



### NAMII Priority Applied Research Needs 04 December 2012

A Pilot Institute for the National Network for Manufacturing Innovation (NNMI)

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- A Defense-wide Manufacturing S&T team-led, Multi-agency collaboration between industry, government and universities
- Public-private partnership







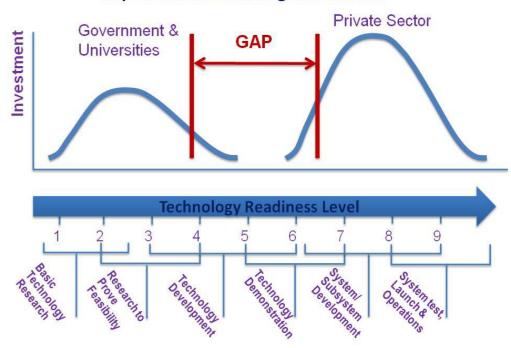






- Shared facilities open to industry
  - Especially attractive to small businesses
- Enabling technology transition and commercialization
- Addressing Technology Readiness Level (TRL) / Manufacturing Readiness Level (MRL) 4-7
  - Bridge the gap in Manufacturing Innovation
- Educational plan to train the future workforce
- Sustainable within 3 years

#### **Gap in Manufacturing Innovation**



A Model for Manufacturing Innovation Institutes within NNMI





#### **Education Sector**

Research universities Community colleges Secondary schools

Private Sector
"Voice of the
Customer"
Large Industry
Small Businesses
Entrepreneurs

Public Sector <a>Federal agencies</a>
National labs
States

#### Innovators:

- Full time applied researchers
- Faculty/students in residence
- Engineers
- Entrepreneurs

#### **Shared Infrastructure:**

- Additive Mfg Equipment
- Design & Simulation
- Part Testing
- Demonstration

#### Links:

- Manufacturing Extension Partnerships
- Other Mfg Innovation Institutes
- International community

Widespread Adoption
of Additive
Manufacturing and
Greater Economic
Competitiveness

- New and better products and manufacturing technologies
- Spin-off Companies
- Highly Skilled Workforce







### Aspects of a Good Public-Private Partnership and a Framework for Success\*

Better use of resources, cost savings

### Relationships

- Open and Trusting
  - Transparency
- Collaborative Leadership

Constituency for Collaboration

Government, Industry, Universities, Community Colleges, Econ Dev Orgs



Ability to do something individual organizations can't do on their own

### **High Stakes**

- Huge opportunity for AM
- Economic revitalization
  - Model for NNMI

High quality, important outcomes

### **The Basics**

- Shared Purpose
- Champions with credibility/clout
- Pooled resources
- Open, credible processes
- Coop Agreement, Statement of Work, Mgmt Structure
- Program Op Plan, Perf Metrics,
   Roadmapping, Project Call Process

Collaboration = <u>co-labor</u>: joint effort, ownership and decision making

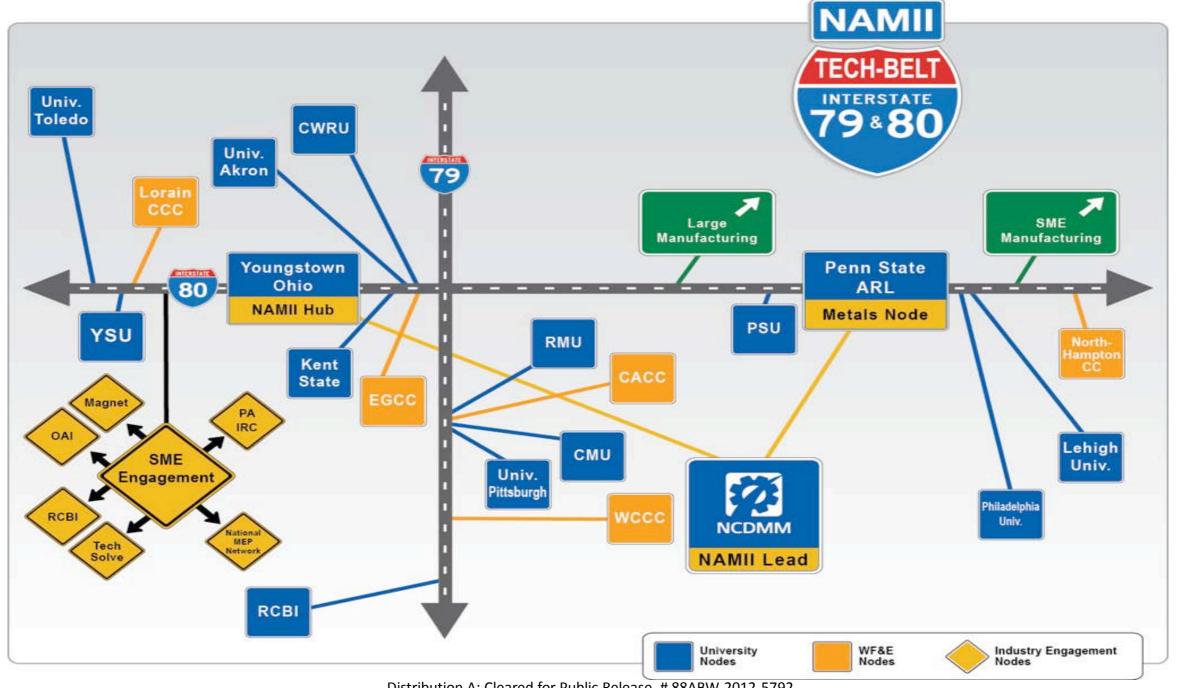
<sup>\*</sup> Working Across Boundaries: Making Collaboration Work in Government and Non-profit Organizations (R. Linden, 2002)

