NIST – Working with Industry To Accelerate Innovation

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ASEE Engineering Research Council
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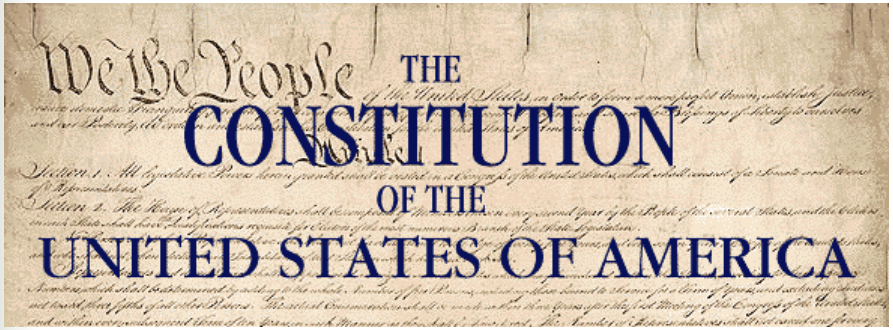
NIST
National Institute of Standards and Technology
U.S. Department of Commerce

Talk Outline

- NIST Overview
  - NIST Labs
  - MEP
  - BPEP
- NIST and Manufacturing – Planned New Programs
  - NNMI
  - AMTech
  - NIST Centers of Excellence
  - MTACs

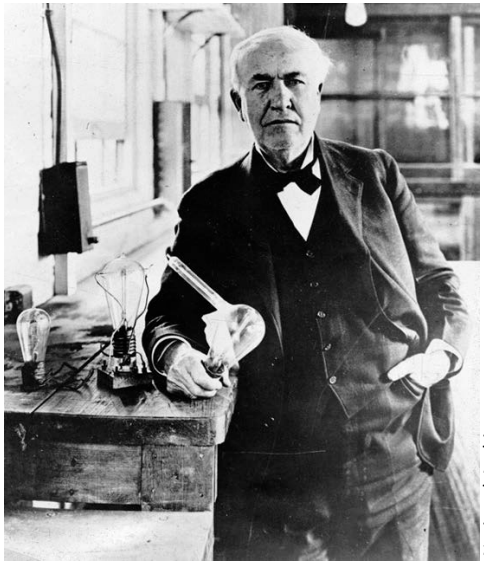
The Importance of Measurements and Standards



Article I, Section 8: The Congress shall have the power to…*fix the standard of weights and measures*

National Bureau of Standards established by Congress in 1901

- Eight different "authoritative" values for the gallon
- Electrical industry needed standards
- American instruments sent abroad for calibration
- Consumer products and construction materials uneven in quality and unreliable



National Archives

Estimated that 80% of global merchandise trade is influenced by testing and other measurement-related requirements of regulations and standards

NIST's Mission

To promote U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology in ways that enhance economic security and improve our quality of life.

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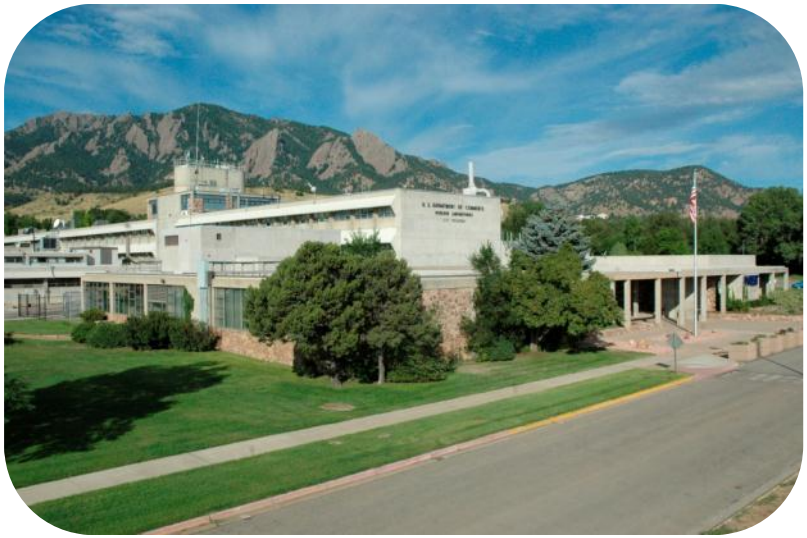
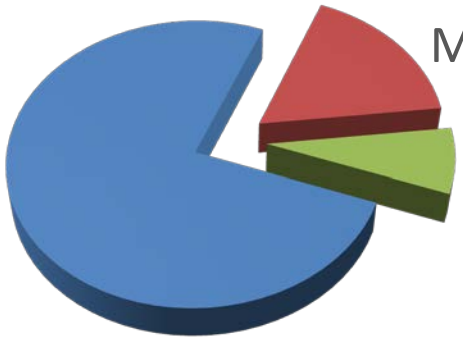
NIST: Basic Stats and Facts

