Welcome Remarks

Kathleen Hogan

Deputy Assistant Secretary Energy Efficiency
U.S. Department of Energy

Innovation and Economic Impact

Ken Lund

Executive Director
Colorado Office of Economic Development
and International Trade

Welcome Remarks

William Farland

Vice President for Research
Colorado State University

Colorado State University

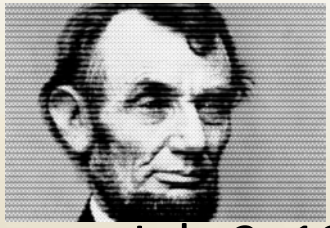
Welcome to Designing for Impact IV: Workshop on Building the NNMI

Millennium House
Boulder, CO
18 October 2012

Dr. Bill Farland
Vice President for Research

Colorado's Land-Grant University

Colorado State University



- July 2, 1862 – Morrill Act
  - Signed by President Abraham Lincoln granting federal land to each state to create colleges to educate anyone who had the talent and desire to be part of an educated citizenry.
  - It gave us the start to becoming the great research university we are today.
  - 150 years of opportunity
- Colorado's Land-Grant university
  - In 1870, Governor McCook signed a territorial bill authorizing the creation of what today is Colorado State University.
  - The mission of CSU is to provide access to university education for talented people from all walks of life – and to advance the quality of life through research, education, and outreach and engagement.

Today, Colorado State is

Colorado State University

- CSU is a world class top-ranked research university
  - CSU is a Carnegie Foundation “university of very high research activity”
  - Research expenditures topped $340M in FY2012
- CSU enrolls more Colorado HS graduates and STEM students than any other campus in the state.
- Twenty-five year history in manufacturing research, education and outreach supporting Colorado’s manufacturing companies and national competitiveness.
  - Colorado’s Manufacturing Extension Partnership founding partner
  - Industrial Assessment Center
  - Manufacturing Excellence Center
  - Committed to technology-based economic development in Colorado and the Rocky Mountain region.

CSU History in Manufacturing

Colorado State University

- Industrial Assessment Center
  - IAC serves the manufacturing industry of Colorado by providing energy and waste assessment audits.
  - The IAC team, comprised mostly of graduate and undergraduate students, provide specific recommendations with complete ROI analysis to the company.
  - Colorado's manufacturing sector becomes more competitive and sustainable.
- Manufacturing Excellence Center
  - A university-wide consortium of laboratories and centers focused on increasing profitability of Colorado's manufacturing industry
  - A single point of entry where manufacturing firms can obtain assistance in manufacturing automation, technical product development, management methods, advanced materials and processes, concurrent engineering and design practices, quality, efficiency, and productivity methods."

Advanced Manufacturing

Colorado State University

- "... is a family of activities that (a) depend on the use and coordination of information, automation, computation, software, sensing, and networking, and/or (b) make use of cutting-edge materials and emerging capabilities enabled by the physical and biological sciences, for example nanotechnology, chemistry, and biology. This involves both new ways to manufacture existing products, and especially the manufacture of new products emerging from new advanced technologies." (PCAST June 2011)
- "… is not limited to emerging technologies; rather, it is composed of efficient, productive, highly integrated, tightly controlled processes across a spectrum of globally competitive U.S. manufacturers and suppliers. For advanced manufacturing to accelerate and thrive in the United States, it will require the active participation of communities, educators, workers, and businesses, as well as Federal, State, and local governments." (PCAST July 2012)

President's Council of Advisors on Science and Technology (PCAST), June 2011
Report to the President on Ensuring American Leadership in Advanced Manufacturing

President's Council of Advisors on Science and Technology (PCAST), July 2012
Report to the President on Capturing Domestic Competitive Advantage in Advanced Manufacturing

CSU Embraces the Vision

Colorado State University

Given the land-grant heritage and the wealth of expertise in place, Colorado State University has a unique opportunity to address needs of Colorado's manufacturing sector.

Our collective focus:

- "…rapid transfer of science and technology (S&T) into manufacturing products and processes." (PCAST, April 2010.)

Our collective goal:

- "… improving the performance of US industry through the innovative application of technologies, processes and methods to product design and production." (PCAST, June 2011)

CSU stands ready to help!...Go Rams!

Welcome Remarks

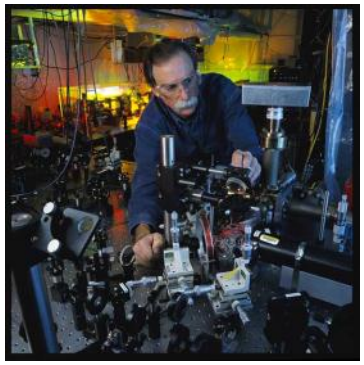
Patricia Rankin

Associate Vice Chancellor for Research
University of Colorado Boulder

CU Boulder:
Research, Innovation, and Partnerships for Advanced Manufacturing

Patricia Rankin
Associate Vice Chancellor for Research
University of Colorado, Boulder

Welcome!
Delighted to be part of discussions



- **Leveraging our strengths**
  - CU-Boulder has synergistic relationships with local federal labs
    - ***JILA: NIST & CU-Physics – 4 Nobel Prize winners***
    - ***RASEI: NREL (DOE) and CU***
    - ***CIRES: NOAA and CU***
    - ***LASP: Collaborating with NASA, NOAA & NIST***
  - CU-Boulder has strong relationships with industry
    - ***Aerospace, Energy, Biotechnology, Materials, Cleantech***
  - Strategic planning – continue to build infrastructure and connections with industry

JILA
CU Boulder and NIST

rasei
NREL
Renewable & Sustainable Energy Institute

CIRES
Cooperative Institute for Research in Environmental Sciences

LASP
Laboratory for Atmospheric and Space Physics
University of Colorado at Boulder

The Role of Universities in Advanced Manufacturing

- As outlined in the recent report from the Advanced Manufacturing Partnership, the nation's innovation economy depends on a close coupling of R&D and production.

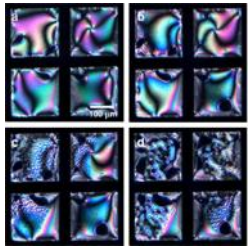
- Universities such as CU-Boulder undertake both basic and applied research that will help drive the innovations on which advanced manufacturing will depend.

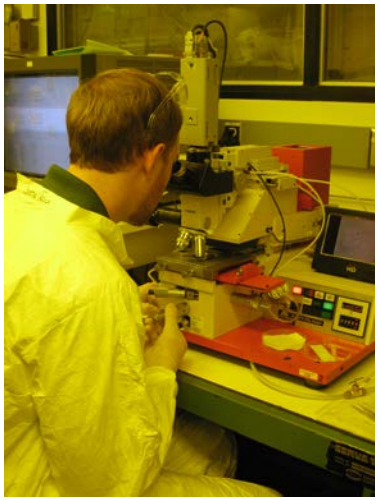
- Efforts to bring together industry, academia, and government will be critical to supporting advanced manufacturing at the regional and national level.

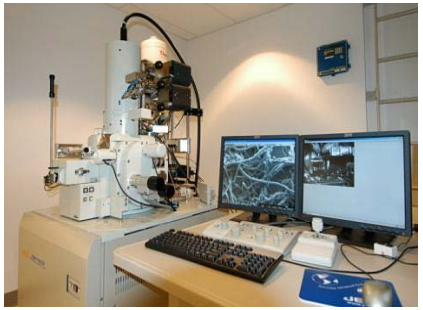
How can we best contribute?

