

ManufacturingUSA[™]

The National Network for Manufacturing Innovation Briefing for the 2017 ASEE Public Policy Colloquium

Mike Molnar, Director-Advanced Manufacturing National Program Office An interagency team building partnerships with U.S. Industry and Academia



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Engineering and the 115th Congress

Many issues today involve science and technology *ASEE Engineering Congressional input is critical to sound policy* Of the 535 Members of the 115th Congress, 2% (13) have engineering expertise

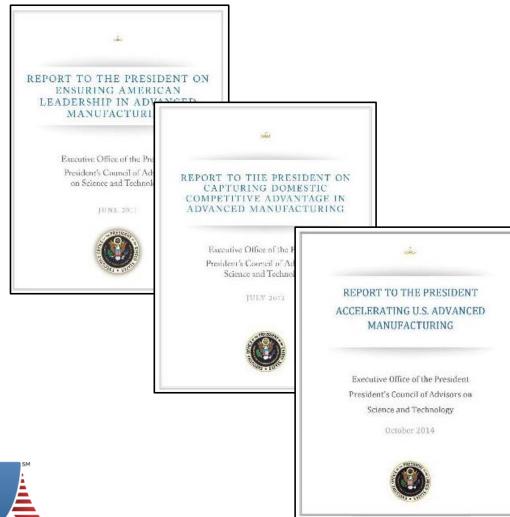
Senator Steve Daines (R-MT) - B.S. chemical engineering 1984 Senator Martin Heinrich (D-NM) - B.S. mechanical engineering 1995 Rep. Joe Barton (R-TX) - B.S. industrial engineering 1972 Rep. Tony Cárdenas (D-CA) - B.S. electrical engineering 1986 Rep. Chris Collins (R-NY) - B.S. mechanical engineering 1972 Rep. Joseph Kennedy, III (D-MA) - B.S. management science & engr. 2003 Rep. Raja Krishnamoorthi (D-IL) - B.S. mechanical & aerospace engr. 1995 Rep. Daniel Lipinski (D-IL) - B.S. mechanical engineering 1988 Rep. Thomas Massie (R-KY) - S.M. mechanical engineering 1996 Rep. David McKinley (R-WV) - B.S. civil engineering 1969 Rep. Brad Schneider (D-IL) - B.S. industrial engineering 1983 Rep. Paul Tonko (D-NY) - B.S. mechanical & industrial engineering 1971 Rep. Bruce Westerman (R-AR) - B.S. biological & agricultural engr. 1990



