Advanced Manufacturing, Policy and Technology Opportunities for American Innovation

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“Our first priority is making America a magnet for new jobs and manufacturing.”

- President Barack Obama
February 12, 2013

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"Now is not the time to gut these job-creating investments in science and innovation. Now is the time to reach a level of research and development not seen since the height of the Space Race."

- President Barack Obama
February 12, 2013

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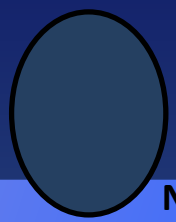
Adv. Mfg. Initiative Developments

7 Manufacturing Innovation Institutes Established (January 2013 – September 2015)



1st Institute! (Pilot)

America Makes Additive Manufacturing

Power Electr.

Digital & Design Mfg

Light-weight Metals

Advanced Composites Mfg

Integrated Photonics

Flexible Hybrid Electronics

Next Steps

Vision: 45 Institutes

2004 PCAST Rept.

2011 Ensuring American Leadership in Advanced Manufacturing

2012 Capturing Domestic Competitive Advantage in Advanced Manufacturing

NNMI Framework

IP Guidelines & Perf. Metrics

2014 AMP 2.0 Securing the

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Primary Recommendations from AMP SC

- 3 key areas / 16 recommendations for action
- Enabling innovation
  - improved coordination among industry, academia, and the government in R&D funding for cross-cutting technologies.
- Securing the talent pipeline
  - community college level education and enhancing advanced manufacturing university programs.
- Improving the business climate
  - tax reform, regulatory, trade, and energy policy.

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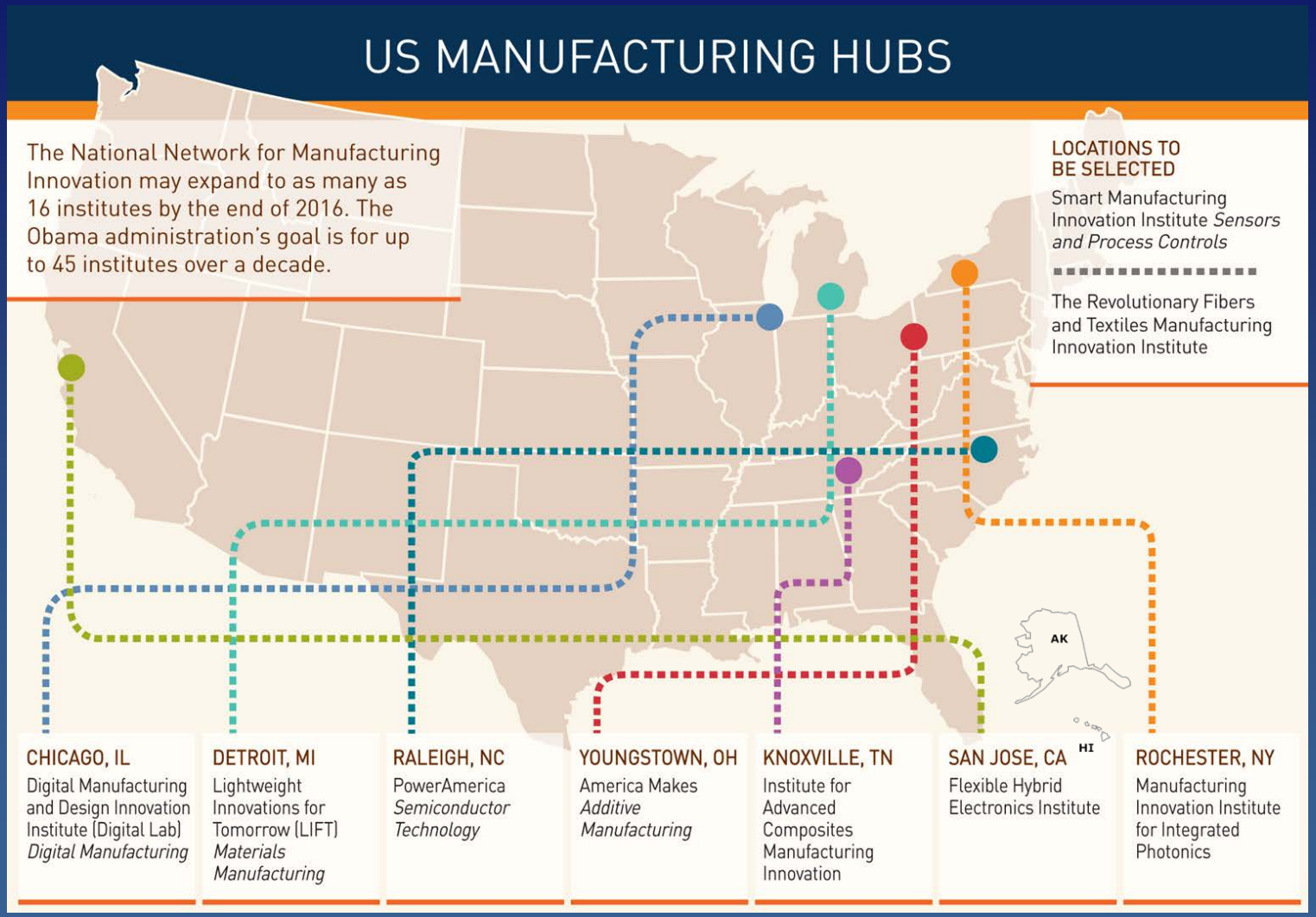
Interagency Collaboration
Advanced Manufacturing National Program Office

