

# Agenda

Research

Concept Development

Final Product

**Fire** *Squad*





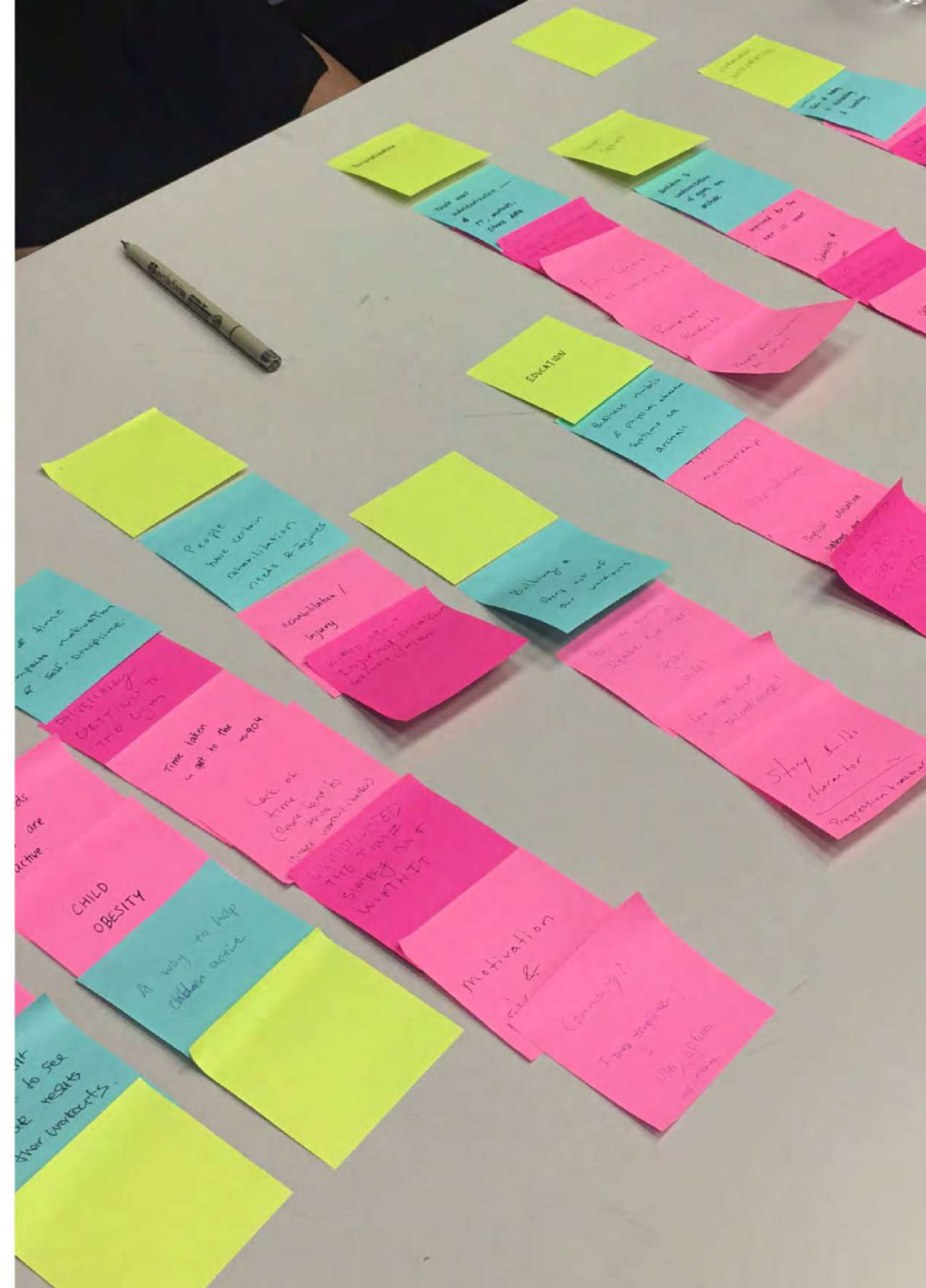
Each year, **50% of Americans** over the age of 18 develop a musculoskeletal injury that lasts longer than 3 months.

# The Problem



## Preliminary Research

When beginning, we set out to identify as many problems as possible within the realm of exercise and wellbeing. Using divergent thinking methodologies, we identified several industries where optimizations were needed most. We looked into pro exercise equipment, home exercise meditation applications, and personal training augmentations. We collected a list of pain points within these disparate arenas and cross pollinated our data points. Once we had collected the problem statements together, we affinitized the data until concurrent themes emerged. After much deliberation, we decided to focus primarily on rehabilitation technology.







# Research Methods

Interviews

Surveys

Secondary Research

"It's a long road committing  
to something that takes so  
long."

- Ali Bassir, Personal Trainer, 35





“

Most times i don't have a workout plan and i just go for whatever machines are open.

- Ali Bassir, Personal Trainer, 35

Less than half of my patients actually do their prescribed exercises at home... accountability is a huge issue.

- Jenny, Physical Therapist, 45

”

## Interviews

We interviewed several physical therapists, fitness trainers, and individuals who had a habit of exercising regularly. In our interview with Ali Bassir, a personal trainer and fitness enthusiast, we asked questions about how people stay motivated to be fit, workout routines, and what creates success. Once we completed our interviews, we affinitized the data, and developed key quotes to help guide our surveys and research questions.

## Surveys

As a team, we each developed a set of survey questions, and identified peer groups to gather data from in order to synthesize insights. Each survey contained a set of 30 questions, and asked about various aspects regarding what motivates you to workout, healthy habits, obstacles to working out, health behaviors and eating habits. After gathering the data from our surveys, we coalesced the data into data visualizations that represented three primary metrics relevant to our problem statement. The three most important metrics were quantity of time spent exercising, the frequency of exercise, and the motivating factors causing people to work out.



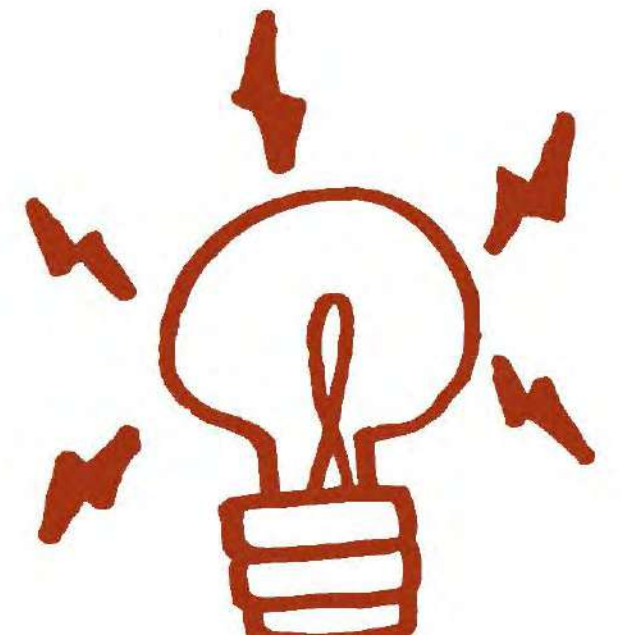
What people value...

Trust  
Responsibility  
Happiness  
Achievement  
Education  
Growth  
Community

# Insight

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After completing our research, we realized the need for improvement in physical therapy resources





