Designing for Impact II:
Workshop on Building the National Network for Manufacturing Innovation

ADVANCED MANUFACTURING NATIONAL PROGRAM OFFICE

Plenary Session

July 9, 2012

Cuyahoga Community College
Corporate College East

Warrensville Heights, Ohio

Framing the Challenge

Towards a National Network of Manufacturing Institutes

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Director, Advanced Manufacturing National Program Office
Chief Manufacturing Officer, NIST

Agenda

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

Interagency Advanced Manufacturing National Program Office (AMNPO)

Advanced Manufacturing Partnership (AMP)

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

Advanced Manufacturing Agency Leaders
(NSTC)

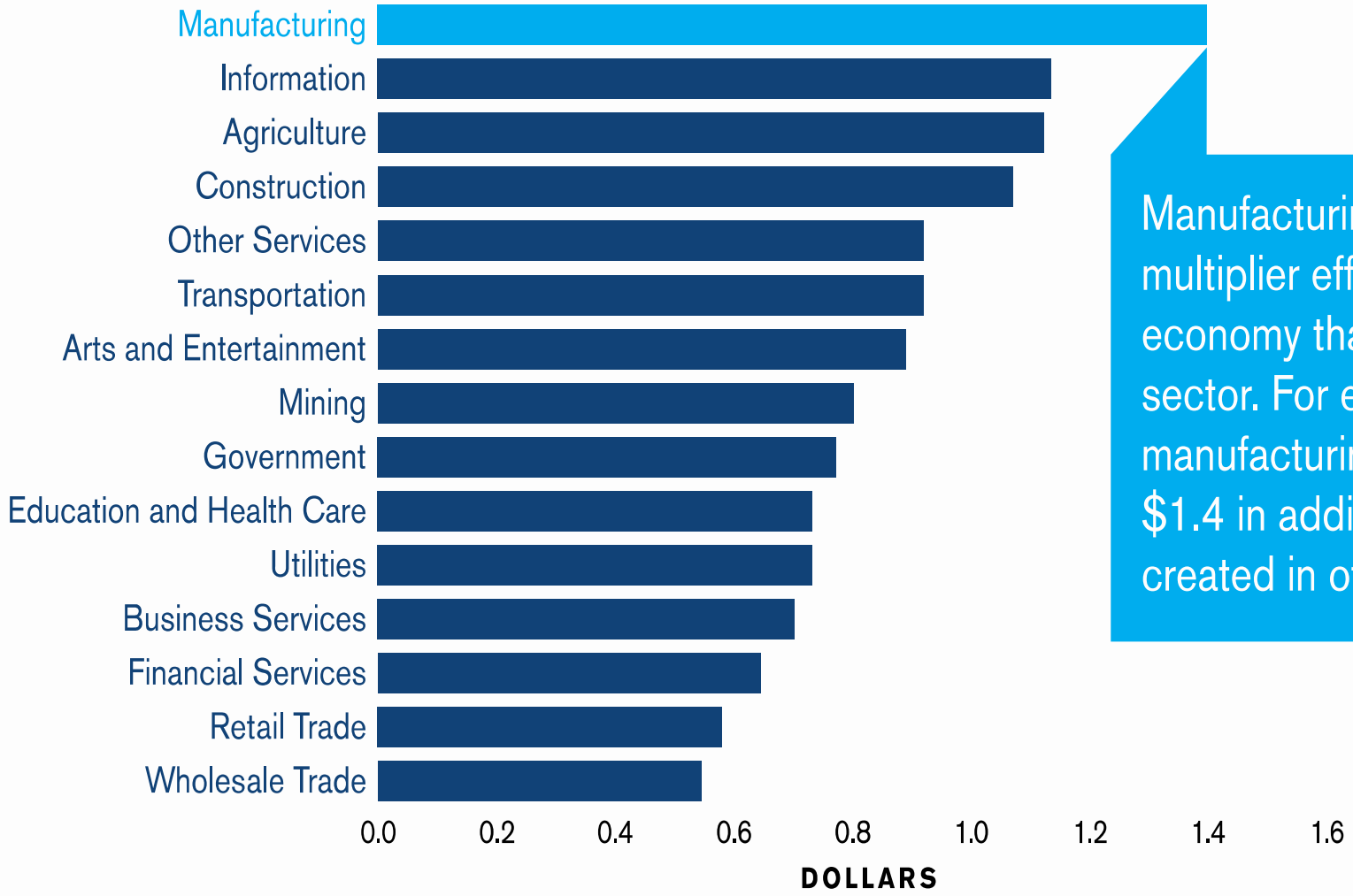
AMNPO activities

- ***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

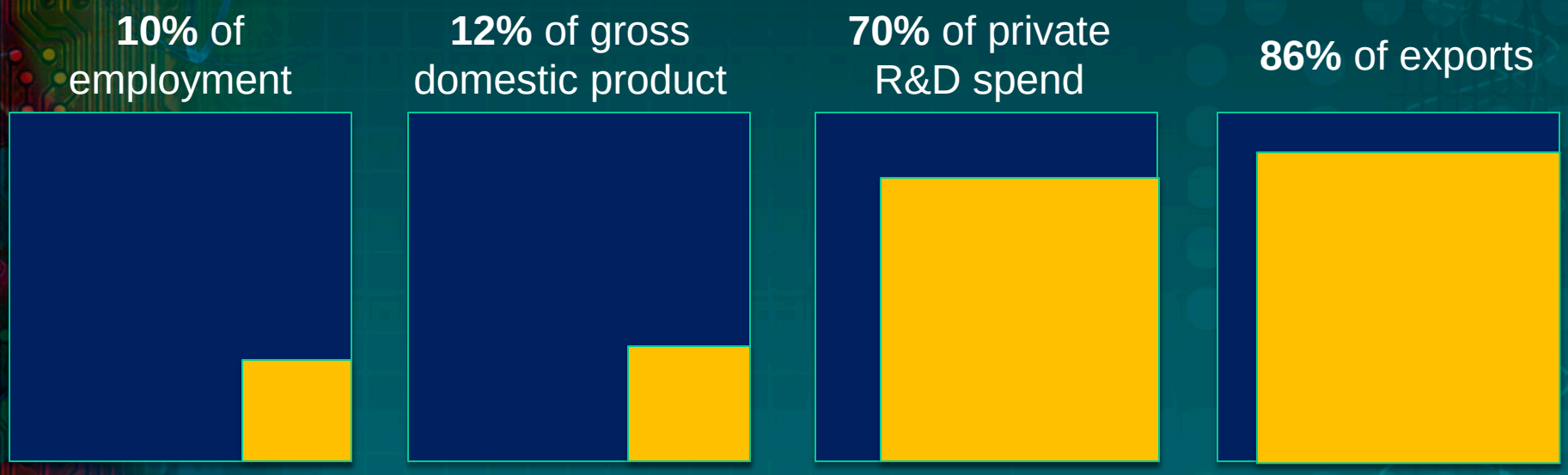


Manufacturing has a higher multiplier effect on the economy than any other sector. For every $1 in manufacturing value added, $1.4 in additional value is created in other sectors.

