NIST Update and Agenda Review

Visiting Committee on Advanced Technology
October 7, 2014

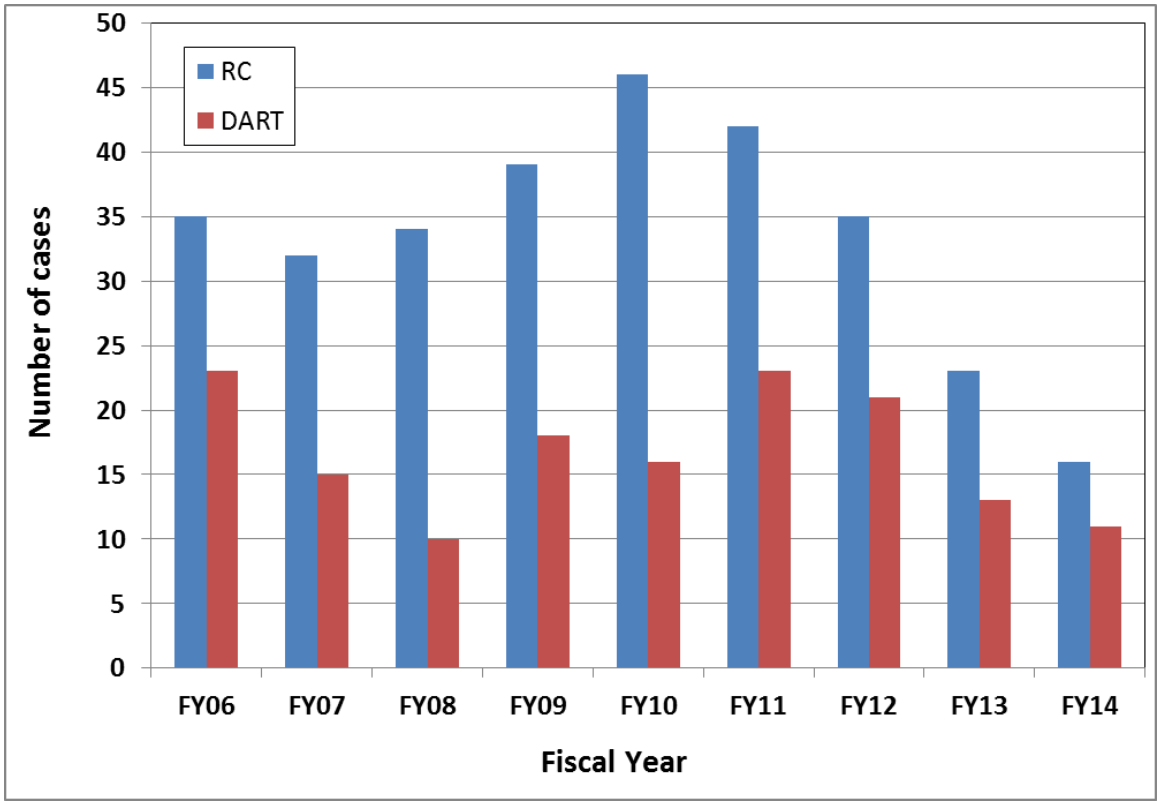
Dr. Willie E. May

Acting NIST Director

Acting Under Secretary of Commerce for Standards and Technology

Safety Update

Goal = Zero



Recordable case (RC)	DART case
• To a first approximation, an injury that required medical treatment beyond first aid	• An OSHA recordable that resulted in employee Days Away, Restricted duty, or job Transfer

NIST Update – Discussion Topics

- **NIST organizational update**
  - **Budget**
  - **Leadership**
- **Recognition of exceptional achievements by staff and our programs**
- **Programmatic updates**
- **Operational policy updates**

Budget Update

FY 2015 Request

- **President's Request: $900M, includes +$29M for the Labs, +$13 for MEP and +$5M for coordinating the NNMI**
  - House Mark: $856M
  - Senate Mark: $900M
- **US Government on Continuing Resolution through Dec. 11**

FY 2016 Request

- **DOC Request to OMB submitted in September**

FY 2017 Request

- **Planning has started**

My Priorities as Acting Director

Fill key leadership vacancies (e.g., Directors of PML, EL, MEP, and the Standards Coordination Office)

Work with the Senior Leadership Team in:

- Continuing to strengthen the NIST Safety Culture
- Completing the successful implementation of programs that NIST has initiated in response to pressing national needs
- Enhancing current and developing new capabilities needed to enhance mission delivery
- Improving the efficiency and effectiveness of our internal operations –
  - becoming an organization known and looked up to for our "Operational Excellence"
- Addressing long-term sustainability of the Baldrige Program
- Supporting the Secretary in the execution of the Department's Strategic Plan
  - personally leading/coordinating the Plan's Innovation Goal Activities

Priority: Filling Key Leadership Positions

Laboratory Director Positions Filled

- **Dr. Howard Harary, Engineering Laboratory**

- **Dr. James Olthoff, Physical Measurement Laboratory**

Will compete the positions for three other key leadership vacancies

- Associate Director for Laboratory Programs
- Director, Hollings Manufacturing Extension Partnership
- Director, Standards Coordination Office

Willie E. May Nominated …..

