The Growth of Manufacturing USA®

October 31, 2017

Mike Molnar
Advanced Manufacturing National Program Office

An interagency team building partnerships
with U.S. Industry and Academia

Agenda

- Overview
- 2016 Program Results
- External Assessments and Responses
- 2017 Developments

Manufacturing USA Strategic Goals

VISION

U.S. global leadership in advanced manufacturing

MISSION

Connecting people, ideas, and technology to solve industry-relevant advanced manufacturing challenges, thereby enhancing industrial competitiveness and economic growth and strengthening our national security.

PROGRAM GOALS

Competitiveness

Technology Advancement	Workforce Development	Technology Sustainability

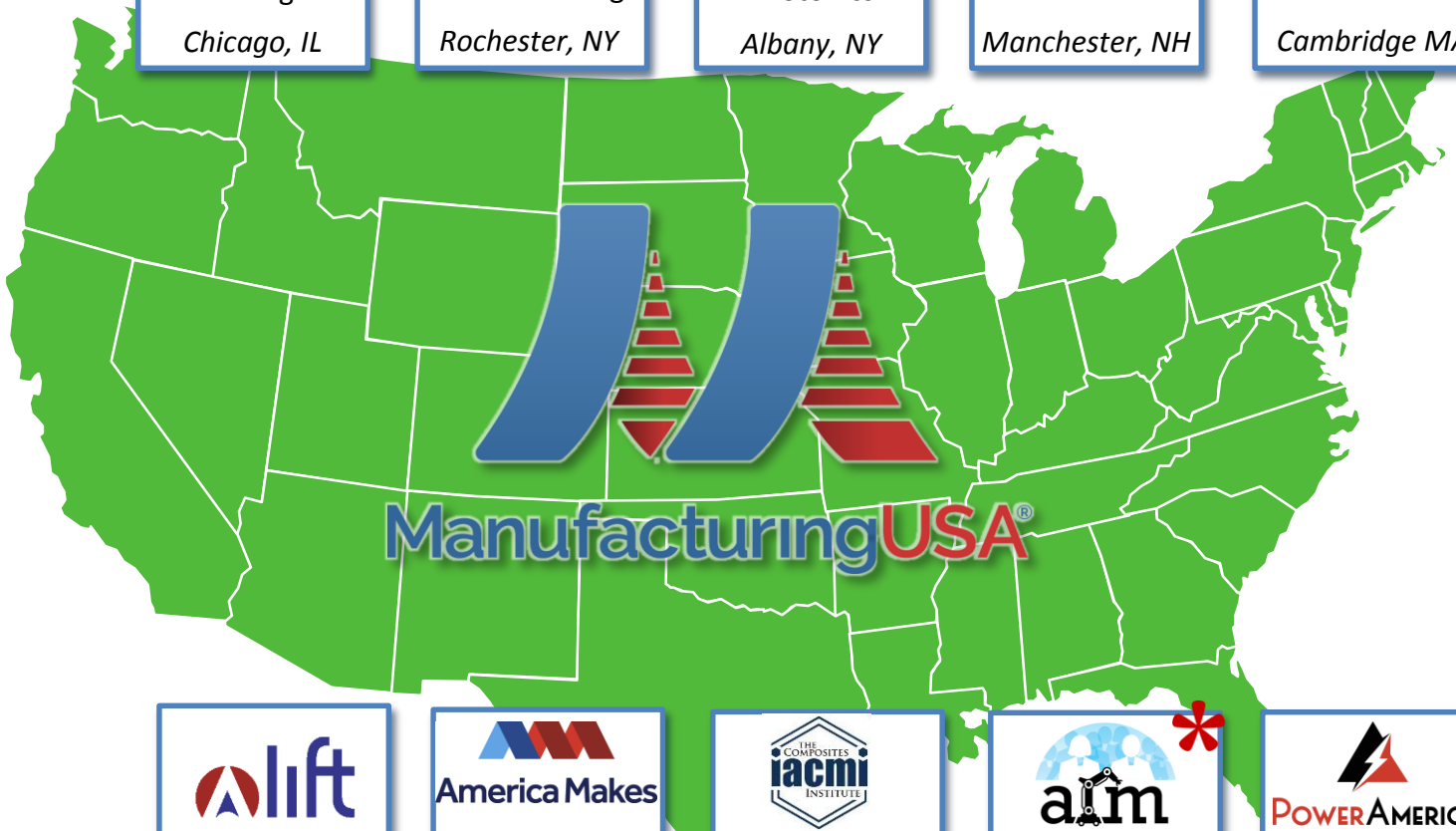
NATIONAL NETWORK FOR MANUFACTURING INNOVATION PROGRAM STRATEGIC PLAN

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

February 2016

Manufacturing USA Institutes

Regional Hubs with National Impact



DMDII — a UI LABS Collaboration
Digital Manufacturing & Design
Chicago, IL

REMADE INSTITUTE *
Sustainable Manufacturing
Rochester, NY

AIM photonics
Integrated Photonics
Albany, NY

biofabusa *
Regenerative Manufacturing
Manchester, NH

affoa
Advanced Fibers and Textiles
Cambridge MA

* New in FY 2017

NEXTFLEX
Flexible Hybrid Electronics
San Jose, CA

CESMII — Clean Energy Smart Manufacturing Innovation Institute *
Smart Sensors and Digital Process Control
Los Angeles, CA