Areas of strength at CU-Boulder:

- Materials Science and Engineering
- Structural Control and Robotics
- Nano- and Micro-Mechanics, including MEMs (micro-electro-mechanical systems) and photonics
- Metrology and Measurement Science and Engineering
- Computational Science and Engineering

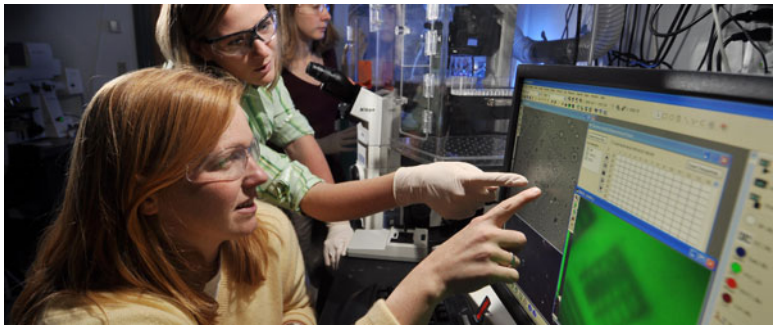






CU labs and facilities available to manufacturers:

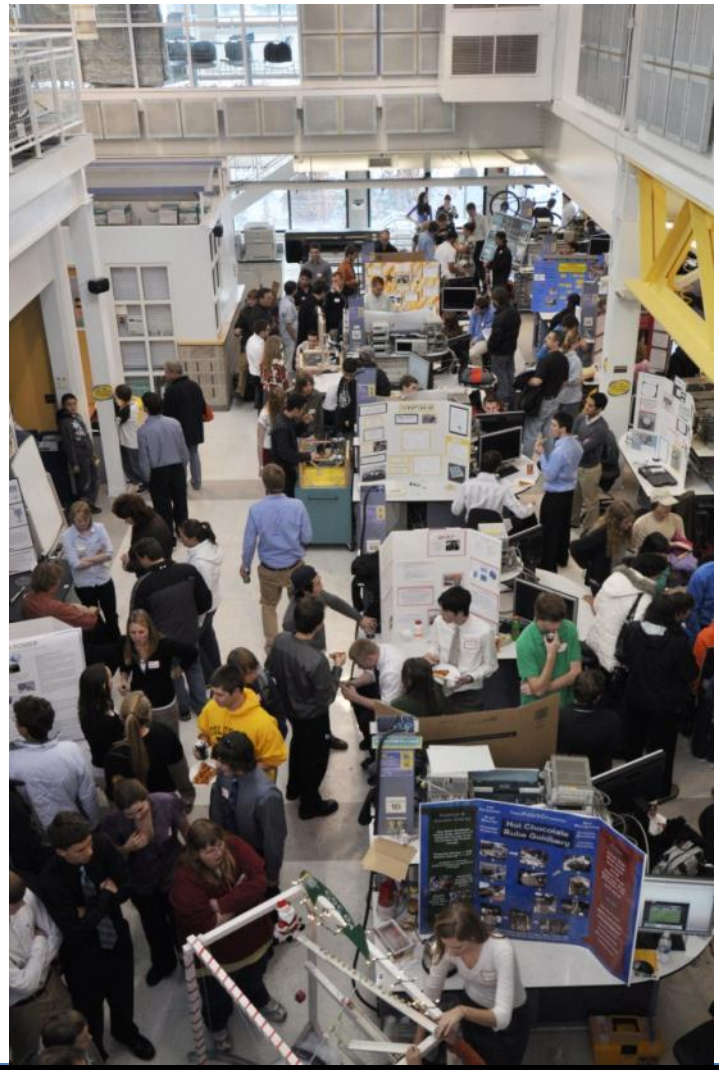
- Liquid Crystals Materials Research Center: http://lcmrc.colorado.edu/
- Nanomaterials Characterization Facility: http://ncf.colorado.edu/
- Colorado Nanofabrication Lab (prototype device fabrication with new materials): cnl.colorado.edu
- BioFrontiers Institute: http://biofrontiers.colorado.edu/



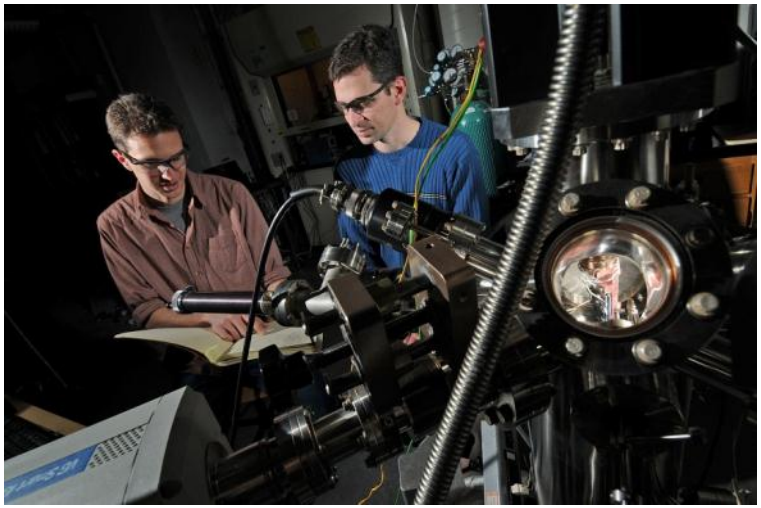
How can we best contribute?

- Workforce Development
  - CU provides graduate and professional education, which are critical to business and community leadership
    - ***The CU System confers 60% of master's degrees and 54% of doctoral degrees in Colorado***

- The National Science Foundation ranks the CU System 8th among public universities for federally financed R&D in science and engineering.
  - How do we best return that investment
    - ***To the State?***
    - ***To the Country?***

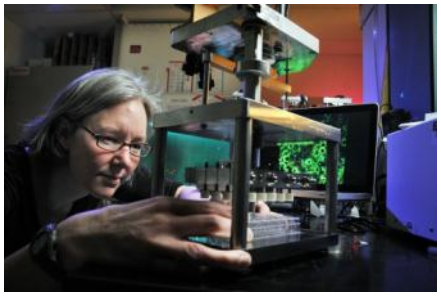


Fostering Technology Revolutions

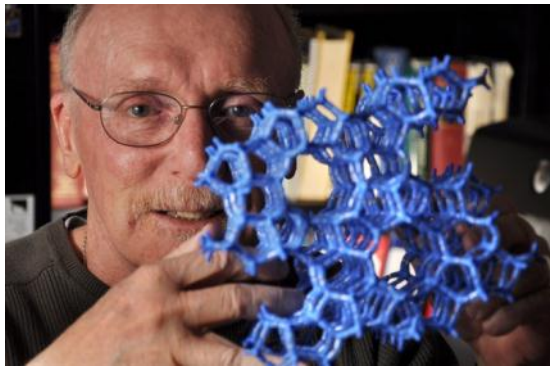


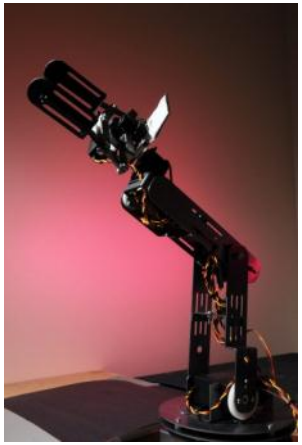
- Faculty research cultivates technology transfer and business start-ups.
- Over the past five years, 51 startup companies based on CU System technology and research have emerged. In fiscal year 2008, CU System tied for 10th nationally with other major universities for its 11 startups.
- Since 2002, efforts to promote and market technology created at the CU System have generated $121.2 million in revenue.

