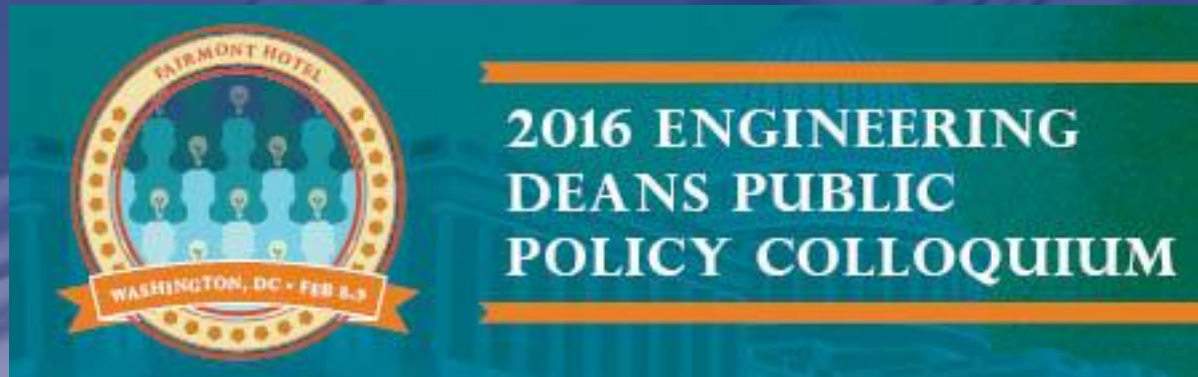




ADVANCED MANUFACTURING NATIONAL PROGRAM OFFICE
NATIONAL NETWORK FOR MANUFACTURING INNOVATION

Building a new partnership

Progress and Opportunities with the National Network for Manufacturing Innovation



February 9, 2016

Mike Molnar
Advanced Manufacturing
National Program Office



National Institute of Standards and Technology

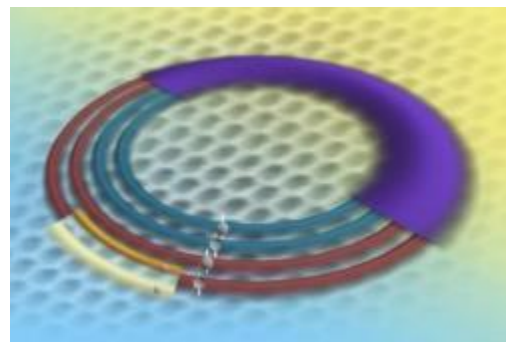
115 years with a unique mission

To promote U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology in ways that enhance economic security and improve our quality of life.

- Mission focus: Targeting Investments to Advance U.S. Innovation and Boost Economic Recovery
- Deep research expertise underpins technological innovation – e.g. lasers, memory, GPS, wireless
- Non-regulatory status enables important role as a convener that facilitates collaboration between industry, academia and government



Cybersecurity: Improved response to cyber threats



Nanomanufacturing: New measurement tools for advanced materials manufacturing



Energy: Measurements and standards for energy security

Interagency Advanced Manufacturing National Program Office (AMNPO)



Executive Office of the President



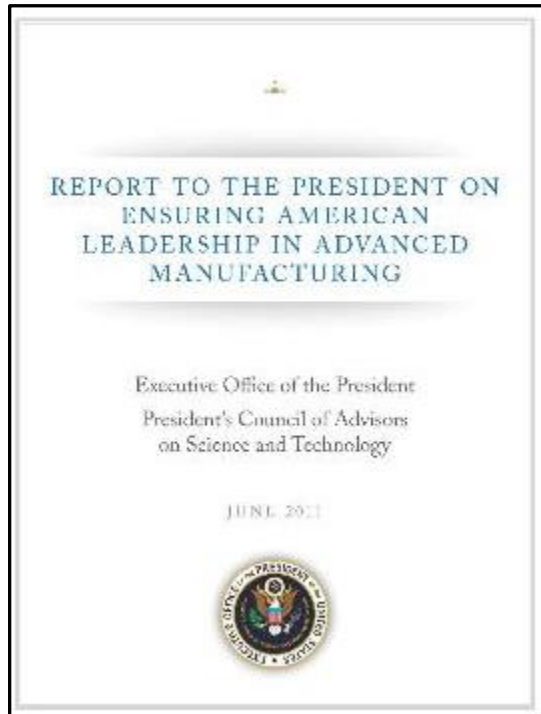
Advanced Manufacturing Partnership (AMP/PCAST)

