ROTA

MOBILITY


Stanford
ROTA Factory
ROTA HQ

2011

**Power-assist module**
Marcus Albonico, Stephen Hibbs, Kevin Ting

2012

**Transfer board**
Rahul Sastry, Sofia Rojasova, Nick Akiona

2012

**Parking brake**
Tyler Haydell, Jai Sajnani, Mark Kurphy

1. How we design
2. How we build
3. **Discussion:** challenging convention

1. **How we design**
2. How we build
3. Discussion: challenging convention

It started with empathy.

# Really hard work

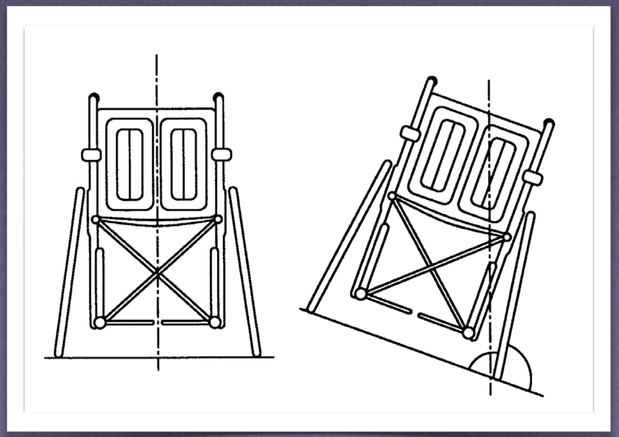
# Painful

# No healthy alternative

Alternatives to pushing?

Best exercise for the upper body?

Other problems with wheelchairs?



- Cardiovascular Health Is Essential
- Provide Riders Individual Freedom
- Solve Repetitive Strain Injury
- Use Lever Propulsion
- The Rowing Motion Is Most Efficient
- Use Gearing
- Make It Light & Compact

## Traditional Wheelchair

$500 - $1,000
Subsidized (Leased)
Exercise for Someone Else
Heavy
Low Failure Rate
Not Cool

## Power Scooter

$1,000 - $6,000
Subsidized
No Exercise
Super Heavy (Requires Lifts)
High Failure Rate
Not Cool

## Lightweight Wheelchair

$2,000 - $8,000
Subsidized
Painful Exercise
≤ 35 lbs
Medium Failure Rate
Cool

Difficult to operate

Adds weight and width to chair

Not cool (the stigma of disability)

Causes repetitive strain injury (RSI)

Retails for $4,000 - $8,000

Rarely subsidized by government and insurers

Hard to propel

Impossible to turn

Difficult to transfer and transport

Causes elbow, wrist and hand pain

Retails for $3,000 - $8,000

Rarely subsidized by government and insurers

| Scores | Rating |
|---|---|
| 0 | Not Available |
| 1 | Poor |
| 2 | Average |
| 3 | Good |
| 4 | Best |

**Usability and Effectiveness Factors Compared**

| Company | Wijit | | Enabling Tech. | | Rio Mobility | | Willgo | | SRB Engineering | | Nu-Drive | | Quantum Runner | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Propulsion mode | Push only | 2 | Push Only | 2 | Push-Pull | 3 | Push only | 2 | Push/Pull | 4 | Push only | 2 | Push/Pull | 3 |
| Power to weight increase | Average | 2 | Good | 3 | Average | 2 | Poor | 1 | Poor | 1 | Good | 3 | Poor | 1 |
| Price | High $4.5k | 1 | < $1K? | 4 | High $5.5K? | 1 | High $5K | 1 | Very High | 0 | Low $.65K | 4 | Medium | 2 |
| Mechanical advantage | 1.2:1 | 2 | 1.7:1 | 3 | 2:1 | 4 | 1:1 | 2 | 1.7:1 | 3 | 1.2:1 | 2 | 1.8:1 | 3 |
| Optimized ergonomics | Average | 2 | Average | 2 | Average | 2 | Average | 2 | Average | 2 | Average | 2 | Average | 2 |
| Effective braking/parking | Average | 2 | Average | 2 | Good | 3 | Good | 3 | Good | 3 | Average | 2 | Good | 3 |
| Increase in chair width | Poor | 1 | Poor | 1 | Good | 3 | Good | 3 | Good | 4 | Average | 2 | Good | 3 |
| Telescopic Levers | NA | 0 | NA | 0 | NA | 0 | NA | 0 | NA | 0 | NA | 0 | NA | 0 |
| Shiftable gearing | NA | 0 | NA | 0 | Good | 3 | NA | 0 | Good | 3 | NA | 0 | NA | 0 |
| Front-&-center propulsion & handling | NA | 0 | No | 0 | NA | 0 | NA | 0 | NA | 0 | NA | 0 | NA | 0 |
| One-arm propulsion | No | 0 | No | 0 | NA | 0 | NA | 0 | Best | 4 | NA | 0 | NA | 0 |
| **Total Score** | | **12** | | **17** | | **21** | | **14** | | **24** | | **17** | | **17** |

