



ADVANCED MANUFACTURING NATIONAL PROGRAM OFFICE  
NATIONAL NETWORK FOR MANUFACTURING INNOVATION

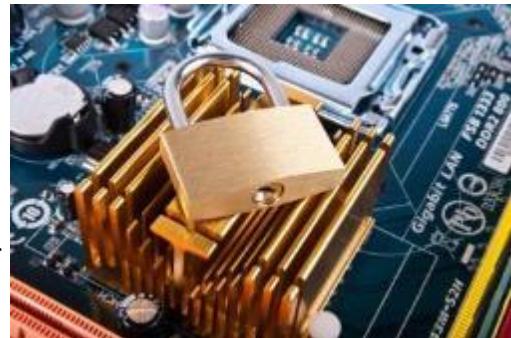
# AMP, CAMF, AMTech and NNMI Acronyms for Advanced Manufacturing Partnership with Academia

Briefing for USNC/TAM  
National Academy of Engineering  
Mike Molnar  
May 1, 2015

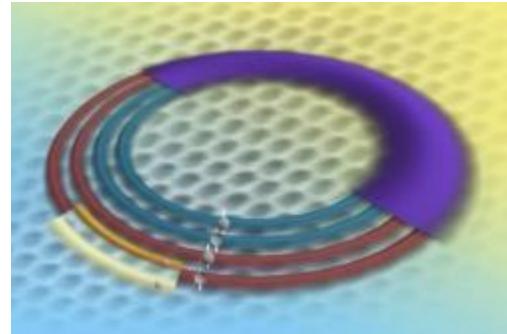
# NIST's Unique Mission

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 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) – Housed at *DOC / NIST*



