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**

<table>
<thead>
<tr>
<th>Competitiveness</th>
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<tbody>
<tr>
<td>Technology Advancement</td>
</tr>
<tr>
<td>Workforce Development</td>
</tr>
<tr>
<td>Technology Sustainability</td>
</tr>
</tbody>
</table>
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
<table>
<thead>
<tr>
<th>Institute Metric Category</th>
<th>Specific Metric</th>
<th>Units of measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Impact to U.S. Innovation Ecosystem</td>
<td>Number of partner organizations with institute membership agreement</td>
<td>Total number of memberships</td>
</tr>
<tr>
<td></td>
<td>Diversity of members</td>
<td></td>
</tr>
<tr>
<td>2) Financial Leverage</td>
<td>Total co-investment</td>
<td>Cost share expended</td>
</tr>
<tr>
<td></td>
<td>Number and value of active R&amp;D projects</td>
<td>Number of projects completed, started and spanning FY 2016</td>
</tr>
<tr>
<td>3) Technology Advancement</td>
<td>Percentage of key project technical objectives met</td>
<td>Total institute expenditures</td>
</tr>
<tr>
<td>4) Development of an Advanced Manufacturing Workforce</td>
<td>STEM activities</td>
<td>Percentage of key milestones met</td>
</tr>
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<td></td>
<td>Educator/trainer engagement</td>
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<td></td>
<td>Number of students participating in institute projects, internships, and training</td>
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<td></td>
<td>Number of workers completing an institute-led certificate, apprenticeship or training program</td>
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<tr>
<td></td>
<td>Number of teachers or trainers participating in institute-led training</td>
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</tbody>
</table>
1) Impact to U.S. Innovation Ecosystem - Membership

- 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.
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.

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

"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
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*

<table>
<thead>
<tr>
<th><strong>9,424</strong></th>
<th>Relationships between organizations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1,174</strong></td>
<td>Organizations involved with the program</td>
</tr>
<tr>
<td><strong>753</strong></td>
<td>Organizations with formal membership</td>
</tr>
<tr>
<td><strong>203</strong></td>
<td>Organizations have relationships with multiple institutes</td>
</tr>
<tr>
<td><strong>120</strong></td>
<td>Organizations are members of more than one institute</td>
</tr>
</tbody>
</table>

**First 8 Institutes:**

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

**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

**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
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.
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.
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Today a Network of Fourteen Institutes

<table>
<thead>
<tr>
<th>PILOT INSTITUTE</th>
<th>IN YEARS 3 OR 4 OF FEDERAL FUNDING</th>
<th>NEW INSTITUTES</th>
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<tbody>
<tr>
<td>America Makes</td>
<td>Sustainable Manufacturing</td>
<td>biofabUSA</td>
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<tr>
<td>Additive Manufacturing</td>
<td>Rochester, NY</td>
<td>Regenerative Manufacturing</td>
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<td>Youngstown, OH</td>
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<td>Manchester, NH</td>
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<tr>
<td>DMDII</td>
<td>Integrated Photonics</td>
<td>NIIMBL</td>
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<tr>
<td>Digital Manufacturing</td>
<td>Albany, NY</td>
<td>Bio-pharmaceutical</td>
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<td>&amp; Design</td>
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<td>Manufacturing Newark, DE</td>
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<td>Chicago, IL</td>
<td>Advanced Composites</td>
<td>NRMN</td>
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<td>Knoxville, TN</td>
<td>Transforming Process Industries</td>
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<td>Modular Chemical Process Intensification</td>
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<td></td>
<td></td>
<td>New York, NY</td>
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<tr>
<td>America Makes</td>
<td>Next Generation Power Electronics</td>
<td>REMADE INSTITUTE</td>
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<tr>
<td>Additive Manufacturing</td>
<td>Raleigh, North Carolina</td>
<td>Flexible Hybrid Electronics</td>
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<td>Youngstown, OH</td>
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<td>San Jose, CA</td>
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<td>Powered by DMDII</td>
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<td>Digital Manufacturing &amp; Design</td>
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<td>Lightweight Metals</td>
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<td>POWER AMERICA</td>
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<td>Advanced Fibers and Textiles</td>
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<td>Cambridge MA</td>
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<td>Advanced Robotics</td>
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<td>Pittsburgh, PA</td>
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<td>NIST</td>
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<td>Regenerative Manufacturing</td>
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<td>Smart Sensors and Digital Process Control</td>
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<td>Los Angeles, CA</td>
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| 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |

U.S. Department of Commerce
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**
- AIFT
  - Lightweight Metals
  - Detroit, MI
- Advanced Composites
  - Knoxville, TN

**Bio-Manufacturing**
- BiofabUSA
  - Regenerative Manufacturing
  - Manchester, NH
- NIMBL
  - Bio-pharmaceutical Manufacturing
  - Newark, DE

**Energy Usage / Environmental Impact**
- RAPID
  - Modular Chemical Process Intensification
  - New York, NY
- SMART Manufacturing
  - Smart Sensors and Digital Process Control
  - Los Angeles, CA
- Re-Made Institute
  - Sustainable Manufacturing
  - Rochester, NY

**Digital Automation**
- DMDII
  - Digital Manufacturing & Design
  - Chicago, IL
- AM
  - Additive Manufacturing
  - Youngstown, OH
- AIM
  - Advanced Robotics
  - Pittsburgh, PA

**Additional Technologies**
- Regenerative Manufacturing
- Digital Manufacturing & Design
- Integrated Photonics
- Advanced Composites
- Wide Bandgap Semiconductors
- Advanced Fibers and Textiles
- Sustainable Manufacturing
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
Manufacturing USA – MEP Embedding Initiative

[Logos of various organizations]
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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