

Framing the Challenge

Towards a National Network of Manufacturing Institutes

Mike Molnar

Director, Advanced Manufacturing National Program Office

Chief Manufacturing Officer, NIST

Agenda

- AMP and AMNPO Introduction
- The Challenge
- The Opportunity
- NNMI Principles
- Pilot on Additive Manufacturing
- Workshop Mission Today

Advanced Manufacturing Initiative Policy Milestones

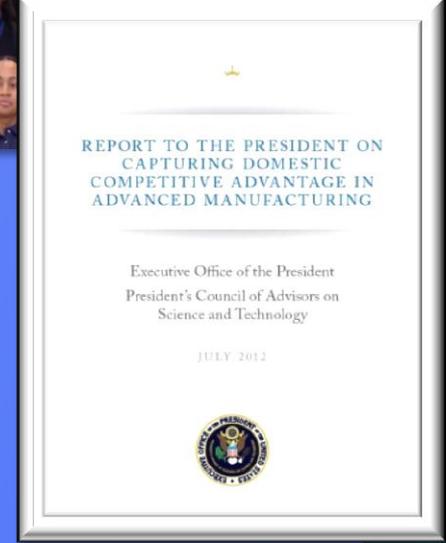
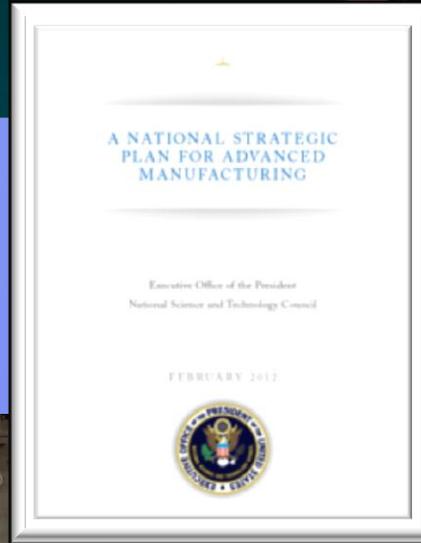
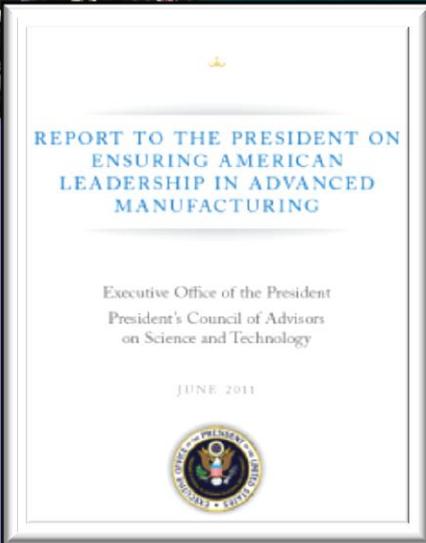
June
2011

Jan
2012

Feb
2012

March
2012

July
2012



AMP Steering Committee

Robert Birgeneau



Wesley Bush



Louis Chenevert



Jared Cohon



Mary Sue Coleman



David Cote



Richard Harshman



Curt Hartman



John Hennessy



Susan Hockfield



Andrew Liveris



Bob McDonald



Alan Mulally



Douglas Oberhelman



Paul Otellini



G.P. "Bud" Peterson



William Weldon



Wendell Weeks



Advanced Manufacturing Partnership



Andrew Liveris
CEO, Dow Chemical

AMP Co-chairs

Susan Hockfield
President, MIT



AMP report released July 17, on whitehouse.gov

Recommendations in three areas: innovation, talent, and policy environment

Two early actions announced by Administration:

- 1) Coordinated “whole of government” effort via an interagency Advanced Manufacturing National Program Office
- 2) Pursue the “missing middle” via manufacturing innovation hubs

Interagency Advanced Manufacturing National Program Office (AMNPO)



Executive Office of the President



Advanced Manufacturing Partnership (AMP)

Advanced Manufacturing National Program Office
(housed at DOC - NIST)

Advanced Manufacturing Agency Leaders
(NSTC)

AMNPO activities

- **Plan**

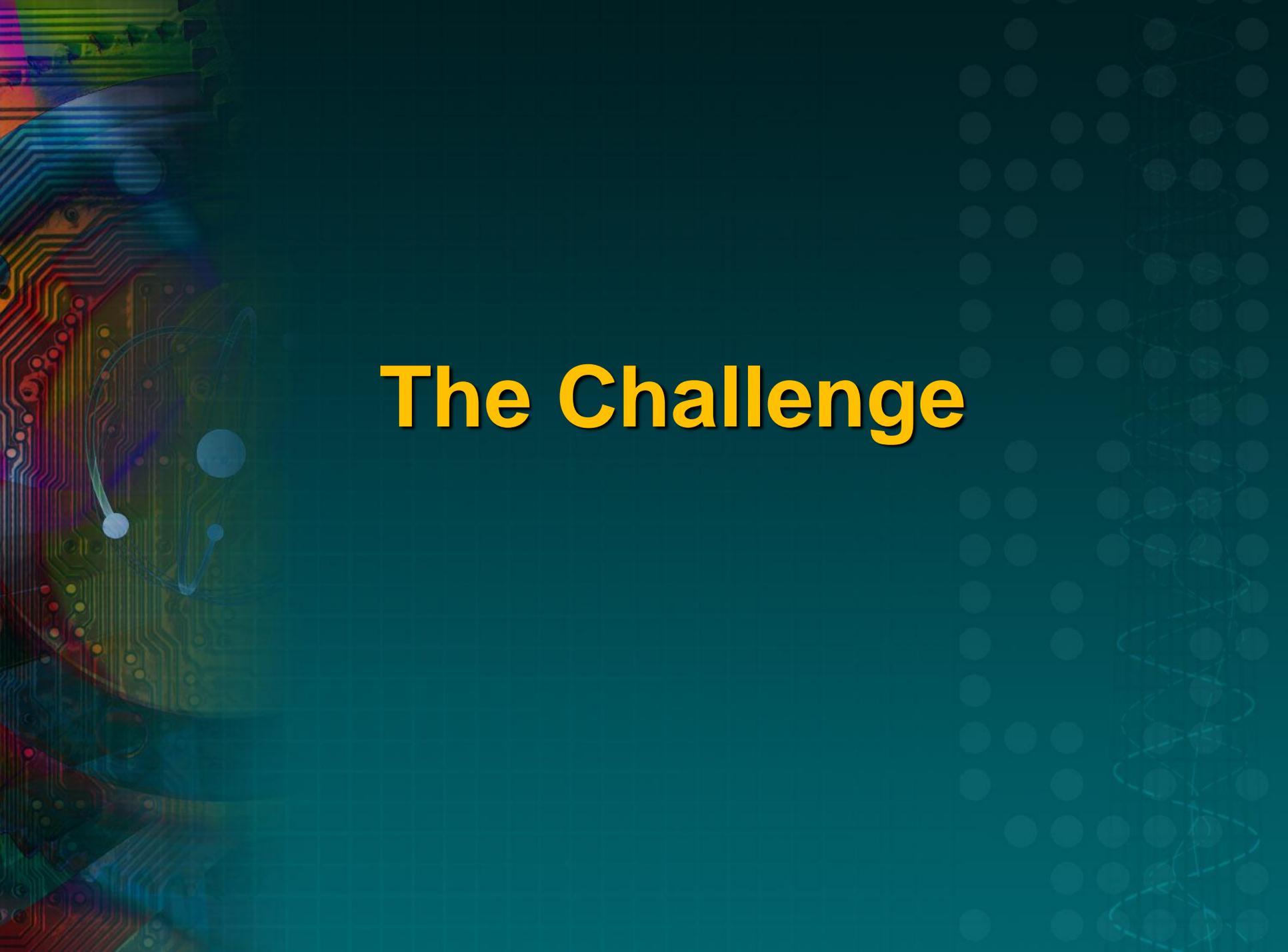
- Coordinate strategy, programs and projects for Federal Advanced Manufacturing activities

