Innovation and US-based Manufacturing

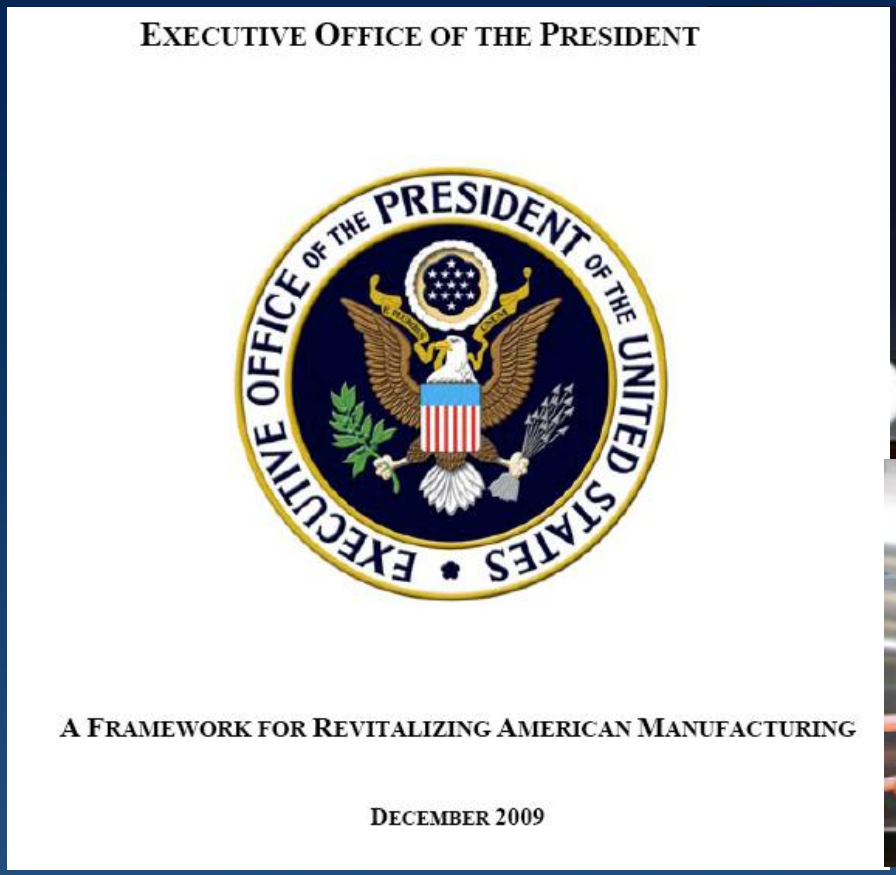
Sridhar Kota

Assistant Director for Advanced Manufacturing

The White House Office of Science & Technology Policy

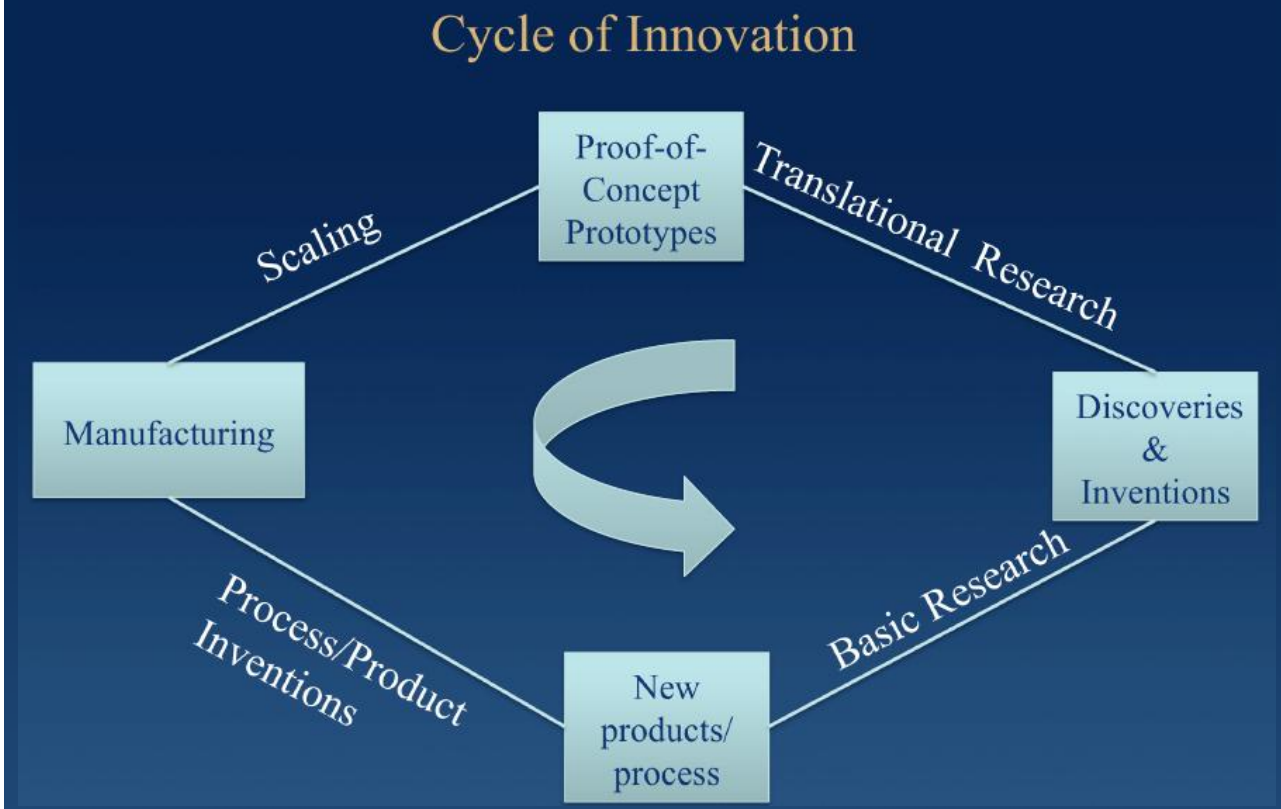
Opening Remarks at "Building a U.S. Battery Industry for Electric Drive Vehicles: Progress, Challenges and Opportunities" Symposium Organized by the National Academy of Sciences in cooperation with The Michigan Economic Development Corporation, 26-27 July 2010

Revitalizing American Manufacturing



"This is about more than building a new factory. It's about building a better future for this city, for this state, and for this country." – President Obama, July 15, 2010

Manufacturing Commons