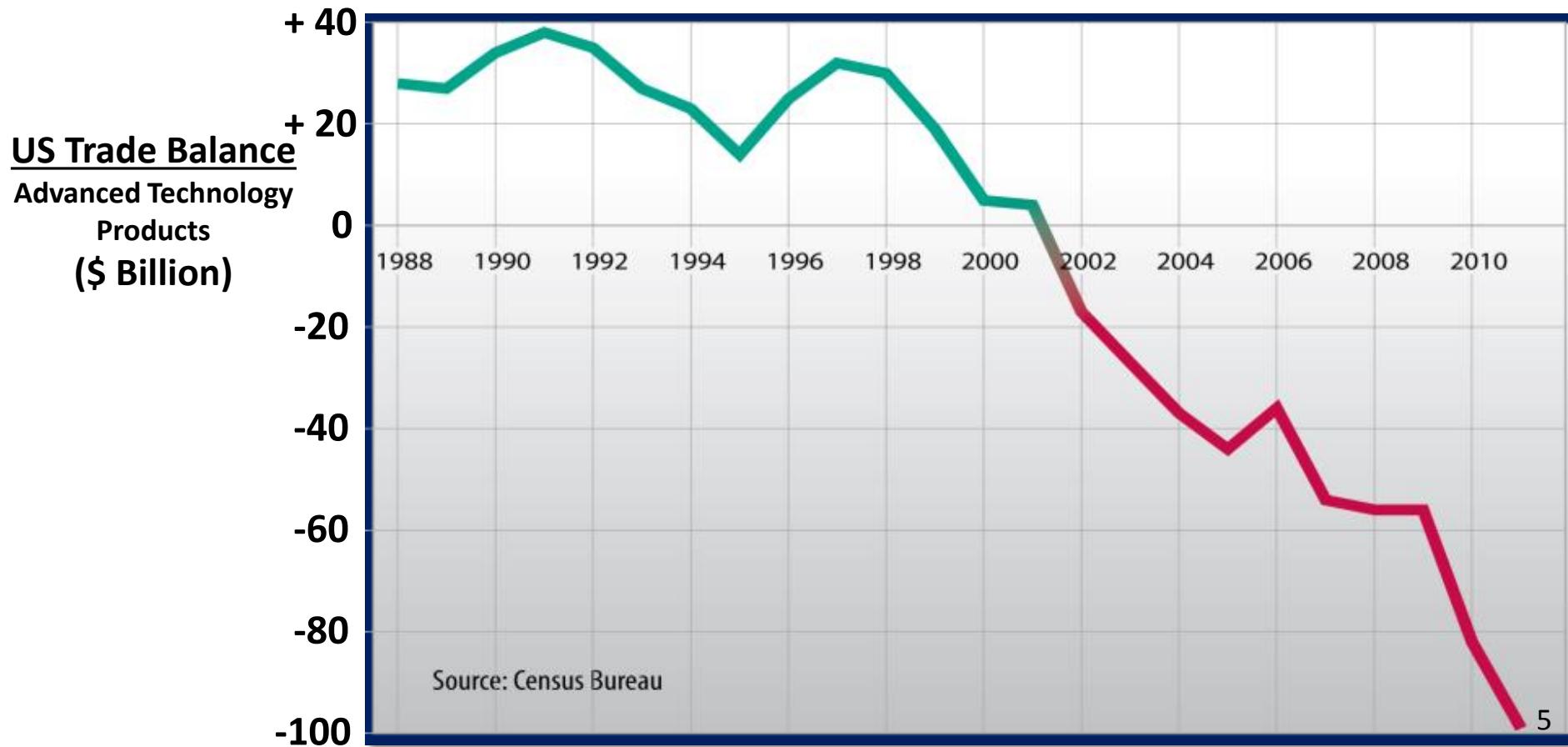
**Executive Office of the President**



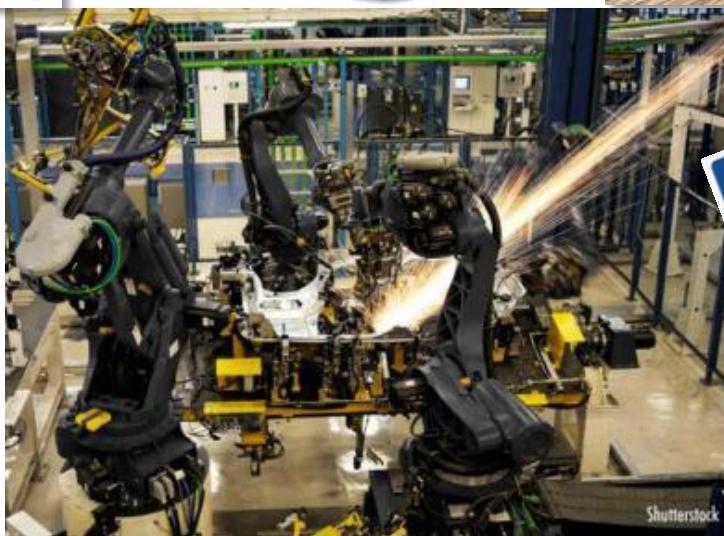
# **PCAST AMP and Manufacturing**

# Challenge: US losing leadership in Advanced Products

## U.S. Trade Balance for Advanced Technology Products

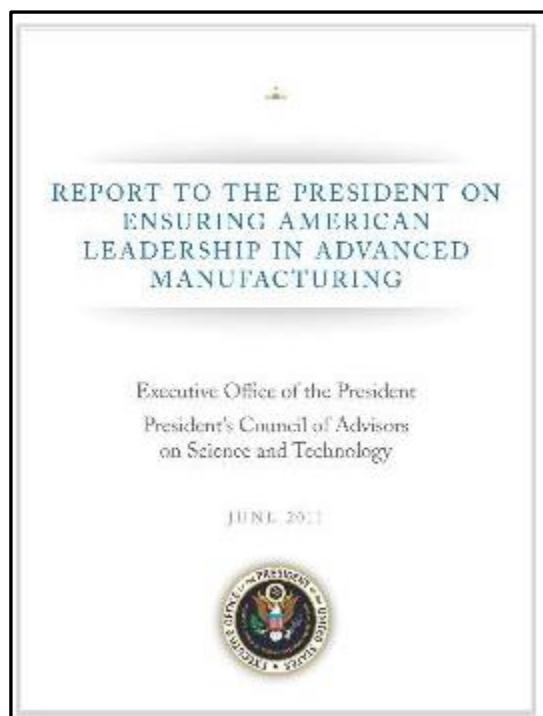


# Products invented here, now made elsewhere - not driven by labor cost

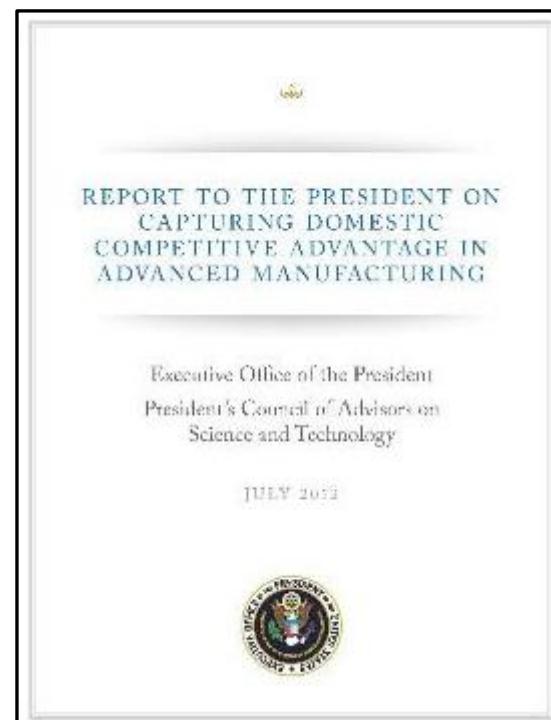


# PCAST: The independent basis of NNMI

*President's Council of Advisors on Science and Technology*



PCAST 2011  
*Recommend***s Advanced  
Manufacturing Initiative as national  
innovation policy**



PCAST 2012  
*Recommend***s Manufacturing  
Innovation Institutes to address  
key market failure**



PCAST 2014  
*Recommend***s strong, collaborative  
network of Manufacturing  
Innovation Institutes**

PCAST Message on *HOW....*

# Partnership

*Industry – Academia – Government*

Working better, together to create transformational technologies and build new products and industries

**And when... NOW**

**We can't wait to restore US Manufacturing Leadership**

# Advanced Manufacturing Technology Consortia (AMTech)

## The Advanced Manufacturing Technology Consortia (AMTech) Program

Launched by NIST in FY 2013

- To incentivize the formation of and provide resources to industry-driven consortia
  - To support basic and applied research
  - On long-term, pre-competitive and enabling technology development
- For the U.S. manufacturing industry



AMTech-supported consortia will strengthen the capacity of U.S. industry and the nation to compete in global markets

