

The Advanced Manufacturing Technology Consortia (AMTech) Program, Complementary with NNMI

Model-Based Enterprise Summit 2014

December 16, 2014

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Advanced Manufacturing Office
National Institute of Standards and Technology
U.S. Department of Commerce
Gaithersburg, MD**

NIST: A Century of Service to Industry

The Congress finds and declares ...

- The future well-being of the United States economy depends on a **strong manufacturing base** and requires continual improvements in **manufacturing technology**, quality control, and techniques for ensuring product reliability and cost-effectiveness.
- Improvements in **manufacturing and product technology** depend on fundamental scientific and engineering research to develop
 - a) the precise and accurate measurement methods and measurement standards needed to improve quality and reliability, and
 - b) new technological processes by which such improved methods may be used in practice to **improve manufacturing and to assist industry** to transfer important laboratory discoveries into commercial products.

NBS established 1901, NIST Organic Act - 15 U.S.C 271, 1988

Manufacturing is in the NIST DNA

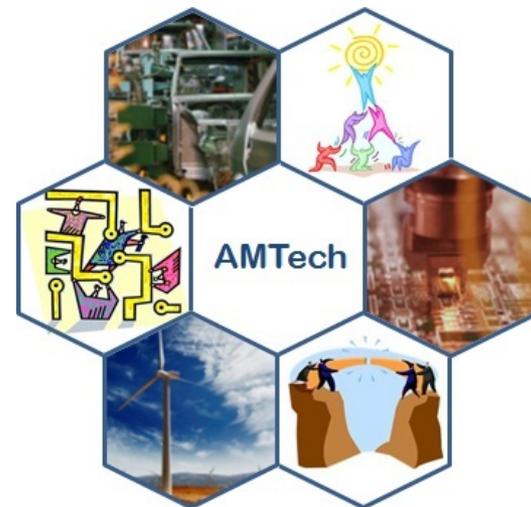
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What is AMTech?

Advanced Manufacturing Technology Consortia (AMTech) Program

- ❑ Launched by NIST in FY 2013
- ❑ \$15M annual program (current)
- ❑ To incentivize the formation of and provide resources to industry-driven technology consortia for the U.S. advanced manufacturing industry
 - To support basic and applied research
 - On long-term, pre-competitive and enabling technology development



How AMTech Works

- AMTech consortia:
 - Identify and prioritize long-term, pre-competitive industrial research needs;
 - Enable technology development;
 - Create the infrastructure necessary for more efficient transfer of technology;
 - Represent a broad range of involved firms across stages of the value chain.
- NIST rollout
 - Planning Awards to create new or strengthen existing technology consortia to create shared vision, industry-driven plans
 - Project Awards (when fully implemented) to perform research that addresses the critical needs and research agenda derived from AMTech Planning Awards

Expectations and Outcomes

- ❑ Increase the number of industry sectors and organizations that participate in technology partnerships.
- ❑ Identify critical pre-competitive, enabling manufacturing processes and platform technologies.
- ❑ Unlock capital and spur industry-led research that arises from the partnerships and roadmaps.
- ❑ Spur technology diffusion and knowledge dissemination among the partnerships.
- ❑ Strengthen the capacity of new small and medium companies to become successful enterprises.

Strengthening the U. S. R&D Ecosystem in Advanced Manufacturing

AMTech Timeline

- June 2011 - PCAST Advanced Manufacturing Report issued
- July 22, 2011 - NIST published a Request for Information (RFI) seeking public opinion on AMTech - a possible new program
- February 7, 2012 - NIST Visiting Committee on Advanced Technology (VCAT) and Advanced Manufacturing subcommittee endorse AMTech as a model public-private partnership for supporting technological innovation
- FY 2012 budget - NIST requests initial AMTech funding
- FY 2013 - AMTech first funded, \$15 million annual; First Funding Opportunity published (7/2013), [19 Awards](#) issued (5/2014), \$9 million for planning activities
- FY 2014 - 2nd AMTech Funding Opportunity for Planning Awards, approx. \$5.6 million ‘... to establish new and strengthen existing industry-driven consortia ...’ to ‘... increase the number of industry sectors and organizations that participate in AMTech...’



