

# **6.S196 / PPAT: Principles and Practice of Assistive Technology**

Today: Project Follow-up Opportunities

Monday, 12 December 2011

## Follow-up Opportunities

- What remains to be done?
  - Creating a functional device for your client
  - Scaling up your solution so that it can benefit more people
  - Creating assistive devices for other people with disabilities
  - Addressing the gap between needed and available assistive technology

## Outline

- Opportunities at MIT
  - IDEAS Global Challenge, Public Service Center, MIT100K
- Disseminating your work
  - External competitions
  - Funding opportunities
- Aspiration: making useful AT widely available (affordable/accessible)
  - Assistive technology economics

## MIT IDEAS Global Challenge



- Identify problems and propose solutions to pressing global problems
- Focus on innovation and feasibility of idea
- Receive seed funding, mentorship, and publicity opportunities
- Many successful assistive technology teams in the past

## MIT IDEAS Global Challenge: Process

1. Submit "Initial Scope Statement" (next deadline: 25 January 2012)
  - Can include "Development Grant Request"
2. Receive feedback from Public Service Center and alumni volunteers
3. If invited, submit formal proposal (due April 8, 2012)
4. Judging through interviews (in-person and telephone) and showcase (May 2012)
5. Awards ceremony (May 2012)
6. Winners Retreat (June 2012)
7. Implementation (June 2012-May 2013)

## MIT IDEAS Global Challenge: Elements of Successful Proposals

1. A well-articulated need
2. A feasible approach to addressing the need
3. A team with the skills to solve the problem
4. A partner organization

# THE NEED

Smartphone accessibility for people with fine motor impairments



# THE IDEA



## OUR WORK

**Partner** with Leonard Florence Center



Leonard Florence CENTER FOR LIVING



**Demonstrate** daily use: Residents with different motor skills will use the device to access building control system

**Design** : Iterative feedback from end users and early adopters with ALS and MS



**Collaborate** with ALS/MS groups, vendors, and assisted living facilities.

## MIT IDEAS Global Challenge: Elements of Successful Proposals

- 1. Need:** Unlocking smartphones for people with fine-motor impairments
- 2. Idea:** Enabling USB-based switch/mouse access
- 3. Team:** MechE/CS/business/policy students
- 4. Partner:** Leonard Florence Center

## MIT IDEAS Global Challenge: Past AT Winners



Leveraged Freedom Chair  
(2008)



6dot Braille Labeler (2009)



Smartphone Universal Access  
Hub (2011)

## MIT IDEAS Global Challenge: Awards

- Cash awards of \$5,000-\$10,000
- 2011: 20 awards totaling \$145,000
  - 8 x \$10K
  - 2 x \$7.5K
  - 10 x \$5K
- Contact:
  - <http://globalchallenge.mit.edu>
  - Kate Mytty, W20-549, [kmytty@mit.edu](mailto:kmytty@mit.edu)

## MIT Public Service Center: Other Funding Opportunities

- Travel/Materials Grants: can cover expenses for prototyping
- Service Fellowships (for working with particular community organizations)
- More information:
  - <http://web.mit.edu/mitpsc/>
  - <http://web.mit.edu/mitpsc/whatwedo/grants/>

## Entrepreneurship: MIT100K

- Business Plan Contest:
  - Timeline: February-May 2011
- Stronger focus on business model
- Can enter both the IDEAS Global Challenge and MIT100K
- More Information:
  - <http://mit100k.org/>

