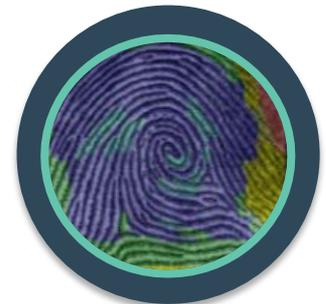
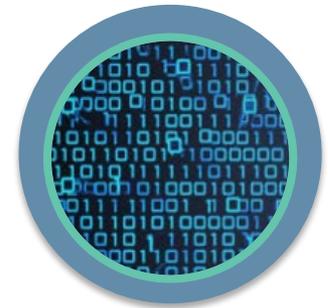

National Institute of Standards and Technology
-- FY 2016 Budget Overview --
Working with Industry to Accelerate Innovation

February 20, 2015
Webinar

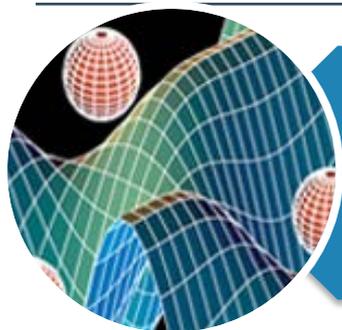


Advancing U.S. Innovation and Competitiveness

- Prioritizes resources towards core delivery of NIST measurement science and standards mission
 - Precision Measurement
 - Systems
 - Data
- Maintains support for top NIST and National priorities
 - Accelerate development of advanced manufacturing infrastructure
 - Support the digital economy through next-generation cybersecurity, privacy, and communications
 - Strengthen community disaster resilience
- Continues investments for needed facility renovations

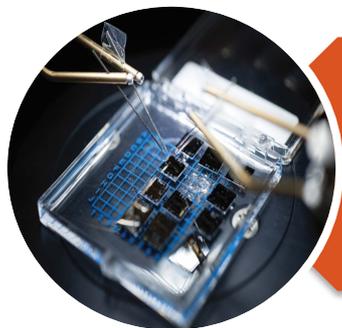


Priorities in NIST FY 2016 Budget Request



Scientific and Technical Research and Services \$754.7 M (+\$79.2 M)

Strengthens efforts in many areas of national importance



Industrial Technology Services \$306.0 M (+\$167.9 M)

Requests funds to establish NNMI and continues support for MEP and AMTech



Construction of Research Facilities \$59.0 M (+\$8.7 M)

Sustains funding for facilities and provides an increase for safety, capacity, maintenance, and major repair

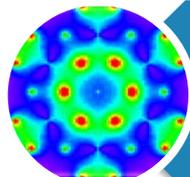
NIST FY 2016 Budget Request Compared to FY 2015 Enacted

(Dollars in millions)

	FY 2014 Enacted	FY 2015 Enacted	FY 2016 Request	+ / (-) Over FY 2015 Enacted
STRS	\$651.0	\$675.5	\$754.7	\$79.2
Laboratory Programs	578.0	591.3	661.6	70.3
Corporate Services	17.3	17.3	16.9	(0.4)
Stds Coord & Special Pgms	55.7	66.9	76.2	9.3
ITS	\$143.0	\$138.1	\$306.0	\$167.9
Advanced Mfg Tech Consortia	15.0	8.1	15.0	6.9
Hollings Mfg Ext Partnership	128.0	130.0	141.0	11.0
Nat'l Network for Mfg Innovation ^{1/}	0.0	0.0	150.0	150.0
CRF	\$56.0	\$50.3	\$59.0	\$8.7
Construc & Major Renovations	11.8	0.0	0.0	0.0
Saf, Cap, Maint & Maj Repairs	44.2	50.3	59.0	8.7
Total, NIST Discretionary	850.0	863.9	1,119.7	255.8

^{1/} National Network for Manufacturing Innovation is a newly proposed program in FY 2016.

