Update on the Administration's Advanced Manufacturing Initiatives

Visiting Committee on Advanced Technology
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U.S. Department of Commerce

Agenda

- ***Advanced Manufacturing Partnership Report***

- Advanced Manufacturing National Program Office (AMNPO)

- Designing the National Network for Manufacturing Innovation (NNMI)

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AMP 'Top Line' Recommendations

More details on key recommend-ations in supplemental slides

1. Enabling Innovation

- Establish a National Advanced Manufacturing Strategy
- Increase R&D Funding in Top Cross-Cutting Technologies
- Establish a National Network of Manufacturing Innovation Institutes
- Enhance Industry/University Collaboration in Advanced Manufacturing Research
- Foster a Robust Environment for Commercialization of Advanced Manufacturing Technologies
- Establish a National Advanced Manufacturing Portal

2. Securing the Talent Pipeline

- Correct Public Misconceptions about Manufacturing
- Tap the Talent Pool of Returning Veterans
- Invest in Community College Level Education
- Develop Partnerships to Provide Skills Certifications and Accreditation
- Enhance Advanced Manufacturing University Programs
- Launch Advanced Manufacturing Leadership Fellowships & Internships

3. Improving the Business Climate

- Enact Tax Reform, Streamline Regulatory Policy
- Improve Trade Policy; Energy Strategy

http://www.whitehouse.gov/administration/eop/ostp/pcast

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Enabling Innovation:
National Advanced Manufacturing Strategy

- **Need:**
  - Establish US as global advanced manufacturing leader
- **Recommendation:**
  - Establish five year National Advanced Manufacturing Strategic Plan
  - Utilize to prioritize technologies, program and public-private partnership investments
- **Who:**
  - Advanced Manufacturing National Program Office coordinates and aligns interagency programs
  - Industry+University+Government Agency partner to develop, manage & execute the plan

Enabling Innovation:
Top Cross-Cutting Technologies

Establish partnerships in top cross-cutting technologies:

- Additive Manufacturing
- Advanced Forming and Joining Technologies
- Advanced Materials Design, Synthesis and Processing
- Advanced Sensing, Measurement, & Process Control
- Visualization, Informatics and Digital Manufacturing Technologies
- Sustainable Manufacturing
- Nano-Manufacturing
- Flexible Electronics Manufacturing
- Bio Manufacturing and Bioinformatics
- Advanced Manufacturing & Testing Equipment
- Industrial Robotics

Enabling Innovation:
Manufacturing Innovation Institutes

Need:

- Expedite filling existing technology and workforce development gaps through network of shared facilities

Recommendation:

- Establish a network of Manufacturing Innovation Institutes

Who:

- Federal, State and Regional Agencies Sponsor
- Industry-University- Community Colleges Manage & Lead
- Advanced Manufacturing National Program Office coordinates

Securing the Talent Pipeline

- **Image of Manufacturing: Ad Council Campaign** A national campaign with local flavor to correct public's misconceptions from "Dull, Dirty & Dangerous" to "Exciting, Engaging, Essential & Environmentally Sustainable"
- **Tap the Talent Pool of Returning Veterans** Use the TAP program to educate veterans about the career possibilities
- **Invest in Community Colleges** Standardized national curricula with project-based learning, internships and apprenticeships. Use partnerships with industry to achieve maximum results
- **Adopt Stackable Credentials** Adapted to life-long learning, these credentials give employers a sense of the candidates' competencies & are recognized nationally.
- **Improve University Programs** Engage ABET & Universities to add manufacturing content to engineering programs and create new degrees at BS, MS, and PhD levels
- **National Manufacturing Fellowships & Interns** Establish coordinated interagency fellowship program

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- Advanced Manufacturing Partnership Report
- ***Advanced Manufacturing National Program Office (AMNPO)***
- Designing the National Network for Manufacturing Innovation (NNMI)

