Advanced Manufacturing Challenges
A Small Business Perspective

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**Academic Partnerships**
- Grant Opportunities for Academic Liaison with Industry (GOALI)
- Industry/University Cooperative Research Centers (I/UCRC)
- Innovation Cluster
- Partnerships for Innovation
- I-Corps

**Small Business Partnerships**
- Nanotechnology, Advanced Materials & Manufacturing
- Biotechnology and Chemical Technologies
- Electronics, Information & Communication Technologies
- Education Applications
- I-Corps
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
*No data before 2000

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

Fewer new jobs are being created...
New jobs as a share of private employment

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

Sources: Commerce Department’s Business Dynamics Statistics (young firms and their workers, startup rates, job quits); PricewaterhouseCoopers/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
3D Printing – Changing the way we make things

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
• I/UCRCs can focus on challenges for small businesses
  • More versatile feedstock for the same printer
  • Higher speeds
  • Lower cost commercial printers

• Help cluster small/large businesses to accelerate relevant technology developments

• SBIR supplement
Manufacturing for Emerging Markets

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

Staggeringly huge markets

$69 Refrigerator
$2K Car
$35 tablet
Current SBIR Grantee

<20 employees

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.

10
Collection sites using Promethean Power System’s rapid milk chilling solution developed with NI products.

Potential 30%↑ in output
$22 Cooking Stove

87% Emissions
65% Fuel
100,000T CO2

875,000 deaths/year

Greenway
Distributor
Mom n' Pop Shops
Consumers

Sold 50K [$600K]

Hi-Z Technologies, Inc

Thermoelectric Materials - Devices - Systems
<20 employees
Help small advanced manufacturing companies to enter emerging markets

International I/UCRCs
- Clustering small US businesses
- Clustering small/large US businesses
- Clustering small US/small non-US businesses
- Clustering small US/Large non-US businesses
Moderated Discussion

• Identify the research and technology issues with respect to the current state-of-the-art

• Explore opportunities to bring together multiple I/UCRCs with unique strengths and groups of companies to form a cluster

• Key considerations and issues in having multiple I/UCRCs work together