@MFGUSA

ManufacturingUSA

The National Network for Manufacturing Innovation

2016 Minority Serving Community College Convening
Washington, DC
November 1, 2016

Frank W. Gayle, Sc.D.
Advanced Manufacturing
National Program Office

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)

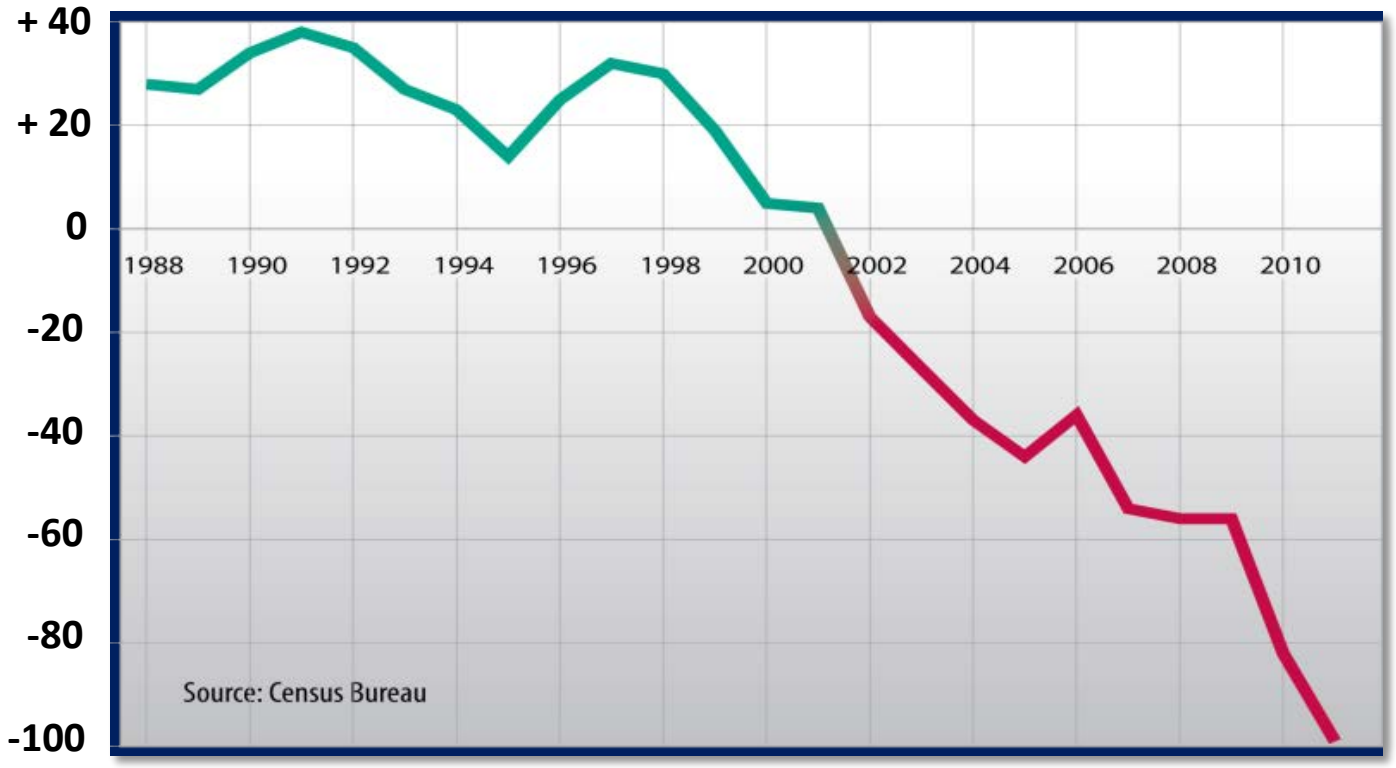
NSTC - Subcommittee on Advanced Manufacturing