Major assets

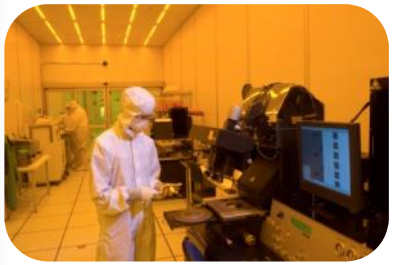
- ~ 3,000 employees
- ~ 2,800 associates and facilities users
- ~ 1,300 field staff in partner organizations
- Two main locations: Gaithersburg, Md., and Boulder, Colo.
- Three Main Programs Labs, MEP, BPEP
- Four external collaborative institutes: JILA, JQI, IBBR, HML



FY 2012 Appropriations $750.8 M



NIST Programs



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NIST Laboratories

- Providing measurement solutions for industry and the nation

Maksim Dubinsky/shutterstock.com

Hollings Manufacturing Extension Partnership

- Nationwide network helping smaller manufacturers compete globally

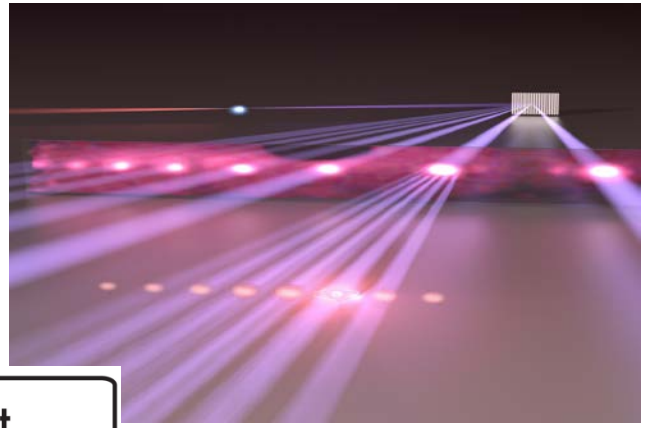
Poudre

Baldrige Performance Excellence Program

- Strengthening performance excellence in U.S. organizations

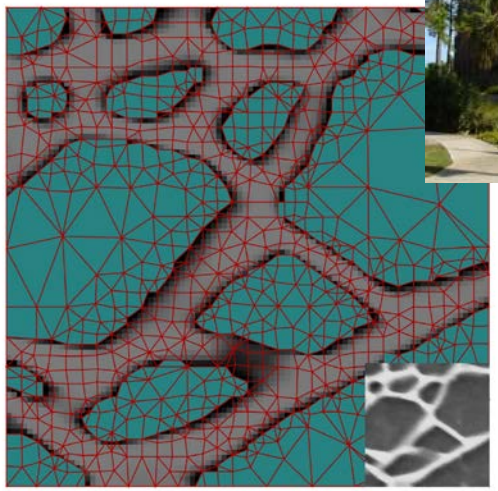
NIST Laboratory Programs – *Driving Innovation through Measurement*

