NIST Update and Agenda Review

Visiting Committee on Advanced Technology
June 11, 2014
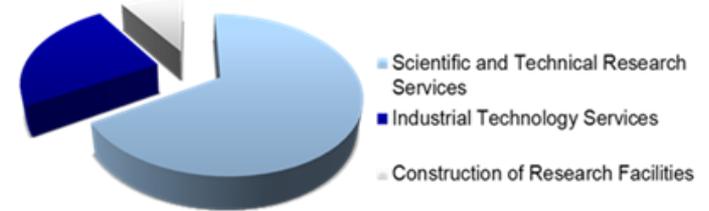
Dr. Willie E. May

Associate Director for Laboratory Programs and Deputy Director

NIST-at-a-Glance

Major Assets

- **~ 3,000 Employees**; 1800 Scientists and Engineers
- **~ 2,800 Associates** and Facilities Users
- ~ 400 NIST Staff on ~1,000 national and international standards committees
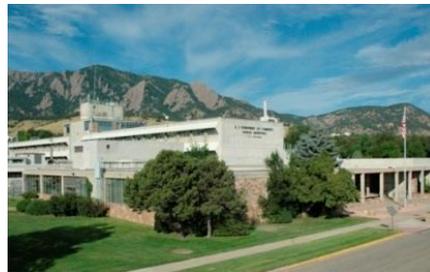
NIST FY 2014 Congressional Appropriations $850

- Scientific and Technical Research Services
- Industrial Technology Services
- Construction of Research Facilities

Plus
~ $120 M from other Government Agencies
~ $50 M for other reimbursable services

NIST has two main campuses   ......   and six joint institutes

Gaithersburg, MD
62 buildings; 578 acres

Boulder, CO
26 buildings; 208 acres

- **JILA –** *amo physics*
- **JQI –** *quantum science*
- **IBBR –** *adv. therapeutics*
- **HML –** *marine bioscience*
- **NCCoE –** *cybersecurity*
- **CHiMaD –** *"materials by design"*

+ two sites housing NIST radio stations:
- **Ft. Collins; 390 acres**
- **Kauai; US Navy 30 acre site**

Safety Incident: Chemical Exposure at Hollings Marine Lab

Event:

- Open vials of sample digests containing tetramethylammonium hydroxide (TMAH) or TMAH breakdown products created irritant fumes in an open lab

- 3 staff were exposed to the irritant fumes on May 13, 2014

- The event was not reported to MML Management or to OSHE until May 21

An incident investigation team (MML Lab Director, Division Chief, Deputy Division Chief, and Group Safety Representative) convened in Charleston the following day, May 22

Possible remote location issues

- Uncertainty on who to contact in the event of incidents

- Isolation from NIST Gaithersburg services

- IT connectivity problems are a barrier to use of NIST on-line safety-related resources.

NEXT STEPS: MML will perform a formal root cause analysis in consultation with an OSHE safety professional, and corrective actions will be taken to prevent the recurrence of this type of incident.

Welcome to New VCAT Member

Rodney Brooks

Founder, Chairman, and Chief Technology Officer of Rethink Robotics, Inc.

Credit: Rethink Robotics

- Founded Rethink Robotics in 2008
- Co-founded iRobot in 1990 and served as CTO, chairman, and board member until 2011
- From 1984 – 2010, served on MIT faculty becoming the Panasonic Professor of Robotics
  - Also founding Director of MIT's Computer Science and Artificial Intelligence Laboratory
- Member of the National Academy of Engineering
- Fellow of the American Academy of Arts and Sciences, the Association for the Advancement of Artificial Intelligence, the American Association for the Advancement of Science, and the Institute of Electrical and Electronics Engineers.

Budget Update

FY 2015 Request

- Request at $900M: $50M increase over FY2014 levels
- Increases in:
  - Forensics ($3.5M)
  - Cyber-Physical Systems ($7.5M)
  - Advanced Materials ($5M)
  - Synthetic Biotechnology ($7M)
  - Lab to Market transformations ($6M)
  - Manufacturing Extension Partnership ($13M)
  - NNMI Network Coordination ($5M)

FY 2015 Appropriations

- FY15 CJS Appropriations Bill passed House with NIST at $856M
- FY15 CJS Appropriations Bill cleared Senate Appropriations Committee with NIST at $900M