Health

ROTA MOBILITY

Utility

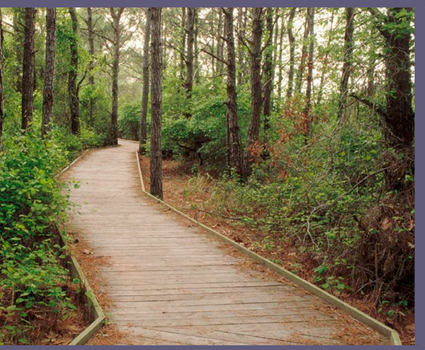




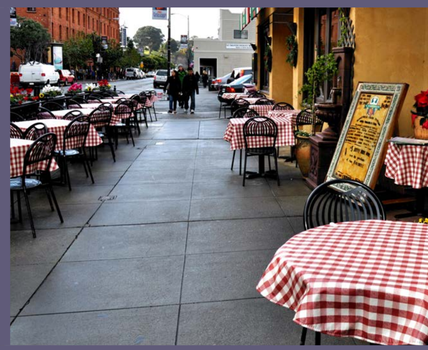




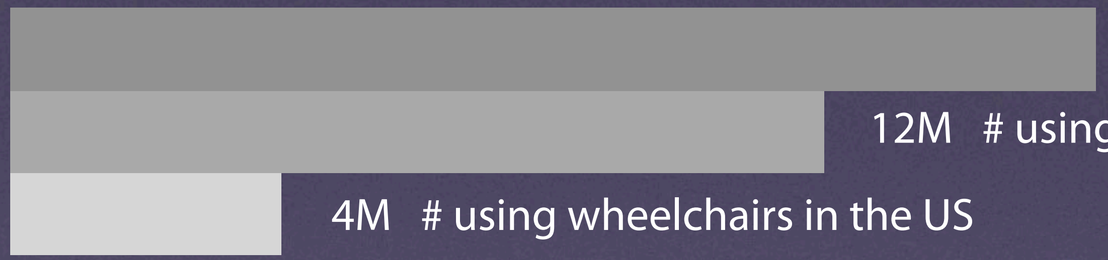






PARADISE PIER




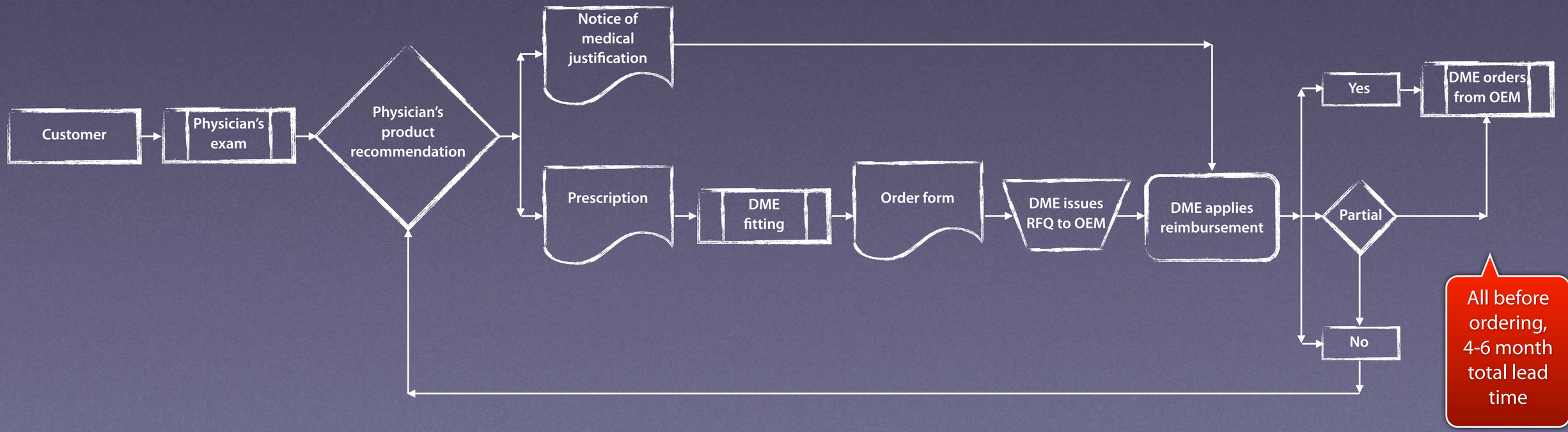




Top 10 Leading Conditions for Wheelchair & Scooter Use in the US

1. Stroke (11.1%)
2. Osteoarthritis (10.4%)
3. Multiple sclerosis (5.0%)