RAPID — Transforming Process Industries *
Modular Chemical Process Intensification
New York, NY

NIMBL *
Bio-pharmaceutical Manufacturing
Newark, DE

lift
Lightweight Metals
Detroit, MI

America Makes
Additive Manufacturing
Youngstown, OH

The Composites Institute — iacmi
Advanced Composites
Knoxville, TN

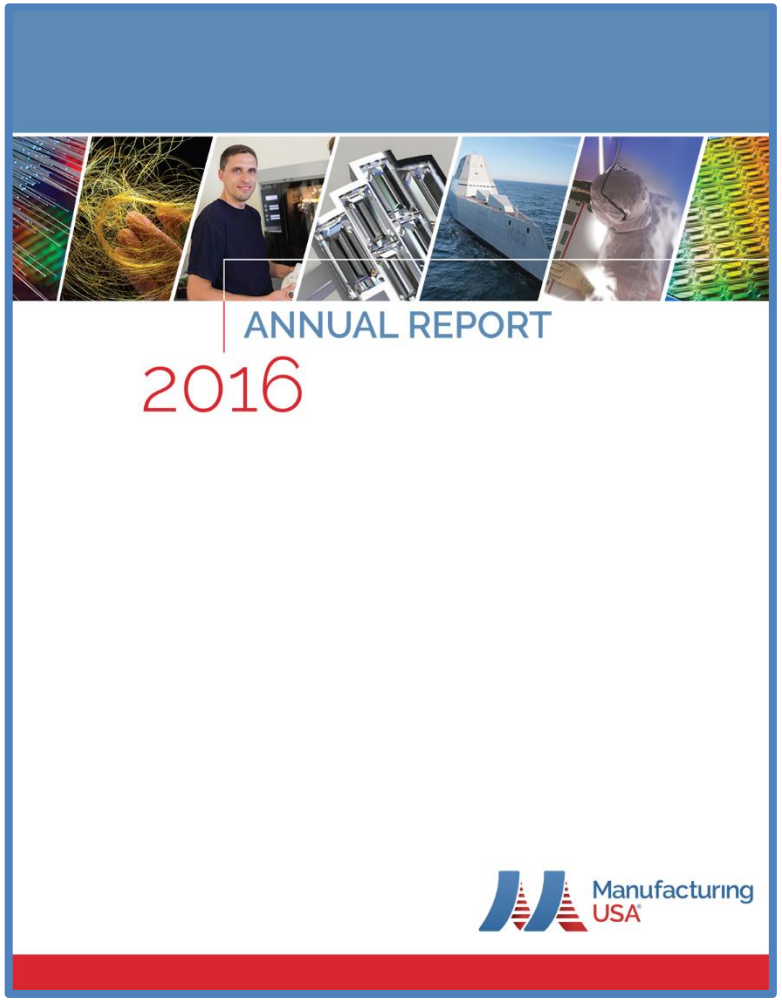
aim *
Advanced Robotics
Pittsburgh, PA

PowerAmerica
Wide Bandgap Semiconductors
Raleigh, NC

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

Agenda

- Overview
- 2016 Program Results - Manufacturing USA® Annual Report
  - Impact to U.S. innovation ecosystem
  - Leverage
  - Technology Advancement
  - Workforce
- External Assessments and Responses
- 2017 Developments



