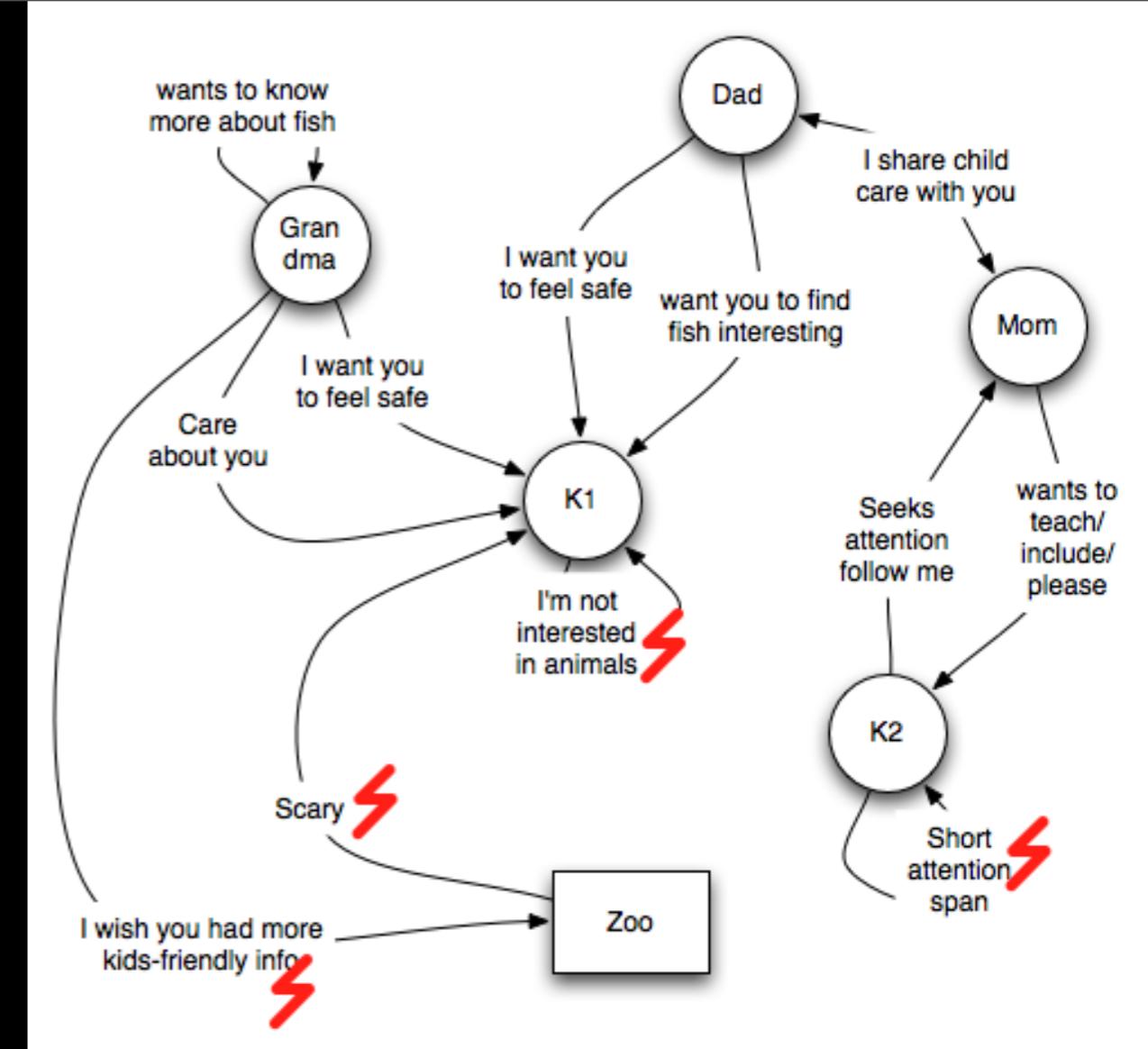
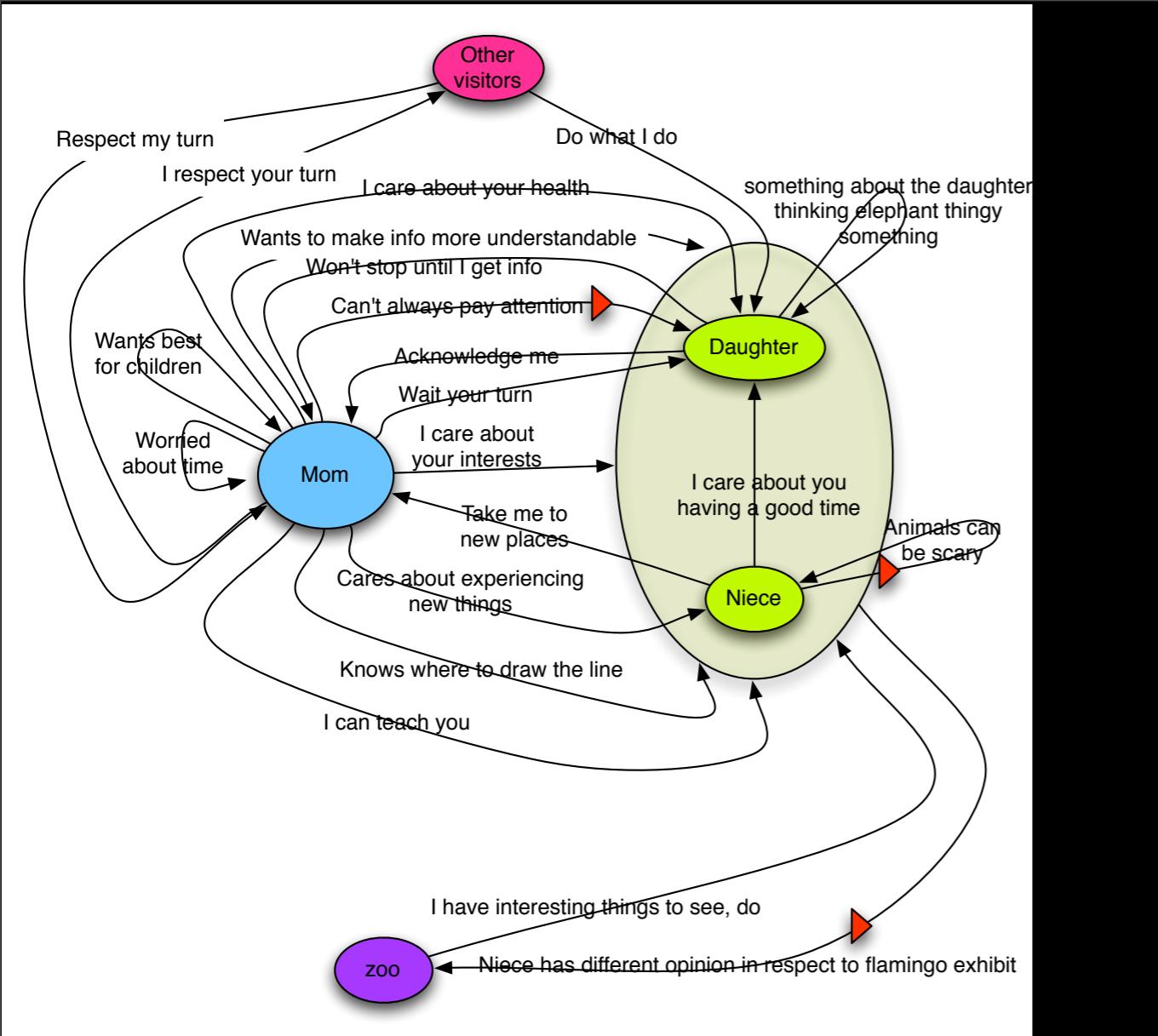
# Flow Models (cont.)