- **Lead**

- Provide an interface to stakeholders
- Implement AMP recommendations and the *National Strategy for Advanced Manufacturing*

- **Build**

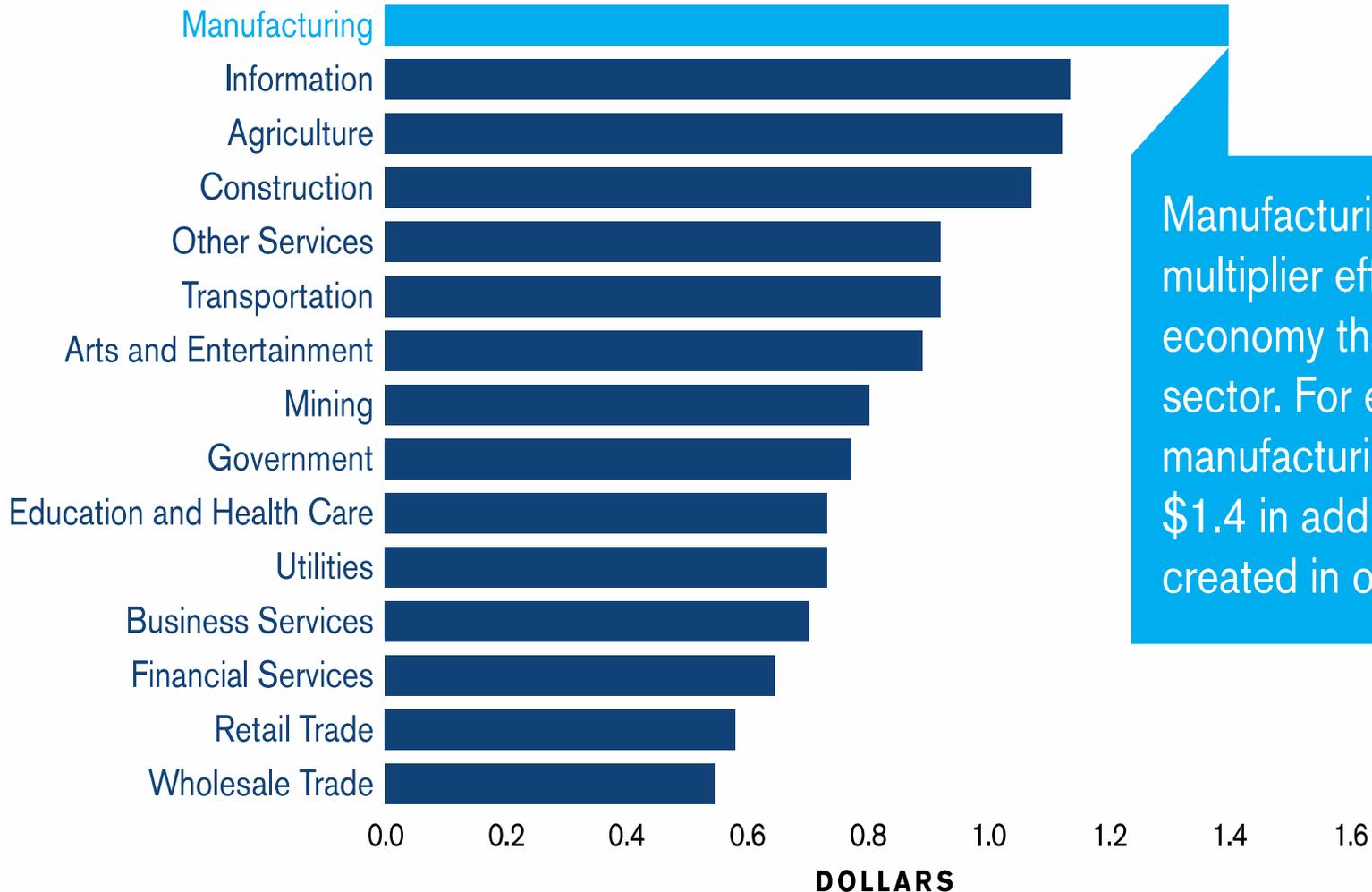
- Develop the **National Network for Manufacturing Innovation (NNMI)** with your help!



The Challenge

Manufacturing Economic Impact

Manufacturing drives jobs throughout the economy, including in services



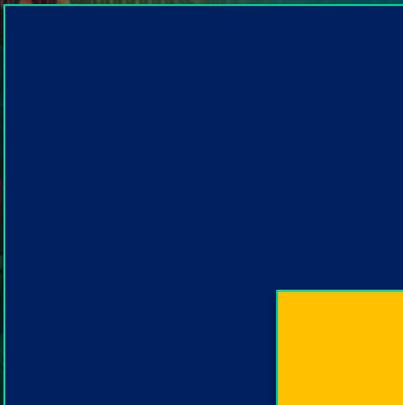
Manufacturing has a higher multiplier effect on the economy than any other sector. For every \$1 in manufacturing value added, \$1.4 in additional value is created in other sectors.

Manufacturing Innovation Impact

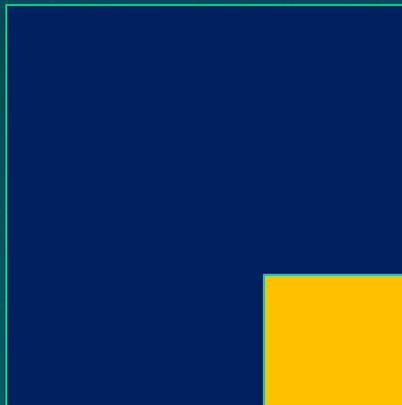
U.S. manufacturers

- Employ over half of all R&D personnel in domestic industry
- Employ over a third of all engineers
- Account for up to 90% of all U.S. patents issued annually