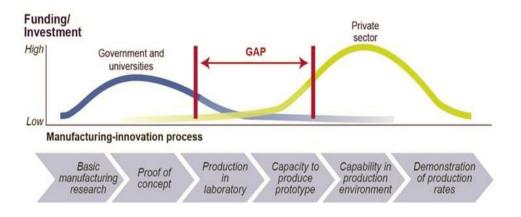


Manufacturing USA addresses national need

President's Council of Advisors on Science and Technology



Market Failure in Pre-Competitive Applied Manufacturing R&D

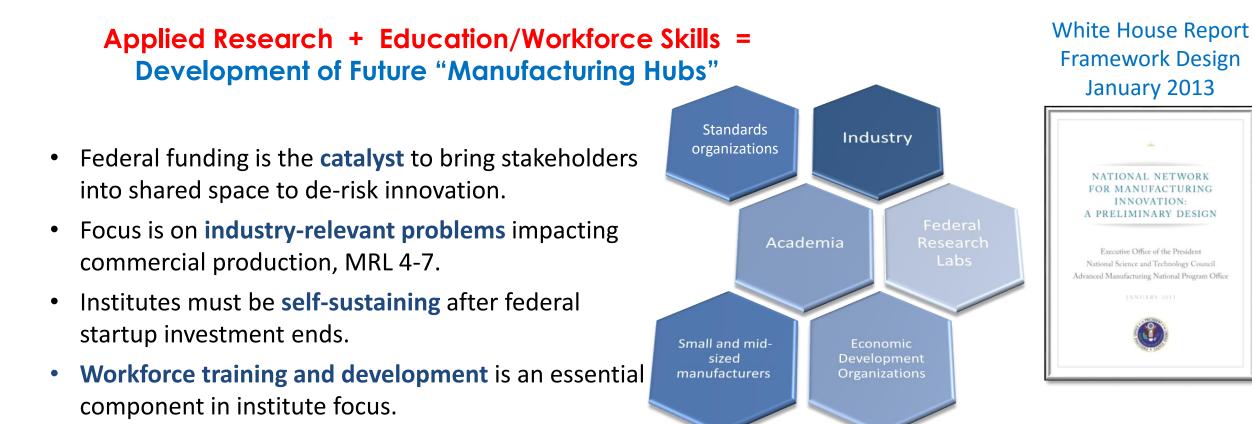


National Network for Manufacturing Innovation creates the space for industry and academia to work on industry-relevant problems

- Addresses the market failure of industry underinvestment in "pre-competitive" applied R&D
- Focuses on "de-risking" new technologies and materials to scale-up for U.S. manufacturers



Manufacturing Institute Framework



Federal startup investment: \$70M - \$120M/institute over 5 years Institute Consortium owners must have minimum 1:1 co-investment





Manufacturing USA Strategic Goals

- Increase the competiveness of U.S. manufacturing.
- Facilitate the transition of innovative technologies into scalable, cost-effective, and high-performing domestic manufacturing capabilities.
- Accelerate the development of an advanced manufacturing workforce.
- Support business models that help institutes become stable and sustainable.



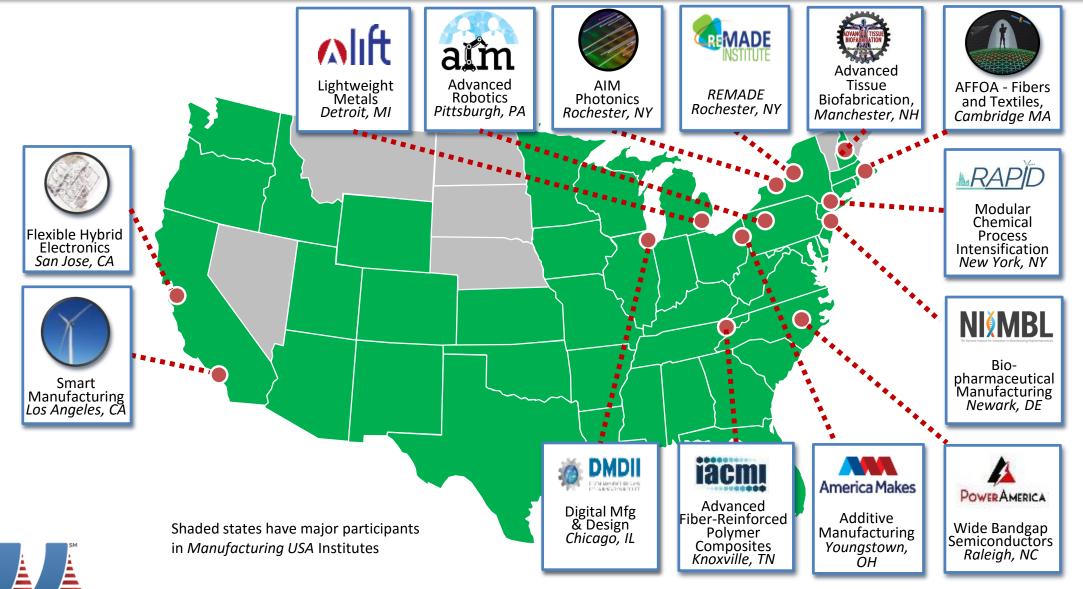
February 2016







Manufacturing USA Today



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

Example Institute: NIIMBL



The National Institute for Innovation in Manufacturing Biopharmaceuticals

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



A NATIONAL NETWORK









Formulation &

packaging of the active

ingredient into final

dosage form



Novel analytics for process & product characterization & control. Regulatory science to assess safety, efficacy, & quality

140+ Partners

A public-private partnership of industry, academic, non-profits and government entities.