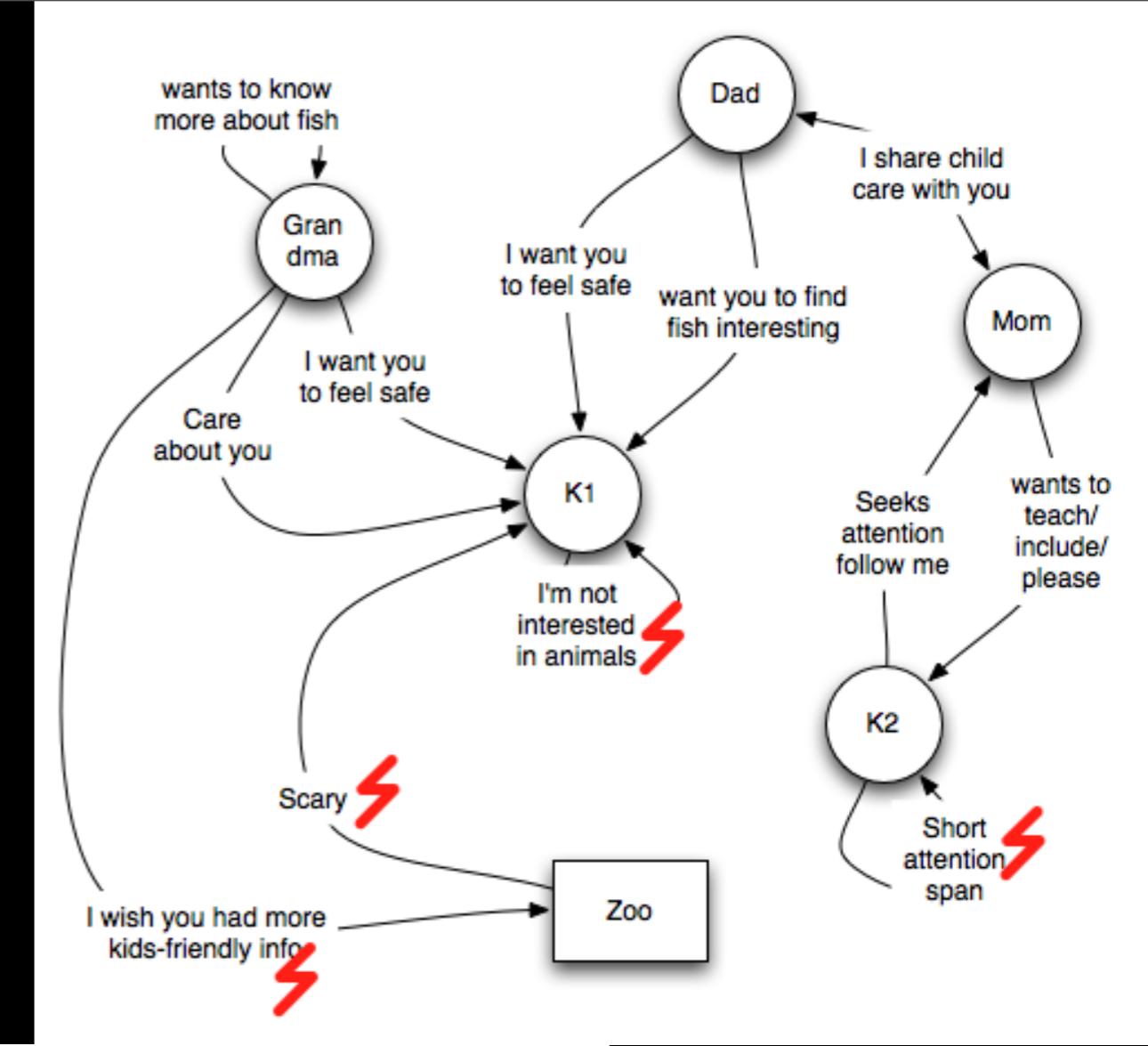
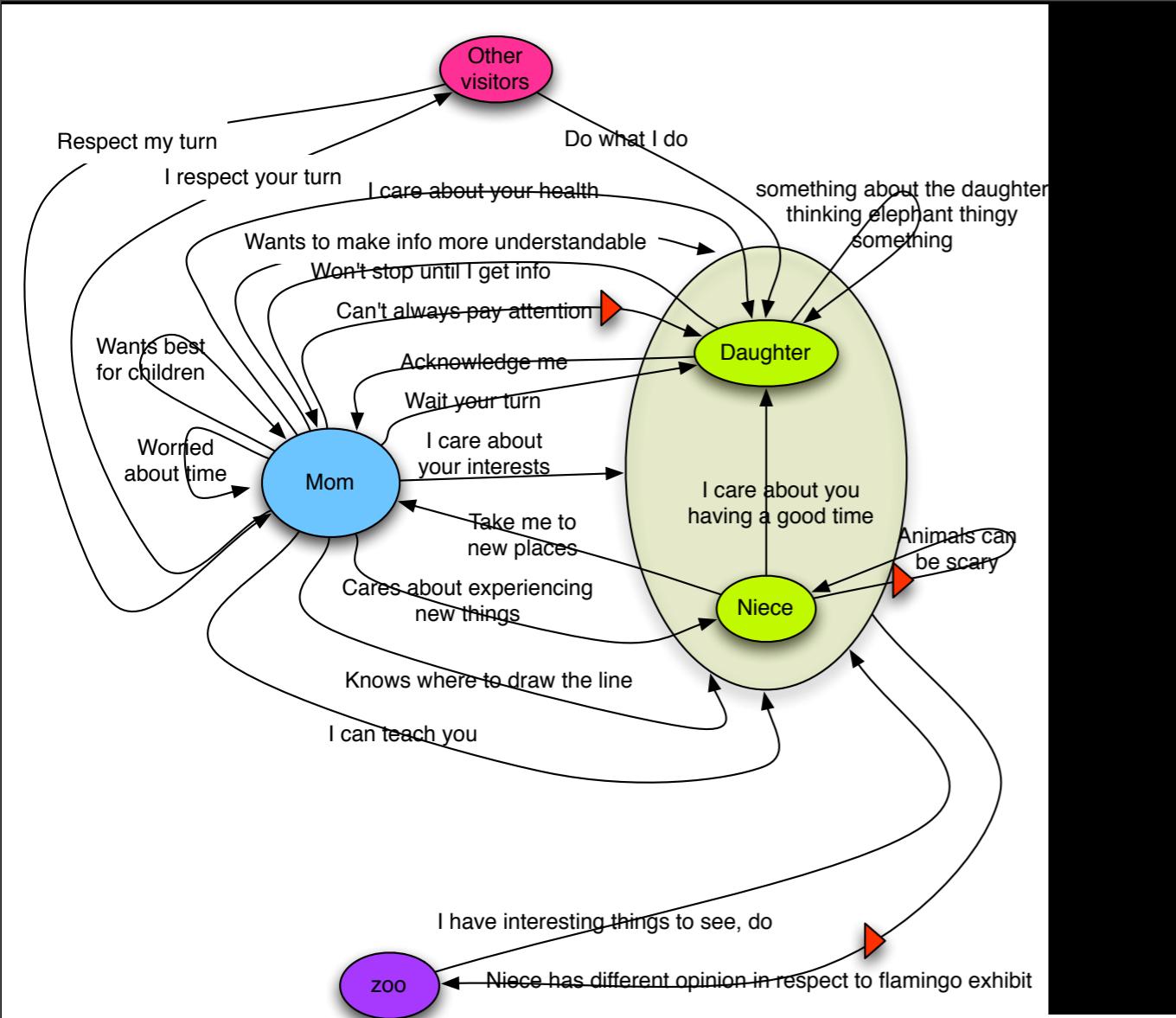
# Cultural Models



