



# Issues of Human Interface design

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# Sydney Barta

An Elite Athlete, who happens to have an amputation



# Contact Lenses



# Contact lenses

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- ✦ Comfort
  - ✦ Change
- ✦ Function
- ✦ Cosmesis
- ✦ Cost
- ✦ Cool

# WHAT IS COMFORT?

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- ❖ When you forget you are wearing something at all...

# FootLess Jo

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# Comfort

- ✱ What makes something comfortable?  
*UN-*
- ✱ Fluid dynamics, what happens when you add pressure to tissue?



# Comfort

- ✱ Transference of pressure
- ✱ No “noxious” stimuli (noise, vibration etc)
- ✱ Heat
- ✱ Nuisance factor
  - ✱ easy to put on and take off
  - ✱ not too bulky
- ✱ Weight
- ✱ Sensitivity of skin or nerve

# Comfort is elusive

- ✿ What may be “comfortable” one minute may not be the next.....

# This is Jessica



- ✿ Traumatic below the knee amputation



# Change

- ✿ Physical Change
  - ✿ Weight loss or gain
  - ✿ Daily fluid changes
  - ✿ Growth
  - ✿ Cyclical changes/ Pregnancy
- ✿ Other Changes

How much pressure can human tissue tolerate?



# funCtion

- Is it a device that reliably does what it is intended to do?

# funCtion

Is there a device that can do everything?











bionic







# Journal of NeuroEngineering and Rehabilitation

Case-study of a user-driven prosthetic arm design: bionic hand versus customized body-powered technology in a highly demanding work environment

Research and development of functional prostheses may want to focus on body-powered technology as it already performs on manually demanding and heavy jobs whereas **eliminating myoelectric technology's constraints seems out of reach**. Relevant testing could be developed to help expediting this.

Myoelectric and cosmetic arm improvement may benefit from a less forgiving focus on perfecting anthropomorphic appearance.

It is hard when the expectation of the user is greater than the design can provide.





# Cosmesis

**What is cosmetic?**



# Cosmesis

- ✻ How do we perceive ourselves?
- ✻ How do changes to our body affect our perception of cosmesis?