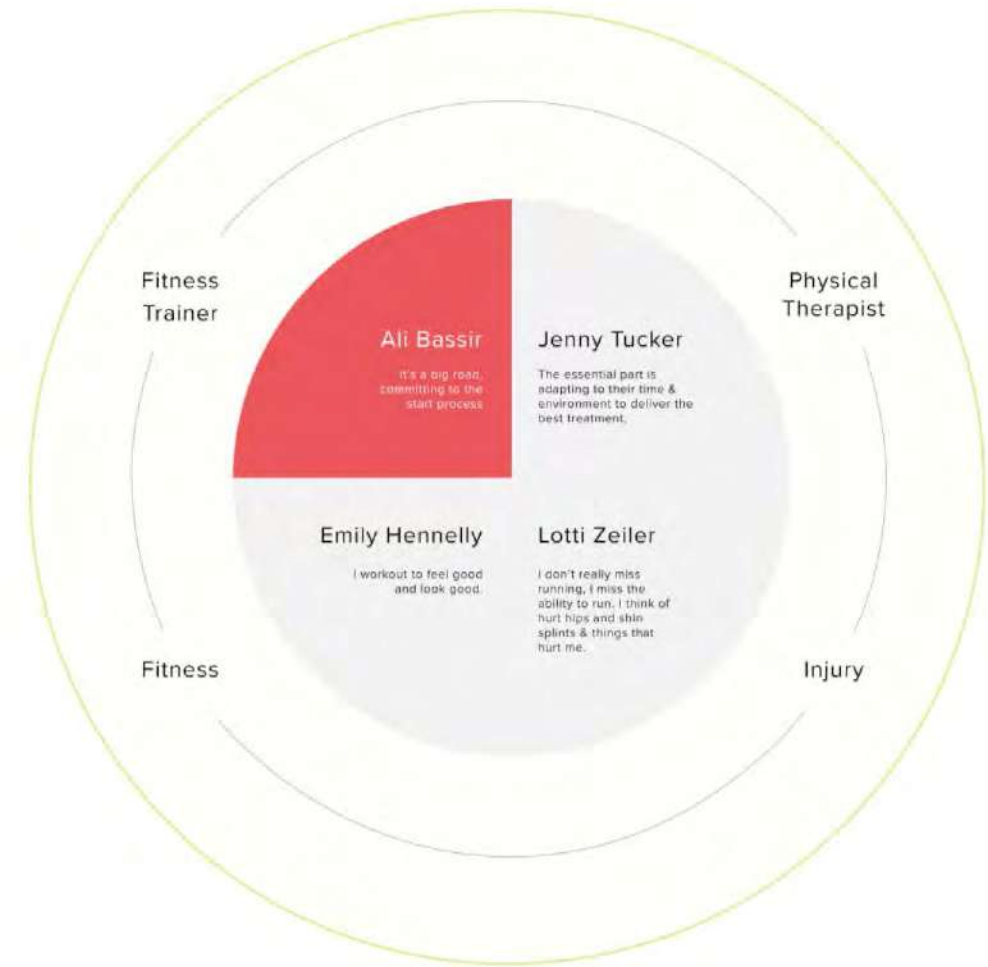


## Cultural Probes

We created a physical cultural probe in order to identify what motivates users to work out. From the probe we learned that maintaining a healthy lifestyle was a prominent motivation among the peer group surveyed. We contrasted this data set with our secondary data we collected, and noticed there was a major unsaturated market space within autonomous physical therapy technologies.

## User Networks

Instead of making persona's, we decided to map out the user networks for people that would use our product. We wanted to identify and hone in on the relationships between various users, and find what problems were common denominators.





## PERSONA

# JASON POWELL

43  
AGE

PHYSICAL THERAPIST

Old school therapist sticking to what has always worked.  
Strict on his exercise regimens for his patients.  
No B.S. allowed but he guarantees results.

OLD SCHOOL

INTIMIDATING

PASSIONATE



LOW

ANALYTICS USAGE

MEDIUM

PHONE USAGE

MEDIUM

COMPUTER USAGE

LOW

VIDEO GAME USAGE

## MOTIVATIONS

SAFETY



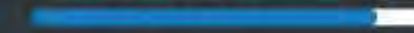
SOCIAL



HELPING PEOPLE



COMPETITION



## LIMITATIONS

Limited knowledge on advanced treatments

Not up-to-date with basic technology

Disorganized communicator with patients

TEACHING  
EXERCISES

PAIN  
MANAGEMENT

EVALUATING  
PROGRESS

UNDERSTANDING  
LIFESTYLE

PERSONALIZING  
PLAN

THERAPY  
FOCUS

# Primary

# Persona



## PERSONA

# LEONARD STAHL

31  
AGE

PERSONAL RELATIONS MANAGER

Extremely dedicated runner. Every second spent in recover is another second losing strength and progress. Very busy with work doesn't do excercises think they are a waste of time.

ENTHUSIASTIC

UNCONVINCED

HEALTH GURU



HIGH

ANALYTICS USAGE



MEDIUM

PHONE USAGE



HIGH

COMPUTER USAGE

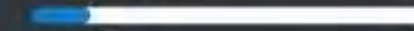


LOW

VIDEO GAME USAGE

## MOTIVATIONS

SAFETY



SOCIAL



RUNNING



HEALTH



## LIMITATIONS

First time in therapy doesn't have much time with work to make it to the clinic

Feels the process is slow and ineffective

Insurance will only pay for one session a week and getting back to running is extremely important to Leonard.



# Secondary

# Persona



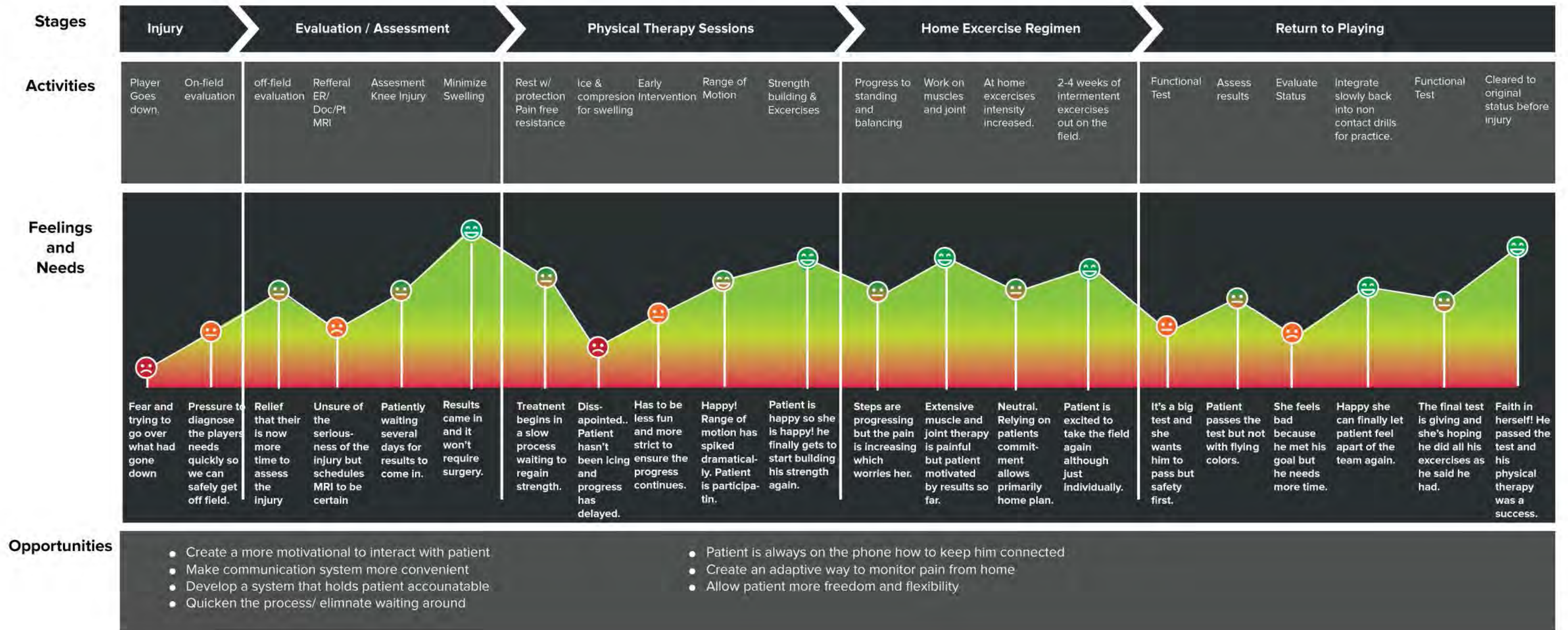


## User Journey

Once we had compiled enough primary research, we wanted to sift through the data, stories, and interviews we had collected in order to craft a user journey for a typical physical therapy patient. We developed the user journey to begin with injury, and end with the patient finally being able to play sports, and exercise again. This helped us uncover important insights that guided our concept development.