THE WHITE HOUSE

Office of the Press Secretary

FOR IMMEDIATE RELEASE

July 24, 2014

President Obama Announces More Key Administration Posts

WASHINGTON, DC – Today, President Barack Obama announced his intent to nominate the following individuals to key Administration posts:

- Tom Frieden – Representative of the United States on the Executive Board of the World Health Organization
- Perry L. Holloway – Ambassador to the Co-operative Republic of Guyana, Department of State
- **Willie E. May – Under Secretary for Standards and Technology, Department of Commerce (and Director of NIST)**
- Therese W. McMillan – Federal Transit Administrator, Department of Transportation
- Pamela Leora Spratlen – Ambassador to the Republic of Uzbekistan, Department of State

Dear NIST Team:

I am pleased to announce that yesterday President Obama nominated NIST's own Willie May to be the next Under Secretary of Commerce for Standards and Technology and Director of NIST. Dr. May has had a long and distinguished career at Commerce, beginning in 1971 at the National Bureau of Standards and rising to the top of NIST, most recently as the Associate Director for Laboratory Programs. NIST is fortunate to have a leader who has dedicated his career to helping make it the world class institution it is today.

I look forward to working with Dr. May to ensure that NIST continues to be a leading scientific and technical institution that addresses some of our Nation's most pressing challenges, including innovation, advanced manufacturing, and cybersecurity.

Please join me in congratulating Willie on this tremendous honor.

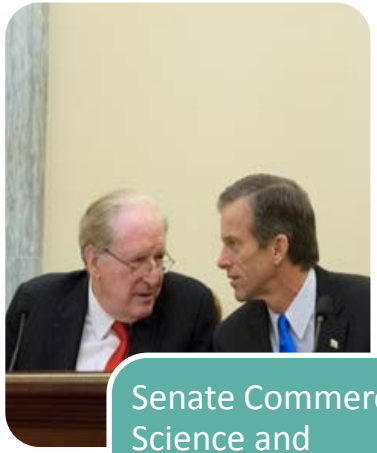
Sincerely,

Penny Pritzker
U.S. Secretary of Commerce

NIST Director Requires Senate Confirmation

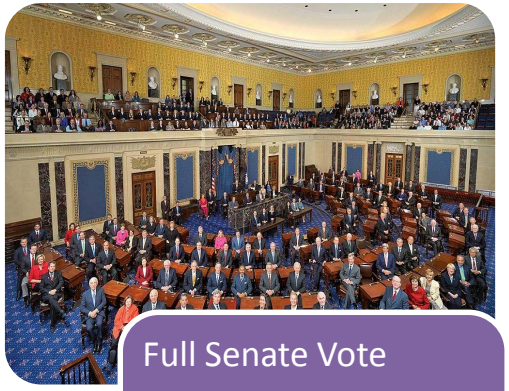
Presidential Nomination

- Nominated to be U/S for Standards and Technology on July 24, 2014



Senate Commerce, Science and Transportation Committee Deliberation

- Referred to Committee on July 28, 2014
- Hearing dates TBD



Full Senate Vote

- Following Committee outcome
- Date subject to Senate and Hill dynamics

NIST Reauthorization

Recent movement in both the House and the Senate to reauthorize NIST

- House bill: NIST Reauthorization Act of 2014. *Passed House in July.*
- Senate bill: America Creating Opportunities to Meaningfully Promote Excellence in Technology, Education, and Science (COMPETES) Reauthorization Act of 2014. *Referred to the Committee*

Credit: Architect of the Capitol

Notable components of the reauthorization bills:

- Authorizes NIST Director to serve as the President's principal advisor on standards (House and Senate)
- Lowers minimum cost share for MEP Centers to 50-50 (House and Senate)
- Lowers minimum VCAT membership to 11 (House) and 9 (Senate)
- Authorizes the National Institute for Standards and Technology Foundation (Senate)
- Removes requirement for NIST to work with National Security Agency in developing information systems standards (House)

Deborah Jin Awarded 2014 Isaac Newton Medal

- The Isaac Newton Medal is awarded annually for “outstanding contributions to physics”
- **The first woman to ever win this international award**, Jin was cited for:
  - "pioneering the field of quantum-degenerate Fermi gases“
  - her ground-breaking work on ultracold atomic gases

"Jin is an outstanding, clever, creative scientist … Her incredibly complex experiments have significantly advanced our understanding of the behaviour of electrons in materials."

