# NIST Update
## Visiting Committee on Advanced Technology

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

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

NIST Boulder
October 16, 2018

# Meeting Agenda

**October 16, 2018**

**Session I: NIST Update**

Session II: Quantum Science

Session III: NIST-on-a-Chip™

Session IV: Technology Transfer

Session V: JILA

**October 17, 2018**

Session VI: Advanced Communications R&D

Session VII: NIST Boulder Facilities Update

# NIST Update

- Safety and Security
- Organizational and Leadership Changes
- Budget Update
- Programmatic Update
- Strategic Planning
- Equity in Career Advancement
- Engagements
- Meeting Agenda Overview

# NIST Safety and Security

## Recordable case (RC)

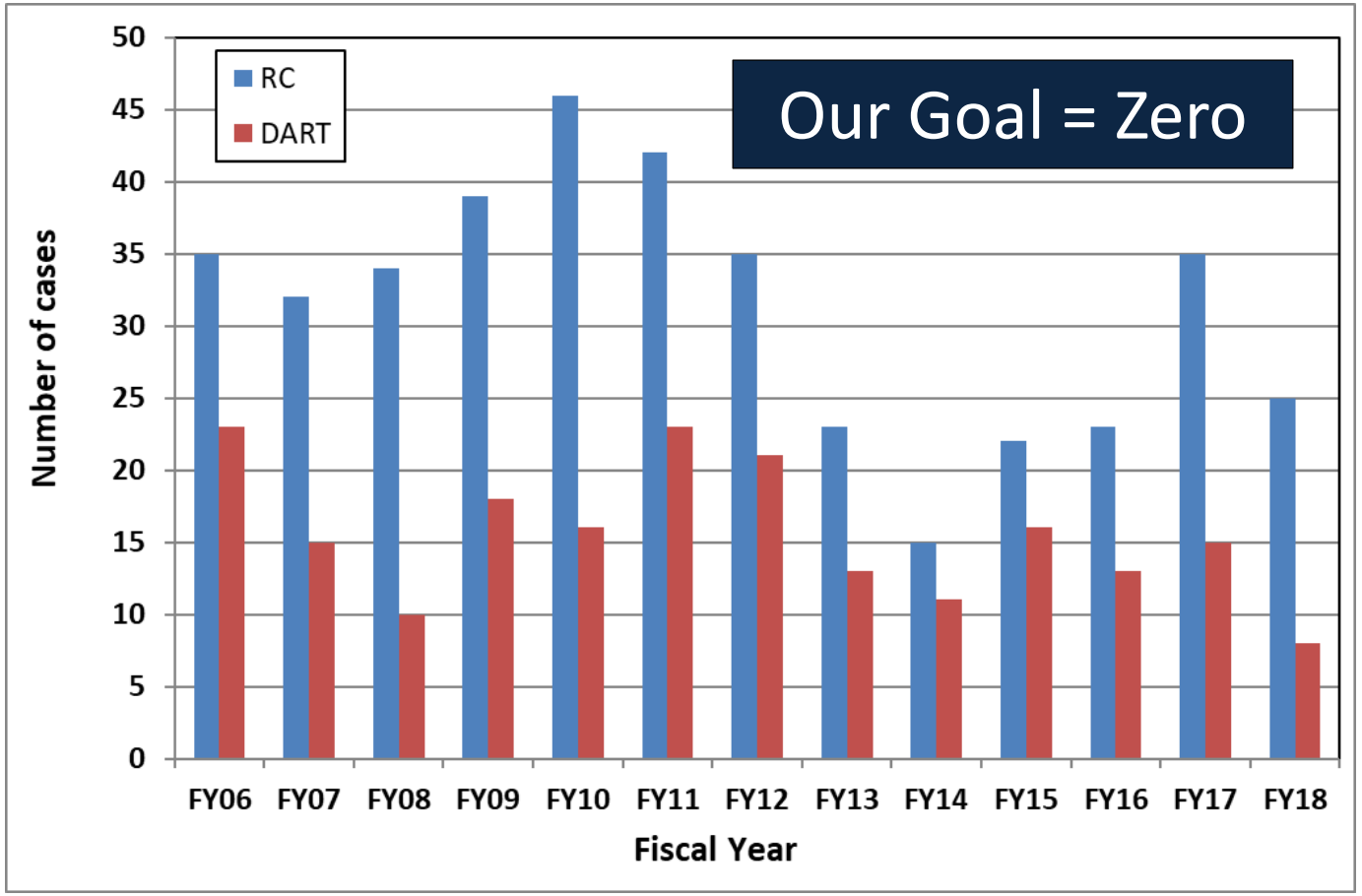
- Any work-related injury or illness that results in any of the following: medical treatment beyond first aid, ,days away from work, restricted duty, transfer to another job, loss of consciousness or death.