FY 2016 Request

- Planning has started

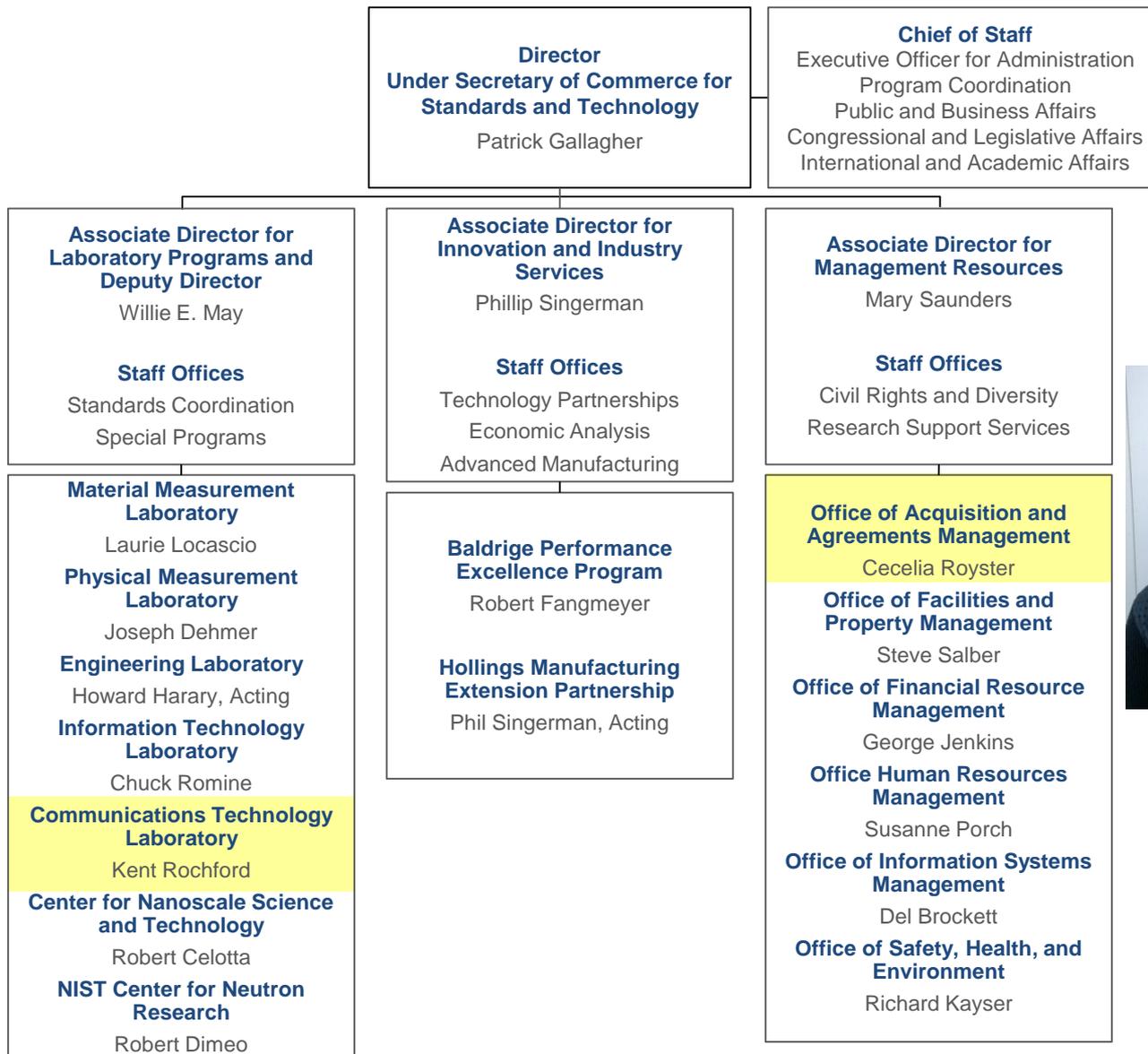# NIST FY 2014 Omnibus Appropriations Bill
(Dollars in millions)

	FY 2013 Enacted	FY 2014 Congressional Budget	FY 2015 President's Request
STRS	**$579.8**	**$651.0**	**$680.0**
Laboratory Programs	517.1	578.0	597.5
Corporate Services	17.3	17.3	17.3
Stds Coord. and Spec. Prgs.	45.4	55.7	65.2
ITS	**$133.6**	**$143.0**	**$161.0**
Advanced Manu. Tech. Consort.	10.6	15.0	15.0
Manu. Innovation Inst. Coord.	--	--	5.0
Hollings Manuf. Ext. Prg.	123.0	128.0	141.0
CRF	**$55.9**	**$56.0**	**$59.0**
Const. & Major Renovations	11.8	11.8	14.8
Saf. Cap., Maint., Maj. Repairs	44.1	48.2	44.2
Total Discretionary	**$769.3**	**$850.0**	**$900.0**
Total NIST	**$769.3**	**$850.0**	**$900.0**

NIST Organization Changes
New Leadership

**Director
Under Secretary of Commerce for Standards and Technology**

Patrick Gallagher

Chief of Staff
Executive Officer for Administration
Program Coordination
Public and Business Affairs
Congressional and Legislative Affairs
International and Academic Affairs

Associate Director for Laboratory Programs and Deputy Director

Willie E. May

Staff Offices
Standards Coordination
Special Programs

Material Measurement Laboratory
Laurie Locascio
Physical Measurement Laboratory
Joseph Dehmer
Engineering Laboratory
Howard Harary, Acting
Information Technology Laboratory
Chuck Romine
Communications Technology Laboratory
Kent Rochford
Center for Nanoscale Science and Technology
Robert Celotta
NIST Center for Neutron Research
Robert Dimeo

