NIST Programs in Manufacturing Innovation

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October 16, 2014

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

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What is AMTech?

The Advanced Manufacturing Technology Consortia (AMTech) Program

Launched by NIST in FY 2013

- To incentivize the formation of, and provide resources to, industry-driven consortia
- Supports both basic and applied research
- Focuses on long-term, pre-competitive, and enabling technology development
- For the U.S. manufacturing industry

The goal of AMTech-supported consortia will be to strengthen the capacity of U.S. industry and the nation to compete in global markets

How Will AMTech Work?

Once fully implemented, NIST envisions AMTech to offer funding in two broad areas: *planning awards* and *implementation awards.*

The FY 2013 AMTech *planning awards* funded eligible applicants to create new, or strengthen existing, industry-led technology consortia.

AMTech-supported consortia will:

- Identify and prioritize long-term, pre-competitive industrial research needs (e.g., through roadmapping or white papers);
- Identify technology roadblocks;
- Enable technology development;
- Create the infrastructure necessary for more efficient transfer of technology;
- Represent a broad range of involved firms across all stages of the value chain.

2013 Planning Awards

- To establish and strengthen new and existing industry-led consortia that are focused on developing advanced technologies to address major technical problems that inhibit the growth of advanced manufacturing in the U.S.

- To identify and prioritize research projects supporting long-term industrial research needs and a range of eligible activities including, but not limited to, creating new or updating existing industry-led, shared-vision technology roadmaps for the development of technologies underpinning next-generation and/or transformational innovations.

- To undertake other activities designed to establish and strengthen new and existing industry-led, multi-partner consortia that catalyze technology infrastructure and American excellence in advanced manufacturing.

2013 Competition Results

Nineteen Awards totaling $9 million in NIST funding

Consortia Characteristics

Status: 11 New
8 Existing

Crosscutting Technologies (# of efforts):

- 1 - Additive Manufacturing
- 2 - Advanced Forming & Joining Technologies
- 7 - Advanced Manufacturing & Testing Equipment
- 2 - Advanced Materials Design, Synthesis & Processing
- 1 - Advancing Sensing, Measurement & Process Control
- 1 - Biomanufacturing & Bioinformatics
- 1 - Flexible Electronics Manufacturing
- 2 - Sustainable Manufacturing
- 2 - Visualization, Informatics & Digital Manufacturing Technologies

2013 Competition Results (cont'd)

Funded Projects

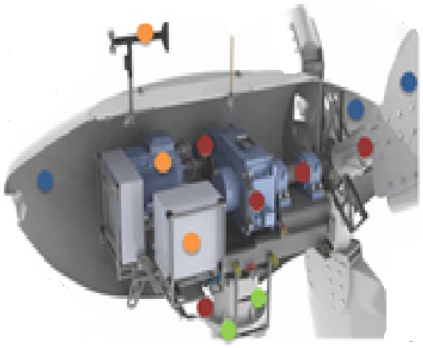
Electrochemical Pathway for Sustainable Manufacturing (EPSuM) Consortium	Ohio University
Consortium for Accelerated Innovation and Insertion of Advanced Composites (CAIIAC)	Georgia Tech Research Corporation
Pathway to Improved Metalcasting Manufacturing Technology & Processes - Taking Metalcasting Beyond 2020	American Foundry Society
Thermal Manufacturing Industries Advanced Technology Consortium (TMI ATC)	ASM International
MTConnect Roadmap Strategy to Promote Advanced Manufacturing in the United States	National Center for Defense Manufacturing and Machining
Advanced Simulation and Visualization for Steel Optimization Consortium	Purdue University
Technologies for Advanced Manufacturing of Pulp and Paper Products	Agenda 2020 Technology Alliance, Inc.
SMART Wind Consortium: Developing a Consensus Based Sustainable Manufacturing, Advanced Research and Technology Roadmap for Distributed Wind	Distributed Wind Energy Association
Facilitating Industry By Engineering, Roadmapping and Science (FIBERS) to Advance U.S. Manufacturing of Composites	University of Massachusetts Lowell
National Technology Roadmap for Photonics (NTRP)	University of Rochester
Semiconductor Supply Chain Road Mapping	SEMATECH, Inc.
Architecting an Institute for Flexible Electronics Manufacturing	AZ Board of Regents on behalf of Arizona State University
Development of a Comprehensive Advanced Joining and Forming Technology Roadmap	Edison Welding Institute