Advanced Manufacturing National Program Office
(hosted by DOC - NIST)

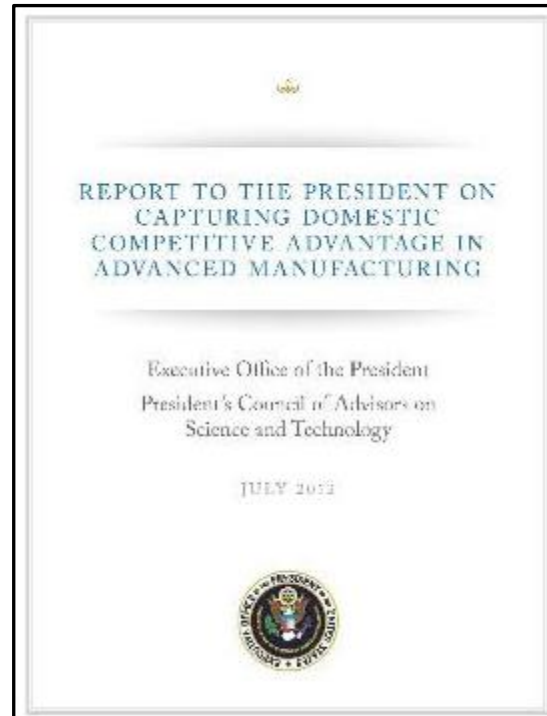
NSTC - Advanced Manufacturing Subcommittee

PCAST: The Independent Basis of NNMI

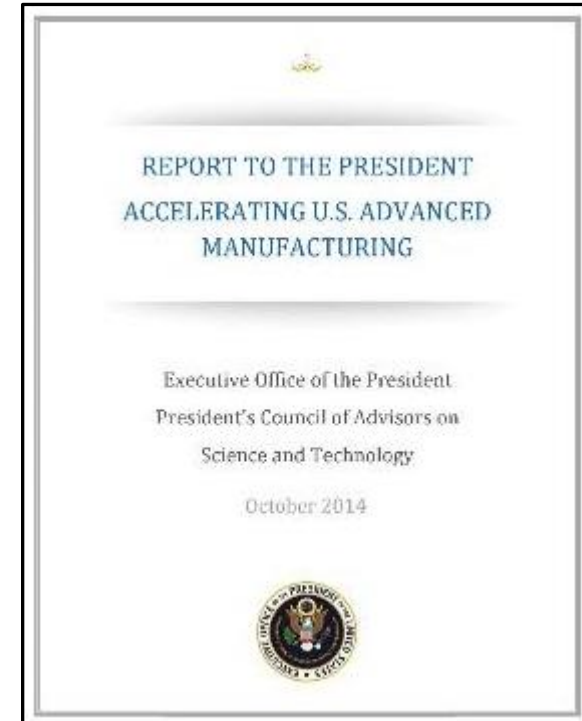
President's Council of Advisors on Science and Technology



PCAST 2011
***Recommends Advanced
Manufacturing Initiative as national
innovation policy***