Executive Office of the President

Federal Agencies Supporting Manufacturing

Network Status

As of September 2015



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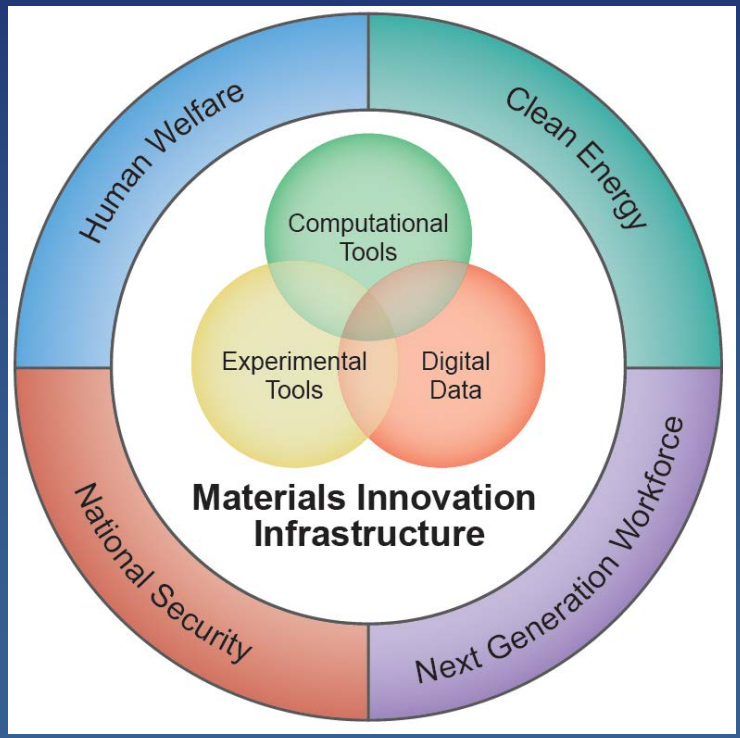
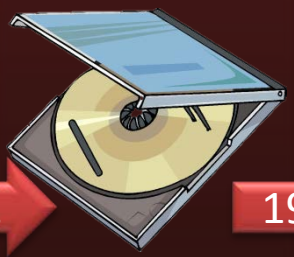
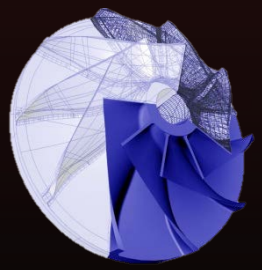
The Big Picture