4. Absence/loss, lower extremity (3.7%)
5. Paraplegia (3.6%)
6. Orthopedic impairment (3.6%)
7. Heart disease (3.3%)
8. Cerebral palsy (3.1%)
9. Rheumatoid arthritis (3.0%)
10. Diabetes (2.4%)

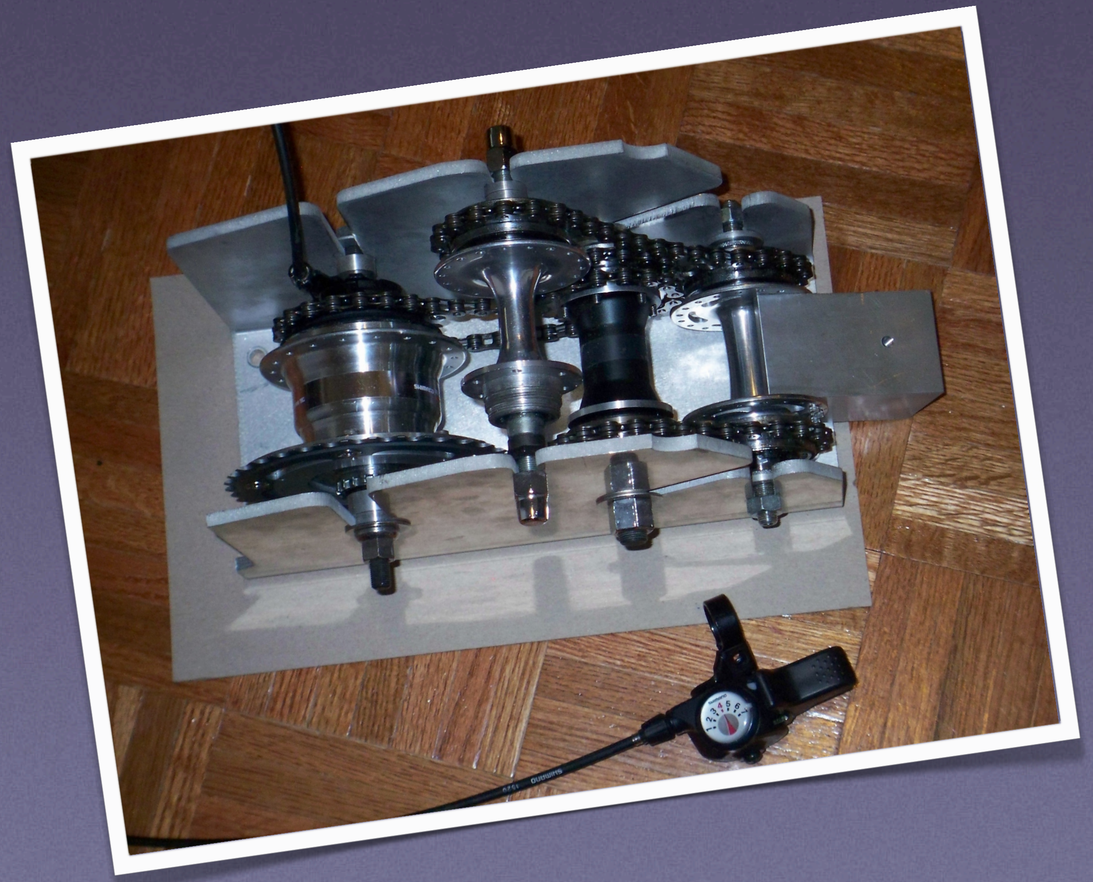
- US wheelchairs and scooters at $3.9B in 2009 are expected to grow to $7.9B by 2015
- 8% CAGR
- Wheelchairs replaced every 3-5 years, making total US annual unit sales ~1MM