Ed Hinds of Imperial College London

(who also works with ultracold atoms)

Deborah Jin in her lab at JILA in Boulder, CO. (Courtesy: JILA)

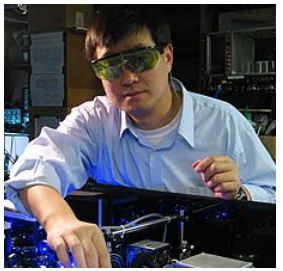
Three NIST Scientists among the "World's Most Influential Scientific Minds"

NIST and JILA (NIST/University of Colorado joint research institute)

- **Dr. Debbie Jin**
- **Dr. Jun Ye**

Dr. Jin and Dr. Ye perform research on new forms of ultracold matter, barely above absolute zero, including the world's first human-controlled chemical reactions, which could eventually lead to new designer materials that would not form in nature.

Dr. Ye also performs world leading research on atomic clocks and new types of lasers.



The NIST Center for Neutron Research (NCNR)

- **Dr. Jeffrey Lynn**

Dr. Lynn develops unique neutron instruments at the NCNR and uses them to learn about the fundamental properties of materials used in superconductors, magnetic storage devices, and many other applications.

The list of Influential Scientific Minds was compiled by Thomson Reuters who analyzed how many times papers written by scientists across the world were cited by other researchers from 2002-2012.

Congratulations

Laurie Locascio

Meritorious Service Award, American National Standards Institute

Her leadership skills, technical expertise, and diplomatic demeanor have made her an excellent representative of the US while leading nanotechnology-related standard-setting committees of the ISO

Terry Lynch

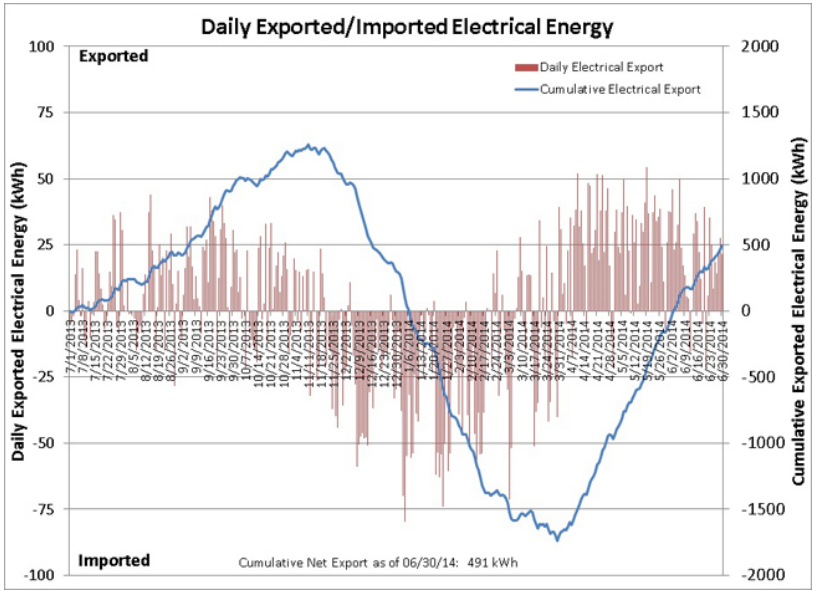
Harold Metcalf Award, Federal Laboratory Consortium for Technology Transfer

For sustained and significant service in technology transfer.

Net-Zero Energy Residential Test Facility Exceeds Goal

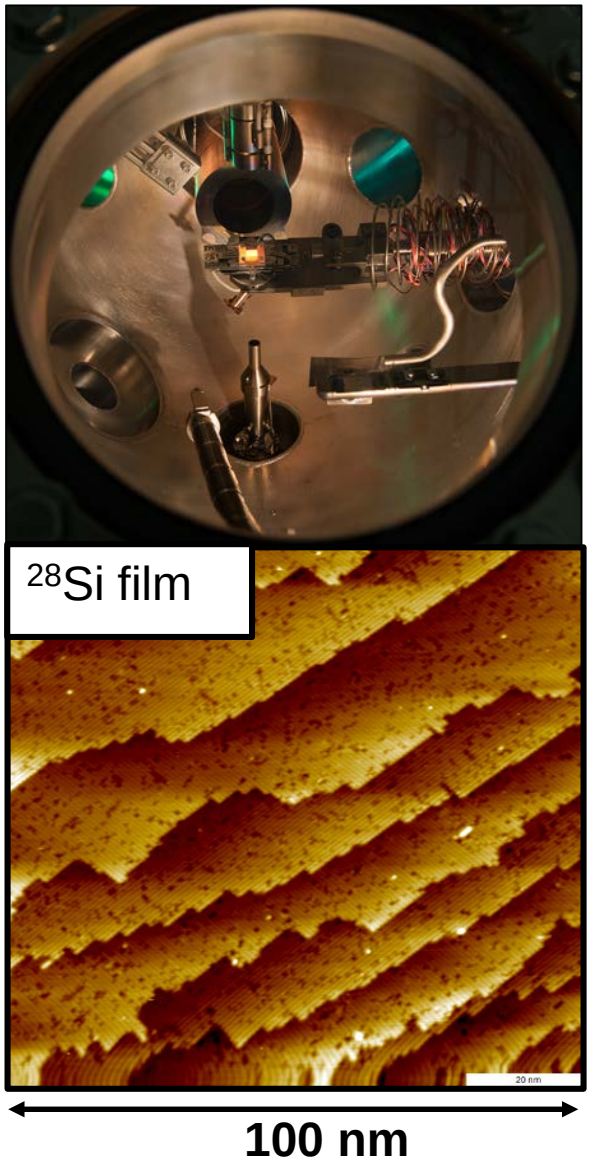
- The Net-Zero Energy Residential Test Facility ended its one year study period with:
  - Savings of over $4300/year or $364/month in electricity bills, by the home's virtual residents
  - Plus, a *net positive energy balance* of 491 kwh, enough energy to drive an electric car 1440 miles.