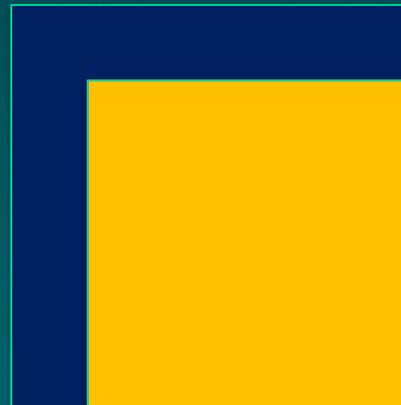
10% of
employment



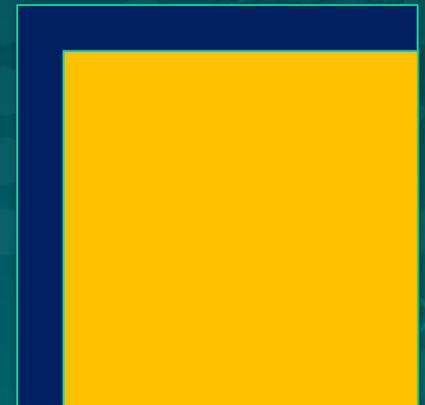
12% of gross
domestic product



70% of private
R&D spend



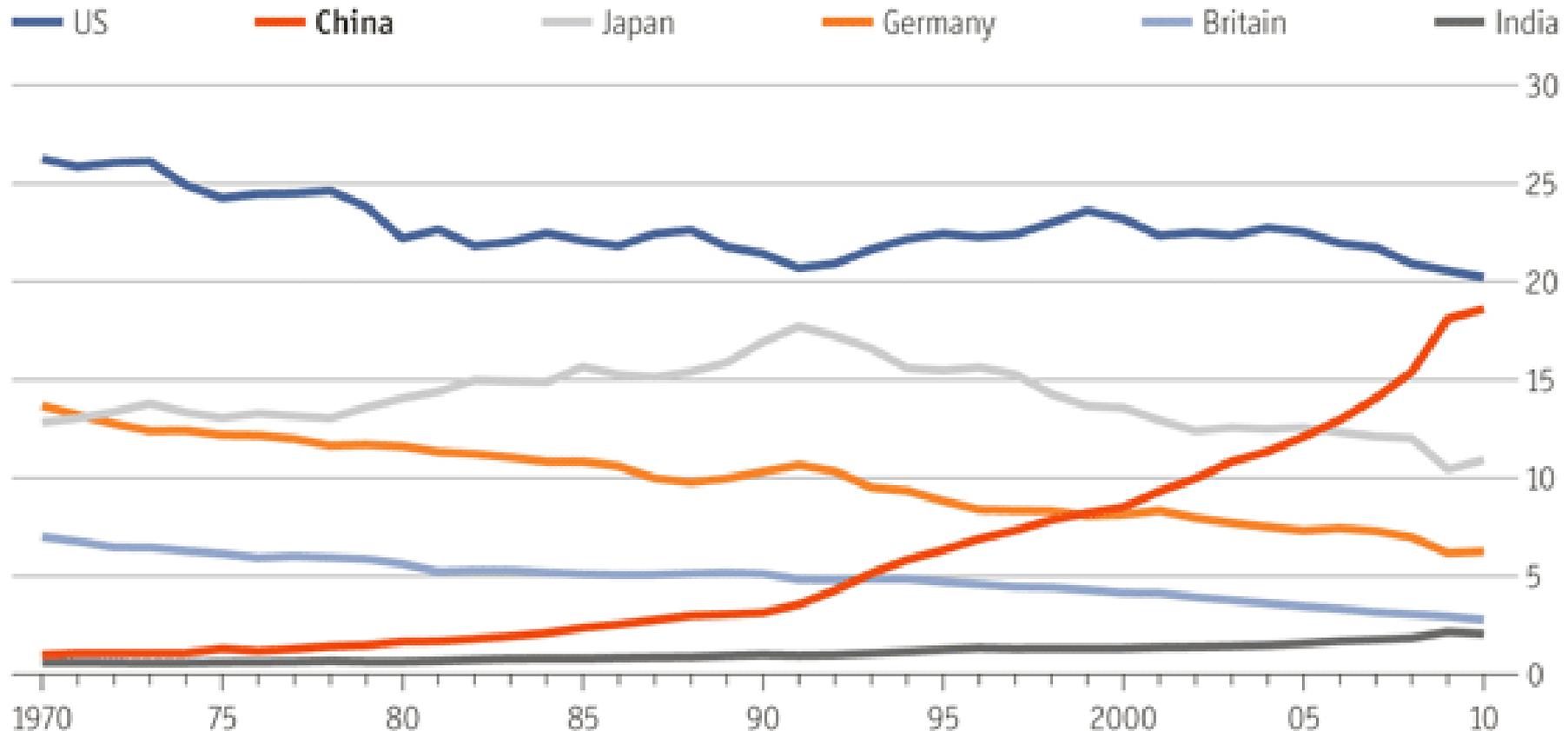
86% of exports



Misperception – US lost Mfg Leadership

World output has never been higher, helping millions rise from poverty
US is world manufacturing leader, China's growth not "zero sum game"
US can remain globally competitive – technology, productivity, quality

