



# DoD Manufacturing USA Institutes

Beyond Phase II Conference  
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# DoD Institutes Introduction

## Overview



### 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:

- ***Technology Development***
- ***Technology Transition and Dissemination***
- ***Workforce & Educational Outreach***



### WHAT

Increase the yield of innovative products and increased domestic manufacturing competitiveness.

**Collaborate ~ Innovate**



# DoD Institutes Introduction

## DoD Institutes Design Tenets



- Industry driven, public-private partnerships
- Regional hubs of manufacturing excellence
- Investments in applied research and industrially-relevant manufacturing technologies
- Required focus on education and workforce development needs

**Tenets meet key DoD ManTech requirements and are aligned with Manufacturing USA**



# DoD Institutes Introduction

## Current DoD Institutes



### **America Makes: The National Additive Manufacturing Innovation Institute**

Est. AUG 2012 (Youngstown, OH)



### **Digital Manufacturing and Design Innovation Institute (DMDII)**

Est. FEB 2014 (Chicago, IL)



### **LIFT - Lightweight Innovations For Tomorrow**

Est. FEB 2014 (Detroit, MI)



### **AIM Photonics (photonic integrated circuits)**

Est. JUL 2015 (Albany, NY)



### **NextFlex (flexible hybrid electronics)**

Est. AUG 2015 (San Jose, CA)



### **Advanced Functional Fabrics of America (AFFOA) – (revolutionary fibers and textiles)**

Est. APR 2016 (Cambridge, MA)



### **Advanced Regenerative Manufacturing Institute (ARMI) (advanced tissue biofabrication)**

Est. DEC 2016 (Manchester, NH)



### **Advanced Robotics for Manufacturing (ARM)**

Est. JAN 2017 (Pittsburgh, PA)

- DoD MII's part of Manufacturing USA: whole-of-government effort, in partnership with industry & academia
- Strategically aligning resources to address targeted technology spaces
- Creating 'industrial commons' for manufacturing R&D, workforce education and development
- Catalyzing defense and broader industrial 'innovation ecosystems' across the nation
- Accelerating trust in supply chain development with diversified risks



DMDII Facility in Chicago, Illinois



# DoD Institutes Introduction

## Manufacturing USA Institutes Headquarter Locations

### Since Launching in 2012:

- \$1B+ Federal; \$2B+ non-Federal
- 1,300+ companies, universities, and non-profits involved
- 44 states represented\*



|     |  |              |
|-----|--|--------------|
| DoD |  | 8 Institutes |
| DOE |  | 5 Institutes |
| DOC |  | 1 Institute  |