- Moving forward, this facility will be used to provide the scientific basis for tests and standards for building energy efficiency and environmental performance



NIST Researchers produce ultra-enriched Si^{28} (99.99996%)

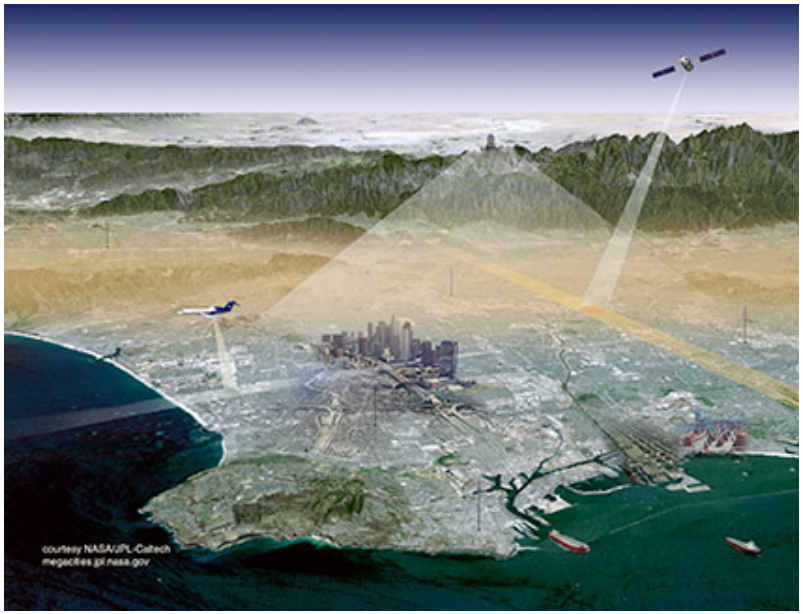
- Silicon-based quantum computing technologies require isotopically pure ^{28}Si in order to achieve the coherence times necessary to succeed.
- Nearly all existing ^{28}Si was manufactured in a repurposed plutonium enrichment plant in St. Petersburg, which is prohibitively expensive to commission for research endeavors
- PML researchers use common lab equipment in a mass spectrometric technique to enrich ^{28}Si to 99.99996% and deposit crystalline films (see STM image at right)
- As the electrical properties of the enriched ^{28}Si are refined, NIST will use this unique material to build and measure the fundamental qubit devices that will form a Si quantum computer



NIST Megacities Carbon Project named “Project to Watch”

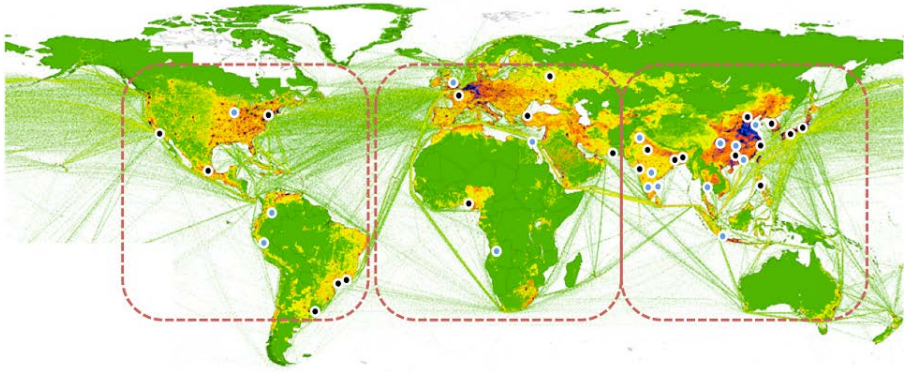
The Megacities Carbon Project was launched in 2012 to determine how to measure the greenhouse gases that cities produce.