BACKGROUND

Challenge: US Losing Leadership In Advanced Products

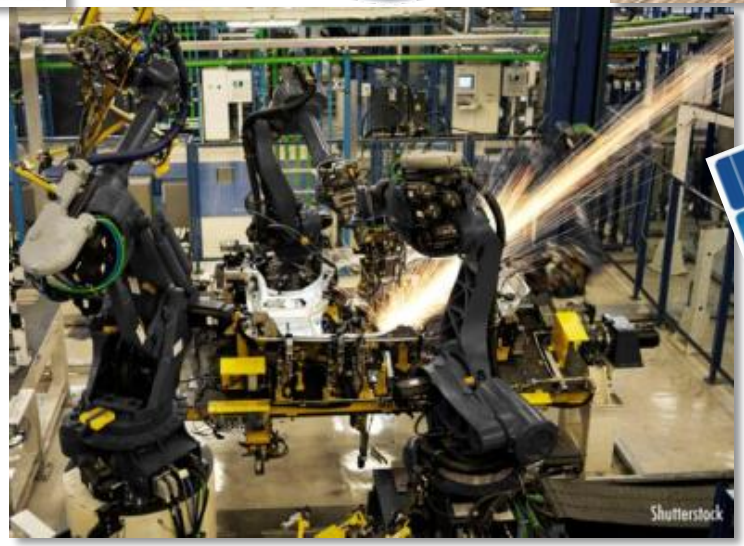
U.S. Trade Balance for Advanced Technology Products

US Trade Balance
Advanced Technology Products
($ Billion)



BACKGROUND

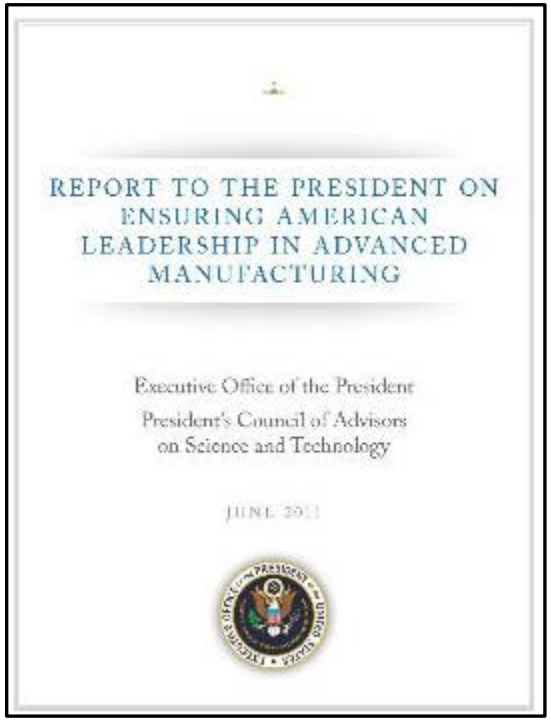
Products Invented Here, Now Made Elsewhere - Not Driven By Labor Cost