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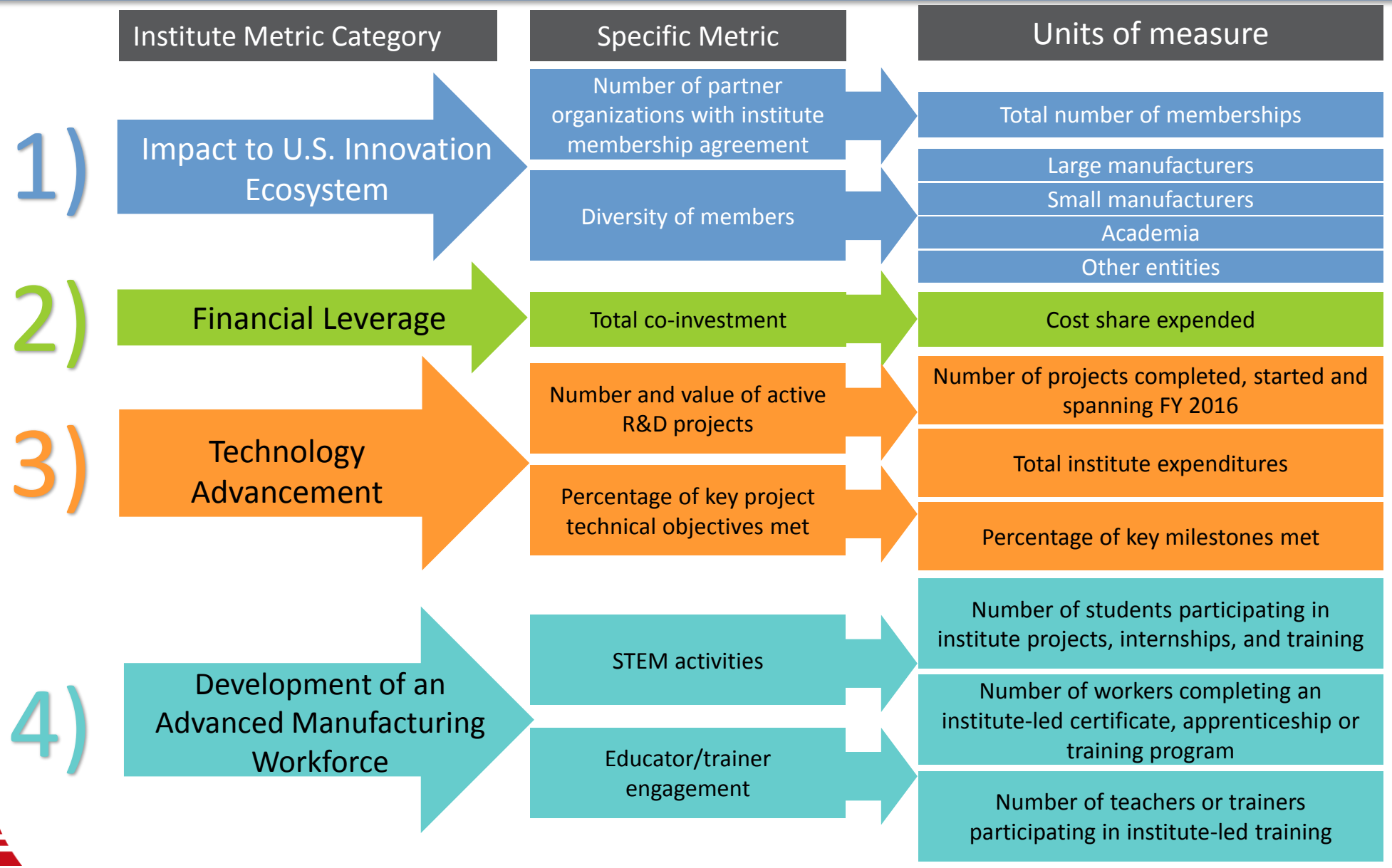
Measuring Performance – Top Level Metrics



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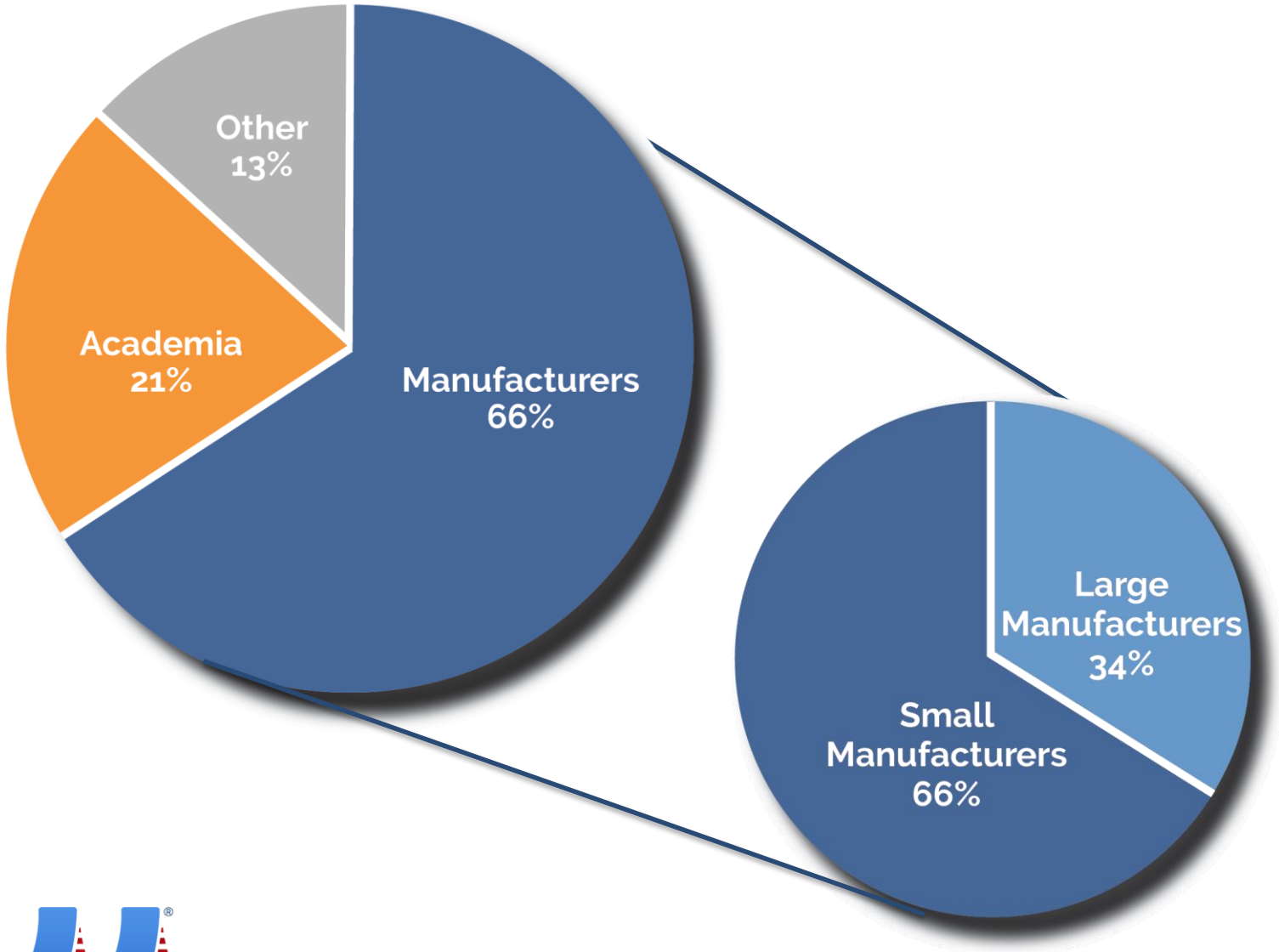
1) Impact to U.S. Innovation Ecosystem - Membership