Manufacturing Commons – Engineering R&D, materials, standards, tools, equipment, scalable processes, components, and manufacturing competencies in platform technologies needed to produce cost-effective, safe and reliable products (in the U.S).

Pisano& Shih, Restoring American Competitiveness, HBR July 2009 – Industrial Commons

Without the Commons we cannot manufacture, then we lose our ability to innovate next generation products.

How do we create new industries?
How can we grow and sustain existing industries?

Essential Elements to Create *New* Industries

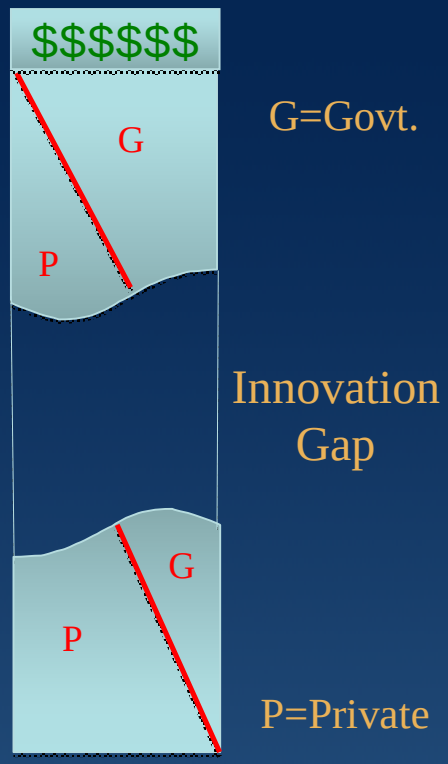
A. Innovation - Radical Technological Innovation

1.Scientific Discoveries -- (traditionally) Federal R&D

1.Early Stage Technology Development / Translation Research
Prototype testing, and component engineering.