NATIONAL





## A REGIONAL Center of Excellence, with a vision for NATIONAL PRESENCE









## **NAMII Initial Partners**

#### Industry

#### **AM Materials**

Allegheny Technologies
FMW Composite Systems
Lubrizol
Oxford Performance Materials
Plextronix
RTI
Touchstone

#### **AM Equipment**

ExOne
Laser Technology Associates
MicroFab Technologies
nScrypt
Optomec
POM
Sciaky
Stratasys

#### **AM Manufacturing**

AlphaMicron
FMW Composite Systems
Kent Displays
Morris Technologies
Paramount Industries

#### **Platform Systems**

Boeing
GE Transportation
General Dynamics
Goodyear
Honeywell
Johnson Controls
Kennametal
Lockheed-Martin
Northrop Grumman
OSRAM Sylvania
Parker Hannifin
Timken
Westinghouse Nuclear

#### Inspection

M-7 Technologies Stratonics

#### Software

AST2 Autodesk IBM

#### Manufacturing Support

#### Manufacturing Extension Partners

PA MEP Network (IRCs) OH MEP Network

#### Industry Organizations/TBEDs

BFTP EIO JumpStart OAI Nortech Wohlers Associates

### NAMII Hub Northeast Ohio Facility

National Center for Defense Manufacturing and Machining

#### Government

Army ARDEC ECDC ManTech NETL NUWC

#### Manufacturing & Standards Organizations

AMT
MTConnect Institute
NDMEC
NIST
SME

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#### **Workforce Training**

#### North Eastern Ohio

Eastern Gateway CC Lorain CCC Youngstown State Univ.

#### Western Pennsylvania

CC of Allegheny C Robert Morris Univ. Westmoreland CCC

#### Eastern Pennsylvania

Northampton CC Penn College of Technology Penn State University

#### West Virginia

RCBI @ Marshall Univ.

#### Research Universities\*

Carnegie Mellon University (Automation)

Case Western Reserve University (Micro/Nano)

> Kent State University (Sensors)

(Composites)

Penn State University, ARL (Metal SLS, E-beam)

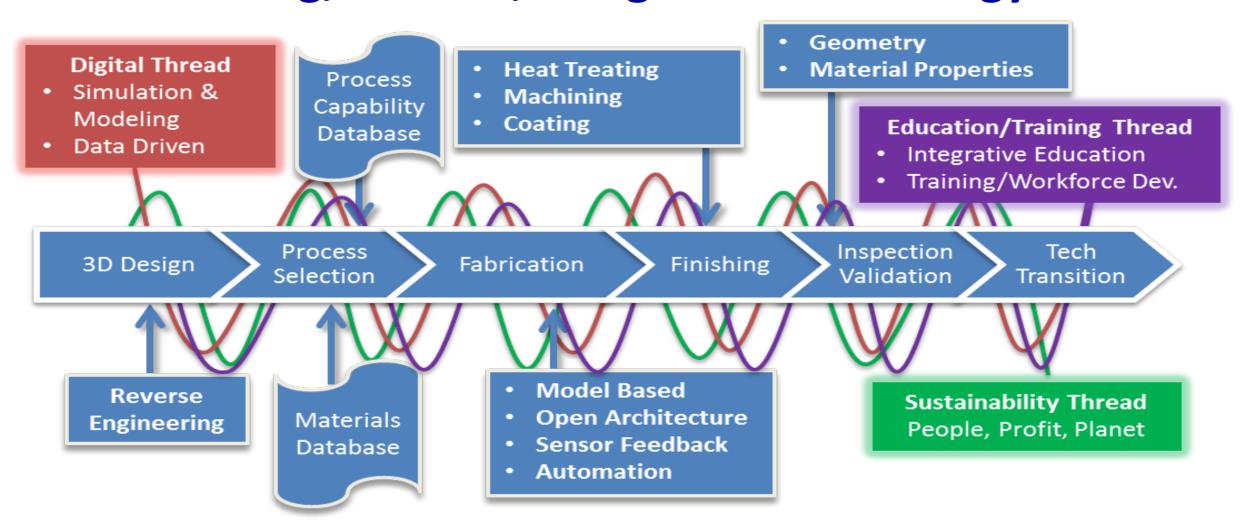
University of Akron (Polymer/Ceramic LOM)

University of Pittsburgh (Medical)





## Strong, Holistic, Integrated Technology Plan



- Process development: metals, polymers, ceramics, electronics, hybrid
- Digital thread / AME
- Specialized, portable AM systems
- Open Architecture
- Process planning