Manufacturing Innovation Impact

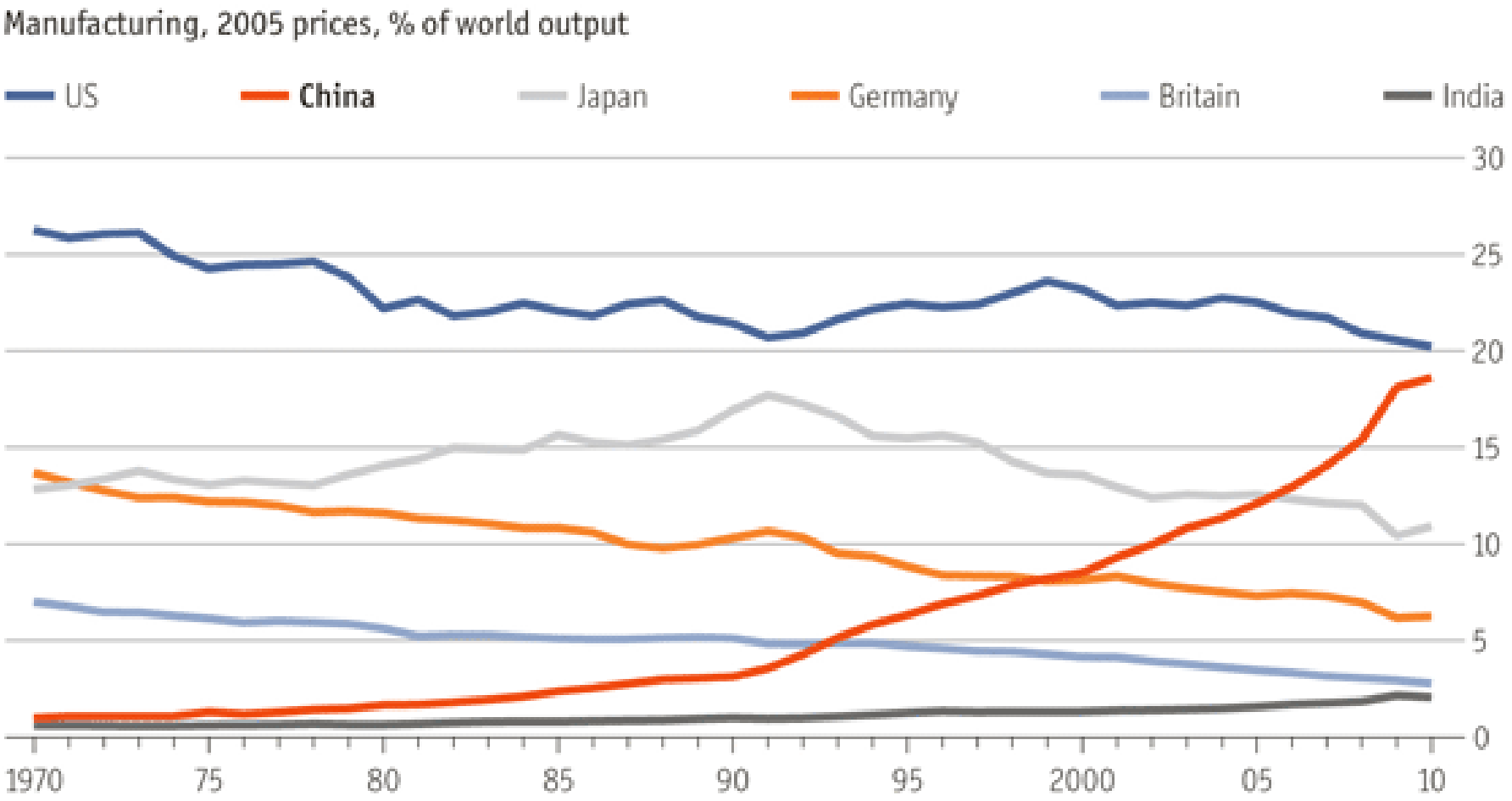
U.S. manufacturers

- 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



Misperception – US lost Mfg Leadership

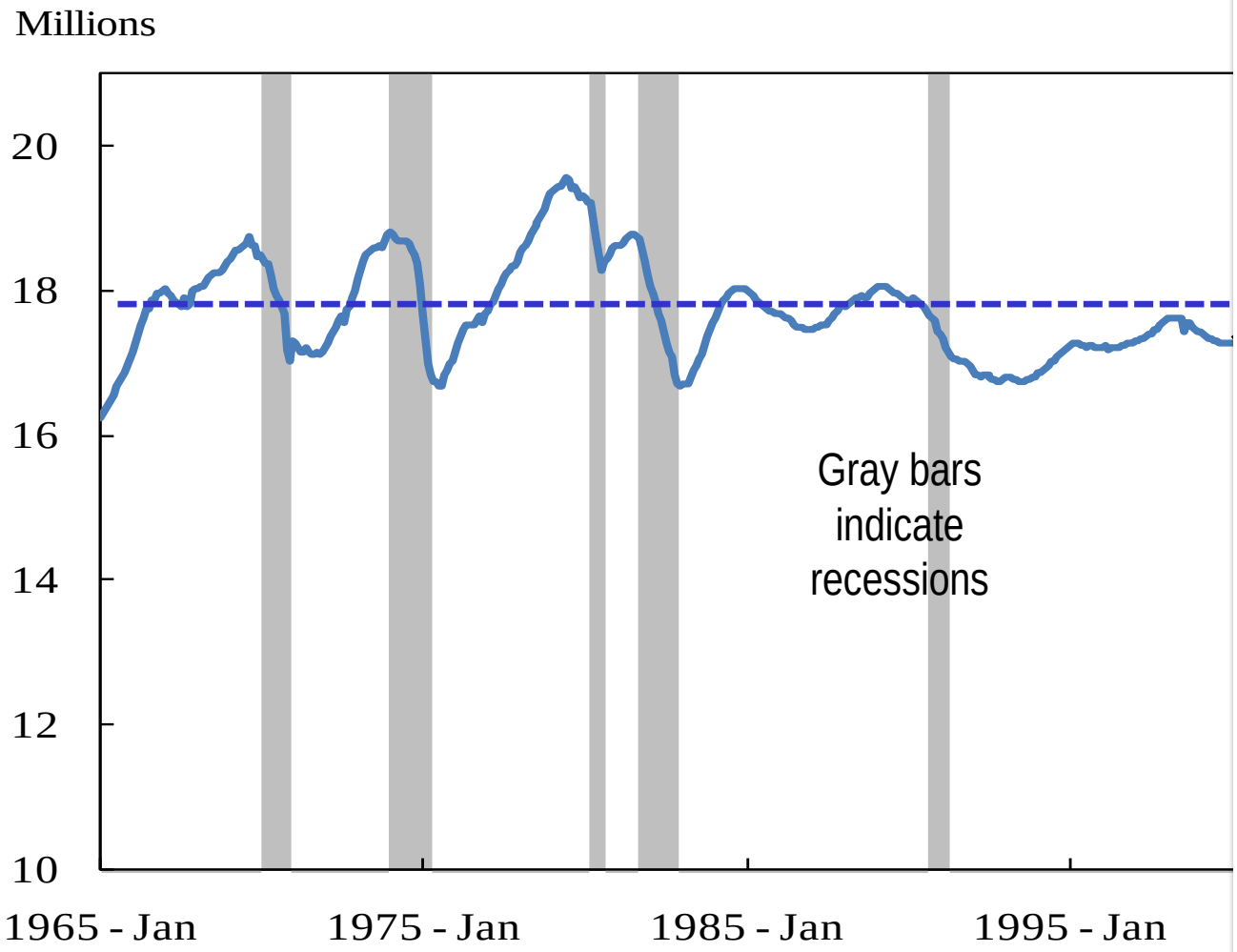
World output has never been higher, helping millions rise from poverty