Associate Director for Innovation and Industry Services

Phillip Singerman

Staff Offices
Technology Partnerships
Economic Analysis
Advanced Manufacturing

Baldrige Performance Excellence Program
Robert Fangmeyer

Hollings Manufacturing Extension Partnership
Phil Singerman, Acting

Associate Director for Management Resources

Mary Saunders

Staff Offices
Civil Rights and Diversity
Research Support Services

Office of Acquisition and Agreements Management
Cecelia Royster
Office of Facilities and Property Management
Steve Salber
Office of Financial Resource Management
George Jenkins
Office Human Resources Management
Susanne Porch
Office of Information Systems Management
Del Brockett
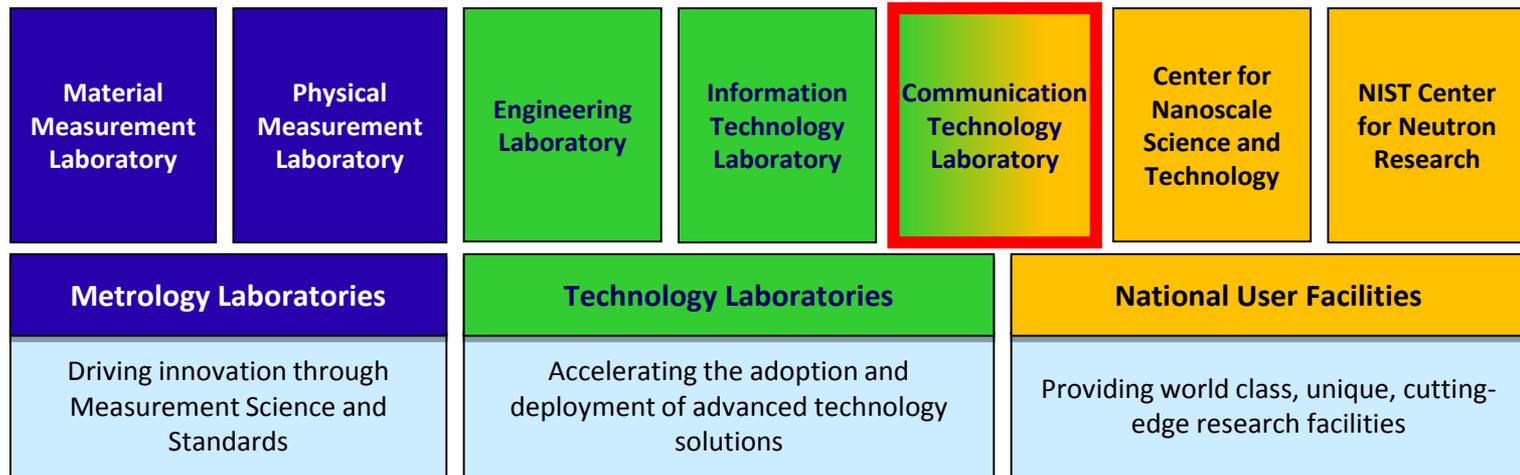**Office of Safety, Health, and Environment**
Richard Kayser

Kent Rochford
Director
CTL

Cecelia Royster
Director
OAAM

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New Communications Technology Laboratory Established

Functional Statement: The CTL promotes the development and deployment of advanced communications technologies through the conduct of leading edge R&D on both the metrology and understanding of physical phenomena, materials capabilities, complex systems relevant to advanced communications; and through the conduct of research targeted at supporting a multi-level testbed facility, including the development of precision instrumentation, validated test-protocols, models, and simulation tools necessary to support the testing and validation of new communications technologies

Material Measurement Laboratory	Physical Measurement Laboratory	Engineering Laboratory	Information Technology Laboratory	Communication Technology Laboratory	Center for Nanoscale Science and Technology	NIST Center for Neutron Research
Metrology Laboratories		**Technology Laboratories**			**National User Facilities**	
Driving innovation through Measurement Science and Standards		Accelerating the adoption and deployment of advanced technology solutions			Providing world class, unique, cutting-edge research facilities	

Initial Focus Areas:

- **Public Safety Communications Research (PSCR)** – The NIST PSCR staff was the first NIST program to be moved into the CTL. Near-term, CTL will increase PSCR technical staff and enhance public safety LTE laboratory infrastructure

- **Spectrum Sharing** – CTL, through the National Advanced Spectrum and Communications Test Network, will create a trusted capability to facilitate spectrum sharing studies; optimize access to engineering capabilities; and engage spectrum users in collaboration.

New Office of Acquisition and Agreements Management (OAAM)

Functional Statement: The OAAM oversees the full range of acquisition and financial assistance activities relating to the programs and operations of NIST, as well as client bureaus serviced by NIST, including contracts, grants, cooperative agreements, and other fellowships, in accordance with Department policies and Federal procurement regulations. The Director of the OAAM serves as NIST's Bureau Procurement Official and works with the NIST operational units to ensure implementation of innovative business models, processes and practices related to acquisition and agreements management across NIST.