Advanced Manufacturing National Program Office

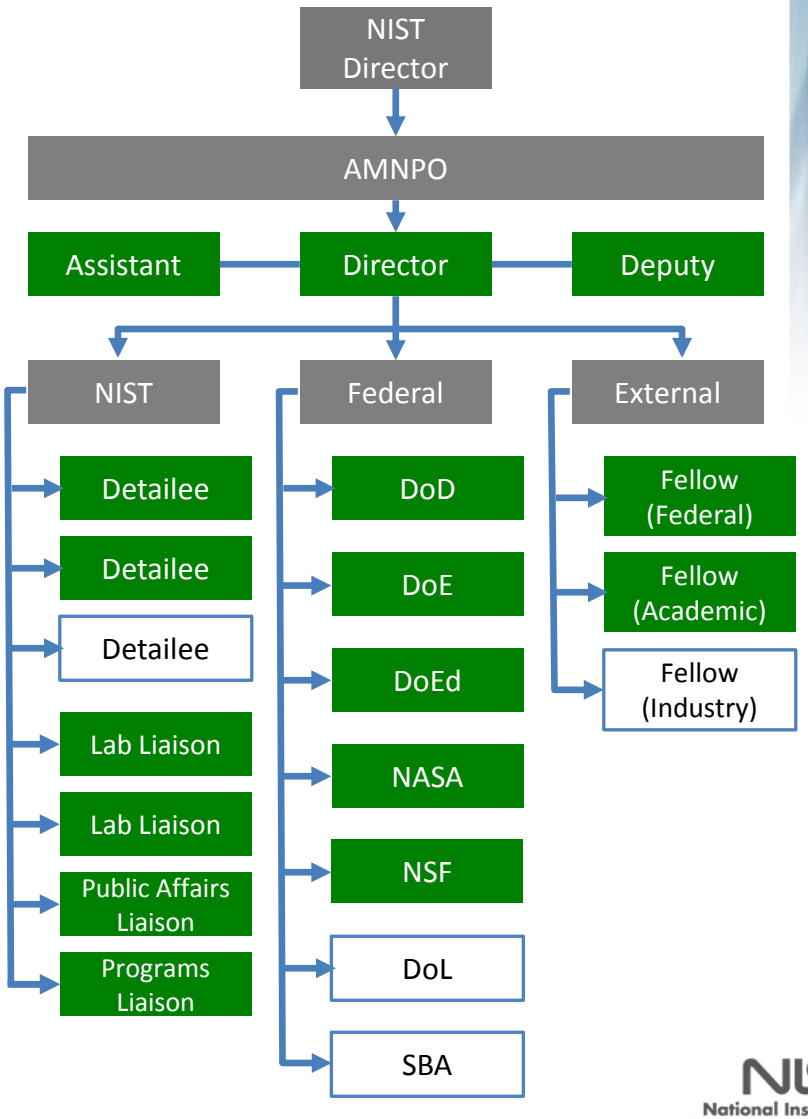
Advanced Manufacturing National Program Office

- Addresses PCAST call for integrated federal focus on advanced manufacturing
- Hosted by Department of Commerce/NIST
- Provides interagency planning/coordination of advance manufacturing programs
- Lead federal initiatives, specifically NSTC and PCAST/AMP

Early Accomplishments include:

1. Built inter-agency team
2. Federal advanced manufacturing portal – new manufacturing.gov
3. NNMI Pilot Center on Additive Manufacturing
4. Comprehensive design of NNMI via public RFI and regional workshops

1) Interagency Advanced Manufacturing National Program Office Structure



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2) www.manufacturing.gov

Advanced Manufacturing Portal ... changing the face of manufacturing

Advanced Manufacturing | AMNPO | Agency Partners | NNMI | Other Organizations | Other Initiatives

Advanced Manufacturing Portal > Welcome to Manufacturing.gov!

Quick Links

- Events
- News
- NNMI
- Data & Trends
- Contact
- Publications & Resources
- National Additive Manufacturing Innovation Institute