Current Tech Transfer Portfolio



- Biosciences ~ 65%
- Cleantech ~ 10%
  - State has 4th largest Cleantech job concentration in the Nation
- Physical Sciences and Engineering ~ 15%
- Software ~ 15%



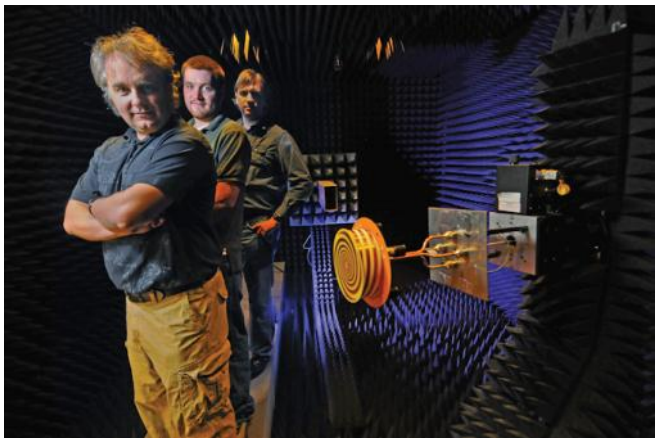


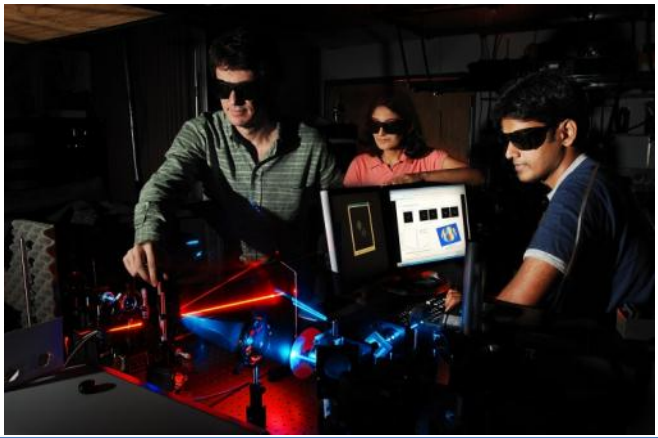
Looking to the Future

- Universities such as CU can play a leading role in public-private partnerships that support our regional and national economy.

- CU recently joined the Colorado Advanced Manufacturing Alliance (CAMA), and looks forward to partnering with the State, industry, the federal government and other universities to support advanced manufacturing.

- CU is also always looking for ways to grow and further engage the community
  - Outreach
  - Feedback
  - Business Processes





Welcome again, looking forward to discussions…..

Innovation and Economic Impact

Phil Singerman

Associate Director for Innovation and Industry Services,
NIST/U.S. Department of Commerce

Framing the Challenge

Mike Molnar

Director, Advanced Manufacturing National Program Office
and
Chief Manufacturing Officer,
National Institute of Standards and Technology (NIST)

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

AMP Co-chairs

Andrew Liveris
CEO, Dow Chemical

Susan Hockfield
President, MIT

AMP report released July 17, on whitehouse.gov

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

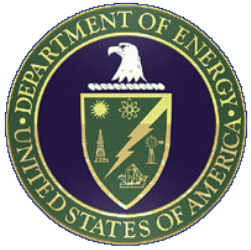
Two early actions announced by Administration:

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)

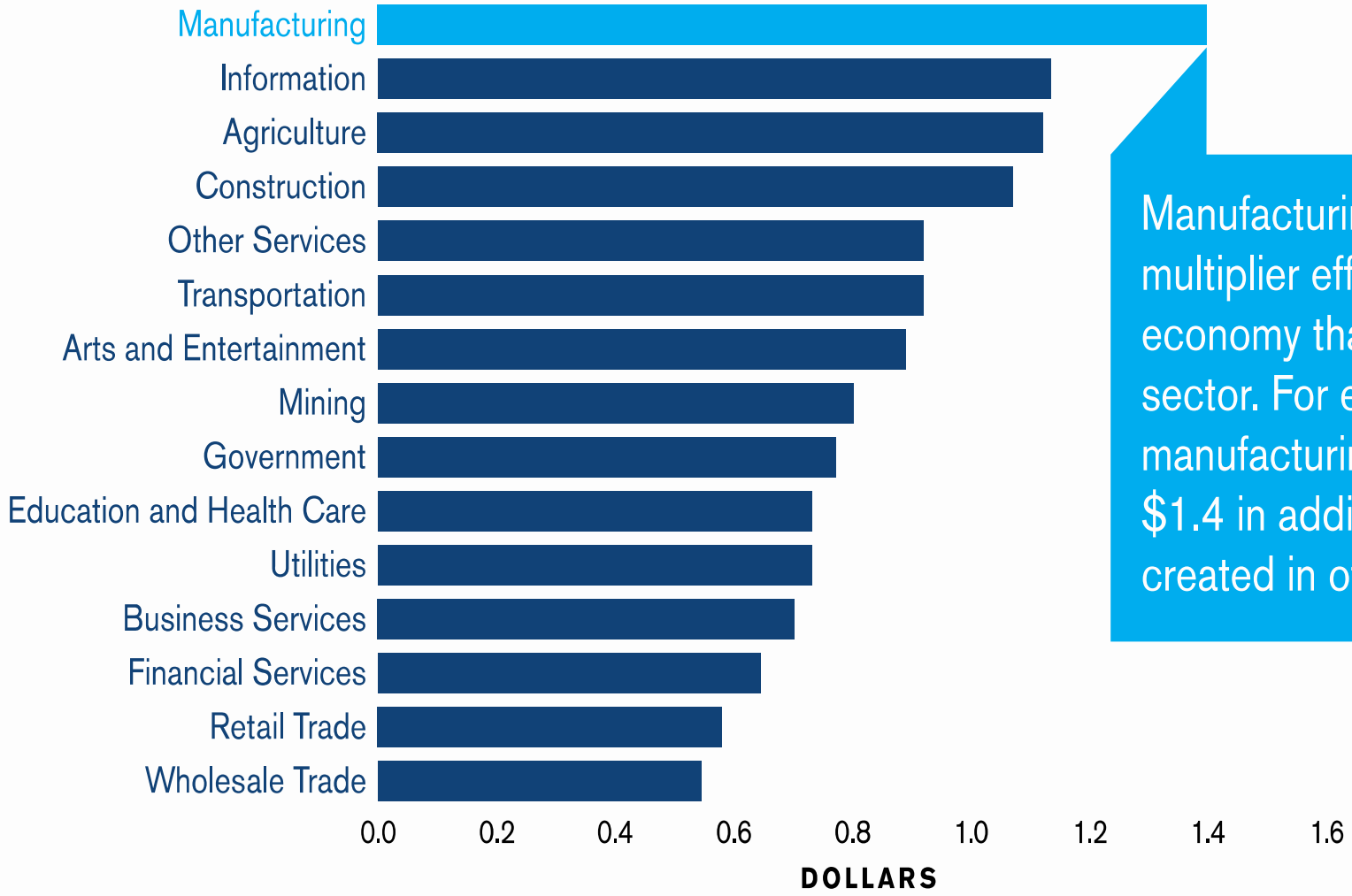
AMNPO activities

- ***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

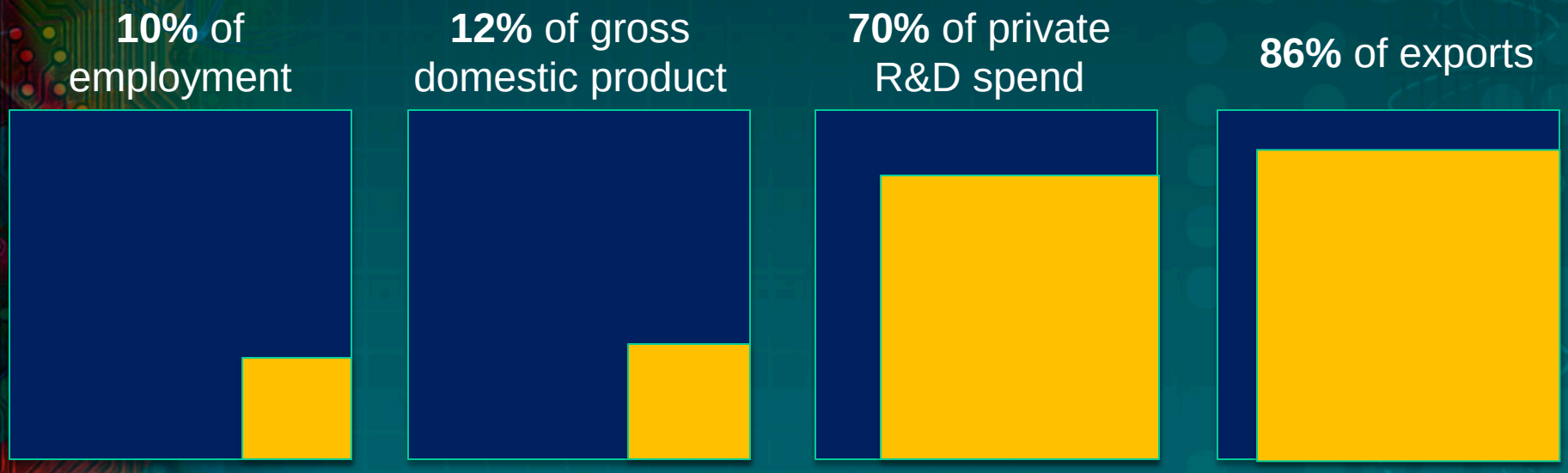


Manufacturing has a higher multiplier effect on the economy than any other sector. For every $1 in manufacturing value added, $1.4 in additional value is created in other sectors.