## External Opportunities: Design Competitions

Competition	Due Date	Submission Requirements
ASME Undergraduate Design Competition in Rehab/Assistive Devices	13 January 2012	<a href="http://www.asmeconferences.org/SBC2012/UndergraduateCompetition.cfm">www.asmeconferences.org/SBC2012/UndergraduateCompetition.cfm</a>
Microsoft Web Accessibility Challenge	4 February 2012	<a href="http://www.w4a.info/2012/submissions/challenge">http://www.w4a.info/2012/submissions/challenge</a>
Ability One Network Design Challenge (to help people with disabilities overcome barriers to employment)	20 April 2012	<a href="http://www.instituteforempowerment.org/design-challenge">http://www.instituteforempowerment.org/design-challenge</a>
Rehabilitation Engineering Society of North America (RESNA)	4 May 2012	<a href="http://aac-rerc.psu.edu/wordpressmu/RESNA-SDC/">aac-rerc.psu.edu/wordpressmu/RESNA-SDC/</a>
ACM SIGACCESS Conference on Computers and Accessibility (ASSETS)	29 June 2012	<a href="http://www.sigaccess.org/assets12/">www.sigaccess.org/assets12/</a>

## External Opportunities: Student Design Competitions

Competition	Due Date	Submission Requirements
IEEE Presidents' Change the World Competition	31 January 2012	<a href="http://www.ieeechangetheworld.org">www.ieeechangetheworld.org</a>
NCIA BMEidea (undergrad/grad students); BMEStart (undergrad only)	6 April 2012; 11 May 2012	<a href="http://nciia.org/bmeidea">nciia.org/bmeidea</a> <a href="http://nciia.org/bmestart">nciia.org/bmestart</a>
IEEE Engineering in Medicine and Biology Society (EMBS)	1 June 2012	<a href="http://www.ieee.org/membership_services/membership/students/awards/eng_medicine_undergrad_design.html">www.ieee.org/membership_services/membership/students/awards/eng_medicine_undergrad_design.html</a>
da Vinci Awards for Accessibility and Universal Design	August 2012	<a href="http://www.davinciawards.org/">www.davinciawards.org/</a>



# MIT Assistive Technology Club



## **Current/Past Work**

- Receive requests and take on projects for low-cost, customized assistive devices
- Participate in IDEAS Global Challenge
- Guest speakers/field trips related to AT
- Mailing list: <http://bit.ly/atmit>
- <http://assistivetech.mit.edu>

Making Assistive Technology  
Widely Available  
(Affordable/Accessible)

# Assistive Technology Economics Beyond the Prototype

## Key Challenges

- Significant technical challenges
- Small market sizes (compared to mainstream consumer products)
- Financial limitations
  - Challenging employment prospects for people with disabilities
  - 2009 employment/population ratio: 19.2% (64.5% for rest of population) (Bureau of Labor Statistics)

## High Cost of AT



\$529



\$599



\$749

(cellphone not included)

12/12/2011

## High Cost of AT



**\$399**



**\$995**

(laptop not included)