US is world manufacturing leader, China's growth not "zero sum game"
US can remain globally competitive – technology, productivity, quality



Misperception - Productivity on Employment

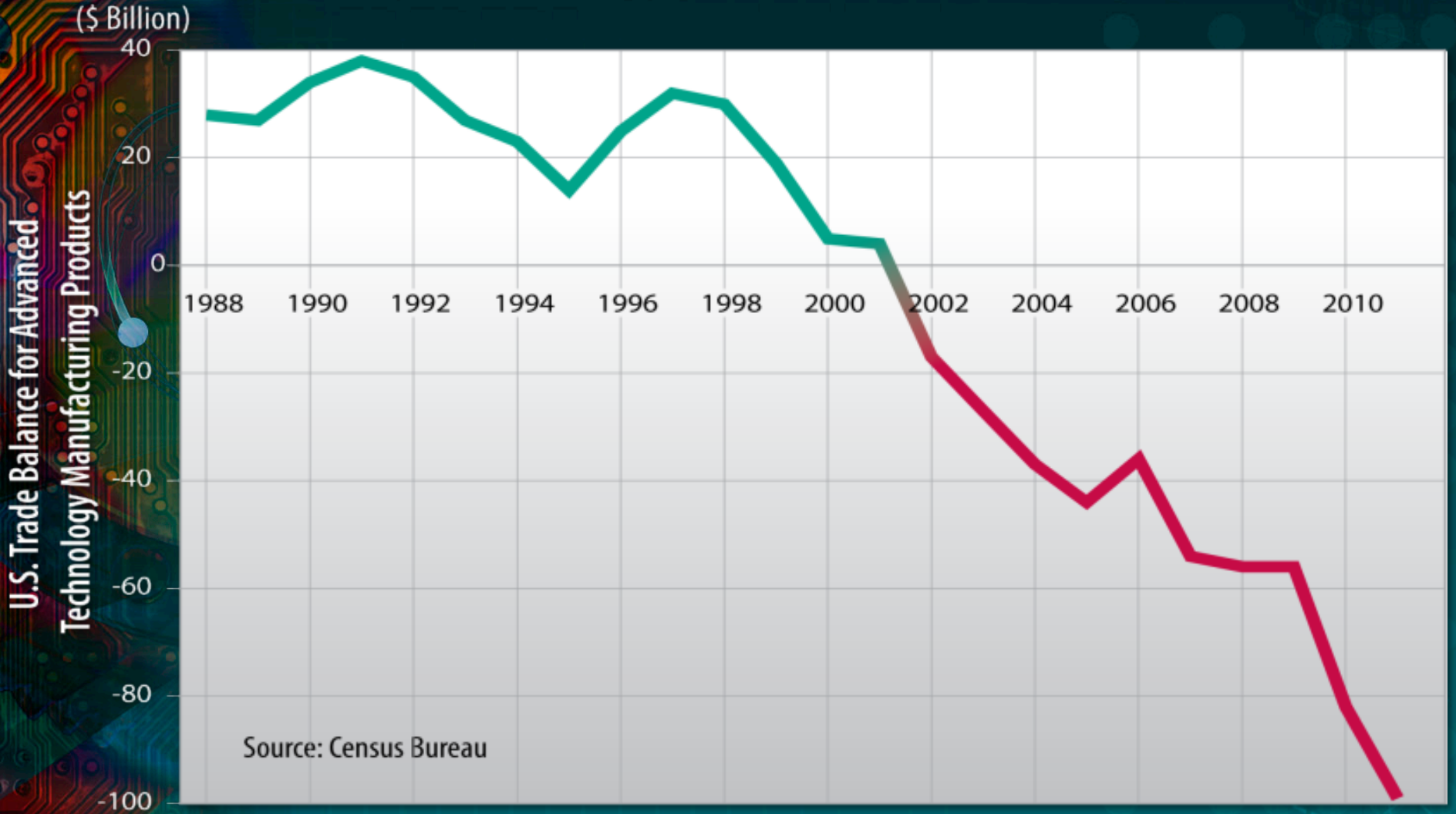
Rising Productivity does ***not*** create employment losses