For details visit: www.nist.gov/amo/fundedawards.cfm

SMART Wind Consortium

Project Objectives

- Form a consortium of distributed wind manufacturers, suppliers, university researchers, and manufacturing centers
- Develop a roadmap to identify manufacturing gaps, prioritize actions, and foster solutions



Project Lead: Distributed Wind Energy Association

Funded Collaborators: eFormative Options
Wind Advisors Team

Project Event

- Consortium Launch, Albany, NY, Oct. 15-16, 2014
  www.distributedwind.org/smart-wind-consortium

Project Deliverable

- An advanced manufacturing roadmap for the distributed wind energy industry (May 31, 2016)

Award Number: 70NANB14H047
NIST Funding: $488,634
Project Period: June 2014 to May 2016
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2014 AMTech Competition

- AMTech anticipates awarding a total of $5.6 million in (2-year-maximum) grants during the program's second competition. Awards will range between about $250,000 and $500,000, subject to the availability of funds.
- Pre-applications were required and were due on Sept. 5, 2014. Selected pre-applicants will be invited to submit a full application, which is due on Oct. 31, 2014.
- Selections will be announced during the first half of 2015.

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AMTech Miscellaneous

AMTech's goal is for funded consortia to have broad National impact, so collaboration with NIST and other Federal agencies is encouraged. **NIST personnel** can, and are encouraged to, participate in any of the consortia and roadmapping activities (just coordinate first with the appropriate NIST/AMTech project manager).

- The **AMTech Website** will list dates for all consortia meetings, workshops, and other events, as well as due dates for roadmaps and other deliverables. It will eventually link to all consortia Websites.
- AMTech has published **on-line consortia maps** to illustrate the National scope of participation.
- AMTech has a **LinkedIn account** that is available for consortia use. Recipients should use it to share information and seek input.

For further information, visit the AMTech Website at www.nist.gov/amo

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National Network for Manufacturing Innovation (NNMI)

Advanced Manufacturing National Program Office
(housed at DOC - NIST)

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National Network for Manufacturing Innovation

Goal: strengthen competitiveness and job-creating power of U.S. manufacturing

- Enable better, faster "scale-up" when innovations are presented to U.S. industry

Bridge the gap between fundamental discovery and large volume manufacturing

- create a space where industry and academia can work together, thereby …
- Reducing the complexity, high risk and long time horizons that prevent **individual** companies from investing in Technology Readiness Level (TRL) 4-7 research
- Allow small and medium-sized companies and start-ups access to the best minds and equipment to develop new innovative ideas.

These institutes create that space, to "de-risk" new technologies and get them into production here in the U.S., with benefits to everyone from start-ups to large corporations.

Develop a workforce with skills needed for advanced manufacturing

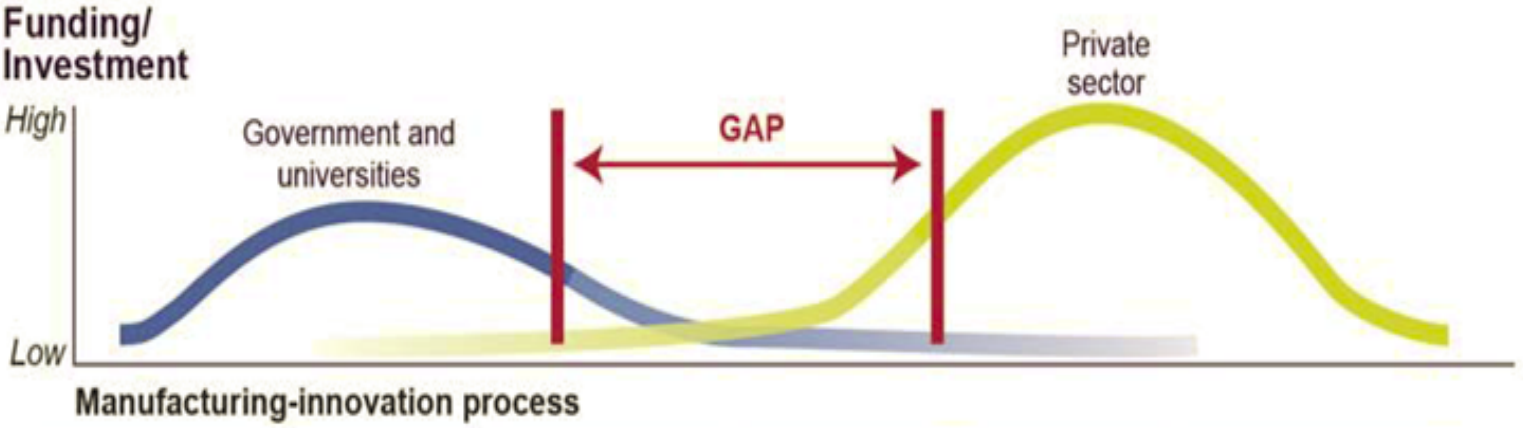
- The United States lags behind competitor nations regarding the skilled workforce needed for advanced manufacturing.
- These Institutes provide a space with state-of-the-art equipment, where workforce training can take place, providing workers with the computer and equipment control skills necessary for modern manufacturing.