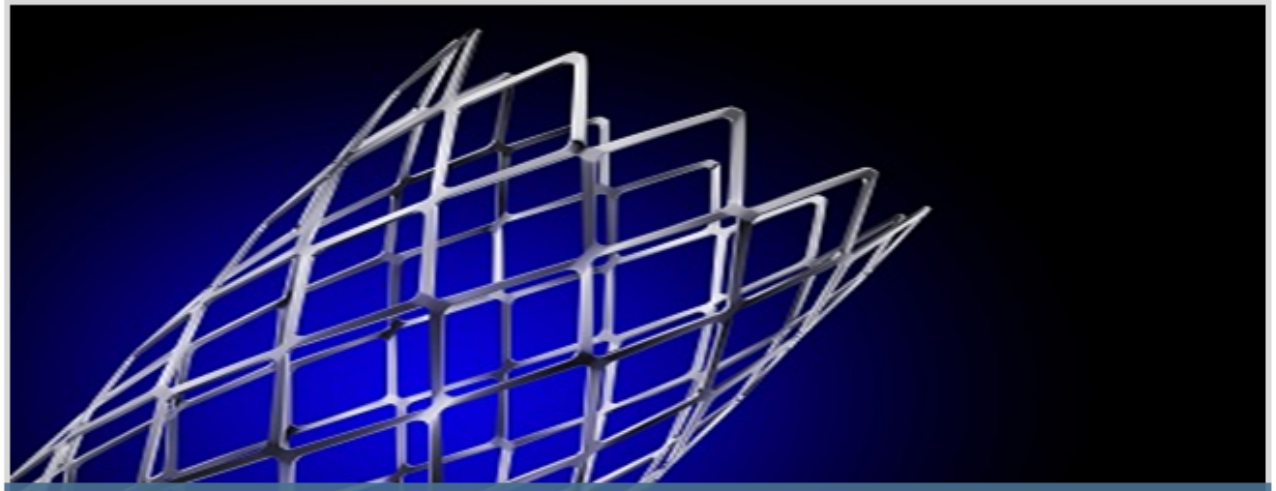
Events

September 27, 2012
Designing for Impact III: Workshop on Building the NNMI.

October 5, 2012
National Manufacturing Day

News

Innovation Network Prompts Lots of Ideas



A cardiovascular stent, currently manufactured using laser cutting, is a candidate for additive manufacturing.

1 2 3 4

Welcome to Manufacturing.gov!

This site will be a "one-stop shop" for news and information on advanced manufacturing programs and related activities under way in federal agencies with science and technology missions. These include interagency initiatives, such as the proposed National Network for Manufacturing Initiative coordinated by the Advanced Manufacturing National Program Office, as well as agency-specific programs.

To remain strong, our economy requires an advanced, globally competitive manufacturing sector that invents and makes high-value-added products and leading-edge technologies, here at home.

3) National Additive Manufacturing Innovation Institute (NAMII), Youngstown OH

Prime Awardee: National Center for Defense Manufacturing and Machining

- Providing $40M cost share, ~ $20M from industry
- $48M available for research projects
- Strong leveraging of equipment, existing resources
- Strong business development
- Ties to many organic facilities
- Tiered membership-based model, low cost to small business and nonprofits

3) NAMII Initial, Regional Partners

*Proposed thrust lead area in parentheses

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- Advanced Manufacturing Partnership Report
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- ***Designing the National Network for Manufacturing Innovation (NNMI)***

4) NNMI Public Design

Partner with private sector, "crowdsource" the design

- NIST issues RFI for Institute and Network design, open through October 25th
- Organize public design workshops – listen and learn
  - Partner with educational institution and regional industry; no cost to host
  - Troy NY April, Cleveland OH July, Irvine CA September, Boulder CO October
  - Formal report for each workshop on mfg.gov
  - Compile thousands of "voices", issue public white paper design
- Public comment on NNMI design
  - Design review workshop(s) – Huntsville AL January, Gaithersburg MD February, possibly others

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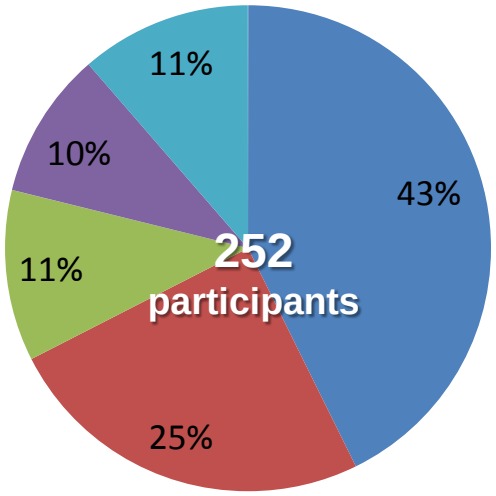
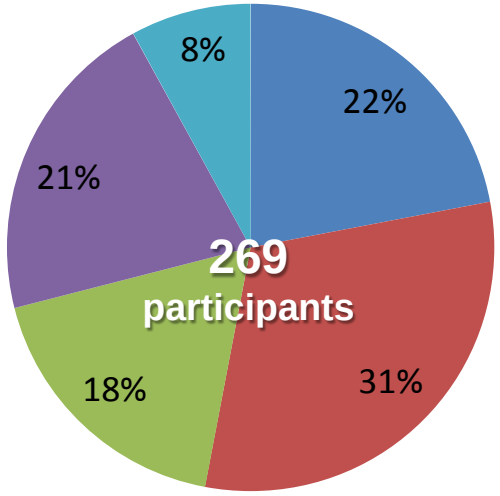
NNMI Design for Impact Workshops Completed

