

# Cardi-Row

Wheelchair Accessible Back and Cardio Workout



Team Free Motion

Darnell Brooks

Huong Phan

Thomas Waggoner

# Summary

- Statement of Problem
- Need Finding
- Existing Products
- Design Process
- Testing with Users
- Future Development
- Questions?



# Problem Statement

Existing outdoor accessible exercise equipment does not meet all the needs of the wheelchair driving population.

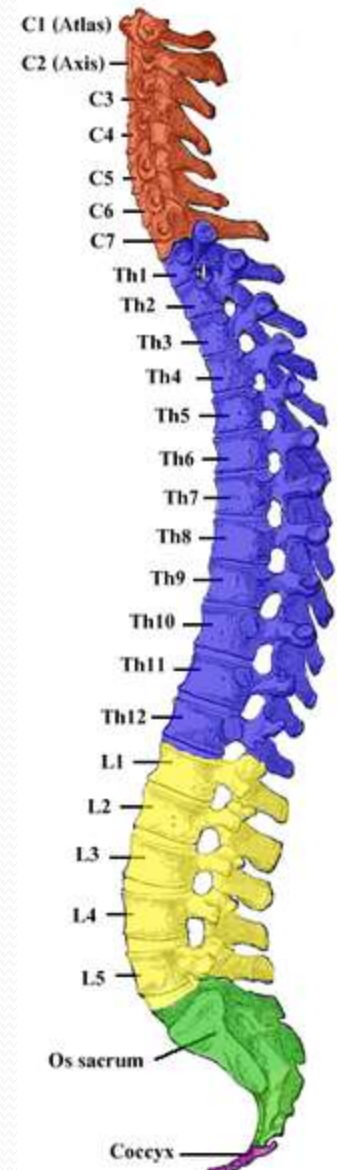
## Trip to VA: Need Finding

- “The point of therapy is to help people reintegrate into society” – VA team
  - Want machines that all users can use
- Lack of cardio machines for wheelchair users
- Lack of resistance variation
- Machine that accommodate all the conditions of our target users



# Target Users

- Wheelchair users with C6 or lower spinal injury
  - Limited hand and wrist control
  - Full elbow control
  - Limited trunk stability
  - No use of legs
- Non-wheelchair users



# Design Requirements

Develop an exercise machine that:

- Is usable by our entire user base
  - Varying athletic abilities
  - Varying grip strength
  - Varying trunk stability
  - Varying wheelchair configuration
- Has variable resistance without free weights
- Is weather resistant