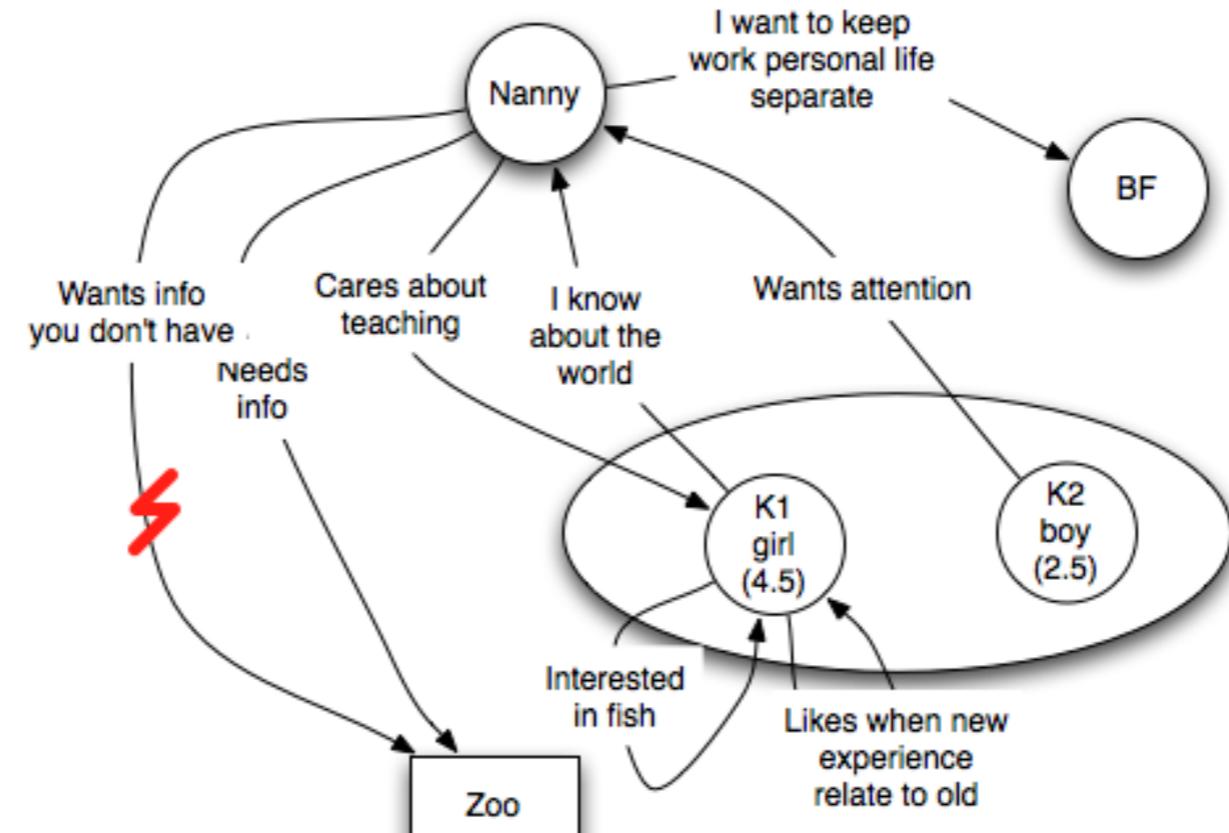
# Cultural Models



# Cultural Models

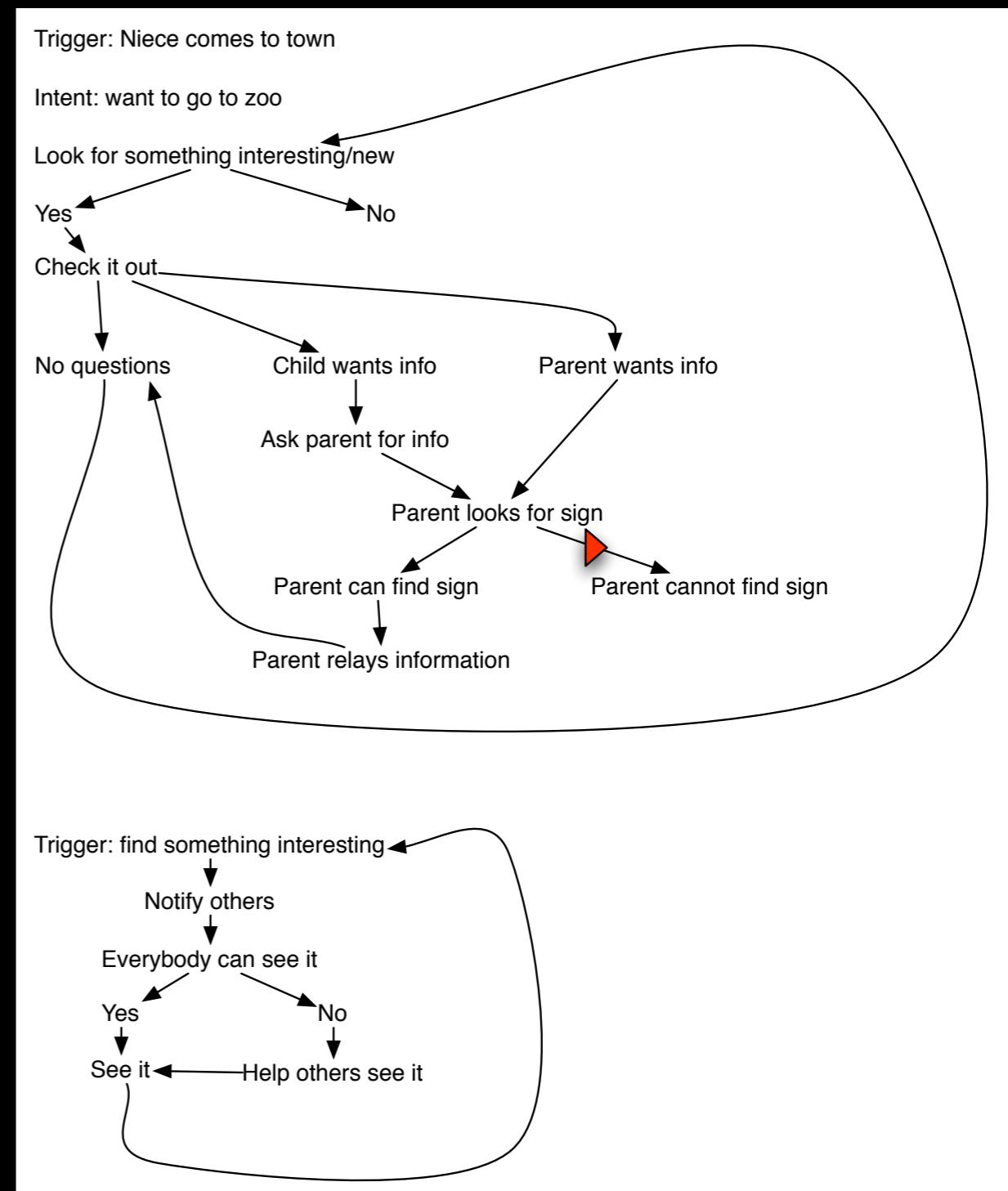


# Cultural Models

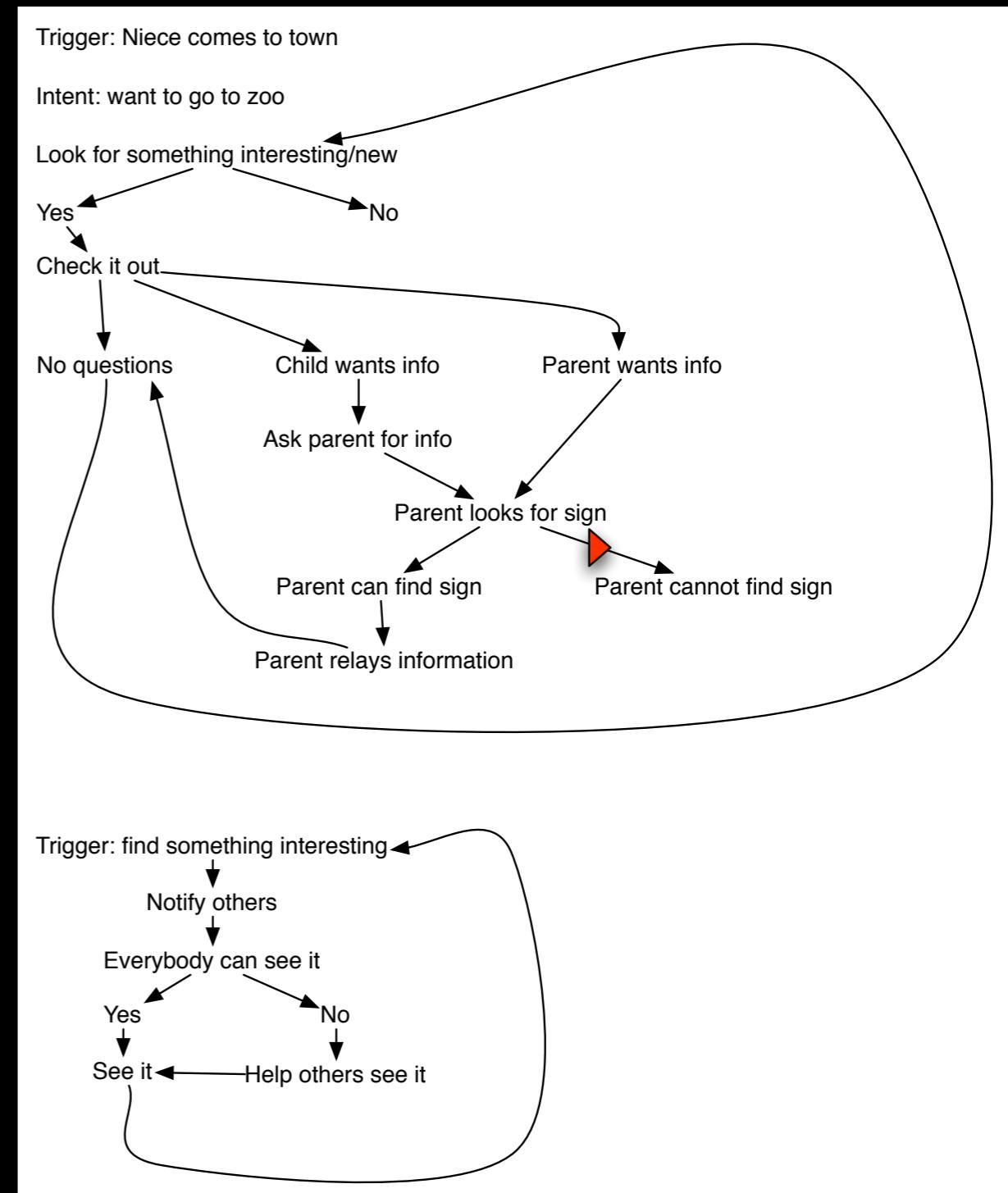
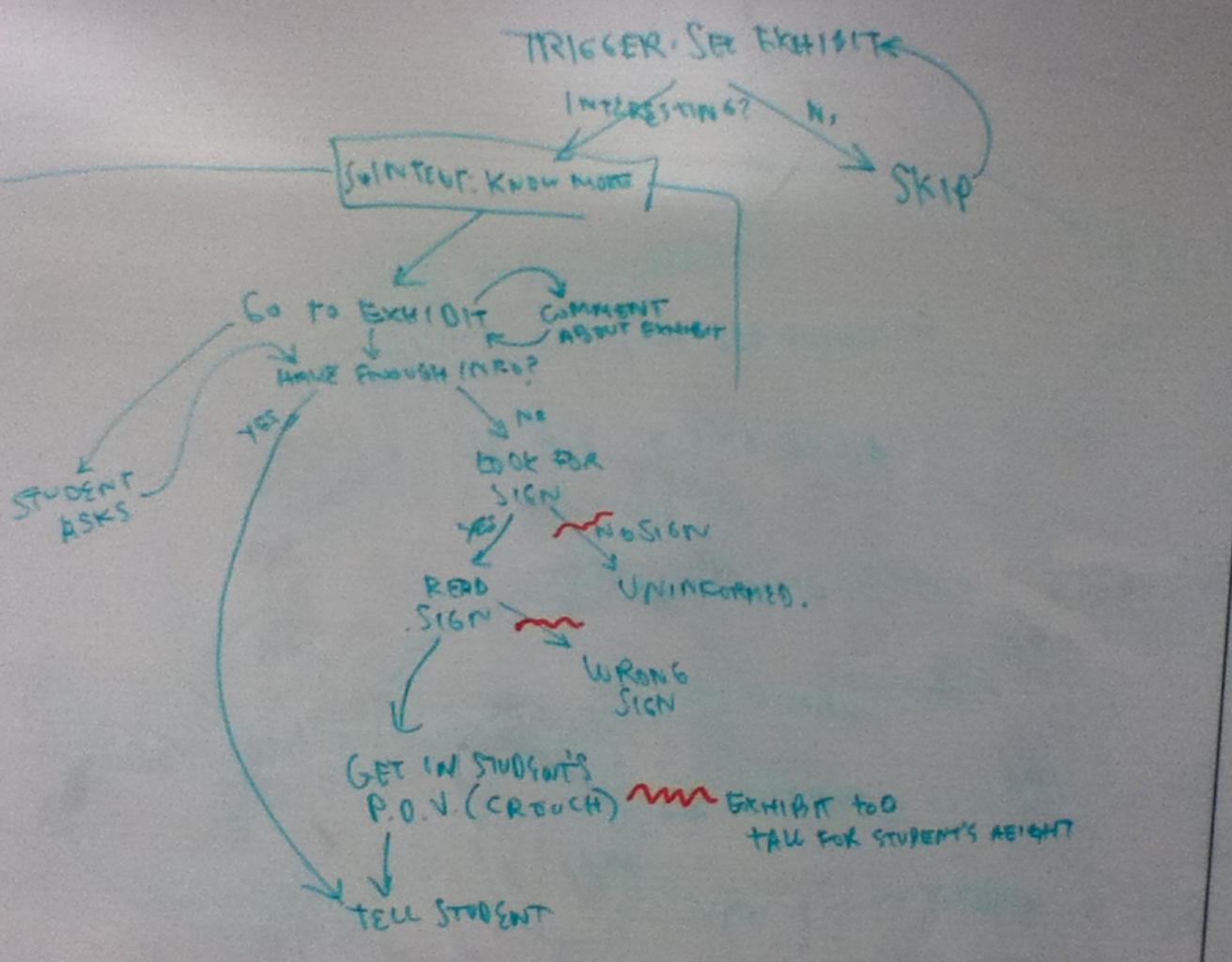


