



# **National Institute of Standards and Technology - NIST FY 2013 Budget Overview -**

## **Working with Industry to Accelerate Innovation**

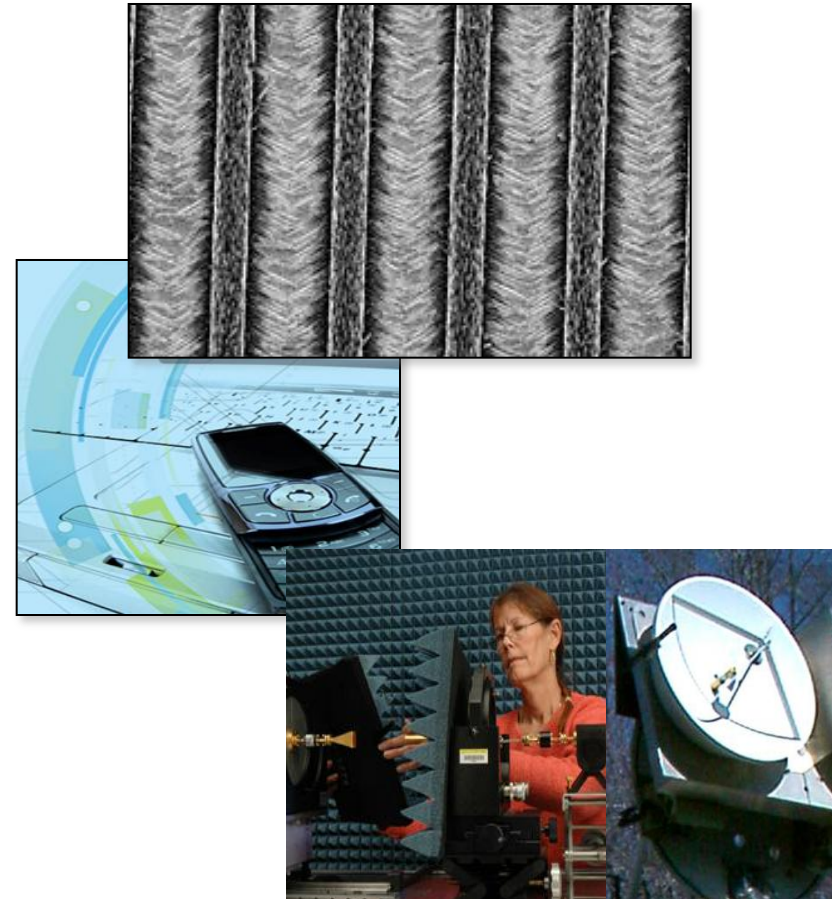
Dr. Patrick Gallagher

Under Secretary of Commerce for Standards and Technology

# NIST – Targeting Investments to Advance U.S. Innovation and Boost Economic Recovery

## FY 2013 Request Addresses Challenges in Key Priority Areas

- Advanced Manufacturing
- Cybersecurity and Communications
- Forensic Science, Advanced Communications, and Disaster Resilience
- Strengthening Technology Transfer



## NIST FY 2013 Budget Request Compared to FY 2011-2012 Enacted (Dollars in millions)

	FY 2011 Enacted	FY 2012 Enacted	FY 2013 Request	+ / (-) Over FY 2012 Enacted
<b>STRS</b>	<b>\$497.4</b> <sup>1/</sup>	<b>\$567.0</b> <sup>2/</sup>	<b>\$648.0</b>	<b>\$81.0</b>
Laboratory Programs	463.2	518.0	572.7	54.7
Corporate Services	18.8	18.5	18.5	0.0
Stds Coord. and Spec. Prgs.	15.4	30.5	56.8	26.3
<b>ITS</b>	<b>\$182.8</b> <sup>1/</sup>	<b>\$128.4</b>	<b>\$149.0</b>	<b>\$20.6</b>
Advanced Manu. Tech. Consort.		0.0	21.0	21.0
Technology Innovation Prg.	44.8	0.0	0.0	0.0
Baldrige Perf. Excellence Prg.	9.6	0.0	0.0	0.0
Hollings Manuf. Ext. Prg.	128.4	128.4	128.0	(0.4)
<b>CRF</b>	<b>\$69.9</b>	<b>\$55.4</b>	<b>\$60.0</b>	<b>\$4.6</b>
Const. & Major Renovations	12.0	13.9	11.8	(2.1)
Saf. Cap., Maint., Maj. Repairs	57.9	41.5	48.2	6.7
<b>Total, NIST Discretionary</b>	<b>750.1</b>	<b>750.8</b>	<b>857.0</b>	<b>106.2</b>
<b>Mandatory</b>	<b>\$0.0</b>	<b>\$0.0</b>	<b>\$1,300.0</b>	<b>\$1,300.0</b>
Wireless Innovation Fund	0.0	0.0	300.0	300.0
National Network for Manufacturing Innovation	<u>0.0</u>	<u>0.0</u>	<u>1,000.0</u>	<u>1,000.0</u>
<b>Total NIST</b>	<b>\$750.1</b>	<b>\$750.8</b>	<b>\$2,157.0</b>	<b>\$1,406.2</b>

