

BLUEPRINT FOR ACTION

Workshop on the Design of the

National Network for Manufacturing Innovation

Technologies with Broad Impact

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Overview

This is a Preliminary Design

Presentations divided into 4 areas:

- Technologies with Broad Impact
- Institute Structure and Governance
- Strategies for Sustainable Operations
- Education and Workforce Development

In each presentation:

- What we heard from the Workshops and RFI
- Preliminary Design
- Suggestions for Café Discussion



Q1: What criteria should be used to select technology focus areas? Examples:

- Technologies should have broad application across multiple industries, and should address a national need
- Should target TRL/MRL4-7
- There should be a strong market potential
- Technologies should be enabling, with transformational potential
 - cross-cutting,
 - widely adaptable
 - driven by industry needs
- Should have the potential to increase the number of domestic jobs
- Should have an impact on energy and environmental sustainability

The screenshot shows the Advanced Manufacturing Portal website. At the top, it says "Advanced Manufacturing Portal" and "changing the face of manufacturing". Below that, there are navigation links for "Advanced Manufacturing", "AMNPO", "Agency Partners", "NMI", "Other Organizations", and "Other Initiatives". The main content area is divided into several sections: "Quick Links" (Events, News, NMI, Data & Trends, Contact, Publications & Resources), "Events" (Jan 16, 2013: Design for Action I Workshop, Jan 21, 2013: USMPO to Host Additive Manufacturing Partnership Meeting, Feb 25-27, 2013: 2013 AMNPO Energy Innovation Summit), "News" (Jan 16 Workshop to Review Design for National Manufacturing Innovation Network, Nov 30 AMNPO Summit Technology Showcase Registration Deadline, Proposed Nationwide Manufacturing Innovation Network Draws Big Response, Obama Administration Announces \$20 Million for 10 Public-Private Partnerships to Support American Manufacturing and Encourage Investment in the U.S., Life at DARPA Innovation House Begins, Administration Teams Up to Bring Jobs Home to America), "RFI Responses & Workshop Reports" (RFI Responses & Workshop Reports, On May 4, 2012, the NIST-hosted Advanced Manufacturing National Program Office (AMNPO) published a Request for Information (RFI) in the Federal Register...), "Workshop Reports" (1. Designing for Impact I Workshop Report, 2. Designing for Impact II Workshop Report, 3. Designing for Impact III Workshop Report, 4. Designing for Impact IV Workshop Report), and "RFI Responses" (1. Agenda 2020 Technology Alliance of the Forest Products Industry, Brown, 2. Arizona State University, Drexel, 3. Association of Public and Land-grant Universities, Woodell, 4. BAE Systems Land & Armaments, Toms, 5. Berkowitz, 6. Buhle, 7. Clarkson University, Catlin, 8. Colorado Advanced Manufacturing Alliance, Heaton, 9. Colorado Office of Economic Development and International Trade, Tartz, 10. Colorado Workforce Development Council, Stafford, 11. CIMAUSA, Indiana, Metzger, 12. Defense Brn Castings, Dettler, 13. ENR, Conway).



Q2: What technology focus areas that meet these criteria would you be willing to co-invest in?

The community sees a real and diverse set of manufacturing needs. Technology focus areas that were most frequently quoted were:

- sensors
- modeling/simulation software
- composites
- biomanufacturing
- additive manufacturing
- advanced materials (and composites)
- robotics
- nanotechnology

But..... many, many focus areas were suggested



Technology Focus Areas from the RFI and Workshop Included:

Flexible electronics, nano/micro, lightweight materials, personalized medicine, alternative energy, additive manufacturing, smart machining, pharmaceuticals, modeling and simulation, composite materials, coatings, energy storage, sensors, metal casting, advanced forming, advanced joining, robotics, peening, machining, other surface finishing, coal compact internal burning, convert truck fleets to natural gas, thermoplastic recycling, sensors for harsh conditions, machining, forming, molding, casting, assembly, forgings, joining, surface engineering, electro-optics, nanomanufacturing, miniaturized electronics, design tools and informatics, nanoelectronics, autonomy, superalloys, precision machining, rapid prototyping, organic electronics, nanocomposites, sensors, embedded technologies, remote sensing, renewable energy, strategy development, printed electronics, sustainable manufacturing, bioprocessing, nanomedicine, nanomaterials, micromanufacturing, stoichiometry in thin films and bulk materials, photonic integrated circuits, electro-optic materials and devices, polymeric-based web converting manufacturing platforms, sensors for diagnosis and control of manufacturing, renewable energy, biofuels, nano/bio manufacturing, digital model-based manufacturing, advanced materials, medical technology manufacturing, additive manufacturing, smart manufacturing, advanced/intelligent machining and fabrication, advanced metrology, digital manufacturing, advanced joining, near-net shape technologies, forging, extrusion, rolling, casting, powder, molding, hydroforming, composites manufacturing, advanced nanomaterials, next generation semiconductor technologies, MEMS/NEMS and embedded sensors, energy efficient technologies, dynamic machine tool management, Big Data, robotics, automation technologies, advanced magnets, joining technologies, in-situ metrology, powder metallurgy, electron beam, cryogenic techniques, coatings, repair welding, composites, maritime technologies, photovoltaics, biomimetic engineering (related to solar), materials characterization, laser-based processing, non-destructive evaluation, wafer fab and equipment, ceramics, sustainable manufacturing, digital manufacturing, mechatronics and cyberphysical manufacturing, optics and imaging, electronics assembly, IT systems, metamaterials, rapid prototyping via flexible manufacturing, wide bandgap manufacturing, advanced batteries...



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Q3: What measures could demonstrate that Institute technology activities assist U.S. manufacturing? Examples:

- Jobs created (re-shored or new)
- Number of startups including SMEs
- Number of partnerships in the institute
- Application of methods developed by the institutes in industry
- Tracking of technologies infused into the marketplace (use a process similar to NASA's "mission use agreements")



Q4: What measures could assess the performance and impact of Institutes? Examples:

- Number of new IMI partnerships
- The size of the Institute's IP portfolio
- Retention rate for Institute members
- Participation of SMEs in the institute
- The amount of industry funding received
- The number of projects that develop from TRL5 to TRL8
- The number of licenses generated from the Institute

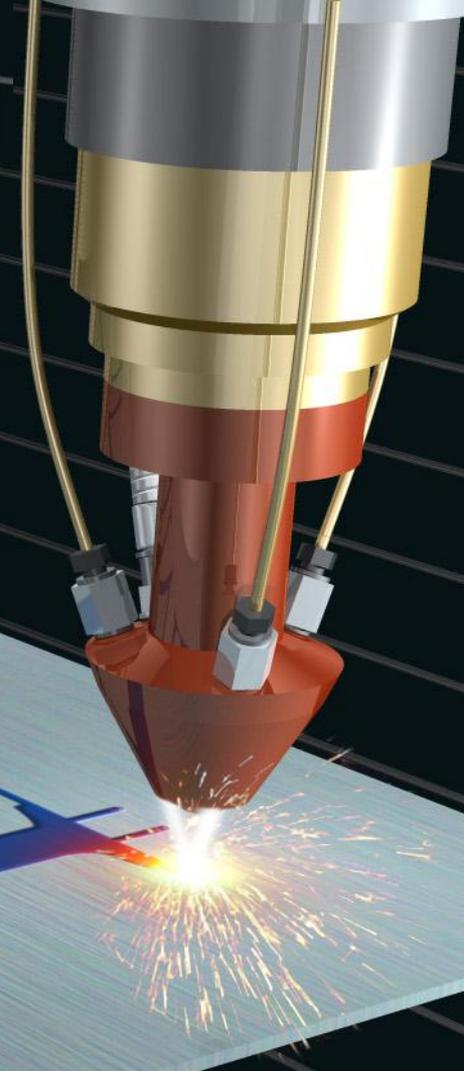


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CONCEPT PAPER
DESIGN ELEMENTS



