Agenda

1. AMP and Manufacturing Innovation
2. Presidential Initiative & Pilot Institute
3. NNMI Design with Public Input
4. 2014 Manufacturing Innovation Institutes
5. Next Steps
The NNMI Story Today…

- **15 Institutes + Pilot**
- **Full-size Institutes**
- **Vision of 45 Institutes**
- **6 x 2014 Institutes**

**March 2012**
- Additive Mfg Pilot
- Public Comment
- PCAST/AMP Call for NNMI

**January 2013**
- Power Electronics

**January 2014**
- Digital Mfg & Design
- Light-weight Metals

- Congressional Authorization
- Formation of Network and More New Institutes

**The Design Continues…**

- NNMI Framework
### I. Enabling Innovation
- Establish a National Network of Manufacturing Innovation Institutes (NNMI)
- Establish a national advanced manufacturing portal
- Establish a national advanced manufacturing strategy
- Increase R&D funding in top cross-cutting technologies
- Empower enhanced Industry/University collaboration in advanced manufacturing research
- Foster a more robust environment for Commercialization of Advanced Manufacturing Technologies

### II. Securing the Talent Pipeline
- Improve public perceptions about manufacturing
- Tap the talent pool of returning veterans
- Invest in community college level education
- Partner to provide skills certifications and accreditation
- Enhance advanced manufacturing university programs
- National manufacturing fellowships and internships

### III. Improving the Business Climate
- Enact tax reform
- Streamline regulatory policy
- Improve trade policy
- Update energy policy
The Scale-up Gap or Missing Middle

Common terms
The “valley of death”
The “missing Bell Labs”
The “industrial commons”

Basic R&D

Commercialization

Funding/Investment

High

Low

Government and universities

Manufacturing-innovation process

Basic manufacturing research
Proof of concept
Production in laboratory
Capacity to produce prototype
Capability in production environment
Demonstration of production rates
Focus on Scale Up – The Missing Middle

Basic science
Largely government funded

Commercialization
private sector owned/funded

- DOE Energy Innovation Hub
- NSF Engineering Research Center
- NSF I/UCRC Center
- Institute for Manufacturing Innovation
- Manufacturing Extension Partnership Center
- State or Regional Center

Manufacturing Maturity

Annual Budget

- $100M
- $10M
- $1M
- $100K
Designing, Building and Growing the NNMI

2) Presidential Initiative and Pilot

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- **Full-size Institutes**
  - Vision of 45 Institutes
  - January 2014
  - 6 x 2014 Institutes
  - + 4 more Inst.

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**NNMI Framework**

- **Power Electronics**
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**The Design Continues**...
National Network for Manufacturing Innovation

“Sparking this network of innovation across the country, it will create jobs and will keep America leading in manufacturing...”
President Obama, March 9, 2012

• The President’s Budget proposes a $1 billion investment to create this new National Network for Manufacturing Innovation, creating up to 15 manufacturing institutes for Industry

• We Can’t Wait: 2012 Pilot Institute – on Additive Manufacturing
Additive Manufacturing Innovation Institute
Youngstown Ohio

Prime Awardee: National Center for Defense Manufacturing and Machining

- Initial $30M federal investment matched by $40M industry, state/local
- 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
Designing, Building and Growing the NNMI

3) Public Input and the NNMI Design

15 Institutes + Pilot

Full-size Institutes

Vision of 45 Institutes

6 x 2014 Institutes

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Public Comment

NNMI Framework

Additive

Power Electronics

Digital Mfg & Design

Light-weight Metals

+ 4 more Inst.
Public Engagement on Design
Workshops & Request for Information

Broad & Diverse Stakeholder Input
1,200 voices on the NNMI Design!

Industry 31%
Academia 31%
All Other 10%
Economic Development 6%
Research & non-profits 8%
Federal State & Local Gov’t 14%

Rensselaer Polytechnic Institute
Troy New York
Cuyahoga Community College
Cleveland Ohio
University of Colorado
Boulder, Colorado
National Academies Beckman Center
Irvine California
U.S. Space and Rocket Center
Huntsville, Alabama
The Institute Design
Creating the space for Industry & Academia to collaborate

White House Report
NNMI Framework Design
January 2013
Institute Activities
Not just Applied R&D – solutions, access & workforce

Applied Research & Demo projects for
• reducing cost/risk on commercializing new tech.
• Solving pre-competitive industrial problems

Tech Integration - Development of innovative methodologies and practices for supply chain integration

Small/Medium Enterprises
• Engagement with small and medium-sized manufacturing enterprises (SMEs).

Education, technical skills and Workforce development
Education and training at all levels for workforce development
Designing, Building and Growing the NNMI

4) New Manufacturing Innovation Institutes

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PCAST/AMP Call for NNMI
NNMI Framework

Vision of 45 Institutes
+ 4 more Inst.

- AN AMERICA BUILT TO LAST
- A BETTER BARGAIN FOR THE MIDDLE CLASS
- A HOME TO CALL YOUR OWN
- + 4 more Inst.
- Light-weight Metals
- Power Electronics
- Full-size Institutes

January 2013
电力电子学

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“In my State of the Union Address, I also asked Congress to build on a successful pilot program and create 15 manufacturing innovation institutes that connect businesses, universities, and federal agencies to turn communities left behind by global competition into global centers of high-tech jobs.