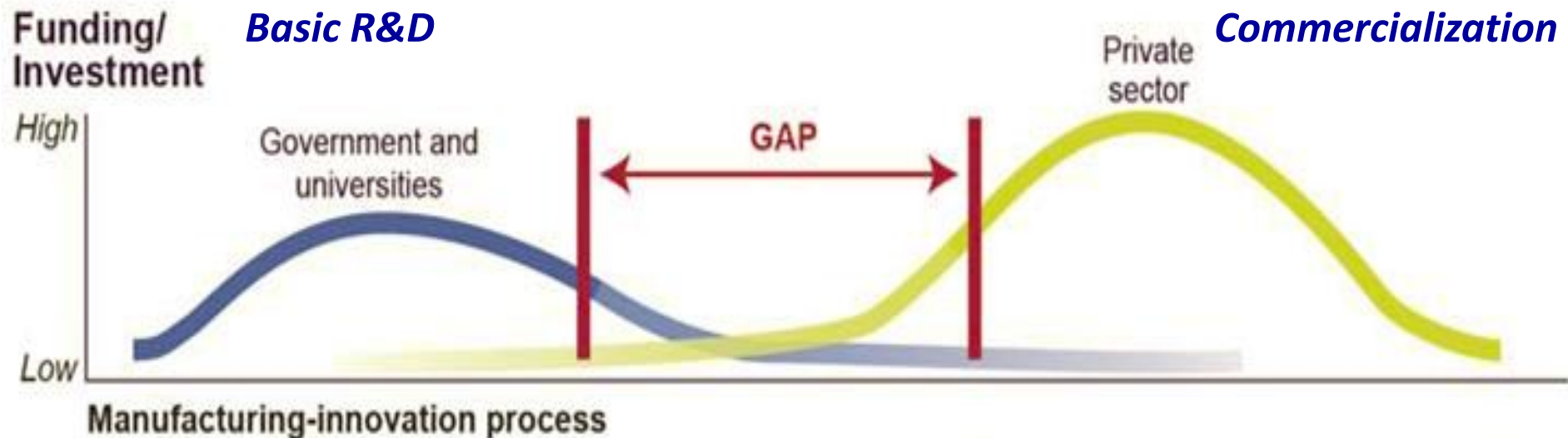
PCAST 2012
***Recommends Manufacturing
Innovation Institutes to address
key market failure***



PCAST 2014
***Recommends strong, collaborative
network of Manufacturing
Innovation Institutes***

NNMI: Addressing the “Scale-up” Gap

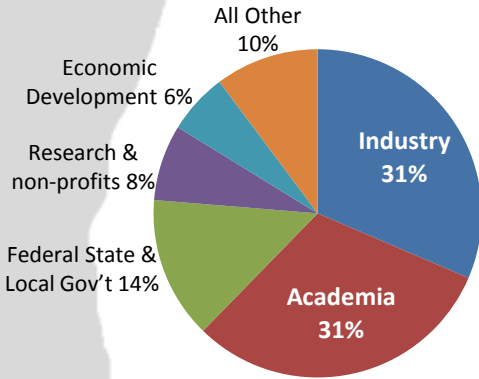
Focus is to address market failure of insufficient industry R&D in the “missing middle” or “industrial commons” to de-risk promising new technologies



Public Engagement on Design

Workshops & Request for Information

***Broad & Diverse Stakeholder Input
1,200 voices on the NNMI Design!***



**Rensselaer Polytechnic Institute
Troy New York**



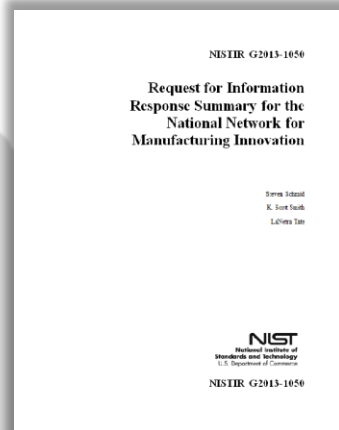
**University of Colorado
Boulder, Colorado**