Overall IMI Focus

The focus of each Institute will be on:

- Integrating capabilities through collaboration
- Offering facilities designed and equipped to address cross-cutting manufacturing challenges...
- Yielding solutions that have the potential to retain or expand industrial production in the United States



Defining Focus Areas

- Focus areas will not be preselected, but will be defined by proposing teams
- Each Institute will have a unique and defined focus area such as:
 - A manufacturing process
 - An enabling technology
 - Manufacturing processes for new advanced materials
 - An industry sector
- AMNPO partners will evaluate the efficacy of the proposal in meeting a national need as part of an overall portfolio
- Proposing teams will need to demonstrate that their focus area is:
 - Appropriate for an Institute
 - Has the potential to deliver regional and national improvements in advanced-manufacturing capabilities
 - Meets national needs



IMI Characteristics

Institutes:

- Should leverage existing regional or national innovation ecosystems or catalyze the formation and sustainability of new innovation clusters
- Will have a specific physical location or locations and a clear lead organization, rather than existing as a “virtual” or distributed organization
- Will collaborate with organizations in any location that have relevant, complementary expertise
- Will draw talent and resources from across the nation and around the world



IMI Activities Will Include:

- **Applied research, development, and demonstration projects** - moving component technologies from a laboratory environment toward demonstration of a system in a representative production environment
- **Education and training at all levels** - including K-12 programs, internships, skills certification, community college engagement, university collaboration, graduate students, post-doctoral students, and retraining
- **Development of innovative methodologies and practices** - for increasing the capabilities and capacity of supply chain expansion and integration



IMI Activities (continued)

- **Engagement with SMEs** - Strategies to encourage the participation of SMEs in Institutes include:
 - Engaging outreach partners
 - Providing information and services tailored to address SME needs
 - Providing a tiered membership fee structure
 - Allowing “all in-kind” contributions for new member SMEs
 - Staged licensing of IP
 - ...
- **Shared facility infrastructure**
 - Scaling up laboratory demonstrations and making technologies ready for manufacture
 - Reducing the cost and risk of commercializing new technologies
 - Addressing manufacturing challenges on a production-level scale



IMI Selection Process

- There will be an open, competitive, IMI selection process managed by the interagency AMNPO (participating Federal agencies currently include DOC/NIST, DOD, DOE, ED, NASA, and NSF)
- Solicitations for Institute proposals may be staged, and the design and number of solicitations will depend on the availability and timing of funds
- The review team will include members of the AMNPO, agency partners, and other experts
- The merit-based selection process may include pre-proposals, site visits, and analyses of the economic and business plans of the Institute



Detailed Evaluation Criteria Will Likely Include:

1. The focus on a critical national need or opportunity for U.S. manufacturing
2. Proposed activities targeting the transition of early stage manufacturing research and technology to commercial application or product
3. The proposed Institute plan to achieve significant impact in manufacturing technology development and scale up to commercialization
4. The proposed Institute resources (personnel, facilities, and participating entities)
5. The level of co-investment from non-Federal entities, and the strength of the plan for sustainability beyond the initial Federal funding
6. The adequacy of the financial plan



Evaluation Criteria (continued):

7. The level of engagement with SMEs
8. The suitability and anticipated utilization of shared facilities
9. The level of involvement and expertise in education and workforce development
10. The adequacy of the governance and oversight model, including the degree of industry involvement and openness to relevant new participants
11. The ability of the Institute to advance American domestic manufacturing
12. Others



Suggested Café Discussion Topics

- How could a proposing team select a well-defined focus area that meets both industry and national needs?
- What metrics could be used to help justify the selected focus area(s) and scale of effort?
- How would you design an Institute with a regional focus and position the Institute to create national/international technical preeminence?
- Is it possible to do this with an industry, technology, or process and product focused Institute agenda?