Membership breakdown of 8 institutes in FY 2016

- The eight 2016 institutes have **830** Members – 66 % are manufacturers
- 66 % of manufacturers (341) were small manufacturers.
- Other participants included:
  - **177** universities, community colleges, and other academic institutions
  - **105** other entities, including federal, state, and local government agencies, federal laboratories, and not-for-profit organizations.

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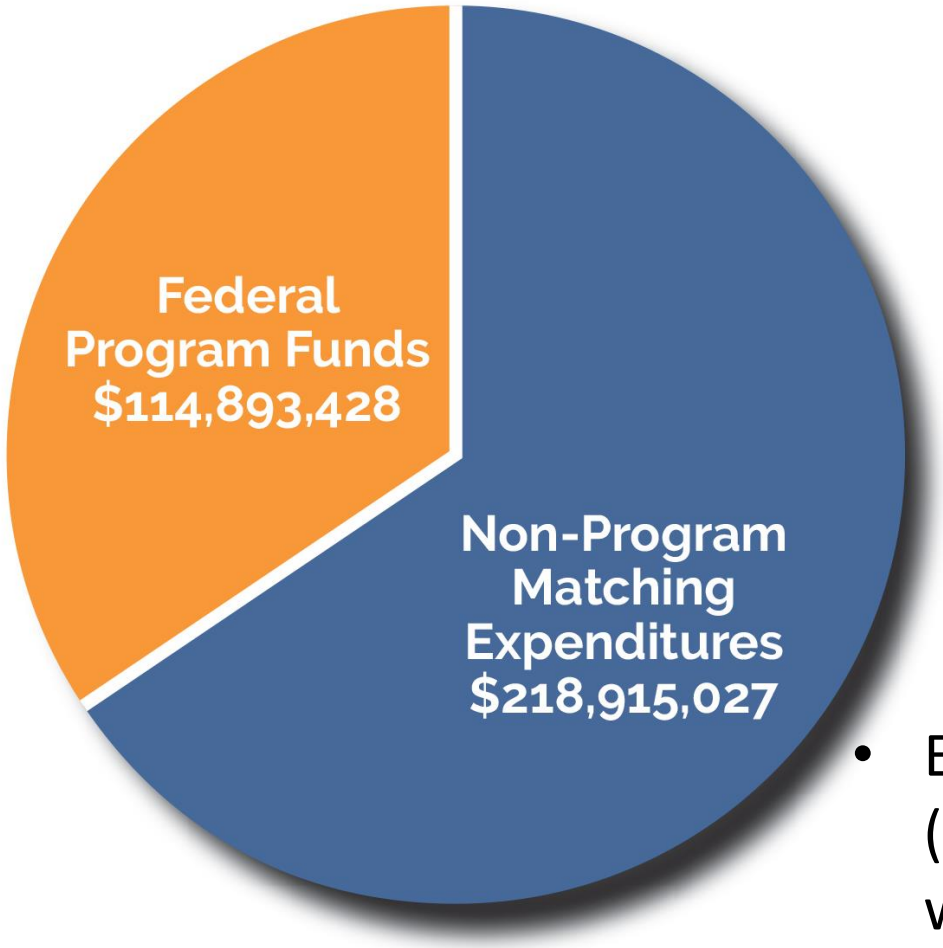
2) Financial Leverage



- FY 2016 matching was nearly 2 to 1
- Of $333,808,455 in total institute expenditures
  - 66 % of Institute support came from non-federal matching funds
  - 34 % came from non-program matching expenditures

- Expenditures funded all aspects of institute operation (e.g. technology advancement projects, education and workforce training efforts, and capital equipment)

3) Technology Advancement: Innovation Leads to U.S. Jobs

FY 2016: 191 active research and development projects at institutes.

Example Project at PowerAmerica

In under a year, researchers from John Deere and the Department of Energy National Renewable Energy Laboratory developed a prototype high power inverter for hybrid motors in heavy duty construction vehicles and trucks.

- Higher efficiency and lower heat-related breakdowns compared with traditional transformer-based inverters.
- Deere plans to hire American production workers in Fargo, ND, to manufacture and sell inverters starting in 2019.