**Cuyahoga Community College
Cleveland Ohio**



**National Academies Beckman Center
Irvine California**

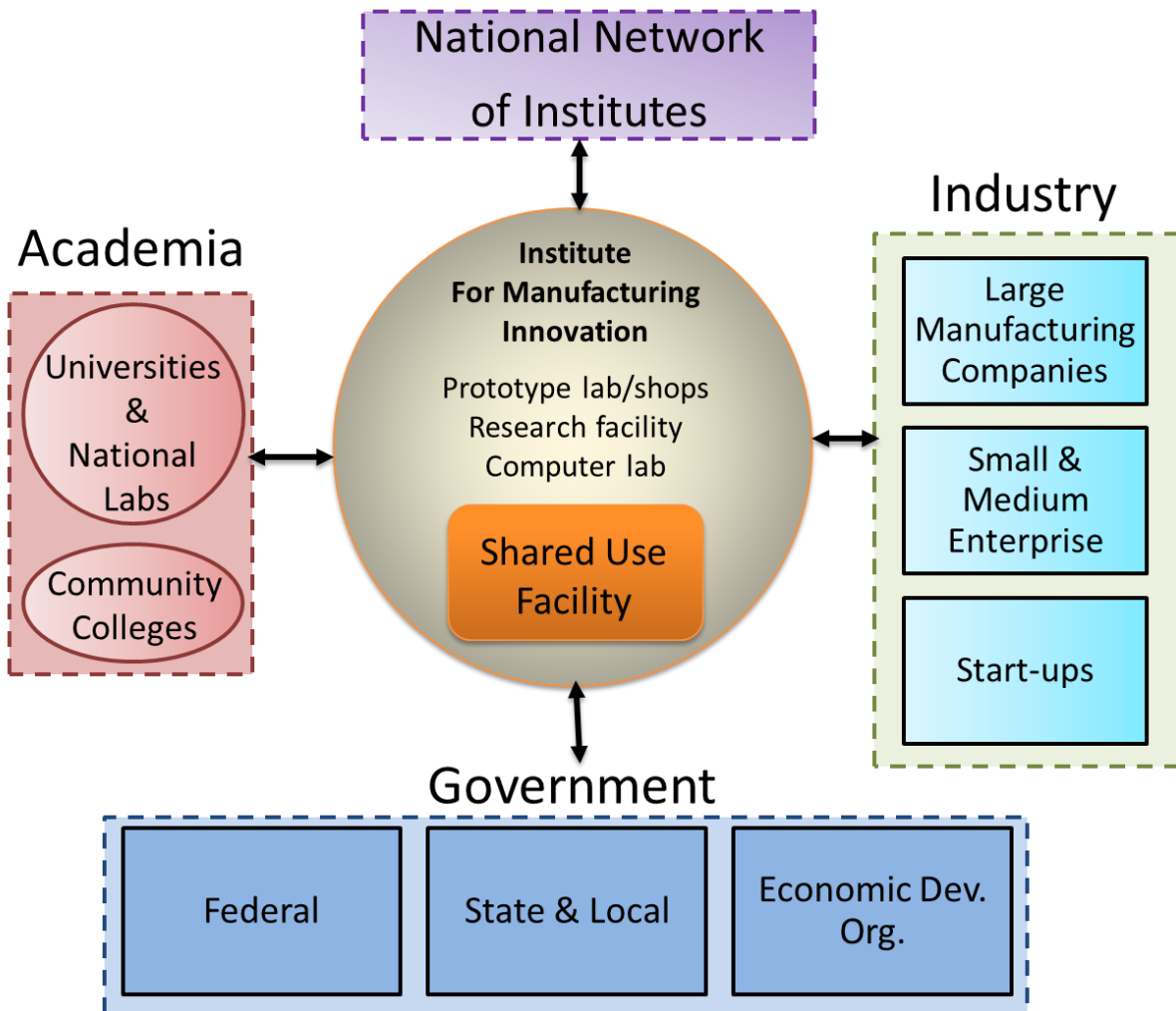
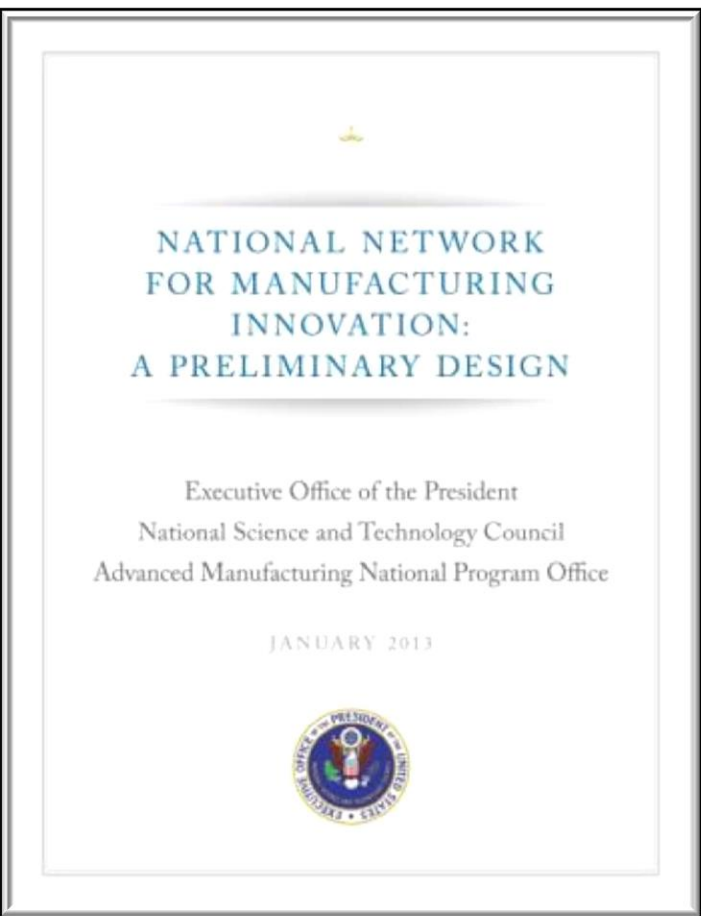