2014 AMTech Planning Awards Funding Opportunity

Grants.gov Funding Opportunity No. [2014-NIST-AMTECH-01](#)

Partnerships and Eligibility

- Collaborative partnerships that include broad participation by companies of all sizes, universities and government agencies to form an industry-driven consortium are sought
- Eligible applicants may be any U.S. organization, located within the United States, excluding commercial organizations and federal entities
- An eligible applicant may work individually or include others effectively forming a team or consortium. Eligible subrecipients are the same types of organizations eligible to be applicants plus commercial organizations
- Commercial organizations may participate in teams as subrecipients, contractors or unfunded roles

Funding Level & Instrument

- Total funding available: approx. \$5.6 M
- Award size & duration: \$250 K to \$500 K, up to 2 yrs.



2013 AMTech Competition Results

www.nist.gov/amo/fundedawards.cfm

- **Nineteen (19) Planning Awards, totaling \$9 million**
 - 82 unique applications received
 - Applicants: 37 Academia / 42 Not-for-Profit / 1 State Gov't / 2 For-Profit

- **Consortia Characteristics**

11 New

8 Existing

10 Academia

9 Not-for-Profit

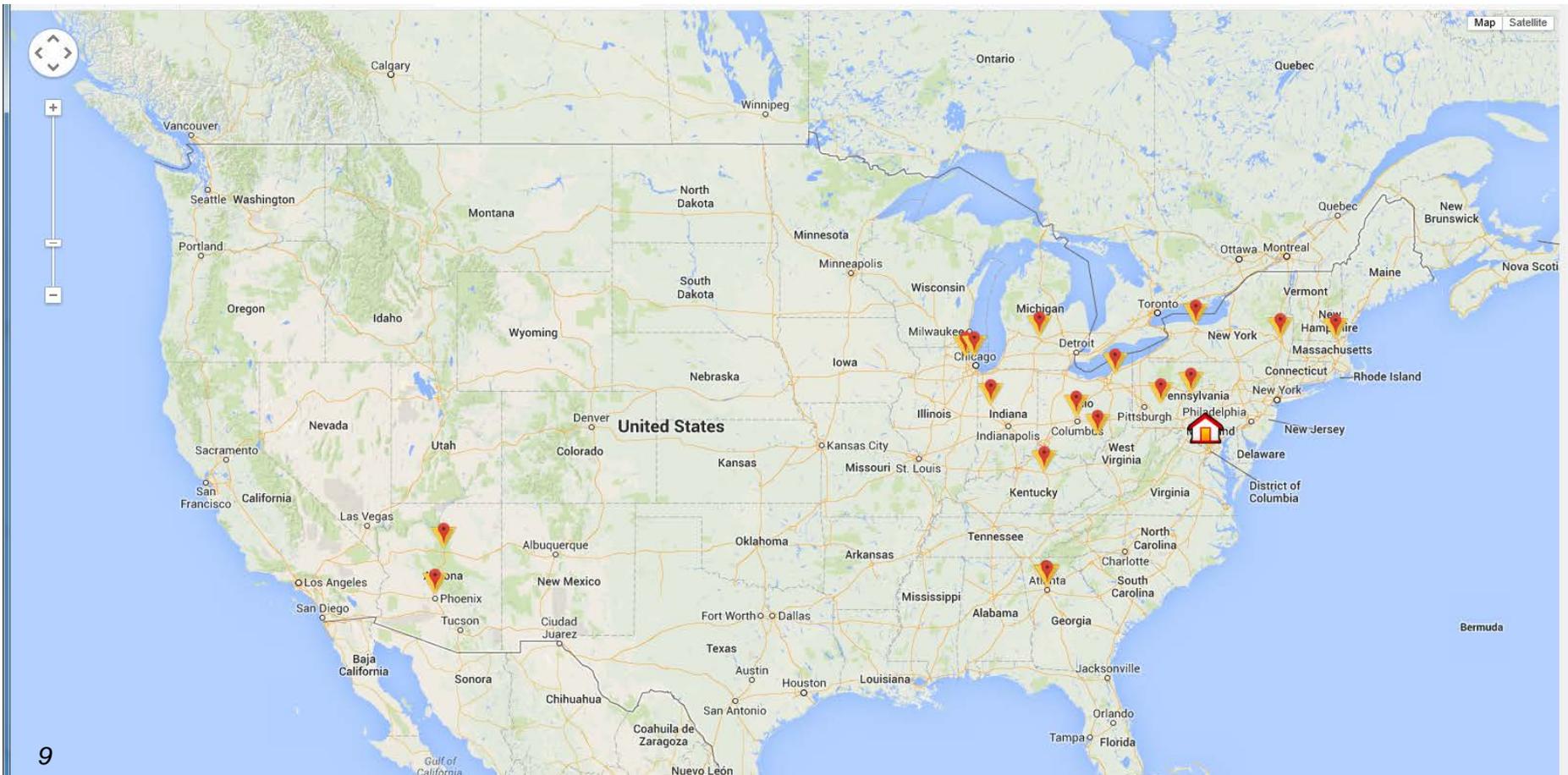
- **Crosscutting Technologies* (# of efforts):**