| Addressable Categories | Unit Sales (2009) | Average MSRP |
|---|---|---|
| **Manual Wheelchairs** | | |
| Lightweight | 207,863 | $1,850 |
| Ultra-Lightweight | 103,932 | $4,000 |
| **Power Wheelchair** | | |
| Power Assisted Pushrim | 2,599 | $5,000 |
| Lightweight Indoor Use | 25,983 | $3,000 |
| Indoor Use & Light Outdoor Use | 51,965 | $4,000 |
| Active Indoor & Outdoor Use | 51,965 | $5,000 |
| Electric Powered Scooter | 181,880 | $2,000 |
| **Institutional** | 90,940 | $3,000 |
| | **717,127** | |


Customer
Physician's exam
Physician's product recommendation
Notice of medical justification
Prescription
DME fitting
Order form
DME issues RFQ to OEM
DME applies reimbursement
Yes
DME orders from OEM
Partial
No
All before ordering, 4-6 month total lead time


Wheelsmith
Low Key
SPEEDPLAY
0-40

1. How we design
2. **How we build**
3. Discussion: challenging convention

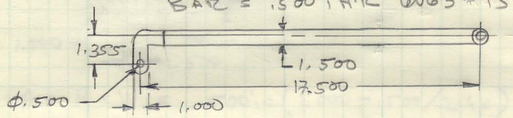




# TRIKE DRIVE SYSTEM LOAD CALC'S

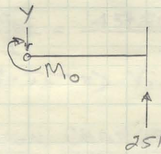
## ① HANDLE CALC'S

ASSUME : 100 lbf PROPULSIVE FORCE
25 lbf STEERING FORCE
TUBING = 3/4 x 1 1/2 x .125 WT 6063-T5
BAR = .500 THK 6063-T5



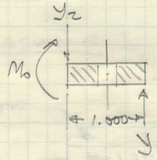


$\Sigma F_x = 0 = X - 100 \Rightarrow X = 100$ lbf.




$\Sigma F_y = 0 = y - 25 \Rightarrow y = 25$ lbf.

$\Sigma m = 0 = M_o - (17.500\text{in})(25\text{lbf}) \Rightarrow M_o = 437.50$ in-lbf.




$\Sigma F_y = 0 = Y_1 - Y_2 \Rightarrow Y_1 = Y_2$


STEAKS BEEF
RIBS
SPARERIBS
AGED TENDER BEEF
BONELESS
CHOPS
PORK
$5.99
$2.77
$1.97
$3.77
HFD
FIRE


Hall C
Halls D, E
Carpark 4
Marriott


ROTA
MOBILITY


Pre-Registered
Visitor
Kinko's
Hall A
Arena, Carpark 1
Meeting Rooms
Anaheim Ballroom
Level
C500
ROTA
MOBILITY


ROTA
MOBILITY


ABILITIES
EXPO
If it's not FUN
it's a risk.