**U.S. Space and Rocket Center
Huntsville, Alabama**

The Institute Design

Creating the space for Industry & Academia to collaborate

White House Report
NNMI Framework Design
January 2013



The Institute Summary

Applied Research + Education/Workforce Skills + Development of Future “Manufacturing Hubs”

The Federal investment in the National Network for Manufacturing Innovation (NNMI) serves to create an effective manufacturing research infrastructure for U.S. industry and academia to solve industry-relevant problems. The NNMI will consist of linked Institutes for Manufacturing Innovation (IMIs) with common goals, but unique concentrations. In an IMI, industry, academia, and government partners leverage existing resources, collaborate, and co-invest to nurture manufacturing innovation and accelerate commercialization.

As sustainable manufacturing innovation hubs, IMIs will create, showcase, and deploy new capabilities, new products, and new processes that can impact commercial production. They will build workforce skills at all levels and enhance manufacturing capabilities in companies large and small. Institutes will draw together the best talents and capabilities from all the partners to build the proving grounds where innovations flourish and to help advance American domestic manufacturing.

**Federal startup investment: \$70M - \$120M/institute over 5-7 years
Institute Consortium owners must have minimum 1:1 co-investment**

The NNMI Mission

“The Network serves the Institutes, the Institutes connect through the Network, and the Program serves the Nation.”

Program Mission (Institutes + Network)

Advance American domestic manufacturing innovation by creating an effective manufacturing research and development infrastructure for U.S. industry and academia to solve industry-relevant problems.

Institute Mission

Create and strengthen American manufacturing hubs through sustainable industry-led innovation institutes that create, showcase, and deploy new capabilities.

Network Mission

Maximize the integrated impact of the manufacturing innovation institutes on U.S. manufacturing competitiveness.