Manufacturing Innovation Impact

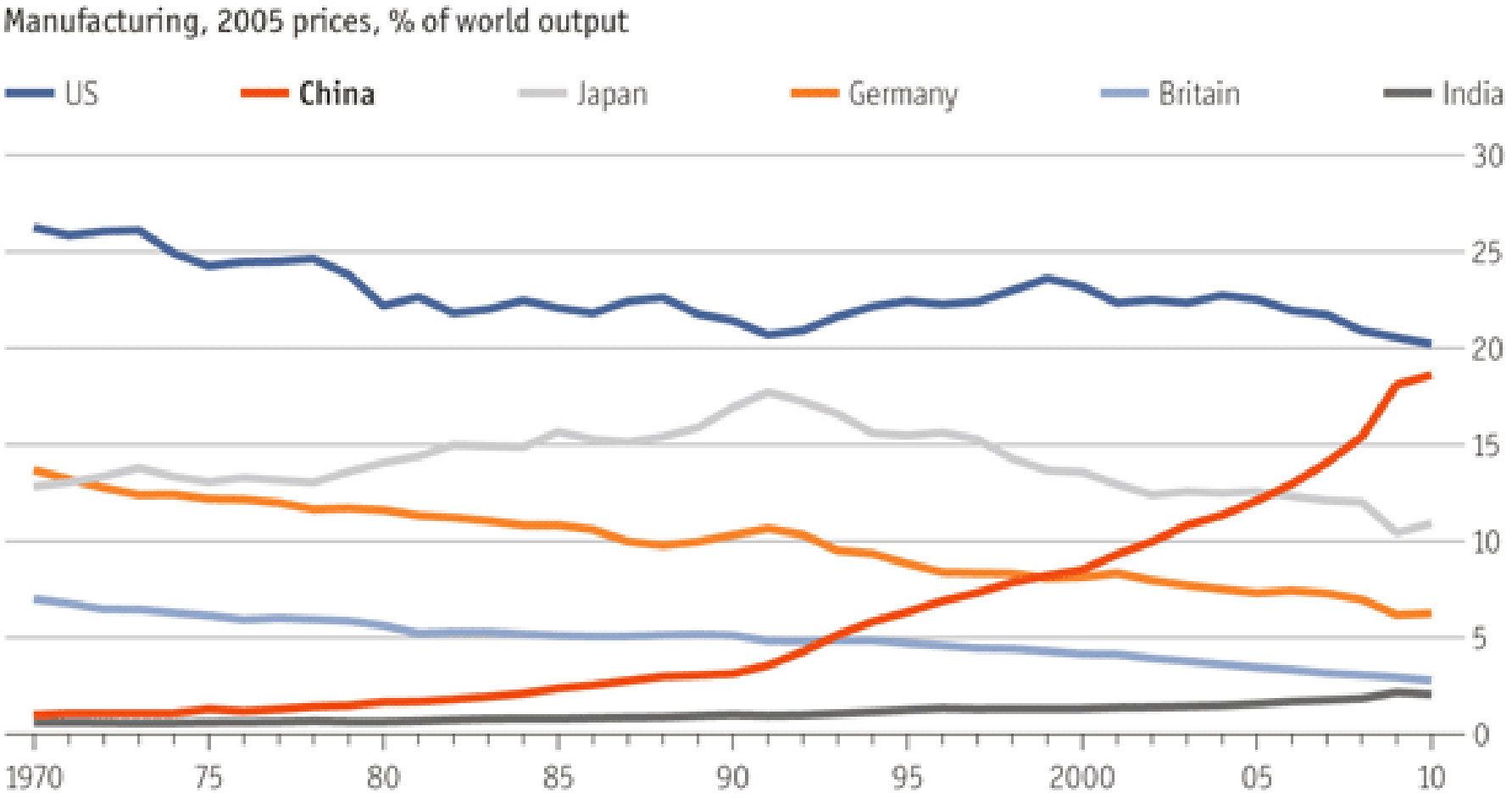
U.S. manufacturers

- 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



Misperception – US lost Mfg Leadership

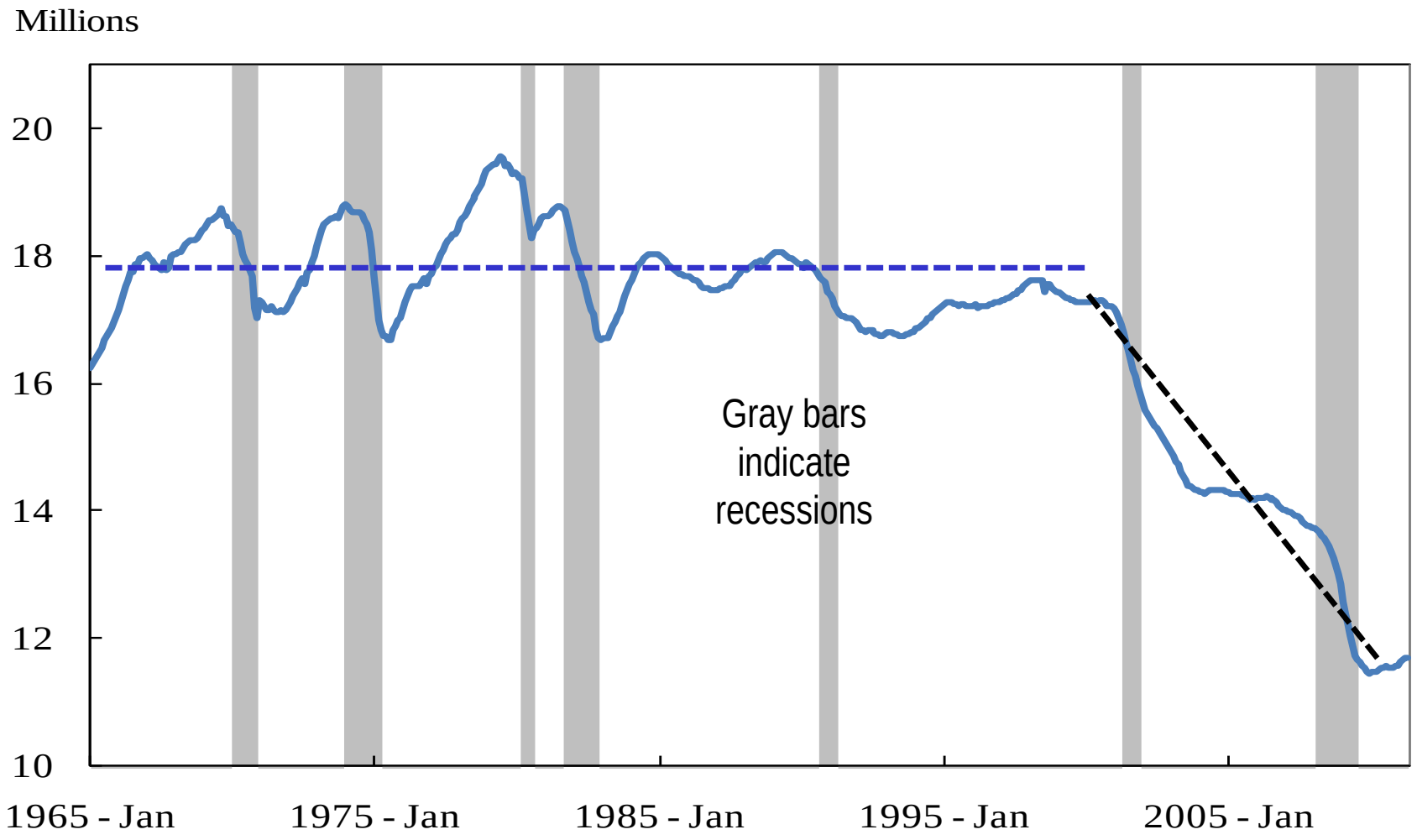
World output has never been higher, helping millions rise from poverty
US is world manufacturing leader, China's growth not "zero sum game"
US can remain globally competitive – technology, productivity, quality