# Manufacturing USA Success

## Organizational Relationships



### Deloitte Report Extract:

**9,424**

Relationships between organizations

**1,174**

Organizations involved with the program

**753**

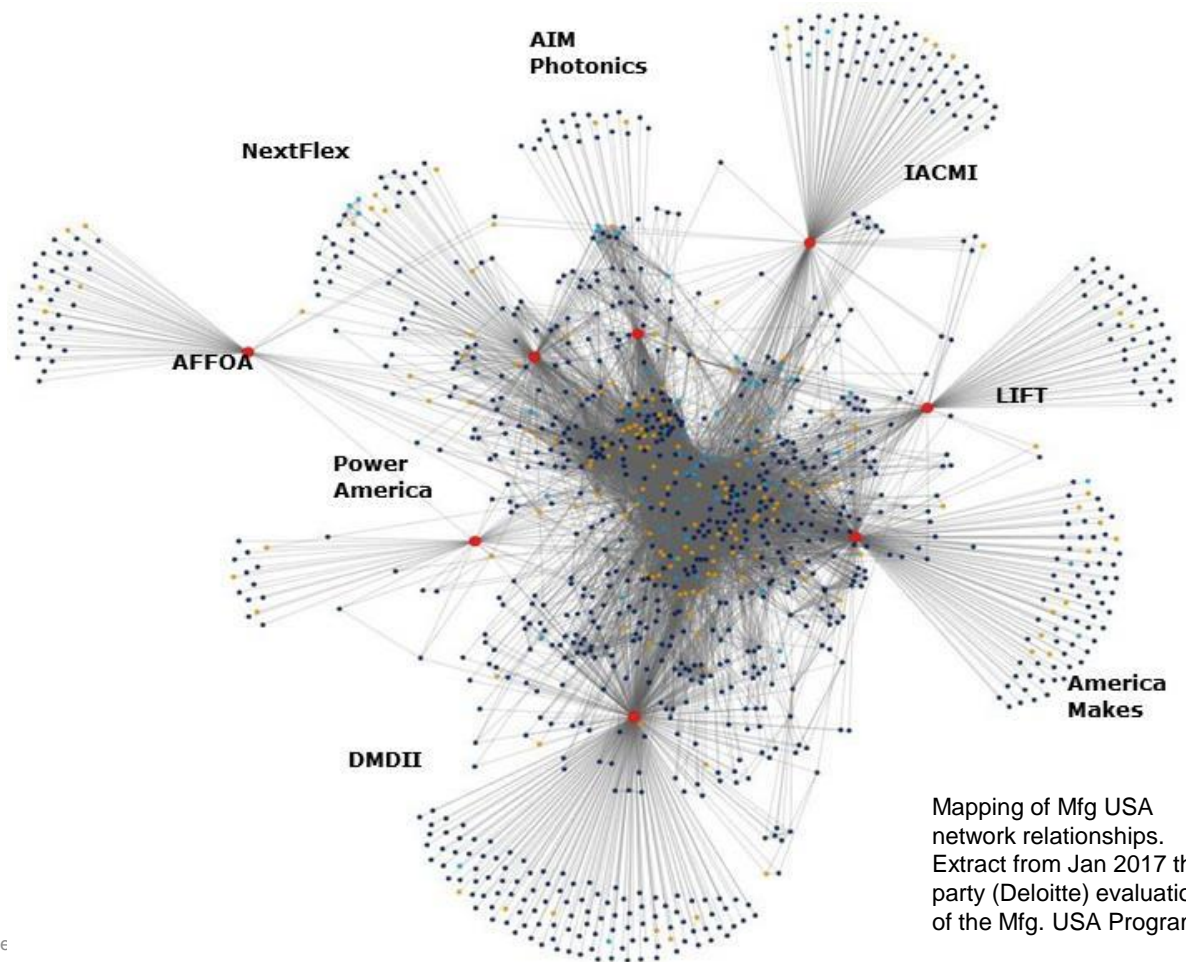
Organizations with formal membership

**203**

Organizations have relationships with multiple institutes

**120**

Organizations are members of more than one institute



Mapping of Mfg USA network relationships. Extract from Jan 2017 third party (Deloitte) evaluation of the Mfg. USA Program.

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





# Manufacturing USA Engagement

Membership Value for Small Businesses



## **Each institute offers exclusive membership benefits including:**

- Participation in project reviews
- Access to institute technical information and reports
- Access to education and workforce development programs
- Access to a Technical Help Desk
- Invitations to institute networking events
- Access to “Member’s Only” website and shared space
- Access to manufacturing equipment



# Questions?



**For more information on the DoD Manufacturing USA Institutes:**

<http://www.businessdefense.gov/Programs/Manufacturing-USA-Institutes/>

**For more information on the Manufacturing USA Program:**

<https://www.manufacturingusa.com/>





# Back Up Slides

# America Makes

FOUO



*The National Additive Manufacturing Innovation Institute – Youngstown, OH*



**America Makes**

**Established:** August 2012

**Hub Location:** Youngstown, Ohio

**Lead:** National Center for Defense Manufacturing and Machining (NCDMM)

**Regional Location:** "TechBelt" Cleveland to Pittsburgh Corridor & El Paso, Texas Region

**Mission: Accelerate additive manufacturing innovation and widespread adoption by bridging the gap between basic research and technology development/deployment.**