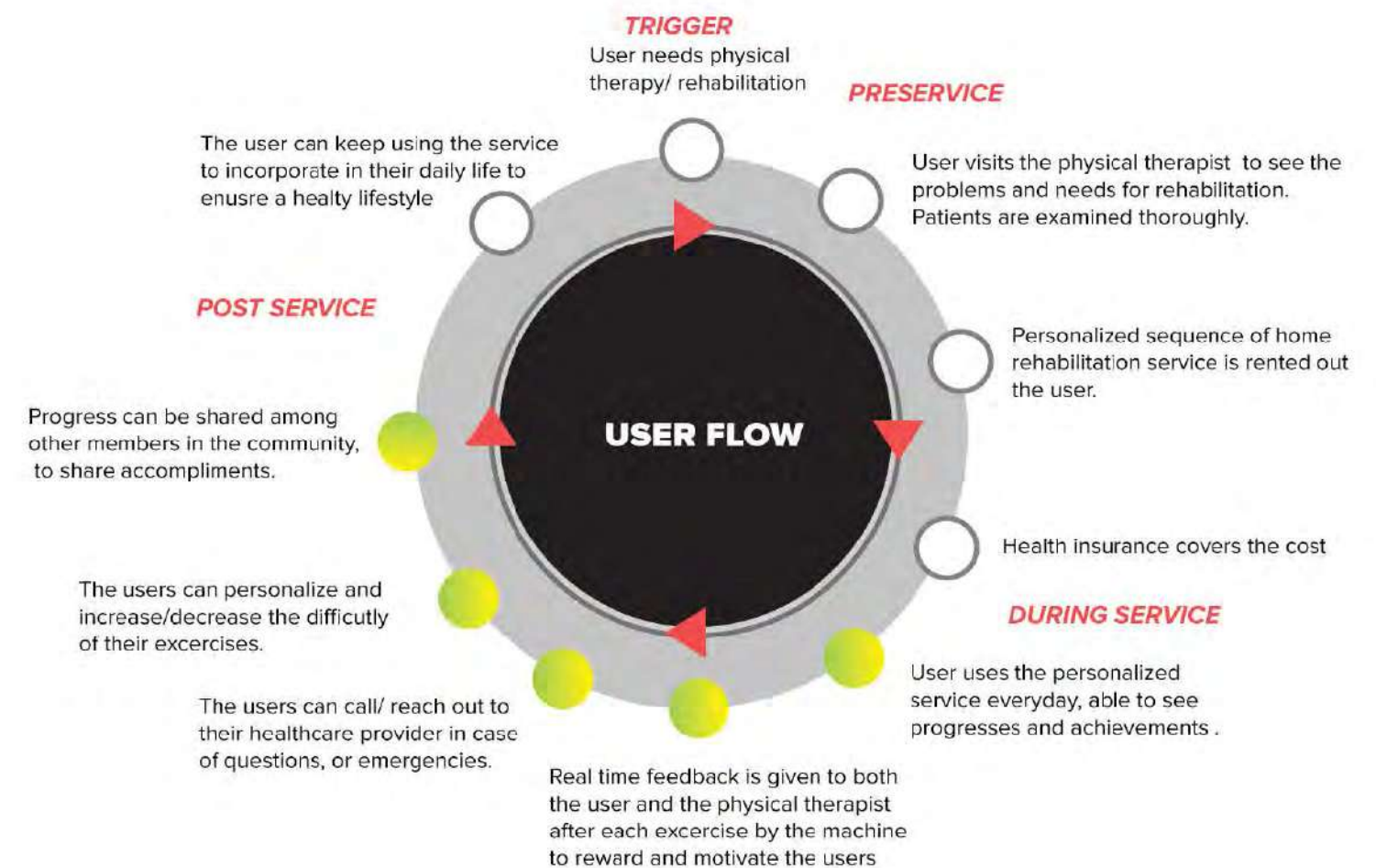
# User Journey





# Encounter Map

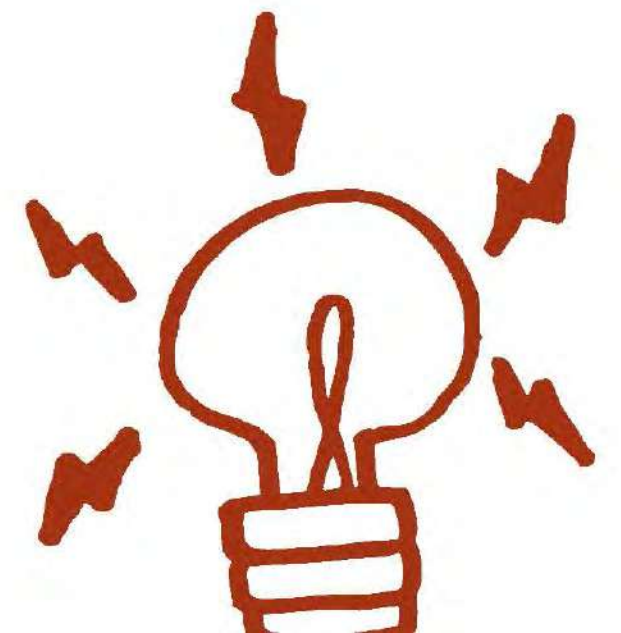
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# Insight

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Once we mapped out the full user journey of our personas, we knew we needed to create a system that could aid in physical therapy as well as fitness.





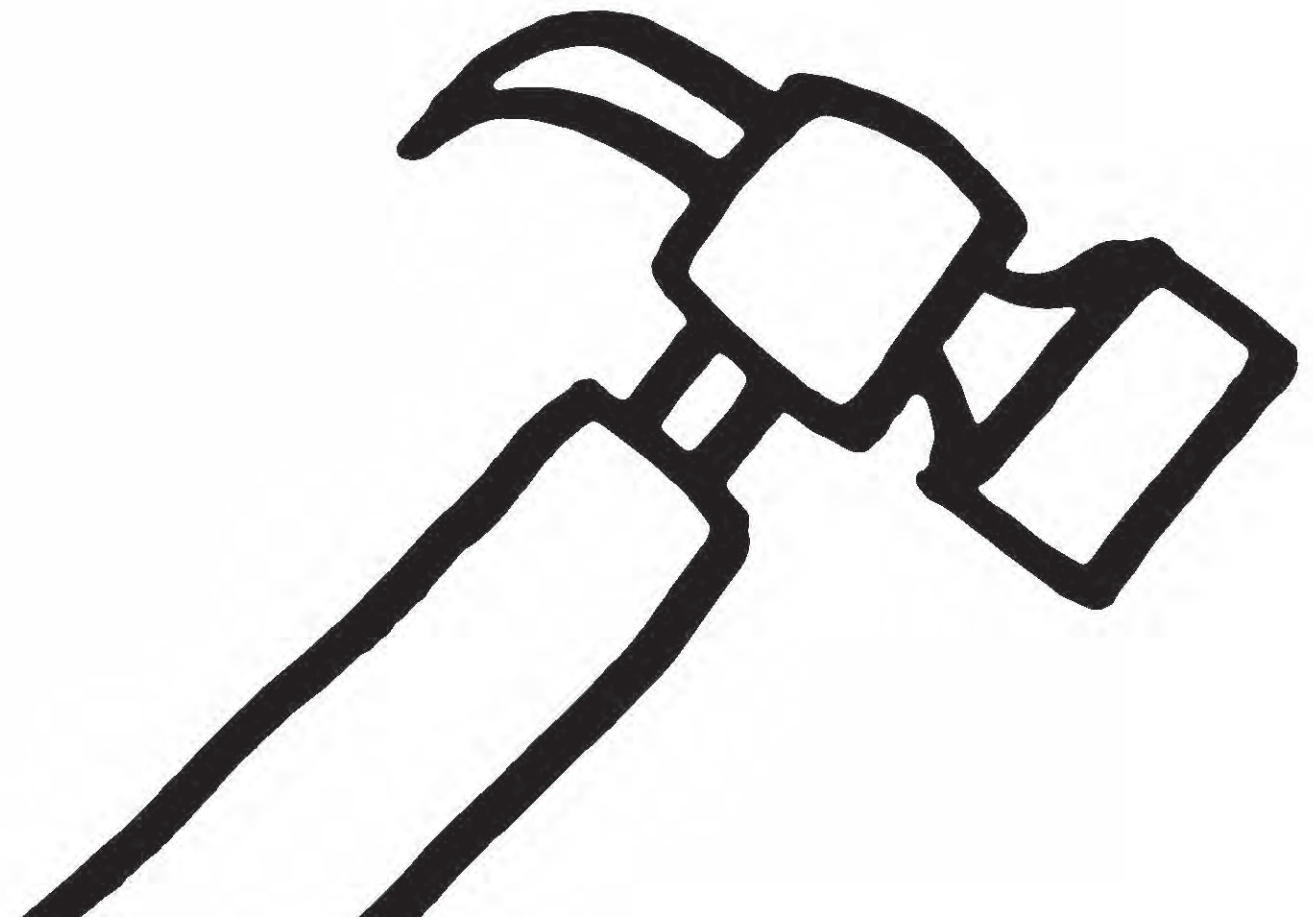


## D.O.S.E

For our secondary research, we combed through research studies on rehabilitation, and looked into the chemicals released when you exercise. Dopamine, Oxytocin, Serotonin, and Endorphins are the four main chemicals that govern our emotional state, and mental reward mechanisms. Dopamine is the chemical reward for performance, and what helps people focus. Oxytocin is the love chemical, Serotonin the happiness chemical, and Endorphins is the chemical reward for exercise. We decided to use these four chemicals (D.O.S.E) as a metaphor for progress in our concept development phase.

After completing our research, we  
moved forward...