Additive Manufacturing (1) 	Advanced Forming & Joining Tech (2) 
Advanced Manufacturing & Testing Equipment (7) 	Advanced Materials Design, Synthesis & Processing (2) 
Advancing Sensing, Measurement & Process Control (1) 	Biomanufacturing & Bioinformatics (1) 
Flexible Electronics Manufacturing (1) 	Sustainable Manufacturing (2) 
Visualization, Informatics & Digital Manufacturing Technologies (2) 	

* Taken from Advanced Manufacturing Partnership (AMP)

2013 AMTech Planning Grant Awardees

- Interactive, dynamic consortia map of awardees, funded partners, and collaborators live on NIST AMTech website with announcement
 - Project brief, logo, location and contact information of every entity
- 19 technology roadmap consortium teams, cooperative agreement over two years



Distributed Wind Award Participants

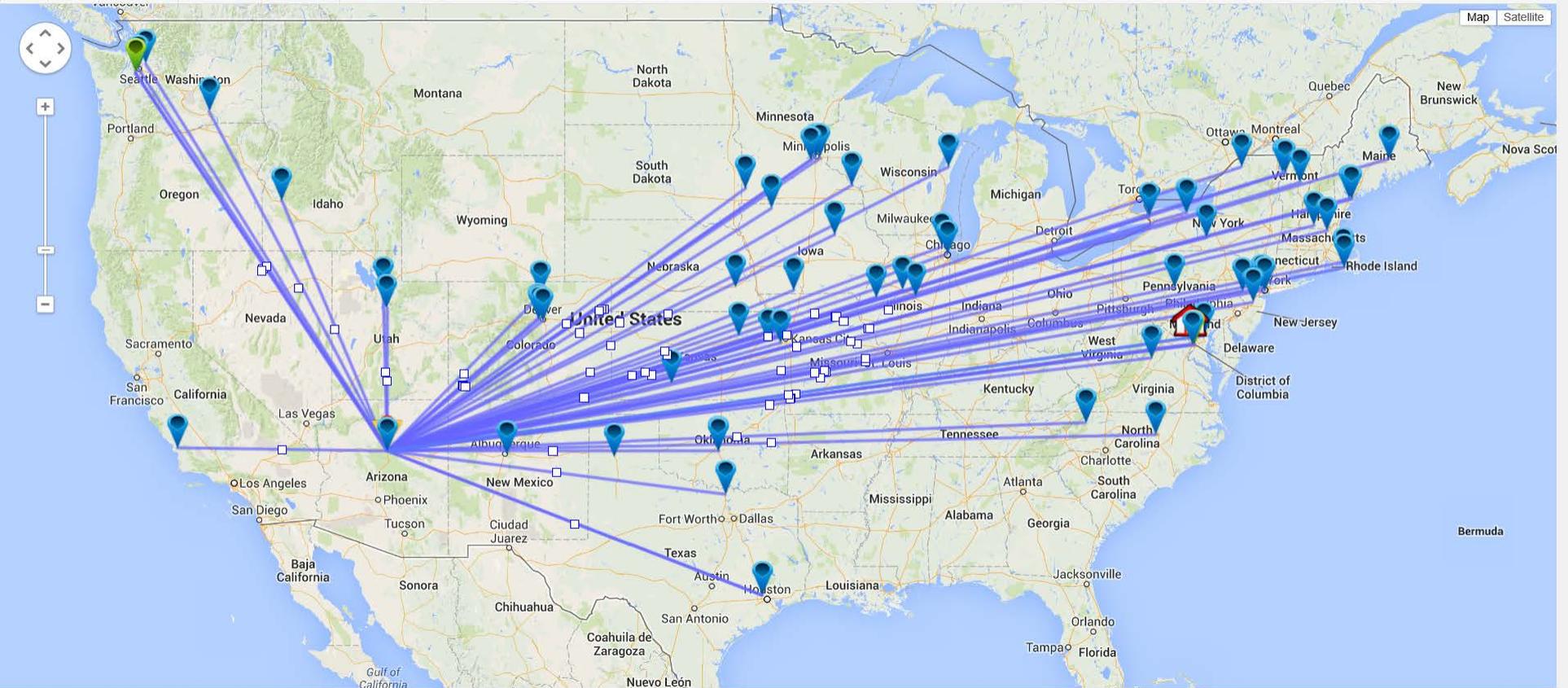
ZeeMaps
We map your lists

SMART Wind Consortium
Distributed Wind Energy Association, 70NANB14H047

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69 entries

MTConnect Roadmap Strategy to Promote Advanced Manufacturing in the United States

Project Objectives

- **Create an open standard** to foster interoperability in manufacturing.
- **Reduce complexity** of interfacing equipment, devices, and software applications.
- **Facilitate** adoption, implementation, and expansion of the MTConnect standard.

Lead Organization: NCDMM

Funded Collaborators: Maya Design; AMT; GIT; CJ Hill Consulting



NCDMM

NATIONAL CENTER FOR DEFENSE
MANUFACTURING AND MACHINING

NIST Funding: \$434,577

Project Period: June 2014 to March 2015

NIST POC: Jean-Louis Staudenmann
301-975-4866

jlst@nist.gov

Project POC: James Fisher
724-539-6133

jim.fisher@ncdmm.org

Project Events

