National Institute of Standards and Technology
U.S. Department of Commerce

NIST Update

Visiting Committee on Advanced Technology

Walter G. Copan
Under Secretary of Commerce for Standards and Technology,
and NIST Director

June 5, 2018

Meeting Agenda

June 5, 2018

Session I: NIST Update

Session II: NIST and Quantum Science

Session III: NIST and Artificial Intelligence

Session IV: Update and Overview of Renovation Projects

Session V: Update on Baldrige Performance Excellence Program

June 6, 2018

Session VI: Advanced Manufacturing across NIST

Welcome New Members

George Fischer

Senior Vice President and Group President

Verizon Enterprise Solutions

Jay Alexander

Senior Vice President and Chief Technology Officer

Keysight Technologies

Katharine Ku

Executive Director, Office of Technology Licensing

Stanford University

Dana “Keoki” Jackson

Chief Technology Officer

Lockheed Martin

NIST Safety and Security: Our People = Our Priority

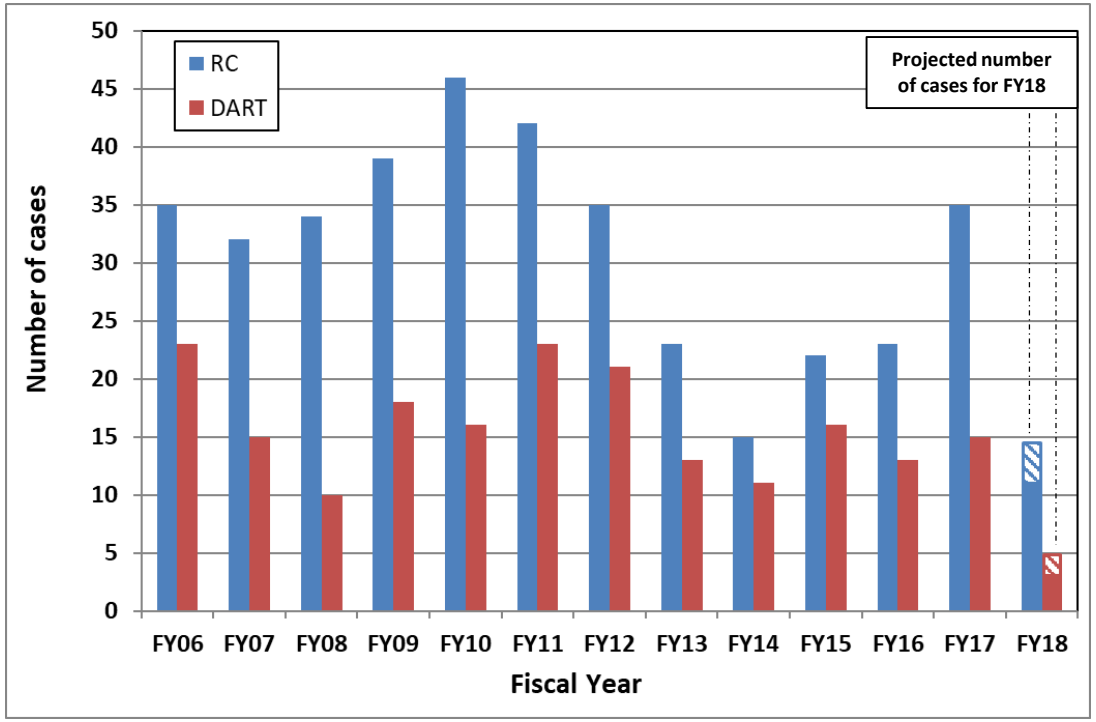
Everyone Home Safe, Every Day

Recordable case (RC)

- To a first approximation, a work-related injury or illness that results in any of the following: death, days away from work, restricted duty, transfer to another job, medical treatment beyond first aid, loss of consciousness.

DART case

- A work-related injury or illness that results in any of the following: **D**ays **A**way from work, **R**estricted duty, **T**ransfer to another job.



- **Data includes Federal Employees and Associates**
- **STS cases* excluded in data for FY15 (5), FY16 (8), FY17 (3), and FY18 (5)**

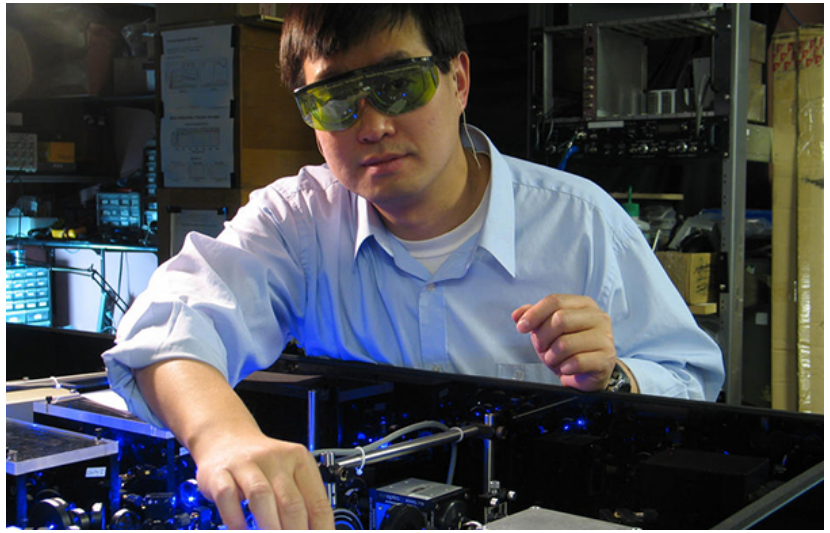
* STS cases are hearing loss incidents – standard threshold shift (STS)

Data shown to June 1, 2018

Our Goal = Zero

NIST 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



NIST AT A GLANCE

Industry's National Lab

3,400+
FEDERAL EMPLOYEES

5
NOBEL PRIZES

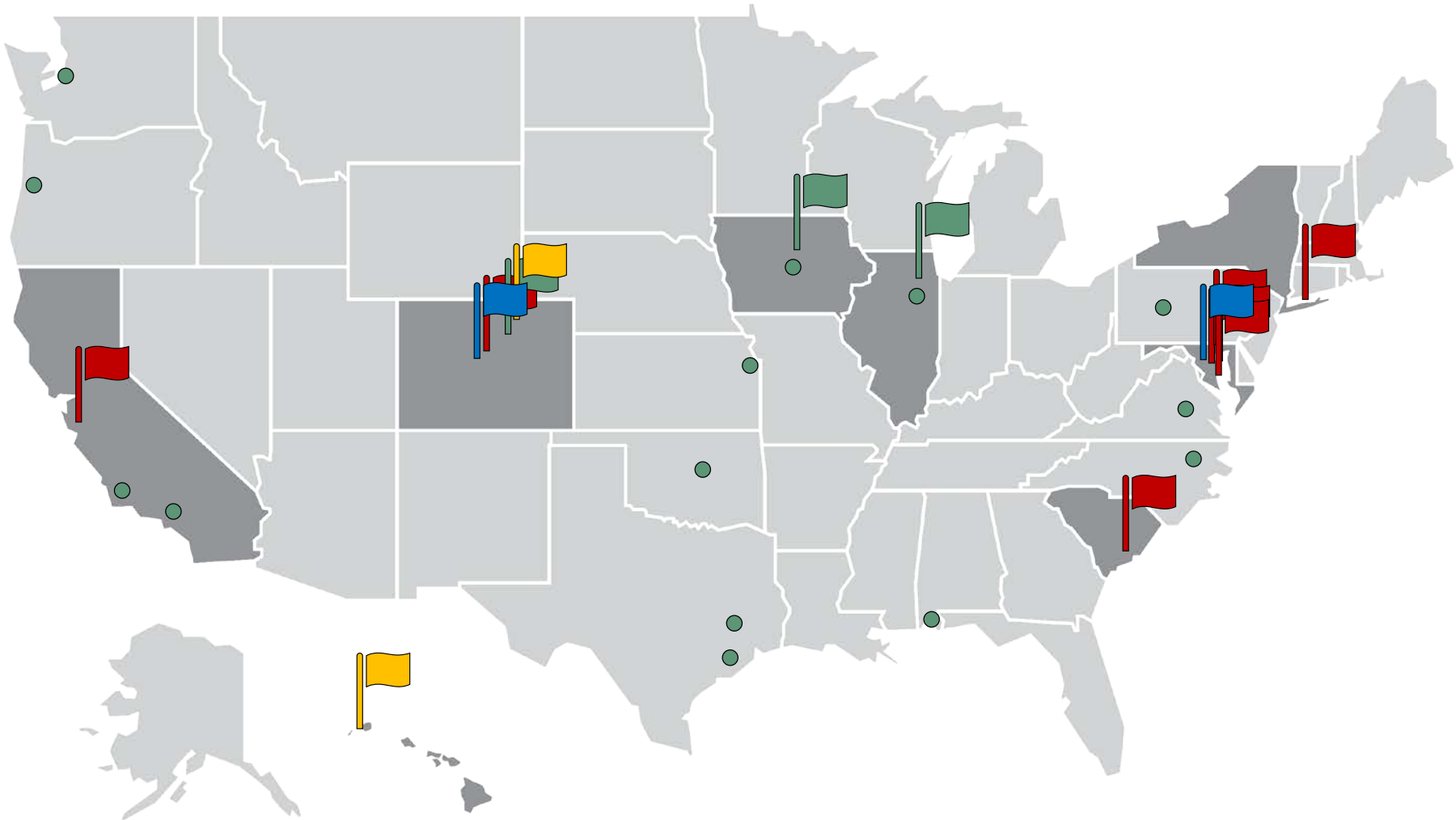
2 CAMPUSES
GAITHERSBURG, MD [HQ]
BOULDER, CO