Misperception - Productivity on Employment

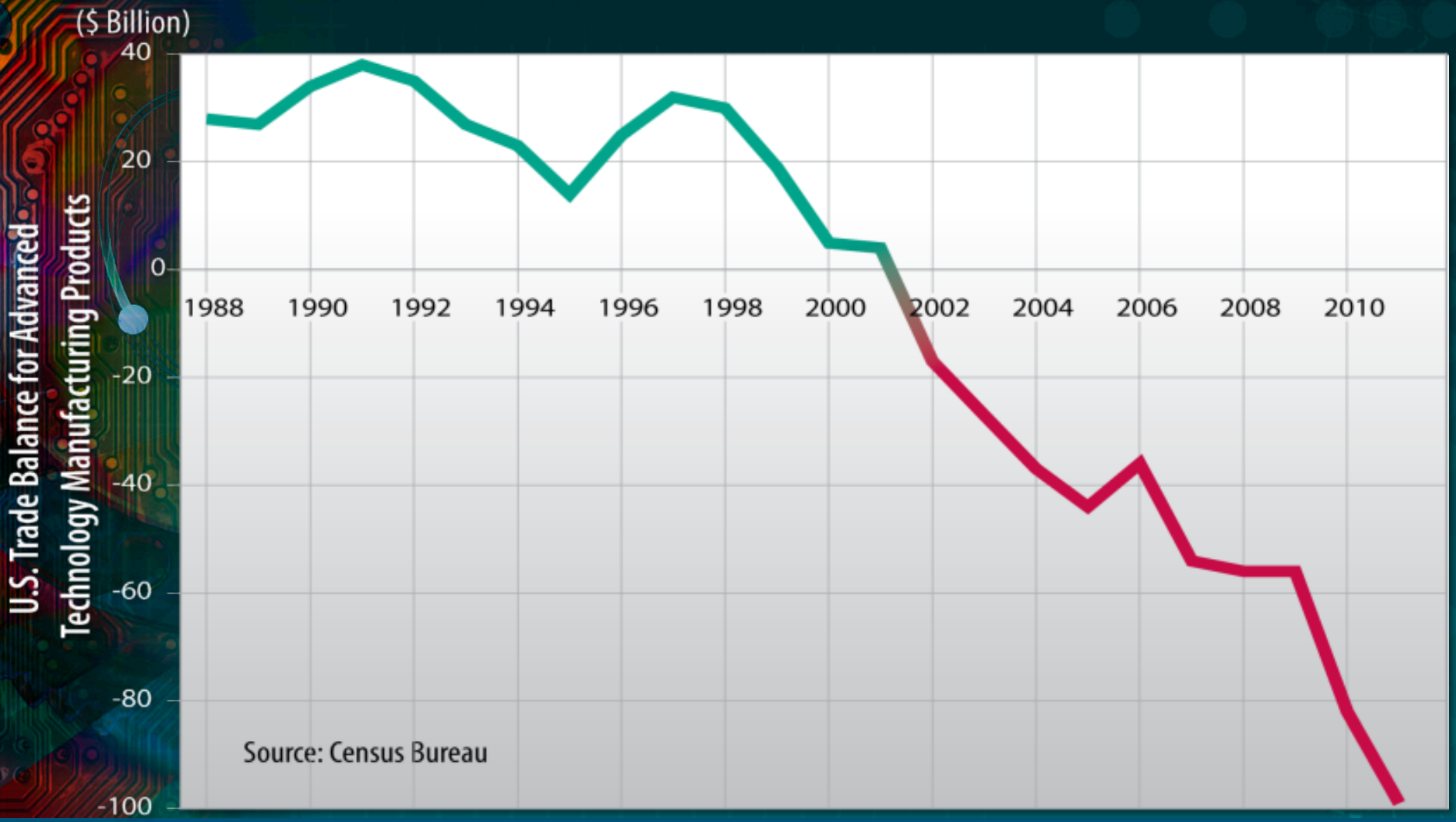
Rising Productivity does ***not*** create employment losses

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 NNMI Initiative

"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

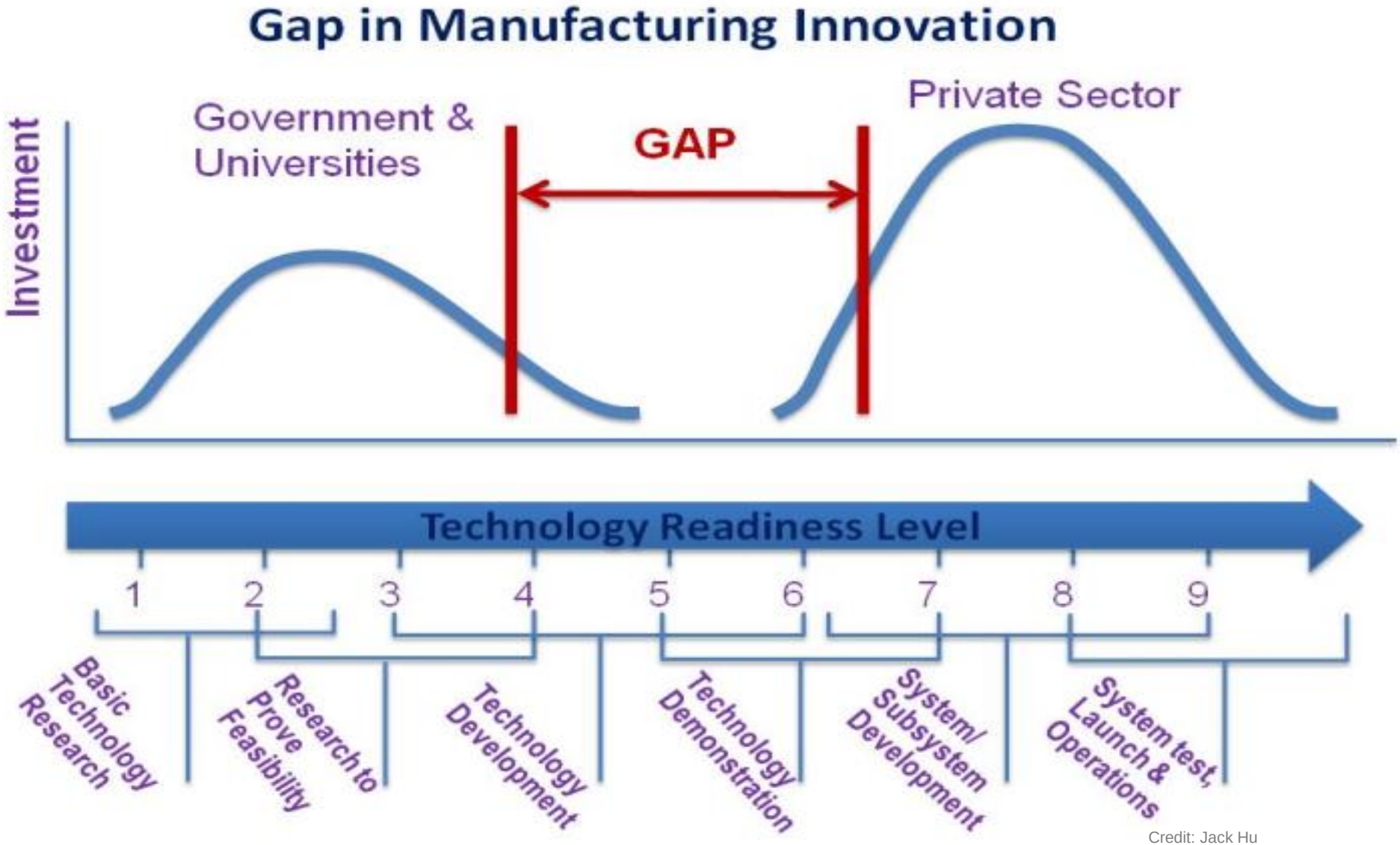
Proposed NNMI Scope

Credit: B. Young/NIST

- Up to 15 linked regional clusters of manufacturing innovation across the country
- Each institute has a well-defined technical focus, intended to be self-sustaining technical centers of excellence
- Shared approaches to infrastructure, intellectual property, contract research, and performance metrics