# Concept Development



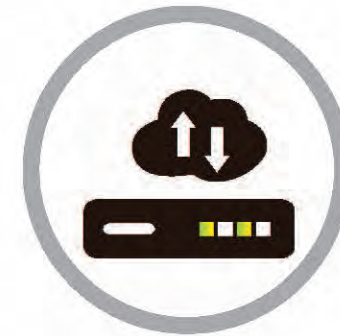


# Areas of Interest

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Autonomy



Machine  
Learning



Augmented  
Reality

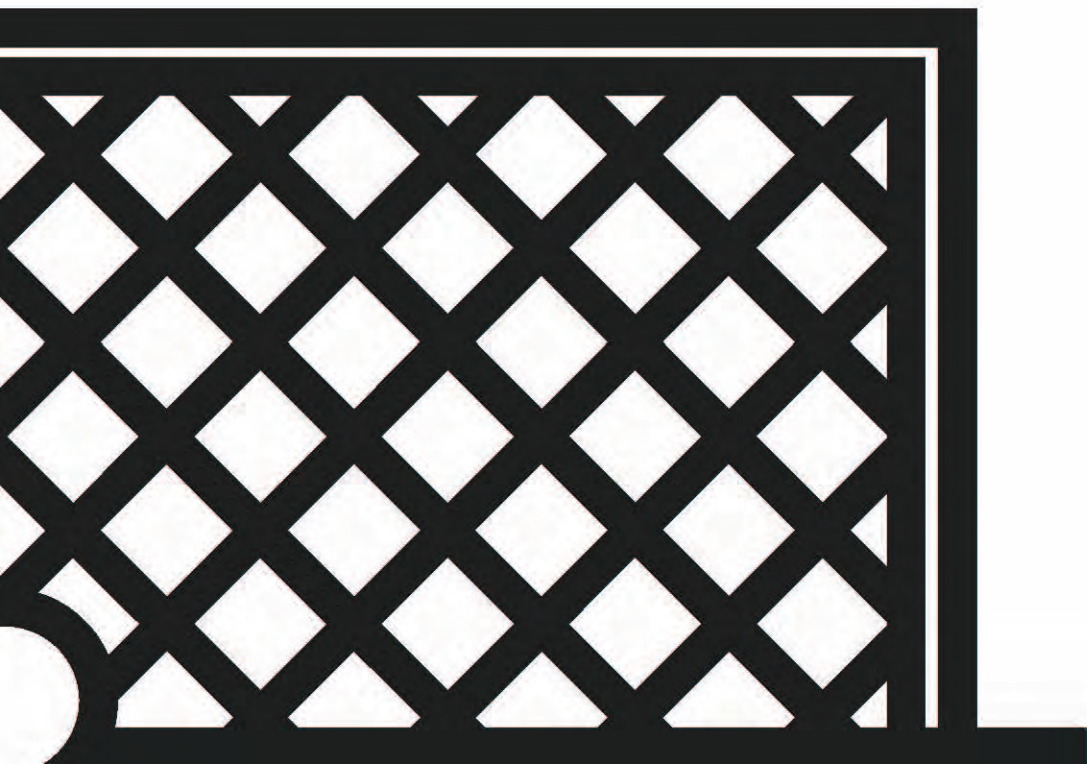
# Our Goals

1.

Inspire a healthier lifestyle by augmenting spaces.

2.

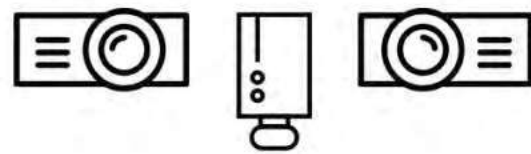
Make physical therapy easy, affordable, and convenient.





WALL PROJECTOR

3D SENSOR



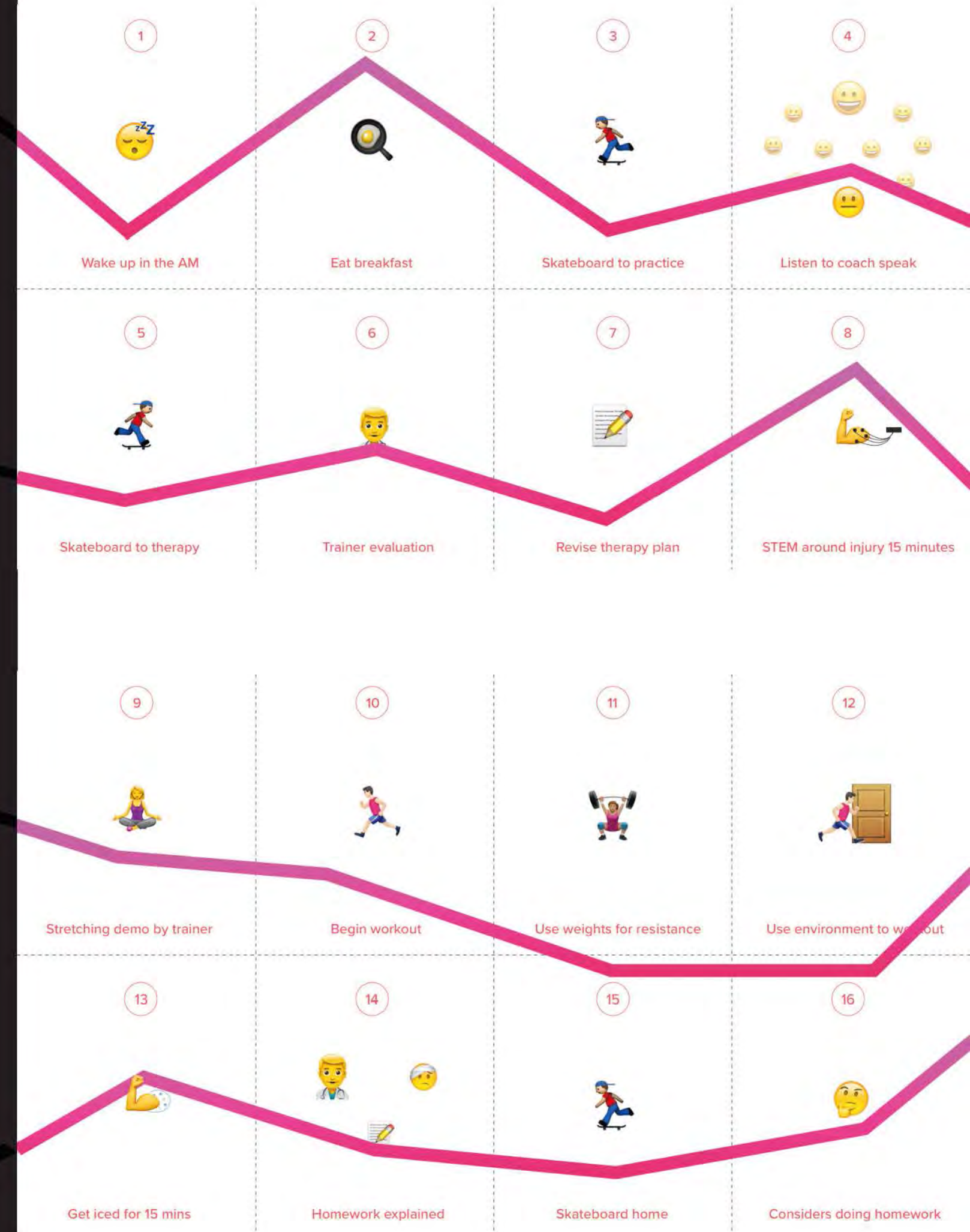
ENVIRONMENT PROJECTOR

## Technology

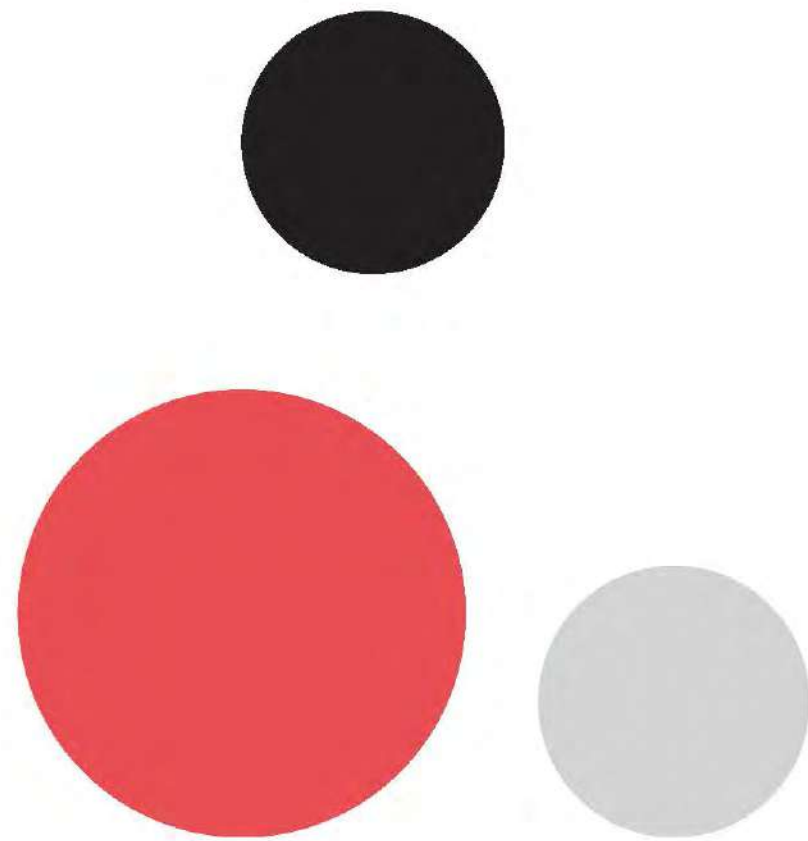
For our initial concept, we focused primarily on using projection mapping technology. Projection mapping allows projector/camera devices to map the environment and create projections that are placed in the real world. We were excited by its potential to augment the space around you to make exercise, and rehabilitation interactive. We also knew that by using a camera embedded within a projector, we could capture valuable visual data to help the system learn how you were performing, and help train machine learning algorithms.

## User Scenarios

To begin our concept development, we wanted to explore the intersection between physical therapy and fitness. We focused primarily on using projection mapping technology to augment the physical therapy experience. We began by first creating a use-case scenario to map out exactly how a product like this might be used. We were experiencing feature creep in our ideation phase so we needed storyboards to help define the a clear use-case for our product.