3,500+
ASSOCIATES

10
COLLABORATIVE INSTITUTES

400+
BUSINESSES USING NIST FACILITIES

NIST and Joint Institute Locations



NIST Collaborative Research Centers

NIST Main Campuses

- **Gaithersburg, MD**
- **Boulder, CO**

Joint Institutes and Centers

- National Cybersecurity Center of Excellence
- Institute for Bioscience & Biotechnology Research
- Joint Quantum Institute
- Joint Center for Quantum information & Computer Science
- JILA
- Hollings Marine Lab
- Brookhaven National Lab
- Joint Initiative for Metrology in Biology

Atomic Clock Signal Stations

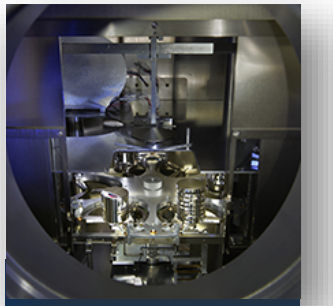
- NIST Ft. Collins CO WWV
- NIST Kauai HI WWVH

NIST Centers of Excellence

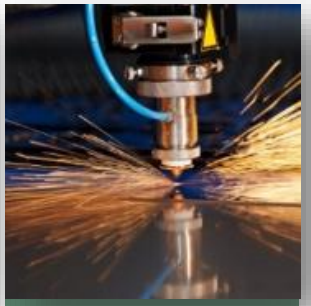
- Forensic Science
- Disaster Resilience
- Advanced Materials

NIST Laboratory Programs

Material Measurement Laboratory



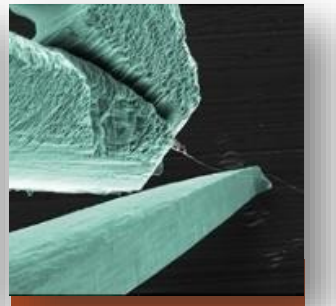
Physical Measurement Laboratory



Engineering Laboratory

Information Technology Laboratory

Communication Technology Laboratory

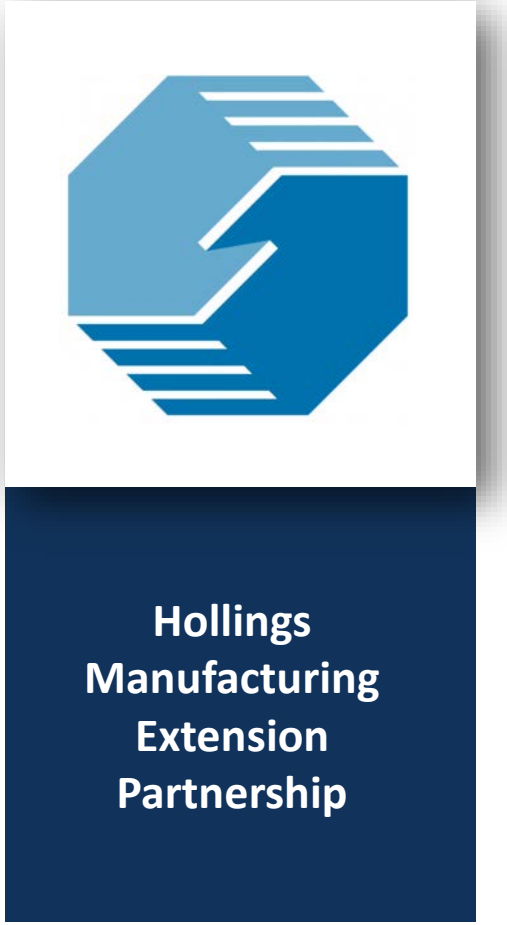


Center for Nanoscale Science and Technology

NIST Center for Neutron Research

NIST Extramural Programs

Public-private partnerships improving U.S. economic competitiveness



Manufacturing Extension Partnership

51 MEP Centers

In 2017:

Connected to 26,000+ manufacturers

$12.6 B in sales

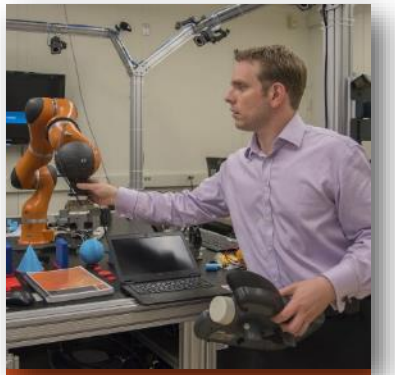
$1.7 B in cost savings

$3.5 B in new client investments

100,000+ jobs created and retained

Manufacturing USA Network

Programmatic Priorities



Advanced Manufacturing

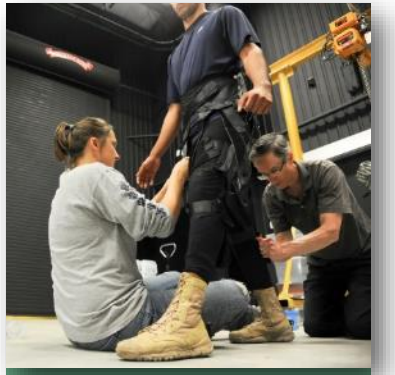
Cybersecurity

Disaster Resilience

© Matt DeLorme

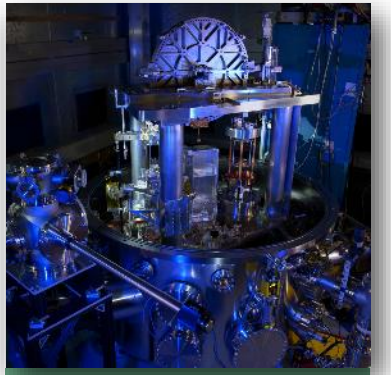
Engineering Biology

Internet of Things



Documentary Standards

Technology Transfer

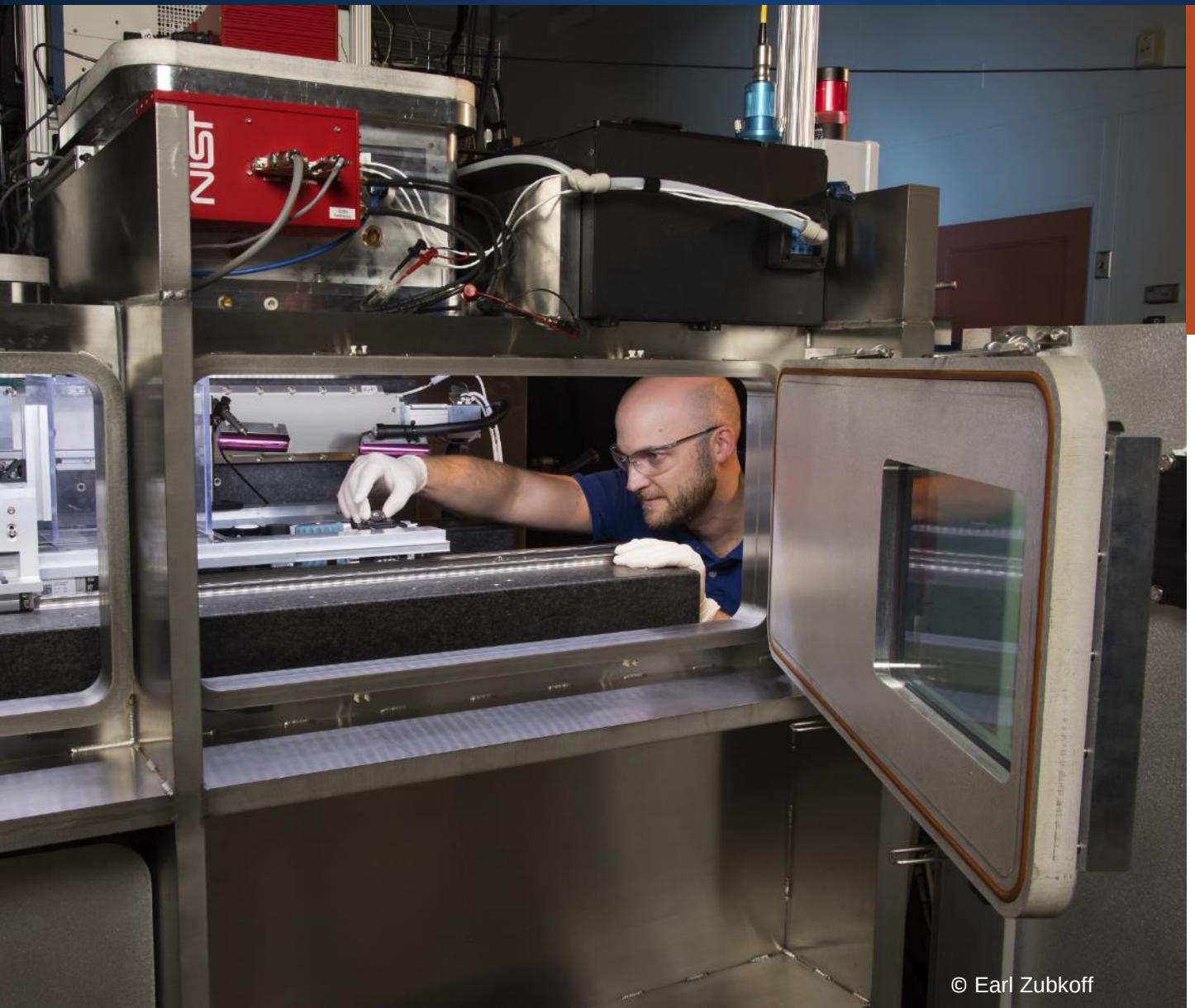


Measurement Dissemination

Quantum Science

Artificial Intelligence

NIST and Advanced Manufacturing



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A partner to the nation's manufacturers for over a century, NIST helps them invent, innovate, and create through:

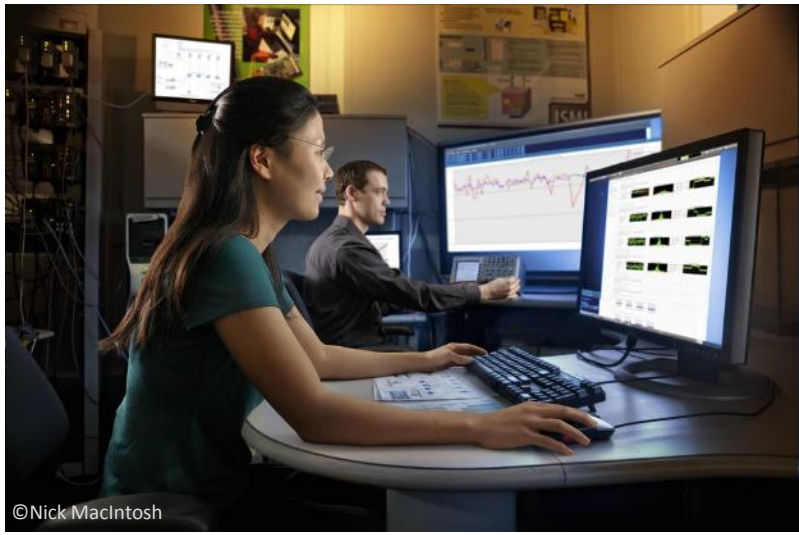
Precision measurements – manufacturers use NIST test methods, tools, and scientific data every day

Advanced materials – NIST is building a materials infrastructure to accelerate the design and deployment of new materials

Partnerships – collaborations with industry and academia help advance research and support US manufacturers

NIST and Cybersecurity

NIST cultivates trust in technology through cybersecurity through: R&D and transition to practice, standards & best practices, outreach, and interagency coordination.



NIST and Disaster Resilience

9/11/2001

WTC Towers Collapse

5/22/2011

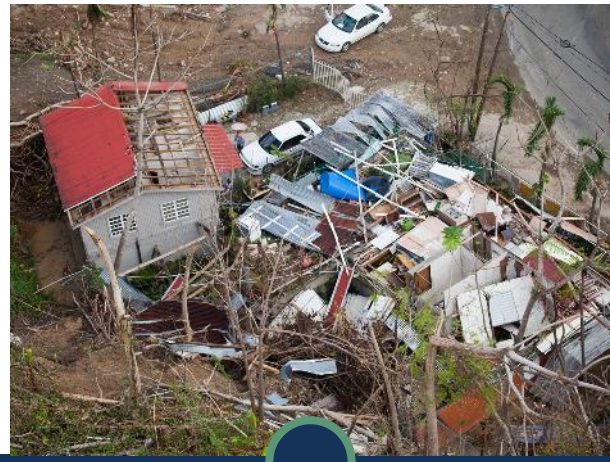
Joplin Tornado

6/23/2012

Waldo Canyon Wildfire

Now

Hurricane Maria

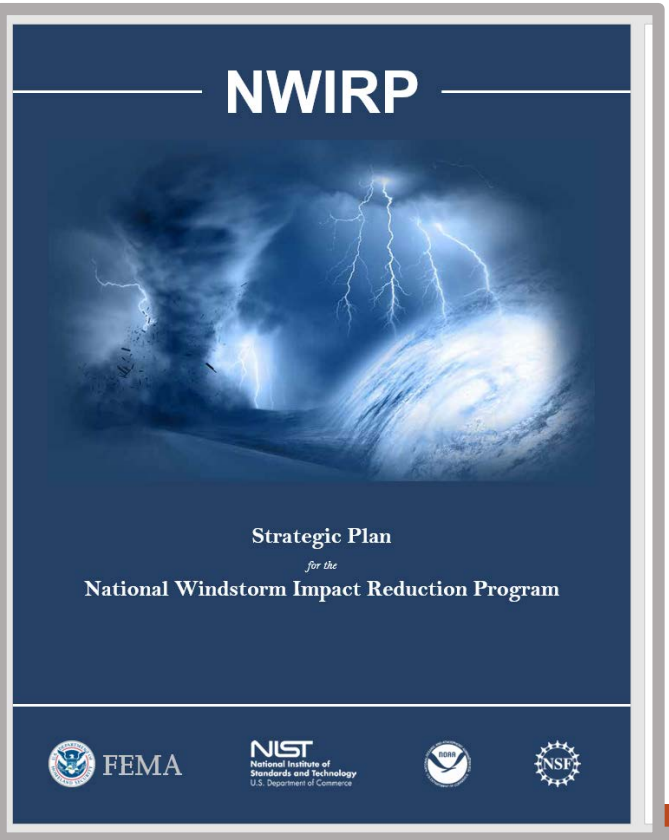


Infrastructure Resilience

40+ NIST-led investigations of disaster and failure events since 1969

Resulting in **>40** significant changes to building codes and design guidelines

Windstorm Preparedness and Response



Strategic Plan for the National Windstorm Impact Reduction Program (NWIRP) submitted to Congress by the Interagency Coordinating Committee: NIST (Chair), OSTP, OMB, NSF, NOAA, DHS / FEMA

2017 Hurricane Disasters: MEP Assisting Manufacturers
(Hurricanes Harvey, Irma, Maria)

Five Awards to MEP Centers (September 2017-January 2018)

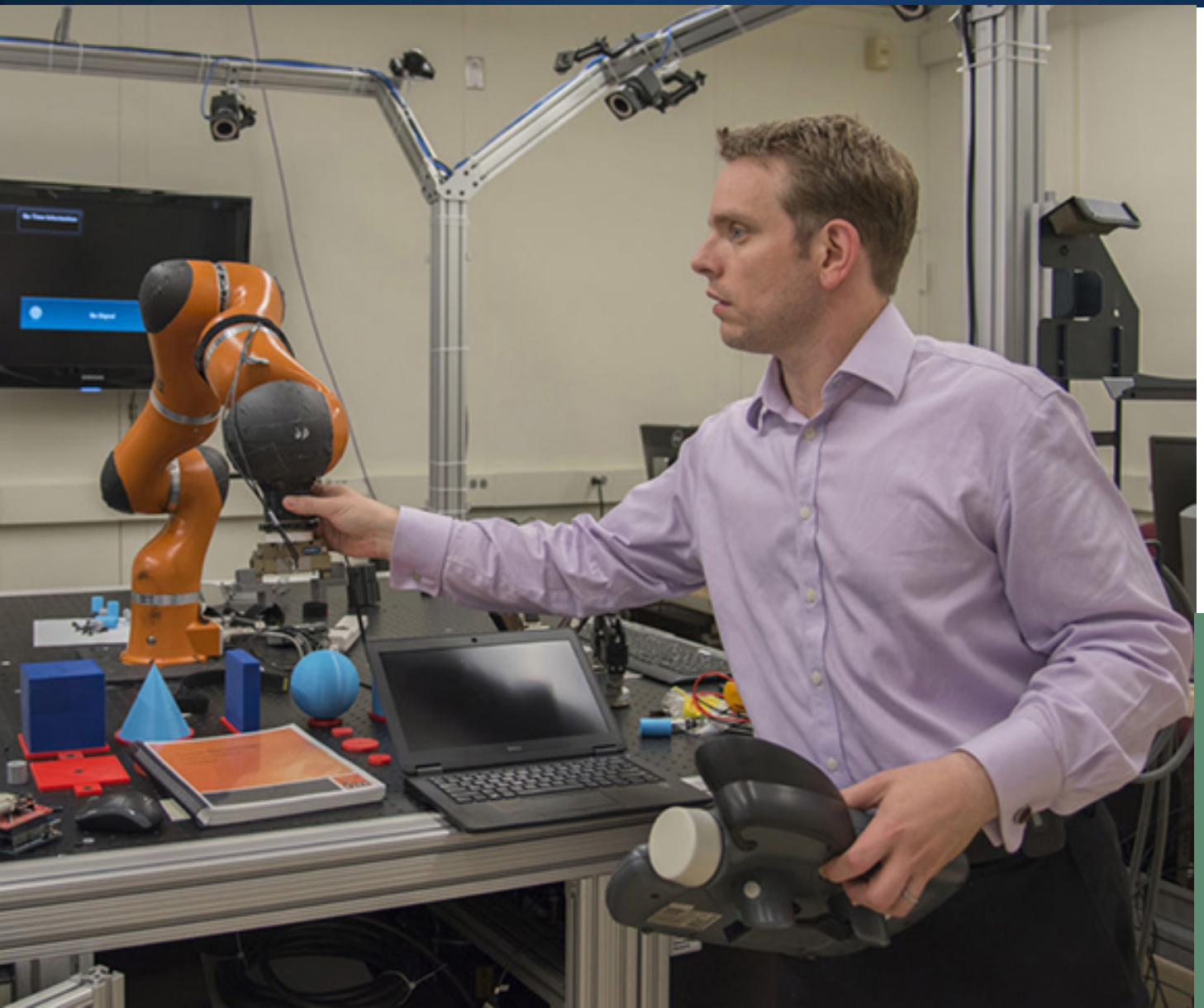
- Texas
- Louisiana
- Florida
- Puerto Rico
- Georgia