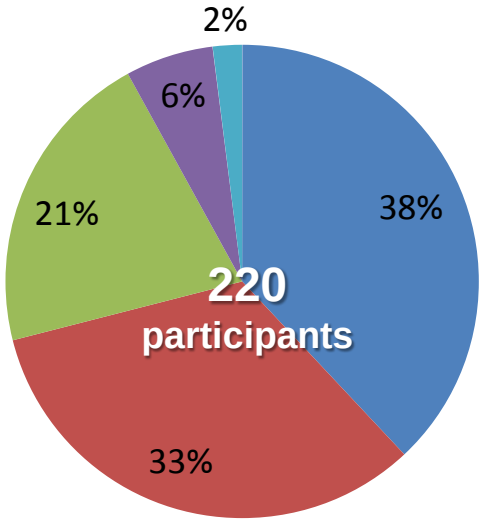
Rensselaer Polytechnic Institute
April 25, Troy New York

Cuyahoga Community College
July 9, Cleveland Ohio

National Academies Beckman Center
September 27, Irvine California







Academia Industry Fed & State Gov. Econ. Dev. Other

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RFI and Public Workshop Dialogue Questions

1. **Technologies with Broad Impact**
   - What criteria should be used to select technology focus areas?
   - What technology focus areas that meet these criteria would you be willing to co-invest in?
   - What measures could demonstrate that Institute technology activities assist US manufacturers?
   - What measures could assess the performance and impact of institutes?

2. **Institute Structure and Governance**
   - What governance models would be effective for the Institutes to manage governance decisions?
   - What membership and participation structure would be effective for the Institutes, such as financial and intellectual property obligations, access, and licensing?
   - How should a network of Institutes optimally operate?
   - What measures could assess effectiveness of Network structure and governance?

RFI and Public Workshop Dialogue Questions (cont'd)

3. Strategies for Sustainable Institute Operations

- How should initial funding co-investments of the Federal Government and others be organized by types and proportions?
- What arrangements for co-investment proportions and types could help an Institute become self-sustainable?
- What measures could assess progress of an Institute towards being self-sustainable?
- What actions or conditions could improve how Institute operations support for domestic manufacturing facilities while maintaining consistency with our international obligations?
- How should Institutes engage other manufacturing related programs and networks?
- How should Institutes interact with state and local economic development authorities?
- What measures could assess Institutes contributions to long term national security and competitiveness?

4. Education and Workforce Development

- How could Institutes support advanced manufacturing workforce development at all educational levels?
- How could Institutes ensure that advanced manufacturing workforce development activities address industry needs?
- How could Institutes and the NNMI leverage and complement other education and workforce development programs?
- What measures could assess Institute performance and impact on education and workforce development?
- How might Institutes integrate research and development activities and education to best prepare the current and future workforce?

Thank you

For questions or comments please contact

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or

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Supplemental – AMP Recommendations

Enabling Innovation:
Waiver or Exception to Revenue Procedure 2007-47

Need:

- To modify tax policies which prohibit greater industry investment & partnership with nations top universities

Recommendation:

- Create Waiver or Exception to Revenue Procedure 2007-47 to remove the cap on private use activities in buildings constructed with tax exempt bonds for activities specifically related to industry research collaborations and supporting dynamic research partnerships between industry and university startups.

Who:

- Department of Commerce
- Department of Treasury

Enabling Innovation:
Policy to Enhance University-Industry Partnerships

Need:

- Foster more robust environment for access to capital & commercialization of Advanced Manufacturing Technologies

Recommendation:

- Create new section of SBA Small Business Innovation Research Program to support early stage funding activities
- Extend nation-wide work of NSF created 501(c)3 Innovation Accelerator to support startups emerging from federal advanced manufacturing programs
- Clear pathway from startup to pilot scale production by greater interagency coordination & procurement
- Incorporate manufacturing impact measures into annual performance reports issued by Association of University Technical Managers

Who:

- Small Business Administration
- NSF and Advanced Manufacturing Interagency Representatives
- University Tech Transfer Offices

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Improving the Business Climate

Tax Reform

- Strengthen & Make Permanent R&D Tax Credits
- Lower corporate tax rate to bring it line with other advanced economies
- Create an internationally competitive corporate tax system

Smarter Regulations

- Early Engagement & Better Cost-Benefit Analyses using Best Available Science & International Best Practice