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



Challenge: US losing leadership in Advanced Products

U.S. Trade Balance for Advanced Technology Products

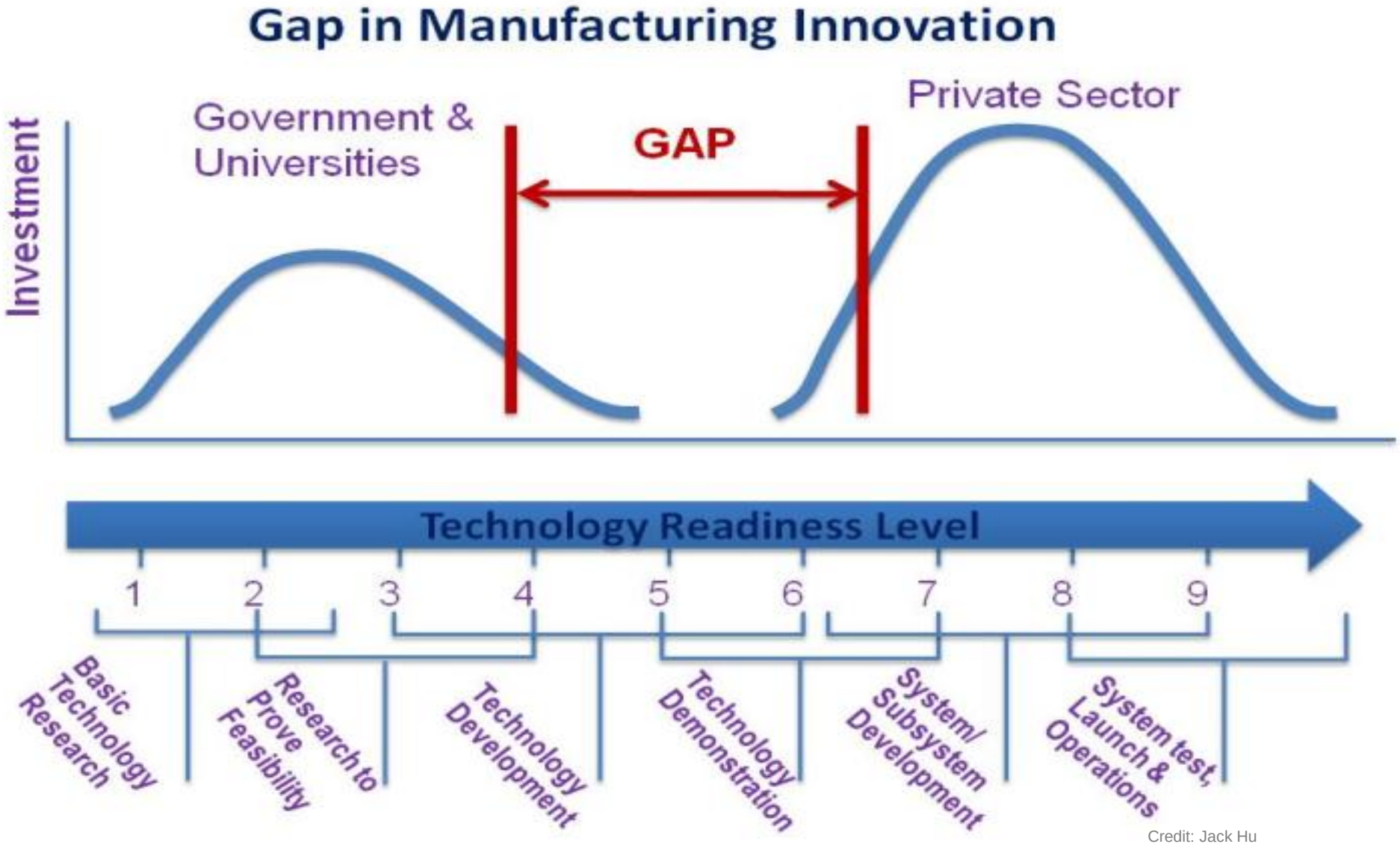


Products invented here, now made elsewhere - not driven by labor cost

The Opportunity

The Scale-up gap

Growing global competition in scaling-up



Credit: Jack Hu

Manufacturing At Scale

an Integral Part of the Innovation Ecosystem

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

INNOVATION PROCESS

Basic R&D | Applied R&D | Tech transfer*

Significant national focus
Innovation clusters and government agency support
Multiple collaborative efforts
Government and private sector investments