- Process Control
- Material Development
- Component Design





## NAMII Governance – Shared Leadership

#### **Governance Board\***

Technical strategy, program operating guidance

#### **Executive Committee\*\***

"Champions" - Vision, Policy and Longterm Strategy and Planning **NAMII Director** 

OSD ManTech (Mfg and Ind. Base Policy)
Gov't Co-op Agreement Program Manager

## Technical Advisory Board (12 gov't members)

Link to Gov't Agencies, Technical Strategy, Program Operating Guidance

#### Deputy Director: Technology Development

- FacilityManagement
- ProjectManagement
- IP Management

## **Deputy Director: Technology Transition**

- Outreach & Engagement
- Technology Dissemination
- Conferences & Events

#### **Deputy Director:**

#### **Advanced Manufacturing Enterprise**

- SME Coordination
- Incubation/Commercialization
- Supply chain and design modeling
- Digital Thread
- Sustainability Thread

### **Deputy Director:**

#### **Workforce/Educational Outreach**

- Education Outreach
- STEM activities
- Workforce Training
- Integrated Education thread

\*Governance Board: All 1<sup>st</sup> and 2<sup>nd</sup> Tier Members, small business members, MEPs & Econ Development Groups, States Ex-officio \*\*Executive Committee: Elected by Governance Board & Tech Advisory Board, 1 year rotating positions





## **Executive Committee**

- Jim Williams, 3D Systems
- Eric Barnes, Northrop Grumman
- Gary Fedder, Carnegie Mellon University
- Jim McGuffin-Cawley, Case Western Reserve University
- Tim Shinbara, Association for Manufacturing Technology
- Mark Tomlinson, Society of Manufacturing Engineers
- Bill Macy, Stratasys
- Tom Stimson, The Timken Company
- John Russell, Air Force Research Laboratory, (DMS&T Program Manager)
- Rob Ivester, Department of Energy
- Bruce Kramer, National Science Foundation





# Leveraging America's VOICe





- Establishing Additive
   Manufacturing EcoSystem
- Developed AM Ontology
- Cataloging member capabilities in company profiles
- Capability search
- Opportunity posting and sourcing
- Virtual collaboration & partnering





# First Iteration Key Topics

- Equipment Capability and Capacity
- Process Capability and Characterization
- Product Quality
- Materials Understanding and Performance
- Workforce Preparation and Readiness
- Qualification, and Certification
- Design and Engineering Toolset
- Outcome-Based Optimization of Product, Materials, and Processes
- Process Control
- Alliance of National Resources

- Modeling and Simulation
- Sustainability
- Standards and Specifications
- Affordability
- Extended Product and Materials Applications
- Data Access
- Post Processing
- Additive Manufacturing Growth and Application
- New, Better, and Available Materials
- Capabilities Integration and Management





# **Project Call #1 Topic Areas**

- Qualification & Certification
  - Rapid qualification and certification methods
  - Leverage modeling and simulation
  - Quantification of process variability
  - Variability reduction to increase reliability, process optimization, rate increases
  - Certification of suppliers





# **Project Call #1 Topic Areas**

- Materials Understanding and Performance
  - Materials database designs
  - Design allowable properties for materials
  - Data access and sharing
  - Materials variability and management
  - Material requirements/gaps identification



# **Project Call #1 Topic Areas**

- Process Capability and Characterization
  - Process repeatability and throughput improvement
  - Develop algorithms for modeling expected outcomes
  - Improved part quality
  - In-situ adaptive control systems





# **Project Call Key Criteria**

- Project Lead must be NAMII Consortium Member
- Project teams SME involvement stressed
- Diverse team expertise (technical, business development, education)
- 50/50 Cost share
- Strong technical approach
- Sound transition plan
- Advanced Mfg. Enterprise & Workforce/Education elements
- Reasonableness and realism of the proposed cost, proposed cost share, and schedule





# NAMII Project Call #1

### **Key Dates:**

Request for Proposal Launched: November 27, 2013

Proposal due date: January 31, 2013

Proposals reviewed: February 2013

Announcement and awards: March 2013

More info at: namii.org/projects





## Membership is Open

### Lead Member\*

More info at: namii.org

- A seat on the NAMII Governance Board
- Royalty free non-exclusive rights for commercial development for all NAMII IP
- Ability to embed one Lead Member employee into the NAMII facility free
- Supporting Membership for SME supplier of the Lead Member's choice

### Full Member\*

- A seat on the NAMII Governance Board
- Ability to embed Full Member employees into the NAMII facility after paying an additional overhead fee per employee
- Non-royalty free Non-exclusive rights for commercial development for all NAMII IP

### Supporting Member\*

 Ability to schedule R&D and first-article production access of the NAMII infrastructure on a fee-for-service basis at the time of use

\* Sampling of Member Benefits





# Summary

- NAMII shows an unprecedented level of collaboration on manufacturing technology across government, industry and universities
- Huge opportunity and high stakes
- Establishing the framework for continued success
- Capturing Best Practices and Lessons Learned
  - Model for the NNMI