Trade Policy

- Focus on non-tariff barriers and export control standardization

Energy Policy

- Focus on energy efficiency & conservation
- Increase and diversify domestic supplies
- Speed the development of cost competitive, renewable sources of energy
- Transition to low carbon economy

Supplemental – NNMI Design Questions And Summary Feedback

Dialogue Feedback

1. Technologies with Broad Impact

- Technologies should have broad application across multiple industries, and should address a national need. Technologies should leverage and enhance the regional supply chain.
- The targeted Technological Readiness Level and Manufacturing Readiness Level should be 4-7; there should be a strong market potential, and 3-5 year time-to-market.
- Technologies should be enabling, with transformational potential; they should be cross-cutting, widely adaptable, and driven by industry needs.
- The technologies should have the potential to increase the number of domestic jobs, and should have an impact on energy and environmental sustainability.
- Performance metrics recommended are tied to employment gains, IP portfolios, numbers of partnerships, and number of technologies transferred to the marketplace

2. Institute Structure and Governance

- Business models suggested included the Fraunhofer-Gesellschaft, Sematech, EWI, Oak Ridge or NSF ERC structures.
- Governance was generally of the CEO that reports to a Board. There should be a low barrier to entry, with fee-for-service contracts as a possibility.
- The network should be flexible, growth-oriented, and responsive to changing needs in industry. The Institutes should adopt consistent contractual vehicles, forms, and guidelines to establish trust with multiple institutes.
- Institutes should share pre-competitive information and research results with one another and with the public. This could be done through an annual conference, annual technology showcase, and via the website. Members could also form self-assembled teams to work on proprietary projects.

Dialogue Feedback (cont.)

3. Strategies for Sustainable Operations

- Many allocations of percentages (50% equipment and facilities, 30% student/training costs, 20% strategic hires) to guide Institute organization to enable sustainability.
- Gradually decrease federal funding on projects to allow SMEs to join activities with an incentive to invest later.
- Future funding can be obtained by collecting membership fees; by encouraging investment by allocating percentage of IP ownership with investment; and funding from revenues and royalties associated with IP.
- IMIs need to be hands-on and one step ahead of industry; in other words, a place where stakeholders can get work done more effectively than they would on their own. Measures to assess the progress of an Institute could include the growth in the number of industry members over time, particularly small and medium-sized businesses, the number of early members that reinvest, the IP licensing revenue, the development of new products and/or processes, or the Institute's income compared to recurring expenses.
- Manufacturing programs and networks should be engaged by helping companies overcome and eliminate bottlenecks in the supply chain, helping companies move from TRL or MRL of 4-7 to 8-10, and identify partners to solve multi-disciplinary challenges.
- IMIs could offer a tax rebate or other tax incentives to promote collaboration with state and local economic development authorities. The state and Institute should have a strong partnership to create a strong strategy toward cluster building and incubators.
- Long term Institute contributions could be measured by the creation of new markets, techniques, and products; number of technologies manufactured in the US; number of technologies developed for federal acquisition programs.

Dialogue Feedback (cont.)

4. Education and Workforce Development

- Suggested activities to promote education and workforce development included:
  - Bring manufacturing to students, such as by bringing 3D printers to schools.
  - Bring students to manufacturing. Industry partners can host them, or Institutes can develop on-site fab labs.
  - Offer free online training courses (based on Khan Academy model).
  - Educate children before 7th and 8th grade so they don't track out of pre-algebra & courses for STEM careers.
  - Internships are critical for college-age students.
  - Incorporate manufacturing into the curriculum and develop materials (high schools & community colleges).
  - Change the perception of manufacturing with youth, students, and parents.
  - Fund scholarships at associate, undergraduate and graduate levels.
- The Institutes need to take the pulse of regional industry needs and ensure that lower skill workers are getting the training they need to enter middle skill jobs. The focus should be on unemployed, underemployed, and displaced workers, as well as returning military personnel.
- The NNMI could leverage and complement other education and workforce development programs by benchmarking best practices. TechShop (a membership-based workshop that provides access to tools and instruction), Dept. of Labor workforce development programs and SME videos were identified as models.
- Assessment methods include The following were suggested: take measures of employment, either from number of employers that hired new workers, numbers of student placements in industry, job performance, etc.
- Students at all levels should be involved in industry-driven R&D programs. Industry participants pointed out that they have good success using internships, co-ops, and apprenticeships as a way to prepare their workforce. Teacher/faculty externships were also proposed.