- Some major initiatives
  - Robotics Initiative
  - Materials Genome Initiative
  - Big Data
- NNMI
  - Getting technology to SME's
  - New models for work force dev.
  - New models for equipment usage
  - IP issues
- MEP
- Infrastructure
- HPC
- Cloud / Connectivity
- Trillions



TIME

	Analog	Digital	Compressed	Distributed
1D: Sound		1982 	1991 	201x 
2D: Image		 1987  1992	 201x	
3D: Volume			 201x	New volume representation and compression technology
	BREP, CSG, Triangular mesh	Voxel model		Cloud computing, Parallel processing, GPGPU

Research goal

Design Iterations Are Expensive

1959 Chevrolet Bel Air vs. 2009 Chevrolet Malibu

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Interaction with Real Humans

Source DLR, Institute of Robotics and Mechatronics

Coordinated Robotics

Courtesy of Professor Vijay Kumar, University of Pennsylvania

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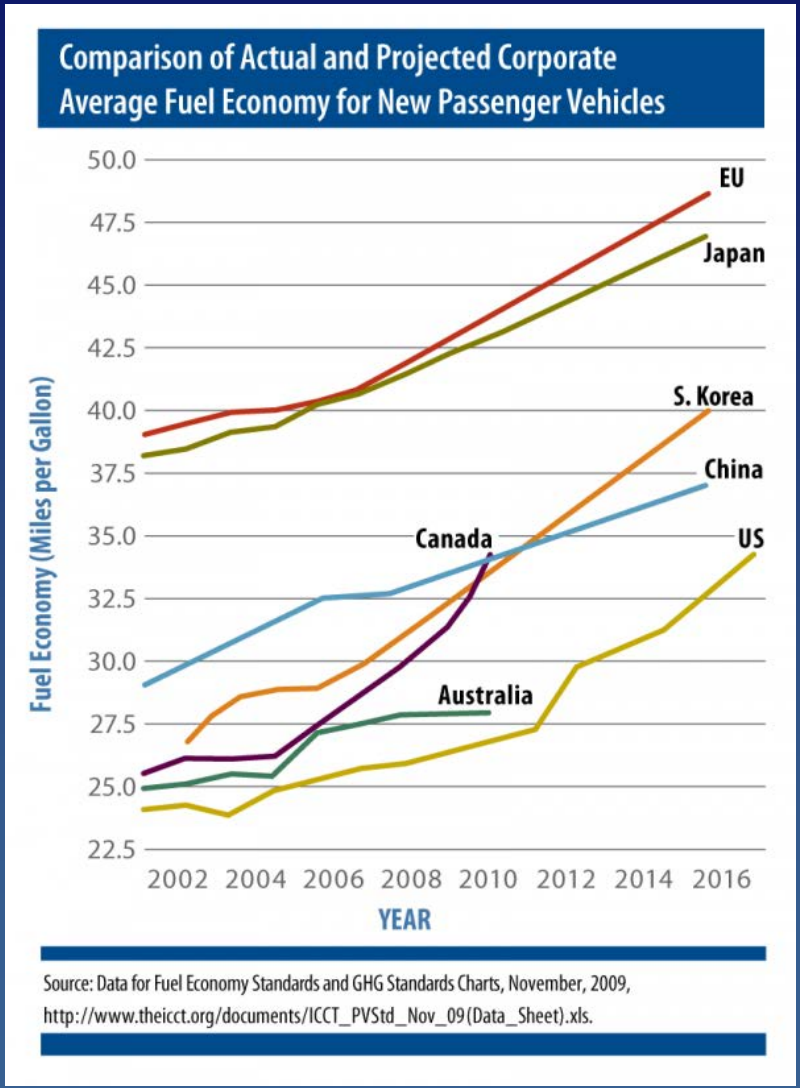
Some Assembly Required

Courtesy of Professor Vijay Kumar, University of Pennsylvania

Regulation – Driving Diversity



Regulations differ across countries. Large costs of meeting new requirements suggests coordinated efforts and/or globally diversified portfolios.