- **The Material Measurement Laboratory** and the **Physical Measurement Laboratory** are responsible for NIST's metrology mission space
- **Core Functions Include:**
  - Maintenance of Fundamental Units
  - Applied measurements and dissemination of the SI
  - Quantum science and engineering
  - Calibrations
  - Characterization of material composition and properties
  - Production of validated methods and data
  - Development and dissemination of standard reference materials
  - Biotechnology and Healthcare measurements



Baxley/JILA

jqi Joint Quantum Institute



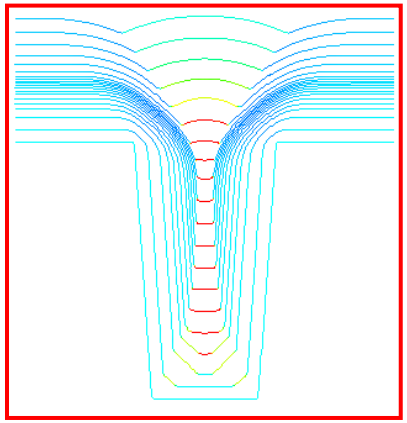
Langer/NIST

Example – High impact partnerships with manufacturers

Electronics Industry -

Partnerships with e.g. SEMATECH, INTEL, IBM and Rohm & Haas enabled:

- industry adoption of models that optimize processes for deposition of metals into nanoscale IC vias and interconnects
- measurements and models for nanoporosity necessary for manufacturers to adopt a new generation of low-K dielectric materials
- X-ray based dimensional metrology instrumentation needed to quantify the shape, fidelity and roughness of 3D chip nanostructures



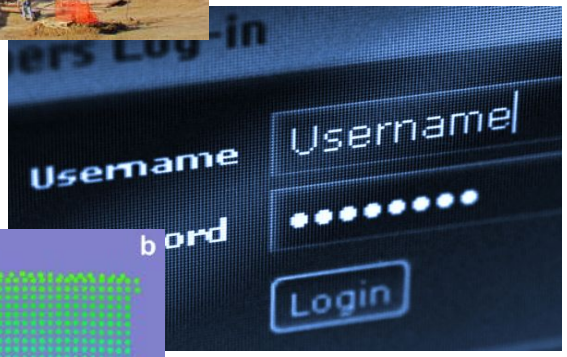
Automotive Industry -

Partnerships with USCAR, USX, Alcoa, GM and Ford enabled:

- Development of instrumented dies needed to quantify the sheet-forming behavior of emerging lightweight alloys for fuel efficient vehicles
- Industry adoption of new used to accelerate the design of dies suitable for lightweight aluminum and high-strength steel alloys.

NIST Laboratory Programs – *Accelerating the adoption and deployment of advanced technology solutions*

- **The Information Technology Laboratory** and the **Engineering Laboratory** share responsibility for NIST's technology mission space
- **Core functions**
  - IT measurement, accreditation, and testing
  - Mathematical and statistical analysis
  - Modeling and Simulation
  - Cybersecurity standards
  - Cloud computing
  - Identity management
  - Advanced manufacturing technologies and processes
  - Building technologies
  - Fire research
  - Smart grid and energy technologies



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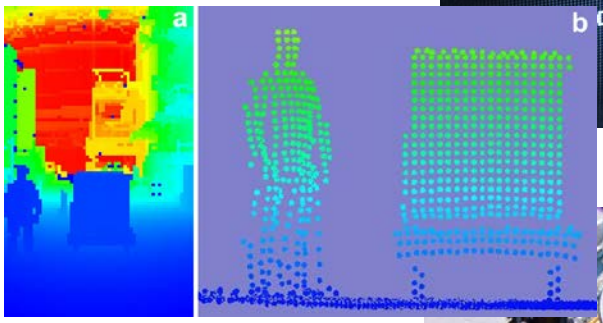
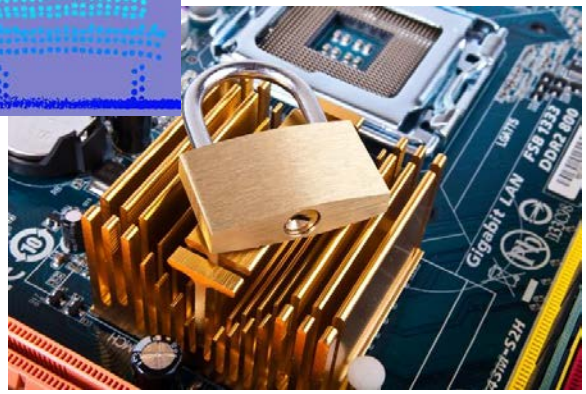