- Big M Conference – June 9-12 – Initial Data Gathering from Attendees; MTConnect TAG Meeting – July 10 – TAG member input; TechSolve – August timeframe - 20-25 invited participants; DC Area – timeframe unknown; Bay Area – timeframe unknown; Potential Chicago Area – timeframe unknown.

Project Deliverables

- Roadmap with both **strategic and tactical** activities for MTConnect to become the sustainable standard across manufacturing industries.

Partnership for Research and Innovation in Sustainable Manufacturing (PRISM)

Project Objectives

- Develop consortia to create technology infrastructure and **promote U.S. excellence** in sustainable manufacturing.
- Identify and **prioritize** research projects supporting long-term strategic industrial needs in sustainable manufacturing.
- Develop **shared-vision** roadmaps for technologies that enable transformational innovations for next-generation manufacturing.

Lead Organization: University of Kentucky

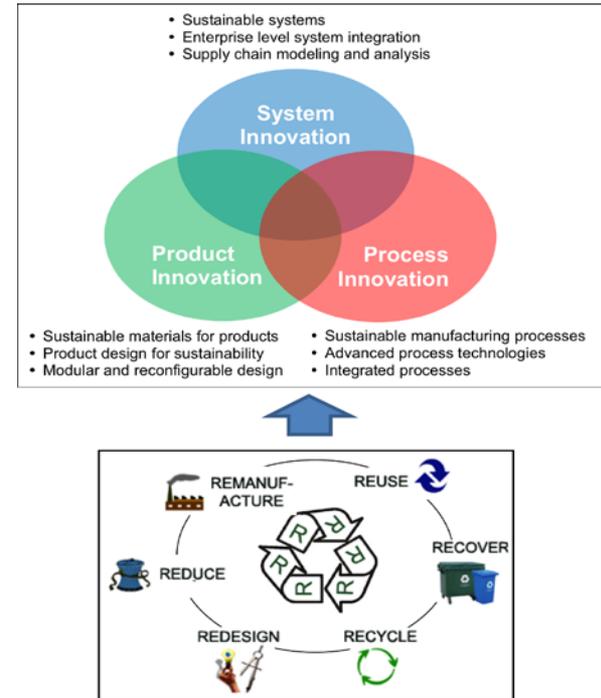
Funded Collaborators: Gold 1 Enterprises, LLC;
Integrated Manuf. Technology Initiative, Inc.;
National Center for Manufacturing Sciences.

Project Events

- TBD

Project Deliverables

- **Sustainable manufacturing roadmaps** for 3 key industries: automotive, aerospace, and consumer electronics



NIST Funding: \$500K

Project Period: June 2014 to May 2016

NIST POC: Thomas R. Lettieri

301-975-3496

thomas.lettieri@nist.gov

Project POC: I.S. Jawahir

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is.jawahir@uky.edu

Consortium for Additive Manufacturing Materials (CAMM)

Project Objectives

- Establish a consortium to develop an **R&D roadmap** for new types of metals, polymers, and ceramics for additive manufacturing (AM) uses in the aerospace, biomedical, energy, and electronics industries.
- Bring together materials producers, AM machine manufacturers, research institutions, and end users in order to identify **strategic U.S. industry needs** in additive manufacturing materials.