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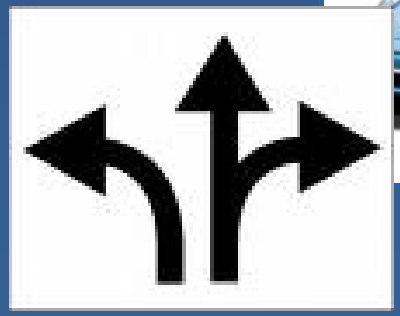
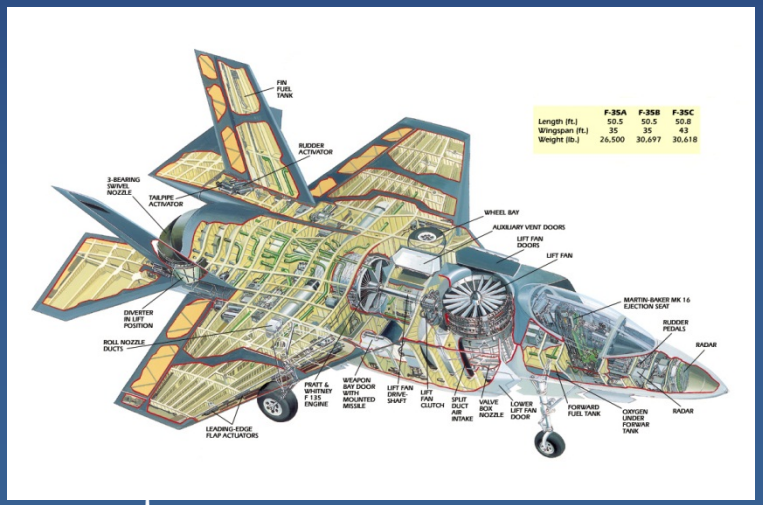
Changing Powertrain Technology



The Winds of Change in a Digital World

- Improve reputation of manufacturing
- Develop educational baseline for manufacturing
- Design and manufacturing
- University acceptance / integration of TRL 4-9 work
- Thinking in a completely new fashion
- A new workforce foundation



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Encouraging Careers in STEM

- The President's "Educate to Innovate" initiative is leveraging private-sector partners to get students excited about STEM subjects.
  - FIRST students many more times likely to major and pursue careers in science and engineering
- "Technology shifts and increasing investments in advanced manufacturing are creating a great demand for STEM-capable students worldwide."
  - Paula Davis, President, Alcoa Foundation

White House, November 2009

White House Science Fair, Feb 2012

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A Few Cold Realities

- Manufacturing is high tech
- SMEs (Jobs / Economy) – Supplier vs. OEM
- Speed to market
- Standards (process vs. product)
- Productivity is up (2X every 10 years)
- Green generating green
- Transportation costs
- The days of hard transfer lines are numbered
- Open source is going to rule

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Back to the Big Picture

- Wealth creation
- Enabling SME's
- Sustainability / efficiency
- A new workforce foundation
- New technical leadership for policy
- The United States of America
  - Enabling innovation
  - Ensuring the talent pipeline
- The World – Making a difference

"In times of change, learners inherit the earth; while the learned find themselves beautifully equipped to deal with a world that no longer exists." (Eric Hoffer 1902-1983)

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"Think about the America within our reach: A country that leads the world in educating its people. An America that attracts a new generation of high-tech manufacturing and high-paying jobs. A future where we're in control of our own energy, and our security and prosperity aren't so tied to unstable parts of the world. An economy built to last, where hard work pays off, and responsibility is rewarded."

- President Barack Obama
January 24, 2012

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