Building a new partnership
Progress and Opportunities with the National Network for Manufacturing Innovation

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Advanced Manufacturing National Program Office
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
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!

Industry 31%
Academia 31%
All Other 10%
Economic Development 6%
Research & non-profits 8%
Federal State & Local Gov't 14%

University of Colorado
Boulder, Colorado

National Academies Beckman Center
Irvine California

Rensselaer Polytechnic Institute
Troy New York

Cuyahoga Community College
Cleveland Ohio

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

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
IACMI, The Composites Institute
Knoxville, TN
Launched June 16, 2015

Agency sponsor: DOE
Startup funding: $70M public, $159M co-investment

+344,000 square feet in five core regions – composite manufacturing, laboratory, instructional and collaboration space
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:
- Dow
- Ford
- BASF
- GE
- Dassault Systèmes
- Boeing
- Lockheed Martin
- Volkswagen
- Du Pont
- Local Motors

Top universities including:
- The University of Tennessee
- Vanderbilt University
- Purdue University
- Colorado State University
- University of Kentucky
- University of Louisville
- Ohio State University

Economic Development Council to leverage state support and investment

Collaboration of state development leaders seeding economies worth $2 trillion
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*

<table>
<thead>
<tr>
<th>Activity</th>
<th>Result</th>
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| 1. First Projects                             | • 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                         | • Identifies key hurdles to high-impact, large scale advanced composites manufacturing  
  • Prioritizes opportunities across the materials and manufacturing supply chain                                                                                                                                 |
| 3. Strategic Investment Plan                  | • 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
Future Network Goal: 45 Regional Hubs

Forthcoming Awards
- Advanced Textiles
- Smart Manufacturing
- Flexible Hybrid Electronics, San Jose, CA
- America Makes, 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
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
• 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

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DOC Open Topic Competition:
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