## 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.

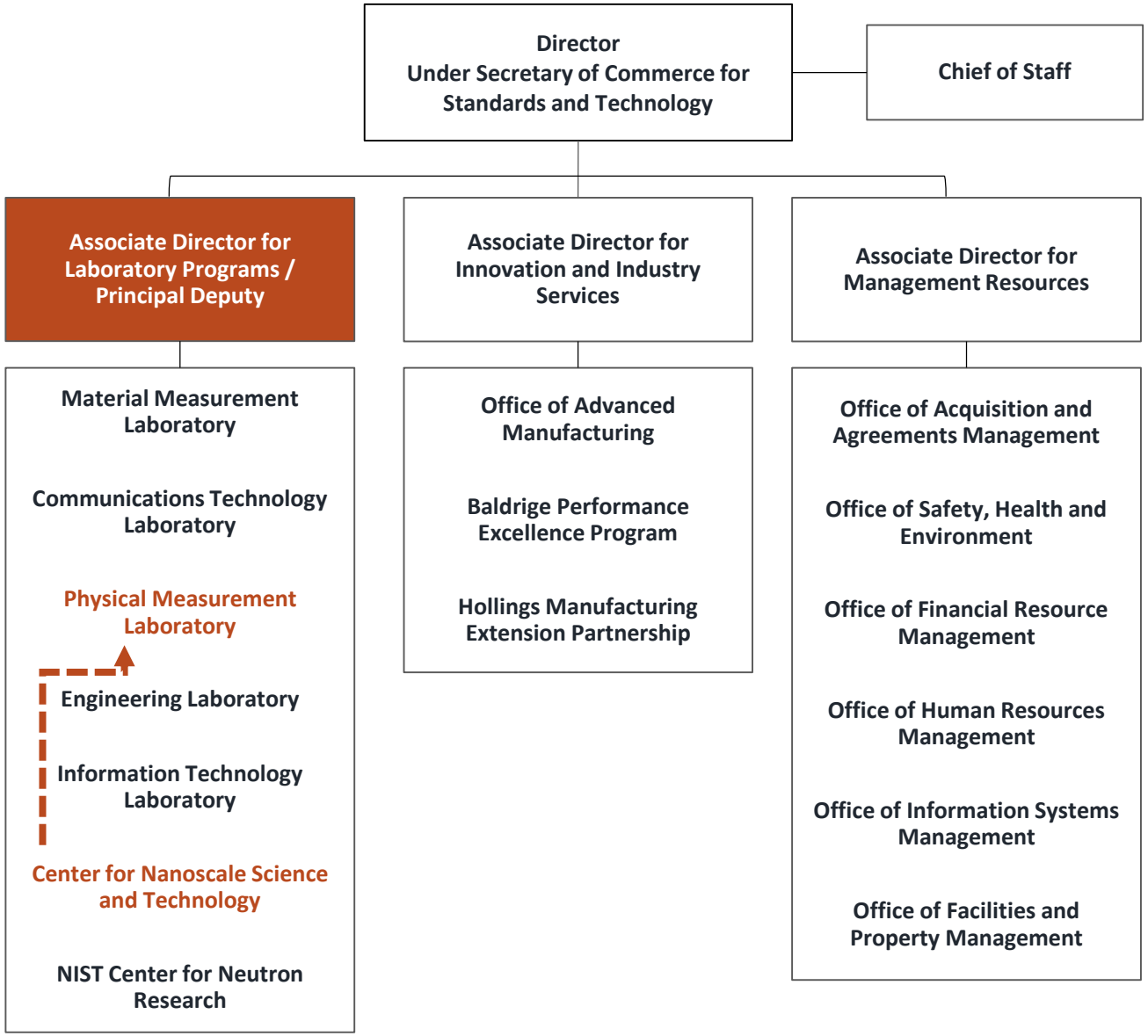
## About the data:

- Includes Federal Employees and Associates
- STS cases (*hearing loss incidents; standard threshold shift)* excluded in FY15 (5), FY16 (8), FY17 (3), and FY18 (8)




**Everyone Home Safe, Every Day**

# NIST Organizational Changes




- Merger of Physical Measurement Laboratory and Center for Nanoscale Science and Technology to create new synergies:  Effective October 1
- Consolidation in Gaithersburg resulted in adding two new divisions and 71 employees to the Physical Measurement Laboratory
- CNST Nanofab will continue as a National User Facility serving thousands of external users as well as researchers from all of NIST's laboratories