<sup>1/</sup> Adjusted transfer of Baldrige Perf. Excellence Prg. From STRS to ITS after the approval of NIST reorganization in FY 2010.

<sup>2/</sup> Includes \$10M for Cybersecurity Center of Excellence and \$16.5M for National Strategy for Trusted Identities in Cyberspace.

# NIST FY2013 Scientific and Technical Research Services Program Increases

## 1. Advanced Manufacturing Activities (+\$45M)

- Metrology Infrastructure and Standards to Support Biomanufacturing (+\$10M)
- Measurement Science and Standards to Support Nanomanufacturing (+\$10M)
- Advanced Materials for Industry (Materials Genome Initiative) (+\$10M)
- Measurement Science and Standards to Support Smart Manufacturing (+\$10M)
- NIST Manufacturing Fellowships Program (+\$5M)

## 2. NIST Centers of Excellence (+\$20M)

## 3. Challenges in Advanced Communications ,Forensic Science,, and Disaster Resilience (+\$20M)

- Secure, Scalable, and Interoperable Advanced Communications (+\$10M)
- Measurement Science and Standards in Support of Forensics Science (+\$5M)
- Disaster Resilience and Natural Hazards Risk Reduction (+\$5M)

## 4. National Strategy for Trusted Identities in Cyberspace (NSTIC) (+\$8M)

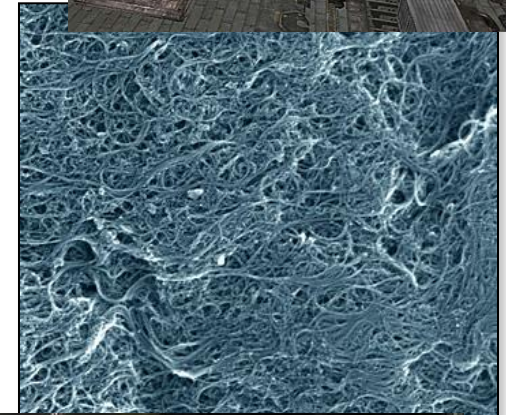


Photo by Viadar, NIST

Credit: J. Burrus/NIST



# NIST and Manufacturing : Building Prosperity through Innovation (+\$45.0M STRS, +\$21.0M ITS)

This set of initiatives will catalyze innovations, develop measurements, and provide technical resources to promote the global competitiveness of U.S. manufacturers and aspiring start-ups.

America's future prosperity depends on our nation's innovation performance

- U.S. manufacturing is worth about \$1.6 T (11% of the GDP)
- High-value-add manufacturing provides the best strategy for maximized return on investment
- China leads U.S. in high-technology exports and the percentage of its value added manufacturing is increasing



NIST will provide focused research efforts targeting advanced manufacturing and enhance public-private partnerships to strengthen U.S. manufacturing capabilities

- Nanomanufacturing, Biomanufacturing, Smart Manufacturing, Advanced Materials, and Manufacturing Fellowships \$135M (+\$45M)
- Building the Advanced Manufacturing Technology (AMTech) Consortia \$21M
- Continue to support the Manufacturing Extension Partnership \$128M



Courtesy: Univ. of Toledo

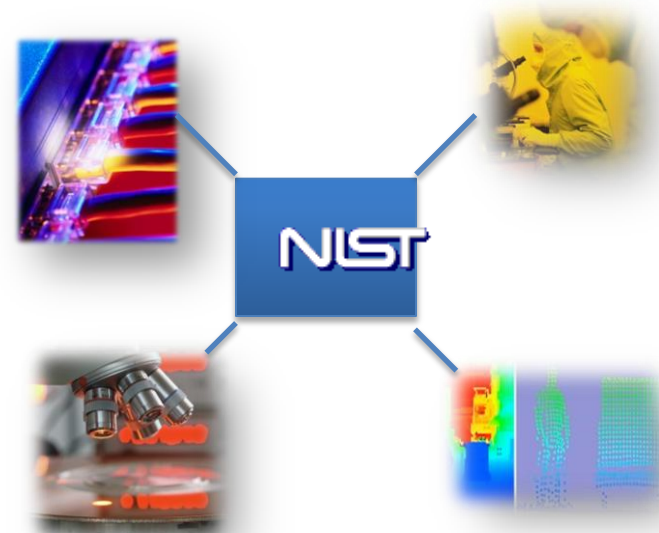
# NIST Centers of Excellence (+\$20.0M)

This initiative will accelerate innovation through enhanced knowledge transfer and strengthening of regional innovation clusters which will increase the long-term competitiveness of industries throughout the United States.