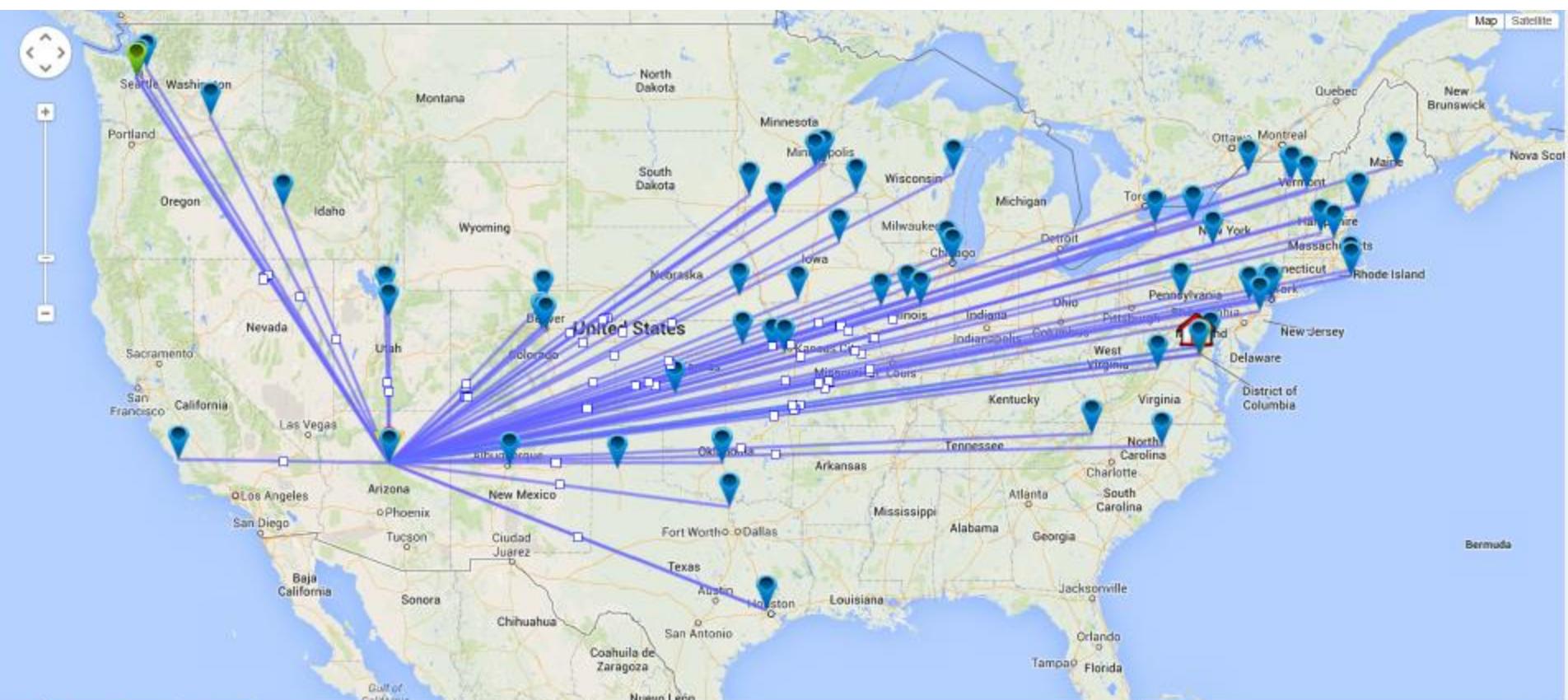
# How AMTech Works

- AMTech *Planning Awards* funds eligible applicants to create new or strengthen existing driven technology consortia
- AMTech supported 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 envisions offering AMTech funding in two broad areas: *Planning Awards* and *Project Awards*

# Example Consortium – Wind Mfg

Example: Developing a Consensus Based Sustainable Manufacturing Technology Roadmap for Distributed Wind Technology

- Awardee: Distributed Wind Energy Association, Flagstaff AZ
- Consortium: SMART Wind Consortium
  - Partners (funded participants, green) – 3, including 1 MEP center as subcontractor
  - Collaborators (unfunded participants, blue) – 63, including 3 national labs



# 2014 AMTech Award Competition Results

- **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)

# The 2015 AMTech Funding Opportunity

- Applications for *Planning Awards* (*technology roadmaps*)
- Grants.gov No. 2014-NIST-AMTECH-01

## Funding Level & Instrument

- Total funding available: approx. \$5.6 M
- Award size: approx. \$250 k - \$500 k
- Grant or Cooperative Agreement

## Key Dates

- Solicitation released: July 30, 2014
- Complementary webinars: August 7 & 14, 2014
- Required Pre-Application due: September 5, 2014
- Pre-Applicants notified: September 24, 2014
- Full Application due: October 31, 2014
- Award Announcement: Early May 2015



# Consortium for Advanced Manufacturing Foresights

# Consortium for Advanced Manufacturing Foresights

[http://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=505203](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=505203)

## What It Is

- A response to the Advanced Manufacturing Partnership 2.0 (AMP 2.0) recommendation #2:
  - *“Create an Advanced Manufacturing Advisory Consortium to provide coordinated private-sector input on national advanced manufacturing technology research and development priorities.”*

## Why It Matters

- Provides private sector technical input to interagency initiatives and programs



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

# Roles & Responsibilities

## Who's Involved

- NSF, DOC/NIST will stand it up
- Partnership members, drawn from industry and academia, will provide input as requested

## Partners Will Provide

- Faster (days/weeks) response to high-level inquiries (e.g., WH)
- Substantive (months-long) studies of deeper issues requested by Agencies
- Identification of new areas that would benefit from shared public-private research efforts

# Governance & Funding

- Joint oversight
  - NSF and NIST will coordinate oversight, with participation of other interested agencies
  - 50/50 financial support from NSF & NIST for base operations
  - Up to \$2 million/year
- Base operations
  - Establishment and maintenance of a standing committee that will meet approximately two times per year and whose members can be called upon for advice and to support the recruitment, guidance, and oversight of rapid response studies.
  - Operational staff and related expenses for management of logistics, recruitment of experts, and publication of studies.
- Funding period
  - Initial funding period will be 3 years, renewable based on progress
- Additional funding
  - Partners will be expected to secure incremental funding for individual studies from interested USG agencies, either single or multiple agencies.