Lead Organization: Pennsylvania State University

Funded Collaborator:

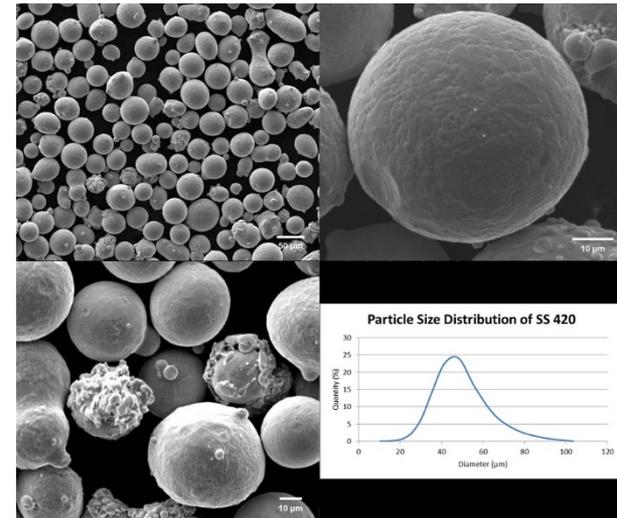
- Nexight Group

Project Events

- TBD

Project Deliverables

- Roadmap for additive manufacturing materials and supplementary documentation (May 2016).



NIST Funding: \$500K

Project Period: June 2014 to May 2016

NIST POC: Thomas R. Lettieri

301-975-3496

thomas.lettieri@nist.gov

Project POC: Todd Palmer

814-863-8865

tap103@arl.psu.edu

Cell Manufacturing Consortium (CMC)

Project Objectives

- Create a national consortium for stakeholders involved in cell manufacturing.
- Bring industries and academia to identify **barriers impeding progress** of cell manufacturing technologies.
- Bring industries and academia to identify future research directions.

Lead Organization: Georgia Research Alliance

Funded Collaborators: University of Georgia; Georgia Tech; NC State; U. Wisconsin; UC Berkeley



Georgia Research Alliance

NIST Funding: \$499,636
Project Period: June 2014 to Nov. 2015
NIST POC: Jean-Louis Staudenmann
301-975-4866
jlst@nist.gov
Project POC: Greg Dane
678-925-7576
gdane@gra.org

Project Events

- Series of workshops (dates TBD) – invited speakers and attendees

Project Deliverables

- **Roadmap for technological innovations** involving stakeholders of the entire cell manufacturing value chain.
- **Acceleration** of cell-derived products to the healthcare market.

Facilitating Industry by Engineering, Roadmapping and Science (FIBERS) to Advance U.S. Manufacturing of Composites

Project Objectives

- Accelerate composites manufacturing in the U.S. includes modeling/simulations, materials/sustainability, automation/manufacturing processes, and education/workforce development.
- Replace trial-and-error approaches with scientifically-driven methods practical for the manufacturing floor.

Lead Organization: UMass Lowell

Funded Collaborators:

- Iowa State University; University of Delaware; University of New Hampshire; Rensselaer Polytechnic Institute; Massachusetts and New Hampshire MEPs; Oak Ridge National Lab; Mentis Sciences; ACMA

Project Events

- Workshop Aug. 8th, 2014, Lowell MA (consortium members)
- ASC, Sep 8-10, 2014 San Diego CA— prospective members
- CAMX conference, Oct. 16, 2014, Orlando FL – special session
- SAE, April 21, 2015, Detroit MI (tentative)

Project Deliverables

- Roadmap about **innovative technologies** for the composites manufacturing industry.
- Understanding of the critical composite manufacturing challenges.
- Effective and functioning consortium to tackle these challenges.



University of
Massachusetts
Lowell

NIST Funding: \$496,439

Project Period: June 2014 to Dec. 2015

NIS T POC: Jean-Louis
Staudenmann

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Project POC: James Sherwood

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james_sherwood@uml.edu

Revitalize American Manufacturing and Innovation Act of 2014

- ... the Secretary shall establish a network of centers for manufacturing innovation... The network established ... shall be known as the **‘Network for Manufacturing Innovation’**
- The Secretary, acting through the Director, shall carry out the purposes set forth ... by supporting
 - the Network for Manufacturing Innovation
 - the establishment of Centers for Manufacturing Innovation.
- The National Office of the Network for Manufacturing Innovation Program (the ‘National Program Office’) shall act as a convener of the Network.