NNMI Authorized: Revitalize American Manufacturing & Innovation Act



Rep. Tom Reed
R NY-23



Rep. Joe Kennedy
D MA-4



Sen. Sherrod Brown
D Ohio



Sen. Roy Blunt
R Missouri



September 15, 2014 –
Passed House
100 Cosponsors (51D, 49R)



December 11, 2014 –
Passed Senate with 2015 Appropriations
18 Cosponsors (10D, 7R, 1I)



December 16, 2014 –
Signed By President Obama

118 Bipartisan RAMI Bill Sponsors

Example Institute: Composites Manufacturing



Institute of Advanced Composites Manufacturing Innovation

1) Clear, unique Institute Focus

Each Institute has a clear mission based on a critical Industry need

Opportunity

Lightweight composites offer benefits to energy efficiency and renewable power generation, overcoming limitations through deployment of advanced technologies to make composite lower cost, faster, using less energy that can be readily recycled offer tremendous opportunities for US manufacturers.

Big Idea

The Institute will provide access to world-class resources to partner with industry and develop new low-cost, high-speed, and efficient manufacturing and recycling process technologies that will promote widespread use of advanced fiber-reinforced polymer composites.

At the new Institute, a world-class team of organizations from leading industrial manufacturers, material suppliers, software developers, government and academia will focus on lowering the overall manufacturing costs of advanced composites by 50 percent, reducing the energy used to make composites by 75 percent, and increasing the ability to recycle composites by more than 95 percent within the next decade.

2) Clear Industry Value Proposition

Each Institute creates value for industry participation and funding

- **Access to Shared RD&D Resources:** Leverage and provide access to equipment from lab to full-scale to enable demonstration and reduce risk for industry investment
- **Applied R&D:** Leverage significant government, industry, and academic investments to develop innovative solutions to member challenges
- **Composites Virtual Factory:** Provide access to end to end commercial modeling and simulation software for composite designers and manufacturers through a web based platform.
- **Workforce Training:** Provide specialized training to prepare current and future workforces for the latest manufacturing methods and technologies



3) Strong Private-Public Partnership

Each Institute is operated by a consortium; serving a partnership of Industry, Academia and government

A partnership of world-class companies including:



Top universities including:



Economic Development Council to leverage state support and investment



4) Addressing Critical Challenges

By workshops and Technology Roadmaps, Each Institute works on the industry priorities and big challenges only solvable by collaboration



Five/Ten Year Technical Goals

- 25/50% lower carbon fiber–reinforced polymer (CFRP) cost
- 50/75% reduction in CFRP embodied energy
- 80/95% composite recyclability into useful products



Impact Goals

- Enhanced energy productivity
- Reduced life cycle energy consumption
- Increased domestic production capacity
- Job growth and economic development

5) Balanced Portfolio of Projects

From Technology Roadmaps and Strategic Investment Plan, Each Institute manages a balanced portfolio of real projects for Industry

Activity

Result

1. First Projects

Identified in proposal to DOE

- Strengthen infrastructure capacity:
 - Materials and processing
 - Modeling and simulation
- Innovation and workforce development in strategic areas with national benefit:
 - Automotive
 - Wind
 - Compressed gas storage

2. Technology Roadmap

Driven by IACMI CTO, Industry and Technology Advisory Board

- Identifies key hurdles to high -impact, large scale advanced composites manufacturing
- Prioritizes opportunities across the materials and manufacturing supply chain

3. Strategic Investment Plan

Driven by IACMI BOD and Technical Advisory Board

- Changing the innovation cycle to enable rapid adoption and scale-up of advanced composites manufacturing

4. Open Project Call

- Aligns with strategic investment plan and technology roadmap
- Emphasis on projects with high near term impact.
- **Project Call**- open NOW