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

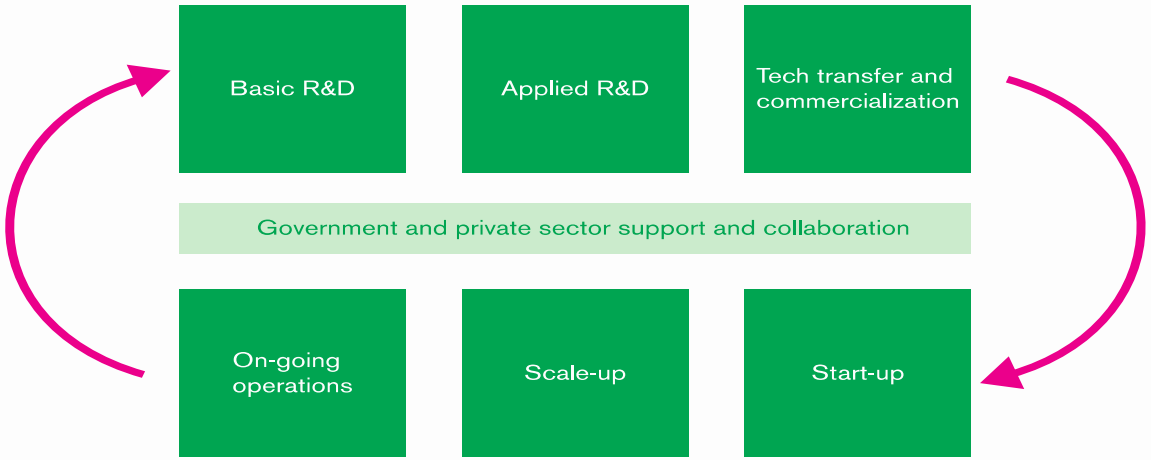
*including commercialization

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



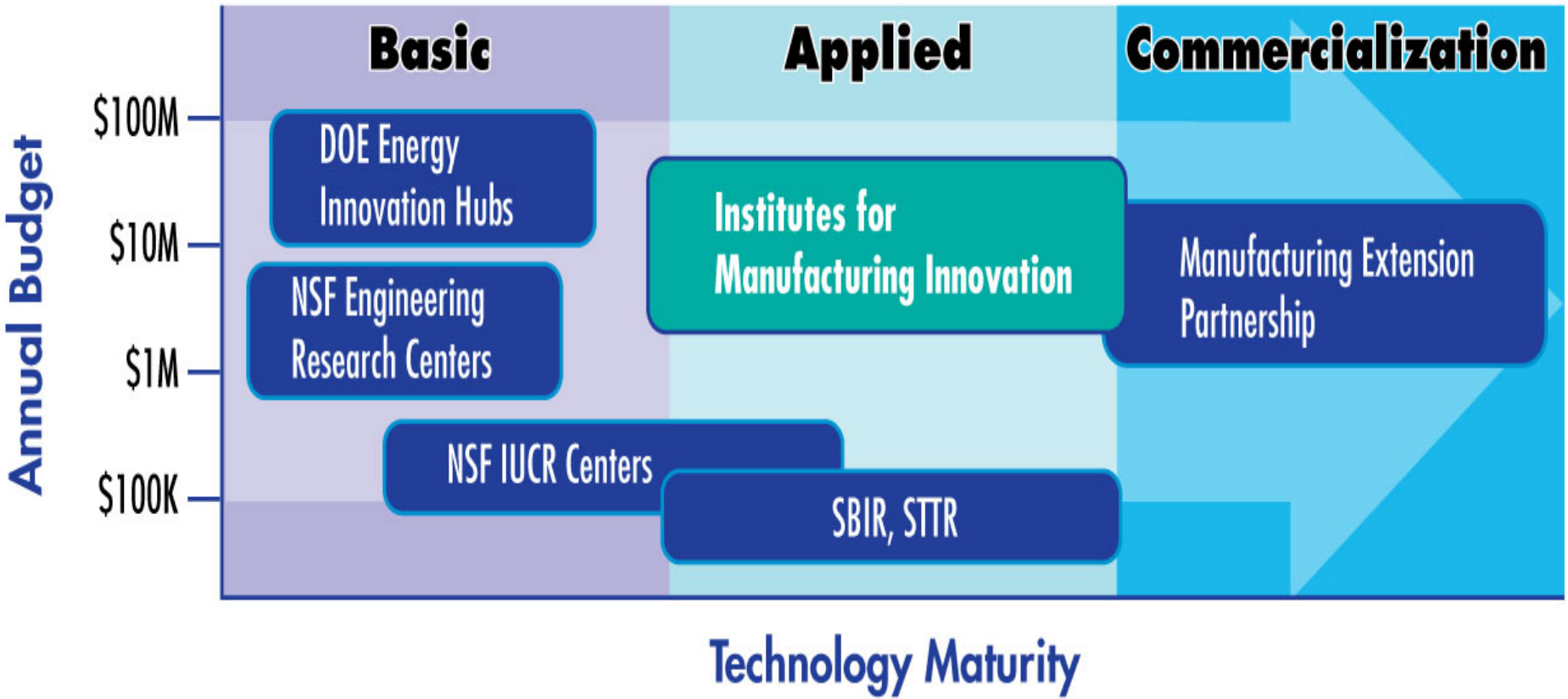
For illustrative purposes.

Source: Council on Competitiveness

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

A network of institutes focused on reducing the cost and risk of commercializing transformative new technologies

Address relevant manufacturing challenges on a production-level scale

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

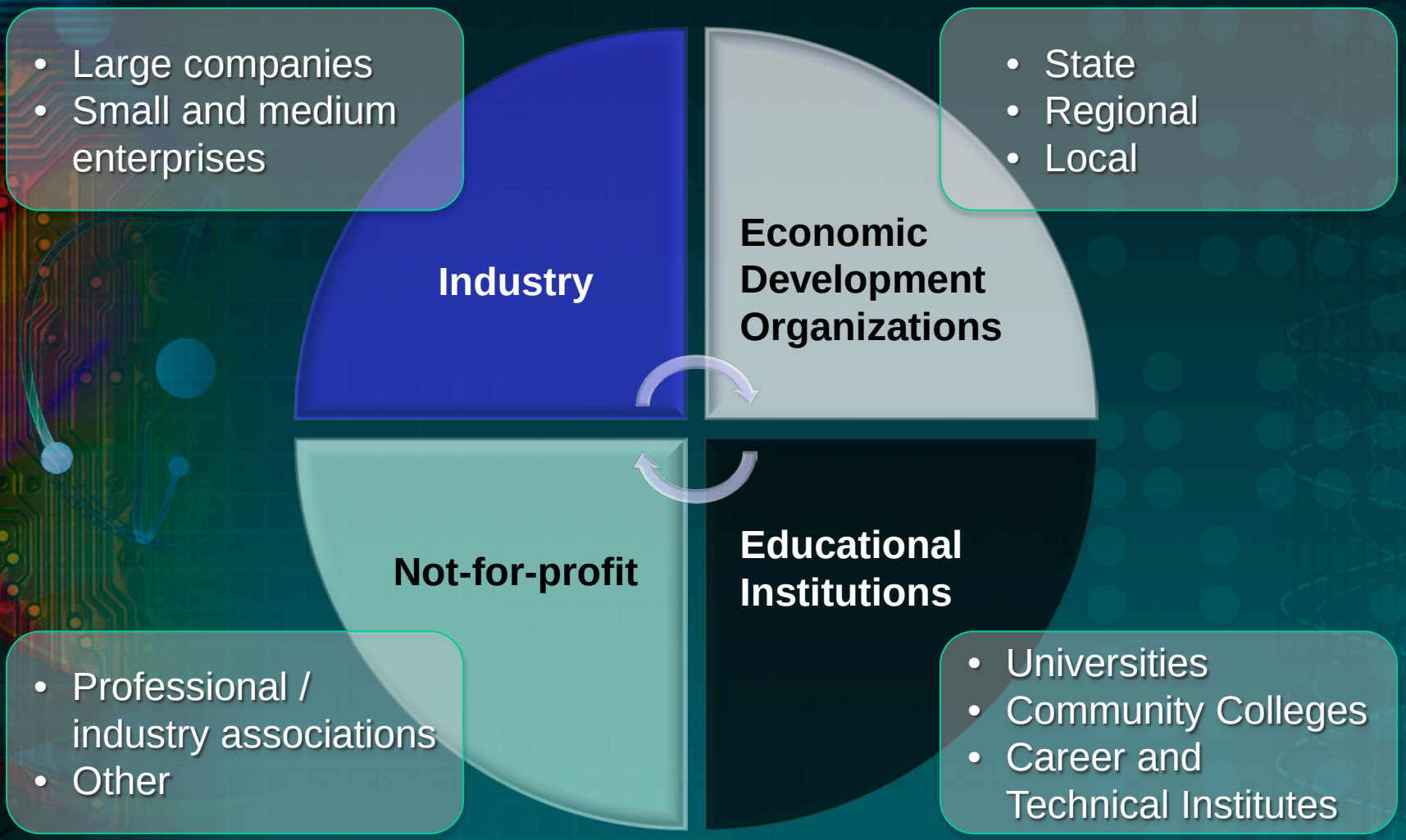
Education, technical skills and Workforce development