Manufacturing, 2005 prices, % of world output

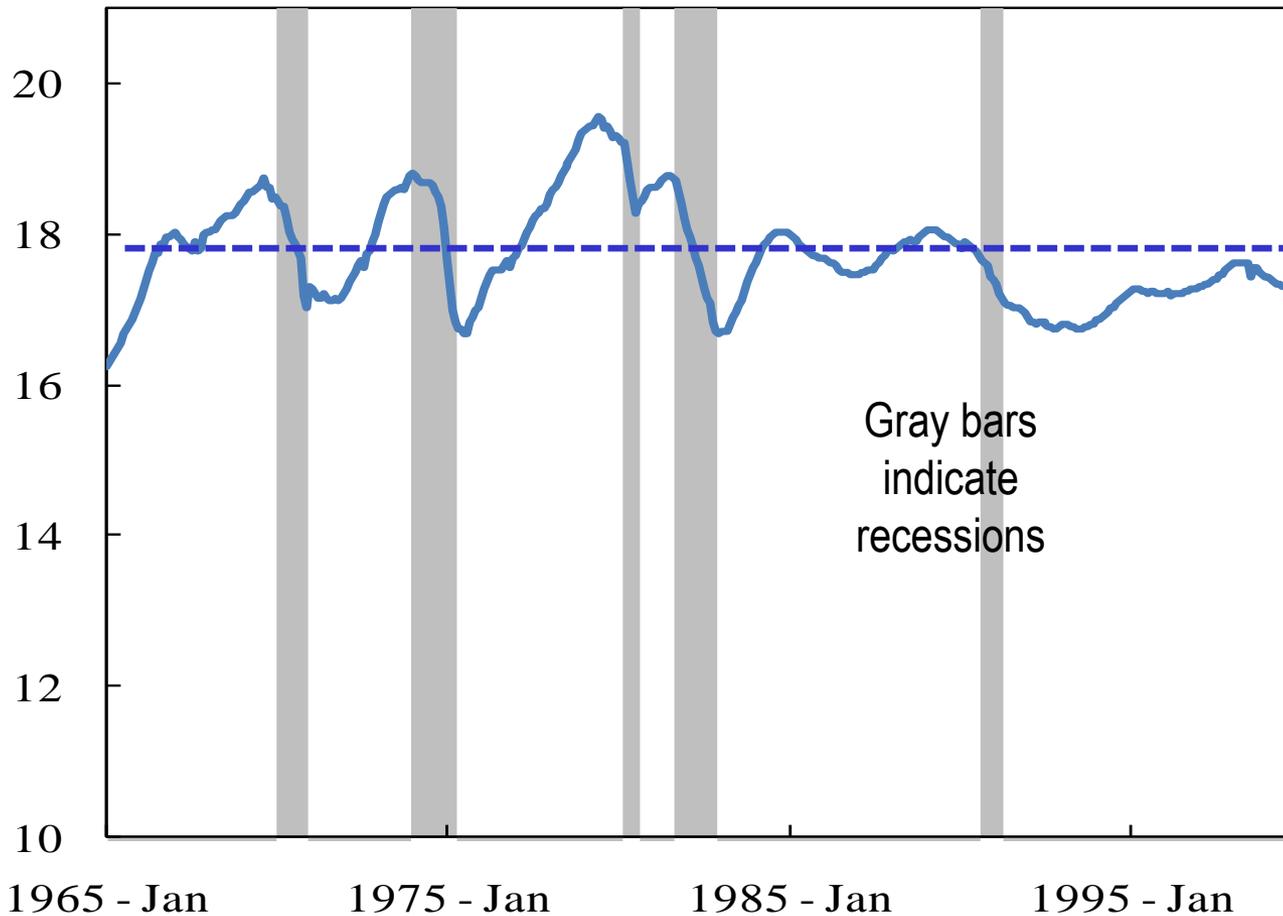


Misperception - Productivity on Employment

Rising Productivity does *not* create employment losses

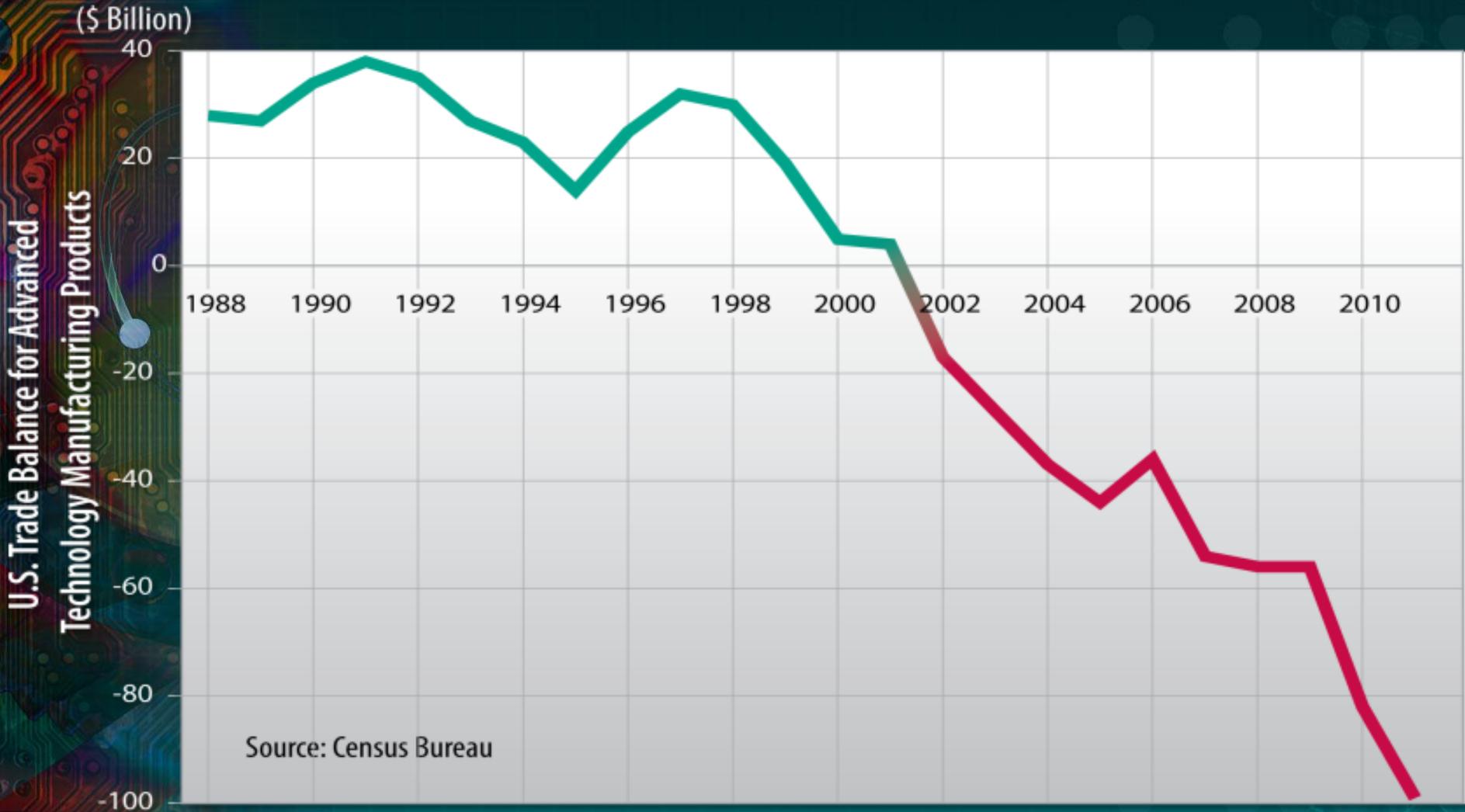
1965 – 2000 : US Mfg output rises **6x**, stable employment

Millions



Challenge: US losing leadership in Advanced Products

U.S. Trade Balance for Advanced Technology Products



Products invented here, now made elsewhere - not driven by labor cost





The Opportunity

National Network for Manufacturing Innovation



**President Obama at Rolls-Royce Crosspointe,
Petersburg, VA, March 9, 2012**

\$1 billion FY13 proposal:

“institutes of manufacturing excellence where some of our most advanced engineering schools and our most innovative manufacturers collaborate on new ideas, new technology, new methods, new processes.”

\$30 million FY12 pilot

DoD led multiagency pilot, focused on additive metal, composites, & direct write electronics