# Timeline & Next Steps

## Timeline

- Solicitation published – 4/22/15.
- Proposal due date – 7/20/15.
- Proposal review Panel - tentatively 8/10/15 and 8/11/15
- Negotiate Cooperative Agreement – August/September, 2015
- Award – September, 2015

## Next Steps

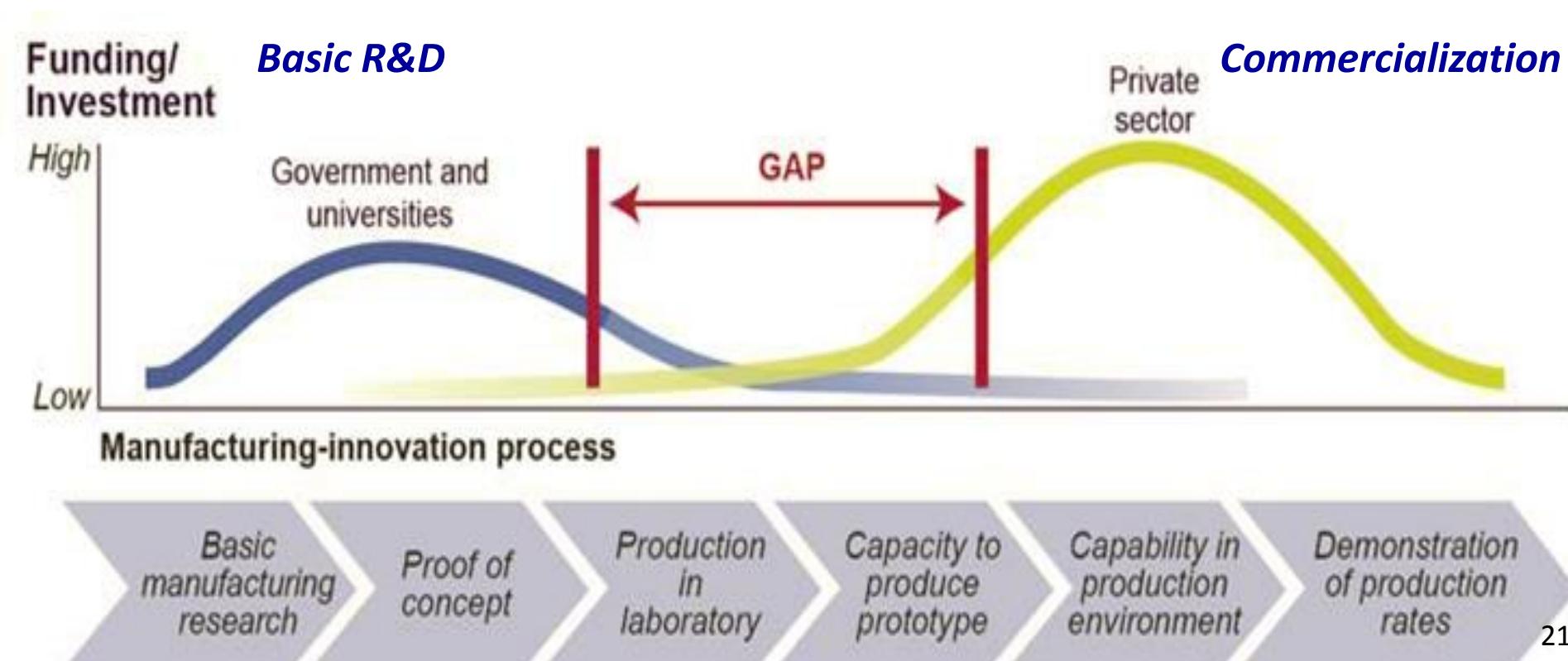
- Encourage capable performers and encourage proposal submission
- Identify reviewers from interested agencies
- Identify reviewers from industry, universities, and other private sector organizations
- Review Panel in early August, tentatively August 10 and 11, 2015

*\* Review panel includes representatives from agency partners, and private sector reviewers*

# **National Network for Manufacturing Innovation (NNMI)**

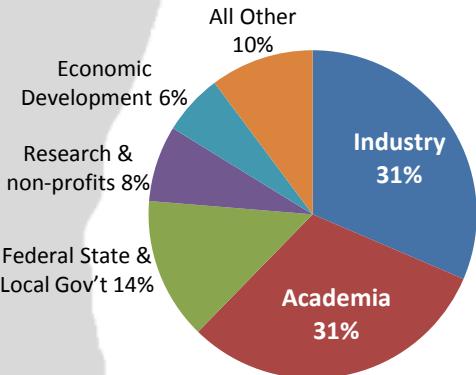
# NNMI: addressing the “Scale-up” Gap

*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!***



University of Colorado  
Boulder, Colorado



National Academies Beckman Center  
Irvine California



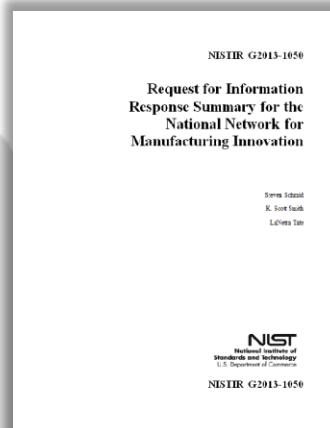
Cuyahoga Community College  
Cleveland Ohio