- Includes support by NIST, NASA, NOAA, and the Keck Institute for Space Studies
- Has expanded to include DOE labs, universities, California Air Resources Board, and international partners
- Pilot started in Los Angeles, second observing system now in Paris, France and potential to expand to Sao Paulo, Brazil



Credit: NASA/JPL-Caltech

Sensor networks in the Megacities Carbon Project generate huge amounts of data. This data drew accolades in the Big Data Climate Challenge, hosted by U.N. Global Pulse and the U.N. Secretary General’s Climate Change Support Team.



Program Update: Hollings Manufacturing Extension Partnership

New MEP Strategic Plan

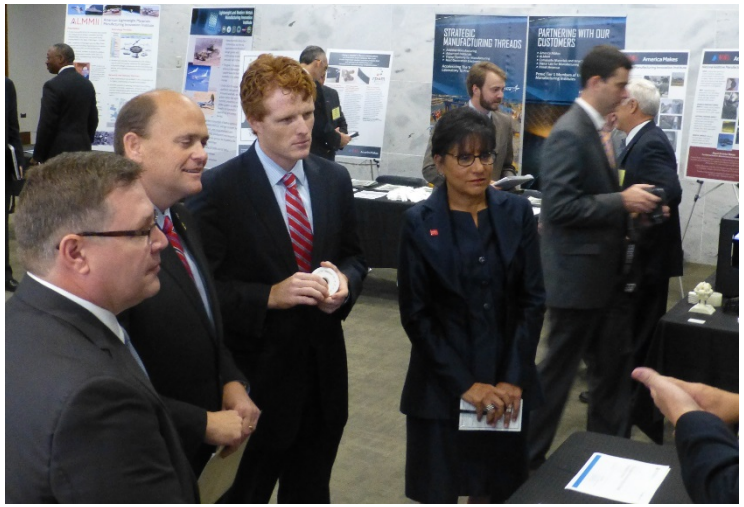
- Significant planning effort in FY14
- Several areas of focus include:
  - Technology Acceleration
  - Supply Chain
  - Manufacturing Ecosystems
  - Data as Intelligence

MEP System Competition

- Full recompetition of MEP system over three years
- First Federal Funding Opportunity – **Published August 1; Closes Oct 15**
- Round 1 includes 10 States ***(Colorado, Connecticut, Indiana, Michigan, New Hampshire, North Carolina, Oregon, Tennessee, Texas, and Virginia)***
- Selection of Proposed Awardees anticipated mid-December

Program Update: National Network for Manufacturing Innovation (NNMI)

- Five institutes have been established through executive action. At least two more are planned for the coming months
- Enabling legislation – the **Revitalizing American Manufacturing Innovation Act** – in process; authorizes NNMI at $300M
  - Passed House on September 16, 2014
  - Passed Senate sub-committee on August 26, 2014, has 16 sponsors
- National Network for Manufacturing Innovation Day on the Hill held September 18, 2014 – with almost 200 attendees



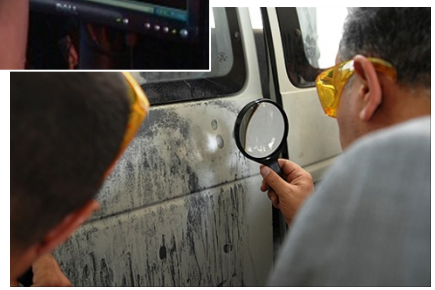
Photos from NNMI Day on the Hill

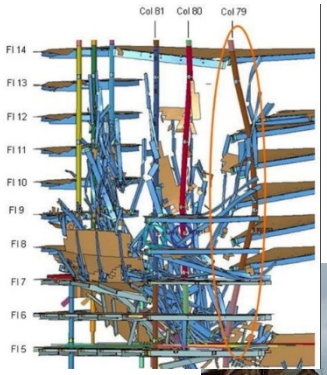
Program Update: NIST Centers of Excellence

NIST FY2014 appropriations include $8M to expand the Centers of Excellence program. We will establish new COEs in:

- **Disaster Resilience**
  - Develop integrated, systems-based computational models to assess community infrastructure resilience and guide community-level resilience investment decisions
  - Received strong response (closed Sept. 12, 2014)
  - Expect to make award in early 2015
- **Forensic Science**
  - Develop probabilistic methods to support the forensic science disciplines, focusing Pattern Evidence and Digital Evidence
  - Proposals due by December 13, 2014

Credit: NIST



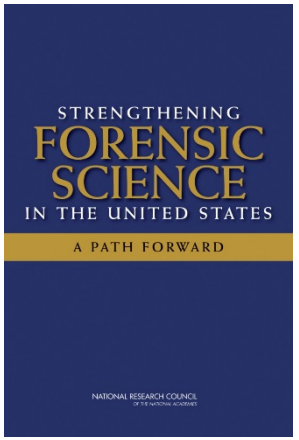


Jace Anderson/FEMA

Helping Strengthen the "Science" in Forensic Science

A landmark forensics report by U.S. National Research Council of the National Academies was issued in Feb. 2009.