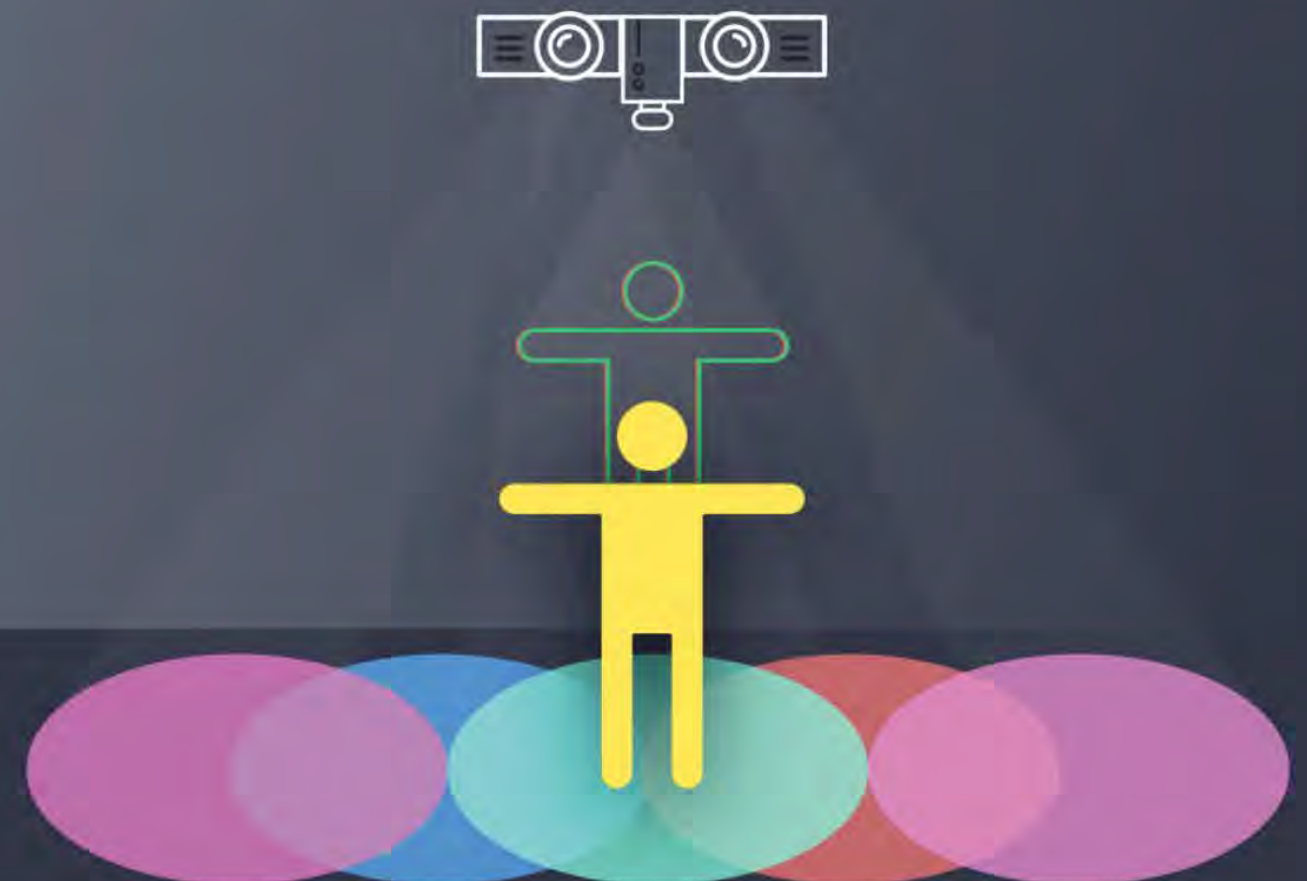
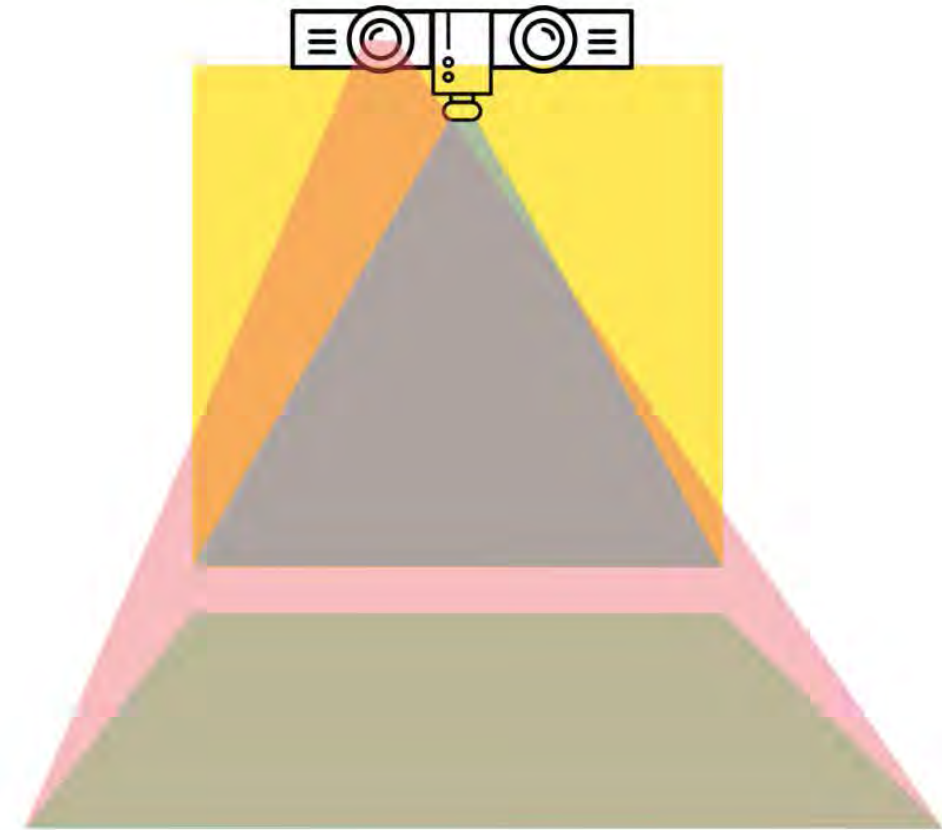


## Brand Guidelines

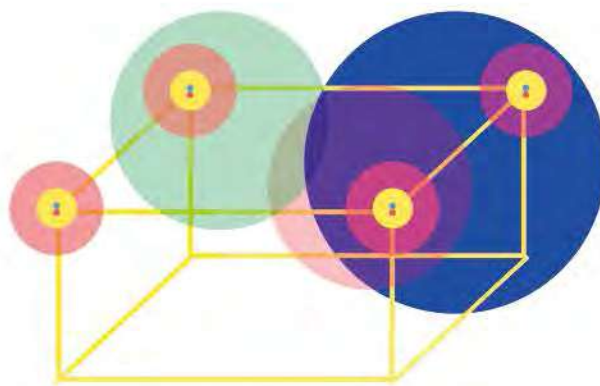
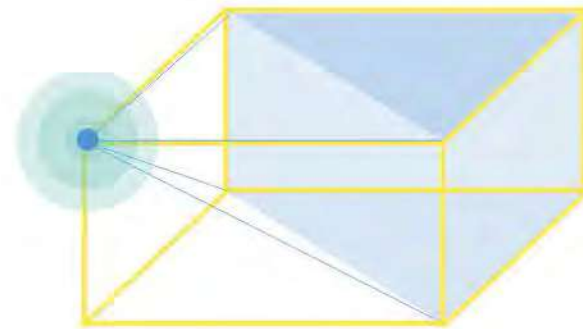
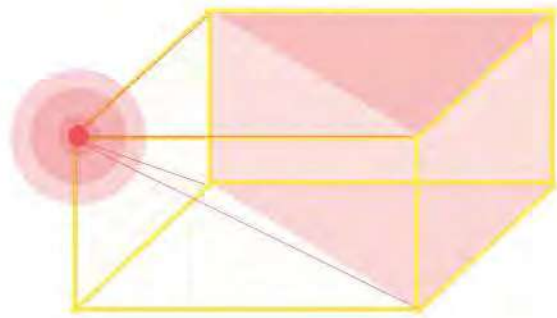
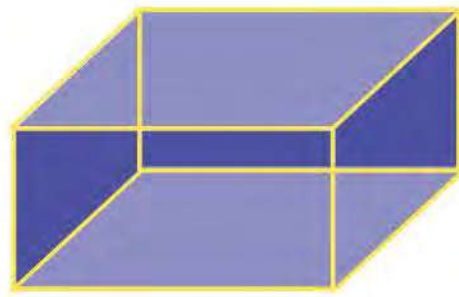
We set out to establish a style guide. Branding Guidelines helped us move forward with our concept in a consistent direction, with multiple group members working on the same concept simultaneously. We developed four primary colors, based off of our D.O.S.E metaphor. We also created a typography hierarchy, and other brand assets. We still wanted to explore new styles, but it was important that we maintained consistency.

## Projection Mapping

Once we had a clear scenario that outlined the device's functions, we began conceiving the actual solution. We began with a wall-mounted projector, with two projection areas; one on the floor, and one on the wall. We knew the device would need cameras and sensors as well to accurately map the area, as well as speakers. We developed a set of simple graphics to represent our concept, and began ideating different functions, and capabilities for the projector.