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

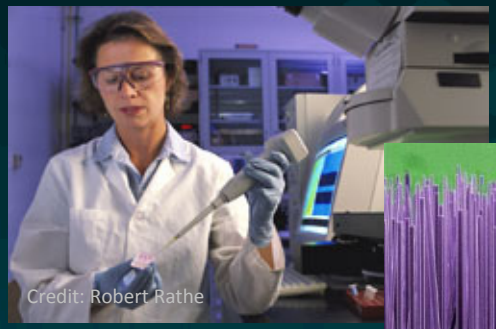
Partnerships are Essential

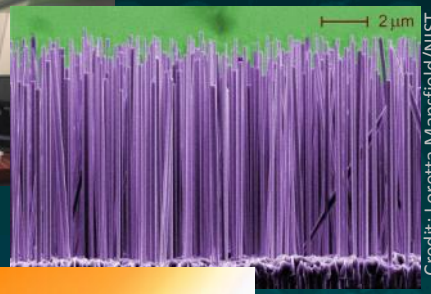


Participation and Co-investment by partners is essential

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

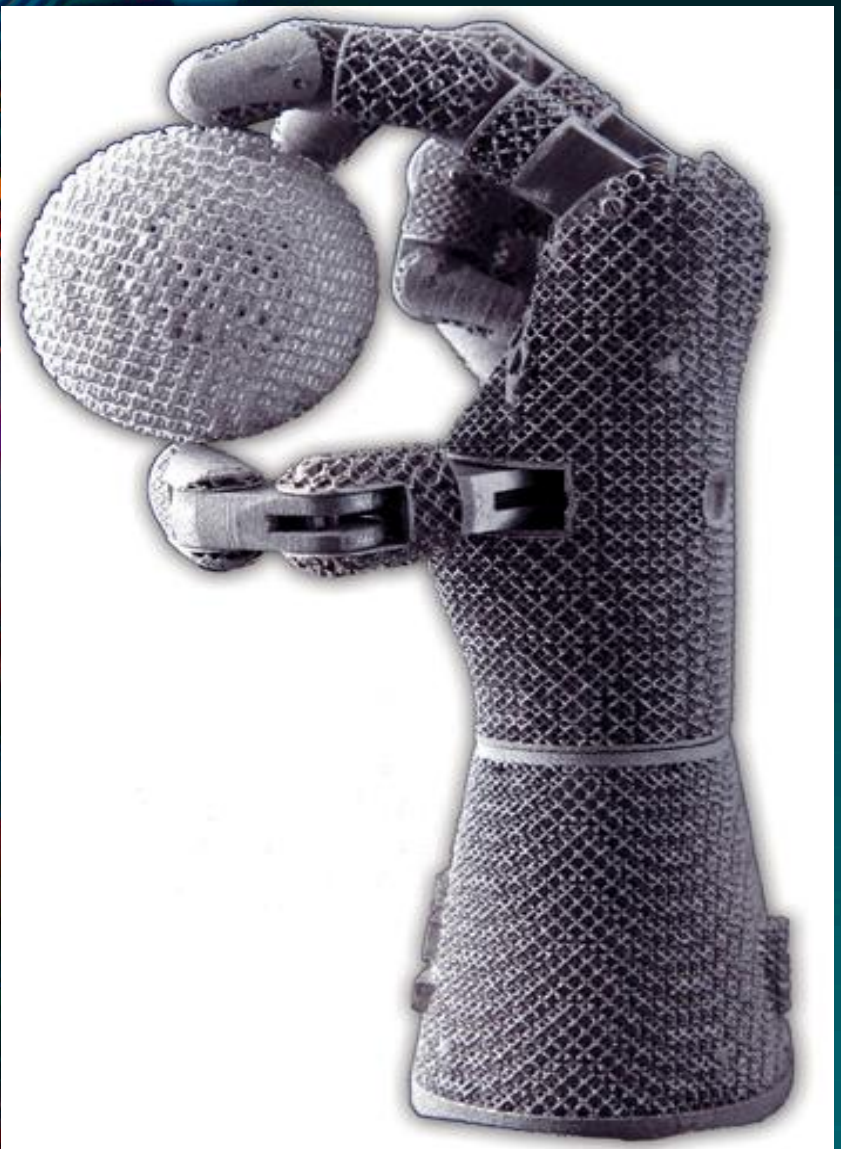
- e.g. smart, sensor-enabled manufacturing for productivity and sustainability

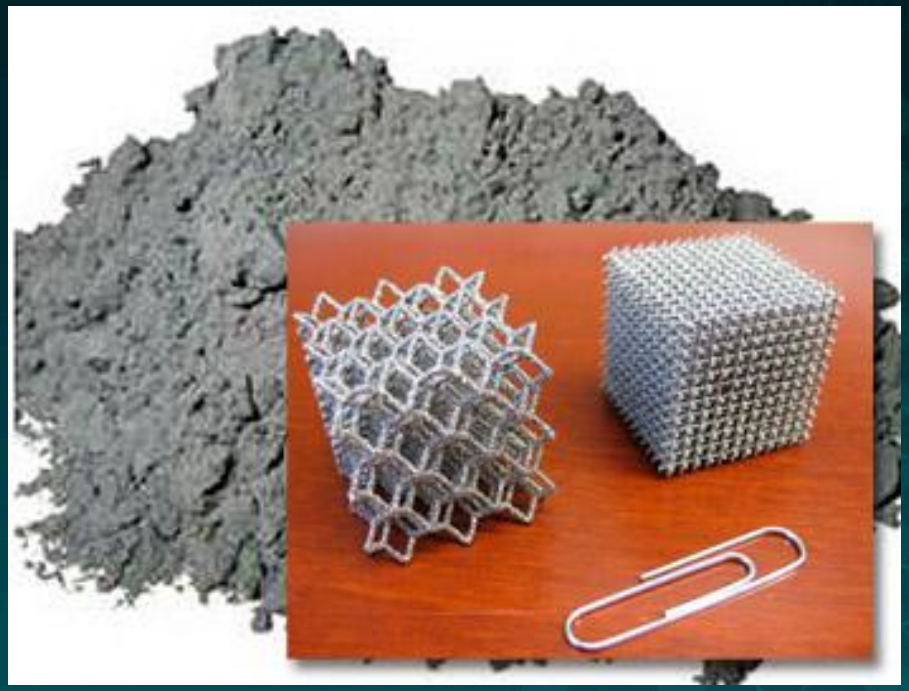
An Industry Sector

- 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	Award

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

NAMII Initial, Regional Partners

*Proposed thrust lead area in parentheses

For More Information on NAMII…

www.namii.org

NAMII NATIONAL ADDITIVE MANUFACTURING INNOVATION INSTITUTE

driven by NCDMM

Home | About NAMII » | Members » | Join | Technology | Projects | News | Events | Contact Us