Management Resources
Civil Rights and Diversity
Research Support Services

Office of Acquisitions and Agreements Management	Office of Safety, Health and Environment	Office of Financial Resource Management	Office of Human Resources Management	Office of Information Systems Management	Office of Facilities and Property Management

- Acquisition Management Division
- Grants Management Division
- Reimbursable Agreements Coordination Office (RACO)
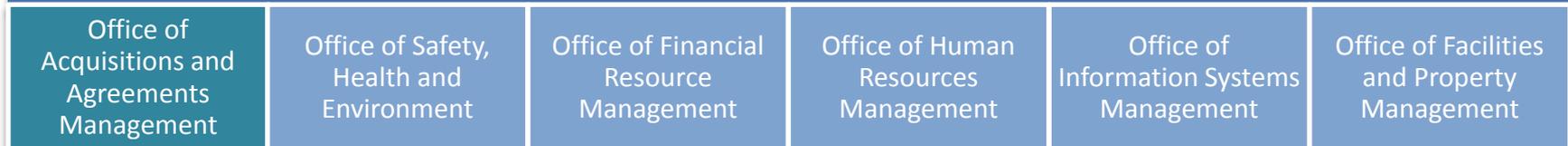
Initial Focus Areas:

- Ensure that NIST can buy or fund those activities essential to our mission when it needs them, consistent with federal requirements and socio-economic goals, by applying all relevant flexibilities.
- Implement socioeconomic and process goals in the context of NIST mission goals.
- Promote ongoing OU and service office communication and collaboration to reach a shared understanding of NIST priorities.
- Consider NIST mission and socioeconomic goals in a strategic context, rather than on a transaction by transaction basis.

NIST Organization Changes
Thank you for your service

George Arnold

Director of Standards Coordination Office is retiring after 33 years in the telecommunications and IT industry and **8 years in Federal Service at NIST**

Gordon Gillerman will serve as SCO Acting Director

Joe Dehmer

Director of Physical Measurement Laboratory is retiring after more than 40 years of Federal Service and **three years at NIST** (two years as leader of Optical Sensor Group and one as PML Director)

Jim Olthoff will serve as PML Acting Director

VCAT Organization Changes
Thank you for your service

Gail Ehrlich

VCAT Executive Director is retiring after 39 years of Federal Service, **38 at NIST, and 9 as VCAT Executive Director**
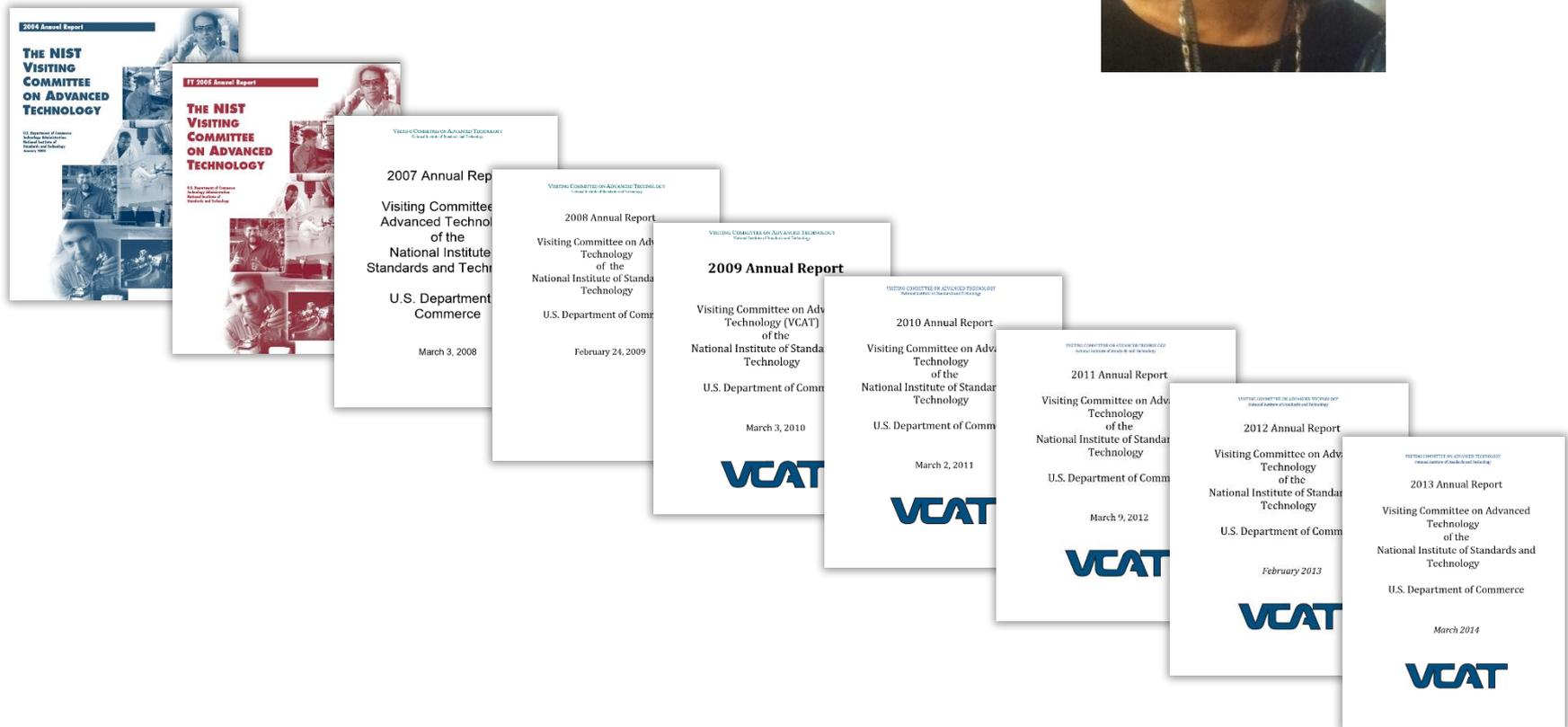
On June 5, 2014, Secretary Pritzker announced that NIST had 4 of DoC's 6 Presidential Rank Award Finalists
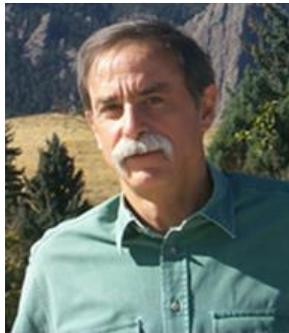
Dear Commerce Team:

It is my honor to congratulate the Department of Commerce's 2013 Presidential Rank Award finalists. The Presidential Rank Award is the most prestigious award given to senior executives and senior professionals. Please join me in recognizing these outstanding individuals for their extraordinary accomplishments and service in the Department of Commerce and elsewhere in government. Their achievements, hard work, and dedication distinguish them as inspiring examples of professionalism in government.

DISTINGUISHED FINALISTS
Dr. Deborah S. Jin
Mr. David M. Kennedy
Dr. David J. Wineland

MERITORIOUS FINALISTS
Mr. George W. Arnold
Dr. Robert J. Celotta
Dr. Richard A. Feely

Sincerely,

Penny Pritzker
U.S. Secretary of Commerce

New Atomic Clock

- New atomic clock, called NIST-F2, launched to serve as U.S. civilian time and frequency standard

- Will neither gain nor lose one second in 300 million years, three times more accurate than previous US clock (NIST-F1), and most accurate in the world.

- Based on cesium fountain technology, like NIST-F1, but is about three times as accurate

- First performance data reported to the International Bureau of Weights and Measures (BIPM)

- Based on a decade of research

Lasers cool and push atoms into a ball
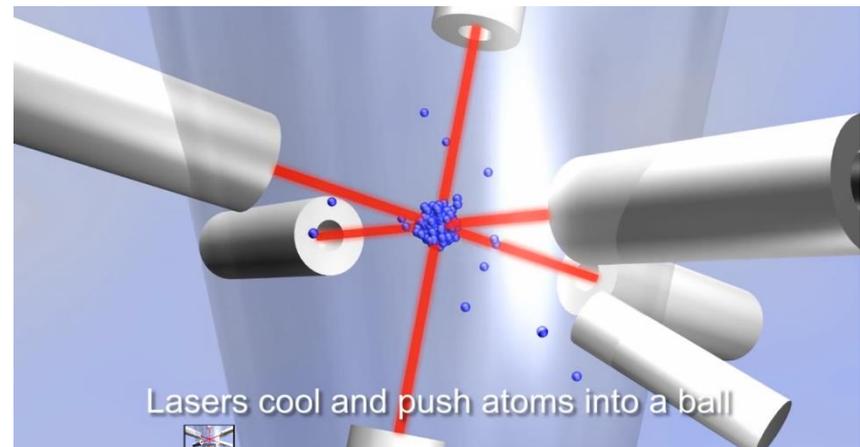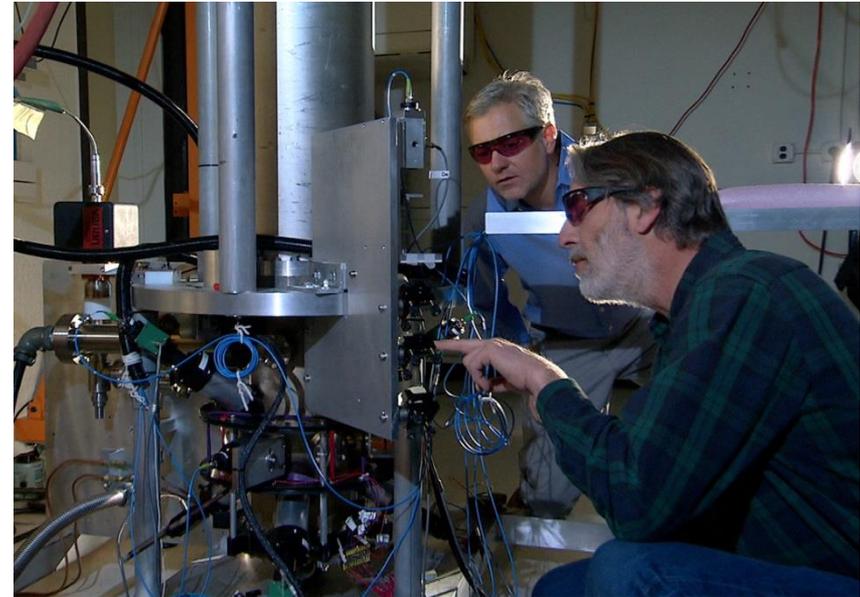
First Direct Evidence of Cosmic Inflation