# NIST Leadership Changes

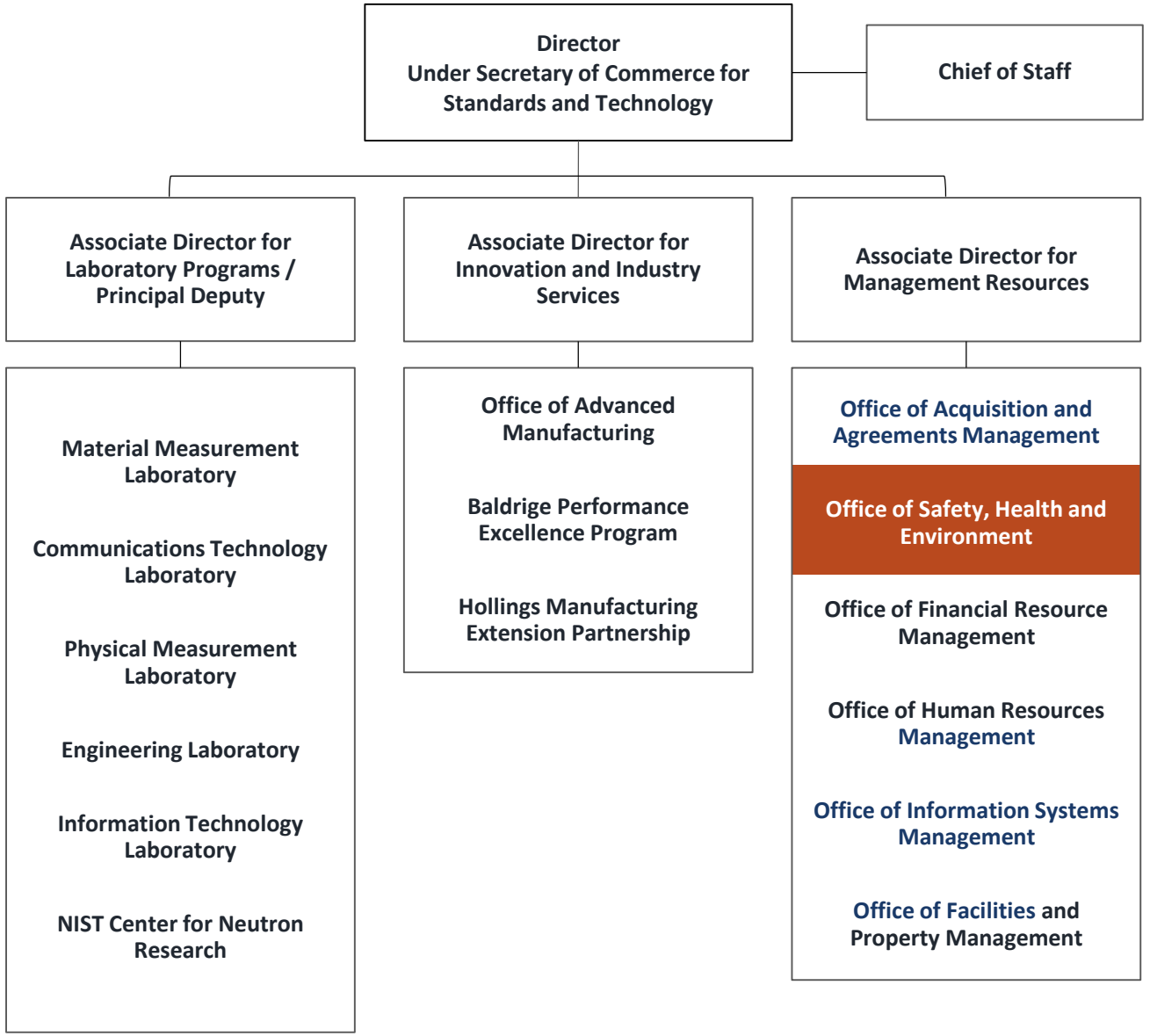
## Chief Safety Officer

**Director, Office of Safety, Health and Environment**

### Dr. Elizabeth Mackey

- Started at NIST in 1991 as a research chemist
- Deputy Division Chief in MML Materials Measurement Science Division
- Safety Program Coordinator for MML

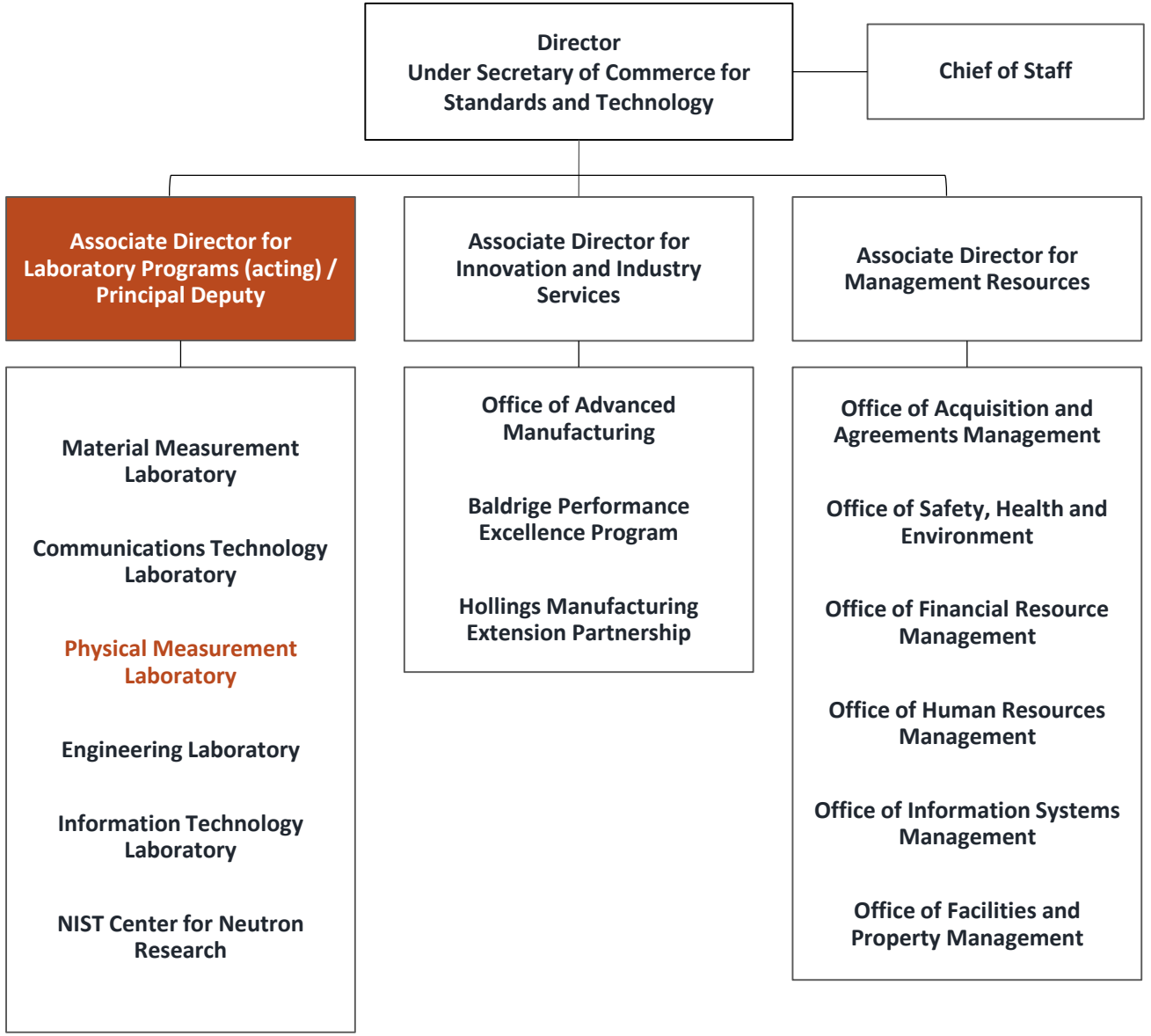
*Thank you to Stephen Banovic, Deputy Director of OSHE, for serving as Acting Chief Safety Officer*