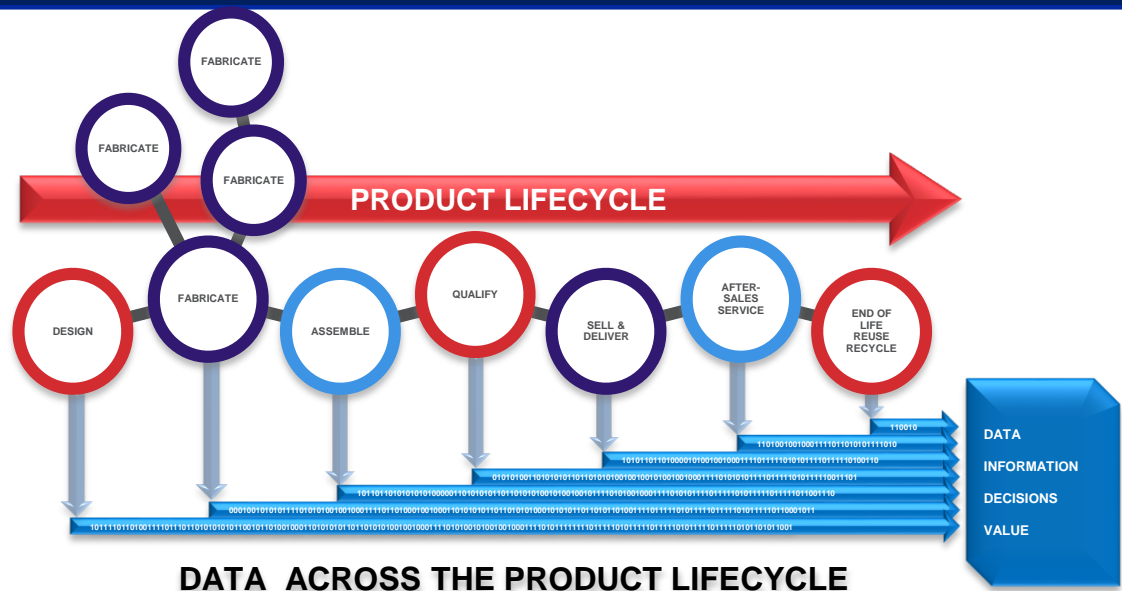
- \$55M federal investment and 1:1 cost share pledged to support development and management of the institute plus applied research projects over 5 years
- Strong tech transition, workforce education & STEM focus





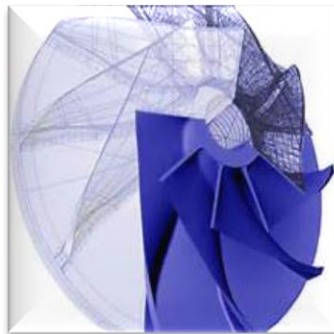
**DMDII**  
+ a UI LABS Collaboration

**Established:** February 2014  
**Hub Location:** Chicago, Illinois  
**Lead:** UI LABS  
**Federal Funding:** \$70M  
**Cost Share (UI Labs):** \$106M



DATA ACROSS THE PRODUCT LIFECYCLE

## Mission: Digitize American Manufacturing Competitiveness Performance Improvements



- **Lower design costs** through better collaboration with suppliers
- **Lower manufacturing cost and capital requirements** from better optimization of end-to-end product lifecycle
- **Reduced time to market** due to more rapid iteration
- **Next-gen innovations first:** digital design, digital factories, digital supply chains
- **New and legacy products**

# LIFT

*Lightweight Innovations for Tomorrow – Detroit, MI*



**Established:** February 2014

**Hub Location:** Detroit Metro, Michigan

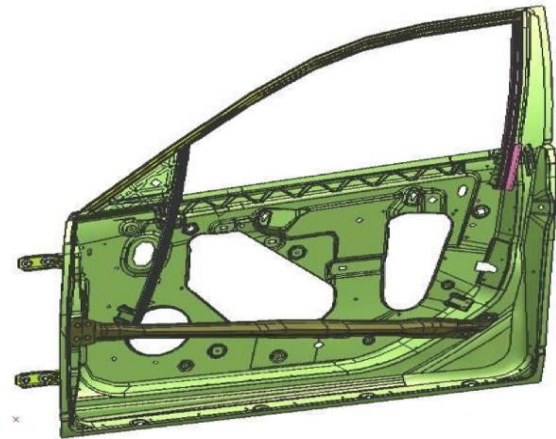
**Lead:** ALMMII (American Lightweight Materials Manufacturing Innovation Institute)

**Regional location:** I-75 Corridor

**Federal Funding:** \$70M

**Cost-Share:** \$78M

**Positioned to expand the US Industrial base for new products and technologies for commercial and USG demands that utilize new, lightweight high-performing metals**



**Mission:** Provide the National focus on expanding US competitiveness and innovation in lightweight metals manufacturing, and facilitating the transition of these capabilities and new technologies to the industrial base for full-scale application.