Proposed NNMI Scope



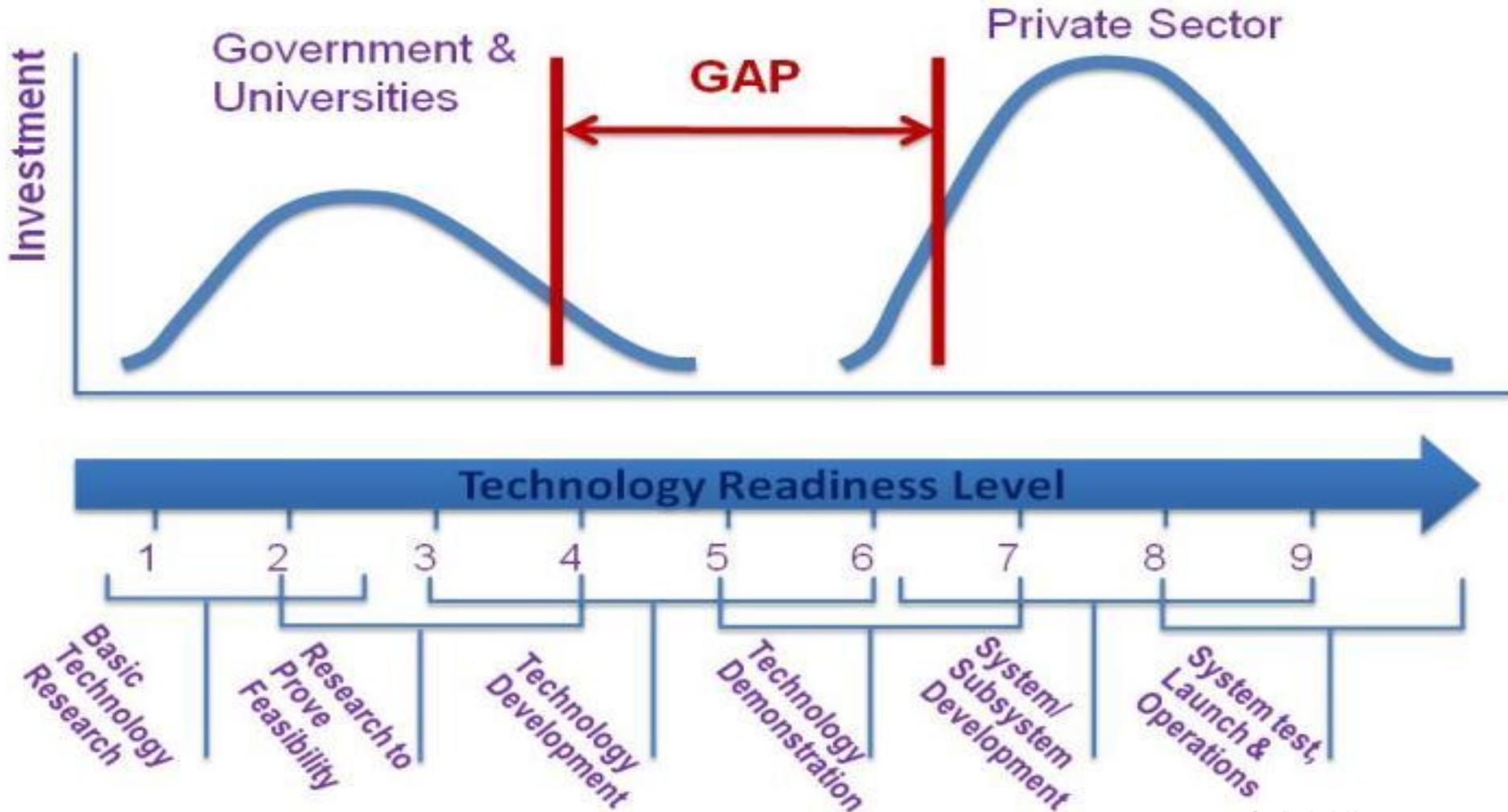
Credit: B. Young/NIST

- Up to 15 linked regional clusters of manufacturing innovation across the country
- Shared approaches to infrastructure, intellectual property, contract research, and performance metrics
 - As nodes of a network, the **Institutes for Manufacturing Innovation** complement each other's capabilities

The Scale-up gap

Growing global competition in scaling-up

Gap in Manufacturing Innovation

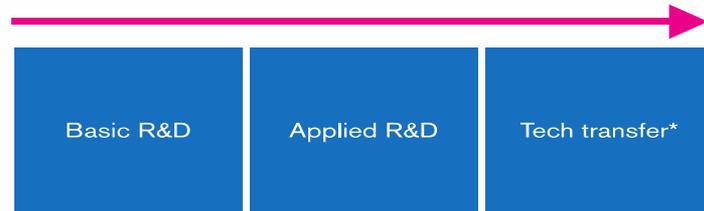


Manufacturing At Scale

an Integral Part of the Innovation Ecosystem

U.S. innovation / production cycle is often viewed as linear and separate

INNOVATION PROCESS



Significant national focus

- Innovation clusters and government agency support
- Multiple collaborative efforts
- Government and private sector investments

*including commercialization

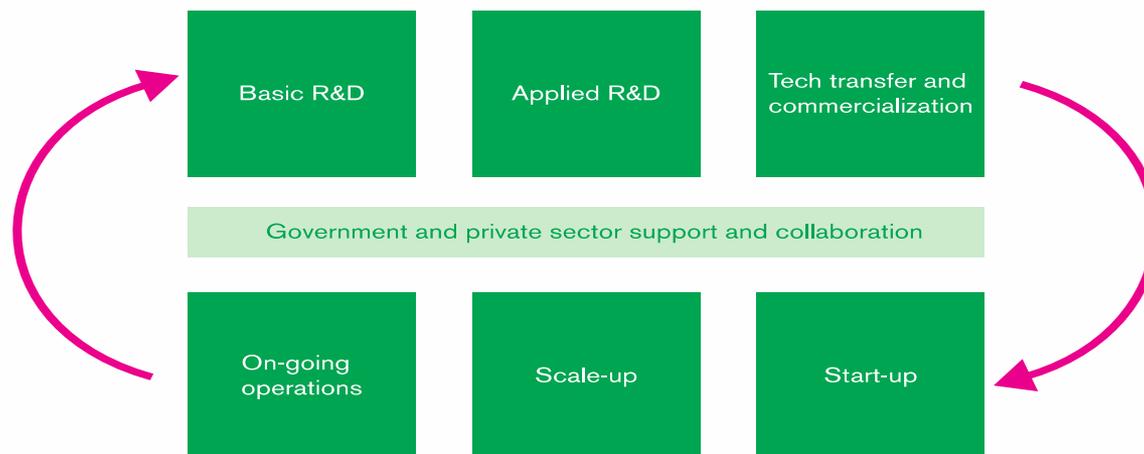
PRODUCTION PROCESS



Limited national focus

- Lack of coordinated efforts
- Barriers to production at scale
- Few government investments and incentives
- Regulatory and tax policy hurdles

U.S. innovation and manufacturing require full life-cycle support to maximize return on innovation



The NNMI Program: Overview



“Sparking this network of innovation across the country, it will create jobs and will keep America leading in manufacturing...”