BACKGROUND

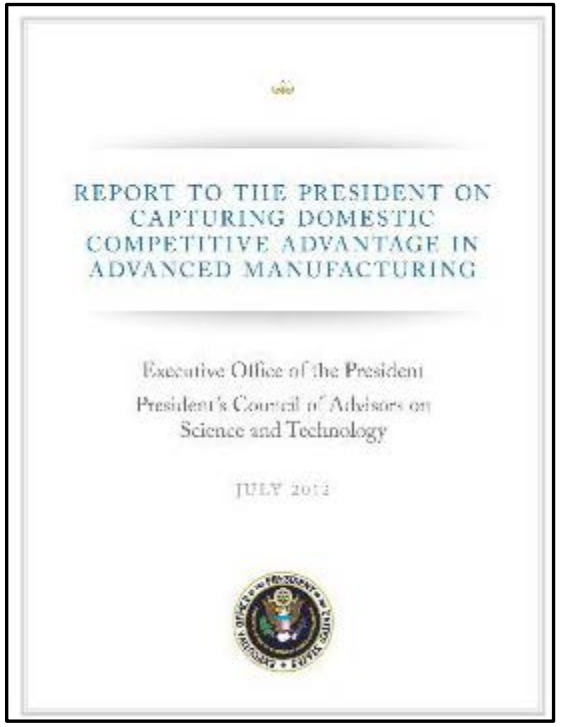
PCAST: The Independent Basis of MfgUSA

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

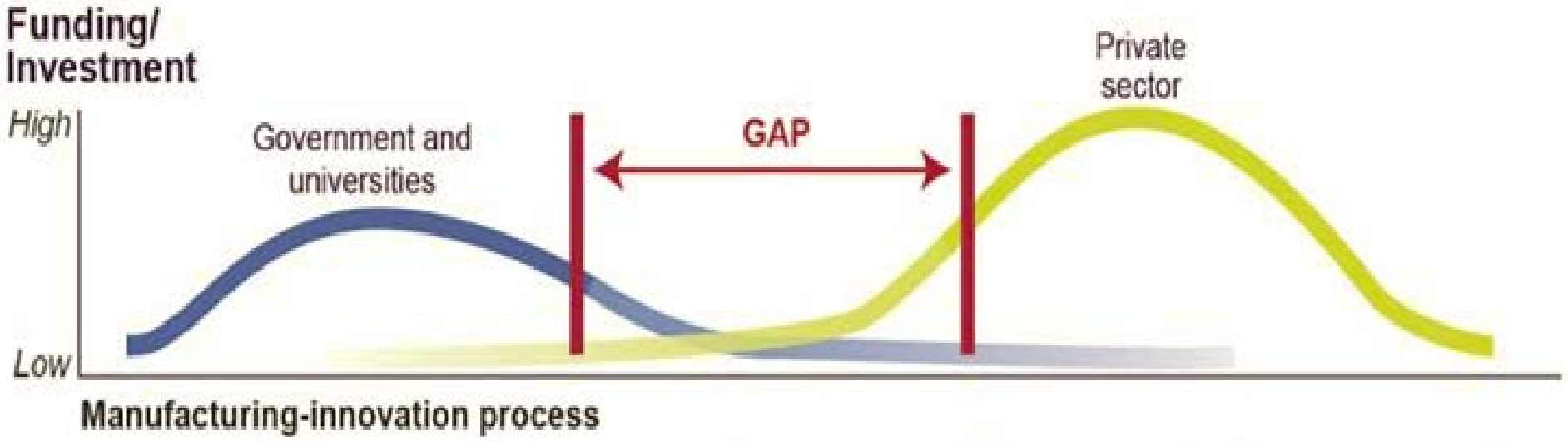
PCAST 2014

Recommends strong, collaborative network of Manufacturing Innovation Institutes

BACKGROUND

Manufacturing USA: 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



The Vision

AP Photo/Susan Walsh

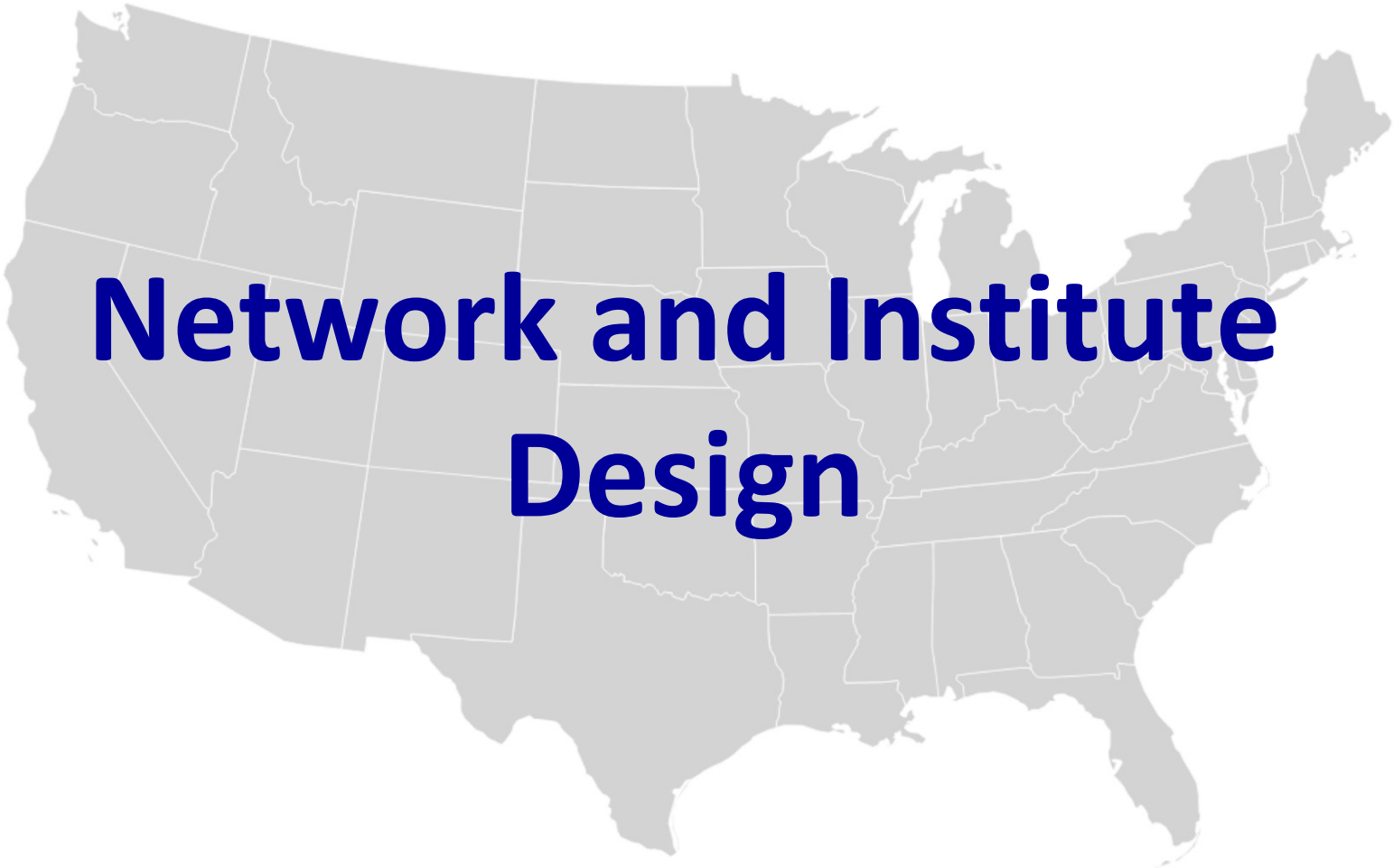
"In my State of the Union Address, I asked Congress to build on a successful pilot program and create 15 manufacturing innovation institutes that connect businesses, universities, and federal agencies to ***turn communities left behind by global competition into global centers of high-tech jobs.***