Rensselaer Polytechnic Institute  
Troy New York



U.S. Space and Rocket Center  
Huntsville, Alabama



# The Institute Design

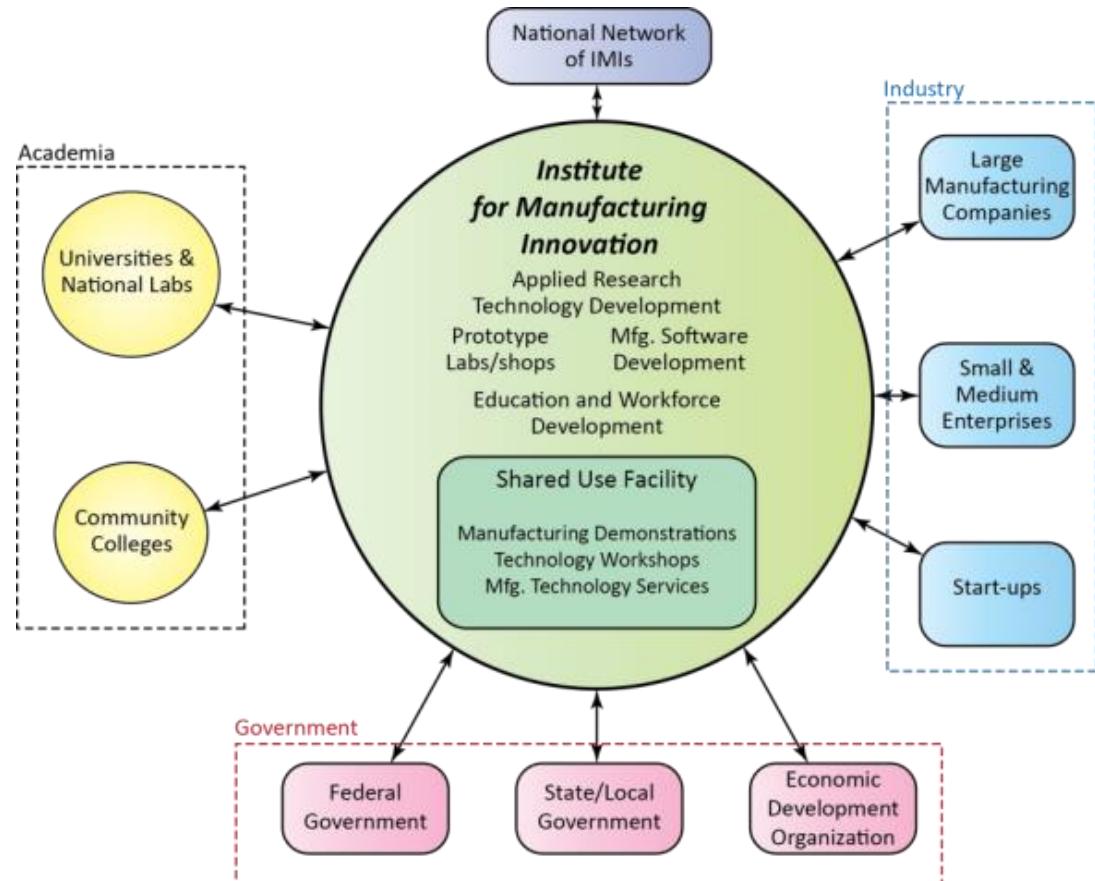
Creating the space for Industry & Academia to collaborate

White House Report  
NNMI Framework Design  
January 2013

NATIONAL NETWORK  
FOR MANUFACTURING  
INNOVATION:  
A PRELIMINARY DESIGN

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

JANUARY 2013



**Partnership: Industry – Academia – Government**

Working better, together to create transformational technologies and build new products and industries

# 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.

# The NNMI Mission

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

## Program

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

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

## Network

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

# Example Institute: Digital Manufacturing

ADVANCED MANUFACTURING NATIONAL PROGRAM OFFICE

NATIONAL NETWORK FOR MANUFACTURING INNOVATION



## UI LABS/DMDII Facility, Chicago IL GRAND OPENING MAY 11 2015

94,000 square feet - digital manufacturing lab, lab, instructional and collaboration space



# 1) Clear, unique Institute Focus

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

## Opportunity

A “Digital Manufacturing Renaissance” will revolutionize how products are designed, and processes engineered and validated. Current software tools are expensive, do not talk to each other, and require expertise that does not exist at many manufacturing companies.