# NIST Leadership Changes

## Acting Associate Director for Laboratory Programs

Jim Olthoff
Director of Physical Measurement Laboratory, Acting ADLP



# NIST Budget

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

**FY19** Continuing Resolution

**FY20** In Development

**FY21** Early Stages

# NIST BUDGET

| | FY 2017 Enacted | FY 2018 Enacted | FY 2019 Cont. Res. (through Dec. 7) | FY 2019 Pres. Request | FY 2019 House Mark | FY 2019 Senate Mark |
|---|---|---|---|---|---|---|
| Laboratory Programs (STRS) | $690.0 | $724.5 | $724.5 | $573.4 | $720.0 | $724.0 |
| Hollings Mfg Ext Partnership (MEP) | $128.0 | $140.0 | $140.0 | $0.0 | $140.0 | $140.0 |
| Manufacturing USA | $25.0 | $15.0 | $15.0 | $15.1 | $5.0 | $15.0 |
| Construction & Renovation | $109.0 | $319.0 | $319.0 | $40.6 | $120.0 | $161.0 |
| **Total** | **$952.0** | **$1,198.5** | **$1,198.5** | **$629.1** | **$985.0** | **$1,040.0** |

# Programmatic Priorities

Advanced Manufacturing

Cybersecurity & Privacy

Disaster Resilience

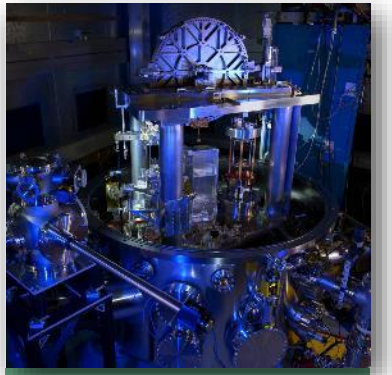


Engineering Biology

Internet of Things

Documentary Standards

Technology Transfer



Measurement Dissemination

Quantum Science

Artificial Intelligence

# Quantum Science


***National Strategic Overview for Quantum Information Science*** **released at White House event**

**Policy Opportunities Identified:**

- Science-first approach to QIS
- Quantum-smart workforce
- Deepened industry engagement
- Providing critical infrastructure
- Maintaining national security and economic growth
- Advancing international cooperation

Session on quantum science coming up next

# Quantum Science

# West Coast Updates

**NIST-Stanford Joint Initiative for Metrology in Biology (JIMB)**

- New home at *SLAC National Accelerator Laboratory* combines NIST measurement mission with SLAC's unique facilities and agility as a Federally Funded Research and Development Center
- NIST and DOE in a 5 year agreement that allows SLAC to provide services to NIST
- JIMB develops fundamental measurements and reference materials for molecular and cellular biology, and provides validated data to give the biotech community confidence in their results

**Quantum Economic Development-Consortium**

- NIST partnering with SRI International, an non-profit, independent R&D center headquartered in Menlo Park, CA

More to come in quantum science session coming up next

## Expanding NIST's reach in areas of critical importance to the nation

SLAC NATIONAL ACCELERATOR LABORATORY

SRI International

Stanford University

# Privacy Framework

- A collaborative initiative to develop a voluntary Privacy Framework to help organizations manage risk
- Goal: enable organizations to respond to privacy challenges while supporting continued innovation
- Models NIST's approach to developing the *Framework for Improving Critical Infrastructure Cybersecurity*