Credit: John Deere and PowerAmerica

"Through our collaboration with PowerAmerica, we believe our silicon carbide technology work has been advanced by five years." **— Brij Singh, John Deere**

3) Technology Advancement: Collaboration Improves Efficiency

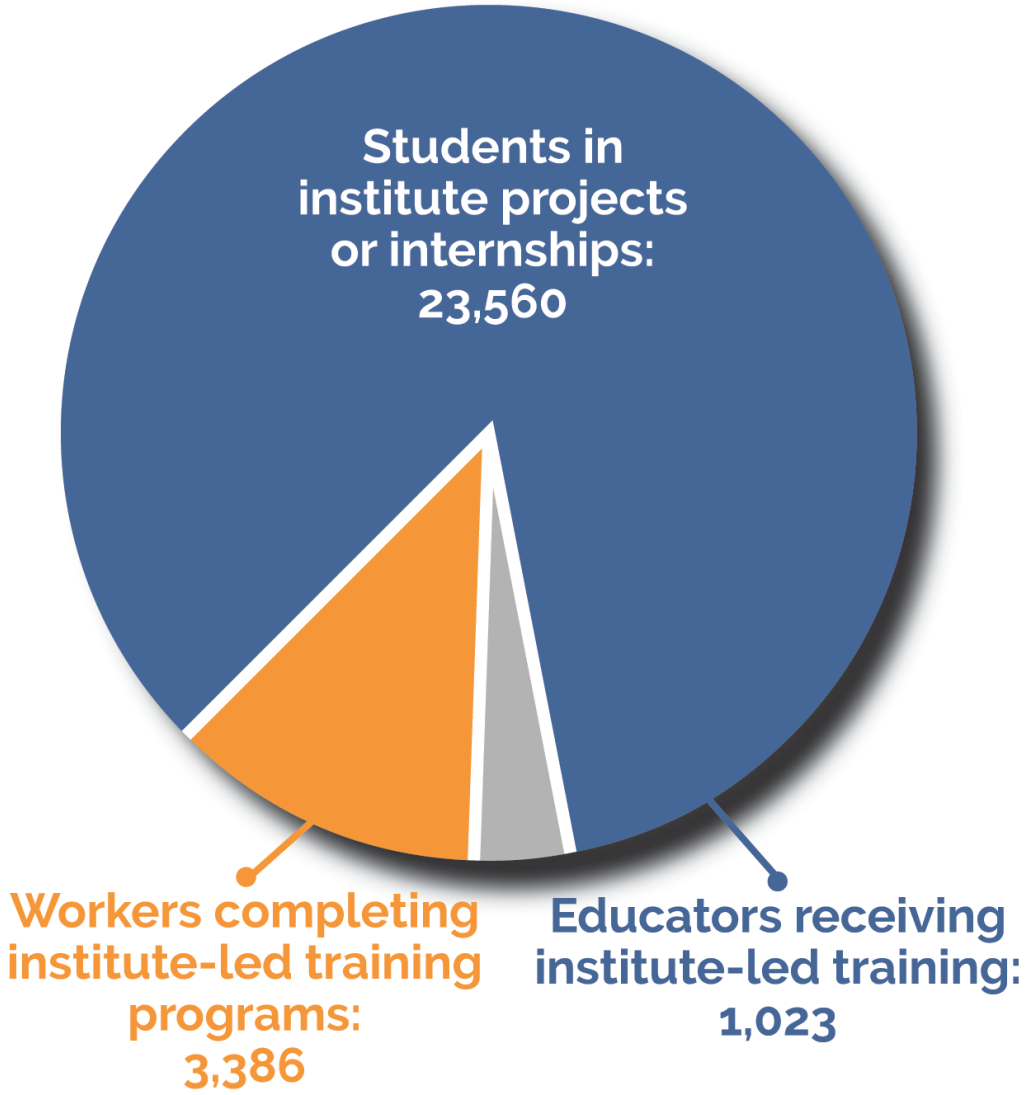
Example Project at PowerAmerica

- Digital Manufacturing Commons Hackathon
  - Participants developed and tested Digital Manufacturing Commons apps using 4.5 years worth of real-world factory floor data from Indiana-based ITAMCO
  - ITAMCO benefits from community analysis of their data, suggesting ways to optimize utilization, improve energy usage and manage machine health

Credit: DMDII

"To develop new ideas and remain competitive, we need to break out of our silos - and that's exactly what we're able to do by working with DMDII. The DMDII network connects us with people we wouldn't have been able to access otherwise - from large OEMs to entrepreneurs and hackers," **Joel Neidig, ITAMCO**

4) Development of an Advanced Manufacturing Workforce



- Nearly 28,000 participated in institute-led workforce programs, including
  - **23,560 students** in institute research and development projects, internships, or training
  - **3,386 workers** completed institute-led certificate, apprenticeship, or training programs
  - **1,023 teachers** and trainers in institute-led training for instructors