ROTA
MOBILITY

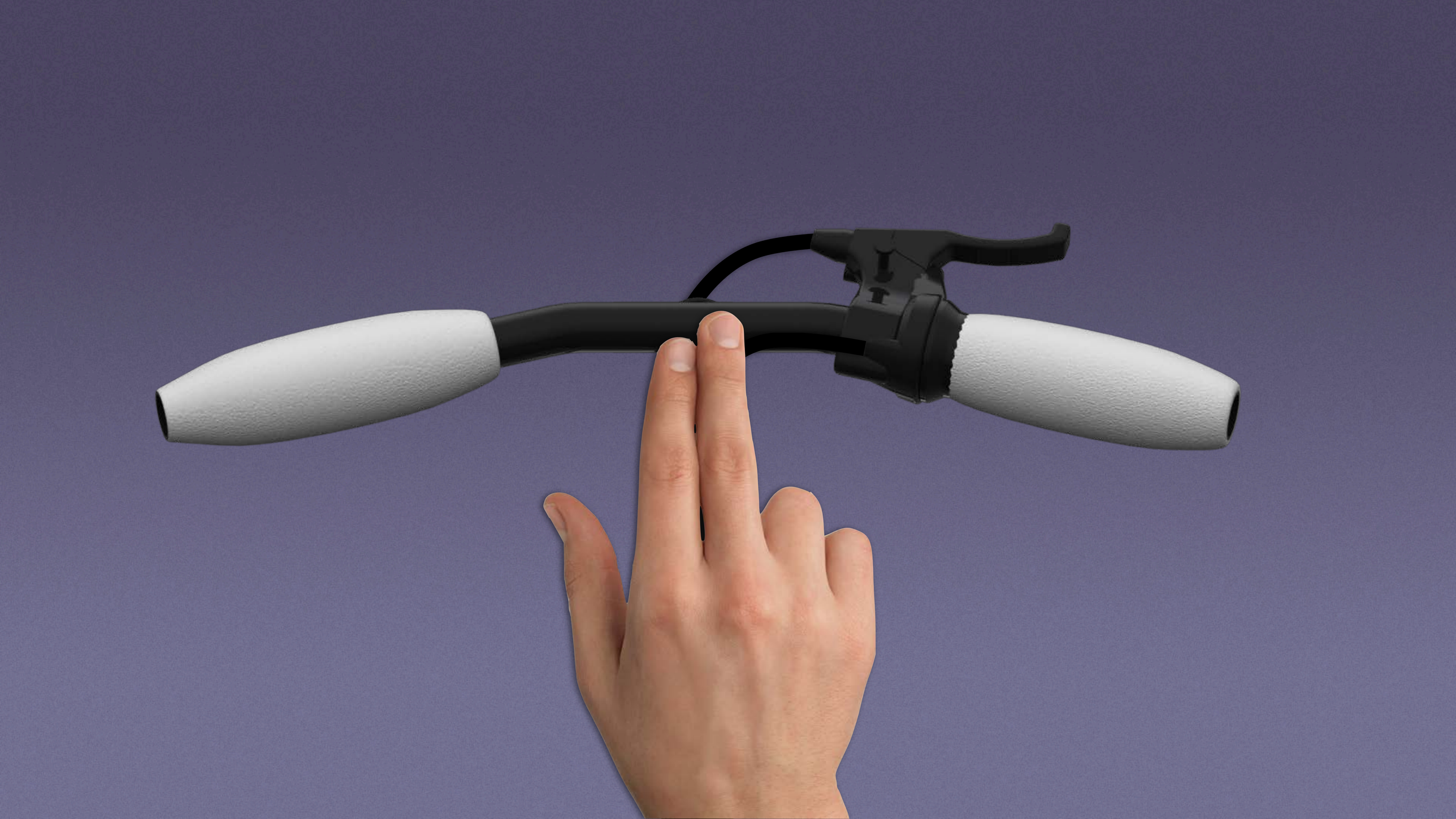

AISLE
800
AISLE
600
ROTA
MOBILITY


MacBook Pro

## RoTrike™

## RoChair™

## RoScooter™

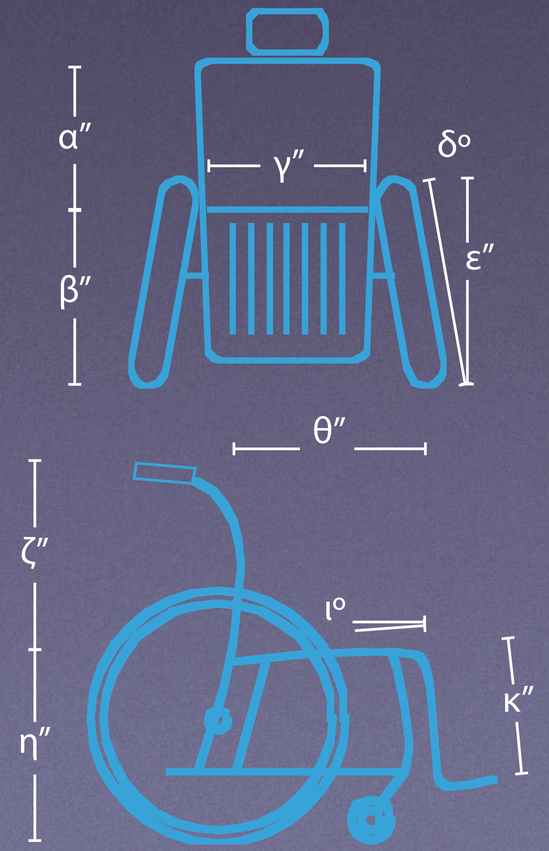