  - $6.2 million total funding
  - Over 800 planned assessments

FEMA Disaster Declared Counties:

# of Manufacturers >41,000
# of Employees >340,000 employees
Totaling > $221 billion in manufacturing GDP

NIST and Documentary Standards



Important Role

- **400+** NIST technical staff in **100+** standard committees
- Leadership in **international standards** bodies

NIST's technical expertise results in improved standards and U.S. competitiveness

NIST and Technology Transfer

- Policy coordination and promulgation of technology transfer regulation
- Lead for Interagency Workgroup for Technology Transfer (11 agencies) and Interagency Workgroup for Bayh-Dole
- Annual reports for the President, the Congress, and OMB on technology transfer across federal agencies
- Support Lab-to-Market NSTC Subcommittee
- Host Agency for the Federal Laboratory Consortium for Technology Transfer

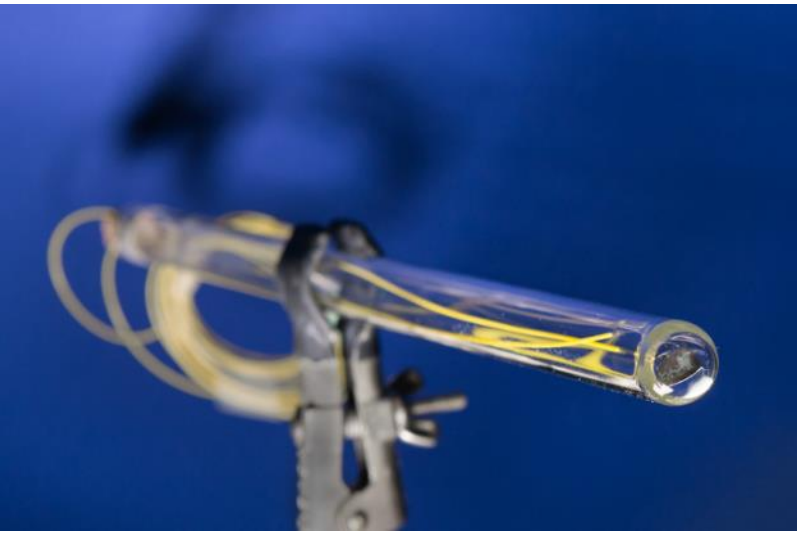
Credit: Peter Cutts

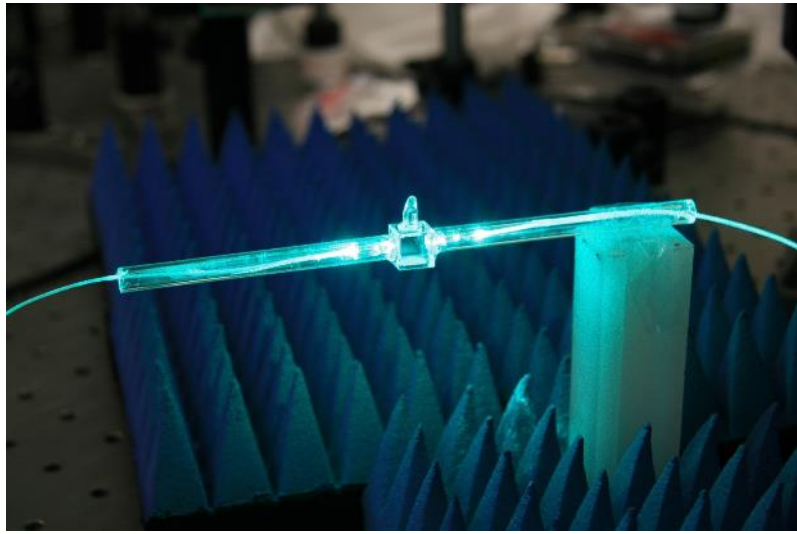
Unleashing American Innovation Symposium

NIST has a unique role in promoting and reporting on the overall strength of federal technology transfer efforts

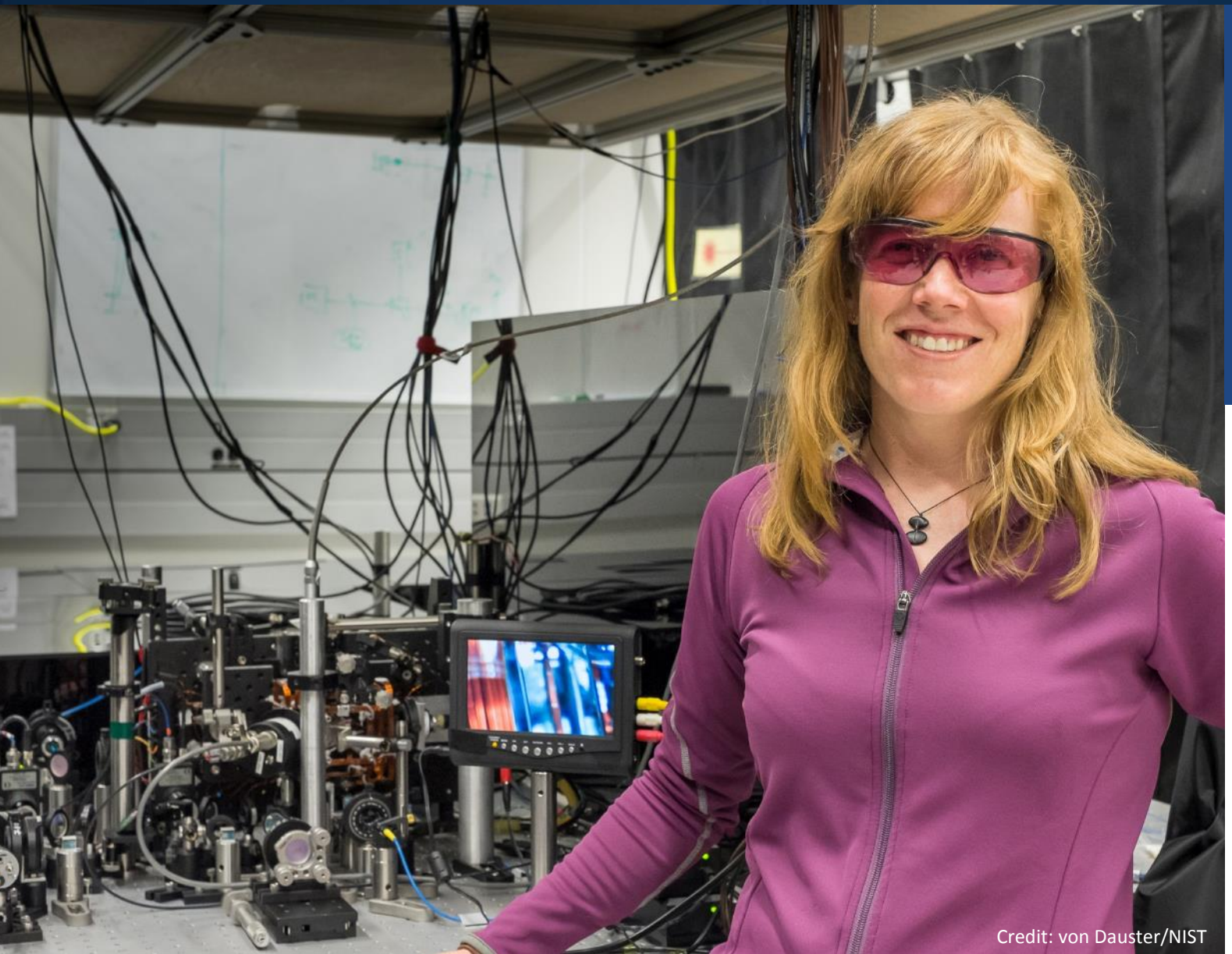
NIST and Measurement Dissemination

Leveraging quantum science expertise, redefinition of the SI, and device engineering and fabrication capabilities to fundamentally change how measurements are made.