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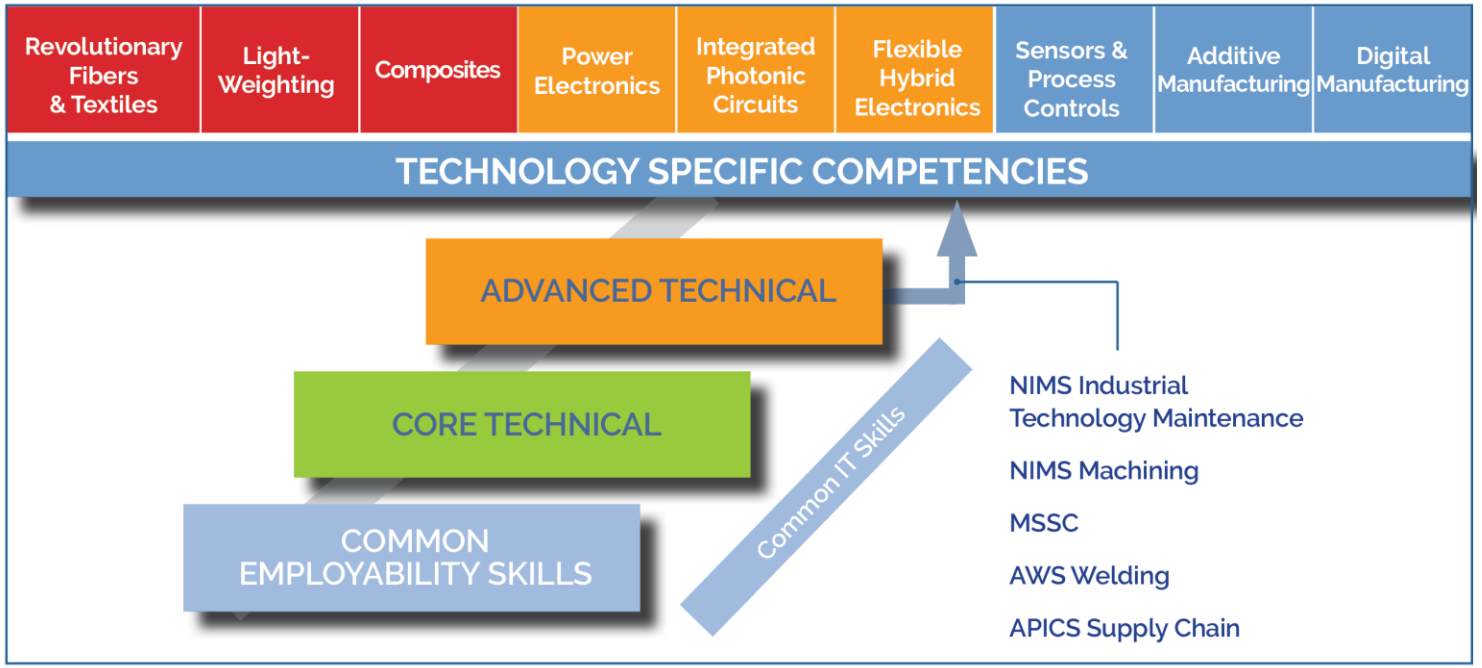
4) Workforce: The Role of the Network



- The Education and Workforce Development team
  - Identified common skills needed across advanced manufacturing technologies
  - Developed a common training model, built around those core competencies
- Institutes
  - Adopt, refine, or develop technology-specific modules to meet each industry's needs.
- The common training model evolves as institutes improve and share materials across the network

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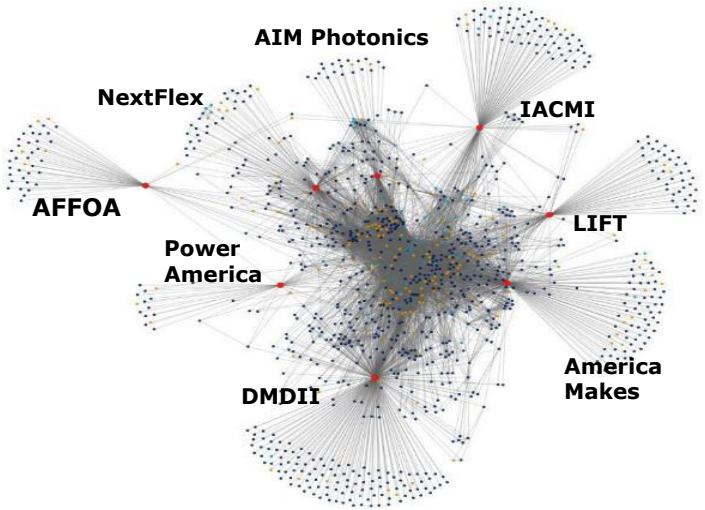
- Overview
- 2016 Program Results
- External Assessments and Responses
  - Deloitte/private sector views
  - GAO/public sector views
  - Building on Deloitte and GAO recommendations
- 2017 Developments

Networking is key to Manufacturing USA success - *Deloitte Finding*



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9,424
Relationships between organizations

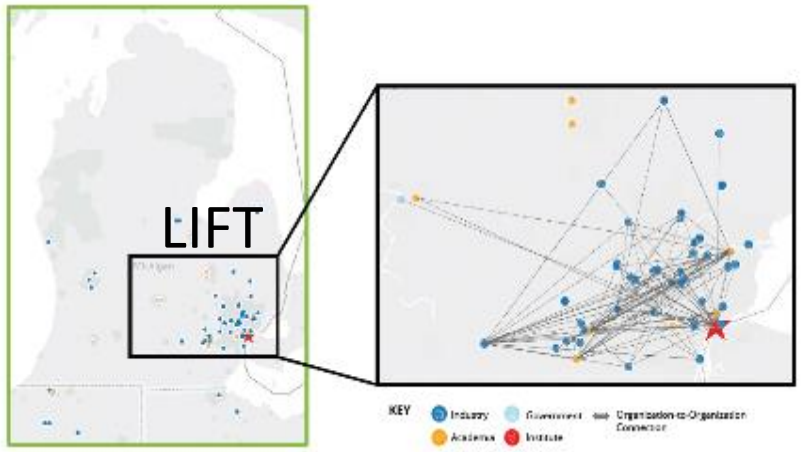
1,174
Organizations involved with the program