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

Our Mission

The NIIMBL mission is to accelerate biopharmaceutical manufacturing innovation, support the development of standards that enable more efficient and rapid manufacturing capabilities, and educate and train a world-leading biopharmaceutical manufacturing workforce, fundamentally advancing U.S. competitiveness in this industry.





2) Each Institute creates value for industry participation and funding



- Regulatory advancement is streamlined
- Enhanced process robustness is obtained
- Major manufacturers work with suppliers to develop new technologies
- Standardization of interfaces, assays, parts, and certifications is achieved
- New methods, technologies, and best practices are achieved collaboratively with health authorities
- Workforce creation matches industry needs

A place where industry, academic, state, and U.S. federal resources synergize to

- meet industry's needs
- de-risk and streamline process development
- train a growing workforce spanning the full supply chain

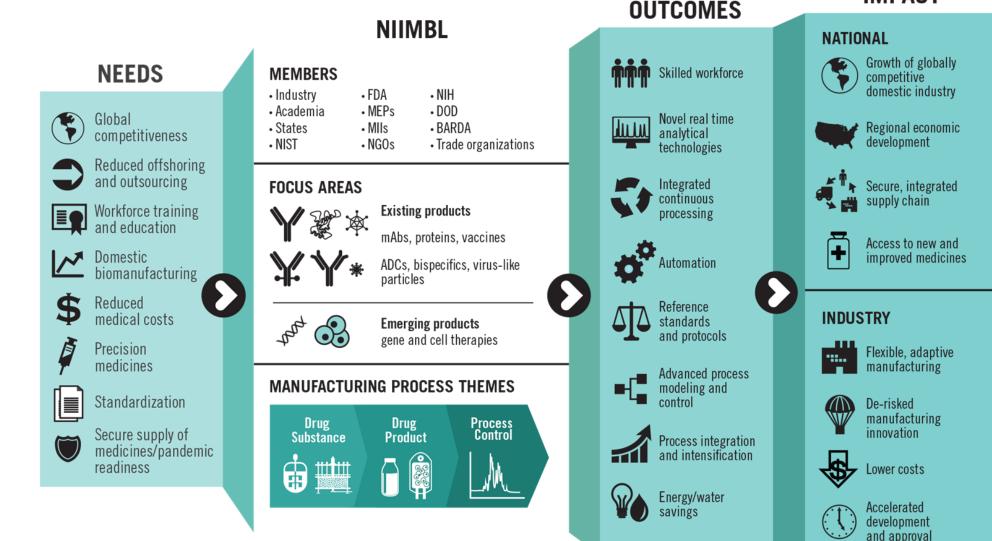


3) Each Institute is operated by an industry-led consortium

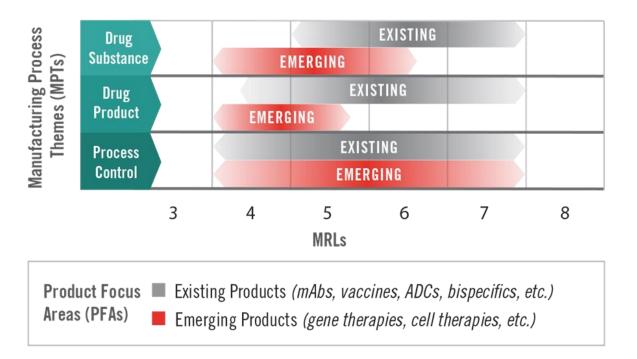
NIIMBL: national impact with shared resources in West, Midwest, Southeast, Mid-Atlantic, and Northeast regional hubs, operated by USA Bio LLC



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



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



NIØMBI

Manufacturing Process Themes



- NIIMBL plans two project calls per year in ongoing operations,.
- 'Quick Start' project calls will be issued at close of the start-up phase.
- A regulatory coordination committee may issue special project calls at any time.