**https://www.nist.gov/privacy-framework**


Series of stakeholder events:

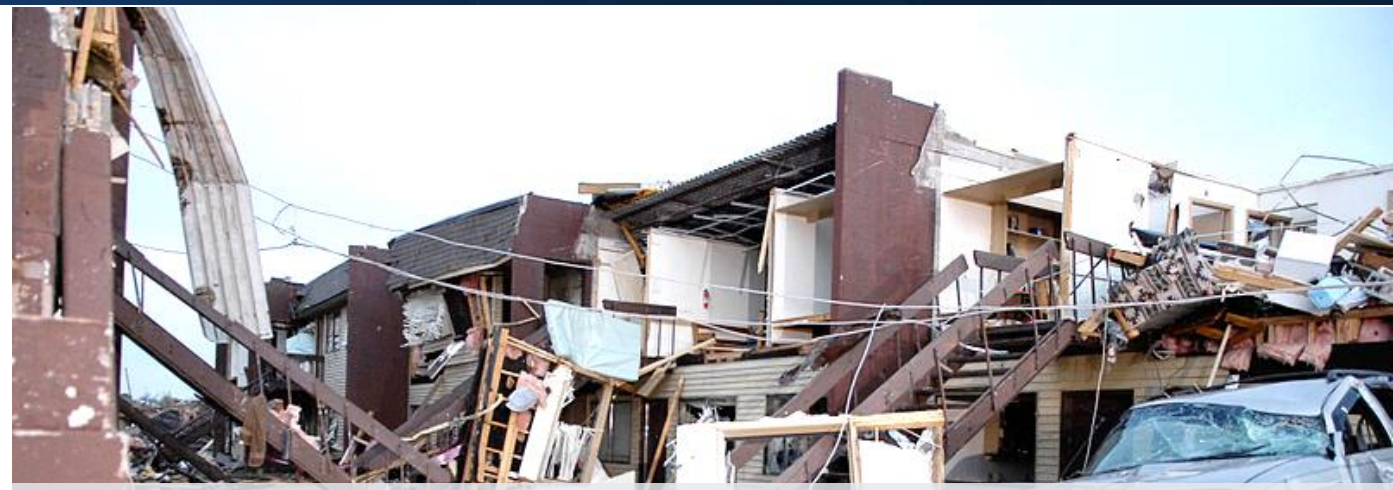
- *Developing the NIST Privacy Framework: How can a collaborative process help manage privacy risks?* September 24, 2018 at Brookings Institution in Washington, DC
- Public Workshop #1 - October 16, 2018 in Austin, Texas
- Live Webinar on the Privacy Framework – November TBD
- *More to be announced*

# Immediate Occupancy Report

In 2017, Congress tasked NIST to define what it would take to achieve **immediate occupancy performance codes and standards** for all buildings in all types of natural hazards

NIST's publication provides information about steps that could be taken, in areas including:

- Building design
- Community needs
- Economic and social impacts
- Fostering acceptance and use of new practices



How to preserve quality of life by keeping buildings habitable and functioning as normally as possible following natural hazard events?

"Increasing the performance goals for buildings would not be easily achieved, but the advantages may be substantial"

*-Research Needs to Support Immediate Occupancy Building Performance Objectives Following Natural Hazard Events (NIST SP 1224)*

# Artificial Intelligence @ NIST

## Training & Education

- Coursera training – 150 participants
- Book club
- Invited speakers
- Communities of interest

## Computing Platform

- State-of-art hardware (IBM Power9)
- Testing the platform now with select projects

## Research

- Advance fundamental research in ML/AI and apply ML/AI to current metrology challenges
- Internal competition for proposals

## Standards

- NIST staff participating in the development of international standards

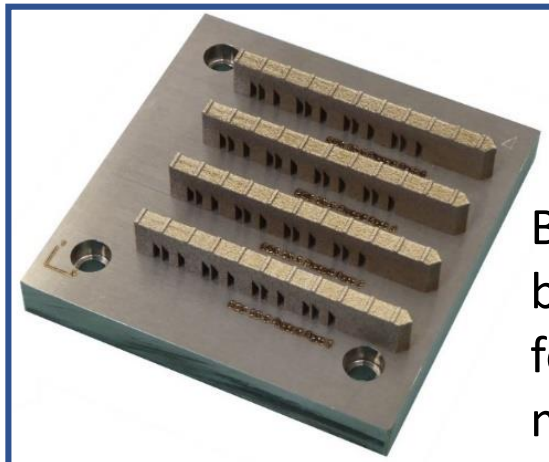
# AM-Bench 2018

NIST hosted the Additive Manufacturing Benchmarks (AM-Bench) technical symposium to validate and improve model predictions