- NIST's ability to impact innovation and competitiveness in the rapidly changing environment will be greatly enhanced by regional presences in innovation clusters.
- Co-locating measurement science capabilities in hubs of innovation will help accelerate tech development.

## NIST will

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



Credit: NIST

# Measurement Science to Support Advanced Communications Networks (+\$10.0M)

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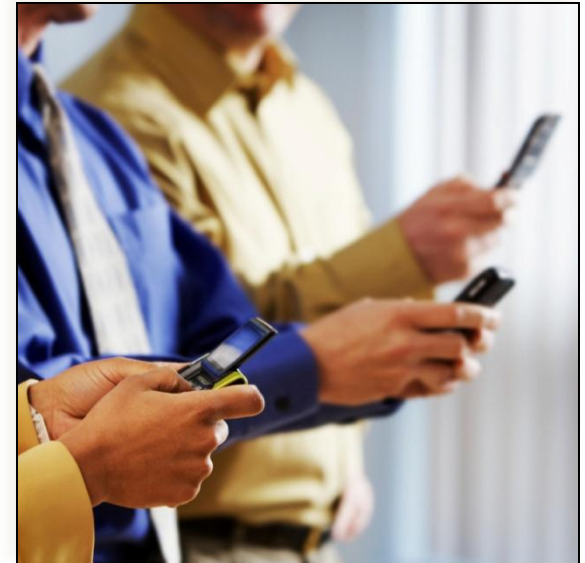
**This initiative will enable reliable, efficient, and secure mobile broadband networks for the future.**

Broadband wired and wireless communications networks are a major component of the Nation's economic infrastructure, critical to future growth areas such as:

- Medicine (Health IT)
- Automated Infrastructure (Smart Grid)
- Information Technology (Cloud Computing)

**NIST will:**

- Support the development of the next generation of broadband – both wired and wireless
- Develop modeling tools to analyze and predict the behavior of these advanced networks
- Produce the measurement science to support the development of future communication devices and test equipment
- Support the next generation public safety broadband demonstration project



# Forensics (+\$5.0M)

This initiative will enhance scientific validity of forensic evidence and investigation impacting crime laboratories and criminal courts across the United States.

Public trust in the justice system relies on the validity and certainty of evidence submitted. That evidence is increasingly gathered and analyzed with innovative forensic technologies. NIST is perfectly positioned to develop strengthened measurement methods and build the public trust in these technologies.

NIST will:

- Develop measurement tools to enable reliable and accurate forensic practice
- Strengthen measurement methodologies for existing forensic methods
- Create training opportunities and facilitate engagement with the standards development community



Credit: NIST



# Measurements to Support Disaster Resilience and Natural Hazard Risk Reduction (+\$5.0M)

This initiative will provide critically needed metrics, tools, and standards to increase the resilience of our Nation's buildings and communities to damage from earthquake, windstorms, and wildfire.

U.S. communities can, and do, suffer catastrophic losses due to hurricanes, tornadoes, wildfires, and flooding.

- In 2011 alone, natural disasters in the United States accounted for \$27 billion in economic losses
- Critically needed metrics, tools, and standards do not exist to enable communities to recover rapidly from these disasters with minimal loss of life, damage, and business disruption

NIST will accelerate the development and adoption of standards and codes for resilience via:

- A national resilience framework and associated model resilience standards and policies, as well as a private sector-led, government-funded National Model Resilience Standards Panel (NMRSP)
- Addressing R&D gaps in the measurement science tools needed for ensuring disaster resilience of structures under extreme weather events