Third Party Assessment Commissioned

Deloitte studied key areas in order to evaluate and assess Manufacturing USA's national-level impacts, including:

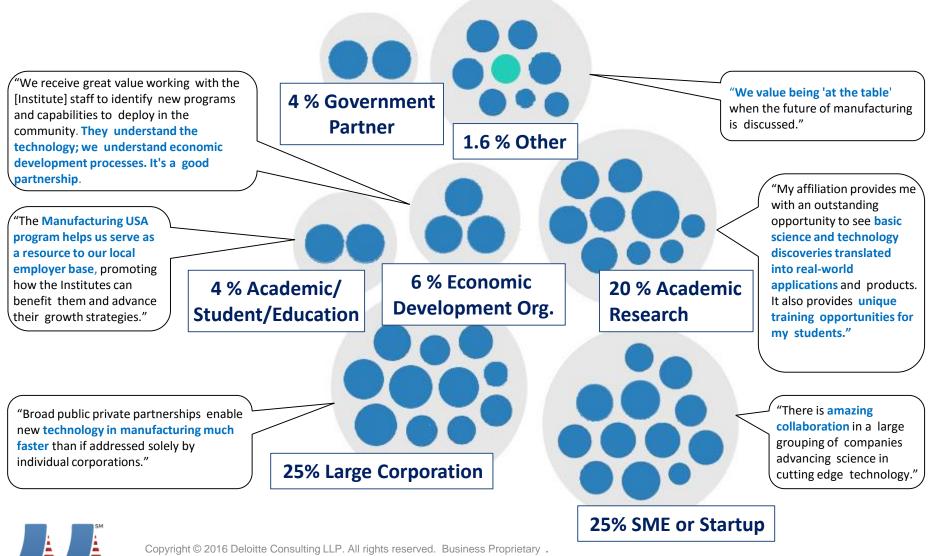
- Program Theory and Structure
 - Is the program doing the right things?
 - Is the program meeting objectives / impacts?
- Program progress
 - How is the program performing, achieving its objectives, and creating impact?
 - Qualitatively, what are case studies / examples of impact?
 - Quantitatively, what does the data tell us about impact?
- Recommendations
 - What can be improved?







Extensive Research and Evaluation



Deloitte conducted:

- Extensive interviews
- Site visits to all the institutes
- Review of institute data
- Research on comparable international efforts

More than 200 institute and program stakeholders were engaged in a crowd discussion to generate powerful insights in support of study findings



Formation of Regional Clusters

Manufacturing USA shows signs of strengthening regional economic clusters

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DMDII

Digital Manufacturing and Design Innovation Institute³³

Established February 2014 Headquarters Chicago, IL DMDII works with factories across America deploying digital manufacturing and design technologies in order to connect different parts of the manufacturing life-cycle through data, and to utilize that information to make smarter, more efficient business decisions.



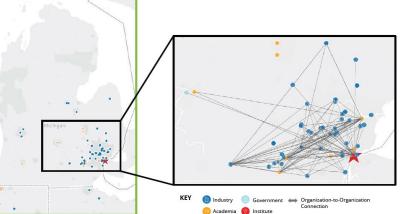
America's Flexible Hybrid Electronics Manufacturing Institute³⁴

Established August 2015 Headquarters San Jose, CA NextFlex catalyzes the U.S. flexible hybrid electronics (FHE) ecosystem to commercialize technology through investments in thinned device processing, device/sensor integrated printing and packaging, system design tools, and reliability testing and modeling.



Institute for Advanced Composites Manufacturing Innovation³⁵ Established June 2015 Headquarters Knoxville, TN

IACMI works to facilitate the development of lower-cost, higher-speed, and more efficient manufacturing and recycling processes for advanced composites. Decreasing the cost of composites can enable their use for a broader range of products including lightweight vehicles with recordbreaking fuel economy, lighter and longer wind turbine blades, high pressure tanks for natural gas-fueled cars, and lighter, more efficient industrial equipment



Inset: Advanced Manufacturing Ecosystem in Detroit, MI – Anchored by the LIFT Institute

aff@a

Advanced Functional Fabrics of America³⁹ Established April 2016 Headquorters Combridge, MA AFFOA's mission is to transform traditional fibers, yarns, and fabri into highly sophisticated, integrated, and networked devices and systems. The institute makes fiber device intellectual property available for domestic manufacturers, links together a Fabric Innovation Network of producers and laboratories to rapidly execute prototypes and pilot production, and oversees a network of advanced fabric' incubators connected to market-facing companies.