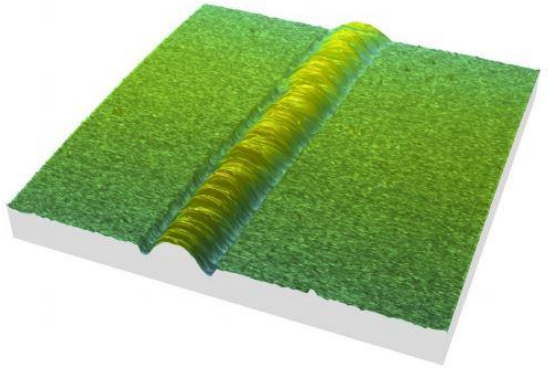
- Test computer simulations against open, rigorous, benchmark test data
- Develop mitigation strategies for difficult build problems

**Gaithersburg June 18-21:**

175 participants
40 organizations
5 exhibitors
2 NIST laboratories



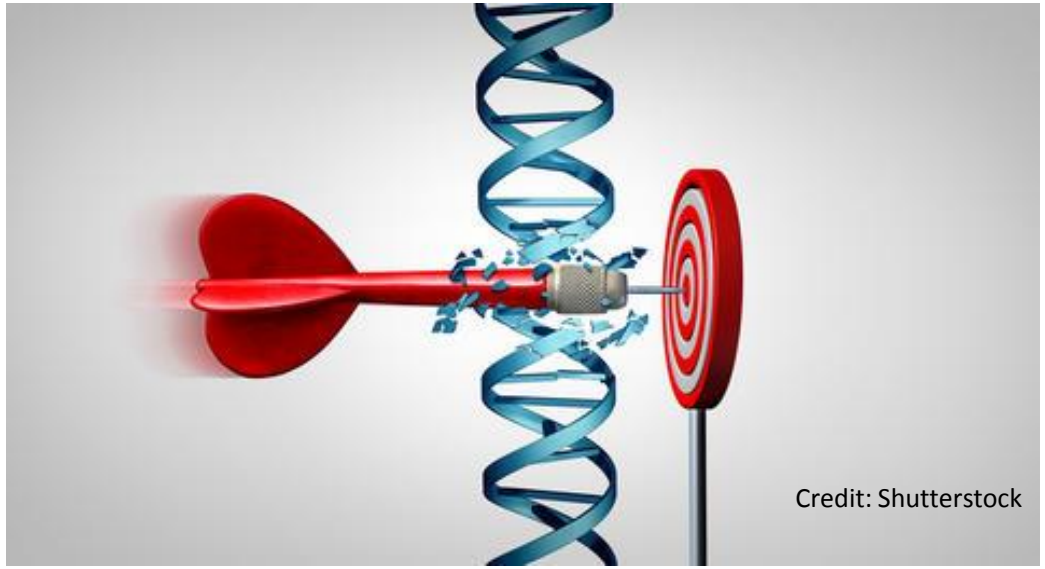
Builds from two laser powder-bed material systems tested for residual stress, distortion, microstructure



Measurements of laser traces on metal plates provided information on melt pool size, cooling rates, cross-section geometry

# NIST Genome Editing Consortium

NIST Genome Editing Consortium is a public private partnership to address the measurements and standards needed to increase confidence and lower the risk of using genome editing technologies in research and commercial products




https://www.nist.gov/programs-projects/nist-genome-editing-consortium

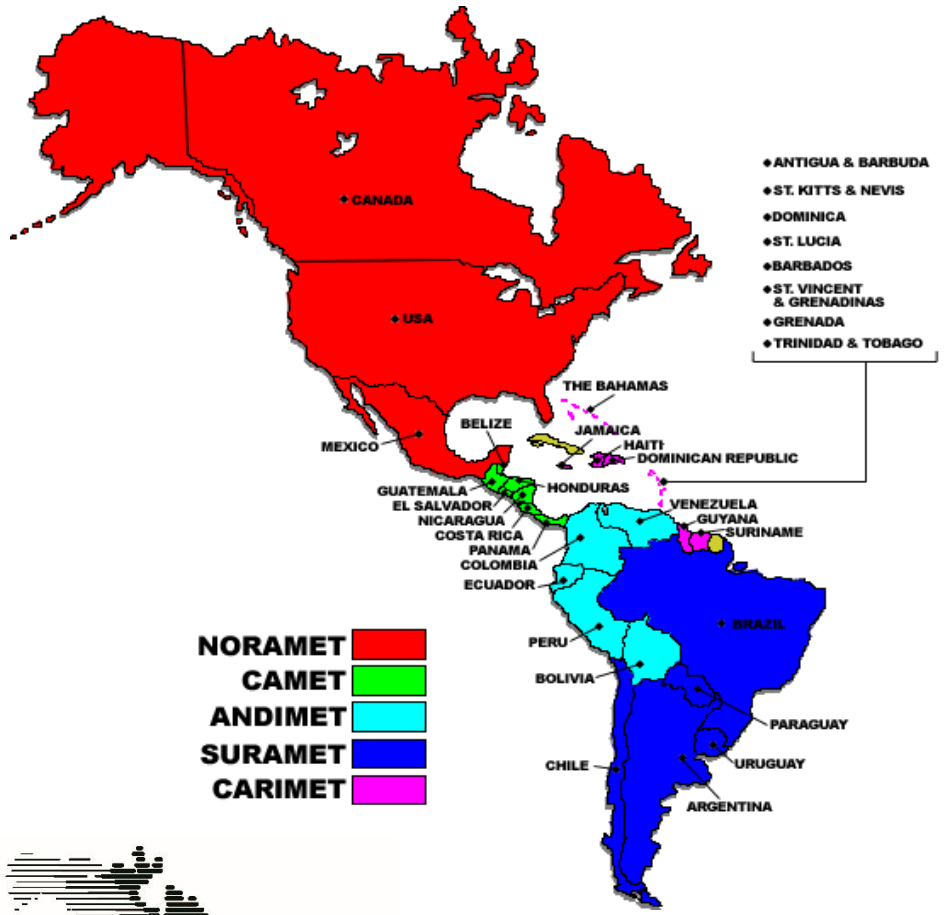
- Workshop with stakeholders May 2018
- Three working groups formed on measurements, data, and terminology
- 22 active member organizations, 10+ more in process of joining