2.Scaling / Pilot Production
Systems engineering - performance, safety, cost & reliability. Manufacturing process scale-up, yield, and automation.

4.Manufacturing and Commercialization – Industrial R&D



B. Early Adoption

C. Access to Capital

Essential Elements to Grow and Sustain *Existing* Industries

A. Technology Innovation
   - Incremental and Radical Innovations

B. Business Innovation
   - Adjacent markets and adjacent products

C. Tools and Resources
   - Skilled workforce at all levels
   - Tools to improve quality, mfg flexibility, reduce costs and timing
     Modeling and Simulation, Process control, Automation, etc.

D. Reduce structural non-production costs
   - Taxes, benefits, energy, pollution abatement, etc.

Revitalizing American Manufacturing

The document identified seven principles to strengthen our manufacturing base and addresses various cost drivers such as labor, access to markets, regulation and taxes, technology and business practices.

Technology Investments-2011 budget examples

- Increase in NSF, 6.1 and 6.2 budgets
- NIST-TIP to $150 million by 2015
- $12M for University-Innovation centers (NSF)
- $10M additional for nano-manufacturing
- $20M additional for NIST-TIP
- $300 million for ARPA-E

Business Investments

- Provide access to capital: DOE 1703 and 1705 loan guarantees
- Ensure access to capital for exporters
- 1603 cash grants in lieu of tax credits
- Section 48C manufacturing tax credit
- Adv. Vehicle Mfg Loan Program

Battery Technology

All the stars are now aligned as a result of Federal, State, & local government support, government-industry-universities partnerships.

The Obama Administration was quick to realize the significance of our energy security and made significant investments in R&D and in the Manufacturing Commons.

Examples include:

$ 2.4 billion in Recovery Act to establish manufacturing infrastructure

$ 4.5 billion in Smart Grid

An excerpt from OMB/OSTP directors' memo (July 21, 2010) to Federal agencies on Administration's S&T priorities for the FY 2012 budget

Prioritize R&D on advanced vehicle technologies, particularly modeling and simulation of lightweight materials and their manufacturing processes, batteries, and hybrid power trains; and systems integration and demonstration of advanced vehicle platforms.

Investments in Battery Technology

Federal investments/ programs:

DOE- EERE/ Vehicle Technology program

DOE- ARPA-E (BEEST etc.)

DOD- Electrification of Army's fleet of non-combat, tactical and combat vehicles

DOD-DOE Collaboration

Michigan investments:

"battery manufacturing capital"– Thanks to the leadership of the Governor, MEDC and the Michigan Congressional Delegation

Significant investments led to:

JCI, A123, Dow-Kokam, CPI -LG Chem, etc.

Ability to attract VC investments

Challenges and Opportunities Ahead

- Challenges
  - Cost, Performance, Safety, Life, and Manufacturing
- Opportunities to leap frog our competitors
  - Component level innovations:
    - Breakthroughs in new battery chemistries, new mfg processes etc.
  - Systems level innovations:
    - Vehicle architecture – batteries, composite structures, hybrid power trains, etc.
  - System of Systems level innovations:
    - Vehicle-to-Grid and Grid-to Vehicle integration
    - Integration of utility-scale batteries with renewable energy sources

Suggested Symposium Outcomes

1. What technological breakthroughs are needed for a sustainable plug-in hybrid and electric vehicle industry?

2. Identify specific public-private partnerships, business models and government policies that will enable the U.S to gain global manufacturing leadership in battery technologies.

3. How can the Federal government be more effective in its ongoing efforts to democratize and to accelerate innovation and further enhance prospects for battery industry growth in the U.S?

"Our goal has never been to create a government program, but rather to unleash private-sector growth" – President Obama, July 15, 2010