NIST



Example-- National Cybersecurity Programs

- **National Cybersecurity Center of Excellence (NCCoE)**
  - Center will undertake carefully developed use cases and associated technology implementations for the proposed solutions to resolve cybersecurity challenges through teams of public and private sector experts
  - $10M received in FY2012 to establish a private-public partnership to operate the center
  - $10M for FY2013/2014 planned
  - Currently exploring a Federally Funded Research and Development Center (FFRDC) as possible governance structure

- **National Strategy for Trusted Identities in Cyberspace (NSTIC)**
  - Charts a course for the public and private sectors to collaborate on raising the level of trust associated with the identities of individuals, organizations, networks, services, and devices involved in online transactions
    - First round of pilot grants announced September 20th
  - Proposed NSTIC budget for FY2014 is $24.5M, equal to the FY2013 funding level
    - Supports expansion of pilots to create additional opportunities for incentivizing the private sector to provide leading roles in delivery of NSTIC solutions

NCCoE
NATIONAL CYBERSECURITY CENTER OF EXCELLENCE

NIST Laboratory Programs – *World class, unique, cutting-edge research facilities*

The Center for Nanoscale Science and Technology (CNST) provides national access to world-class nanoscale measurement and fabrication methods and technology.

- Operates the rapid-access NanoFab, a shared resource with a comprehensive, commercial state-of-the-art nanofabrication tool set
- Provides access to emerging, cutting-edge instrumentation being developed by CNST's multidisciplinary research staff

The NIST Center for Neutron Research (NCNR) is a national resource for researchers from industry, university and other government agencies.

- Currently 28 experiment stations
- Hosts more than 2,000 researchers annually

Manufacturing Extension Partnership

Over 1,400 MEP field staff in every state and Puerto Rico help small and mid-sized U.S. manufacturers:

- create and retain jobs
- increase profits
- save time and money

MEP clients reported creating & retaining 72,075 jobs in 2009.

MEP Project Initiatives:

- Buy American Supplier Scouting
- Competitive Award Program
- E3: Economy, Energy, Environment
- Innovation Engineering
- Lean Product Development
- National Innovation Marketplace

MEP • MANUFACTURING EXTENSION PARTNERSHIP
NIST NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY

Baldrige National Performance Excellence Program

Standard of Performance Excellence

Organizations are judged against the Baldrige criteria in in seven areas:

- leadership;
- strategic planning;
- customer and market focus;
- measurement, analysis, and knowledge management;
- workforce focus;
- process management;
- and results.

Three awards may be given annually in

- manufacturing,
- service,
- small business,
- education,
- health care;
- and nonprofit.

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National Network for Manufacturing Innovation

President Obama at Rolls-Royce Crosspointe Petersburg, VA, March 9, 2012

$1 billion proposal:

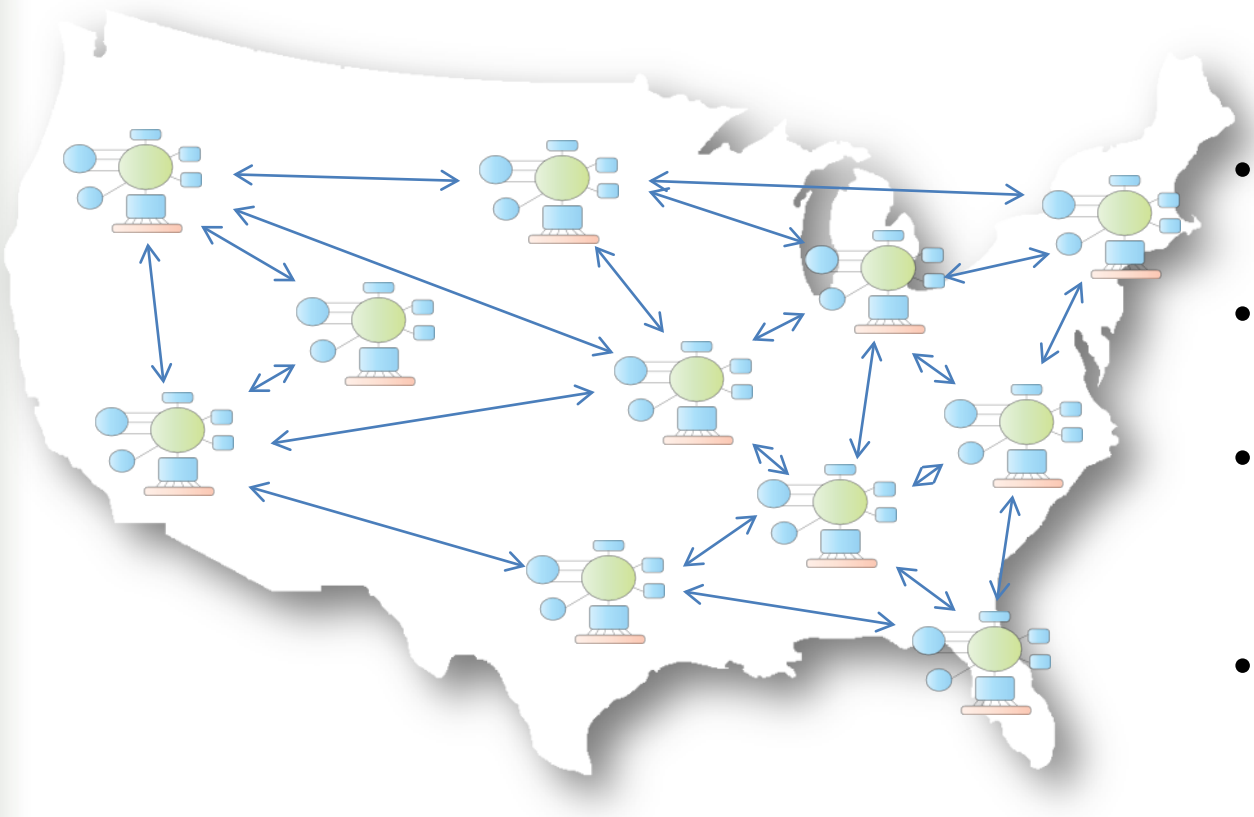
"institutes of manufacturing excellence where some of our most advanced engineering schools and our most innovative manufacturers collaborate on new ideas, new technology, new methods, new processes."

Proposed NNMI Scope

- Up to 15 linked regional clusters of manufacturing innovation across the country, each with a unique focus
- Shared approaches to infrastructure, intellectual property, contract research, and performance metrics

As nodes of a network, the Institutes for Manufacturing Innovation complement each other's capabilities

