

# Agenda

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## Tuesday, June 13, 2017

### Session I: NIST Update

- NIST update
- Security update
- Budget update

### Session II: NIST Laboratory Programs Strategic Planning

12:45 Laboratory Programs Strategic Planning Overview

1:30 Update on NIST Bioscience Program

2:30 Update on NIST Information Technology Program

## Wednesday, June 14, 2017

### Session III: Safety Update

### Session IV: Developing Organizational Flexibility

### Session V: Next Steps and Adjourn

How should we think about allocating decreasing resources while strengthening NIST for future industry needs?

Are the strategic priorities NIST has identified the right ones?

How can NIST more effectively address:

Interdisciplinary technologies?

Cross-laboratory work?

Change and program flexibility?

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# Director's briefing to the Visiting Committee on Advanced Technology

Kent Rochford

Acting Director of NIST & Under Secretary of Commerce for Standards and Technology

Tuesday June 13, 2017

# Outline

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Safety update

Personnel changes – NIST

NIST program highlights

*Security update*

NIST Budget

Program changes

DoC Reform Plan

# Welcome to new VCAT Members

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Credit: MedImmune



## Gail Folena-Wasserman, Ph.D.

Senior Vice President, Biopharmaceutical Development, MedImmune

- Oversees all analytical, process, formulation and drug product development including delivery and devices; and clinical manufacturing and quality control for clinical products.
- Joined MedImmune in 1991 as director, development, and was promoted to vice president, development, in October 1995. In 2010, she was appointed head of vaccines and biologics development.
- PharmaVOICE selected Dr. Folena-Wasserman as one of the 100 Most Inspiring People in 2011.

Credit: IoT Talent Consortium



## David Vasko

Director, Advanced Technology, Strategic Development, Rockwell Automation

- Responsible for applied R&D and Global Product Standards and Regulations within Rockwell.
- Previously at Rockwell, he managed the Distributed Control Research lab and the Architecture Development group.
- On the boards of the Smart Manufacturing Leadership Coalition, the IoT Talent Consortium, and the Milwaukee Institute.

# NIST Safety Incident Metrics

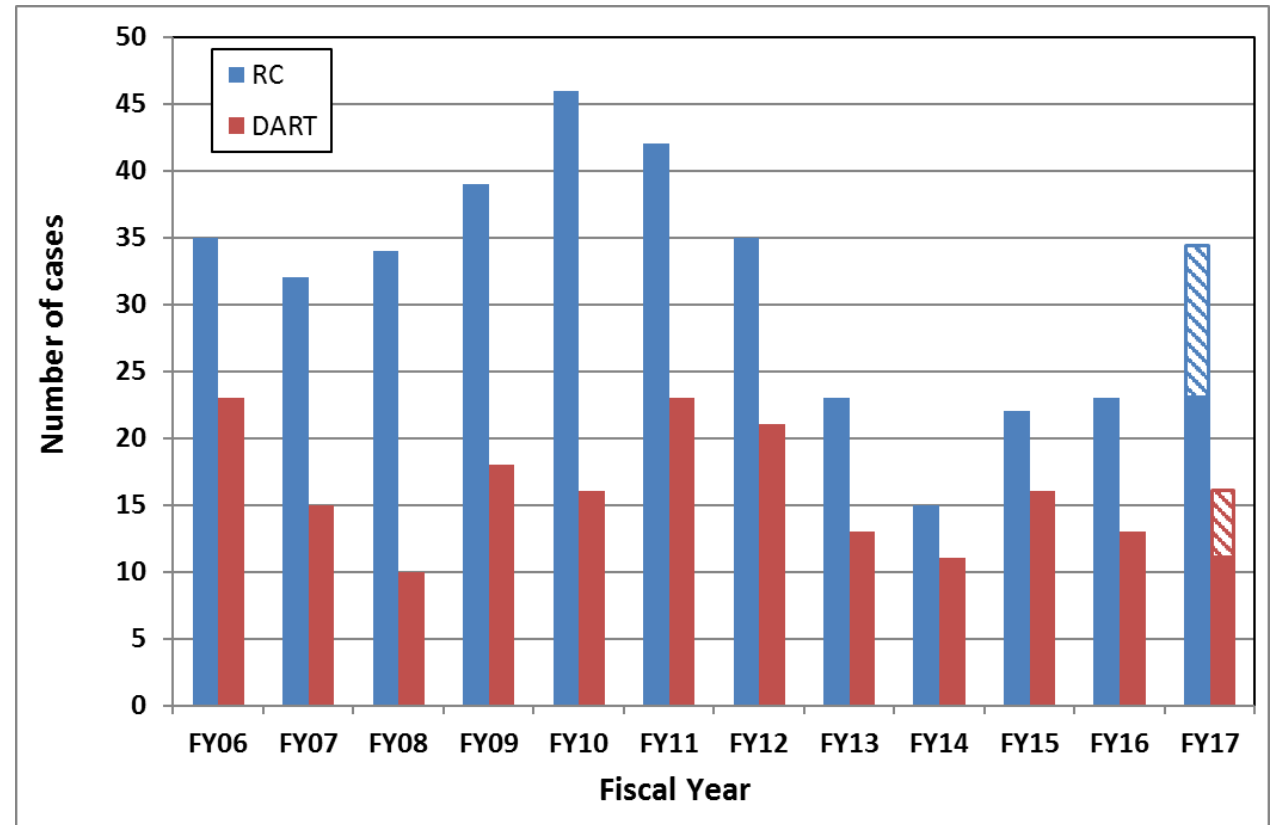
Data shown is to June 1, 2017

## 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), and FY17 (1)

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

# Slips, Trips, and Falls (STFs)

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Incident data from September 2013 to the present (3½ years)