NIST and Quantum Science



Leveraging NIST's global leadership in basic and applied quantum science research to transform the foundational blocks of commerce:

Measurement and engineering of quantum systems to understand and harness quantum-based technology to transform computing and communications

Disruptive new class of reference standards re-thinking traceability through "self-calibrating" sensors

NIST and Bioscience

© Matt DeLorme

Building the foundations of trust in bioscience:

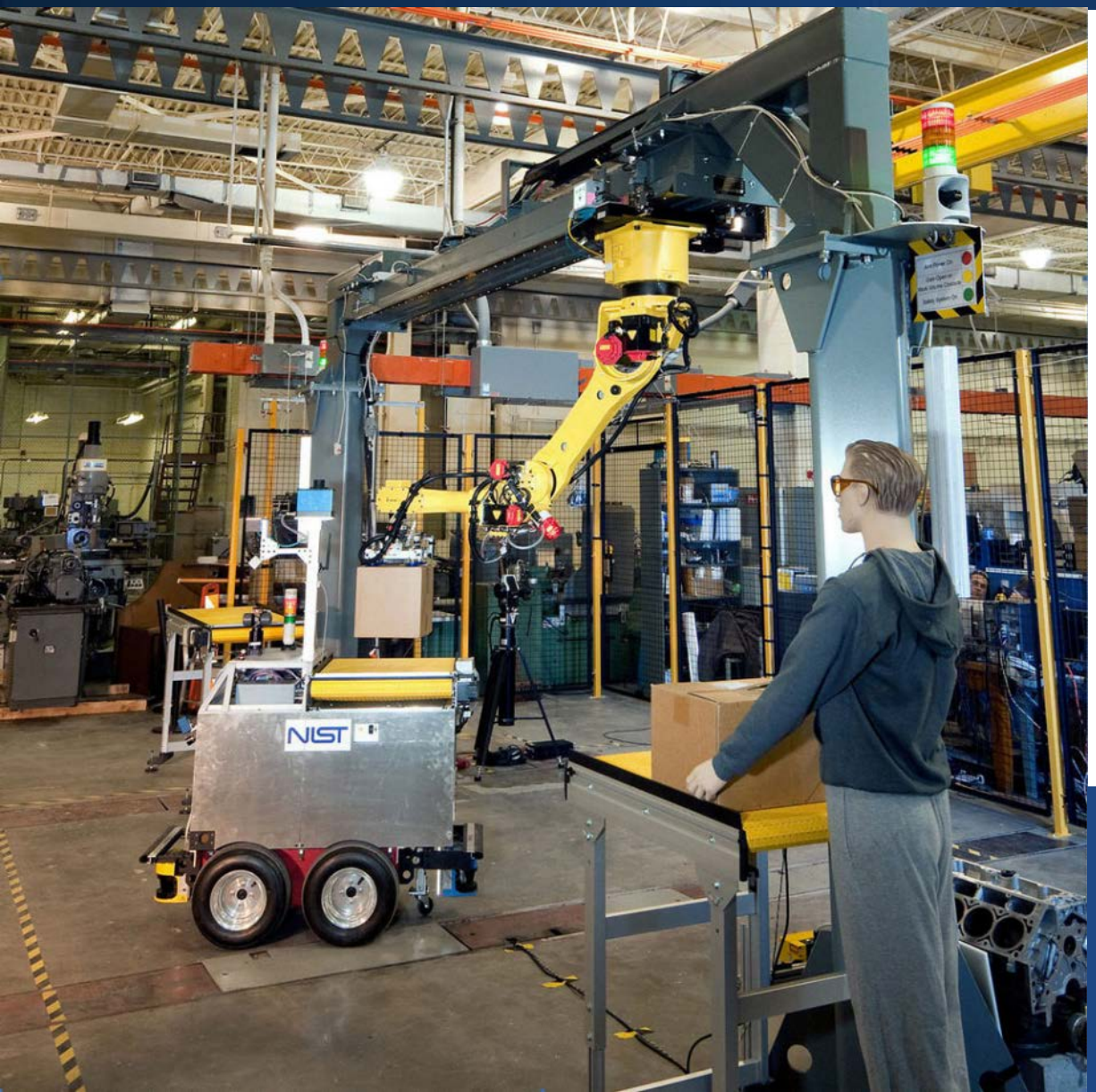
Measurements, calibrations, and standards ensuring accuracy and efficacy of medical treatments and test procedures.

Data and measurement infrastructure to support industry's development and manufacture of new biopharmaceuticals

Measurement science research efforts to support advances in synthetic biology, personalized medicine, and the microbiome

NIST tools bridge the gap between proof-of-concept and market realization

NIST and the Internet of Things



Cybersecurity
Applying Cybersecurity Framework principles for IoT systems including advanced manufacturing, connected vehicles, and medical devices.

Reliable Connectivity
Supporting advanced communications technologies like spectrum sharing, wireless co-existence, next- gen communication systems

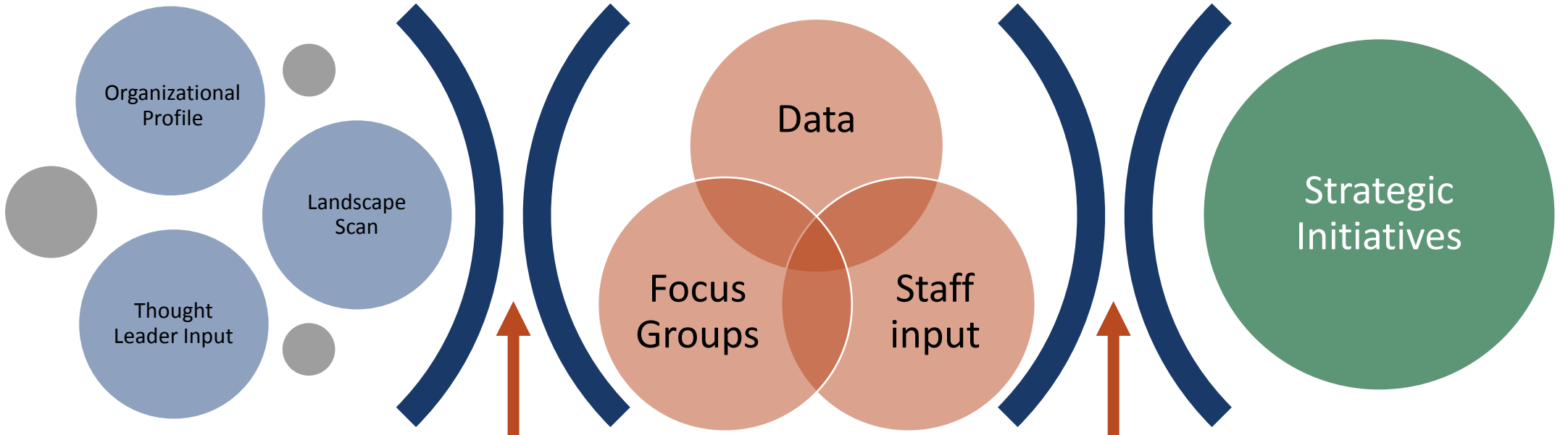
Interoperability
Ensuring interoperability through test beds, standards and conformance suites

IoT economic impact predicted to reach more than $4 trillion per year by 2025

NIST and Artificial Intelligence

New insights in data science needed for confidence in Artificial Intelligence and Machine Learning (AI/ML)

NIST Strategic Plan



NIST Budget

NIST is operating under, planning for, and developing budgets for three fiscal years

FY18 Enacted March 23, 2018

FY19 President's Request in Committee

FY20 In Development

NIST BUDGET

	FY 2017 Enacted	FY 2018 Enacted	FY 2019 President's Request	% Over FY 2018 Enacted	FY 2019 House Mark	% Over FY 2018 Enacted
Laboratory Programs	$690.0	$724.5	$573.4	-20.9%	$720.0	-0.6%
Hollings Mfg Ext Partnership	$128.0	$140.0	$0.0	-100.0%	$140.0	0%
Manufacturing USA	$25.0	$15.0	$15.1	0.7%	$5.0	-66.9%
Construction & Renovation	$109.0	$319.0	$40.5	-87.3%	$120.0M	-62.4%
Total	**$952.0**	**$1,198.5**	**$629.0**	**-47.5%**	**$985.0M**	**-17.8%**

FY 2018 Laboratory Programs

+$22.2M in targeted investments

+$11.3M for NIST strategic priorities

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FY 2018 Industry and Technology Services