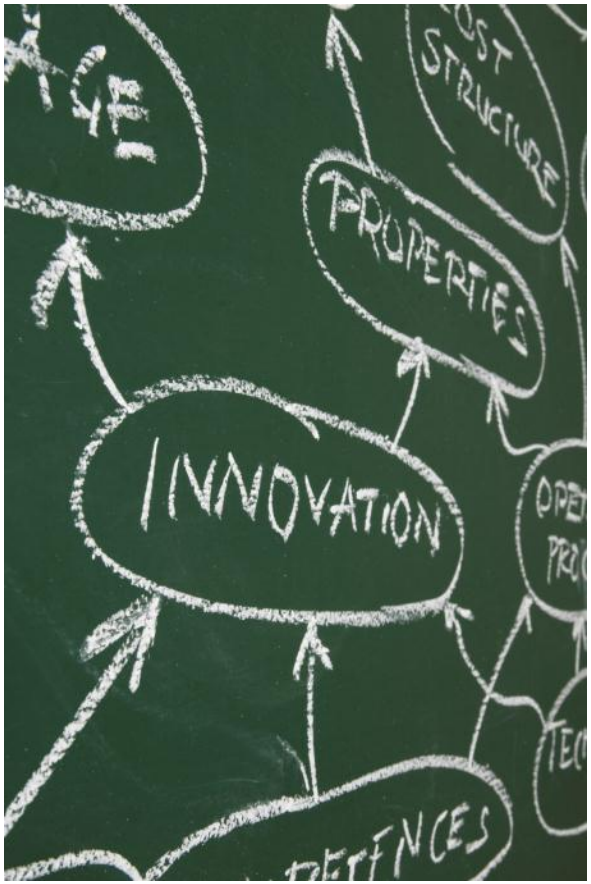
NNMI Characteristics



- Promote collaboration between institutes
- Provide a forum for sharing best practices
- Establish common IMI Policies when appropriate
- Link activities through the Manufacturing Portal

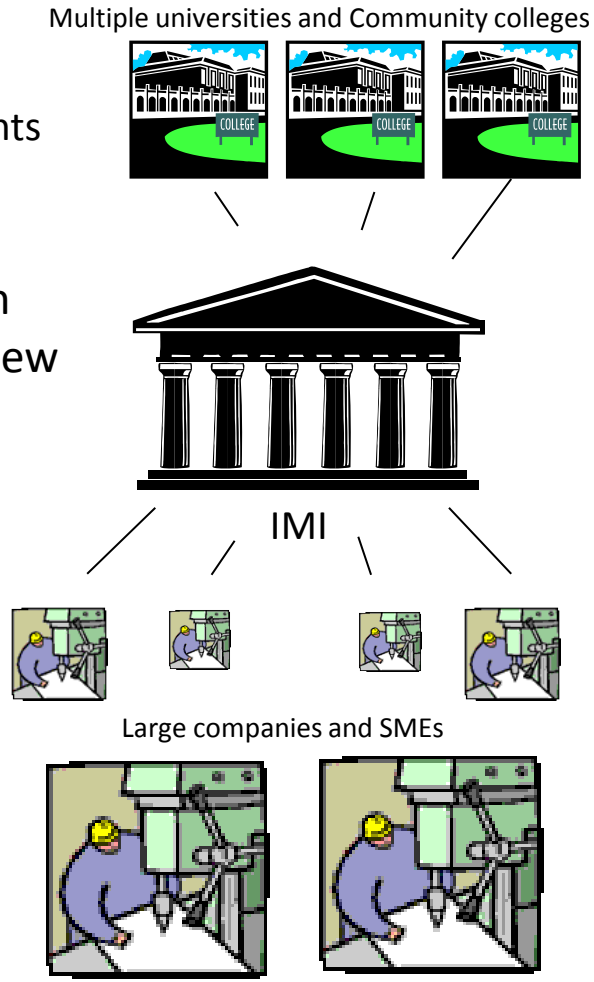
IMI Key Characteristics

- Institutes will be the anchor to a regional innovation ecosystem, with a vision for national and international preeminence.
- Institutes will be partnerships between all stakeholders: industry, academia, government, industry development organizations. Collaboration is critical.
- Each institute will have its own unique focus area, one of:
  - Manufacturing process
  - Advanced Materials
  - Enabling Technology
  - Industry Sector
- Institutes should be proposed by an industry-based non-profit organization. Focus areas will be ideally be defined by proposing teams.
- Institutes will be self-sustaining after 7 years.



IMI Proposal

- Proposing teams should demonstrate their focus area is:
  - Appropriate for an Institute
  - Has the potential to deliver regional and national improvements in advanced-manufacturing capabilities
  - Meets national needs
- IMIs should leverage existing regional or national innovation ecosystems or catalyze the formation and sustainability of new innovation clusters.
- IMIs will have a specific physical location and a clear lead organization; they will not be distributed or virtual.
- IMIs will have a regional focus with a plan for national and international preeminence.
- Activities will include
  - Applied research, development and demonstration projects
  - Education and training at all levels
  - Development of innovative methodologies and practices.