# Sequence Models

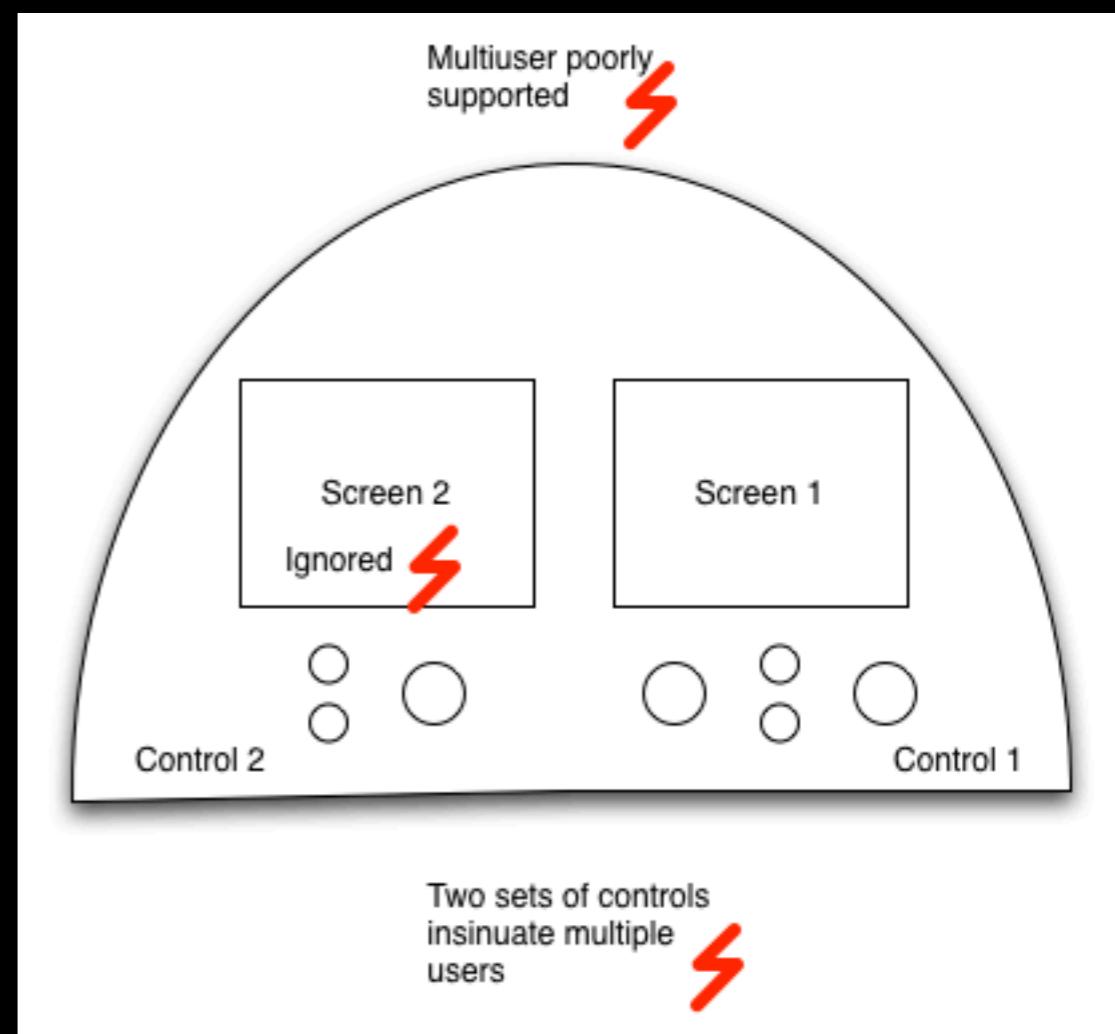
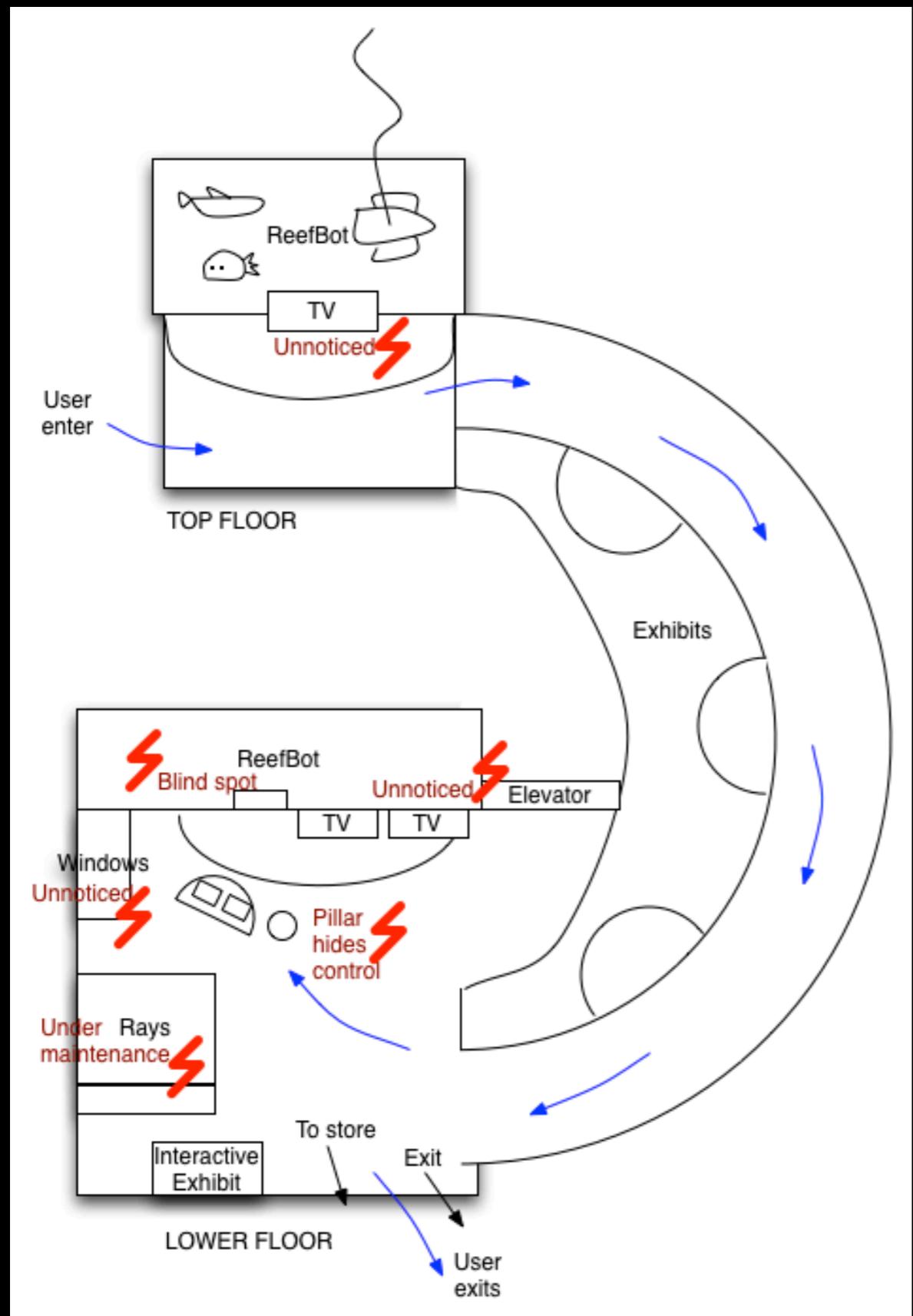
# Sequence Models