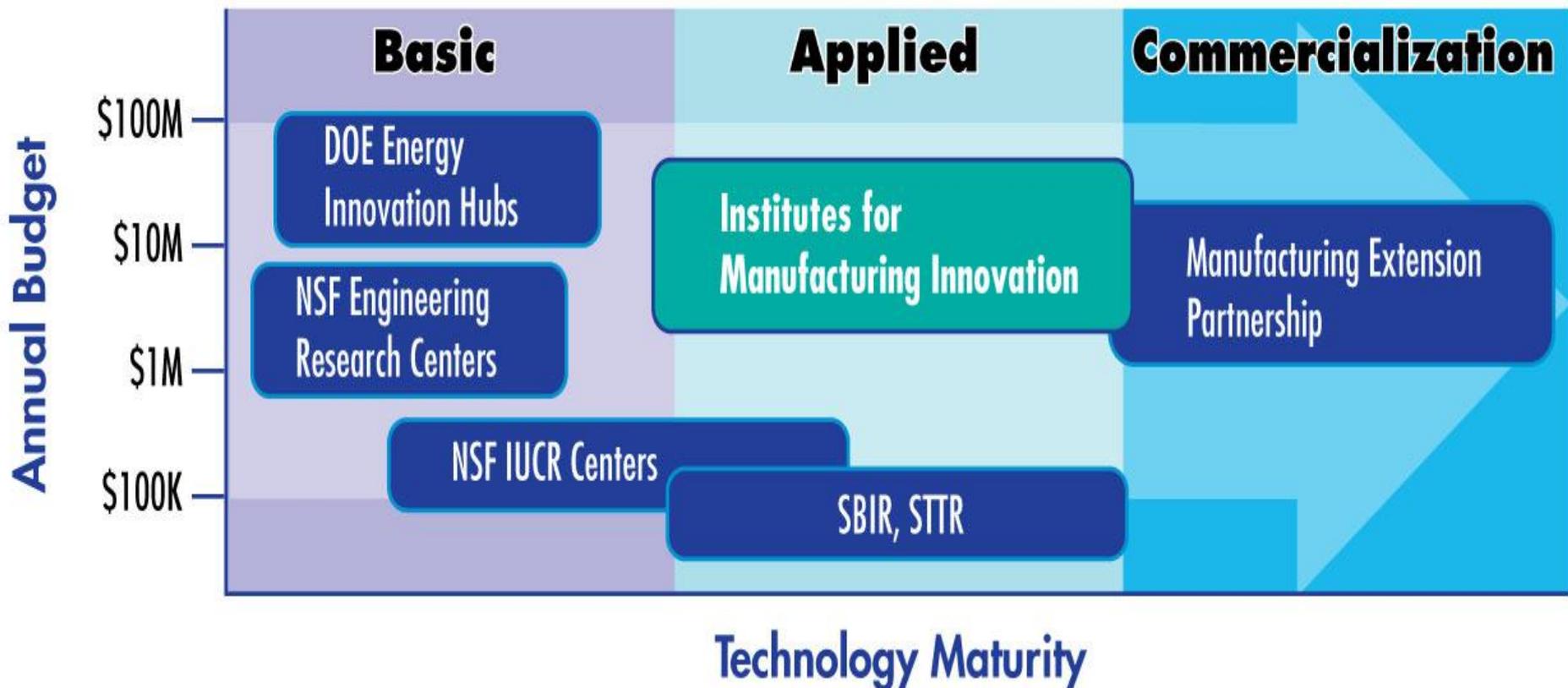
President Obama, March 9, 2012

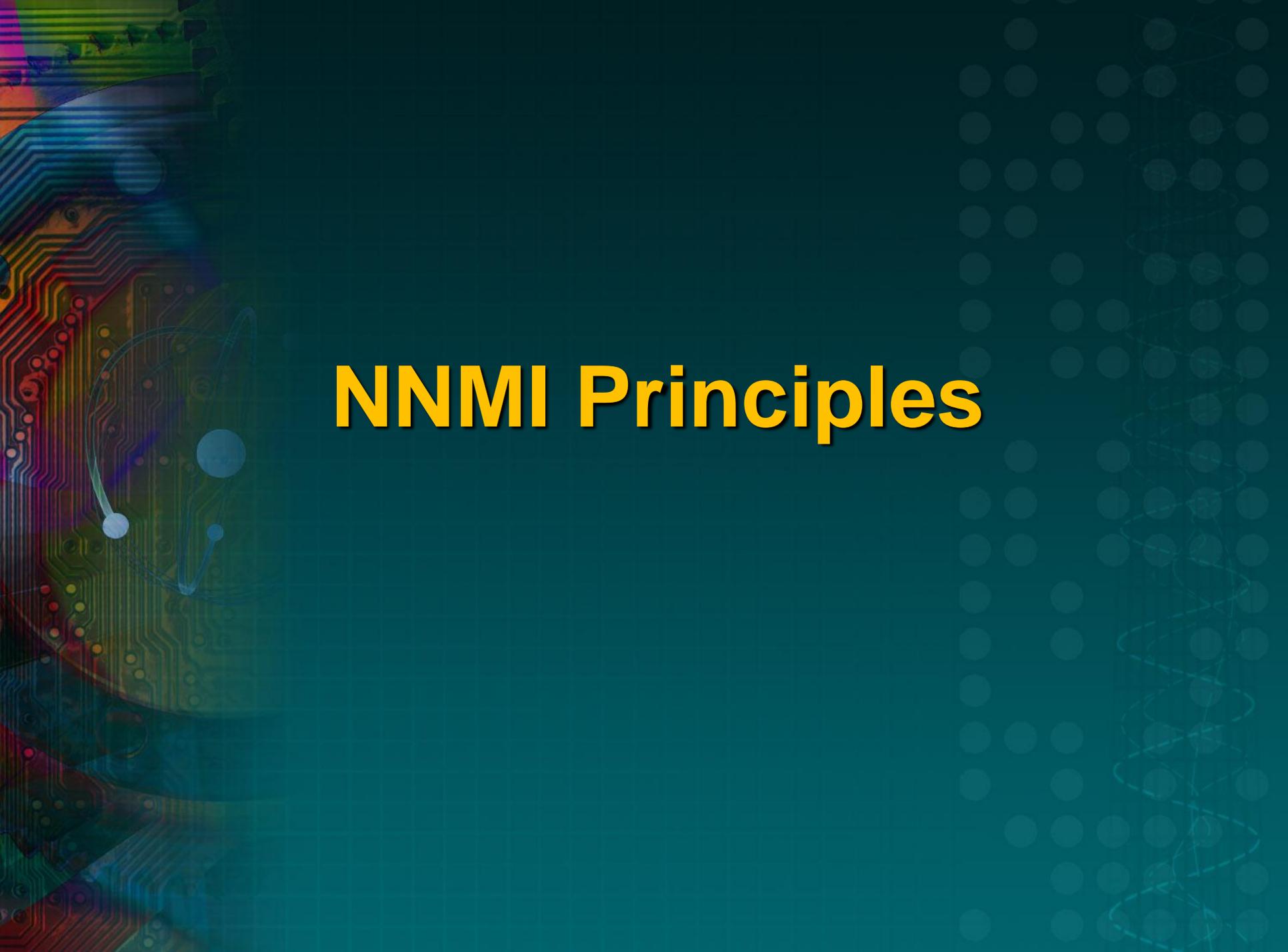
- The President’s Budget proposed a \$1 billion investment from mandatory FY 2013 funding to create this new **National Network for Manufacturing Innovation**
- We Can’t Wait: FY 2012 Additive Manufacturing Pilot

Focus on Scale Up – The Missing Middle

Basic science
Largely government funded

Commercialization
private sector owned/funded





NNMI Principles

Proposed NNMI Scope



Credit: B. Young/NIST

- Up to 15 linked regional clusters of manufacturing innovation across the country
- Shared approaches to infrastructure, intellectual property, contract research, and performance metrics
- As nodes of a network, the **Institutes for Manufacturing Innovation** complement each other's capabilities

Proposed Institute Activities



Credit: anyaivanova /Shutterstock

Applied Research & Demo projects for

- reducing cost/risk on commercializing new tech.
- Solving pre-competitive industrial problems



Credit: Dmitry Kalinovsky /Shutterstock

Tech Integration - Development of innovative methodologies and practices for supply chain integration



Credit: withGod/Shutterstock

Small/Medium Enterprises

- Engagement with small and medium-sized manufacturing enterprises (SMEs).