Joplin, MO tornado

Source: Reuters



Amarillo, TX wildfire

Credit: Joe Gamm Photography

# National Strategy for Trusted Identities in Cyberspace (+\$8.0M)

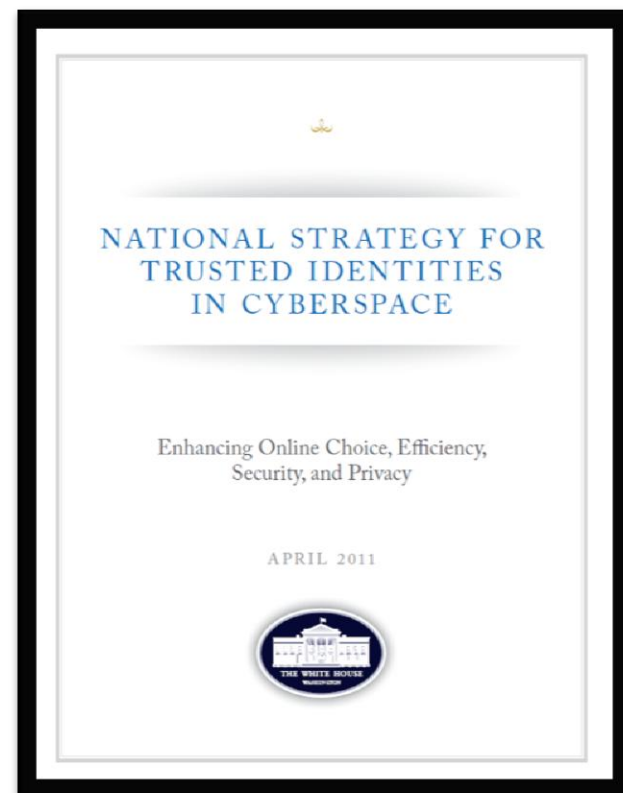
This initiative will support the President's *National Strategy for Trusted Identities in Cyberspace* by funding pilots to incentivize the private sector and state and local governments to lead delivery of NSTIC solutions and collaborate across sectors.

The lack of secure, trusted identities online is an increasingly exploited cybersecurity threat which also hinders growth and innovation in the Internet economy.

- NSTIC is a direct Presidential response to these challenges – focused on catalyzing a voluntary industry driven Identity Ecosystem to raise levels of online trust.

## NIST will

- Fund additional pilot programs that demonstrate innovative frameworks to provide a foundation for the Identity Ecosystem
- Expeditiously tackle barriers that have impeded strong identity solutions in the past



# Advanced Manufacturing Technology Consortia (AMTech) (+\$21.0M)

This initiative will support R&D in advanced manufacturing and strengthen long term U.S. leadership in critical technologies leading to sustainable economic growth and job creation.

U.S. R&D intensity lags behind competing nations

- Manufacturing drives innovation
- Addresses a critical early stage funding gap
- PCAST highlighted the need for the AMTech model of consortia-driven precompetitive R&D in their 2011 Report on Manufacturing

AMTech Supported Consortia will:

- Support basic and applied research on long-term precompetitive technology development
- Convene stakeholders from across the innovation lifecycle to create the Infrastructure necessary for more efficient technology transfer



# Wireless Innovation (WIN) Fund (+\$300.0M in mandatory funding)

This program (a component of the Public Safety Trust Fund ) will address critical barriers to innovation, increase efficiency of domestic innovation, and accelerate delivery of new products and services for public safety communication technologies.

Public Safety Communication critical to U.S.

- 4 million first responders impacted by an end-to-end interoperable wireless network
- Unique public safety requirements and considerations – cover 95% of U.S. population, minimum 90% system availability, etc.
- Enable data and video flows augmenting voice communication

NIST will work with industry and public safety organizations to:

- Conduct research and develop new technologies and applications to advance public safety communications
- Create 700 MHz Public Safety Broadband Demonstration Network
- Coordinate standards development and conformance testing
  - identify and incorporate public-safety requirements into national and international standards



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# NIST FY 2013 Construction of Research Facilities Requests (\$60.0M)

These funds will enable renovation of research facilities to strengthen NIST's core facilities to secure U.S. leadership in measurement science.

## Boulder Building 1 Renovation (+\$11.8 M)

- Multi-year project initiated in FY 2010
- Allows the continuation of the phased renovation of the Building 1 wings
- Specifically awards the Wing 6 interior renovation contract
- Improves safety of existing facilities

## Safety, Capacity, Maintenance and Major Repairs (SCMMR) (\$48.2M)

- Continue the repair and upgrade of facilities that have a high impact on staff and visitor safety
- Continue abatement of hazardous materials from site buildings and structures
- Enable or maintain building environmental conditions required for meeting scientific requirements



Credit: NIST



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# **Additional Program Descriptions**

# Measurement Science and Standards to Support Nanomanufacturing (+\$10.0M)

This initiative will overcome a number of barriers to the high volume manufacture of transformative materials and products based on nanotechnology for a spectrum of applications – including batteries, coatings, medicines, and more.