# International Metrology Leadership

**Sistema Interamericano de Metrología (SIM)**
NIST hosted SIM General Assembly, September 24-28


Claire Saundry - *Director, NIST International and Academic Affairs Office* with SIM President – Héctor Laiz *Director of Metrology INTI Argentina*

**Claire Saundry: SIM President Elect**




SIM
SISTEMA INTERAMERICANO DE METROLOGÍA

# Manufacturing Extension Partnership

## MEP – Celebrating 30 Years of Impact for American Manufacturing


DOD DFAR requires defense suppliers to implement guidance from NIST Special Publication 800-171 rev 1, “Protecting Controlled Unclassified Information in Nonfederal Information Systems and Organizations.”

## 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**
- **ROI:  9.1 : 1 tax dollar for dollar**

**MEP – Working to help secure DOD Supply Chain**

- Since 2013 MEP Centers completed >2,500 projects with 1,650 DOD supply chain companies
- NIST MEP, in partnership with NIST ITL, published “Cybersecurity Self-Assessment Handbook”
- MEP National Network established coordinated cybersecurity assistance practice

# Manufacturing USA

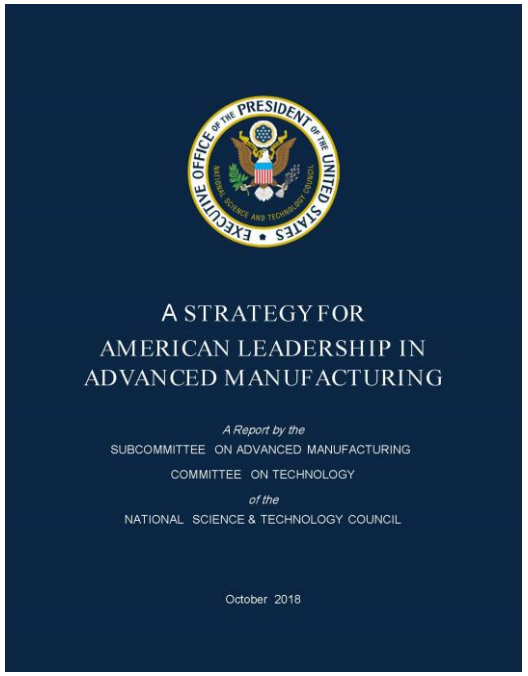

## Major releases and events

- Congressional Briefing: *Securing the US Global Leadership in Advanced Manufacturing*
- Manufacturing USA Expo
- Fall Network Meeting at NIST
- Manufacturing USA Annual Report, FY 2017
  - Program report and summary of institute activities

# Strategy for American Leadership in Advanced Manufacturing

The Administration charged the interagency **Subcommittee on Advanced Manufacturing** to develop a national strategic plan

- Subcommittee is co-chaired by NIST and composed of leaders from all agencies with programs related to advanced manufacturing
- January 2018 – Plan kickoff. Subcommittee collected extensive stakeholder input from a *Request For Information* and 11 roundtables across the nation
- October 5, 2018 – the White House released ***A Strategy for American Leadership in Advanced Manufacturing*** along with a Presidential Proclamation on National Manufacturing Day





Credit: Baker College of Jackson (MI)

**VISION: American Leadership in advanced manufacturing across industrial sectors to ensure national security and economic prosperity**

**GOALS:** Develop and transition new manufacturing technologies

Educate, train and connect the manufacturing workforce

Expand the capabilities of the domestic manufacturing supply chain

# U.S. Semiconductor Workforce

The President's National Security Strategy (2017):

- Importance of emerging technologies to economic growth and security
- Commitment to workforce development

NIST is leading an interagency effort on assessing and recommending actions for a strong U.S. semiconductor workforce

Request for Information

Semiconductor Workforce Roundtable (sponsored by SIA)

Report with Key Recommendations

# American Worker Executive Order

**National Council for the American Worker**
established by President Trump July 19, 2018

- Secretary of Commerce is co-chair
- Council is charged to develop a national strategy to ensure access to education and job training for American students and workers
- DOC/NIST will lead the development of "*a plan for recognizing companies that demonstrate excellence in workplace education, training, and re-training policies and investments, in order to galvanize industries to identify and adopt best practices, innovate their workplace policies, and invest in their workforces*"
- BALDRIGE PERFORMANCE EXCELLENCE PROGRAM integral to the recognition plan