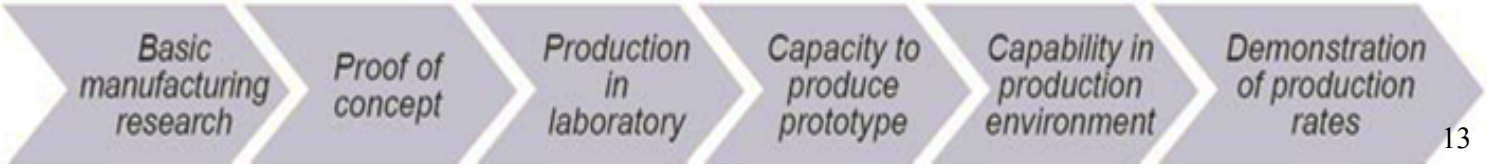
The "Scale-up" Gap or Missing Middle

Basic R&D

Common terms
The "valley of death"
The "missing Bell Labs"
The "industrial commons"

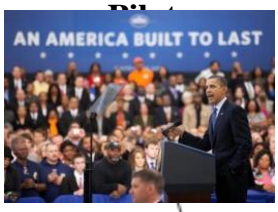
Commercialization



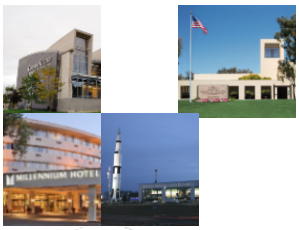


National Network for Manufacturing Innovation

15 Institutes +



Public Comment



Full-size Institutes

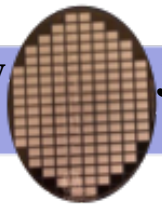
Vision of 45 Institutes

Congressional Authorization - RAMI -

Formation of Network and New Institutes

March 2012

January 2013

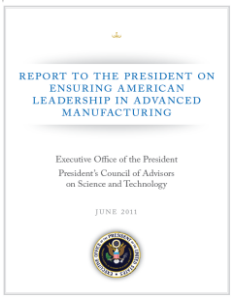


January 2014

+4 more

Next Steps

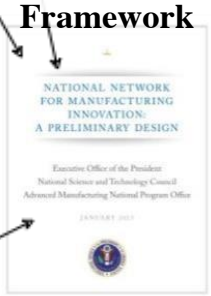
PCAST: Manufacturing Linked to Innovation



Additive Mfg Pilot

PCAST/AMP Call for NNMI

NNMI Framework



Power Electronics Pilot Inst.

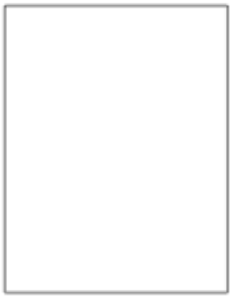
IP Guidelines

Digital Mfg Pilot Inst.