12/12/2011

## High Cost of AT



**\$1658**

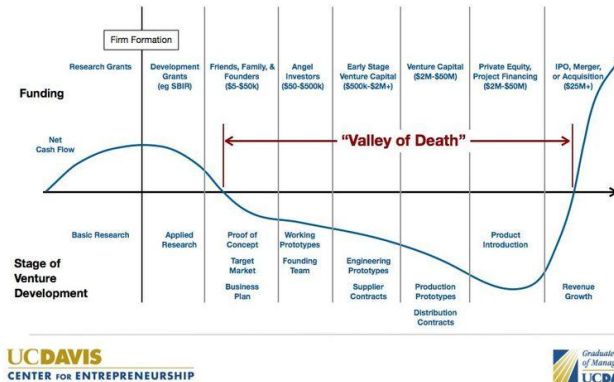


**\$7820**

12/12/2011

# Assistive Technology Economics

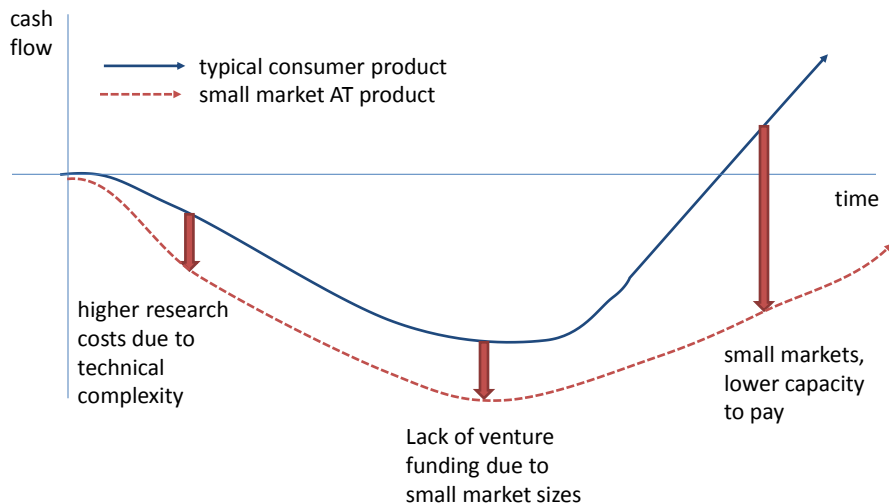
## Lifecycle of a venture



Credit: Andrew Hargadon, UC Davis

# Assistive Technology Economics

## The "Valley of Death"



# Assistive Technology as a Business

How do new AT products become successful in the marketplace?



## Raising Funds

- U.S. Small Business Innovation Research (SBIR) grants
- Angel investors
- New sources of funding, e.g. kickstarter.com



## Making Industry Connections

- Assistive Technology Industry Association (ATIA) Annual Conference
- Closing the Gap Annual Conference
- CSUN International Technology and Person with Disabilities Conference
  - Held annually in San Diego

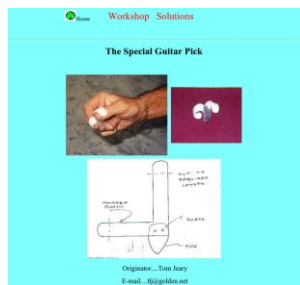
## Alternative Approaches

# Open-Source Models


- GitHub/Google Code/freeware models
- instructables.com
- Limitations for AT adoption?

# Volunteer Organizations

- Examples: MIT Assistive Technology Club, Tetra Society of North America, Remap UK, individual volunteers



## Social Enterprise

- Social and financial bottom lines
- Benetech  Bookshare
  - Problem: less than 5% of print materials are accessible to people with visual/reading disabilities
  - Mix of staff and volunteers scan, upload, and proofread books and make them accessible
  - Free for students; \$50/year otherwise

## Social Enterprise

- Social and financial bottom lines
- Apple iOS Accessibility
  - Why has Apple prioritized accessibility for blind people?
  - What implications exist for more open approaches (e.g. Android OS)?
  - Is there a quality of experience vs. customizability tradeoff in AT?





## Other Design Approaches

- Conventional technologies with assistive applications
  - Speech recognition, smartphones/tablets
- Universal design
  - Curb cuts, low-floor buses, slider-top resealable bags
- Limitations?

## “Situational Impairments”

- People experience impairments:
  - In poor environmental conditions, e.g. lighting, noise, distractions, extreme weather
  - While in motion
- Examples
  - Interacting with controls in a car
  - Typing on a phone while walking
  - Controlling a mouse while typing?
- Could devices be designed to be usable in these situations?

## Do-It-Yourself (DIY) Efforts



Hurst and Tobias, ASSETS 2011

- Could assistive technology users be empowered to create solutions for themselves?
- Increasing availability of rapid prototyping facilities and resources
  - 3D printing: Shapeways.com
  - Materials/Tools: Sugru, Arduino
  - Low barriers to software development?
- Limitations?
- Further reading: A. Hurst and J. Tobias, "Empowering Individuals with Do-It-Yourself Assistive Technology," ASSETS 2011

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## Beyond Design

- Design- and technology-savvy people are needed in:
  - AT training and education
  - Disability service/advocacy organizations
  - Clinical (OT/PT/SLP) roles
  - Social work
  - AT/disability public policy

## Takeaways

- Consider the IDEAS Global Challenge to carry on and scale up your work
- Sign up and contribute to the AT@MIT mailing list: <http://bit.ly/atmit>
- Share your work with others through design competitions and other venues
- Unsolved problems remain in making AT widely available, affordable, and accessible