Next steps: Manufacturing in the State of the Union

Our first priority is making America a magnet for new jobs and manufacturing. After shedding jobs for more than 10 years, our manufacturers have added about 500,000 jobs over the past three. Caterpillar is bringing jobs back from Japan. Ford is bringing jobs back from Mexico. After locating plants in other countries like China, Intel is opening its most advanced plant right here at home. And this year, Apple will start making Macs in America again. There are things we can do, right now, to accelerate this trend… **So tonight, I'm announcing the launch of three more of these manufacturing hubs, where businesses will partner with the Departments of Defense and Energy to turn regions left behind by globalization into global centers of high-tech jobs. And I ask this Congress to help create a network of fifteen of these hubs and guarantee that the next revolution in manufacturing is Made in America.**

-President Obama, February 12, 2013

NNMI Next Steps

- ***DOD and DOE will be announcing their plans for three Institutes for Manufacturing Innovation (coming weeks)***
- ***Legislative action is needed to establish the NNMI program***
- ***Future stakeholder events being planned (will announce soon)***
- ***www.manufacturing.gov***

Advanced Manufacturing Technology Consortia (AMTech) ($21.0M Requested in FY13)

AMTech – Proposed program will provide funding to establish industry-led consortia to create technology roadmaps to identify and tackle long-term R&D challenges shared by industry. AMTech consortia will:

- Target university research capabilities on industry-driven R&D
- Lower the risk to investment in new technologies
- Accelerate technology transfer

Status: The AMTech program is supported in both the House (at $21M) and Senate (at $14.5M) marks for the FY 2013 budget.

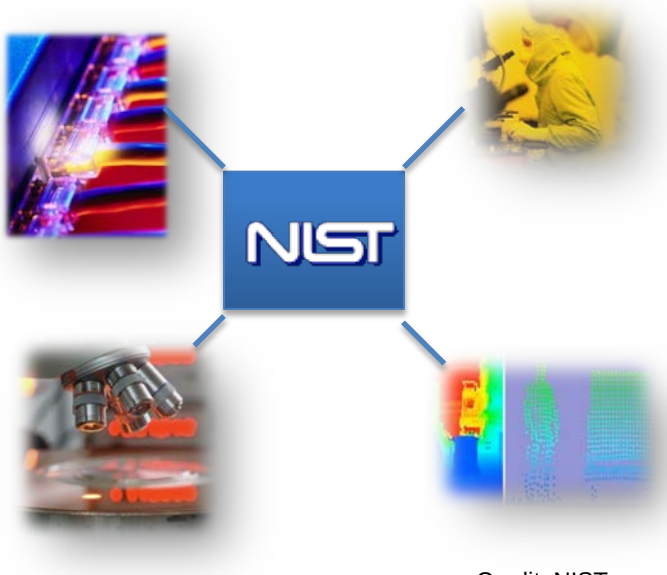
Cannot launch under a C.R.

NIST has conducted an RFI and received input from its advisory committee, and is ready to start the program should an FY 2013 budget be approved.

NIST Centers of Excellence (+$20.0M) -- Update

Proposed Initiative in FY13 -- This initiative will provide support for centers focused on emerging areas of research and technology to be determined by NIST.