"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.'"***

- President Barack Obama, July 30, 2013

118 Bipartisan RAMI Bill Sponsors

December 16, 2014 – Signed By President Obama

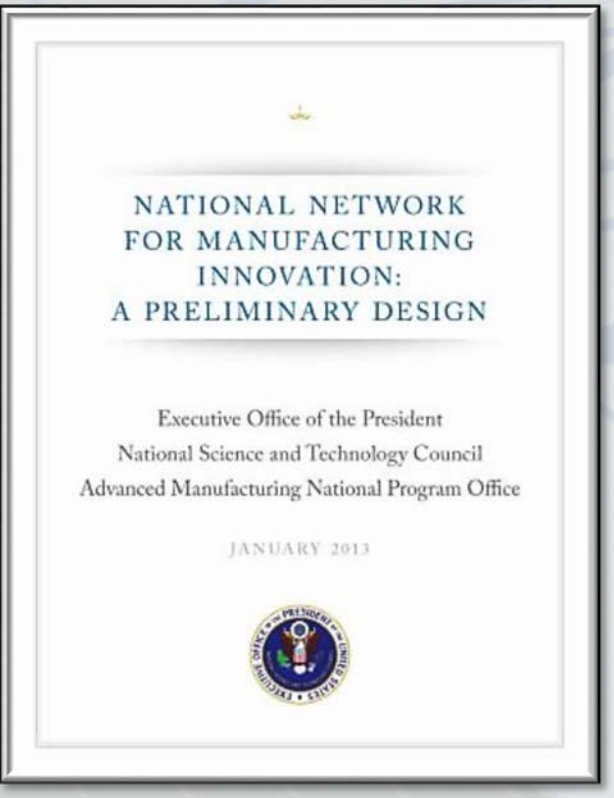


Network and Institute Design

The Institute Design

Creating the space for Industry & Academia to collaborate

White House Report
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

National Network of Institutes

Academia

Universities & National Labs

Community Colleges

Institute For Manufacturing Innovation

Prototype lab/shops
Research facility
Computer lab

Shared Use Facility

Industry

Large Manufacturing Companies

Small & Medium Enterprise

Start-ups

Government

Federal

State & Local

Economic Dev. Org.