## Big Idea

Accessible, interoperable, cutting edge, common approach and open source software tools will allow companies to bring new products to market, faster and at lower cost via a “digital thread”.

The consortium includes many of America’s best manufacturing companies. These companies have committed to use these new tools and to encourage their supply networks – which represent tens of thousands of small manufacturing businesses – to do the same. Through this network, this Institute will drive the adoption of digital manufacturing technologies in a way that will improve the competitiveness of the entire U.S. manufacturing sector.

## 2) Clear Industry Value Proposition

*Each Institute creates value for industry participation and funding*

- **Applied R&D:** Leverage significant government, industry, and academic investments to implement innovative solutions to member challenges
- **Digital Manufacturing Commons:** Exchange product information and transmit detailed design information on a secure, neutral and IP-safe digital environment
- **Workforce Training:** Access 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:



Proven talent from numerous state, educational, and vocational institutions:



Hundreds of **Small and Medium Sized Manufacturing Enterprises (SMEs)** seeking to improve competitiveness:



# 4) Addressing Critical Challenges

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

Theme	Sub-theme	Industry	Academia	Government
Integration of the digital thread	Optimization across value chain	★	★	★
	Big data	★	★	★
	Standard data format and machine communication	★		★
	Cyber-Security	★	★	★
	Make-design link	★	★	★
	Tracking product performance in the field		★	★
	“Real time” supplier visibility			
Leadership/organization capabilities	Commercialization of lab technologies	★	★	
	Articulation of business case for digital	★		★
	Workforce training/availability	★	★	★
Other	Enabling of mass-customization			
	Barriers to user adoption			★



Top priority for DMDII



Secondary priority for DMDII

# 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
<b>1. First Projects</b> Identified in proposal and by federal government customer	<ul style="list-style-type: none"><li>• <b>First Project Call</b> – DARPA AVM Transition</li><li>• <b>Digital Manufacturing Commons</b> (GE online collaboration platform)</li><li>• <b>1000 Jobs</b> (Workforce Development Initiative)</li><li>• <b>Project calls 6, 7 &amp; 8</b> in each technology thrust area</li></ul>
<b>2. Technology Roadmap</b> Driven by DMDII Technical Advisory Committee	<ul style="list-style-type: none"><li>• Identifies value opportunities from digital manufacturing, and obstacles preventing the value from being realized</li><li>• Offers taxonomy and ranking of biggest market pull opportunities</li></ul>
<b>3. Strategic Investment Plan</b> Driven by DMDII Technical Advisory Committee	<ul style="list-style-type: none"><li>• Identifies <b>13 specific technology investment topics</b></li><li>• Investment plan is structured into <b>problem statements with near-term impact</b> (rather than potential solutions)</li><li>• <b>Next Project Call</b> – open NOW</li></ul>