- U.S. cosmologists using the BICEP2 telescope at the South Pole announced in March the first direct evidence of the rapid inflation of the universe after the Big Bang

- The BICEP2 camera relies on the extraordinary signal amplification made possible by NIST's technology

  - NIST Boulder researchers generated custom superconducting circuits that amplify signals generated by detectors measuring the cosmic microwave background

  - The 16 NIST circuits contain a total of more than 2,000 superconducting quantum interference devices (SQUIDs).

  - NIST invented a method for wiring hundreds of SQUID signal amplifiers together to make large arrays of superconducting detectors practical

  - The cryogenic NIST circuits assemble the signals into a sequential time stream that can be read by conventional room-temperature electronics.
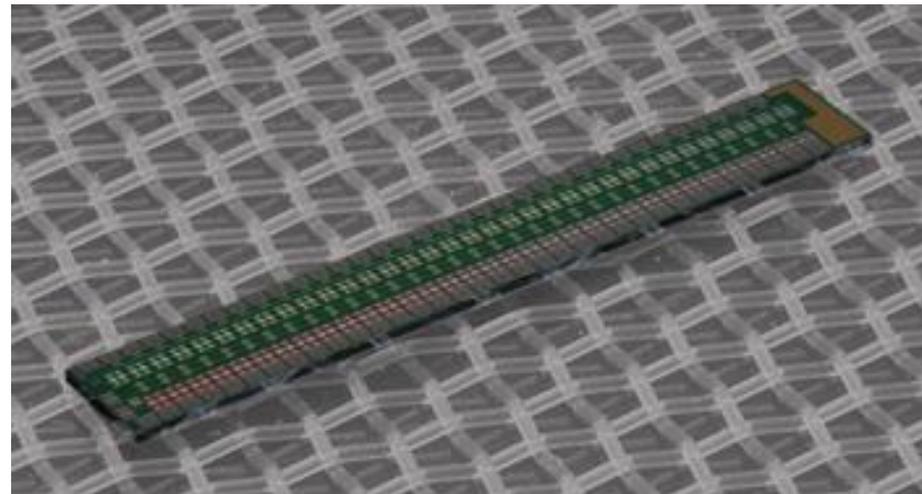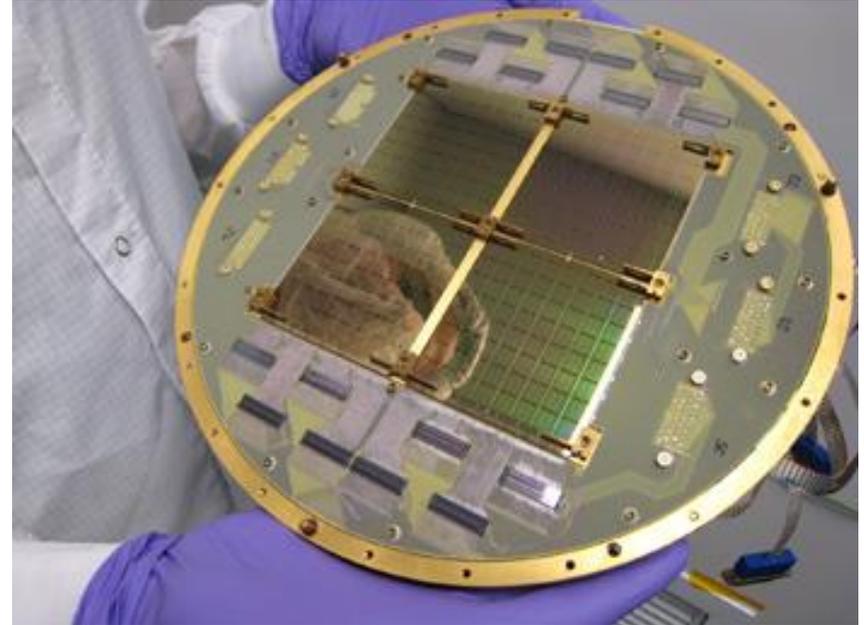
Program Update: Centers of Excellence (COEs)