AIM

U.S. Institute for Manufacturing Integrated Photonics⁴⁰ Established July 2015 Headquarters Albany, NY

eclassime jury 2015 reconjusters hadary, with AIM Photonics provides access to state-of-the-art fabrication, packaging, and testing capabilities for small-to-medium enterprises, academia and the government; creates an adaptive integrated photonic circuit workforce capable of meeting industry needs and thus further increasing domestic competitiveness; and meets participating commercial, defense and civilian agency needs in this burgeoning technology area.

Power America The Next Gen

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The Next Generation Power Electronics Manufacturing Innovation Institute⁴¹

Established January 2015 Headquarter: Ralegh, NC PowerAmerica is developing advanced manufacturing processes that will enable large-scale production of wide bandgap (WBG) semiconductors, which allows power electronic systems to be smaller, faster, and more efficient than semiconductors made from silicon. WBG semiconductor technology has the potential to reshape the energy economy by increasing efficiency in everything that uses semiconductors.

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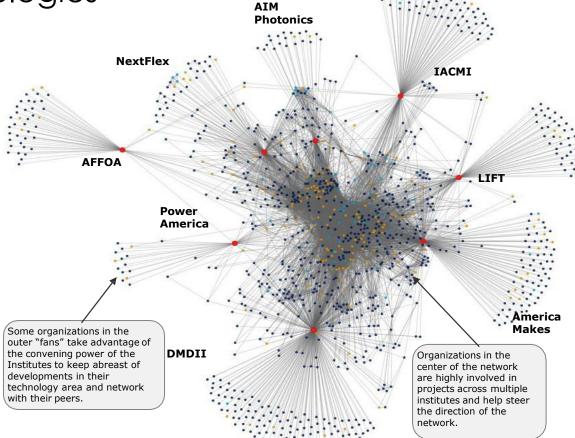
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•organizations from across seven Institutes have generated 125 connections



The Power of Connections

Manufacturing USA Institutes address the "valley of death" through seed funding and by bringing together stakeholders to commercialize advanced technologies



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

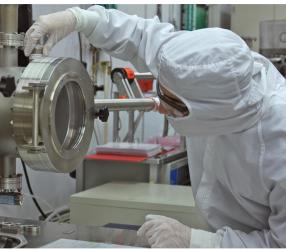
Together, the Institutes' convene **nearly 1,200 organizations** in an inter-industry network comprised of **9,000+ organization relationships**





Collaboration Multiplier Effect

- Institutes decrease the cost of experimentation for their members by providing access to cost prohibitive equipment and pooling R&D dollars.
 - Institutes are demonstrating the potential to deliver 5x leveraged value for members
 - Institutes give members access to not only government funding and partner funding on projects but also broader IP portfolios and R&D



PowerAmerica Institute member facility.



DMDII Facility in Chicago, Illinois

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Standards and Technology

U.S. Department of Commerce



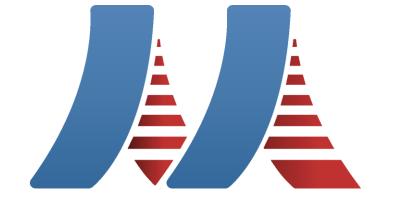
Third Party Assessment Findings & Program Progress

Key Findings - Manufacturing USA Spurs R&D Innovation

- The Program is a highly effective ecosystem convener
- Institutes are demonstrating the potential to deliver 5x leveraged value for members
- Institutes are successfully planning for sustainability independent of U.S. government influence

Progress to Date

- As of today, 14 institutes launched \$1 billon federal investment matched by over \$2 billion non-federal
- Of 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.



ManufacturingUSAsm







Thank You!



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