NSF SBIR/STTR Programs
The Search for Transformational Technologies

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Faculty Development Needs for Adv Mfg in USA
Arlington, VA
January 9, 2014
Part of NSF that NEVER funds basic research

- You do not need a Ph.D. to apply
- You do not need years of experience in a field to apply
- You are expected to dream BIG, work HARD, and make a HUGE impact on the marketplace/society
- NOT just another funding mechanism for academic research – it requires a VERY different mindset
- You could help your students pursue this career path if it is the right path for them
- Be an advisor, NOT the majority owner!
Commercialization: A Rocky Road...

- University
- Small Business
- Industry
- Investors
- Foundations

Resources Invested:
- Discovery
- Development
- Commercialization

Innovation
Commercialization focused programs

- NSF overall
- NSF Eng. overall
- GOALI
- ERC
- PFI
- UCRC
- i-Corps
- SBIR | STTR

“Ditch” of death
Valley of death

Commercialization focused programs
• About $150M in equity-free grants (FY12)

• Provides early-stage funding to entrepreneurs for R&D on high-risk technologies with high potential for economic/societal benefits

• Selects proposals based on both Technical & Commercial Merit

• Proposal calls - once/6 months
Small Business Innovation Research (SBIR)  
Small Business Technology Transfer (STTR)  
http://www.nsf.gov/eng/iip/sbir/  (703) 292-8050

NSF SBIR/STTR Innovation Model

Phase IB  
Third-Party Investment + 1:2 NSF Matching (up to $30K)

CA

Phase IIB  
Third-Party Investment + 1:2 NSF Matching (up to $500K)

CA

Private Sector or Non-SBIR Investment

Phase I  
Feasibility Research  
SBIR - $150K/6 mos.  
STTR - $225K/6 mos.

Phase II  
Research towards Prototype  
$750K/24 mos.

PHASE III  
Product Development to Commercial Market

Federal Investment

Taxes

CA: Commercialization Assistance
Demonstrate a steadfast commitment to commercialization of your technology

Could receive in excess of $1M equity-free grant in 2 phases

By the NUMBERS
• Median age of companies ~ 3 years
• Median no. of employees ~ 4
• Companies having no employees with a PhD degree ~ 25%
• Companies receiving Phase II award for the first time: 70%
SBIR Program Outcomes
Internal NSF Phase II Commercialization Tracking Study
Dr. George Vermont

- 40% of the companies successful
  - Successful product/technology launch into the marketplace
    - 60% if a major company intimately involved

- 9:1 ROI
  - Sizeable acquisitions leverage this number significantly.
  - Company or technology acquired within 12 years (50%).

- Academia is a major source of the successful projects.
  - Estimated that over 50% of the successes have academic roots in a faculty member and/or Ph.D. thesis.
Levant Power introduces the world’s most advanced fully active, regenerative suspension system for autos and trucks. GenShock technology virtually eliminates the perception of road bumps while enabling unprecedented handling. A ride unlike anything you’ve ever experienced.

Video coming soon +
140M tall inland wind towers

Onsite tapered welding

Current SBIR Grantee

~5 employees

http://keystonetowersystems.com/
Current SBIR Grantee

http://www.mangomaterials.com/
Current SBIR Grantee

**BENEFITS OF IMAGING WITH THE TAG LENS**
- Instantaneous high depth of field
- Simultaneous z-stacking of multiple focal planes
- Alleviates the need for motorized z-stages or mechanically moving parts

**MANUFACTURING & INDUSTRIAL APPLICATIONS**

**BENEFITS OF THE TAG LENS**
- Increases depth of fields for beam delivery systems
- Removes the need for surface mapping or mechanical z-stages
- Ultra fast variable focus lens can speed up manufacturing processes

http://tag-optics.com/
Richmond, CA ◊ eksobionics.com

Robotic Orthotics to Augment Human Mobility & Capabilities

◊ Powered exoskeleton - enabling patients with limited mobility to sit, stand, and walk on their own.

◊ Helps Stroke or Spinal Cord Injury patients

◊ Deployed in 30 rehabilitation centers worldwide

http://www.eksobionics.com/
Risk-Averse Culture Infects U.S. Workers, Entrepreneurs
Updated June 2, 2013

Playing It Safe
Even before the recent recession, entrepreneurship was declining.

A smaller share of U.S. businesses are new companies...
Share of companies founded in past five years

The startup rate is falling...
Share of private companies less than one year old

...a declining share of venture capital is going to seed new firms...

...and the share of the labor force working at new companies has fallen.
Share of workers at young firms

Workers and companies grew more cautious, too.

Migration rates have been falling for more than 20 years...
Movers as a share of the U.S. population, one year of age and older

...fewer workers are quitting their jobs...
Quits measured as a share of the employed*

...and companies are keeping more cash on hand.
Cash and liquid assets as a share of total assets at nonfinancial corporations

*No data before 2000

...adults are changing jobs less often.
Job tenure of those 20 years and older

Sources: Commerce Department's Business Dynamics Statistics (young firms and their workers, startup rates, job creation); Pricewaterhouse Coopers/National Venture Capital Association (seed money, investment by region); Census Bureau (migration); Labor Department (job tenure, quit rates); Federal Reserve (corporate cash)
Traditional approach…..

- Slow
- Innovations on the shelf…?
- Generation of employment?
Time for new approaches......

- Grow by other faster means
- Bring innovations to the marketplace
- Generate employment
Challenges for small businesses:

- Slow processing technology (making an entry in commercial aerospace industry ~25 years’ effort!)

- Hobbyist printers inexpensive but commercial printers are expensive

- Limited feed materials

- Unclear when small businesses will be able to participate in the marketplace to deliver the promise

Coat hangers/smart phone cases/ head phones/ nutritionally enhanced foods......Body parts...... qualified parts for large companies

Factory Workers → Craft-persons with global connectivity
Manufacturing for Emerging Markets

- Meet basic customer needs
- Affordable
- Priced right
- May have societal benefits

**Staggeringly huge markets**

- $69 Refrigerator
- $2K Car
- $35 tablet
Promethean Power Systems

Current SBIR Grantee

<20 employees

http://www.coolectrica.com/

10 BILLION
US Dollars worth of perishable food items that spoil each year in India because of unreliable refrigeration.

102 MILLION
Gallons of milk produced by rural Indian farmers each year.

4
Hours it takes for bacteria growth to spoil unrefrigerated milk.

400 MILLION
Indians without access to reliable power.

Potential 30% increase in output
$22 Cooking Stove

87% Emissions
65% Fuel
100,000T CO2

Sold 50K [$600K]

http://greenwaygrameen.com/

875,000 deaths/year