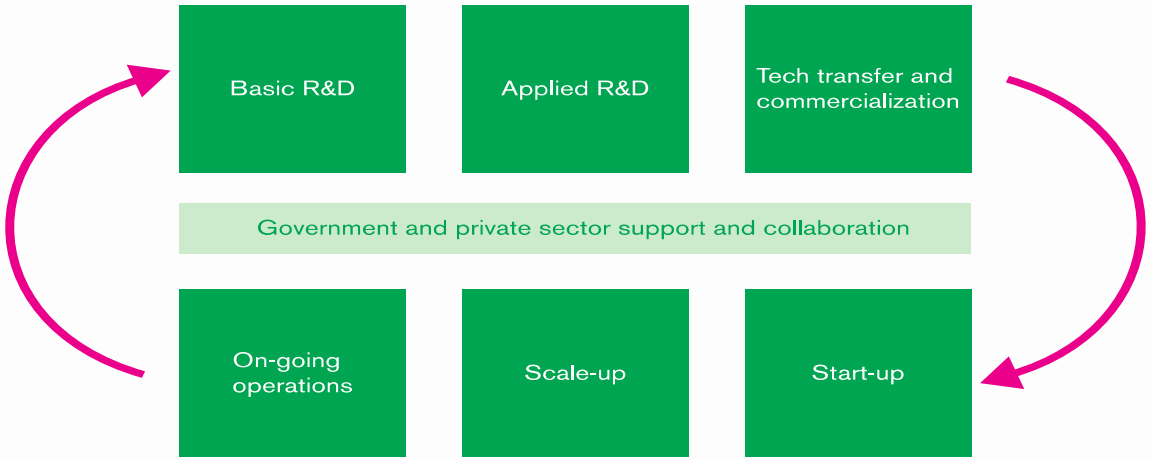
*including commercialization

PRODUCTION PROCESS

Start-up | Scale-up | On-going operations

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



For illustrative purposes.

Source: Council on Competitiveness

The NNMI Program: Overview


White House photo

"Sparking this network of innovation across the country, it will create jobs and will keep America leading in manufacturing…"

President Obama, March 9, 2012

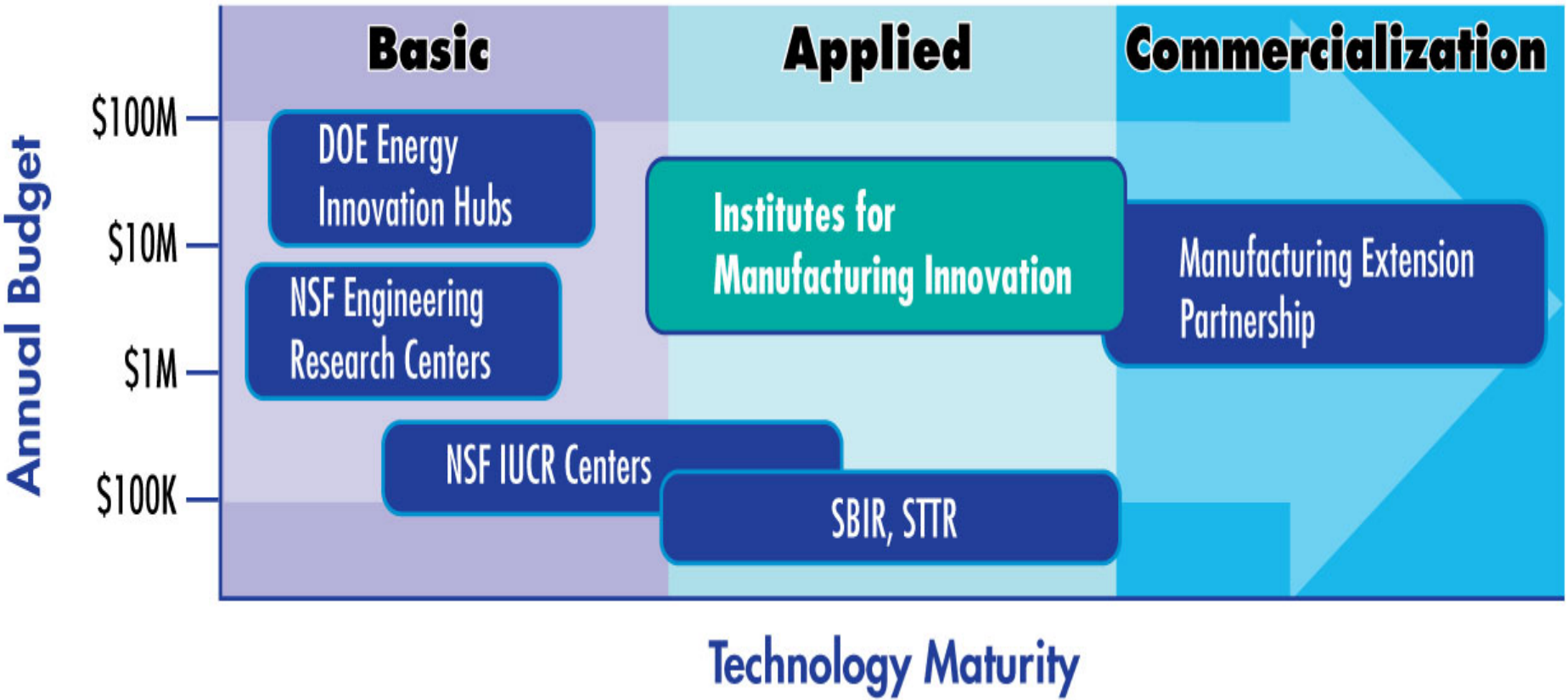
- The President's Budget proposed a $1 billion investment from mandatory FY 2013 funding to create this new National Network for Manufacturing Innovation