Institute



Source: istockphoto



Credit: Lisa Young/Shutterstock

Education, technical skills and Workforce development

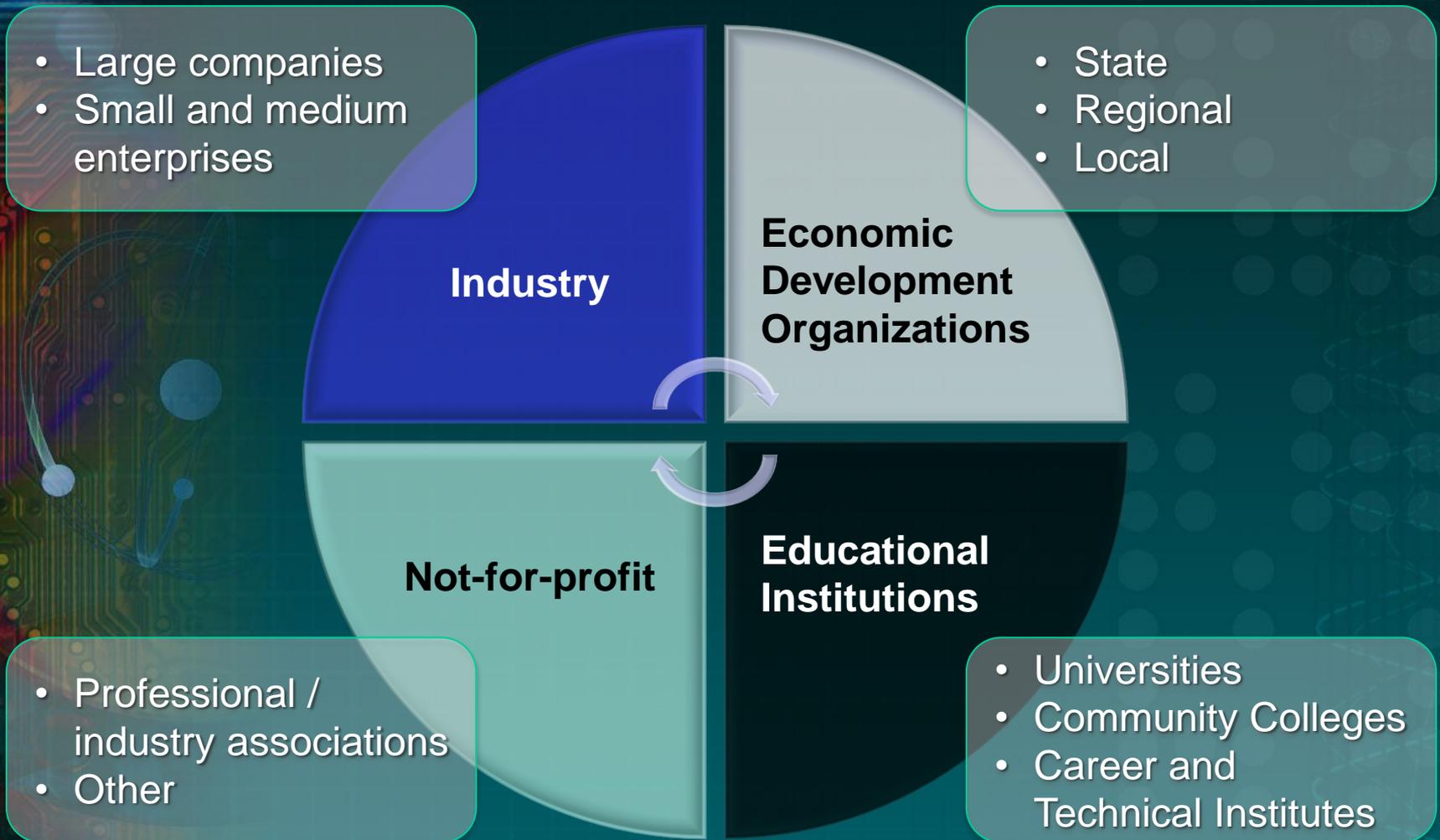
Education and training at all levels for workforce development

Proposed Governance

- Independent Director and Board
- Network Leadership Council
- Support from Advanced Manufacturing National Program Office



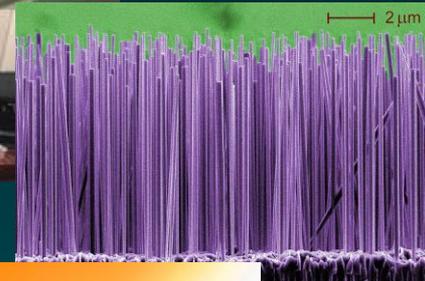
Partnerships are Essential



Participation and Co-investment by partners is essential

Proposed Selection Criteria

- Technology focus
- RD&D plan
- Broad Impacts
- Partner resources
- Co- investments



Open to all opportunities

Example focus areas

A Manufacturing Process

- e.g. additive manufacturing (focus of FY12 pilot)

An Advanced Material

- e.g. lightweight, low cost carbon fiber composites

An Enabling Technology

- e.g. smart, sensor-enabled manufacturing for productivity and sustainability

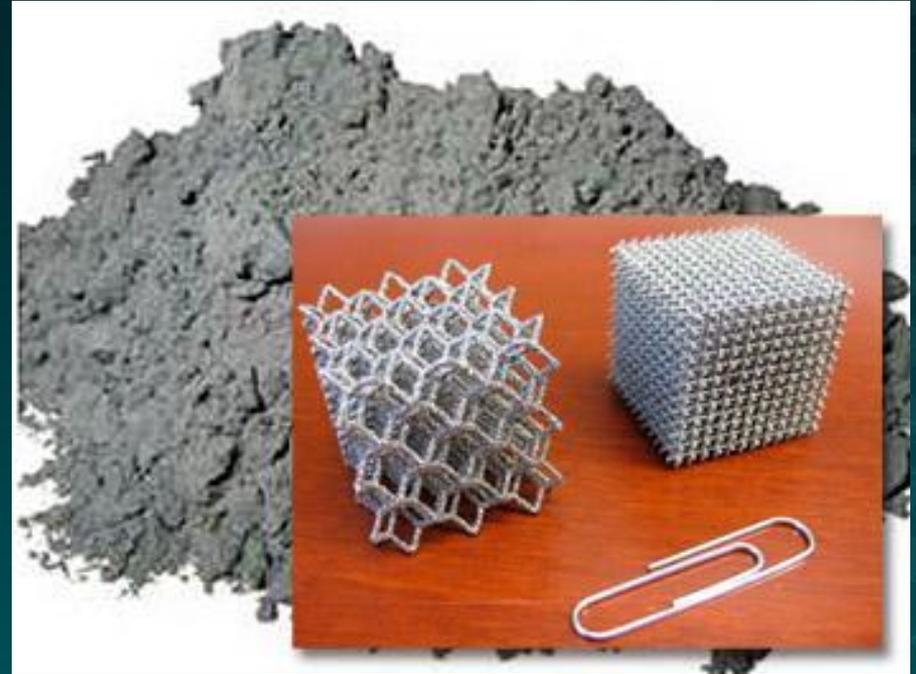
An Industry Sector

- e.g. biomanufacturing to enhance safety, quality, and consistency of bio products



Pilot on Additive Manufacturing

2012 Pilot Manufacturing Institute on Additive Manufacturing



April 13 May 8 May 16 August 16

SN BAA Industry Day \$30 M



National Additive Manufacturing Innovation Institute (NAMII), Youngstown OH

Prime Awardee: National Center for Defense Manufacturing and Machining

- Providing \$40M cost share, ~ \$20M from industry
- \$48M available for research projects
- Strong leveraging of equipment, existing resources
- Strong business development
- Ties to many organic facilities
- Tiered membership-based model, low cost to small business and nonprofits



Credit: All photos courtesy National Additive Manufacturing Innovation Institute



For More Information on NAMII...

www.namii.org

NAMII NATIONAL
ADDITIVE MANUFACTURING
INNOVATION INSTITUTE

driven by



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RAPID 2013 in Pittsbu...