753
Organizations with formal membership

203
Organizations have relationships with multiple institutes

120
Organizations are members of more than one institute

Manufacturing USA is strengthening regional economic clusters
Advanced Mfg Ecosystem in Detroit, MI – Anchored by LIFT and IACMI – 63 organizations from across seven Institutes have generated 125 connections



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First 8 Institutes:
Nearly 1,200 organizations convened in an inter-industry network comprised of over **9,000 organization relationships**

Institutes decrease R&D costs for members by providing access to cost prohibitive equipment and pooling resources.

- Potential to deliver 5x leveraged value for members
- Access to not only government funding and partner funding on projects but also broader IP portfolios and R&D

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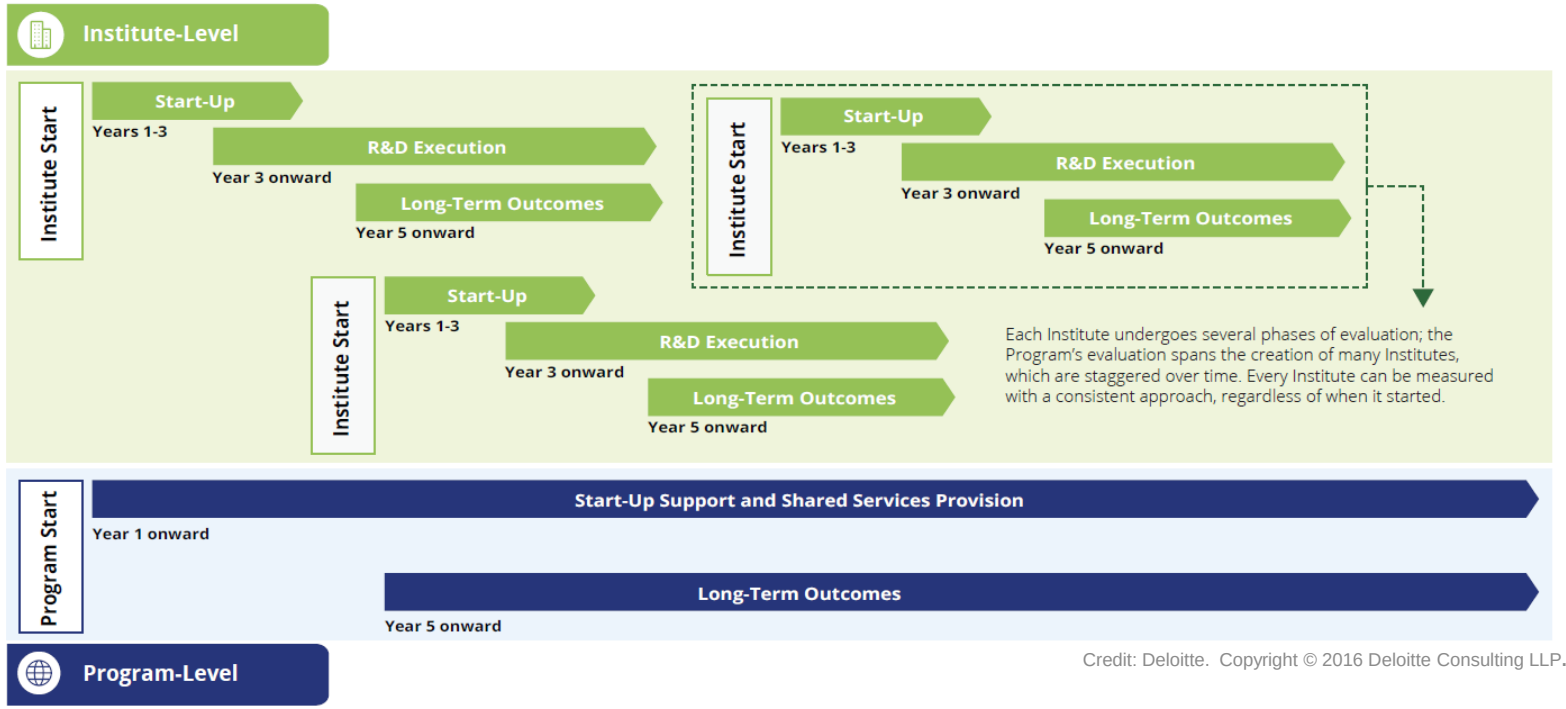
Building on External Assessments – *Deloitte Recommendations*

- Deloitte Recommendation: Develop strategies for long-term growth and sustainability, maintaining focus on U.S. national priorities.