Barriers remain for full commercial exploitation of nanotechnology

- Lack of manufacturing and characterization tools result in significant delay and high cost of product development
- Lack of measurements to characterize the environmental, health, and safety risks of engineered nanomaterials

NIST will

- Develop technologies to measure the properties and performance of nanomaterial based systems
- Characterize manufactured nanomaterials to enable accurate assessment of health and environmental risks
- Develop innovative, rapid measurement methods to ensure product quality during high-speed processing of nanocomposite systems



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# Metrology Infrastructure and Standards to Support Biomanufacturing (+\$10.0M)

This initiative will reduce manufacturing costs and improve the quality of biologic products (e.g. pharmaceuticals) and promote innovation in the regulatory environment.

Biotechnology medicines are critical for the U.S. healthcare system

- Biotech drugs are the fastest growing category of health care spending (~20%/yr)
- Manufacturing processes are not optimized (~\$15B/yr wasted on inefficiencies)
- Regulatory challenge in determining performance of similar products without repeated costly clinical trials

NIST will develop measurement science, process monitoring tools, and standards for biomanufacturing

- Improved real-time monitoring and control of biomanufacturing lines to reduce waste in production
- Better tools to determine safety and efficacy of biopharmaceuticals including characterization of 3-D protein structure and glycosylation



Courtesy: Univ. of Toledo

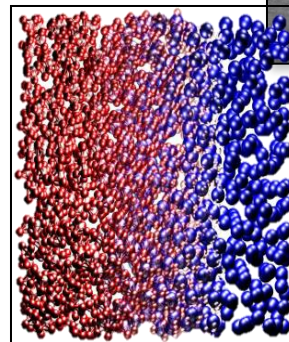
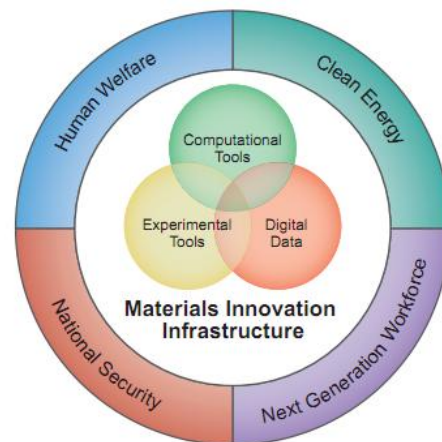




# Advanced Materials For Industry (+\$10.0M)

This initiative will enable and accelerate the creation and manufacture of innovative, advanced materials via the integration of modeling and simulation, experimental tools, and digital data/informatics.

- In the same way that silicon in the 70s led to the modern IT era, advanced materials could fuel multibillion dollar industries in energy, national security, and human welfare.
- This effort will provide critical links needed to realize the vision of the recently launched *Materials Genome Initiative (MGI)*, aimed at accelerating industrial innovation by significantly reducing the timeline from discovery to commercial deployment for new materials.
- NIST will support the MGI and enable advanced materials by developing:
  - Computational and validated databases, data assessment tools, and standards
  - Modeling and simulation tools
  - Mechanisms for exchange of information



**Atomistic simulations of materials used in automotive light-weighting**

# Smart Manufacturing (+\$10.0M)

This initiative will provide U.S. manufacturers with foundations for optimizing production and quality.

Smart Manufacturing refers to production systems at the equipment, factory, and enterprise levels that integrate cyber and physical systems to enable innovative production, products, and systems of products. This requires infrastructural advances to enable:

- smart operations systems to monitor, control, and optimize performance
- systems engineering-based open architectures and standards, and
- embedded and/or distributed sensing, computing, communications, actuation, and control technologies

## NIST will:

- Develop measurements and standards for a **quality measurement system** focusing on automated in-process quality monitoring and control
- Develop a testbed which integrates a systems architecture framework and an open standards platform for **facilitating the simultaneous engineering of the computational (cyber) and physical elements of manufacturing systems**



# NIST Manufacturing Fellowships Program (+\$5.0M)

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**This initiative will provide opportunities for engineers and scientists to work with NIST staff on manufacturing measurement and standards.**

Manufacturing competitiveness requires cutting edge tools based on a firm grounding on measurement science and standards. This program will help manufactures gain access to people with training in measurement science, providing them a competitive edge as they develop innovative new tools.

## NIST will:

- Create opportunities to work jointly with NIST on measurements and standards needed to create cutting edge manufacturing tools
- Provide fellowships to those employed in industry and to recent recipients of degrees in relevant fields