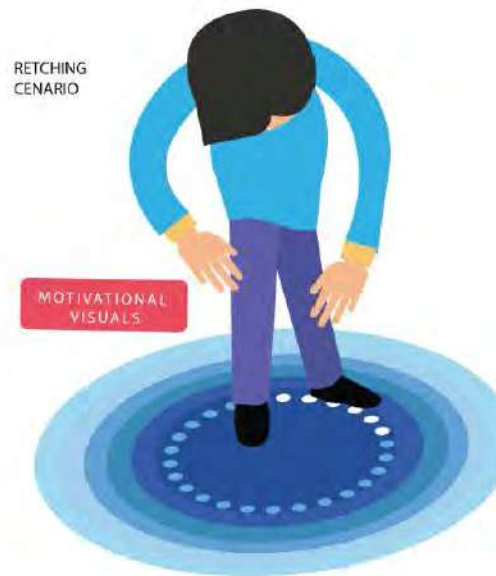
## Environments

We used simple graphics to explore how we could use patients environments to create interactive physical therapy exercises. We used these graphics to understand how many cameras we would need, and the various benefits and downsides each setup afforded. Eventually, we decided that having one device was simpler to set up, and gave the device enough projection real-estate to create interactive games.

## Interactivity

We used paper sketches, and vector graphics to illustrate how the system could interact with the user. Using these graphics, we explored different use cases for the product. Based on feedback from potential users and the class, we determined that their only needed to be two primary modes of interaction. Form tracking, and gamified exercises would allow our product to help physical therapists accurately inform patients physical therapy routines, and update the treatment based in the patient's performance.

RETCHING  
CENARIO



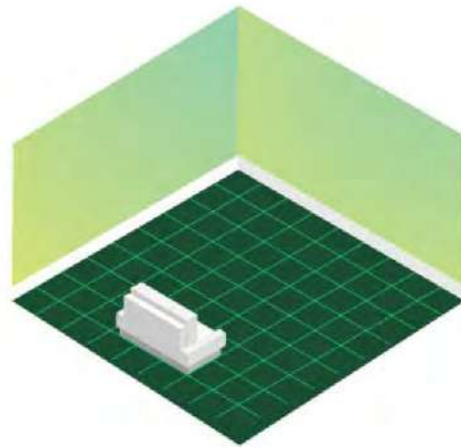
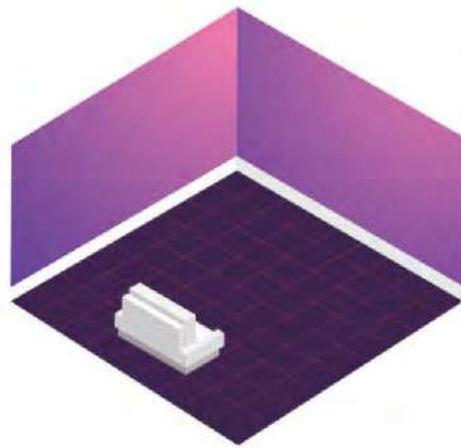
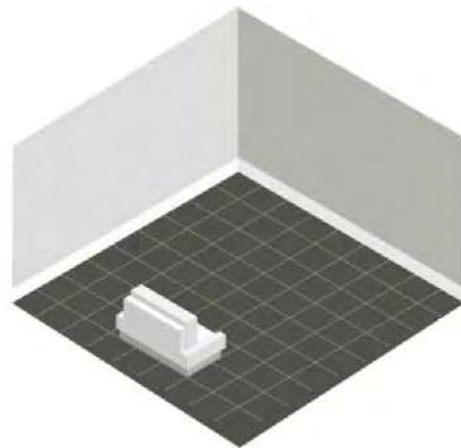
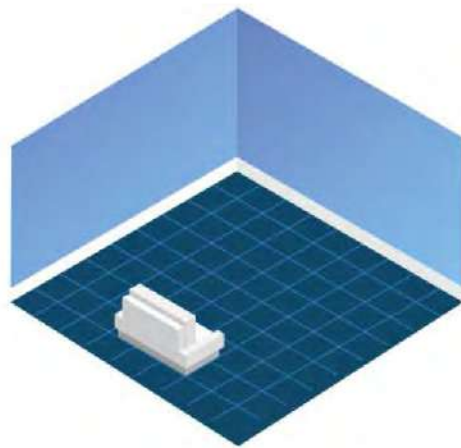
SPACE DETECTED  
PROJECTION MAPPING