NAMII brings event to Pittsburgh, Pa.
June 10-13.



NAMII Ribbon Cutting

Sept. 27 marks the official ribbon-cutting
ceremony to launch NAMII in
Youngstown, Ohio.



NAMII is Announced

On Aug. 16, the Obama Administration
creates NAMII and awards NCDMM with
its oversight.



NNMI Public Design
Why we are here today

Today's Goal

- Input from you – the stakeholders – on the NNMI design
- Ground rules
 - Integrate your experiences and lessons learned of scaling up technologies into this new program
 - Free-flowing discussion
 - Get specific! (Details wanted)
 - No “wrong answer”
- Explore the following topics in greater detail...

1. Technologies with Broad Impact

- Aspects to consider for a particular focus area:



- The “industrial commons”
- Shared problems throughout the supply and/or value chain
- Transition to larger-scale production beyond Institute operations

2. Institute Structure and Governance

- Aspects to consider:
 - Coordination among the different types of organizations
 - Balancing structure with flexibility
 - Process for selection, management, and operation of different types of activities

3. Strategies for Sustainable Institute Operations

- Aspects to consider:
 - Plan and strategy for private sector co-investment beyond the initial federal investment
 - Demonstration of the necessary financial and strategic commitment to ensure successful operation.

4. Education & Workforce Development

Aspects to consider:



- education
- professional credentialing
- informal or formal K-12 education and outreach
- entrepreneurial mentoring
- mid-career professional development.

How the Dialogues work

- Four concurrent topics in two 70-minute sequential sessions
- Each session will be moderated by:
 - Agency lead + Facilitator + Scribe
- Each participant is assigned to two topics based on preference and capacity
- Key findings reported at evening reception
- Formal report made public on manufacturing.gov

Dialogue Engagement Team – Session 1

Dialogue 1: Technologies **Exec. Dining Room / Huntington**

Agency Lead *John Hines, NASA*

Facilitator *Paul Wright* *Scribe: John Fort*

Dialogue 2: Institute Structure and Governance **Atrium / Board Room**

Agency Lead *David Korsmeyer, NASA*

Facilitator *John Anderson* *Scribe: Christine Marcyes*

Dialogue 3: Sustainable Institute Operations **Newport / Laguna**

Agency Lead *Robert Ivester, DOE*

Facilitator *Tab Wilkins* *Scribe: Adrienne Monroe*

Dialogue 4: Education & Workforce **Dining Room / Balboa**

Agency Lead *Robin Utz, DoEd*

Facilitator *Virginia Green* *Scribe: Maureen Halpert*

Dialogue Engagement Team – Session 2

Dialogue 1: Technologies **Balboa / Newport**

Agency Lead *Bruce Kramer, NSF*

Facilitator *Betsy Cantwell* *Scribe: Steven Bowers*

Dialogue 2: Institute Structure and Governance **Laguna / Dining Room**

Agency Lead *David Brinkley, DoD*

Facilitator *Patrick Dempsey* *Scribe: Stephanie Ussery*

Dialogue 3: Sustainable Institute Operations **Boardroom / Atrium**

Agency Lead *Paul Bartolotta, NASA*

Facilitator *Jonathan Lee* *Scribe: Irene Reynolds*

Dialogue 4: Education & Workforce **Exec. Dining Room / Huntington**

Agency Lead *Gregory Henshel, DoEd*

Facilitator *Paul Stark* *Scribe: Laura Leahy*

For More Information on AMNPO...

www.manufacturing.gov

Advanced Manufacturing Portal

... changing the face of manufacturing

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Events

September 27, 2012

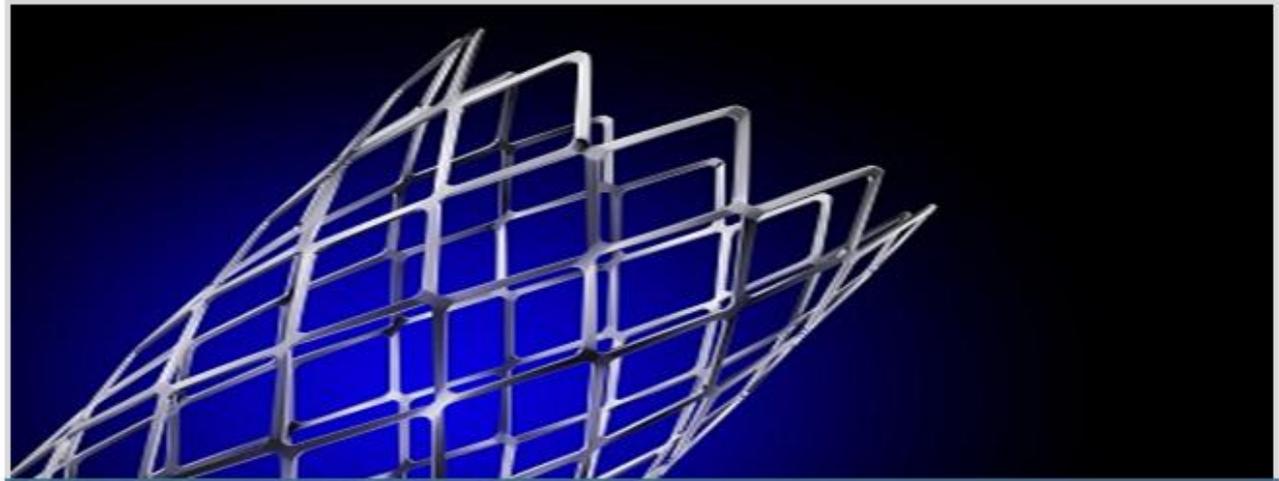
[Designing for Impact III: Workshop on
Building the NNMI.](#)

October 5, 2012

[National Manufacturing Day](#)

News

[Innovation Network Prompts Lots of Ideas](#)



A cardiovascular stent, currently manufactured using laser cutting, is a candidate for additive manufacturing.

1 2 3 4

Welcome to Manufacturing.gov!

This site will be a "one-stop shop" for news and information on advanced manufacturing programs and related activities under way in federal agencies with science and technology missions. These include interagency initiatives, such as the proposed National Network for Manufacturing Initiative coordinated by the Advanced Manufacturing National Program Office, as well as agency-specific programs.

To remain strong, our economy requires an advanced, globally competitive manufacturing sector that invents and makes high-value-added products and leading-edge technologies, here at home.



Thank you

For questions or comments, please contact

Advanced Manufacturing National Program Office

amnpo@nist.gov

301-975-2830