“Consolidated and Further Continuing Appropriations Act, 2015”

National Network for Manufacturing Innovation

Vision – 45 Institutes



AP Photo/Susan Walsh

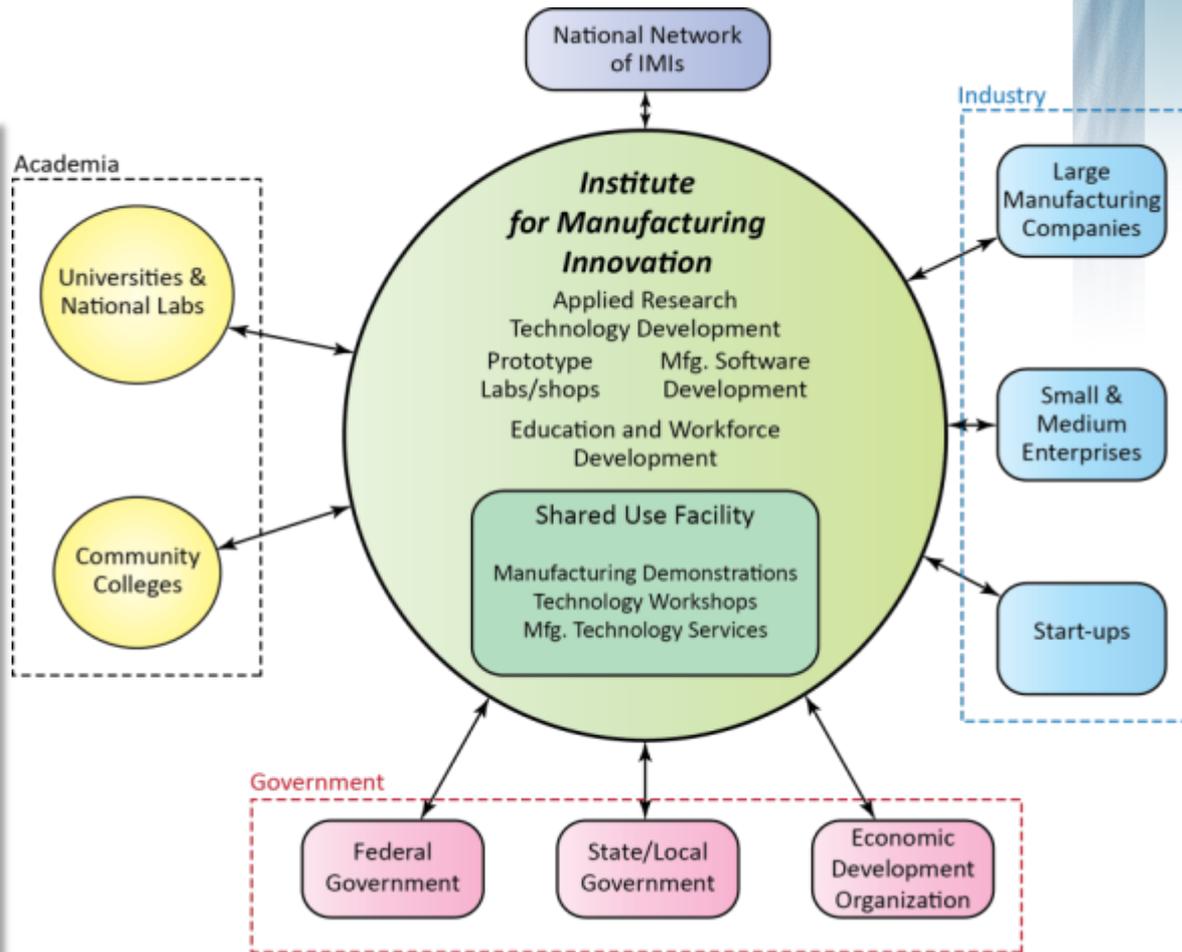
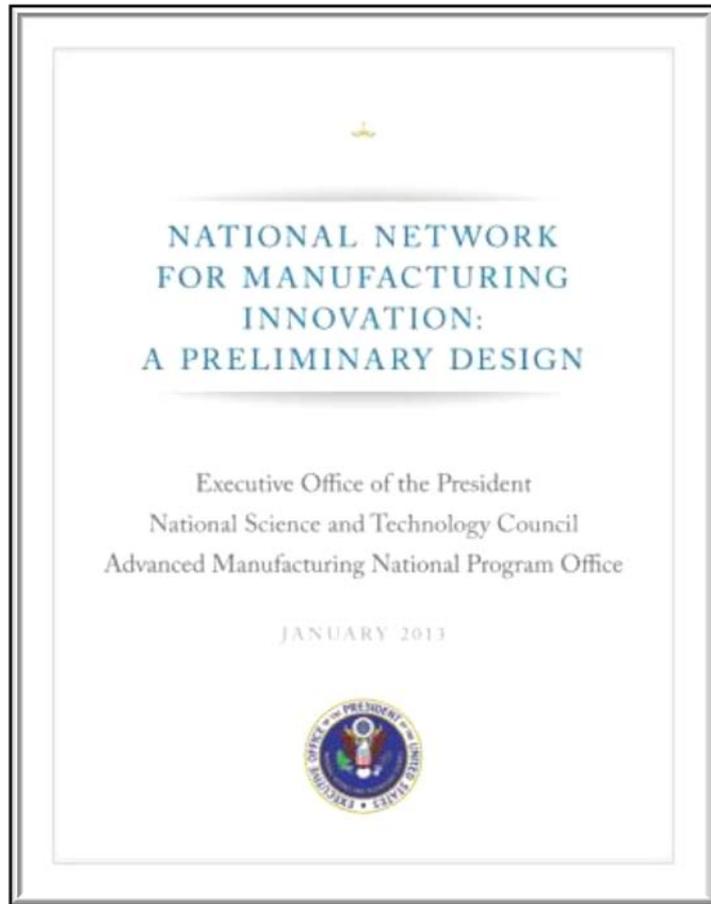
“In my State of the Union Address, I asked Congress to build on a successful pilot program and create 15 manufacturing innovation institutes that connect businesses, universities, and federal agencies to turn communities left behind by global competition into global centers of high-tech jobs.”

