The National Network for Manufacturing Innovation

ASEE Engineering Deans Public Policy Forum Update

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Interagency Advanced Manufacturing National Program Office
(AMNPO) – Housed at DOC / NIST

Executive Office of the President
Agenda

NNMI Basis

*U.S. Manufacturing Challenge and PCAST*

NNMI Design

NNMI Development

NNMI Authorization

NNMI Next Steps
Misperception - Productivity on Employment

Rising Productivity does **not** create employment losses

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

Gray bars indicate recessions
Challenge: US losing leadership in Advanced Products

U.S. Trade Balance for Advanced Technology Products

Source: Census Bureau
Products invented here, now made elsewhere - not driven by labor cost
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
The “Scale-up” Gap or Missing Middle

Common terms
The “valley of death”
The “missing Bell Labs”
The “industrial commons”

Basic R&D

Commercialization
Initial Network Proposed

“Sparking this network of innovation across the country, it will create jobs and will keep America leading in manufacturing…”
President Obama, March 9, 2012

• President asks Congress to authorize initial network of up to 15 Manufacturing Innovation Institutes

• President directs Agencies to work together on Pilot Institute, while designing Institutes with input from Industry and Academia
Agenda

NNMI Basis

**NNMI Design**
*National Network for Manufacturing Innovation*

NNMI Development

NNMI Authorization

NNMI Next Steps
Public Engagement on Design
Workshops & Request for Information

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

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

National Academies Beckman Center
Irvine, California

University of Colorado
Boulder, Colorado

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

Partnership: Industry – Academia – Government
Working better, together to create transformational technologies and build new products and industries
Institute Major Activities

Applied Research & Demo projects
- reducing cost/risk on commercializing new tech.
- Solving pre-competitive industrial problems

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

Small/Medium Enterprises
- Engagement with small and medium-sized manufacturing enterprises (SMEs).

Workforce Training
Education, technical skills and Workforce development

Education and training at all levels for workforce development
Agenda

NNMI Basis

NNMI Design

NNMI Development
Pilot Institutes by Administrative Actions

NNMI Authorization

NNMI Next Steps
The First Pilot Manufacturing Innovation Institute
Additive Manufacturing/3D Printing – Youngstown OH

Prime Awardee: National Center for Defense Manufacturing and Machining

- Initial $30M federal investment matched by $40M industry, state/local
- Strong leveraging of equipment, existing resources
- Strong business development
- Tiered membership-based model, low cost to small business and nonprofits

- Now at $50M federal, $60M co-invested
- OVER 100 Participating partners!
Mission: Develop advanced manufacturing processes that will enable large-scale production of wide bandgap semiconductors, which allow power electronics components to be smaller, faster and more efficient than silicon.

Poised to revolutionize the energy efficiency of power control and conversion.
3rd Pilot Institute:
Digital Manufacturing & Design Innovation

Mission: Establish a state-of-the-art proving ground that links IT tools, standards, models, sensors, controls, practices and skills, and transition these tools to the U.S. design & manufacturing base for full-scale application.

$70M public investment, ~$240M match

Lead: UI Labs

Hub location: Chicago, Illinois

- 41 Companies
- 23 Universities and Labs
- 9 Other Organizations

Over 3:1 Industry Cost Share
4th Pilot Institute: Lightweight and Modern Metals

Mission: Provide the National focus on expanding US competitiveness and innovation, and facilitating the transition of these capabilities and new technologies to the industrial base for full-scale application.

 Positioned to expand the US Industrial base for new products and technologies for commercial and USG demands that utilize new, lightweight high-performing metals

$70M public investment, $70M match
Lead: EWI
Hub location: Detroit, Michigan
Regional location: I-75 Corridor

• 34 Industry Partners
• 9 Universities and Labs
• 17 Other Organizations
5th Pilot Institute: *Proposals under evaluation*

**Advanced Composites Manufacturing**

$70M public investment over five years

**Objective**

Develop and demonstrate innovative technologies that will, within 10 years, make advanced fiber-reinforced polymer composites at...