- NIST Centers of Excellence program objectives:
  - Assist NIST in meeting its mission needs in new or expanding areas of strategic focus, and provide opportunities for NIST to engage with experts.
  - Enable NIST to better leverage existing areas of research expertise.
  - Accelerate innovation through earlier alignment of measurement science in new areas of research and technology.
  - Foster the development of expertise in measurement science for students and early-career scientists and engineers.
  - Expand NIST's strategic foot print
- FY2013 appropriations supported first NIST COE on advanced materials. On May 8, inaugural meeting between CHiMAD and NIST leadership and technical experts

Credit: CHiMaD

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Program Update: Centers of Excellence

- NIST FY2014 appropriations include $8M for the COE program. We will establish new Centers of Excellence in:

  - **Forensic Science**

    o developing probabilistic methods to support the forensic science disciplines, focusing Pattern Evidence and Digital Evidence

    o would also develop training tools for practitioners and non-practitioners

  - **Disaster Resilience**

    o developing integrated, systems-based community infrastructure resilience computational models

    o would also develop a data management infrastructure, tools and best practices to improve disaster and resilience data collection

Credit: NIST

Jace Anderson/FEMA
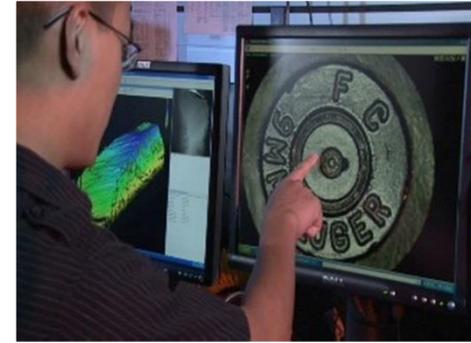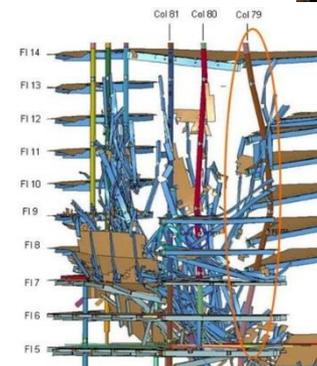
Program Update: National Cybersecurity Center of Excellence (NCCoE)

- In February 2014, NIST, the state, and county signed a Partnership Intermediary Agreement
  - Enable further collaboration
  - Expanded programs
  - Identifies a facility to serve as the permanent home of the NCCoE.
  - The County Executive and Governor have requested $4.5M in each of their respective budgets to support the renovation and leasing of the facility.

- NCCoE will be a Federally Funded Research and Development Center – the first in DOC. The official Request for Proposals was published April 2, 2014

- On March 27, 2014, the center hosted a Framework kickoff event for state and local government CISOs in collaboration with the White House National Security Council, Department of Homeland Security, National Governor's Association, and National Association of State Chief Information Officers.

Credit: Kauffman/NIST

Cybersecurity Framework Implementation Progress

- Released first version of the *Framework for Improving Critical Infrastructure Cybersecurity* on Feb 12, 2014

- Published companion *Roadmap for Improving Critical Infrastructure Cybersecurity*, outlining NIST's next steps
  - Evolution of the Cybersecurity Framework
  - Strengthening Private Sector Involvement in Future Governance of the Framework
  - Areas for Development, Alignment, and Collaboration

- Privacy Engineering Workshop held April 9-10, 2014

- Continuing outreach to stakeholders to increase Framework adoption

Advanced Manufacturing Partnership 2.0

AMP Mission: *Encourage approaches that sustain and grow U.S. leadership in advanced manufacturing*

19 Senior Leaders
industry, academia & labor

Steering Committee Co-Chairs
Rafael Reif   Andrew Liveris

Massachusetts Institute of Technology   Dow

CATERPILLAR®   APPLIED MATERIALS.

ALCOA   GLOBALFOUNDRIES

South Central College
A MINNESOTA COMMUNITY AND TECHNICAL COLLEGE   Honeywell

MACARTHUR
CORPORATION   Harper College

NORTHROP GRUMMAN   UNITED STEELWORKERS
USW
MÉTALLOS

MICHIGAN

Overland storage   GEORGIA TECH   Berkeley
UNIVERSITY OF CALIFORNIA

SIEMENS   Rensselaer   The University of Akron

AMP Coordinating Group
DOW, MIT, WH, AMNPO

Five Working Teams
- Transformative manufacturing technologies
- Demand-driven workforce solutions
- Supporting implementation of NNMI
- Manufacturing policy
- Manufacturing image

Each Working Team has one Draft Letter Report out for agency comment, except Manufacturing Technologies, which ID 3 Manufacturing Technology Areas:
- Advanced Sensing and Measurement, Process Control and Optimization, Platforms and Shared Infrastructure for Manufacturing
- Visualization, Information, and Digital Manufacturing
- Advanced Materials Manufacturing
  – Advanced Structural Composites Manufacturing
  – Biomanufacturing

AMP 2.0 National Meeting held June 9, 2014 Detroit, MI (part of "Big M" event)

Program Update: Advanced Manufacturing Technology Consortia Program (AMTech)