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

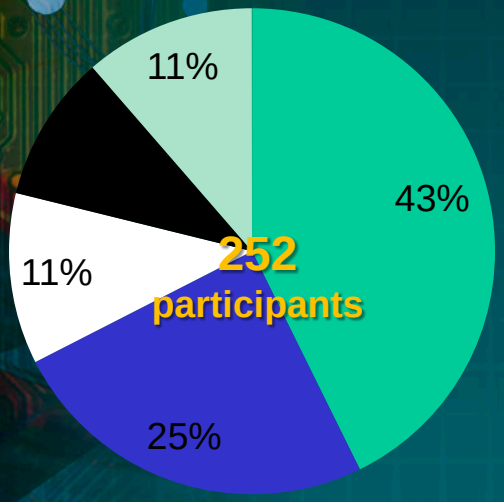
Why we are here today

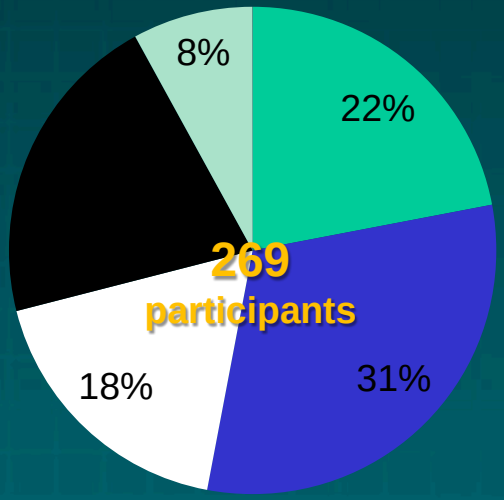
NNMI Design for Impact Workshops Completed

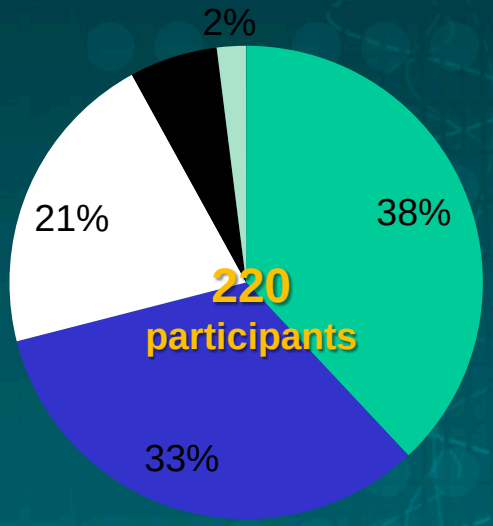
Rensselaer Polytechnic Institute
April 25, Troy New York

Cuyahoga Community College
July 9, Cleveland Ohio

National Academies Beckman Center
September 27, Irvine California







Academia Industry Fed & State Gov. Econ. Dev. Other

NNMI Public Design Engagement Plan

- NIST issues RFI for Institute and Network design, May 4 through October 25, 2012
- Four Public Design Input Workshops ➔ public report for each

- Compile voices, AMNPO creates NNMI Design from YOUR input
- Proposed: one or more regional “design review” events

Boulder Colorado

October 18th

- Colorado Office of Economic Development
- University of Colorado Boulder
- Colorado State University
- National Renewable Energy Laboratory

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 work

- Four concurrent topics in three 60-minute sessions
- Each session will be moderated by:
  - Agency lead + Facilitator + Scribe
- Each participant is assigned to three topics based on preference and capacity
- Key findings reported at end of the day
- Formal report made public on manufacturing.gov

Dialogue Engagement Team – Session 1

Dialogue 1: Technologies — Millennium Room

Agency Lead *John Hines, NASA*

Facilitator *Heather Evans* *Scribe: Blake Marshall*

Dialogue 2: Institute Structure and Governance — Suite 231

Agency Lead *Marina Sofos, DOE*

Facilitator *Gary Thompson* *Scribe: Kelly Visconti*

Dialogue 3: Sustainable Institute Operations — Suite 331

Agency Lead *Steve Schmid, NASA*

Facilitator *LaNetra Tate* *Scribe: Lynn Daniels*

Dialogue 4: Education & Workforce — Century Room

Agency Lead *Gregory Henschel, DoEd*

Facilitator *Richard Adams* *Scribe: Kevin Hedin*

Dialogue Engagement Team – Session 2

Dialogue 1: Technologies — Millennium Room

Agency Lead *John Vickers, NASA*

Facilitator *Heather Evans* *Scribe: Linda Rose*

Dialogue 2: Institute Structure and Governance — Suite 231

Agency Lead *Joni Richards, NASA*

Facilitator *Scott Smith* *Scribe: Marissa Cannady*

Dialogue 3: Sustainable Institute Operations — Suite 331

Agency Lead *Mike Schen, NIST*

Facilitator *Steve Schmid* *Scribe: Daryl Kohlerschmidt*

Dialogue 4: Education & Workforce — Century Room

Agency Lead *Adele Ratcliff, DoD*

Facilitator *Gary Thompson* *Scribe: Lynn Daniels*

Dialogue Engagement Team – Session 3

Dialogue 1: Technologies — Millennium Room

Agency Lead *John Hines, NASA*

Facilitator *Richard Adams* *Scribe: Kelly Visconti*

Dialogue 2: Institute Structure and Governance — Suite 231

Agency Lead *Scott Smith, NIST*

Facilitator *Marina Sofos* *Scribe: Cynthia Christie*

Dialogue 3: Sustainable Institute Operations — Suite 331

Agency Lead *LaNetra Tate, NASA*

Facilitator *Mike Schen* *Scribe: Marissa Cannady*

Dialogue 4: Education & Workforce — Century Room

Agency Lead *Gregory Henschel, DoEd*

Facilitator *Adele Ratcliff* *Scribe: Daryl Kohlerschmidt*

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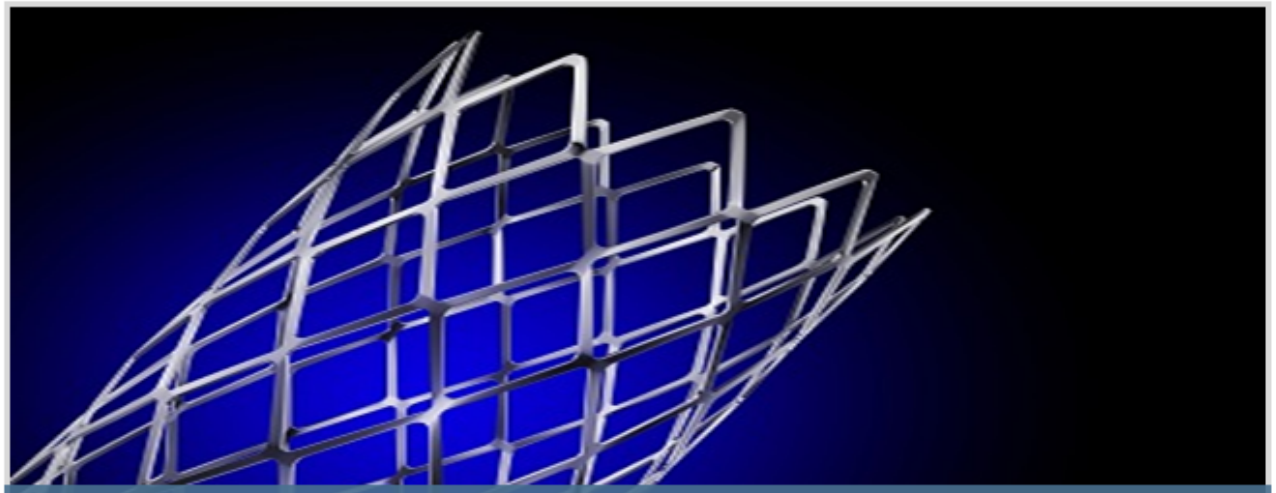
Events

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

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