# The NNMI Vision



*"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.'**"*

*- President Barack Obama, July 30, 2013*

# 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

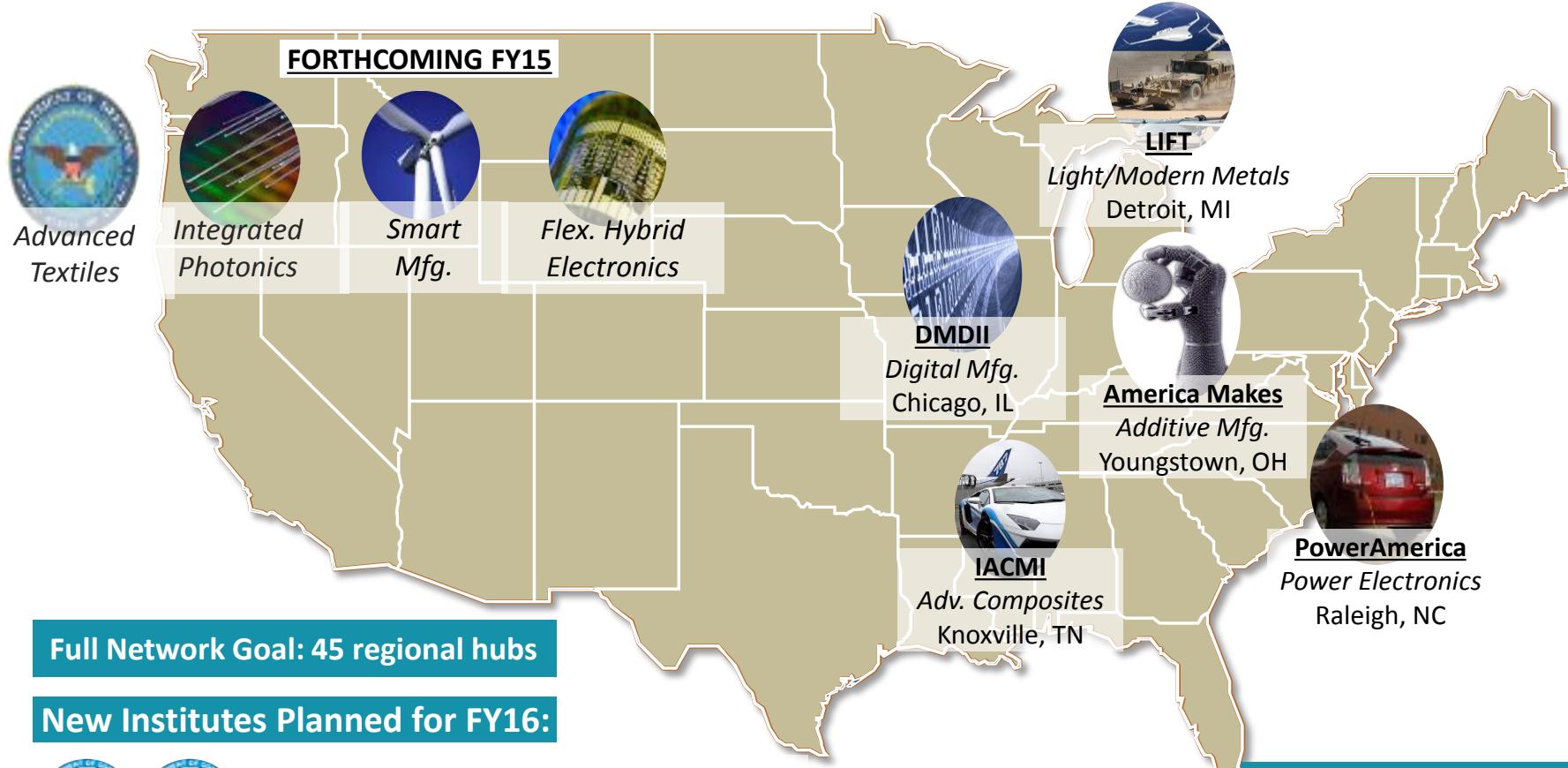
*Bipartisan Momentum Supporting NNMI Passage*

# Legislative Requirements: A Call To Action

The Revitalize American Manufacturing Innovation Act of 2014 (RAMI) RAMI calls upon the U.S. Secretary of Commerce to establish:

- **The “Network for Manufacturing Innovation Program” (*Network function*)** - to convene and support a network of Institutes
- **New “Centers for Manufacturing Innovation” (*Institutes*)** - using an open topic, open competition process
- **The National Program Office at NIST** - to oversee and carry out the program (*coordination, network support, and reporting*)

# Building the Network: Network Status and FY16 Plans



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**

# Enabling a Manufacturing Renaissance

# Huge STEM Education Potential of Digital Mfg.



# Opportunities from Digital Manufacturing

## Democratization of tools needed to Design and Make



## Shared access to non-profit and commercial makerspaces.



# Meet our Future Manufacturers

*Inspiration to Innovation to **MAKING***

*Enabled by a **Digital Manufacturing Renaissance!***



There are exactly 10 types of people in this world...

1. Those that understand binary
10. Those that do not.

***Thank you***

Connecting with the  
Advanced Manufacturing National Program Office  
(AMNPO)

*Phone:* 301-975-2830

*Email:* amnpo@nist.gov

*Web:* [www.manufacturing.gov](http://www.manufacturing.gov)

*Twitter:* @AdvMfgNPO