> *"With the exception of nuclear DNA analysis, no forensic method has been rigorously shown to have the capacity to consistently, and with a high degree of certainty, demonstrate a connection between evidence and a specific individual or source."*



New Role for NIST:

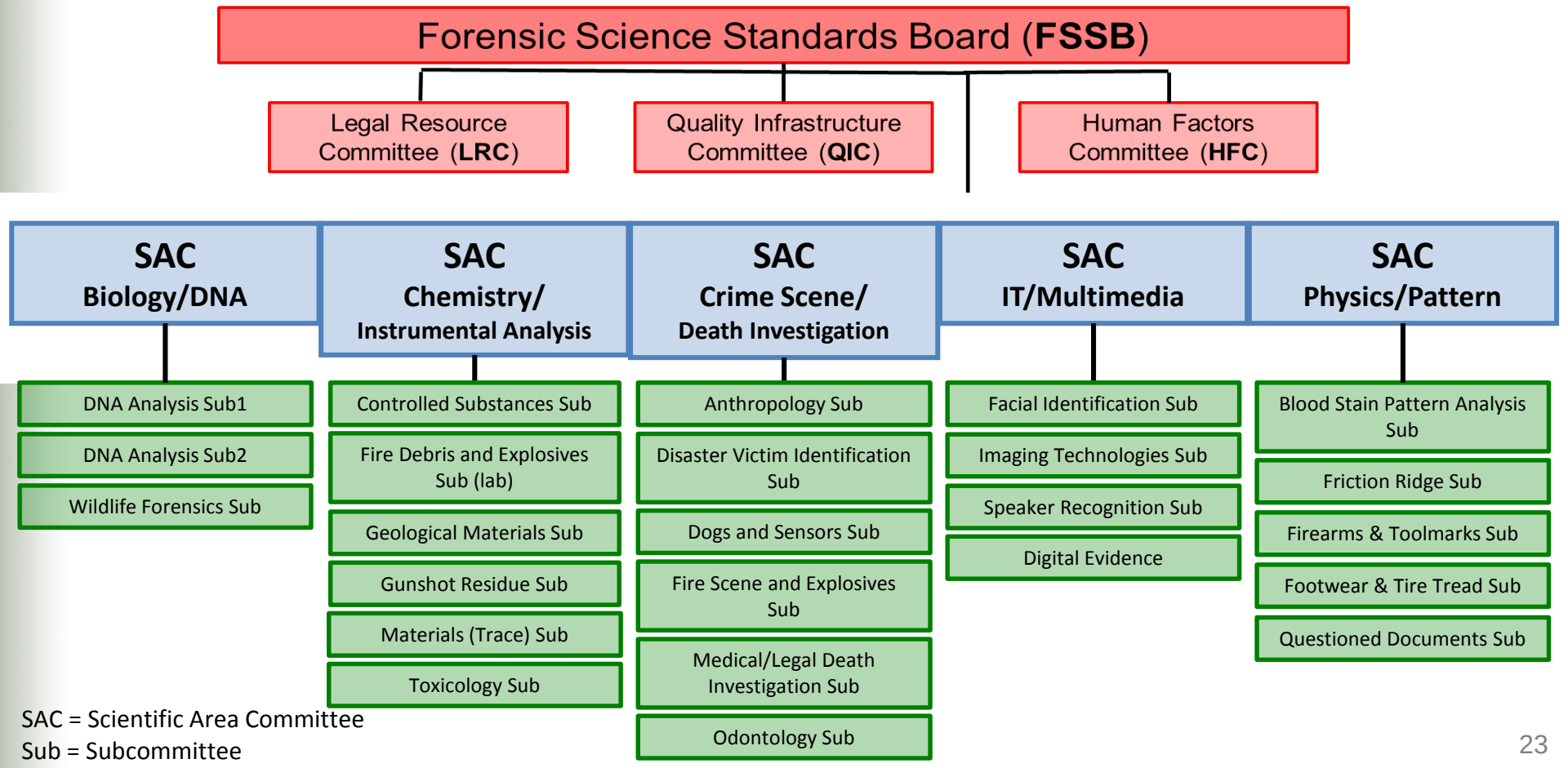
- With US DoJ, establish a National Commission on Forensic Science
  - to help improve the reliability of forensic science data/information and to develop policy recommendations for the U.S. Attorney General.
  - to be comprised of forensic science practitioners, academic researchers, prosecutors, defense attorneys, judges, and other relevant stakeholders