Perf. Metrics

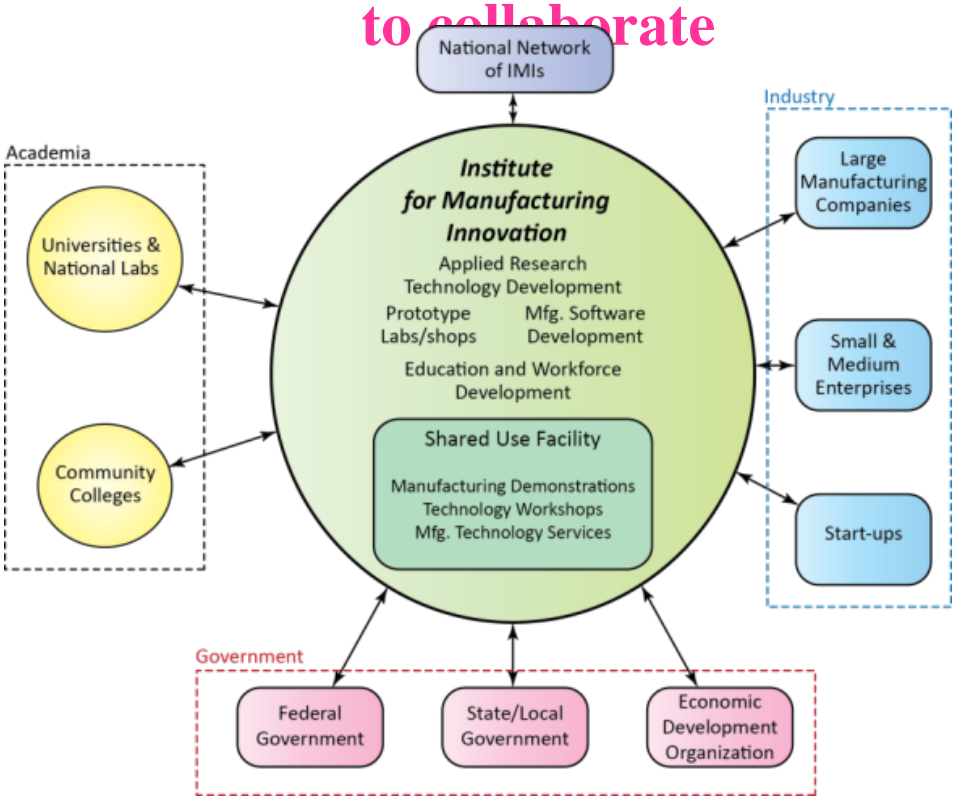
Light-weight Metals Pilot Inst.

…



Design of an Institute for Manufacturing

Creating the space for Industry & Academia to collaborate



The Start of a Network…

Additive Manufacturing

Power Electronics

Digital Manufacturing

Lightweight Metals

Adv. Composites Mfg.

2014 Solicitation TBA

2014 Solicitation TBA

2014 Solicitation TBA

Funding Opportunity (proposals in review):
Advanced Composites Manufacturing Innovation Institute

$70M public investment over five years

Objective

Develop and demonstrate innovative technologies that will, within 10 years, make advanced fiber-reinforced polymer composites at…

50% Lower Cost Using 75% Less Energy

And reuse or recycle >95% of the material

Application	Estimated Current CFC Cost	Institute CFC Cost Reduction Target (2018)88	CFC Ultimate Cost Target (2024)	CFC Tensile Strength	CFC Stiffness	Production Volume Cycle Time
Vehicles (Body Structures)	$26-33/kg	>35%	<$11/kg by 2025 ~60%	0.85GPa (123ksi)	96GPa (14Msi)	100,000 units/yr <3min cycle time (carbon) <5min cycle time (glass)
Wind (Blades)	$26/kg	>25%	$17/kg ~35%	1.903 GPA (276ksi)	134GPa (19.4Msi)	10,000 units/yr (at >60m length blades)
Compressed Gas			$10-15/kg	2.55 GPa	135 GPa	500,000 units/yr

DoD Request for Information (RFI): INSTITUTES FOR MANUFACTURING INNOVATION

Six Technical Focus Areas are currently under consideration by DoD:

- Flexible Hybrid Electronics
- Photonics
- Engineered Nanomaterials
- Fiber and Textiles
- Electronic Packaging and Reliability
- Aerospace Composites

On Oct. 3, President Obama unveiled a new competition to award more than $200 million in public and private investment to create an Integrated Photonics Manufacturing Institute.

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Thank you

For questions or comments, please contact the
Advanced Manufacturing National Program Office
amnpo@nist.gov
www.manufacturing.gov
301-975-2830

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