# AIM Photonics

*American Institute for Manufacturing Integrated Photonics - Rochester, NY*



**Established:** July 2015

**Hub Location:** Albany & Rochester, NY

**Lead:** RF SUNY

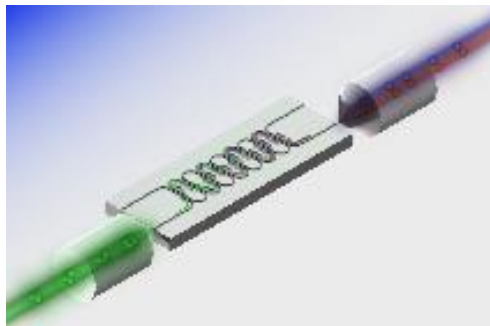
**Federal Funding:** \$110 M

**Industry Cost Share:** \$502 M

**Objective:** Develop & demonstrate innovative manufacturing 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 focuses 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.**

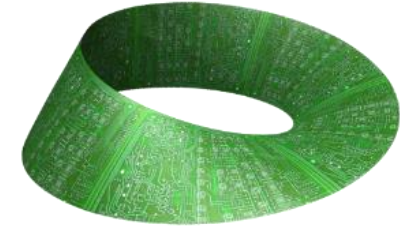
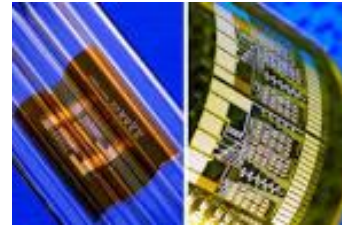


# NextFlex

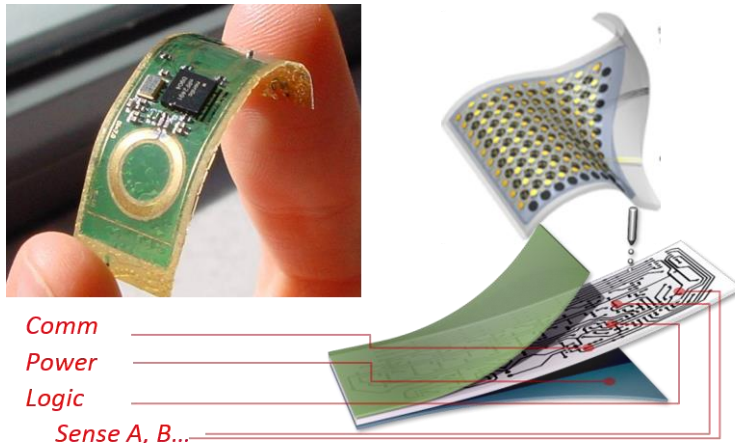
Flexible Hybrid Electronics Manufacturing Innovation Institute – San Jose, CA



**Established:** August 2015  
**Hub Location:** San Jose, California  
**Lead:** FlexTech Alliance  
**Federal Funding:** \$75 M  
**Industry Cost Share:** \$96 M



**Flexible Hybrid Electronics:** Highly tailorable devices on flexible, stretchable substrates that combine thinned CMOS components with components that are added via “printing” processes. This technology is identified as flexible-hybrid due to integration of flexible components such as circuits, communications, sensors, and power with more sophisticated Silicon based processors.



| Commercial                                    | DOD Applications   |
|---|--|
| <u>Wearable Technologies</u>                  | Warfighter information devices and sensors                           |
| <u>Internet of Things</u>                     | Unattended sensors, vehicle borne sensors                            |
| <u>Medical</u> (prosthetics, medical sensing) | Warfighter Training and performance monitoring. Soldier medical care |

## Advanced Functional Fabrics of America – Cambridge, MA



**Established:** April 1, 2016  
**Hub Location:** Cambridge, Massachusetts  
**Lead:** Advanced Functional Fabrics of America.  
**Federal Funding:** \$75 Million  
**Industry cost share:** \$240 million

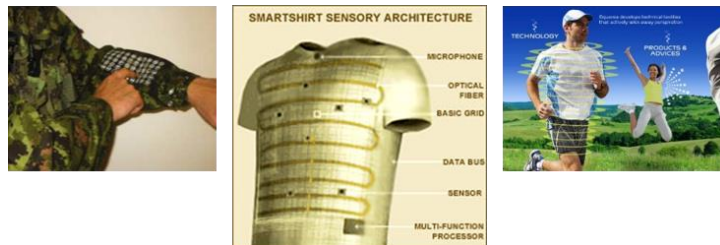
### Objectives:

- Serve as a public-private partnership to address manufacturing challenges from government, academia, and industry and products
- Support an end-to-end innovation ecosystem in the U.S. for revolutionary fibers and textiles manufacturing and leverage domestic manufacturing facilities to develop and scale-up manufacturing processes
- Provide rapid product realization opportunities, based on robust design and simulation tools, pilot production facilities, a collaborative infrastructure with suppliers, and workforce development opportunities through targeted training and curriculum programs