$140M for Manufacturing Extension Partnership

$15M for ManufacturingUSA

$2.2M for Baldrige Performance Excellence Program

FY 2018 Construction of Research Facilities

Fully fund Building 245

Accelerate progress in Boulder

Invest in aging utility infrastructure

NIST Engagements

Unleashing American Innovation Symposium

April 19, 2018

Maryland Technology Transfer Summit

April 20, 2018

Artificial Intelligence for American Industry Summit

May 10, 2018

Photo by White House Office of Science and Technology Policy, Erik Jacobs photographer

Engaging Congress on NIST Priorities

Hearings
Briefings
Tours

Maryland Technology Transfer Summit

Governor Larry Hogan

U.S. Senator Ben Cardin (D-MD)

U.S. Senator Chris Van Hollen (D-MD)

Boulder Building 3 Ribbon Cutting

U.S. Senator Corey Gardner (R-CO)

May 4, 2018

National Science & Technology Council

Committee on Science	Committee on Technology	Committee on Homeland and National Security	Committee on Environment	Committee on STEM Education	Committee on S&T Enterprise
Food and Agriculture	Advanced Manufacturing	Bio Defense R&D	Polar Research	FC-STEM	Lab 2 Market
Open Science	Material Genome Initiative	Space Weather	Global Change		Networking IT R&D
Quantum Information Science	Machine Learning/AI	Critical Minerals	Water Availability and Quality		Research Business Models
Physical Sciences	Advanced Transportation	Cybersecurity	Earth Observations		Scientific Collections
Opioid FTAC	Nanotechnology	Nuclear Defense R&D	Ocean Science		R&D Infrastructure
		Disaster Reduction			Open Data
		DAMIEN			International S&T Coordination
		Critical Infrastructure			

Artificial Intelligence for American Industry Summit

NIST is member of Select Committee on Artificial Intelligence

Photo by White House Office of Science and Technology Policy, Erik Jacobs photographer

Return on Investment (ROI) Initiative

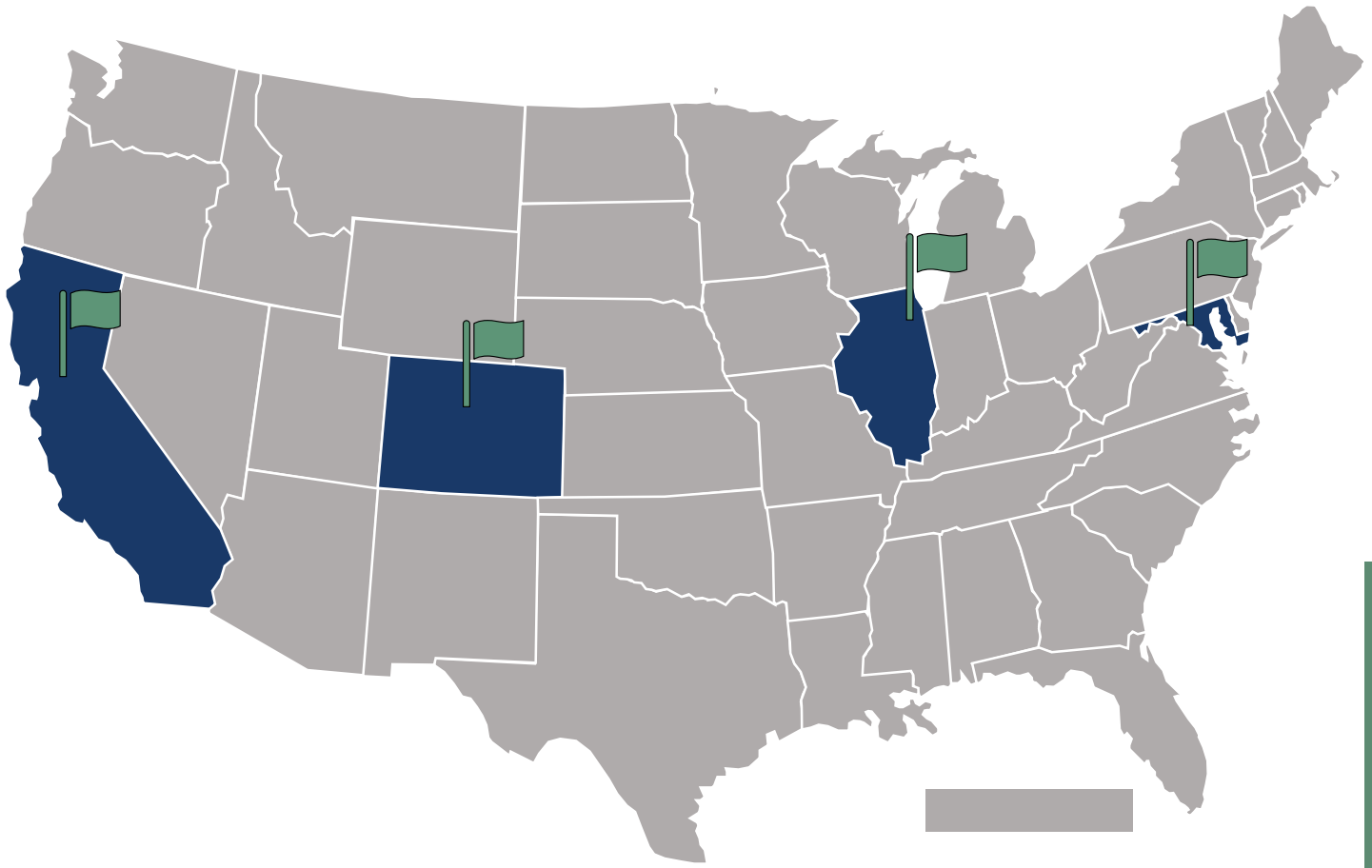
As part of the President's Management Agenda, NIST seeks to enable greater return on the Federal government's investment in R&D

Federal R&D Investment
$150B/year

Technology Transfer System

New IP, licensing, products, processes, services and companies return value via economic growth and enhanced national security