STRS Initiative Summary (\$754.7 M, +\$79.2 M)



Ensuring a World-Class Neutron Facility
(+\$11.0 M)



Cryptographic Capabilities
(+\$7.0 M)



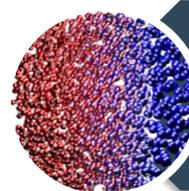
Quantum Based Sensors and Measurements
(+\$5.0 M)



Advanced Communications
(+\$9.0 M)



Advanced Sensing for Manufacturing
(+\$5.0 M)



Materials Genome Initiative
(+\$10.0 M)



Engineering Principles for Efficient Biomanufacturing
(+\$4.0 M)



Disaster Resilient Buildings and Infrastructure
(+\$10.0 M)



Smart Cities & Cyber Physical Systems
(+\$5.0 M)



Manufacturing Entrepreneurship
(+\$5.0 M)



Lab to Market
(+\$4.0 M)

Ensuring World Class Neutron Research (\$46.8 M, +\$11.0 M)

- Extend lifetime of neutron source facility to maintain reliable operations and availability to end users
 - Ensure availability of reactor fuel by supporting domestic fuel production
 - Upgrade main components of primary cooling system
 - Replace 46 tons of heavy water used to cool the reactor

Enhance U.S. competitiveness through a world class neutron research facility



Cryptography and Privacy (\$6.2 M, +\$7.0 M)

- Robust independent cryptographic capabilities
 - Expand cryptography team
 - Analyze quantum-resistant security technologies
 - Develop and disseminate standards, guidelines, and tests
- Privacy-enhancing technologies
 - Provide tools for privacy risk management
 - Ensure privacy guidelines reflect Fair Information Practices Principles

Strengthen U.S. cybersecurity through enhanced cryptography and privacy

\$262 B Value of U.S. 2013e-commerce transactions

\$445 B Annual global cost of cybercrime

800 M people with records compromised by 2013 data breaches

\$160 B Cost of the 2013 data breaches

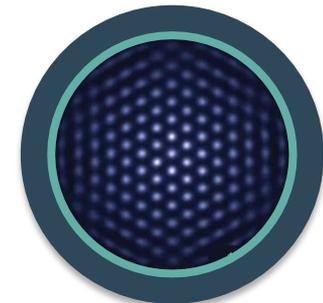
Quantum-Based Sensors and Measurement (\$21.6 M, + \$5.0 M)

- Widespread use of quantum science
 - Create capabilities needed for mass production of solid-state qubits
 - Develop roadmap for enabling business adoption of quantum science
- Next-generation quantum devices
 - Advance simulation capabilities of complex quantum systems
 - Improve commercial single-photon detectors by 10x

Ensure U.S. leadership in quantum info science

140% growth of quantum computing industry from 2017–2022

16 jobs created for every computer electronics manuf. job



Advanced Communications (\$12.8 M, +\$9.0 M)

- Spectrum efficiency
 - Develop measurement capabilities for high-performance components
- Spectrum sharing
 - Develop approaches to spectrum sensing and sharing
 - Enhance interference measurement and modeling capability
- Next-generation (5G) wireless communications
 - Build measurement infrastructure for millimeter-wave communications

Address the spectrum crunch

10 B number of mobile devices expected by 2018

\$4.5 T projected global economic impact of wireless enabled projects by 2020



© Geoffrey Wheeler

Advanced Sensing for Manufacturing (\$5.0 M, +\$5.0 M)

- New precision metrology for advanced manufacturing
 - Advance methods for defect detection in materials
- Methods for real-time automated inspection and assembly
 - Develop 3D, hi-fi laser imaging techniques
 - Enable in-process physical and chemical imaging
- In-place calibration to minimize downtime
 - Develop reference materials, data, and methods