- We Can't Wait: FY 2012 Additive Manufacturing Pilot

Focus on Scale Up – The Missing Middle

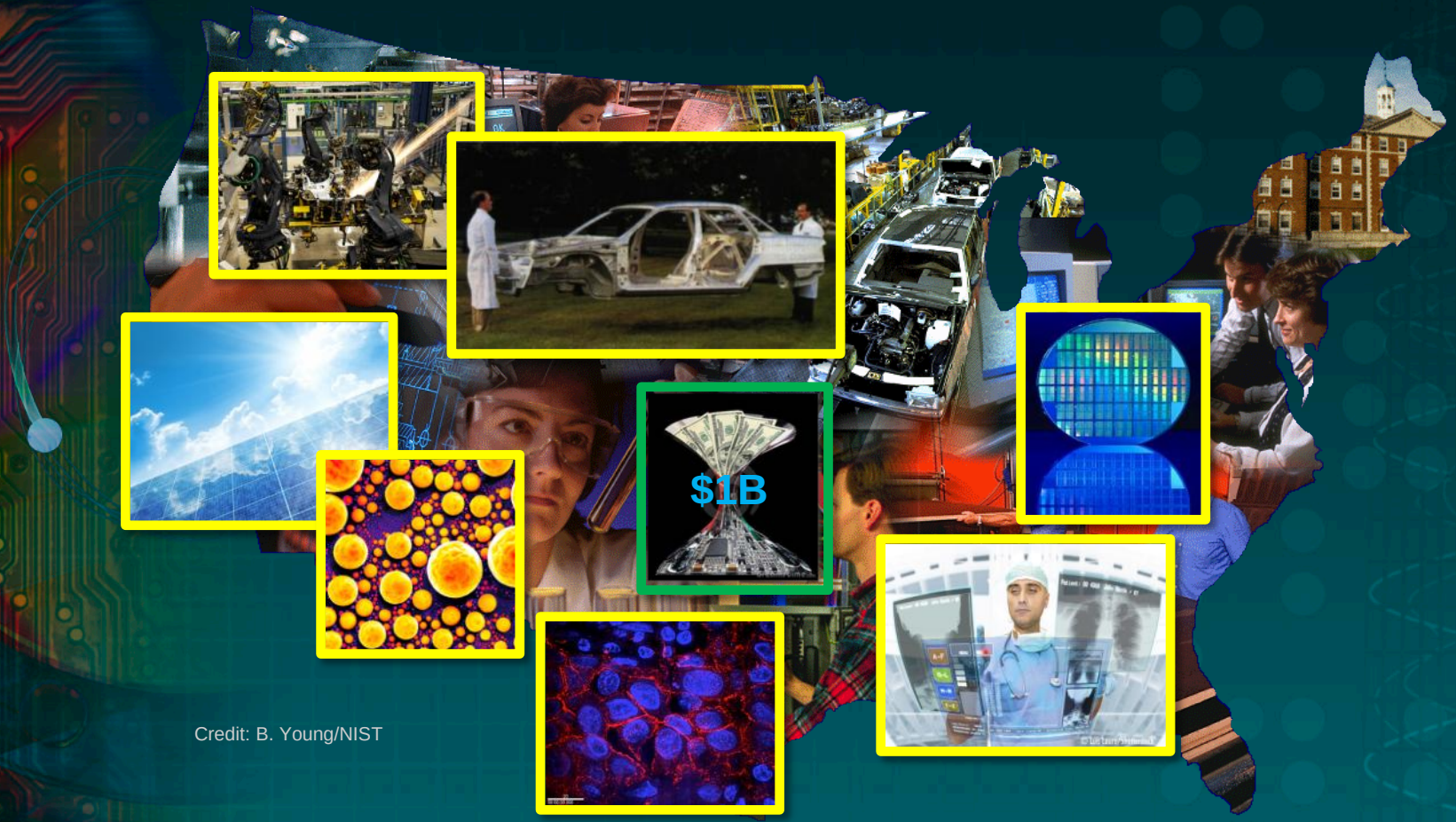
Basic science
Largely government funded

Commercialization
private sector owned/funded



NNMI Principles

National Network of Manufacturing Institutes



Credit: B. Young/NIST

The network of institutes will be national, integrated, and dynamic

Proposed NNMI Scope

Credit: B. Young/NIST

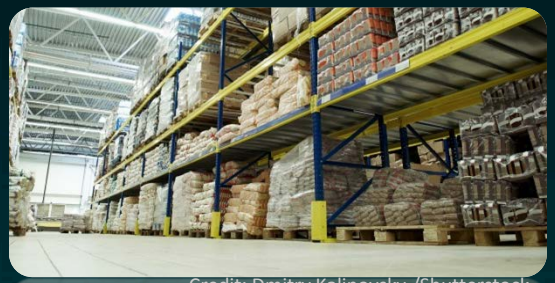
- Up to 15 linked regional clusters of manufacturing innovation across the country
- Shared approaches to infrastructure, intellectual property, contract research, and performance metrics
- As nodes of a network, the Institutes for Manufacturing Innovation complement each other's capabilities

Proposed Institute Attributes

- Integrate capabilities and facilities to reduce the cost and risk of commercializing new technologies
- Address relevant manufacturing challenges on a production-level scale
- Well-defined technical focus
- Intended to become a self-sustaining technical center of excellence