Network Status and 2016/17 Plans

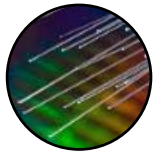
Future Network Goal: 45 Regional Hubs

Flexible Hybrid Electronics
San Jose, CA

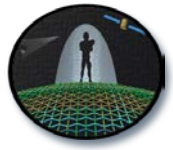
Smart Manufacturing
Los Angeles, CA

America Makes

Additive Manufacturing
Youngstown, OH



AIM Photonics
Rochester, NY



AFFOA - Fibers and Textiles,
Cambridge MA

PowerAmerica

Wide Bandgap Semiconductors
Raleigh, NC

DMDII

Digital Manufacturing & Design
Chicago, IL

lift

Lightweight Metals
Detroit, MI

iacmi

Advanced Fiber-Reinforced Polymer Composites
Knoxville, TN

New Institutes Planned for 2016/17

- **Open topic competition**
- Bioengineering for Regenerative Medicine
- Assistive and Soft Robotics
- Modular Chemical Process Intensification
- Sustainable Mfg - R*ecycling and Re-mfg.*

Progress to Date

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- $600 million federal investment matched by over $1.3 billion non-federal
- Eight active institutes: 1,300 members, over 240 technology development projects.
  - *Members include two-thirds of Fortune 50 U.S. manufacturers*
  - *8 out of the 10 top-ranked research and engineering universities.*
- Competitions underway for additional institutes

Example Institute: America Makes

The National Additive Manufacturing Innovation Institute

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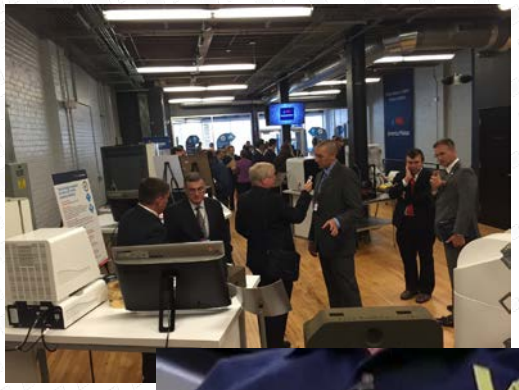
The National Accelerator for Additive Manufacturing



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

America Makes

WHY

The U.S. is not doing well in the Global Economy, and needs a reinvigorated Manufacturing Sector that includes a strong Defense Industrial Base

HOW

Transform manufacturing in the U.S. through innovative, coordinated Additive Manufacturing Technology Development, Technology Transition, and Workforce & Educational Outreach

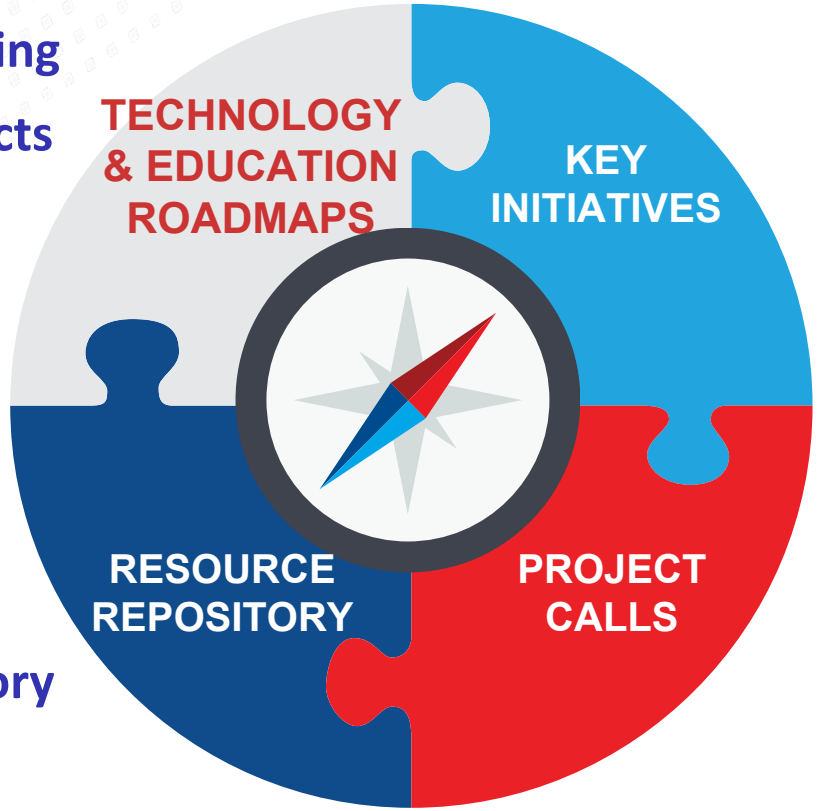
WHAT

Accelerated adoption of additive manufacturing technologies in the U.S. manufacturing sector that yield innovative products and increased domestic manufacturing competitiveness that yield innovative products and increased domestic manufacturing competitiveness