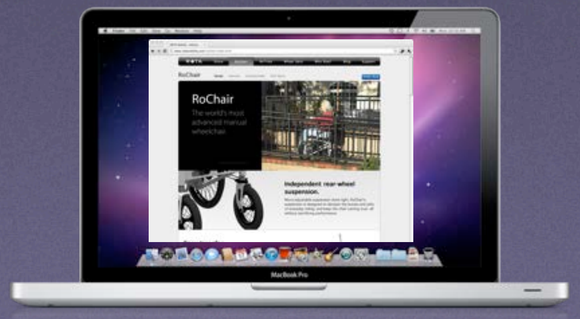
Transferring

On the flat

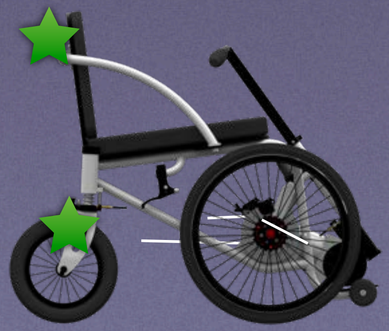
Going uphill

Going downhill

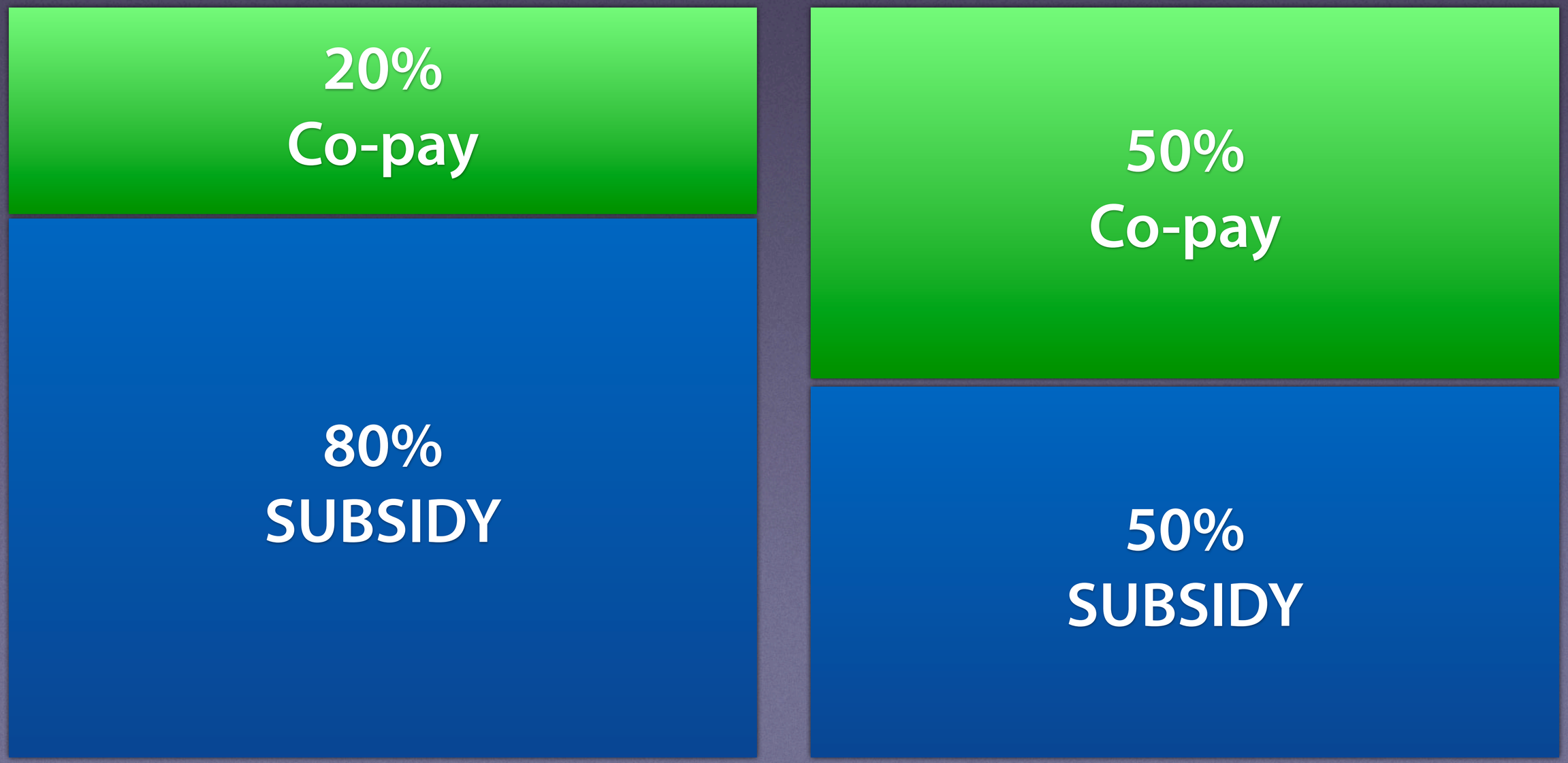

α″
β″
γ″
δ°
ε″
θ″
ζ″
η″
ι°
κ″


RoChair
The world's most advanced manual wheelchair.
Independent rear wheel suspension.
MacBook Pro