Building the Network



America Makes

Additive
Manufacturing
DOD-Youngstown OH



DMDII

Digital Mfg & Design
Innovation
DOD – Chicago IL



LIFT

Lightweight &
Modern Metals
DOD – Detroit MI



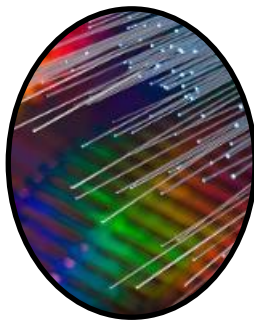
PowerAmerica

Power Electronics
Manufacturing
DOE – Raleigh NC



IACMI

Adv. Composites
Manufacturing
DOE – Knoxville TN



Integrated Photonics

DOD-
Rochester NY



Flexible Hybrid Electronics

DOD
Solicitation



Smart Manufacturing

DOE
Solicitation



Revolutionary Fibers & Textiles

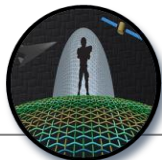
DOD
Solicitation

Building the Network

Network Status and FY16 Plans

Future Network Goal: 45 Regional Hubs

Forthcoming Awards



Advanced Textiles



Smart Manufacturing



Flexible Hybrid Electronics
San Jose, CA



Additive Manufacturing
Youngstown, OH



Integrated Photonics
Rochester, NY

New Institutes Planned for 2016



Open topic competitions



Selected topic competitions supporting agency mission, using agency authorities and budgets



Digital Manufacturing & Design
Chicago, IL



Lightweight Metal Manufacturing
Detroit, MI



Advanced Fiber-Reinforced Polymer Composites
Knoxville, TN



Wide Bandgap Semiconductors
Raleigh, NC



DOD RFI for next Institute Topics

Asking for information on selecting next institute topics - *Responses Due February 16th*

- Assistive and Soft Robotics
- Advanced Machine Tools and Control Systems
- Securing the Manufacturing Digital Thread – Cybersecurity for Manufacturing
- Bioengineering for Regenerative Medicine
- Bioprinting across Technology Sectors
- Certification, Assessment and Qualification
- Open topic (RFI responders may suggest)

NIST Advanced Manufacturing Office

**The Commerce Sponsored
Manufacturing Innovation
Institutes**



NIST
**National Institute of
Standards and Technology**
U.S. Department of Commerce

Commerce/NIST Institutes “Open Topic” Competition

Uses new authorities under the Revitalize American Manufacturing and Innovation Act (RAMI) -

Proposals will be accepted on any topic not already covered by existing NNMI institutes

- Key attributes
 - Open topic competition
 - Up to \$70 M federal share per Institute
 - Each institute to serve as a regional hub with well-defined focus area
 - Two-step process, Pre-Applications then Invited Full Applications - each step to be open no less than 60-days

Coming Soon – NNMI Reports



NATIONAL NETWORK FOR
MANUFACTURING INNOVATION
PROGRAM
ANNUAL REPORT

Executive Office of the President
National Science and Technology Council
Advanced Manufacturing National Program Office

February 2016



**First Annual Report
on the NNMI Program**



NATIONAL NETWORK FOR
MANUFACTURING INNOVATION
PROGRAM
STRATEGIC PLAN

Executive Office of the President
National Science and Technology Council
Advanced Manufacturing National Program Office

February 2016



**First Strategic Plan
on the NNMI Program**

NNMI: Enabling a Manufacturing Renaissance

Accelerating Discovery to Application to Production

- Establish a presence, at scale, in the “missing middle” of advanced manufacturing research
- Create an Industrial Commons, supporting future “manufacturing hubs”, with active partnering between all stakeholders
- Emphasize/support longer-term investments by industry
- Combine R&D with workforce development and training
- ***Overarching Objective: Unleash new U.S. advanced manufacturing capabilities and industries – for stronger global competitiveness and U.S. economic & national security***



Thank You! – How to connect

Advanced Manufacturing National Program Office

Phone: (301)-975-2830
Email: amnpo@nist.gov
Web: www.manufacturing.gov

DOC Open Topic Competition:

Phone: (301) 975-0404
Email: nnmifund@nist.gov
Website: www.nist.gov/amo/nnmi