Enable non-invasive sensing and real-time process analysis

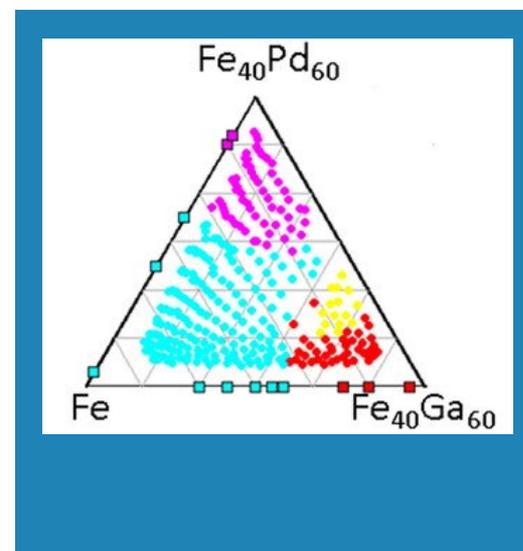
HIGH Rating of need for non-invasive sensing and measurement (2014 *PCAST* report)



Materials Genome Initiative (\$18.9 M, +\$10.0 M)

- Accelerate development of an advanced materials innovation infrastructure
 - Data assessment and validation
 - Data standards
 - Modeling and simulation
 - High-throughput techniques

**MGI vision:
discover and
deploy new
materials twice as
fast as today**



Biomanufacturing (\$15.0 M, +\$4.0 M)

- Biological system measurement infrastructure
 - Develop measurement methods to assess biomanufactured products
 - Convene community to identify needs
- Robust design and testing tools
 - Develop standards for DNA modification and synthesis
- Predictive models for biological systems
 - Advance theoretical models for biological response prediction

**Enable efficient
biomanufacturing
of essential
commodities**

\$1 T potential global market for biomanufacturing

Zarxio first “biosimilar” drug recommended for U.S. FDA approval, in January 2015

\$200 B expected 2015 sales from biomanufactured drugs

Disaster Resilient Buildings and Infrastructure

(\$10.4 M, +\$10.0 M)

- Develop new measurement science to collect and archive disaster field data
- Improve the design, construction and retrofit of built infrastructure under extreme wind and flooding
- Facilitate the construction and retrofit of earthquake-resilient infrastructure
- Develop national wildland-urban interface fire mitigation strategies

Promote cost-effective disaster resilience of manmade structures

\$57 B annual cost of US disasters

83 disaster declarations in 2014

100 M victims of natural disasters worldwide in 2013

54% increase in victims of natural disasters by 2015

Smart Cities and Cyber Physical Systems (\$6.7 M, +\$5.0 M)

- Develop **measurement science principles** to enable predictive design and performance measurement of at-scale smart city systems
- Advance the technical basis for **consensus standards and interoperability**
- Provide smart city **test beds** for experimental research and science-based design
- **Convene** stakeholders to identify needed IT capabilities

Build the measurement science foundation for smart city technologies

\$408 B predicted smart city global market size by 2020

25-40% U.S. GDP increase due to cyber physical systems by 2030

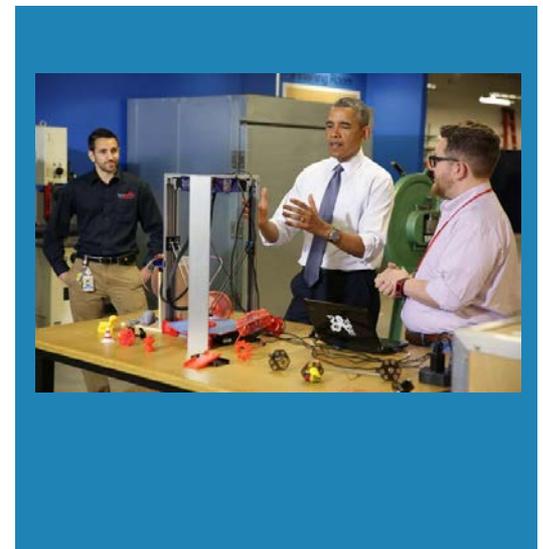
2.5 B people added to urban populations by 2050