This is Jane

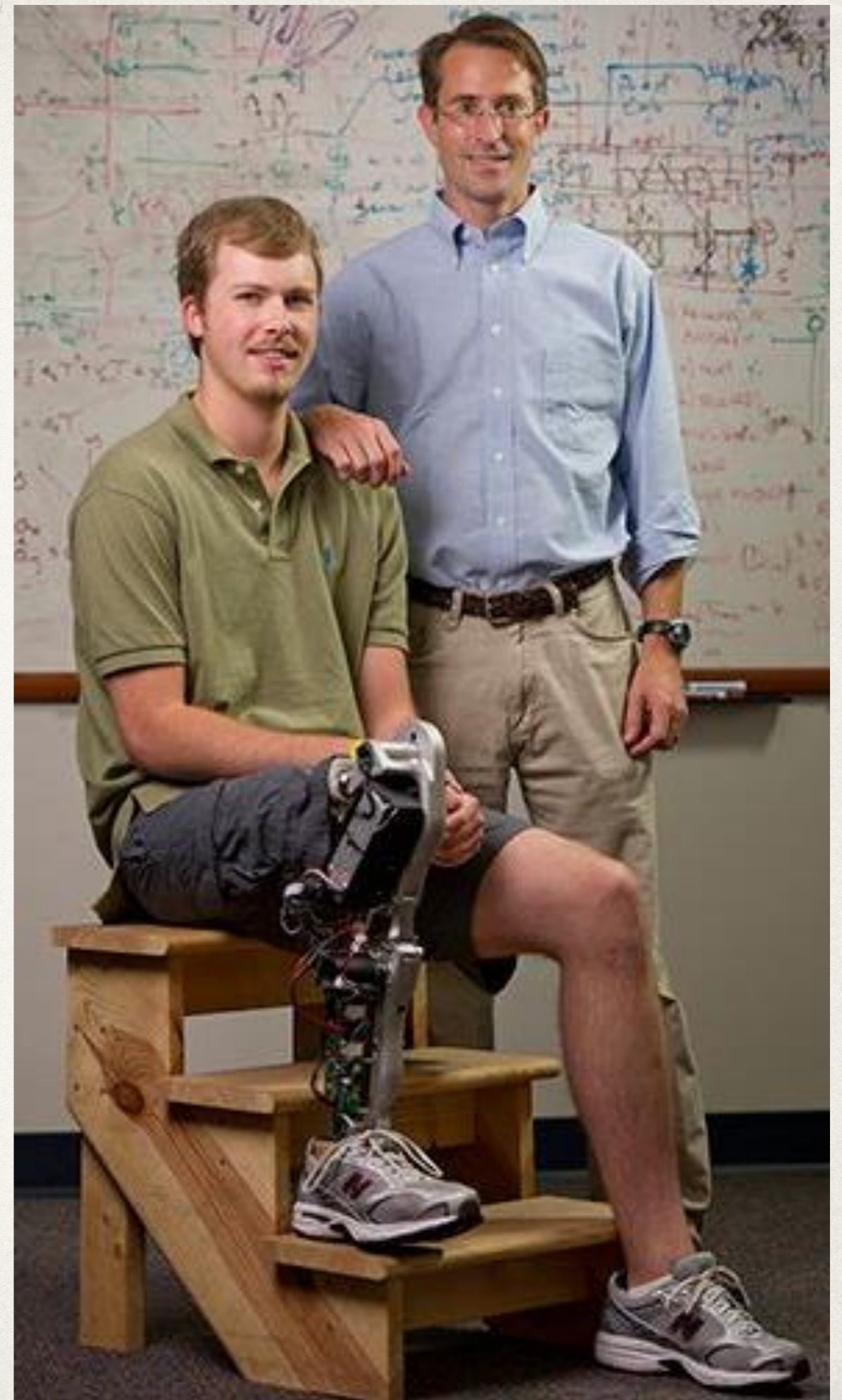




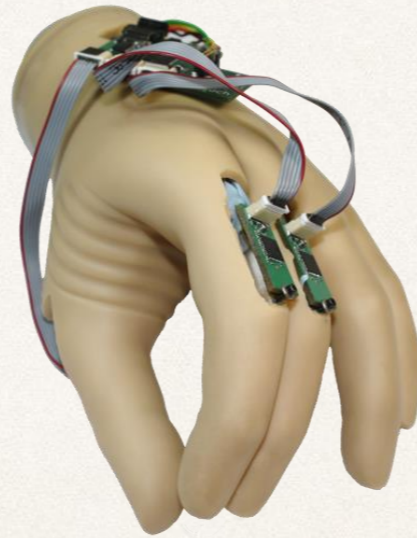


# Cost

- What is it worth to the consumer and...
- If it costs way more than standard care, does it provide a proportional improvement in comfort, function, cosmesis?



# What does a prosthesis cost AND what do we get paid?





cool



# Contact lenses

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# Contact Lenses

CONTACT LENS	POWER (SPH) RANGE	BASECURVE	DIAMETER	MATERIAL	WATER
1 Day Acuvue Define	Plano to -9.00	8.5	14.2	Etafilcon A	58%
1 Day Acuvue Moist for Astigmatism	+4.00 to -9.00	8.5	14.5	Etafilcon A	58%
1 Day Acuvue Moist Multifocal	+6.00 to -12.00	8.4	14.3	Etafilcon A	58%
1 Day Acuvue Moist	+6.00 to -12.00	8.5, 9.0	14.2	Etafilcon A	58%
1 Day Acuvue Trueye	+6.00 to -12.00	8.5, 9.0	14.2	Narafilcon A	46%
Acuvue 2	+8.00 to -12.00	8.3, 8.7	14.0	Etafilcon A	58%
Acuvue 2 Colours Enhancers	+6.00 to -9.00	8.3, 8.7	14.0	Etafilcon A	52%
Acuvue 2 Colours Opaques	+6.00 to -9.00	8.3	14.0	Etafilcon A	52%
Acuvue Advance	+8.00 to -12.00	8.3, 8.7	14.0	Galyfilcon A	47%
Acuvue Advance for Astigmatism	+6.00 to -9.00	8.6	14.5	Galyfilcon A	47%
Acuvue Bifocal	+6.00 to -9.00	8.5	14.2	Etafilcon A	58%
Acuvue Oasys	+8.00 to -12.00	8.4, 8.8	14.0	Senofilcon A	38%
Acuvue Oasys 1 Day	+8.00 to -12.00	8.5, 9.0	14.3	Senofilcon A	38%
Acuvue Oasys for Astigmatism	+6.00 to -9.00	8.6	14.5	Senofilcon A	38%
Acuvue Oasys Presbyopia	+6.00 to -9.00	8.4	14.3	Senofilcon A	38%
Acuvue Vita	+8.00 to -12.00	8.4, 8.8	14.0	Senofilcon A	41%
Air Optix Aqua	+6.00 to -10.00	8.6	14.2	Lotrafilcon B	33%
Air Optix Aqua Multifocal	+6.00 to -10.00	8.6	14.2	Lotrafilcon B	33%
Air Optix Colors	0.00 to -8.00	8.6	14.2	Lotrafilcon B	33%
Air Optix for Astigmatism	+6.00 to -10.00	8.7	14.5	Lotrafilcon B	33%
Air Optix Night & Day Aqua	+6.00 to -10.00	8.4, 8.6	13.8	Lotrafilcon A	24%
Avaira	+8.00 to -12.00	8.4, 8.5	14.2	Enfilcon A	46%
Avaira Toric	+6.00 to -10.00	8.5	14.5	Enfilcon A	46%
Biofinity	+8.00 to -12.00	8.6	14.0	Comfilcon A	48%
Biofinity Multifocal	+6.00 to -10.00	8.6	14.0	Comfilcon A	48%
Biofinity Toric	+8.00 to -10.00	8.7	14.5	Comfilcon A	48%
Biofinity XR	+8.00 to -20.00	8.6	14.0	Comfilcon A	48%
Biomedics 1 Day Extra	+6.00 to -10.00	8.6, 8.8	14.2	Ocufilcon D	55%
Biomedics 1 Day Extra Toric	0.00 to -10.00	8.7	14.5	Ocufilcon D	55%

# 2.1M people with limb loss in the US today

- ✿ We would need at least 2 million off the shelf sizes and shapes to be able to make provide these in a pre-fabricated manner.