*Military and Commercial Shelters*



*Military and Commercial Smart Clothing*



*Transportation – Covers and Airbags*



*Geosynthetics – Construction*







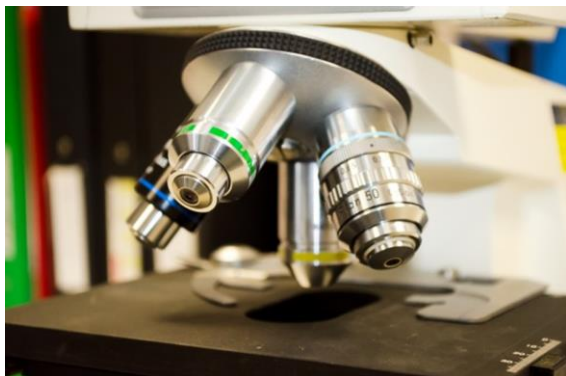
**Established:** December 2016

**Hub Location:** Manchester, New Hampshire

**Lead:** ARMI

**Federal Funding:** \$80 Million

**Industry cost share:** \$214 Million



## Focus Areas:

- Cell & Material Selection & Sourcing: The ATB-MII will use industrial manufacturing practices to reliably and reproducibly generate cells and biomaterials.
- Biofabrication Platforms: Integrated biofabrication platforms will be developed to transform these standardized starting materials into novel and evolving tissue and tissue-related end-products.
- Process Design and Automation: Additionally, process design and automation will need to be used to improve the rate and reproducibility of multi-step manufacturing processes.
- Tissue Finishing and Testing Technologies: The ATB-MII will assist in developing the successful commercialization of tissue-based products and non-destructive validation tools.

**Biofabrication:** An innovative manufacturing industry segment is *creating state-of-the-art manufacturing innovations in biomaterial and cell processing, bioprinting, automation and non-destructive testing technologies* for critical Department of Defense and novel commercial use.



**Established:** January 2017  
**Hub Location:** Pittsburg, PA  
**Lead:** American Robotics  
**Federal Funding:** \$80 Million  
**Industry cost share:** \$173 Million

**Technologies ripe for significant evolution within the RIME institute include, but are not limited to:**

- Robot control (learning, adaptation, & repurposing)
- Collaborative robotics
- Dexterous manipulation
- Autonomous navigation and mobility
- Perception and sensing
- Testing, verification, and validation (TV&V)



**Problem:** The use of robotics is becoming widespread in manufacturing environments but the robots are typically **expensive, singularly purposed, challenging to reprogram,** and require **isolation from humans for safety.**

**Need:** Robotics are increasingly necessary to achieve **the level of precision necessary for defense and other industrial manufacturing requirements** which limits the participation of mid-size to small manufacturers due to capital cost and complexity of use.

**Solution:** ARM will integrate industry practices and institutional knowledge across many disciplines to **realize the promises of a robust manufacturing innovation ecosystem.**



# DOC and DOE Institutes



**Established:** January 2014  
**Hub Location:** Raleigh, NC  
**Lead:** North Carolina State University  
**Current Number of Members:** 70  
**Federal Funding:** \$70 Million  
**Industry cost share:** \$70 Million



**Established:** January 2015  
**Hub Location:** Knoxville, TN  
**Lead:** University of Tennessee, Knoxville  
**Current Number of Members:** 122  
**Federal Funding:** \$70 Million  
**Industry cost share:** \$180 Million



**Established:** June 2016  
**Hub Location:** Los Angeles, CA  
**Lead:** Smart Manufacturing Leadership Coalition  
**Current Number of Members:** 56  
**Federal Funding:** \$70 Million  
**Industry cost share:** \$70 Million



**Established:** December 2016  
**Hub Location:** Newark, DE  
**Lead:** University of Delaware  
**Federal Funding:** \$70 Million  
**Industry cost share:** \$129 Million



**Established:** December 2016  
**Hub Location:** New York, NY  
**Lead:** American Institute of Chemical Engineers  
**Federal Funding:** \$70 Million  
**Industry cost share:** \$140 Million



**Established:** January 2017  
**Hub Location:** Rochester, NY  
**Lead:** Rochester Institute of Technology  
**Federal Funding:** \$70 Million  
**Industry cost share:** \$70 Million



\*The first Manufacturing USA institute to operate under the RAMI Legislation