Inaugural competition for AMTech planning grants announced July 24, 2013

- Received 82 applications seeking a total of $37.4 million
- Announced funding of 19 AMTech awards on May 8, 2014, total of $9 million (for up to 2 years)
- Of the 19 consortia receiving grants, 11 are new

Examples of topics:

- Technologies for Advanced Manufacturing of Pulp and Paper Products
- Architecting an Institute for Flexible Electronics Manufacturing
- Consortium for Accelerated Innovation and Insertion of Advanced Composites
- Consortium for Electrochemical Processes and Technology
- Consortium for Additive Manufacturing Materials
- New York Photonics Manufacturing Initiative

The Start of a Network

Additive Manufacturing
DOD – Youngstown, OH

Power Electronics
DOE – Raleigh, NC

Digital Manufacturing
DOD – Chicago, IL

Lightweight Metals
DOD – Detroit, MI

Adv. Composites Mfg.
DOE – TBD

2014 Solicitation TBA

2014 Solicitation TBA

2014 Solicitation TBA

National Research Council (NRC) Laboratory Assessment

- Since 1959, the NRC has assessed **technical merit, relevance, and quality** of NIST's laboratory programs
- From FY 2007 – FY 2011, NRC assessed half of NIST laboratories each year
- In FY 2012, NRC assessed NIST-wide manufacturing-related programs
- In FY 2013, NRC returned to technical assessment of individual NIST laboratories.
    - FY2013: NIST Center for Neutron Research
    - FY2014: Material Measurement Laboratory and Engineering Laboratory
    - FY2015: Physical Measurement Laboratory and Information Technology Laboratory

- The assessments focus on:
    1. The quality of the organization's technical programs.
    2. The portfolio of scientific expertise within the organization.
    3. The adequacy of the organization's facilities, equipment, and human resources.
    4. The effectiveness by which the organization disseminates its program outputs.

- Orientation in mid-April, assessments in May and June in Gaithersburg and Boulder, Reports will be finalized in January

NIST Measurement Services Programmatic External Review

Purpose: *provide a high level review of the NIST measurement service programs (calibrations, SRMs, and SRD) evaluating the capabilities and performance of NIST compared to the general competencies of the world's national measurement institutes*

External Review:
- By a team of seven high-level, technical representatives from each of the world's five Regional Metrology Organizations
  - Led by Alan Steele, Chief Metrologist, NRC-Canada
  - Two days of program review late fall or early winter 2014

Background:
- *The Organic Act of 1901 and updated in 2008 requires that NIST conduct "Comparison of US national standards with those of other nations."*
- *The CIPM Mutual Recognition Arrangement (MRA) was established in 1999 in response to a growing need for an open, transparent and comprehensive scheme to give users reliable quantitative information on the comparability of national metrology services and to provide the technical basis for wider agreements negotiated for international trade, commerce and regulatory affairs. It requires:*
  - *Declaring and documenting calibration and measurement capabilities (CMCs)*
  - *Evidence of successful participation in formal, relevant international comparisons*
  - *Demonstration of system for assuring quality of each NMI's measurement services*

In that context, this review is expected to provide the following:
- Assessment of:
  - Technical capabilities of NIST in delivering Calibration, SRMs, and SRD measurement services
  - NIST Quality System

NIST Data Policy

Responding to Administration directives, NIST is developing the policies and tools to increase access to the results of our research

- Organizational management of NIST data will benefit research programs by ensuring data integrity and increasing visibility of NIST measurements, standards, technology, and data research activities

- Data Policy Group is drafting a common taxonomy and identifying steps for implementing and cultivating a data-aware culture at NIST

- New policies should be in effect October 1, 2014

OSTP "Public Access" Memo
Feb 22, 2013

OMB "Open Data" Memo
May 9, 2013

Notional Data Taxonomy

SRD

Reference Data

Resource Data

Published Results

Publishable Results

Derived Data

Working Data

VCAT Meeting Agenda

Session I: Overview

Session II: Hollings Manufacturing Extension Partnership (MEP) Program

    MEP Update
    Phil Singerman, NIST Associate Director for Innovation and Industry Services

    MEP Program Perspective
    Vickie Wessel, Vice Chair, MEP Advisory Board and Founder and President, Spirit Electronics, Inc.
    Jeffrey Wilcox, Member, MEP Advisory Board and Vice President for Engineering, Lockheed Martin Corporation
    Ed Wolbert, Member, MEP Advisory Board and President, Transco Products, Inc

Lunch

Session III: Disaster Resilience Capabilities and Authorities

    Context Setting
    Willie May
    Disaster Resilience Capabilities and Authorities
    Jason Averill, Acting Chief, Materials and Structural Systems Division, Engineering Laboratory

Session IV: Cybersecurity

    Subcommittee on Cybersecurity – Progress Report
    Roberto Padovani, Chair, VCAT Subcommittee on Cybersecurity

Session V: Public Comments

Session VI: Future Focus of the VCAT

    Priorities and Challenges for NIST and Focus of VCAT in the Next Year
    Willie May

    Wrap-Up
    Tony Haymet, VCAT Chair

Adjourn