Proposed Institute Activities

Credit: anyaivanova /Shutterstock



Credit: Dmitry Kalinovsky /Shutterstock

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Applied Research & Demo projects for

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

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

Institute

Small/Medium Enterprises

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

Source: istockphoto

Credit: Lisa Young/Shutterstock

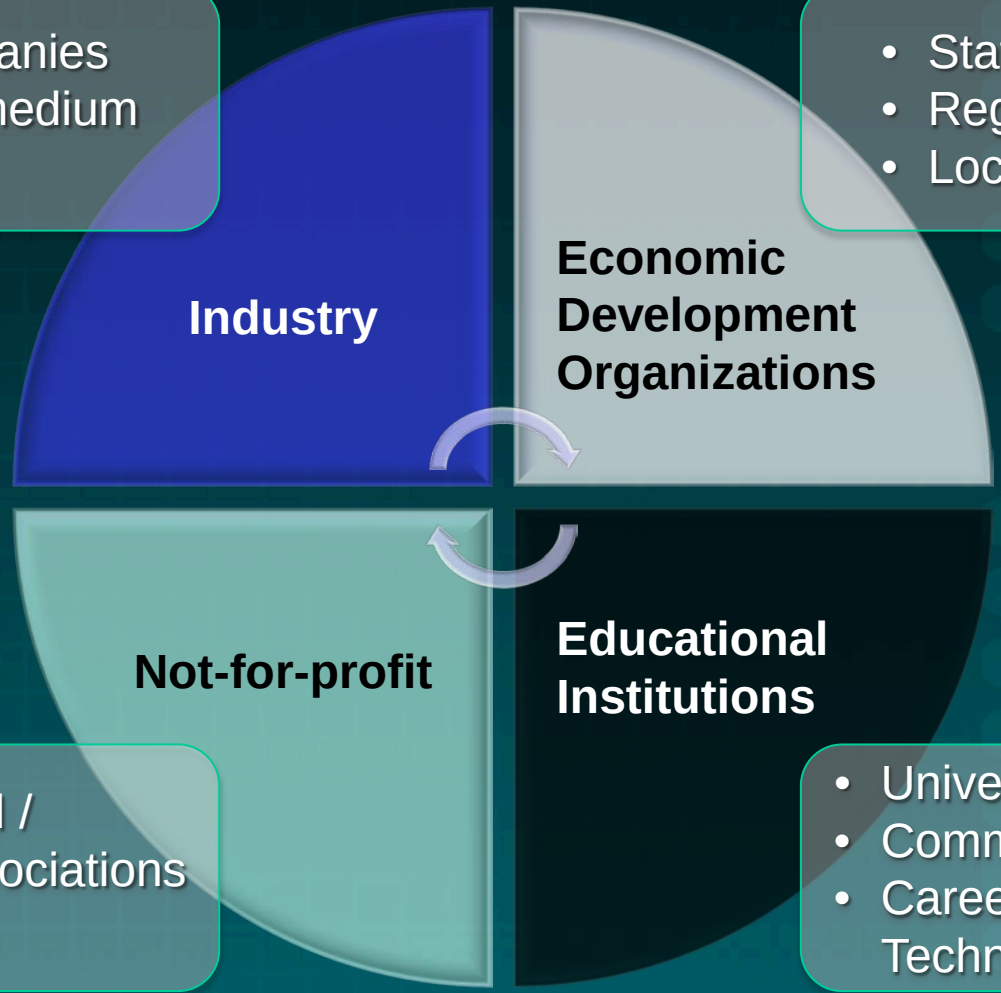
Education, technical skills and Workforce development

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



- Large companies
- Small and medium enterprises

- State
- Regional
- Local

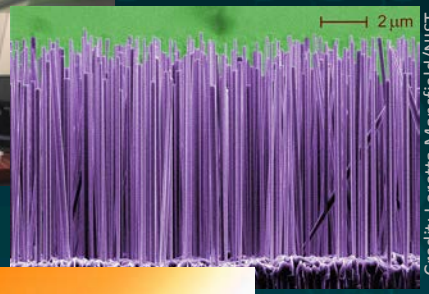
- Professional / industry associations
- Other

- Universities
- Community Colleges
- Career and Technical Institutes

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

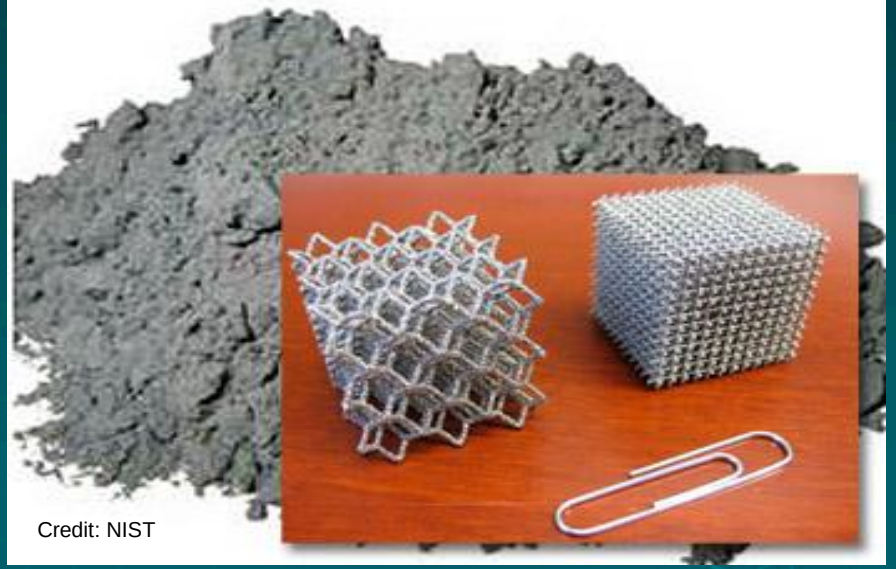
Pilot on Additive Manufacturing

Pilot Topic Chosen – Additive Manufacturing

Additive Manufacturing: Process of joining materials to make objects from 3D model data, usually layer upon layer, as opposed to subtractive manufacturing methodologies, such as traditional machining. Synonyms include *additive fabrication*, *additive processes*, *additive techniques*, *additive layer manufacturing*, *layer manufacturing* and *freeform fabrication* (ASTM 2792-12)