“Today, I’m asking Congress to build on the bipartisan support for this idea and triple that number to 45 – creating a network of these hubs and guaranteeing that the next revolution in manufacturing is Made in America.”

July 30, 2013

With Congressional Legislation

• Open competition on ANY topic proposed by Industry and Academia
• Selection of topics made on merit
  • let best proposals of greatest impact to US industry move ahead
• Institutes by Administrative Action limited to topics Federal agencies need
• Creates capability for enough institutes to form a value-added network
• Provides stable funding and certainty for consortia – path to sustainability
Next Generation Power Electronics Manufacturing Innovation Institute

Lead: North Carolina State University

Mission: Develop advanced manufacturing processes that will enable large-scale production of wide bandgap semiconductors, which allow power electronics components to be smaller, faster and more efficient than silicon.

Poised to revolutionize the energy efficiency of power control and conversion.
Designing, Building and Growing the NNMI 2014 Actions

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The Design Continues ...

Authorization
Formation of Network and More New Institutes
We also have the chance, right now, to beat other countries in the race for the next wave of high-tech manufacturing jobs. My administration has launched two hubs for high-tech manufacturing in Raleigh and Youngstown, where we’ve connected businesses to research universities that can help America lead the world in advanced technologies.

Tonight, I’m announcing we’ll launch six more this year. Bipartisan bills in both houses could double the number of these hubs and the jobs they create. So get those bills to my desk and put more Americans back to work.

President Barack Obama
January 28, 2014

Six full-scale manufacturing innovation institutes to be awarded in 2014
• New structural alloys face tremendous barriers to application due to lack of design guides and certifications as well as cost and scale-up challenges.

• The goal is to develop an advanced lightweight-metal supplier base for the U.S. to compete in the global market.

• Enable DOD to realize significant fuel reduction, increased payloads, and greater speed and agility of manned, unmanned, and soldier systems as well as benefits for commercial applications and energy savings.
Digital Manufacturing and Design Innovation Institute

- Provide the proving ground to link promising information technologies, tools, standards, models, sensors, controls, practices and skills, and then transition these capabilities to the industrial base for full-scale application.

- For example, proving and progressing intelligent electro-mechanical design and manufacturing capabilities from laboratory to prototype factory environments would improve production efficiencies and costs.

- Focus is the smart and comprehensive use of the ‘digital thread’ throughout design, production and support.
Designing, Building and Growing the NNMI

5) NNMI Next Steps

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- The Design Continues ...

- Report to the President on Capturing Domestic Competitive Advantage in Advanced Manufacturing
- National Network for Manufacturing Innovation: A Preliminary Design
- Draft Guidelines on Intellectual Property Rights for the National Network for Manufacturing Innovation
- The Design Continues...
The Design Continues

Please stay tuned for updates and announcements!

Advanced Manufacturing National Program Office

Draft Guidance on Intellectual Property Rights for the National Network for Manufacturing Innovation

Draft Institute Performance Metrics for the National Network for Manufacturing Innovation

Edited by Michael F. Molnar, Director
Advanced Manufacturing National Program Office

Digital Manufacturing Institute
Light-weight Metals Institute

Partnership

Industry – Academia – Government

Working better, together to create transformational technologies and build new products and industries


November 2013
**Foundational Technologies** are **cross cutting**, which benefit **many industries and markets**, including the most energy-intensive manufacturing sectors.

A foundational technology can be **a product, a material, or a process**, that has potentially **transformational technical and manufacturing productivity** impact.

Examples include **but are not limited to**:

- Additive Manufacturing
- Low Cost Carbon Fiber Composites*
- Low Cost, High Strength Structural Metals
- Combined Heat and Power Systems
- In-Situ Metrology and Process Controls
- Multimaterial Joining*
- Catalysis to increase the efficiency of industrial processes

- Direct heating RF and microwave process technologies*
- Sustainable Nanomaterials*
- Wide Bandgap Semiconductors as the basis for next generation power conversion devices*
- Membranes for more efficient industrial separations*

* Workshops held
NNMI Bipartisan/Bicameral Legislation
Revitalize American Manufacturing & Innovation Act of 2013

Lead Sponsors

Sen. Sherrod Brown
D Ohio

Sen. Roy Blunt
R Missouri

Rep. Tom Reed
R NY-23

Rep. Joe Kennedy
D MA-4

Senate Commerce Committee Hearing Nov. 13, 2013
House Science Committee, Subcommittee on Research & Technology Hearing Dec. 12 2013

Joint press release: “Their landmark bill would establish a Network for Manufacturing Innovation to position the United States, once again, as the global leader in advanced manufacturing and ensure that the U.S. can out-innovate the rest of the world while creating thousands of high-paying, high-tech manufacturing jobs.”
Potential Future NNMI Topics

Public input identified 135 unique topics

Are you ready to propose your topic?

With congressional authorization will come open solicitation.
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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