Collaborate
Cooperate
Innovate

2) *Each Institute creates value for industry participation and funding*

- **Robust Additive Manufacturing Roadmapping**
- **Opportunity to Participate in Funded Projects**
  - **Consortium-driven Project Calls**
  - **Agency-driven Projects**
  - **Member-driven Projects**
  - **Client-driven Projects**
  - **Competitively-awarded Projects**
  - **Crowd-sourced Projects**
- **Access to Consortium Developed IP**
- **Use of the America Makes Innovation Factory**



3) Each Institute is operated by an industry-led consortium

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174 members; continuing to grow

- 106 Industry Partners (60 Small Businesses)
- 39 Academic Partners (including community colleges)
- 14 Government Partners
- 11 Non-Profit Organizations
- 4 Manufacturing Extension Partnerships (MEPs)

Operated by the National Center for Defense Manufacturing & Machining (NCDMM)

NCDMM
NATIONAL CENTER FOR DEFENSE MANUFACTURING AND MACHINING

4) Each Institute works on the industry priorities and big challenges only solvable by collaboration

- **Technology Roadmap v. 2.0**
- **Workforce and Education Roadmap v. 1.0**
  - → **National Forum on Additive Manufacturing Education & Training, October 11-12, 2016, State College, PA**
- **systems engineering-based methodology**

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America Makes

Swimlane	Critical Technology Element	Impact Focus
Design	Bio-Inspired Design & Manufacturing	Complexity Exploitation, 3D Graded Materials, Multi-Material Integration, Model-Based Development, Product Customization
	Cost & Energy Driver, Driver Analysis	
	Design Aides/Apps	
Material	Additive Mfg Tech Data Packages	Standard Feedstock Materials, Benchmark Property Data, Microstructure Relationships, Process Window Definition, Processing Guidelines & Specifications
	Next-Gen Materials	
	Powder/Material Characterization	
Process	Multi-Material Delivery & Deposition	Faster Build Speeds, Improved Surface Quality, Larger Part Envelopes, Improved Detail Capability
	Next-Gen Machines	
	Process Temperature Gradient Control	
Value Chain	Digital Thread Integration	Material Costs, Processing Costs, Quality Control Costs, Productivity Costs, Energy Efficiency Costs
	Advanced Sensing & Detection Methods	
	Intelligent Machine Control Methods	
	Rapid Inspection (Post Build)	
	Repair Technologies	
	Standards/Schemas/Protocols	
AM Genome	Benchmark Validation Use Cases	Concurrent Methods, Computational Tools, Experimental Tools, Modular Open Simulations, Open Multi-Scale Data
	Physics-Based Modeling & Simulation	
	Model-Assisted Property Prediction	

5) Each Institute manages a balanced portfolio of real projects for Industry

Project Portfolio Total: $97M

- Public Total: $56.5M
- Cost Share Total: $40.5M

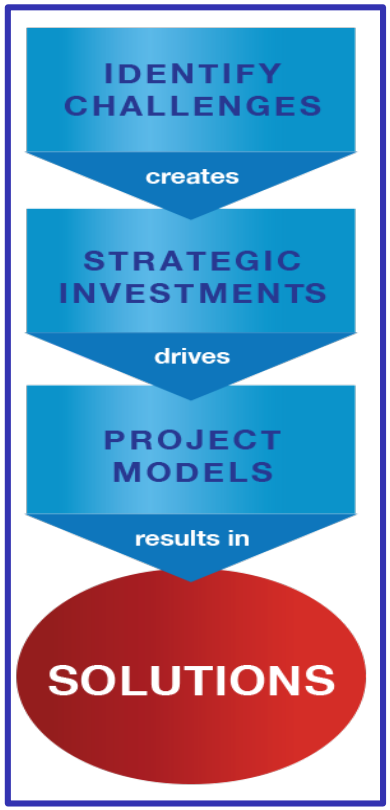
Total Project Count: 66

- Annual Project Calls*: 52
- Agency Directed: 14

*Includes

- Technology Development,
- Technology Transition,
- Workforce & Educational Outreach

America Makes 3DP Sand Casting Adoption Project



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Thank You! – To learn more…

www.ManufacturingUSA.com

www.manufacturing.gov - federal portal for advanced manufacturing programs