INTERACTIVE  
PHYSICAL THERAPY



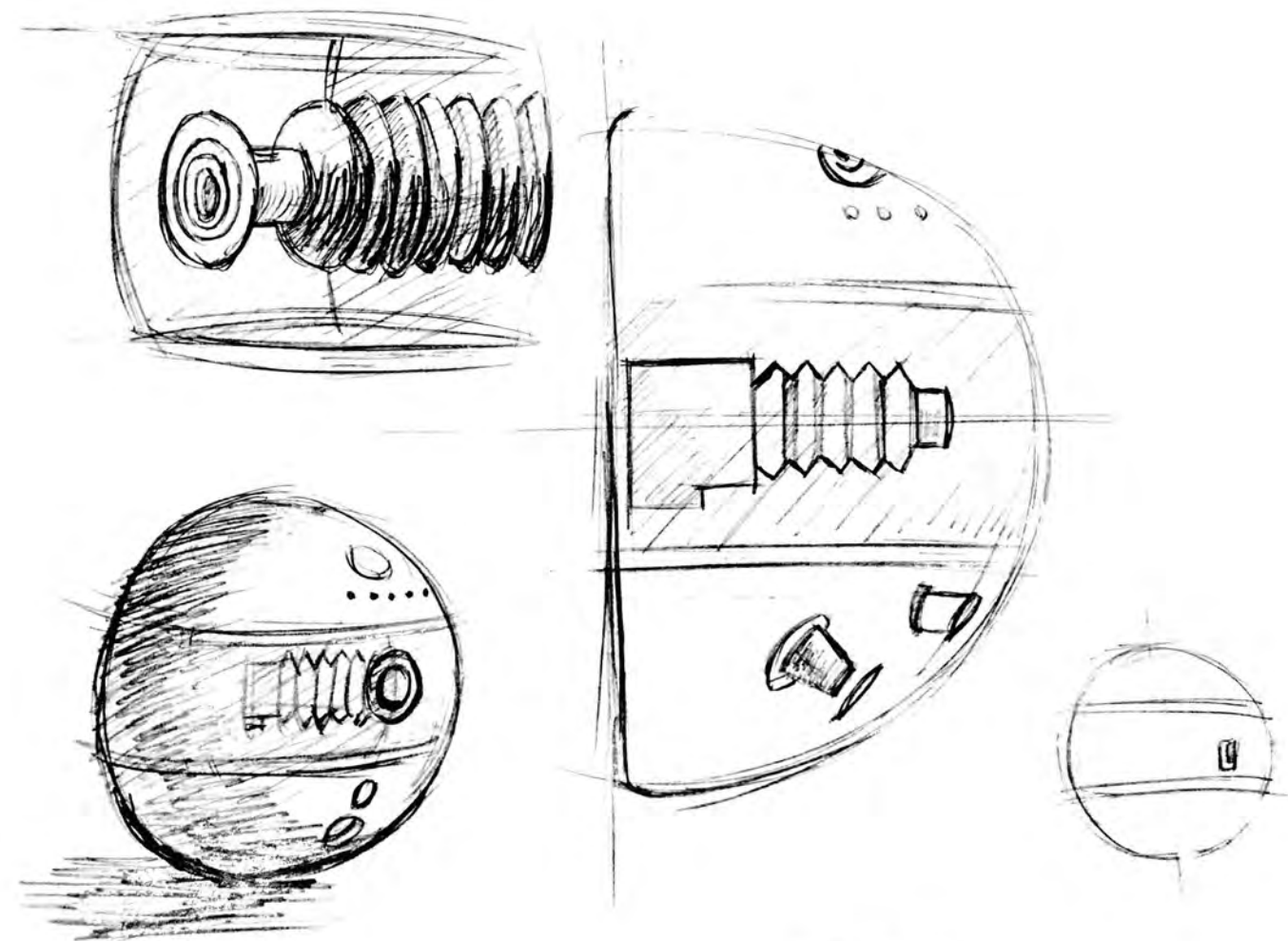




## Levels

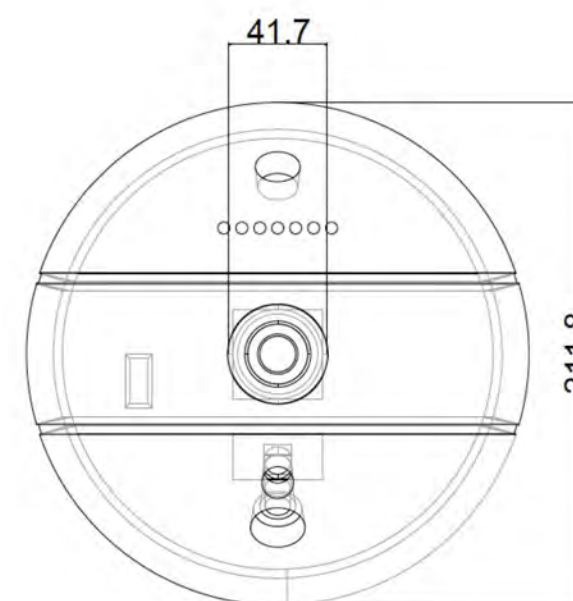
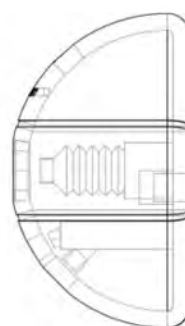
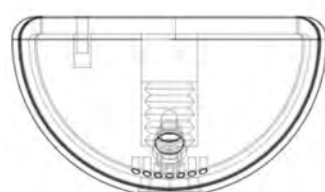
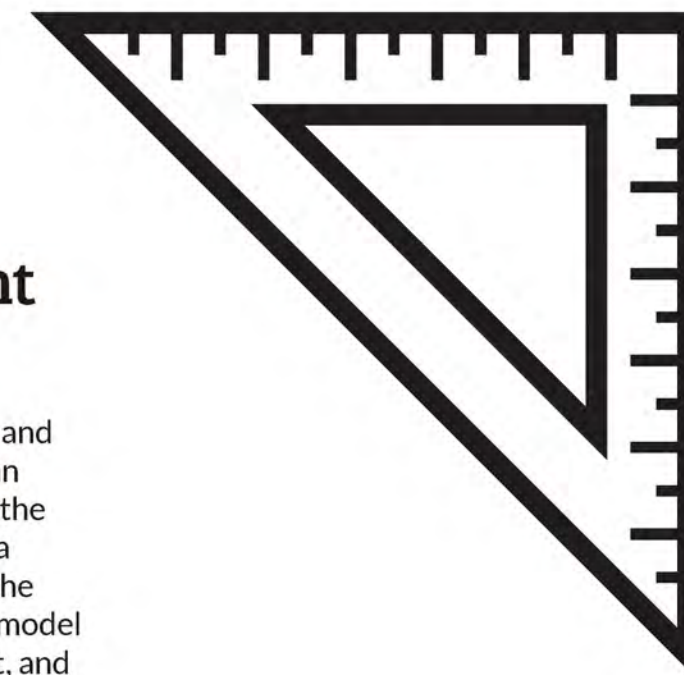
Based on our research, we knew we needed to incorporate gamification into our product. We began to develop a set of physical therapy routines and exercises based on a levels system. As the user progressed through each routine incrementally, we wanted the system to provide them with an increasing number of exercises they could unlock. This would encourage the user to “level up”, and could also help the system tailor



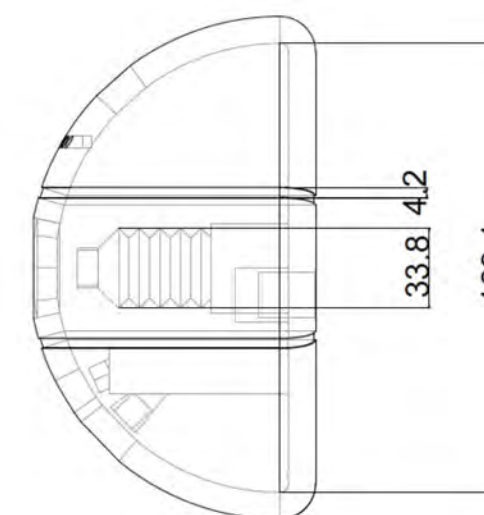


## Product Development

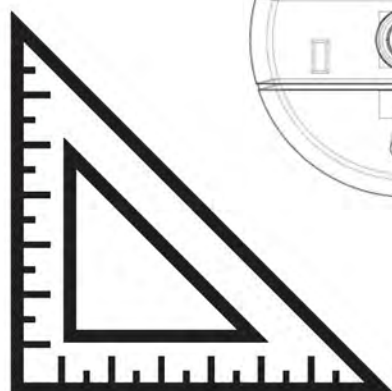
After defining the product's functionality, and how the software would operate, we began creating detailed sketches and renders of the device. Our end goal was to manufacture a prototype of the product, and make sure the design was feasible. We prepared a rhino model of the final product so we could 3D print it, and use it during user testing.



Front



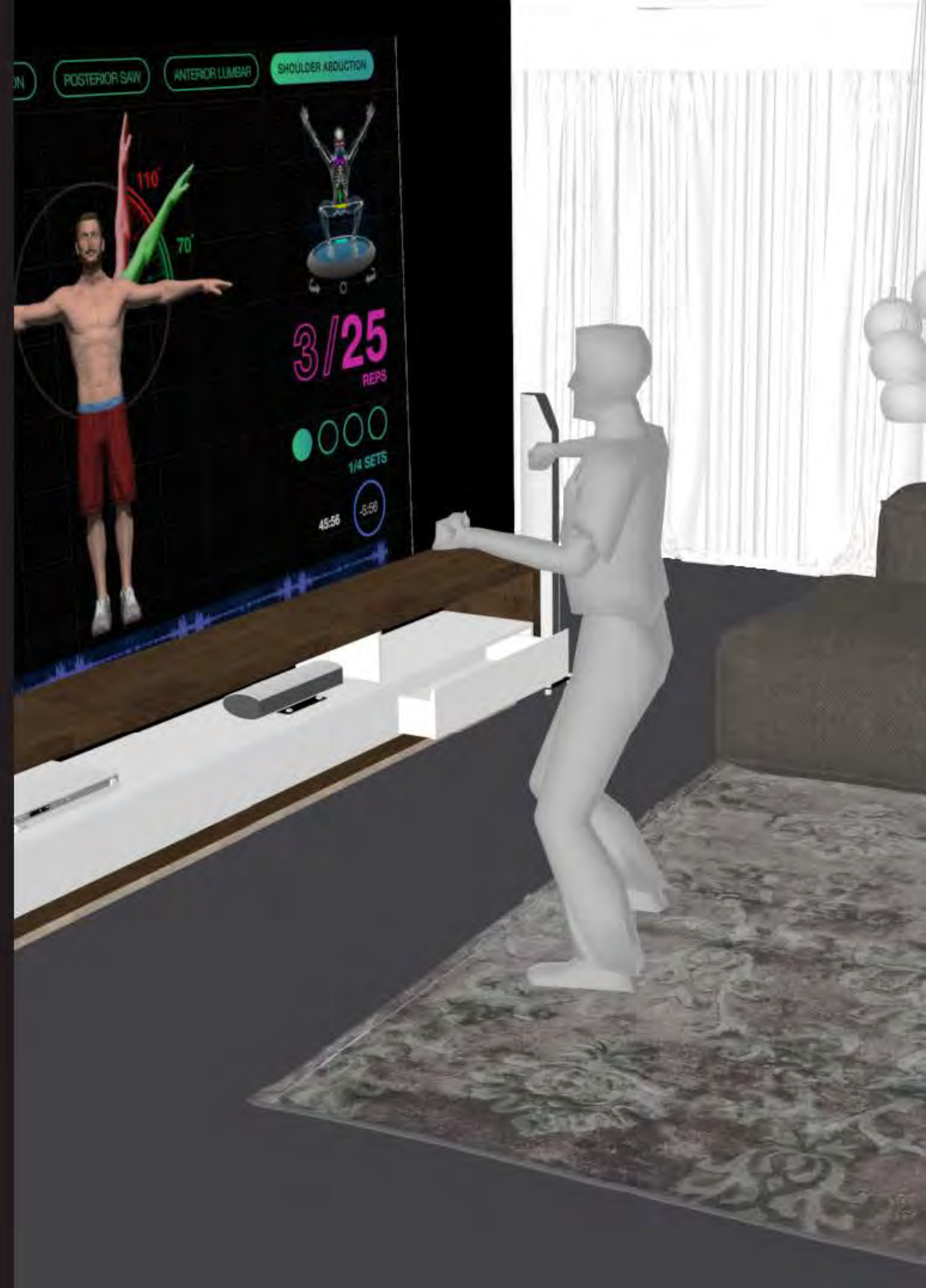
Side





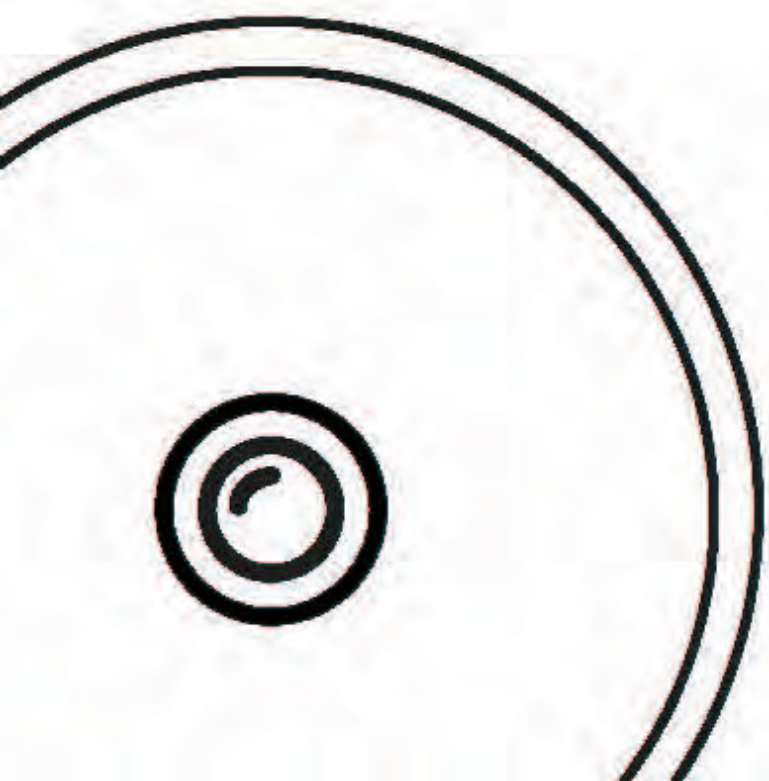
## Exercises

We developed a set of exercises for our user testing, and prototyped them in the motion capture studio. We scanned our body, uploaded it as a 3D model, and used Maya to create simple exercise animations. This helped us gain valuable feedback on the concept, and identify points of confusion in the exercises.