ROI Initiative - Outreach



Unleashing American Innovation Symposium

April 19, Washington, DC

Request for Information

May 1 – July 30

ROI Public Meetings

May 17 – San Jose, CA

May 21 – Denver, CO

May 31 – Chicago, IL

June 14 – Gaithersburg, MD

Examples of Systemic Challenges

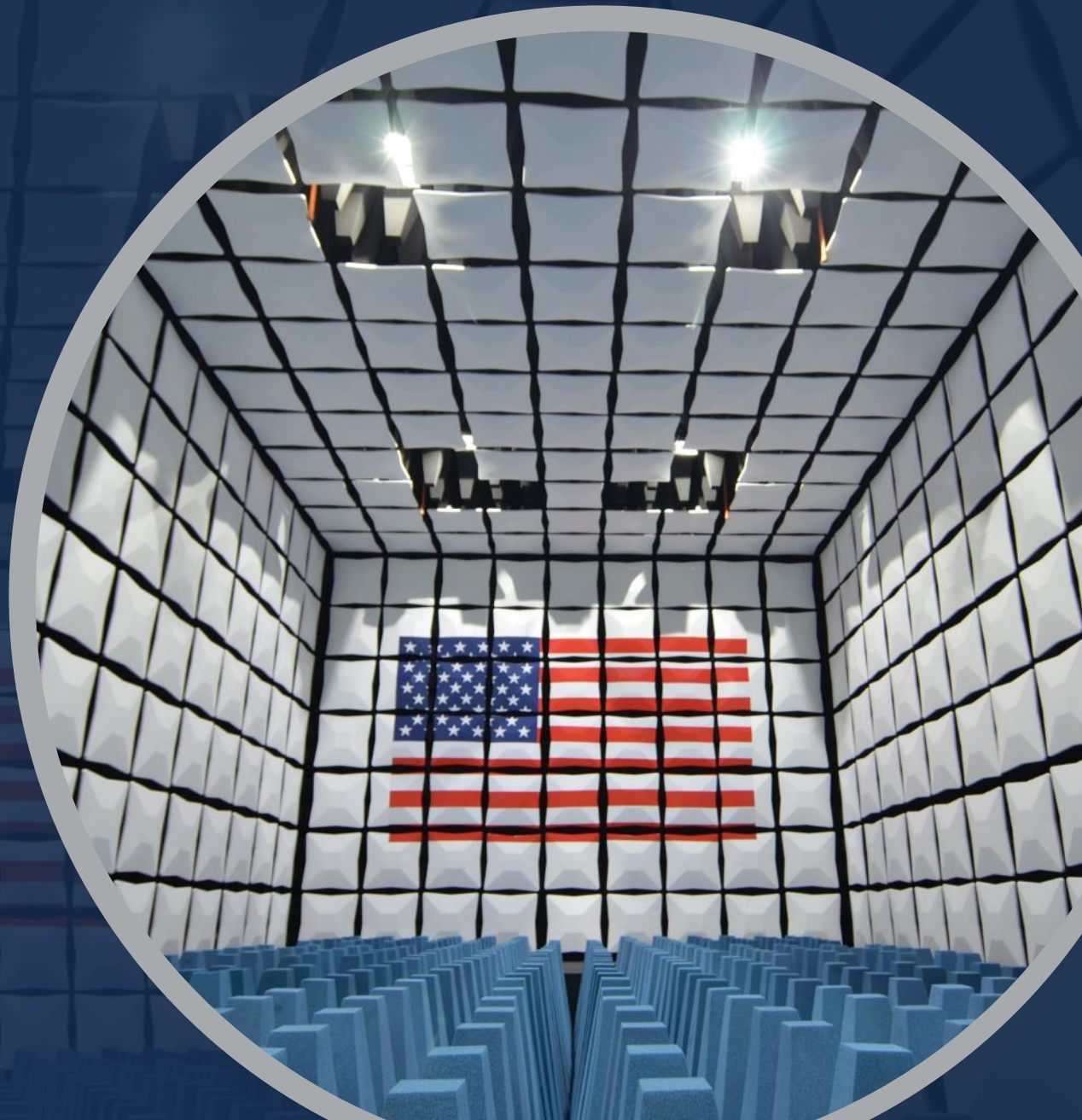
©Robert Rathe

- Difficulty negotiating IP terms and indemnification provisions
- Inconsistent practices and interpretation of authorities across USG
- Inability to copyright software and digital products developed by USG-operated labs
- Challenges in protecting trade secrets when collaborating with Federal laboratories
- Concern about march-in rights
- Requiring Feds to leave government service to be entrepreneurs
- Conflict of interest provisions that make it difficult for Feds access resources needed to commercialize technology

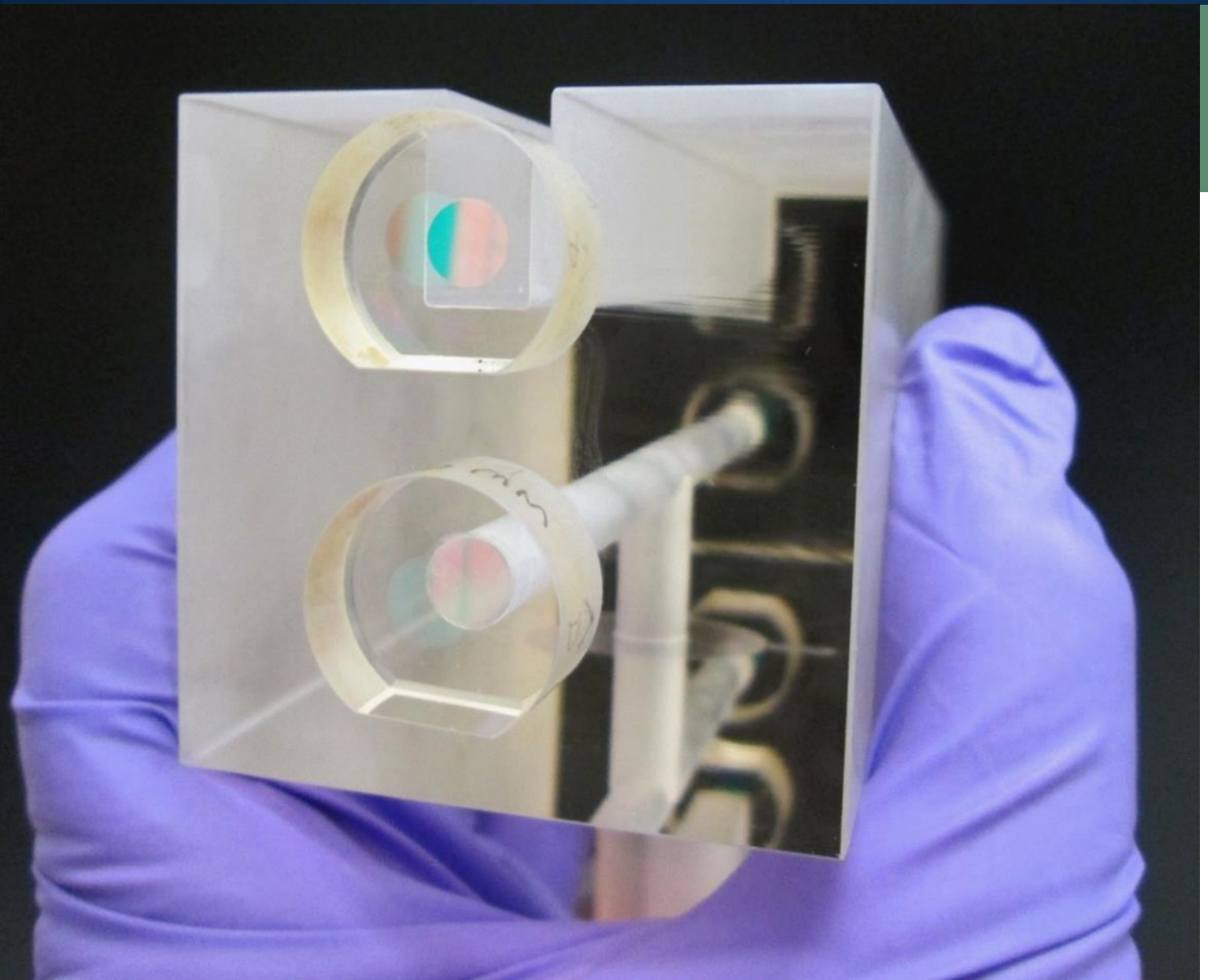
Which core Federal technology transfer principles and practices should be protected, and which should be adapted or changed?

What are the systemic challenges to effective transfer of technology, knowledge, and capabilities resulting from Federal R&D, and what are the solutions?

What are other ways to significantly improve transfer of technology, knowledge, and capabilities resulting from Federal R&D, and what changes to practices, policies, regulations, and legislation are required?



VCAT Subcommittee on Tech Transfer



Subcommittee Charge

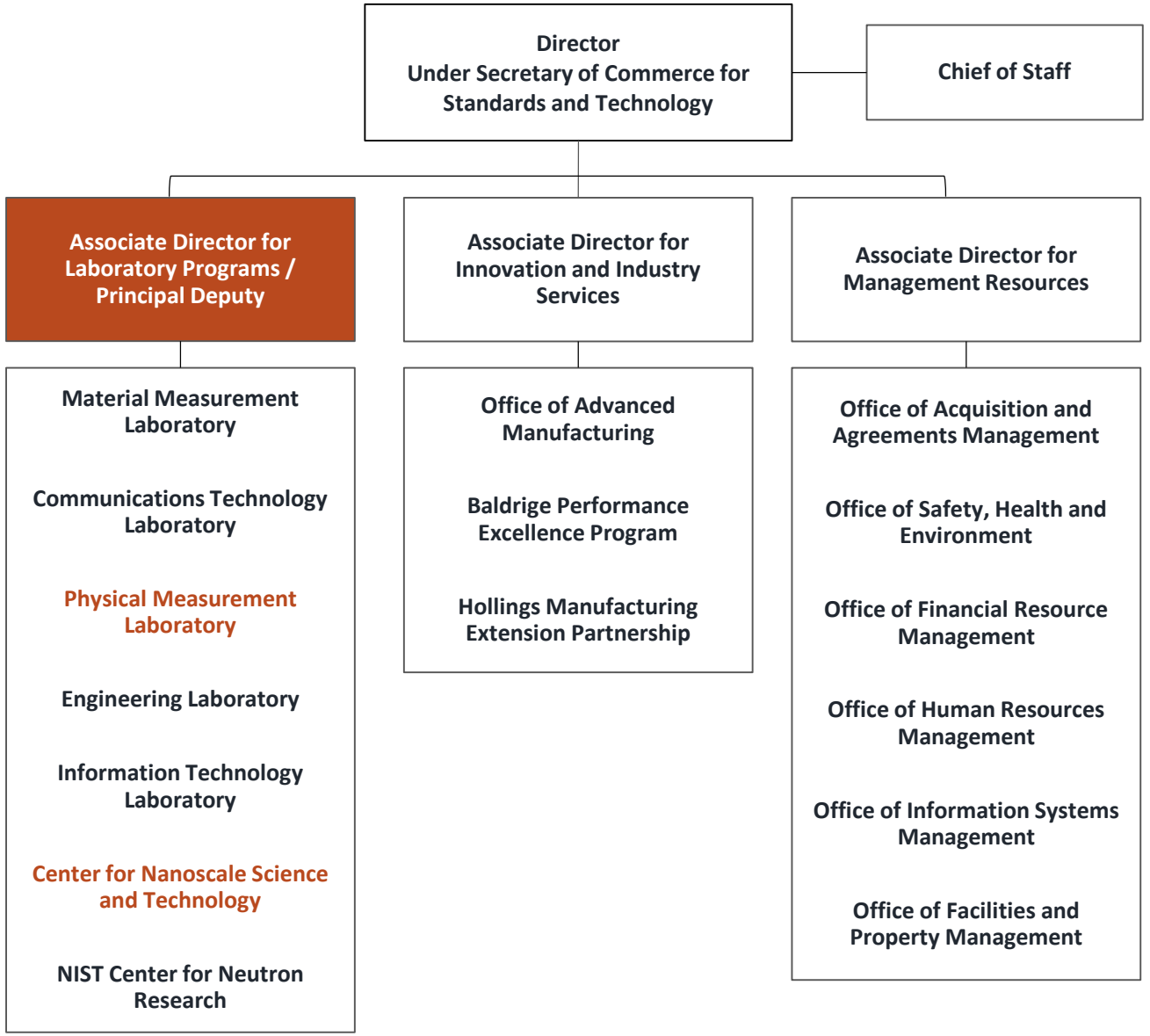
1. Review NIST's current technology transfer policies and practices and provide feedback on the principles that should drive these efforts and the processes for effectively engaging the business community and communicating with stakeholders.
2. Assess NIST performance in the development and dissemination of work products and knowledge and note areas for improvement. Specific areas include the development and use intellectual property and collaborative research.