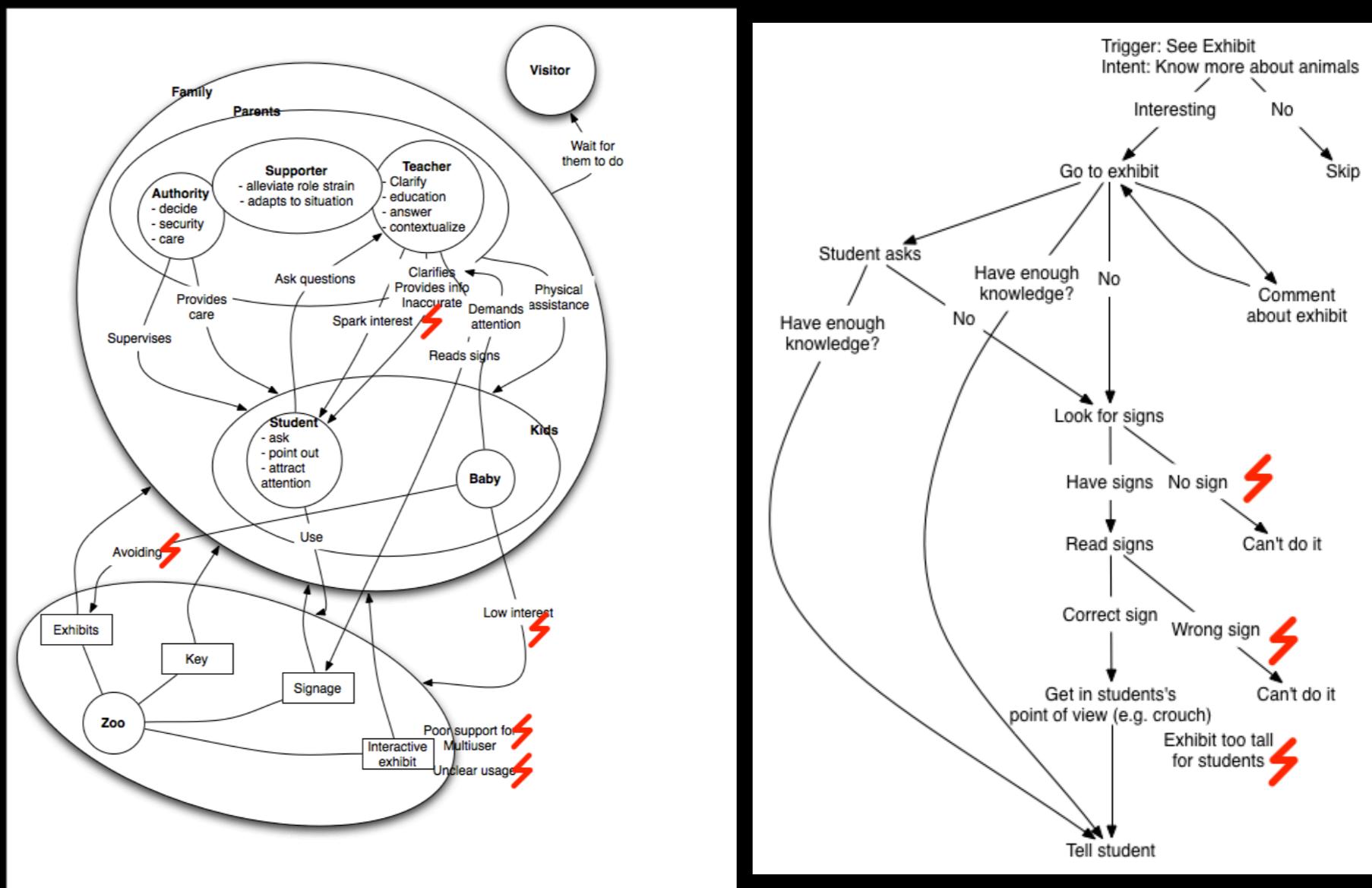
# Sequence Models



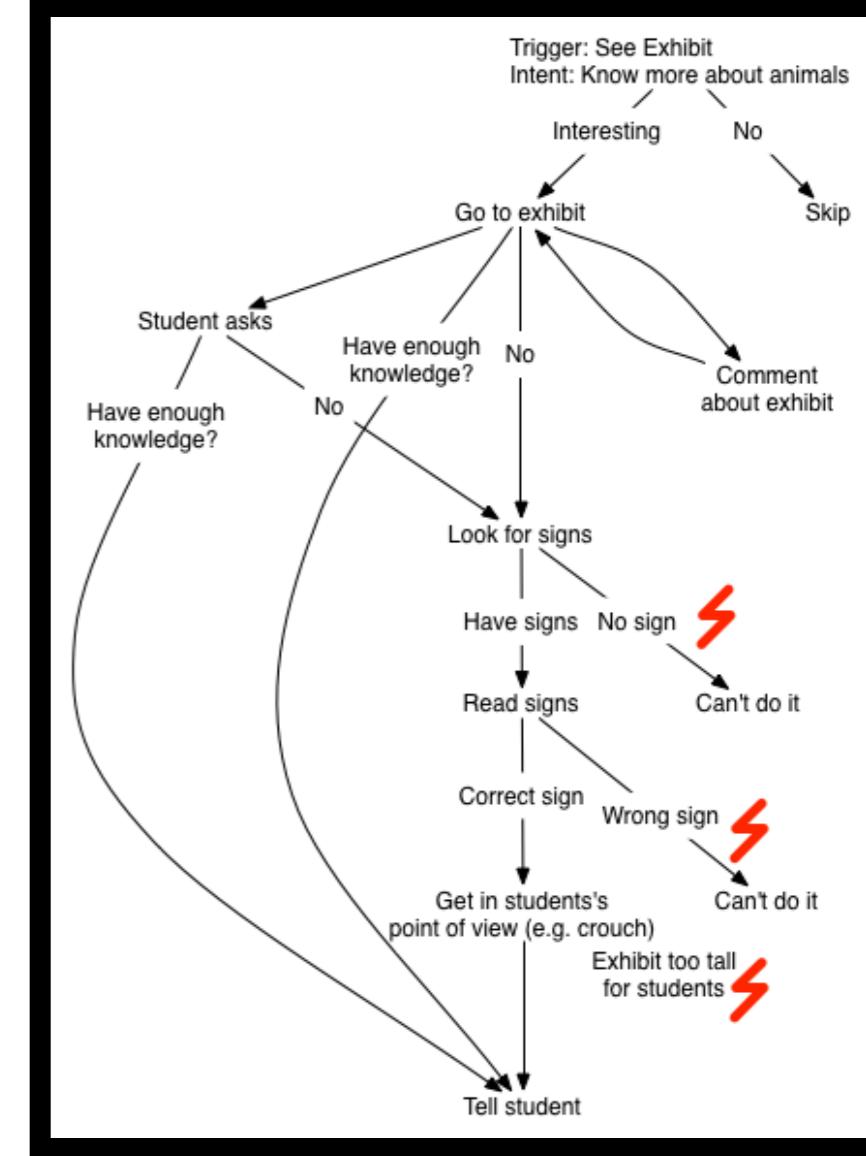
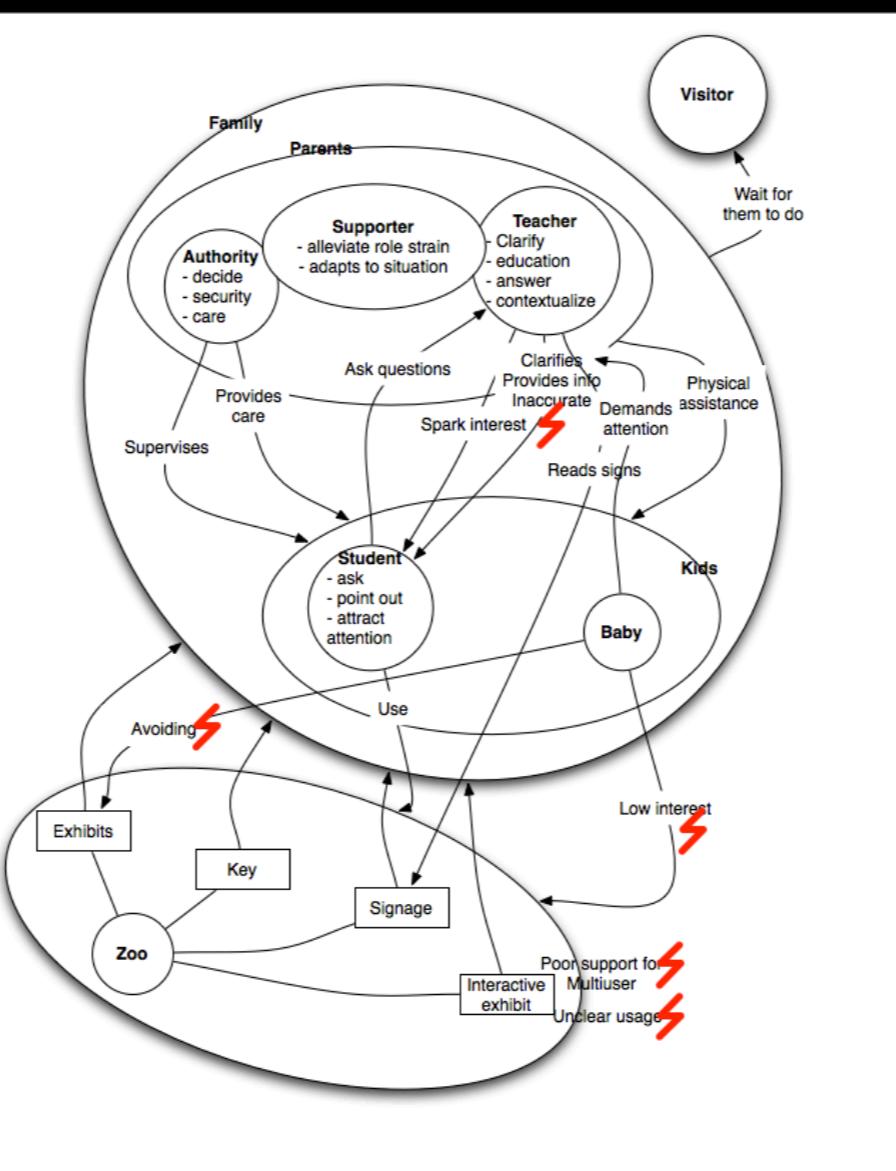
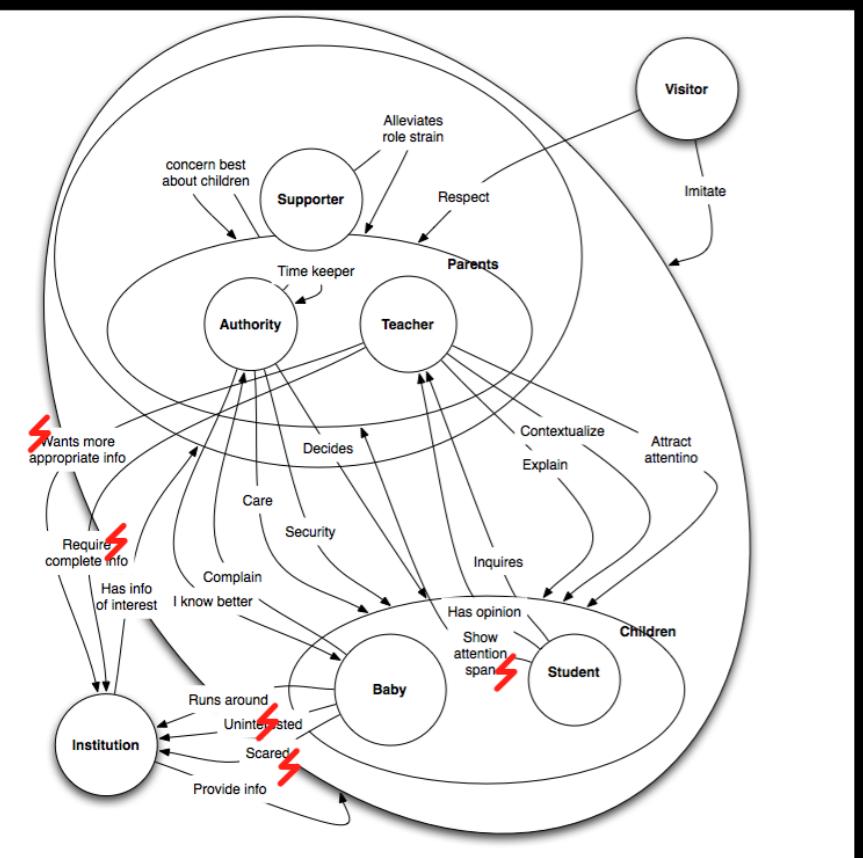
# Physical & Artifact Models



# Consolidated Models



# Consolidated Models



# What we found

- Signs were rarely read, misplaced
- Younger kids only interested in visual characteristics of animals
- The zoo can be scary to kids sometimes
- Parents try to relate the animal to something the kid has seen before
- Parents guess a lot when explaining to kids then use signs to verify

# Cogtool

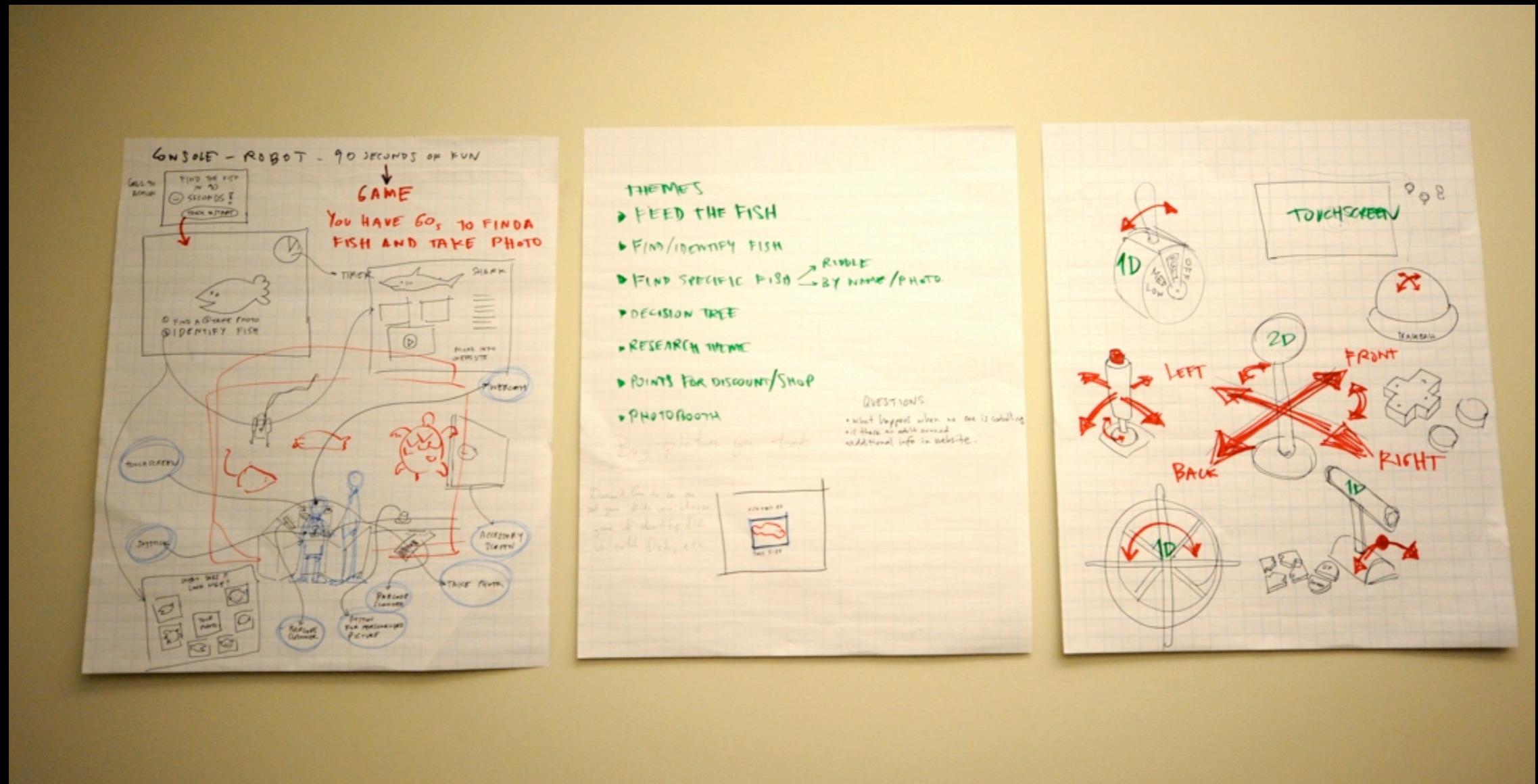
# What we found

- *Expert users* navigate both interfaces in the same time
- But we do not have expert users
  - Focus on simplicity