50% Lower Cost
Using 75% Less Energy

And reuse or recycle >95% of the material

### Table

<table>
<thead>
<tr>
<th>Application</th>
<th>Estimated Current CFC Cost</th>
<th>Institute CFC Cost Reduction Target (2018)</th>
<th>Institute CFC Cost Target (2024)</th>
<th>CFC Ultimate Cost Target (2024)</th>
<th>CFC Tensile Strength</th>
<th>CFC Stiffness</th>
<th>Production Volume</th>
<th>Cycle Time</th>
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<tbody>
<tr>
<td>Vehicles (Body Structures)</td>
<td>$26-33/kg</td>
<td>&gt;35%</td>
<td>&lt;$11/kg by 2025 ~60%</td>
<td>0.85GPa (123ksi)</td>
<td>96GPa (14Msi)</td>
<td>100,000 units/yr</td>
<td>~3min cycle time (carbon)</td>
<td>&lt;5min cycle time (glass)</td>
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<td>Wind (Blades)</td>
<td>$26/kg</td>
<td>&gt;25%</td>
<td>$17/kg ~35%</td>
<td>1.903 GPa (276ksi)</td>
<td>134GPa (19.4Msi)</td>
<td>10,000 units/yr</td>
<td>(at &gt;60m length blades)</td>
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<tr>
<td>Compressed Gas Storage (700 bar – Type IV)</td>
<td>$20-25/kg</td>
<td>&gt;30%</td>
<td>$10-15/kg ~50%</td>
<td>2.55 GPa (370ksi)</td>
<td>135 GPa (20Msi)</td>
<td>500,000 units/yr</td>
<td>(carbon fiber)</td>
<td></td>
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</tbody>
</table>
6th Pilot Institute Funding Opportunity BAA in 2014  
Integrated Photonics Manufacturing Innovation Institute

More than $100M federal investment  
over five years

Objective

Develop and demonstrate innovative technologies for:

- Ultra high-speed transmission of signals for the internet and telecommunications
- New high-performance information-processing systems and computing
- Sensors and imaging enabling dramatic medical advances in diagnostics, treatment, and gene sequencing

This Institute will focus on developing an end-to-end photonics ‘ecosystem’ in the U.S., including domestic foundry access, integrated design tools, automated packaging, assembly and test, and workforce development.

All these developments will require cross-cutting disciplines of design, manufacturing, packaging, reliability and testing.
“In my State of the Union Address, I asked Congress to build on a successful pilot program and create 15 manufacturing innovation institutes that connect businesses, universities, and federal agencies to turn communities left behind by global competition into global centers of high-tech jobs.

“Today, I’m asking Congress to build on the bipartisan support for this idea and triple that number to 45 – creating a network of these hubs and guaranteeing that the next revolution in manufacturing is ‘Made in America.’”

- July 30, 2013
Agenda

NNMI Basis
NNMI Design
NNMI Development

NNMI Authorization
*Revitalize American Manufacturing and Innovation Act*

NNMI Next Steps
NNMI Authorized: Revitalize American Manufacturing & Innovation Act

118 bipartisan RAMI Bill Sponsors

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

Bipartisan Momentum Supporting NNMI Passage
Call to Action: RAMI calls upon the U.S. Secretary of Commerce and NIST to establish:

1. The “Network for Manufacturing Innovation Program” (*Network function*) - to convene and support a network of Institutes

2. New “Centers for Manufacturing Innovation” (*Institutes*) - using an open topic, open competition process

3. The National Program Office at NIST - to oversee and carry out the program (*coordination, network support, and reporting*)
The Secretary Shall...

1. **Financial:** “...award financial assistance to a person or group of persons to assist the organization in planning, establishing, or supporting a center for manufacturing innovation.”

2. **Open Process:** “...ensure an open process that will allow for the consideration of all applications relevant to advanced manufacturing regardless of technology area.”

3. **Outside Expertise:** “...use a competitive, merit review process that includes peer review by a diverse group of individuals with relevant expertise from both the private and public sectors.”

4. **Transparency & Accountability:** “...implement a conflict of interest policy that ensures public transparency and accountability, and requires full disclosure of any real or potential conflicts of interest on the parts of individuals that participate in the merit selection process.”
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NNMI Next Steps
FY16 plans
Building the Network: 
Network Status and FY16 Plans

FORTHCOMING FY15

- Integrated Photonics
- Smart Mfg.
- Flex. Hybrid Electronics
- LM3I Light/Modern Metals
- Canton, MI
- DMDII Digital Mfg.
- Chicago, IL
- America Makes Additive Mfg.
- Youngstown, OH
- Smart Power Electronics
- Raleigh, NC

Full Network Goal: 45 regional hubs

New Institutes Planned for FY16:

- Open topic competition – addressing “white space” between mission agency topics
- Selected topic competitions supporting Agency mission – using agency authorities and budgets

FY17-26 – central fund proposed for remaining institutes, via open topic process
Impacting the Future Manufacturers

Inspiration to Innovation to Making
Thank you

For questions or comments, please contact the Advanced Manufacturing National Program Office

amnpo@nist.gov

www.manufacturing.gov

301-975-2830

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