NIST Leadership Changes

Associate Director for Laboratory Programs

Kent Rochford became CEO of SPIE

Jim Olthoff, Director of Physical Measurement Laboratory, acting ADLP

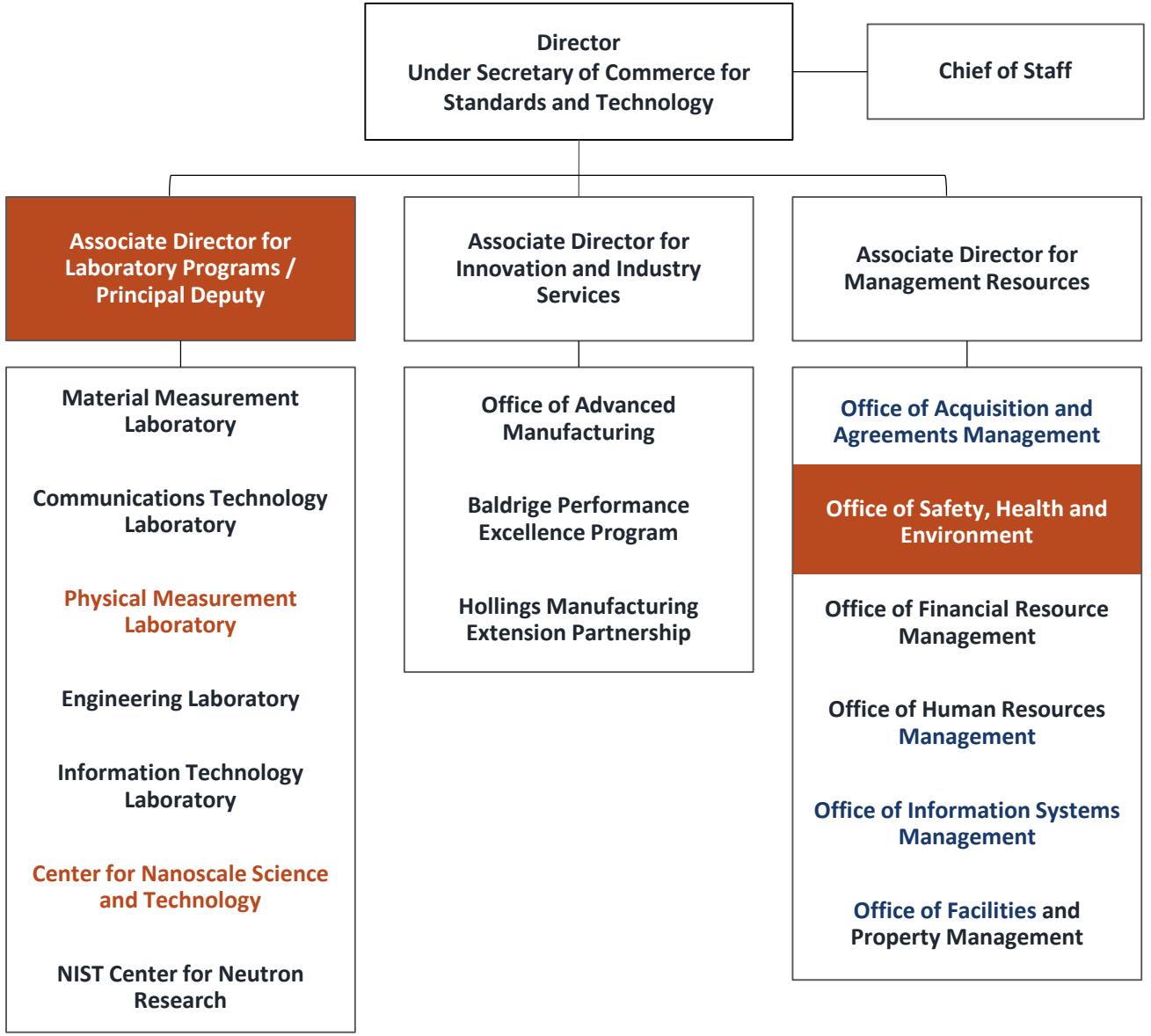


NIST Leadership Changes

Chief Safety Officer

Richard Kayser retired from Government service

Stephen Banovic, Deputy Director of OSHE is acting CSO

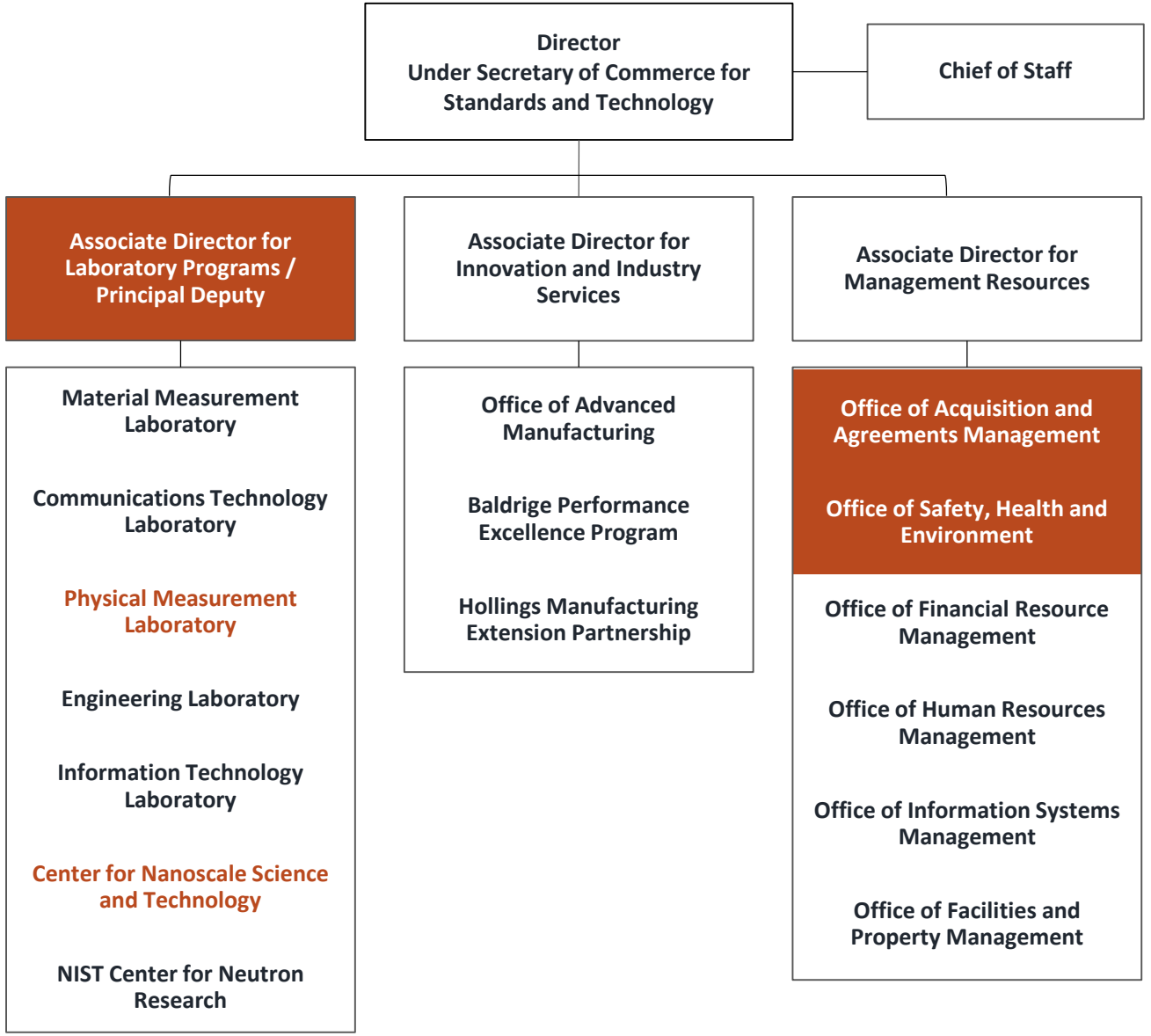


NIST Leadership Changes

Director, Office of Acquisition and Agreements Management

Cecelia Royster retired from Government service

George Jenkins, CFO, is acting Director of OAAM



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