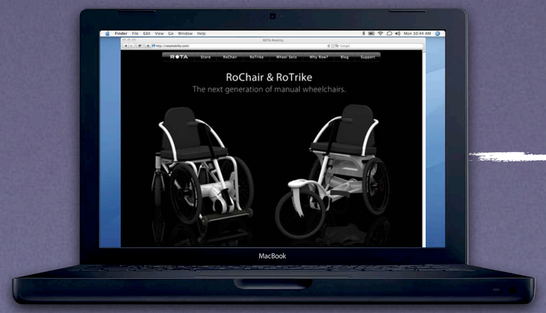

ϙ

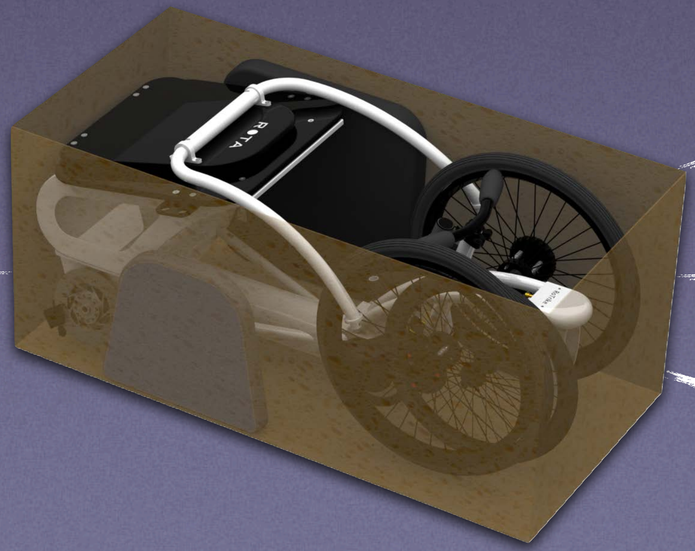


1. How we design
2. How we build
3. **Discussion: challenging convention**


TODAY
20%
Co-pay
80%
SUBSIDY
TOMORROW
50%
Co-pay
50%
SUBSIDY

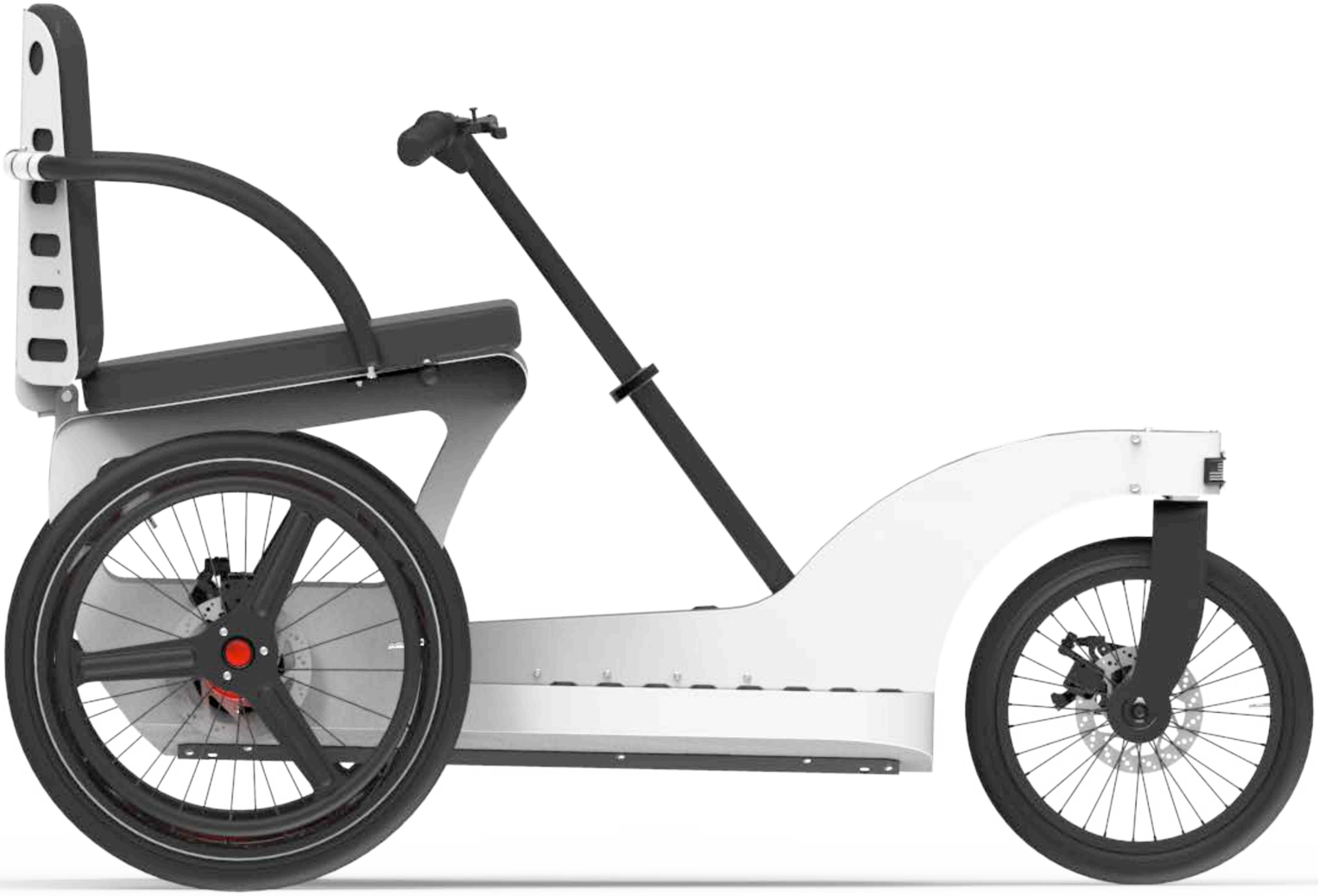
# ROTA'S RETAIL PRICE = Co-pay





ROTA




RoTrike


RoChair


RoScooter

ROTA
MOBILITY

www.rotamobility.com