[www.vendalimb.com](http://www.vendalimb.com)

Adult leg: £99.99  
Child leg: £69.99

Fitting service available  
see  
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for details

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BUY ONLINE  
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Service -



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# How to make a prosthesis



# Sydney Barta

“Takes a long time to make a prosthesis”





# Total Contact / Total Surface Bearing

❖ Predicting change



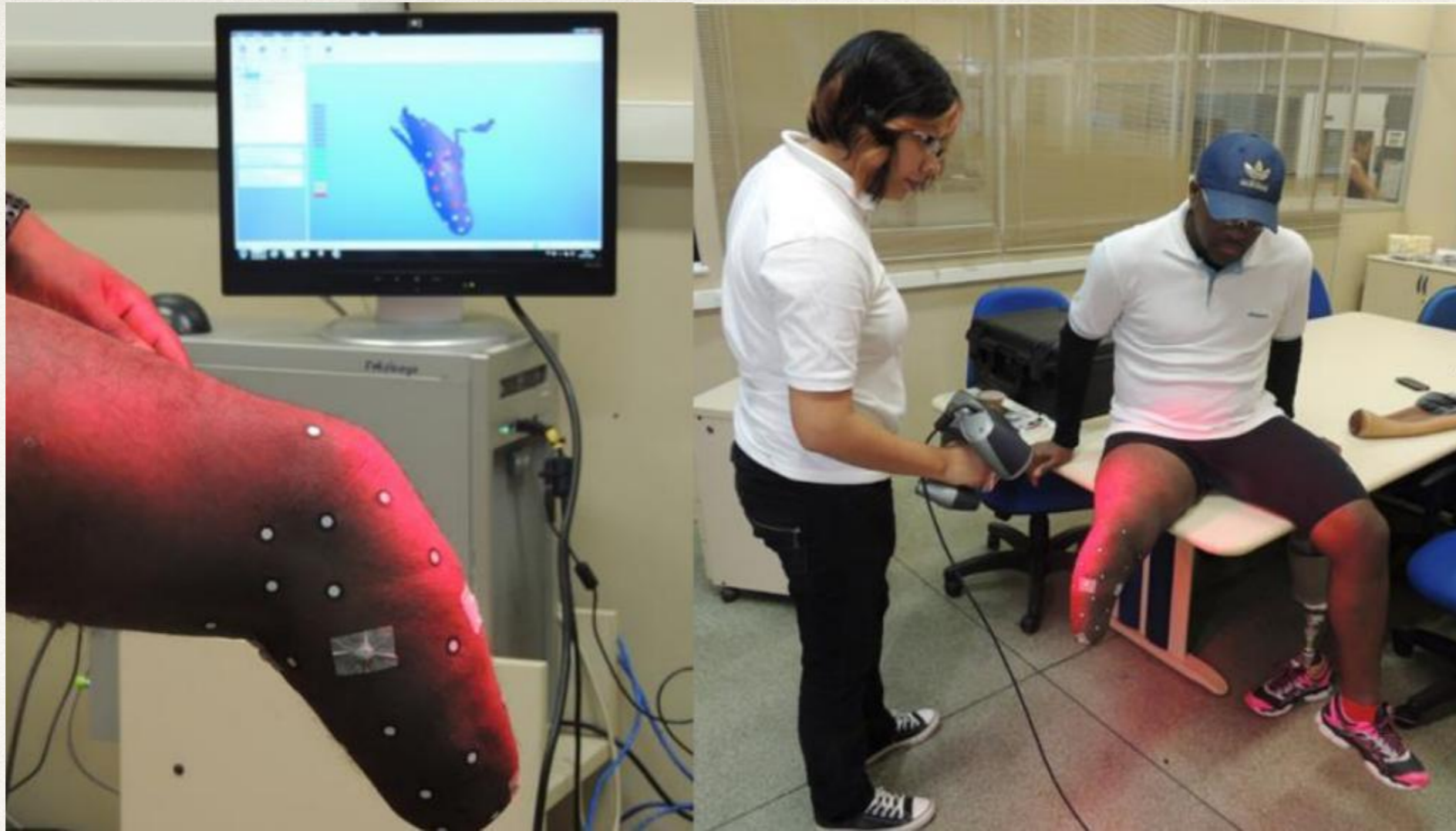
✿ Just because we CAN, doesn't mean we  
SHOULD



This is Riley







I give you permission to be skeptical  
with your optimism

You can't start with the technology and try to figure out where you're going to try to sell it.

Steve Jobs





Human?