- Wide variety of structural and functional material types and processes
- Any of the following, or combinations of the following, AM focus areas:
  - Metallic Components
  - Polymeric/Composite Components
  - Electronic Components

"20% of output of 3D printers is now final products, rather than prototypes. By 2020 it may be 50%."
– *The Economist*



Credit: NIST

Additive Manufacturing Pilot

DOD-led, multiagency initiative occurring now
- NOT a Pilot Institute for Manufacturing Innovation

The Pilot is a way for us to demonstrate the concept of a multiple-agency, industry, and academia jointly executing a single program.

Demonstration effort based entirely on existing programs within the participating agencies.

There is much we will learn through the process of standing up the Pilot with our federal partners, and then enable us to use those lessons learned to benefit the eventual design and structure of the NNMI.

Award Schedule
BAA released on 8 May 2012
Proposer's Day held on 16 May 2012
Proposal Due Date: 14 June 2012
Agreement Award : 15 Aug 2012

Questions: NNMI2012@wpafb.af.mil

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

Photo credit: NIST/CNST

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.

Photo credit: Premier Inc.

How the Dialogues will work

- Four topics, with two, 75-minute concurrent sessions
  - One set in the morning
  - Second set in the afternoon
- Each of the eight sessions will be moderated by:
  - Agency lead + Facilitator + Scribe
- Each participant is assigned to two topics (one in morning; second in afternoon) based on preference and capacity
- After the second dialogue session, each moderator team will report out highlights of morning and afternoon sessions

Dialogue Engagement Team

Dialogue 1: Technologies with Broad Impact (Rooms 203 and 204)

Agency Leaders: *Prasad Gupte, NIST; John Vickers, NASA*

Facilitators: *Suhas Vaze; Beth Colbert*

Dialogue 2: Institute Structure and Governance (Rooms 223 and 224)

Agency Leaders: *Michael Schen, NIST; Carol Tolbert, NASA*

Facilitators: *Bob Schmidt; Mike O'Donnell*

Dialogue 3: Strategies for Sustainable Institute Operations (Rooms 207 and 208)

Agency Leaders: *Abhai Kumar, DOD; LaNetra Tate, NASA*

Facilitators: *Don Majcher; Dave Snow*

Dialogue 4: Education and Workforce Development (Rooms 233 and 234)

Agency Leaders: *Gregory Henschel; Robin Utz, Department of Education*

Facilitators: *Judith Crocker; Mary Ann Pacelli*

After today's workshop, consider…

- Spread the word about the NNMI
- Share and respond to the NNMI *Request for Information* in the Federal Register, open through Oct. 25th
- More regional workshops coming - Including
  - September: Irvine California – UC Irvine, National Academies, NIST
  - October: Denver Co - Univ of Colorado, DOE
  - November: Orlando FL with Defense Mfg Conference – Univ of Central FL, DOD
- Visit manufacturing.gov for updates
- Participate on the NNMI wiki

www.manufacturing.gov

MANUFACTURING.GOV

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ADVANCED MANUFACTURING

A national effort to support the creation of good jobs through U.S. manufacturing.

LEARN MORE

MAKE IT IN AMERICA

Learn more about the partnerships and programs boosting domestic manufacturing across America.

LEARN MORE

RESHORING

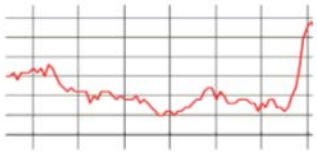
Moving manufacturing production back to the United States

LEARN MORE

NEWS
MANUFACTURING.GOV

President Proposes National Network for

INDICATORS & DATA
MANUFACTURING TRENDS



What the data are telling us about U.S. manufacturing.

200,000 jobs were added in December, while the

UPCOMING EVENTS
FOR MANUFACTURERS

MARCH 19-21, 2012
Innovation Engineering Leadership Institute
Woodstock, Vermont

The Innovation Engineering Leadership Institute (IE uses advanced education programs and digital too that build confidence in your ability to lead the creati communication and commercialization of meaningf unique ideas.

APRIL 23-25, 2012
Innovation Engineering Leadership Institute

ABOUT THE ADVANCED MANUFACTURING NPO

To maintain the partnership's momentum, U.S. Commerce Secretary John Bryson has initiated formation of the National Program Office (Advanced Manufacturing NPO). Hosted by the National Institute of Standards and Technology (NIST), the office will be staffed by representatives from federal agencies with manufacturing-related missions as well as fellows from manufacturing companies and universities.

Also recommended in PCAST's advanced manufacturing report, the Advanced Manufacturing NPO is charged with:

- *Convening and enabling industry-led, private-public partnerships focused on manufacturing innovation and engaging U.S. universities, and*
- *Designing and implementing an integrated whole of government advanced manufacturing initiative to facilitate collaboration and information sharing across federal agencies.*

By coordinating federal resources and programs, the Advanced Manufacturing NPO will enhance technology transfer in U.S. manufacturing industries and help companies overcome technical obstacles to scaling up production of new technologies.

WHO IS PART OF THE ADVANCED MANUFACTURING NPO?

Thank you

For questions or comments, please contact

Advanced Manufacturing National Program Office

amnpo@nist.gov

301-975-2830