- Create multidisciplinary centers of excellence in critical areas of emerging technology leveraging the measurement science of NIST with leading researchers in academia and industry
- Leverage multidisciplinary capabilities of Centers back into NIST core activities



Credit: NIST

Initiative is supported in both House and Senate Report Language for FY13 at the $20M level

C.R. will delay launch of program

Planning is continuing

MEP Manufacturing Technology Acceleration Centers

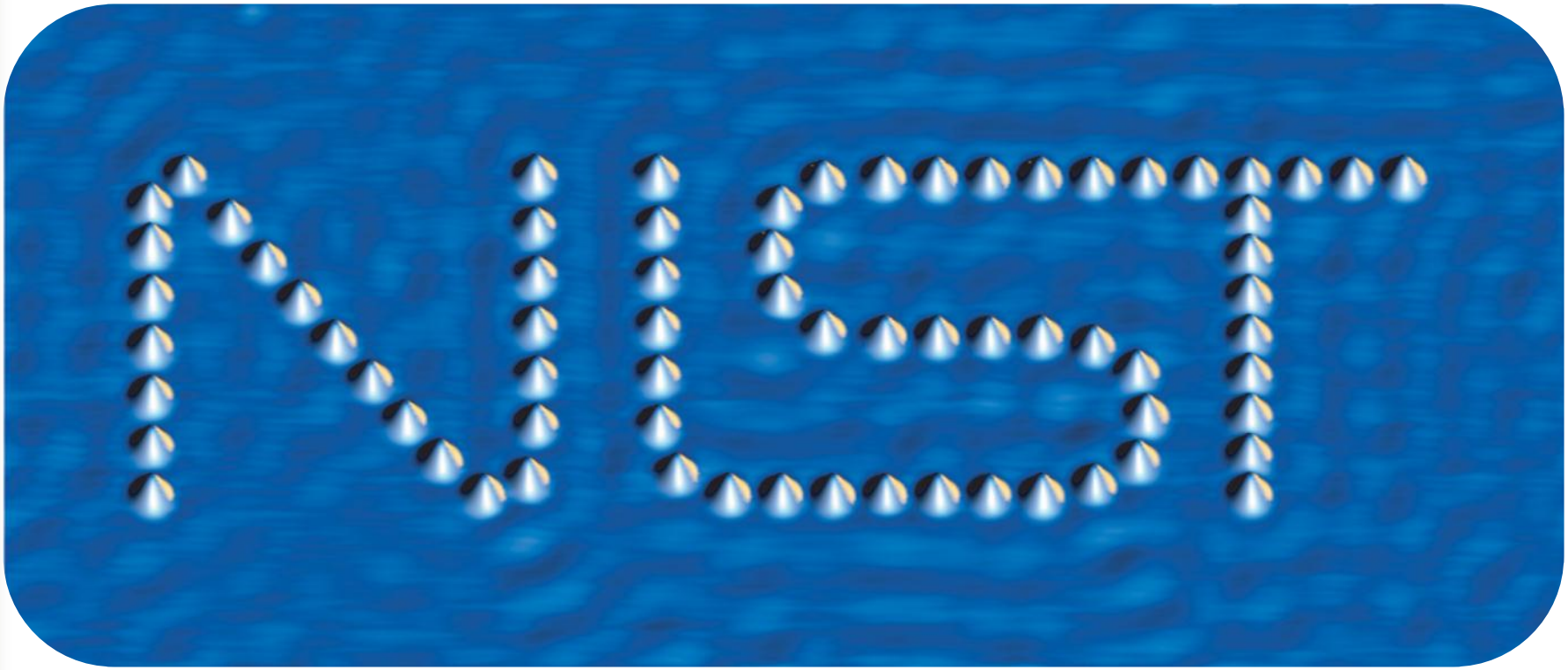
- Announced in the SOTU and "The President's Plan to Make America a Magnet for Jobs by Investing in Manufacturing"
- The President's Budget will propose a $25 million increase to launch Manufacturing Technology Acceleration Centers (MTACs)
- Industry-specific centers that can serve as a coordination point within key supply chains.
- MEP plans to pilot two new centers in 2013 dependent upon FY13 Appropriation.

Tools and Services

- Technology Scouting
- Lean Product Development
- Technology-Driven Market Intelligence - TDMI
- National Innovation Marketplace
- Prototyping Technology
- Access to Finance

Partners

- Universities
- Federal Labs
- Prototyping Firms
- Technology Intermediaries
- Innovation Organizations
- Financial Organizations
- NNMI (initially NAMII)



Questions?