# Small Business Innovation Research (SBIR)

Proposed work in response to NIST's call for innovations in specific technology areas:

- Advanced communications, networks, and scientific data systems
- Advanced manufacturing and material measurements
- Cybersecurity and privacy
- Exploratory measurement science
- Physical infrastructure and resilience
- Collaborations and partnership
- Data and modeling
- Precision measurements
- Systems

$4 million in grants to small businesses in 15 states

More than 80% of awards to companies with < 20 employees

**11** Phase I awardees (up to $100,000 each)

**10** Phase II awardees (up to $300,000 each)

# NIST Strategic Planning Update

# Strategic Plan Goals

## 1 Position NIST to Advance U.S. Innovation

NIST will ensure that it has the workforce, organizational structures, tools and partnerships to support the development and adoption of emerging technologies critical to innovation and the economic competitiveness of the United States.

## 2 Provide High Quality Services to Improve Mission Delivery

NIST will optimize service delivery, streamline processes, and strengthen stakeholder engagement for organizational excellence, and to transform technology transfer.

## 3 Create the Infrastructure for a 21st Century Research Institution

NIST will make sure that it has the necessary physical and IT infrastructure to carry out its programs and mission for America.

## 4 Build a One NIST Culture

NIST will ensure that our workforce of federal staff and NIST associates are united around NIST's mission, valued for the expertise they bring, inclusive in engagement and recognition, and aligned for effectiveness.

# Addressing Equity in Career Advancement


Kickoff Symposium at NIST June 22, 2018

1. **Steering Group on Equity in Career Advancement** to identify the causes of apparent inequities in promotions at NIST for women and minority researchers and make recommendations.

2. **Events to engage and learn** such as outside speakers, forums, coffee hours with grassroots groups on NIST campuses

3. **Sources Sought Notice** on Analysis of Equity Disparity and Resolution to Known Equity Disparity Regarding STEM Career Advancement (Aug. 2018)

4. **Increased training opportunities** offered by NIST's Office of Human Resource Management and Civil Rights and Diversity Office

# NIST Frontiers

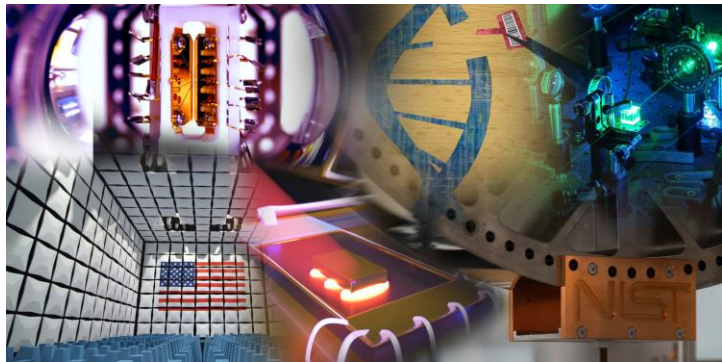
## New Major Lecture Series Featuring NIST Researchers

Eric Cornell, Nobel Prize in Physics 2001
Inaugural NIST Frontiers speaker

- The venerable NIST Colloquium series brings in external speakers
- The new **NIST Frontiers Series** features NIST's own researchers talking about their cutting-edge work
- Sponsored by Sigma Xi, Frontiers will provide new opportunities for NIST S&T community interactions
- Initial series: NIST Nobel Prize winners share current research

**Eric Cornell October 31, 2018**
***"Looking for Fossils of the Big Bang in Molecular Spectra."***

Applying precision measurement to learn about early moments of the universe and in the search for new sub-atomic particles.



# NIST Portrait Gallery

On October 26th, NIST will add nine former staff members to the NIST Gallery of Distinguished Scientists, Engineers, and Administrators

- **Robert Celotta** (CNST, 1971-2017)
- **Robert Chapman (**EL, 1975-2016)
- **A. Hunter Fanney** (EL, 1977-2017)
- **Gary L. Gilliland (**MML, 1986-2005)
- **Bettijoyce Breen Lide (**ITL, 1969-2013)
- **Laurie Locascio** (MML, 1986-2017)
- **Raymond D. Mountain** (MML, 1963-2008)
- **Bourdon F. Scribner** (MML, 1927-1973)
- **Rolf L. Zeisler** (MML, 1978-1991 and 1996-2009)

# Recent NIST / JILA Recognition

**CO Governor's Award for High Impact Research - CO-LABS**

*for inventing tabletop x-ray technology for multidimensional imaging*

**Margaret Murnane and Henry Kapteyn, JILA**

October 4, 2018

**U.S. Department of Commerce Gold Medal & Ron Brown Excellence in Innovation Award**

*for creating the world's best atomic force microscope, and pioneering its biological applications*

**Tom Perkins, NIST / JILA Chair**

September 25, 2018

# NIST Engagements

**SelectUSA Investment Summit**

**Panel on Advanced Manufacturing**


**Politico Live: Government's Role in Artificial Intelligence**


July 11, 2018

**White House Summit on 5G**

**Session on Standards**

September 28, 2018

**STS forum – Kyoto**

**Society Changed by ICT**


October 8, 2018

**Simposio Metrología**

**CENAM – Mexico**

October 11, 2018

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# DISCUSSION