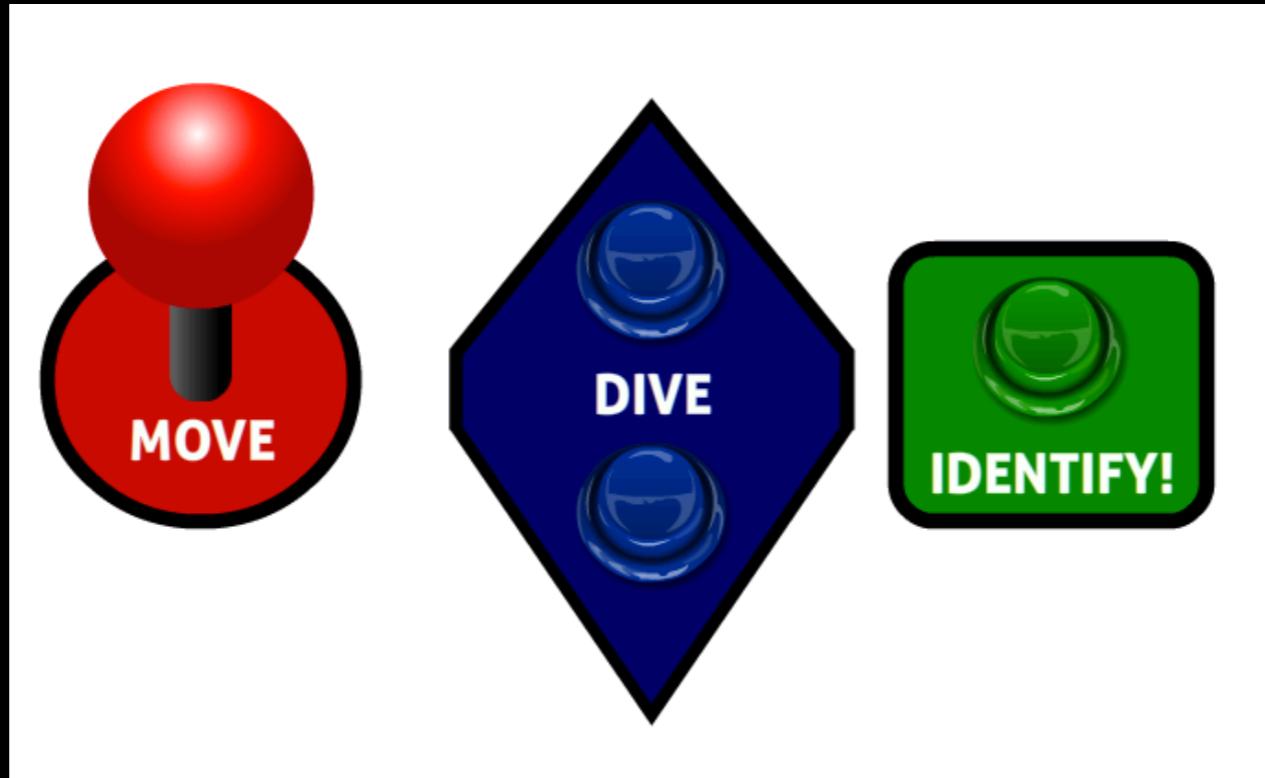
# Design Process

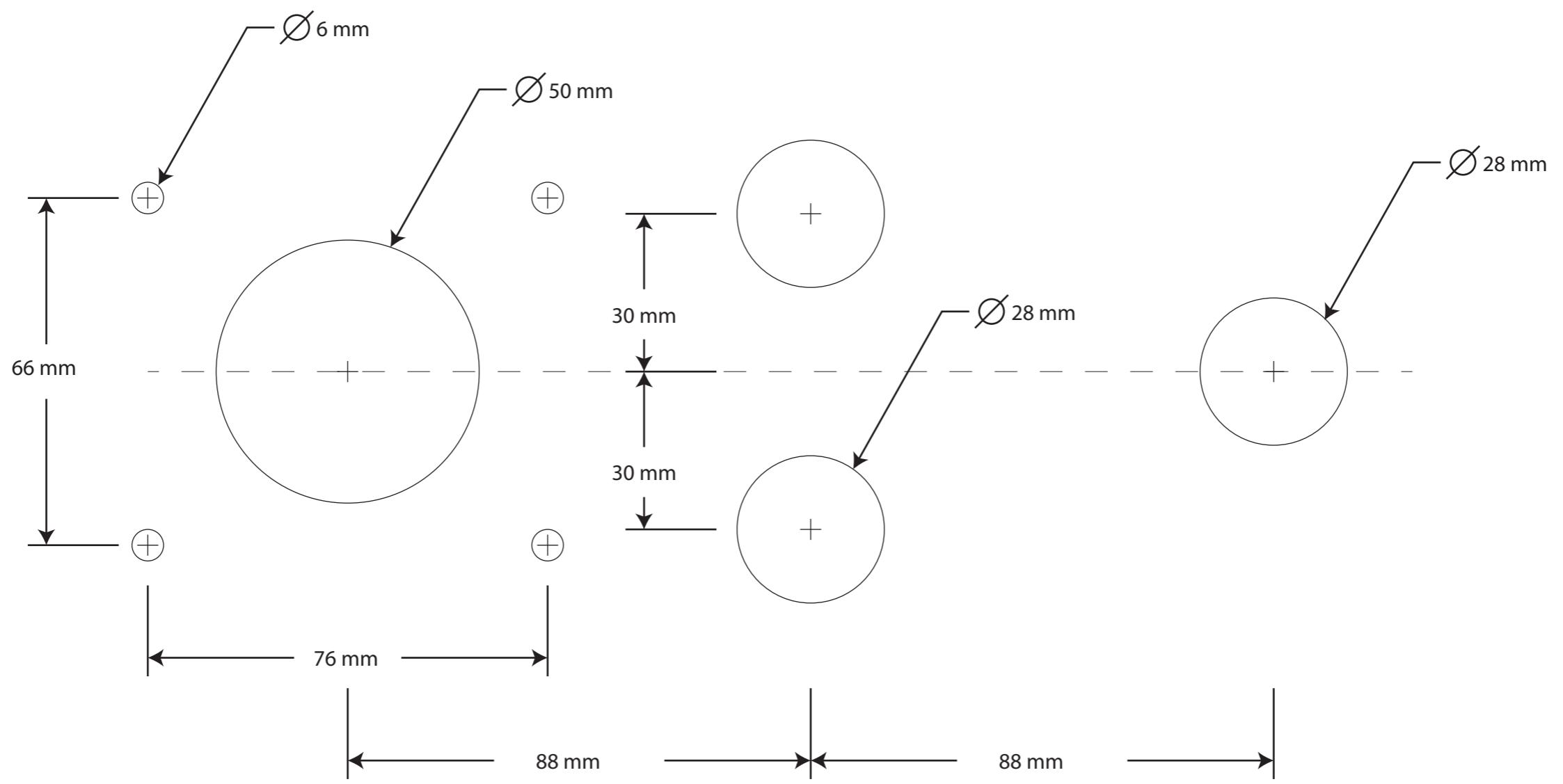
- Brainstorming
- Sketches
- Paper Prototypes
- Flash Prototypes