# Final Product

SPARK





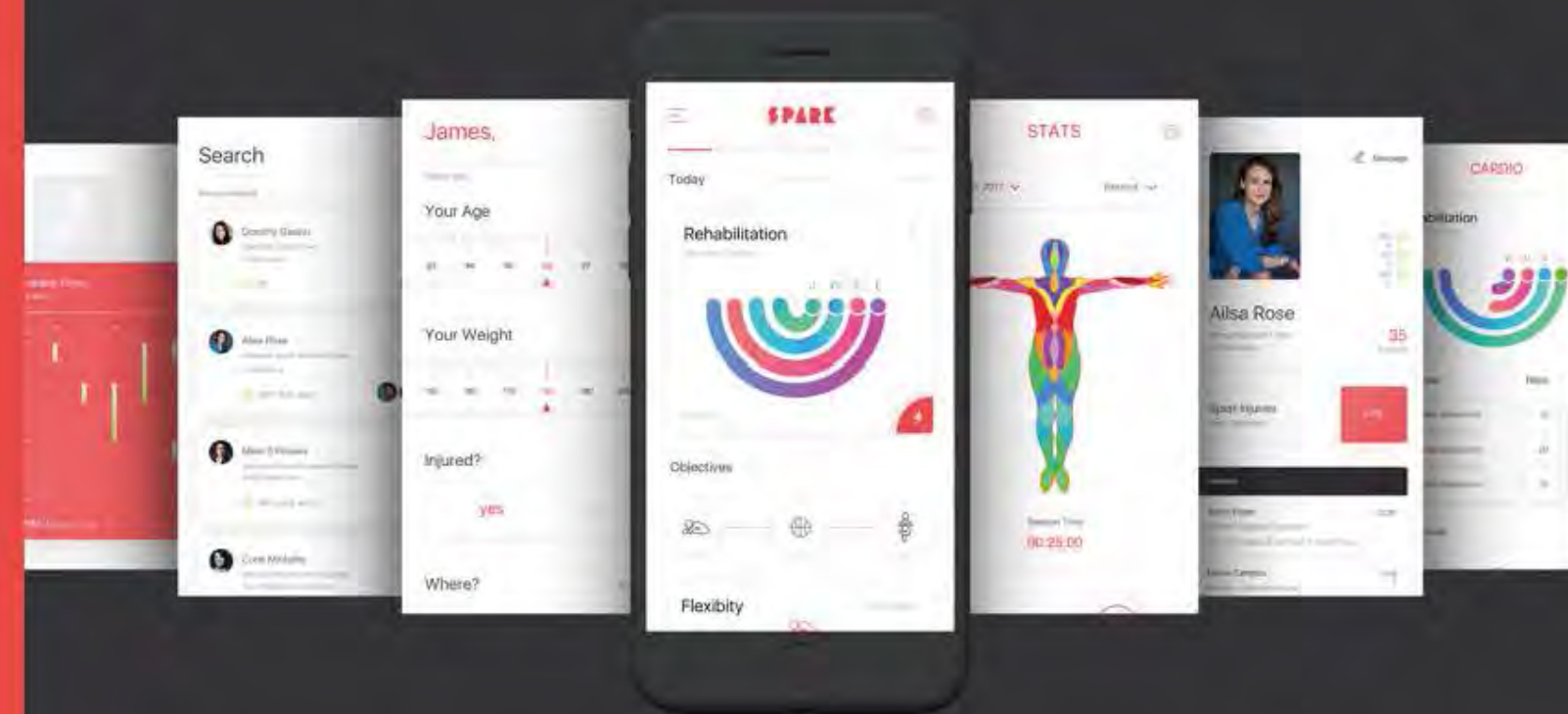


## The Device

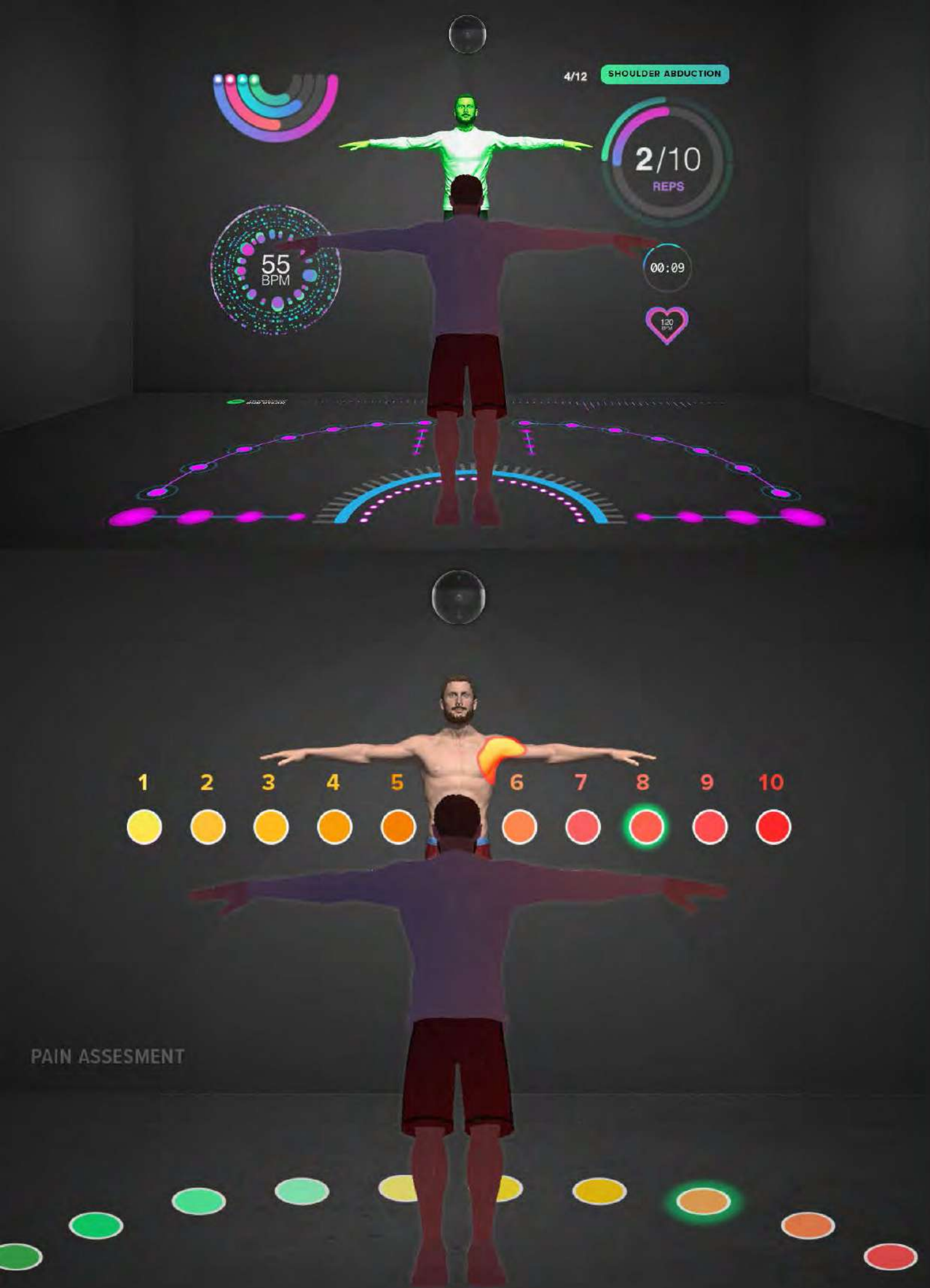
Spark is an autonomous physical therapy and fitness training platform that uses a projector to interact with the user. Using the power of projection mapping, coupled with machine learning, physical therapists can create personalized rehabilitation routines that adapt to the users rate of progression. The projector has a wall and ceiling projector, and a camera integrated with an infrared sensor. This allows Spark to track the users form, and project interactive games into the environment.

## The App

The application is where users can set up their device, and manage their exercises and track their progress. The app enables quick and easy communication with your physical therapist so you can ask questions and receive personalized suggestions about your rehabilitation program. The app also features a social aspect that allows users to see their friends progress.







## Interactive Interface

The projected interface allows the user to navigate the most immediate tasks with simple gestures and voice control. The user can identify pain levels after each exercise, and activate different interactive exercises. The interfaces color scheme uses our D.O.S.E philosophy to help differentiate elements. While exercising, the system also detect the user's heart rate through infrared sensors, and generates a resonant breathing graphic to help the user stay calm while completing their routine.