— Manufacturing USA will build on Deloitte's recommendation for expanding and modifying metrics as the program matures



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Building on External Assessments – *GAO Recommendations*

- GAO: work with all non-sponsoring agencies whose missions contribute to or are affected by advanced manufacturing
  - **Manufacturing USA** has added Department of Labor, and Department of Health and Human Services (FDA and BARDA) to its interagency working team

- GAO: expand the Manufacturing USA governance document to detail roles and responsibilities of participating agencies that do not sponsor institutes
  - Participating agencies have begun implementation of this recommendation

Engaging Department of Labor (DOL)

- DOL is active in the Manufacturing USA Education and Workforce Development (E/WD) working group and Interagency Working Team (IWT) meetings.
- Institutes and the E/WD leaders are engaging with DOL on education and workforce initiatives in both the federal and state programs.
  - AmericaMakes is working with the Robert C. Byrd Institute for Advanced Flexible Manufacturing to pilot a competency model for an Additive Technician Apprenticeship as part of their DOL Apprenticeship Works Grant.
  - The E/WD team is working with the DOL Employment and Training Administration to incorporate industry-specific approaches developed at Manufacturing USA institutes into DOL's Advanced Manufacturing competency model.

Daniel J. Villao, Deputy Administrator, Office of Apprenticeship, Employment and Training Administration speaking at the April 2017 Manufacturing USA Network Meeting in Raleigh, NC.

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Today a Network of Fourteen Institutes

PILOT INSTITUTE	IN YEARS 3 OR 4 OF FEDERAL FUNDING		NEW INSTITUTES	
		NEXTFLEX Sustainable Manufacturing Rochester, NY	biofabusa Regenerative Manufacturing Manchester, NH	
		AIM photonics Integrated Photonics Albany, NY	NIMBL Bio-pharmaceutical Manufacturing Newark, DE	RAPID Transforming Process Industries Modular Chemical Process Intensification New York, NY
	DMDII a UI LABS Collaboration Digital Manufacturing & Design Chicago, IL	The Institute for iacmi Advanced Composites Manufacturing Innovation THE COMPOSITES INSTITUTE Advanced Composites Knoxville, TN	CLEAN ENERGY SMART MANUFACTURING INNOVATION INSTITUTE Smart **Sensors** and Digital Process Control Los Angeles, CA	REMADE INSTITUTE **Flexible Hybrid Electronics** **San Jose, CA**
America Makes **Additive Manufacturing** **Youngstown, OH**	lift **Lightweight Metals** **Detroit, MI**	PowerAmerica **Next Generation Power Electronics** **Raleigh, North Carolina**	affoa Advanced Fibers and Textiles Cambridge MA	aim Advanced Robotics Pittsburgh, PA
2012	**2013**	**2014**	**2015**	**2016**	**2017**

Unique Institute Charters spanning a range of technologies

Electronics

AIM Photonics
Integrated Photonics
Albany, NY
Rochester, NY

NextFlex
Flexible Hybrid Electronics
San Jose, CA

PowerAmerica
Wide Bandgap Semiconductors
Raleigh, NC

Materials

LIFT
Lightweight Metals
Detroit, MI

IACMI
Advanced Composites
Knoxville, TN

AFFOA
Advanced Fibers and Textiles
Cambridge MA

Bio-Manufacturing

BioFabUSA
Regenerative Manufacturing
Manchester, NH

NIIMBL
Bio-pharmaceutical Manufacturing
Newark, DE

Energy Usage / Environmental Impact

RAPID
Modular Chemical Process Intensification
New York, NY

Clean Energy Smart Manufacturing Innovation Institute
Smart Sensors and Digital Process Control
Los Angeles, CA

REMADE Institute
Sustainable Manufacturing
Rochester, NY

Digital Automation

DMDII a UI LABS Collaboration
Digital Manufacturing & Design
Chicago, IL

America Makes
Additive Manufacturing
Youngstown, OH

aim
Advanced Robotics
Pittsburgh, PA

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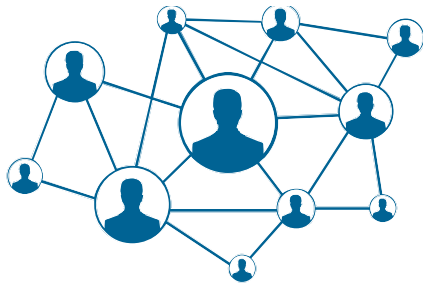
NIST Manufacturing Extension Partnership (MEP)

PROGRAM MISSION

To enhance the productivity and technological performance of U.S. Manufacturing



National Network

- MEP Center in all 50 U.S. states, Puerto Rico
- System-wide non-Federal staff of over 1,200 individuals in ~600 service locations assisting U.S. manufacturers.
- Contracting with >2,500 3rd party service providers

Local ➡ National Connection

System of Centers providing localized service to manufacturers in each State – with National reach and resources

MEP Budget & Business Model

$130M FY17 Federal Budget with Cost Share Requirements for Centers

Partnership Model

- Federal, State, Industry
- Managed by NIST at Federal level
- Well aligned with state and local economic development strategies

MEP Strategy: Global Competitiveness and Growth

Provide direct, hands-on technical and business assistance as trusted advisors to domestic manufacturers to help them compete and grow

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Manufacturing USA – MEP Embedding Initiative

Manufacturing USA - Conclusions

- Manufacturing USA is successfully achieving its program goals
- Manufacturing USA institutes are convening a diverse array of members and coordinating project activities
- Small business engaged and is especially benefitting
- Leveraging and collaboration improve effectiveness of institutes and provide multiplier effect for members

All tables, figures, and photos in this document were produced by the Advanced Manufacturing National Program Office Interagency Working Team, unless otherwise noted.

Thank you!

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