- **Administer Guidance Groups of subject-matter experts for specific forensic disciplines**

- Conduct Laboratory-based Research to:
  - Validate select existing forensic science methods and guidance
  - Develop and critically evaluate new methods

Program Update: Forensics and OSAC

- Under DOJ-NIST MOU, NIST is responsible for developing **the Organization of Scientific Committees (OSAC),** which is the **practice-focused organization of the National Commission on Forensic Science.**
- OSAC organizational structure consists of:



SAC = Scientific Area Committee
Sub = Subcommittee

Program Update: National Cybersecurity Center of Excellence (NCCoE)

- In February 2014, NIST, Maryland, and Montgomery County signed an Agreement to:
  - Enable further collaboration
  - Expand programs
  - Identify a facility to serve as NCCoE's permanent home
    The Montgomery County Executive and MD Governor have requested $4.5M in each of their respective budgets to support renovation and leasing of the facility.

Credit: Kauffman/NIST

- NCCoE will be a Federally Funded Research and Development Center – **the first FFRDC in DOC**.
- **Use cases/building blocks include:**

Health Sector:	IT Mobile Device
Energy Sector:	Identity and Access Management
	Situational Awareness
Financial Services:	Access Rights Management
	IT Asset Management
Building Blocks:	Trusted Geolocation in the Cloud
	Software Asset Management
	Attribute Based Access Control
	Mobile Device Access Control

NCCoE Partners include:

Akamai	HP
Intel	McAfee
redhat	Tripwire
CA technologies	Hytrust
Juniper Networks	Microsoft
Splunk	Vanguard
Cisco	I/DW
Lumeta	paloalto networks
Symantec	Venafi
	RSA

National Cybersecurity Center of Excellence (NCCoE)

- On Sept 23rd, NIST awarded FFRDC contract to MITRE, a not-for-profit company that operates multiple FFRDCs for DOD and FAA.
- MITRE has existing expertise in cybersecurity, as well as systems engineering and advanced technologies
- First task orders include:
  - Use Case Development and Implementation ($6M over 2 years)
  - Building Block Development and Demonstration ($5.5M over 2 years)
  - Operations Management and Facilities Planning Support ($17.6M over 5 years)

NCCoE
NATIONAL CYBERSECURITY CENTER OF EXCELLENCE

MITRE

Framework for Improving Critical Infrastructure Cybersecurity

Raising awareness, encouraging use, and gaining feedback about experiences with the framework

- Working with stakeholders, domestic and international, to encourage use of the framework and achieve critical mass
- Gathering information about use, challenges, and gaps to inform future iterations of framework
- Issued an RFI on August 26, 2014 for experience implementing the Framework

Advancing areas identified in the Cybersecurity Framework Roadmap

- Authentication
- Automated Indicator Sharing
- Conformity Assessment
- Cybersecurity Workforce
- Data Analytics
- Federal Agency Cybersecurity Alignment
- International Aspects, Impacts, and Alignment
- Supply Chain Risk Management
- Technical Privacy Standards

Cyber-Physical Systems Global City Teams Challenge

- Cities around the world are turning to advanced technologies to improve services, promote economic growth, and enhance the quality of life – to become ***Smart Cities***
- NIST is launching the Global City Teams Challenge to encourage collaboration and standards for interoperability in smart cities
- The Global City Teams Challenge:
  - Expands on the success of the NIST SmartAmerica Challenge
  - Facilitates partnerships among city planners and technology innovators
  - Gives participants the chance to contribute to the NIST Smart Cities Framework
  - Includes ARM, Cisco, Extreme Networks, GE, IBM, Intel, Juniper Networks, and Qualcomm
- **Kick-off Workshop – Sep 29-30**
- TechJam – Feb 2015
- Summit/Expos – Jun 2015

NIST Partnering with NFL in Head Health Challenge

In September, NIST signed a Memorandum of Understanding to cooperate with the National Football League, Under Armour, Inc., and General Electric Company

- Will launch a prize challenge focusing on research and technologies to develop advanced energy absorbing materials
- Will utilize NIST expertise in materials testing and assessment

Activity is highly aligned with the NIST efforts under the Administration's Materials Genome Initiative

NIST Science & Technology Entrepreneurship Program

This new program will accelerate the development and commercialization of new technologies and grow new business opportunities around the NIST campuses

As highly trained scientists and engineers, NIST postdoctoral researchers are an underutilized resource for spin-offs and development of new products