15% Cities worldwide pursuing smart city opportunities

Manufacturing Entrepreneurship (+\$5.0 M)

- Promote the growth of manufacturing entrepreneurs by providing infrastructure for knowledge transfer and collaboration
 - Develop information and knowledge libraries
 - Engage with entrepreneurs through MEP
 - Enable collaboration between entrepreneurs and government agencies

Strengthening the small-batch industrial revolution



Lab to Market (\$6.0 M, +\$4.0 M)

- **Interactive digital platforms**
 - Enable stakeholders to build complementary technology packages from multiple agency portfolios to address national priorities
- **Access to government technology data**
 - Integrate government data with other databases to enhance connections between technology solutions and the marketplace

Promote data sharing efforts to accelerate technology transfer

\$130 B – Annual Federal R&D investment

100,000 – Federally-funded patents

700 – Federal R&D facilities that can be used by innovators

ITS Summary (\$306.0 M, +\$167.9 M)



- National Network for Manufacturing Innovation
- +\$150.0 M



- Hollings Manufacturing Extension Partnership
- +\$11.0 M



- Advanced Manufacturing Technology Consortia
- +\$6.9 M

National Network for Manufacturing Innovation (+\$150.0 M)

Revitalize American Manufacturing and Innovation Act of 2014
authorizes NIST to create NNMI

- Establish and manage the NNMI network
 - Establish a National Program Office
 - Work with existing institutes to establish a framework for network management and operations
- Conduct open competitions for 2 additional DOC-funded institutes
 - Public Private Partnerships on topics proposed by industry

**Transform
innovative
technology into
manufacturing
capability**



NNMI Hill Day September 18, 2014

Manufacturing Extension Partnership (\$131.3 M, +\$11 M)

- Support ongoing recompetition of national MEP centers to enhance local flexibility and increase accountability
- Provide MEP centers with greater capability to serve very small, rural, and young companies
- Reinvigorate efforts to deploy federally funded technologies through MEP centers' engagement

Provide U.S. manufacturers the tools they need to compete

12 M Americans employed in manufacturing jobs

12.5% manufacturing's contribution to the GDP

60 MEP centers nationwide

1,200 MEP technical experts solving manufacturers' challenges

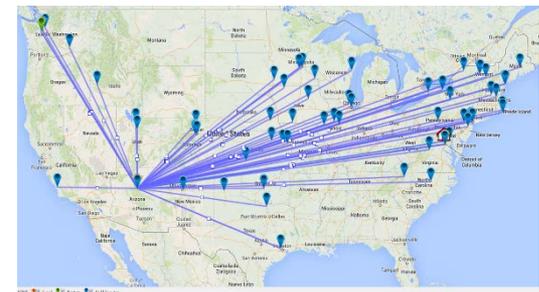
30,056 clients served by MEP centers in FY 2014

Advanced Manufacturing Technology Consortia (\$8.1 M +\$6.9 M)

- Support industry-led consortia to develop roadmaps for technologies addressing technical barriers to advanced manufacturing
- AMTech program incentivizes industry to share resources towards common challenges
 - First set of awards are on track, consortia formed, workshops held and roadmaps underway
 - Second competition is currently in process, with new awards in Q2 of CY 2015

Strengthen U.S. leadership in critical technologies

19 AMTech awards were announced in March 2014



SMART Wind Consortium, an AMTech award recipient

Construction of Research Facilities (\$59.0 M, +\$8.7 M)

- Fund next phase of planned multiyear critical renovations and restore CRF funding
 - Address deterioration
 - Reduce backlog
 - Provide flexibility to fund the most critical facilities

Ensure facilities for mission-critical operations

Planned Renovation Projects:

Boulder Building 3 (B3R)

Boulder Building 1 (B1R)



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Thank You
Questions ?