“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)

Institute Design

Creating the space for Industry & Academia to collaborate

NNMI Framework Design
January 2013



Institute Major Activities



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



Small/Medium Enterprises

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



Education, technical skills and Workforce development
Education and training at all levels for workforce development



6th Pilot Institute Funding Opportunity in 2014

Integrated Photonics Manufacturing Innovation Institute

FOA-RQKM-2015-0009

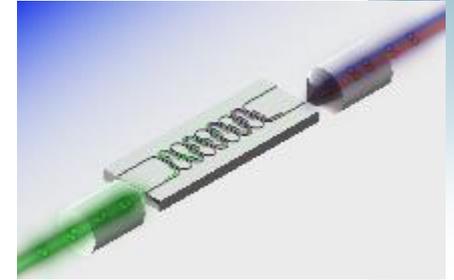
More than \$100M federal investment over five years

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.

The Start of a Network of Centers for Manufacturing Innovation



**Additive
Manufacturing**



**Power
Electronics**



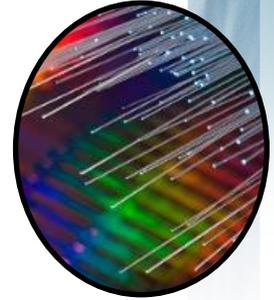
**Digital
Manufacturing**



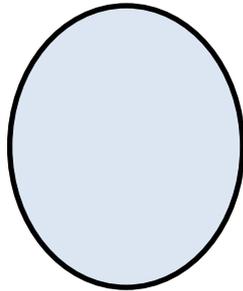
**Lightweight
Metals**



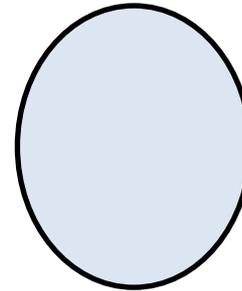
**Adv. Composites
Manufacturing**



**Integrated
Photonics
Manufacturing**



**DOE - Smart
Manufacturing**



**DOD - Flexible Hybrid
Electronics**

Thank you

For questions or comments, please contact the
NIST Advanced Manufacturing Office

amtech@nist.gov

www.nist.gov/amo and www.manufacturing.gov

(301) 975-2830

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