# Arcade Controls - Brainstorming



# Final Control Design



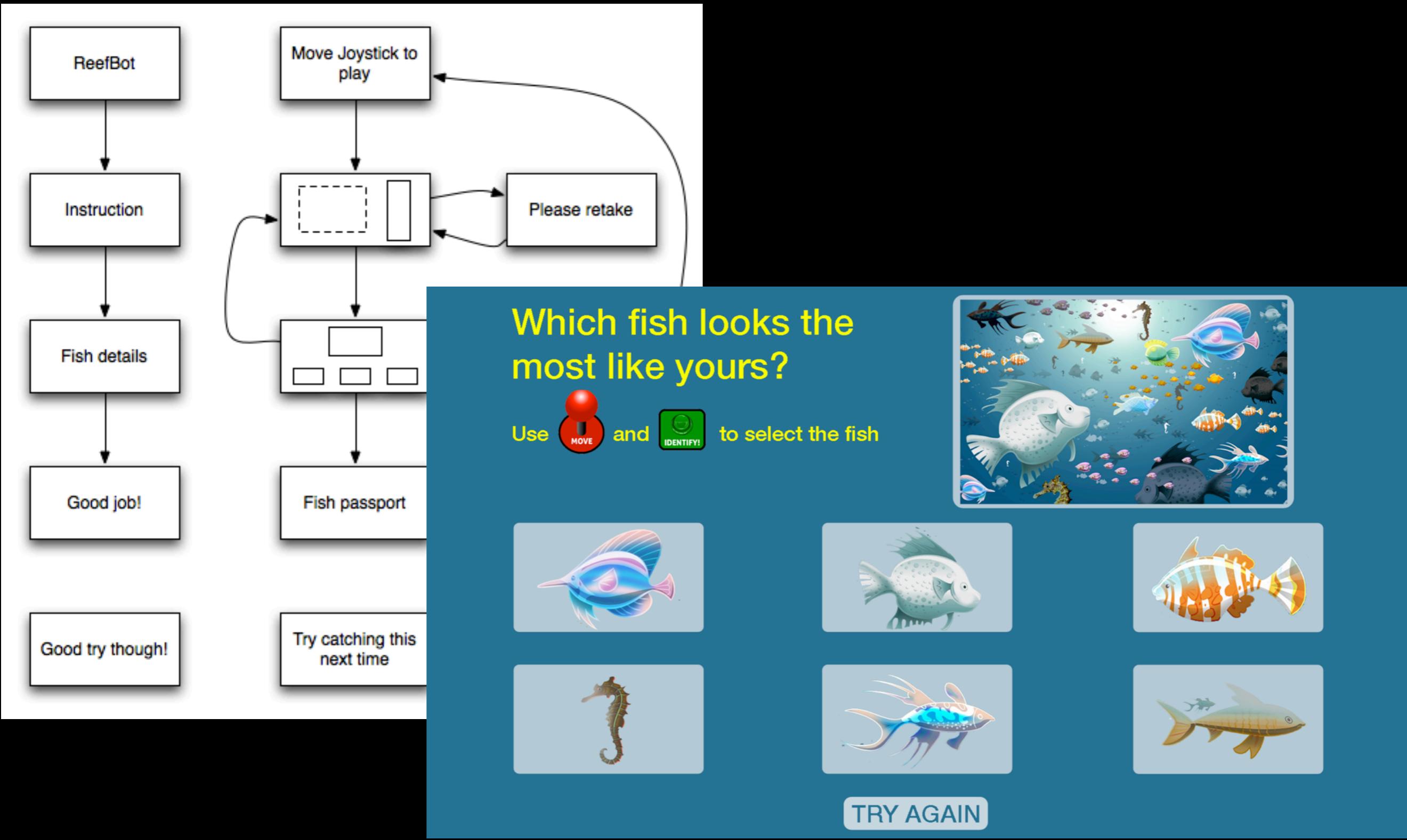


## JOYSTICK AND BUTTON MOUNT SCHEMATIC

Designed by: Nico and the ReefBots

NOTE: Minimum depth ~60 mm

# Interface Designs



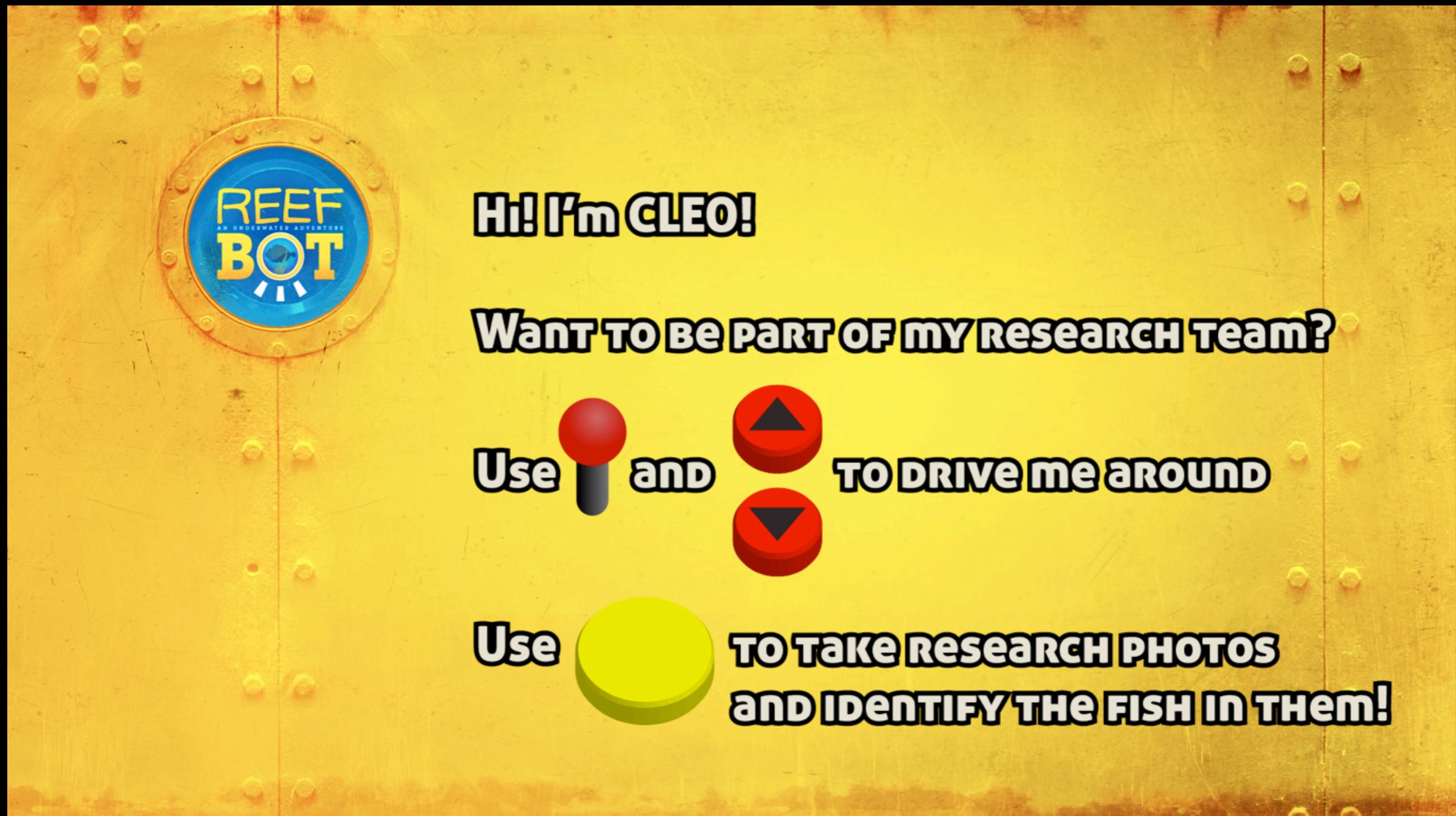
# Flash Prototype



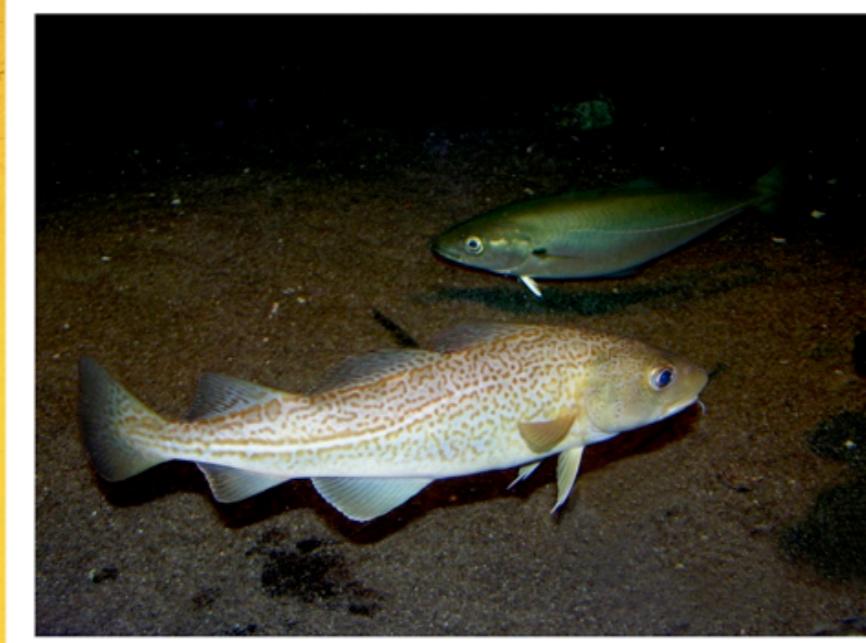
# Final Design

- Screens
- Flow
- Controls

# Screens



# Screens



You selected:

common name

**ATLANTIC COD**

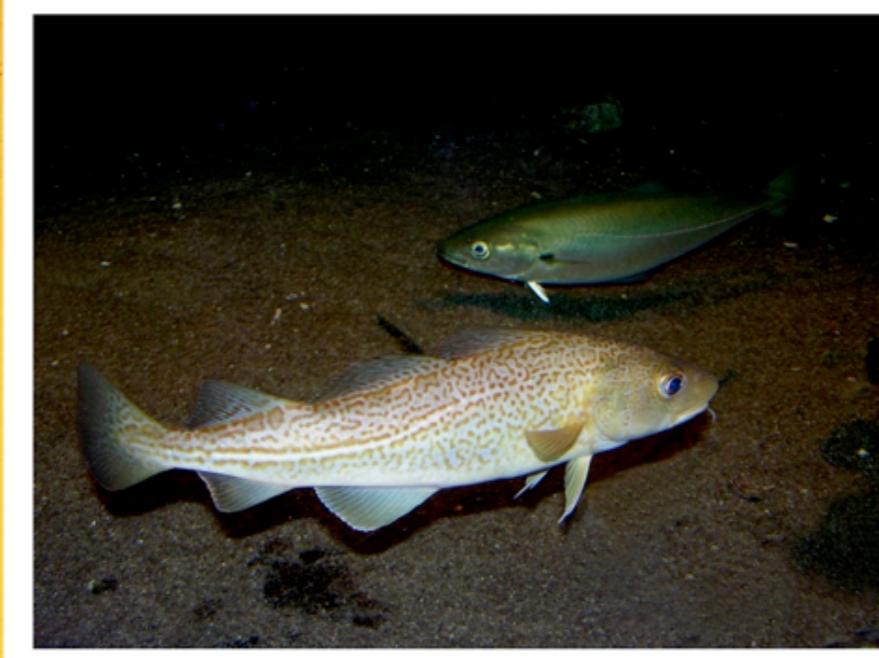
does the fish in your photo have:

orange spots

three fins on its back

whiskers

# Screens



You selected:

common name

**ATLANTIC COD**

Does the fish in your photo have:

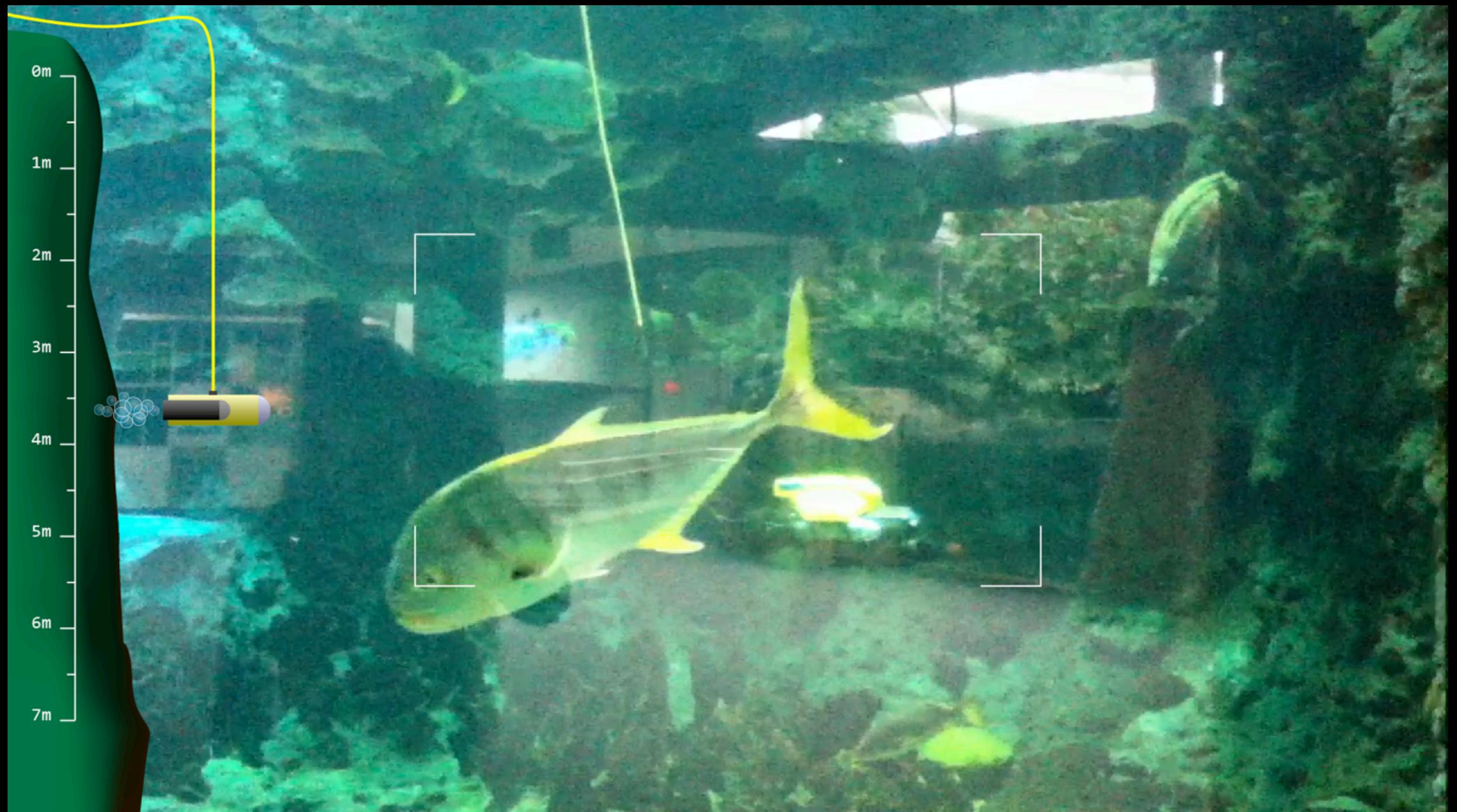
ORANGE SPOTS

THREE FINS ON ITS BACK

WHISKERS

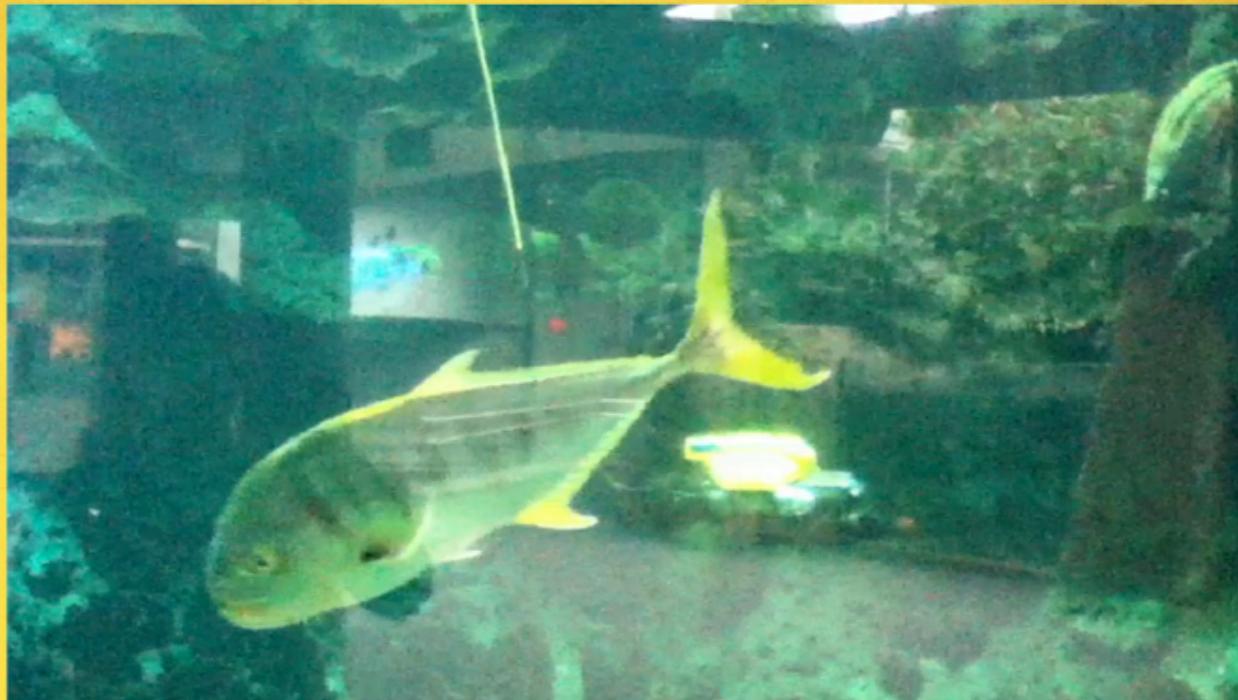
**approved!**

# Screens



# Screens

**WOW THAT IS A REALLY NICE PHOTO!**



**FIND THE FISH THAT LOOKS  
LIKE THE ONE IN YOUR PHOTO**



← LOOK THERE FOR MORE INFORMATION!

**ATLANTIC COD**

# Screens

**THANK YOU!**

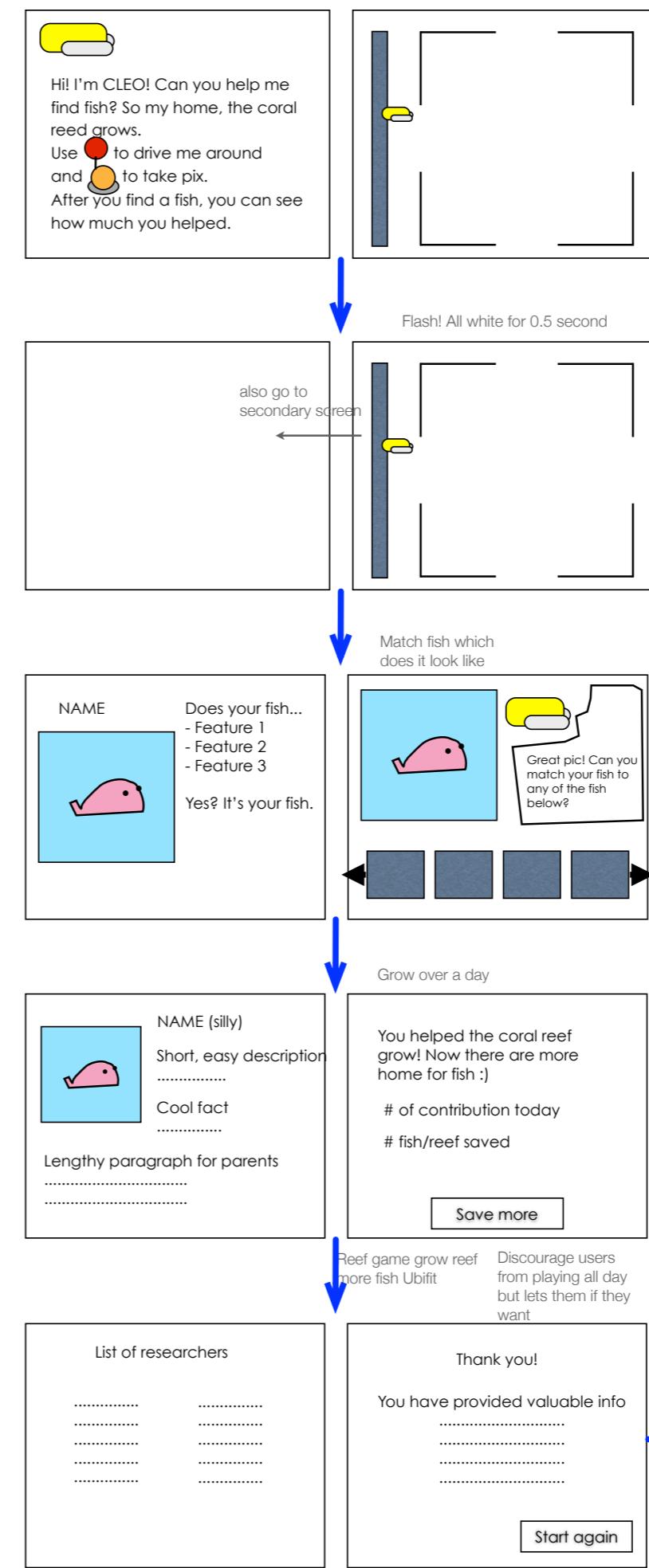
**You have PROVIDED VALUABLE  
INFORMATION FOR MY RESEARCH AND  
HAVE HELPED THE REEF GROW!**

**PRESS**



**TO START again**

# Flow



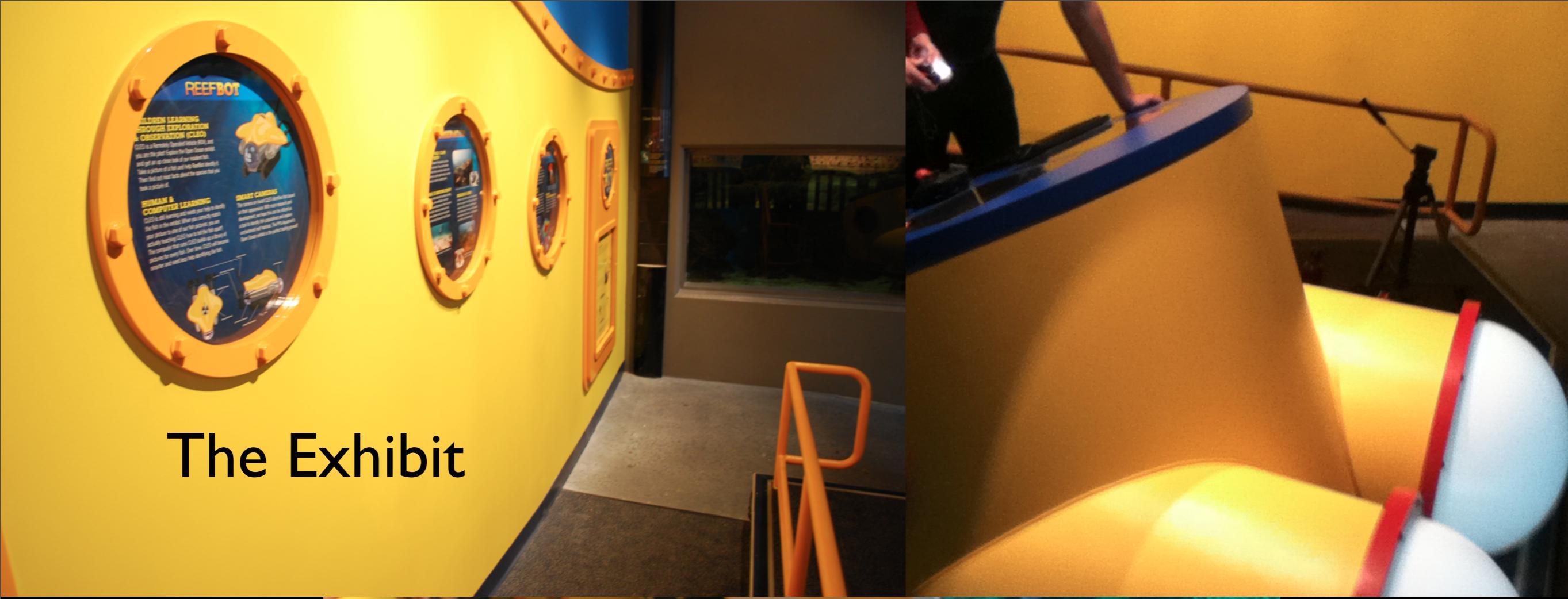
# Reefbot Today

- Robot shell
- Console and exhibit launched
- Buttons added
- Interface

# The Robot







# The Exhibit



# Questions?