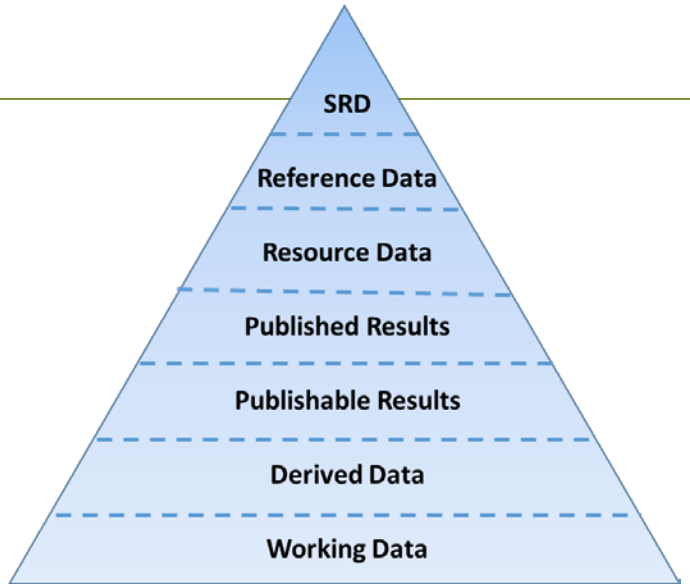
- **Research & Development Awards**
  - Competitive program for NIST post-docs completing their research program
  - Focus on directed R&D to ready a technology for commercial application

- **Entrepreneurial Training**
  - Program participants will take advantage of approved entrepreneurship training activities
  - Entrepreneurs-in-Residence will serve as valuable consultants

NIST Plan for Managing Public Access

NIST is initiating new activities in support of several recent White House directives on public access to federally funded data.

- These plans utilize a new taxonomy for describing NIST research data.
- Three phases:



1: Data Management Plans

- NIST laboratory directors are managing this implementation
- Plans describe what data is being generated, how it will be stored and accessed
- **DMP required for data generated starting October 1, 2014**

2: NIST Metadata Catalog

- Currently NIST is posting limited data sets to an inventory
- Q2 FY15: Pilot phase of enterprise data tool
- **Metadata will be required for applicable data generated starting October 1, 2015**

3: NIST Publications

- Publications will be publicly accessible (PubMed, GPO)
- **NIST-authored publications dated after October 1, 2015** must be deposited within 12 months of publication
- Similar policy applies starting October 1, 2016 for awardees from non-NIST organizations

Enhancing Mission Delivery – Use of Human Subjects in Research

Background

- Many unethical studies and atrocities in the late 20th Century led to the need to protect humans who were subjects of research.
- The current rules and regulations governing such research are captured in the "Common Rule" which applies to NIST and DOC
- NIST current interpretation and implementation of these regulations has led to significant delays for both internal and external work.

Process

- Program Coordination Office led a team from MR, Labs, and IIS to revise the current policy specifically addressing:
  - Lack of awareness of responsibilities
  - Unclear processes and procedures
  - Lack of full time staff to keep process running efficiently

Results

- Team has drafted a new policy and procedures (undergoing clearance) in line with best practices at other agencies and universities
- Working to recruit dedicated Human Subjects Protection Professionals to manage and run process

Enhancing Mission Delivery –
Improving the efficiency and effectiveness of our internal operations

- **Effective Mission Delivery** requires Operational Excellence in Key Functions:
  - Acquisitions
  - Agreements
  - Human Resources
  - Legal Services

- "**Task Forces"** have been established where each is to provide me and the ADs with input as to:
  - What success might look like in their area?
  - What is currently working well?
  - What is currently hindering success?
  - What should we be doing to fix these barriers?

Each Task Force will:
- Involve customers from across NIST and Management Resource process owners
- Challenge the status quo
- Recommend process improvement solutions
- Report back to me every 30 days with completion by first of 2015

VCAT Meeting Agenda

Session I: Overview and Safety

Session II: Cryptographic Review

NIST's Response to VCAT Recommendations, Anticipated Actions
Chuck Romine, Director, Information Technology Laboratory

Session III: Disaster Resilience Plan

Context Setting
Willie May
Overview of Disaster Resilience Plan Changes, Framework, and Community Resilience Center of Excellence
Jason Averill, Acting Division Chief, Materials and Structural Systems Division, Engineering Laboratory
Howard Harary, Director of Engineering Laboratory

Session IV: Healthy NIST: Recruiting, Training, and Retaining Scientific and Technical Talent

Context Setting
Willie May
Ensuring a Healthy NIST for the Future: The People Perspective
Susanne Porch, Director, Office of Human Resource Management

Session V: Advanced Communications

Context Setting
Willie May
NIST's Programmatic Approach to Advanced Communications
Kent Rochford, Director, Communications Technology Laboratory
NTIA's Programmatic Approach to Advanced Communications
Glenn Reynolds, Chief of Staff, National Telecommunications and Information Administration
Stakeholder Perspective
Sue Swenson, Chair, First Responder Network Authority Board of Directors
Tom Taylor, Department of Defense

Session VI: Close and Administrative Business