# Existing Products

Wheelchair treadmill and hand-cycle for cardio workout



# Existing Products

## Wheelchair Latpull





# Existing Products

## Traditional Latpull and Rower

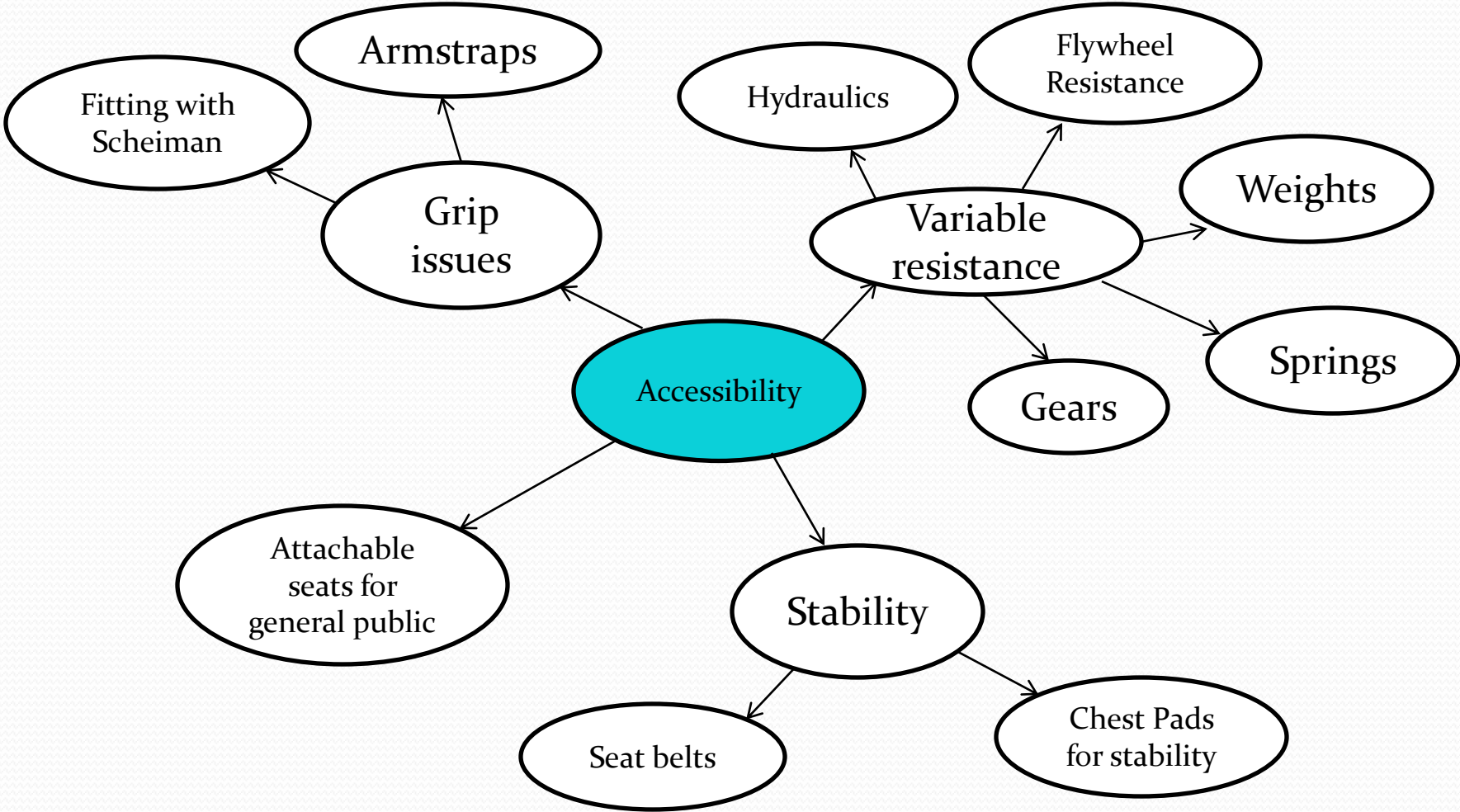


# Existing Products

## Scheiman Rebuild Fitness



# Brainstorming



# Design Solutions

## Our Resistance Solution

- Resistance wheel

## Existing Solutions

- Weights
- Hydraulics
- Friction
- User bodyweight



# Design Solutions

## Our Stability Solution

- Adjustable Chestpad



## Existing solutions

- Seatbelts
- Not addressed on most machines

# Design Solutions

## Our Gripping Solutions

- Armstraps



## Existing Solutions

- Schieman Devices
- Not addressed on most machines

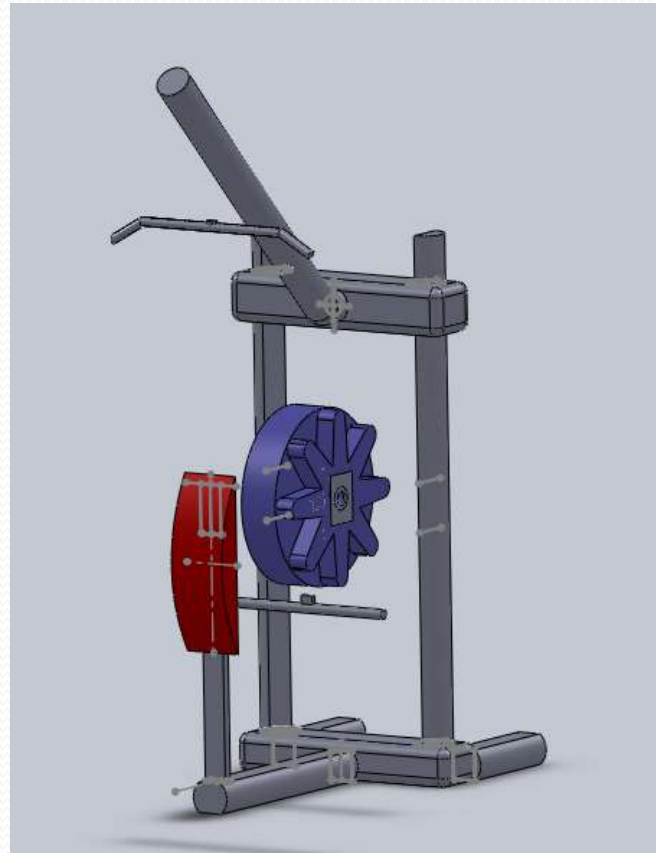
# Design Solutions

## Dual Purpose Machine

- Lat pull
- Cardio rower



# Prototype Development



Early CAD design



# Prototype Development



Foam Core Model

# Prototype Development



Tested Model

# User Testing at the VA



# User Testing at the VA





# User Testing at the VA



# Final Model



# Future Development

- Adjustability
  - Telescoping and height adjustment of chestpad
  - Height adjustment of latpull bar
- Bilateral control
  - Dual independent handles
- Independence of rower and latpull
  - Multiple rowers
  - Dual independent cables
- Enhance weather resistance



Questions?