- 667 total incidents                      121 STFs (**18%**)
- 108 OSHA recordables                38 STF OSHA recordables (**35%**)
- 49 lost-time cases                      26 STF lost-time cases (**53%**)

STF lost time average: **37 days**

About 1/3 of STFs – no associated hazard (some sort of human factor or unsafe practice such as hurrying or walking off paved surfaces)

## A NIST Safety Minute



Colleagues,

Each year at NIST, more people are injured on our sites by a slip, trip, or fall than by any other means. The impact of these falls is significant and real. In the past 3.5 years, we've had 38 slips, trips, and falls requiring medical treatment beyond first aid, and 26 of the individuals injured spent an **average of 37 days away from work or on restricted duty**.

About a third of our slips, trips, and falls involved no identified physical hazard and likely resulted from human factors such as being tired, distracted, or rushing. Even though it is challenging to address every physical hazard in a dynamic environment like ours, we often can avoid being injured by **keeping our minds and our eyes on the path**.

I hope you will take a few minutes to hear from your colleagues in the video below about the impact falls had on their lives and what you can do to avoid a similar mishap.

Thanks,

Kent Rochford  
NIST Acting Director



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Thanks,

Kent Rochford  
NIST Acting Director

# NIST Management Changes – recent & upcoming



**Del Brockett**  
Acting Associate Director  
for Management Resources  
Effective: February 2017



**James Olthoff**  
Acting Associate Director  
for Laboratory Programs  
Effective: July 2017



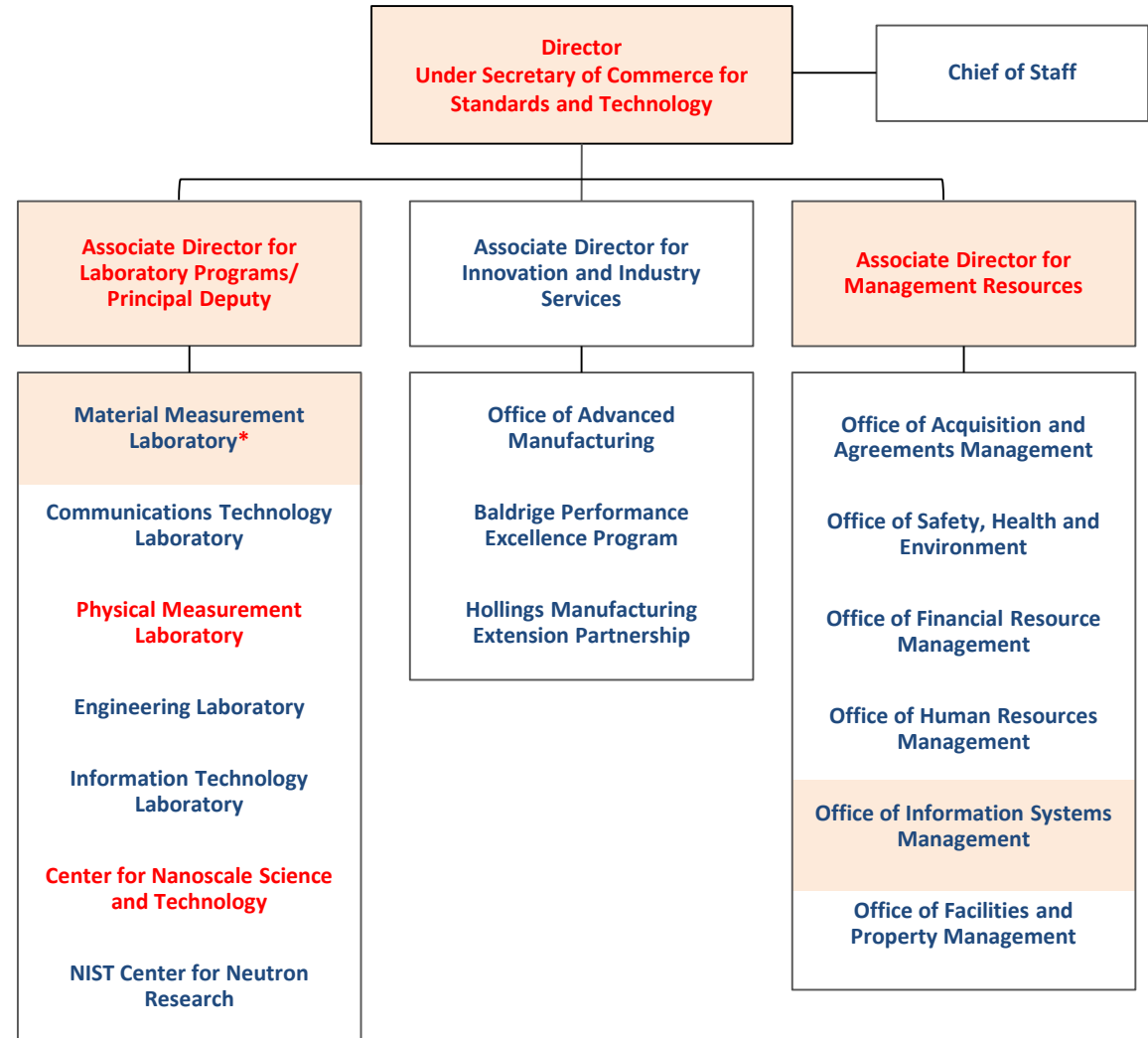
**Mike Fasolka**  
Acting Director, Material  
Measurement Laboratory  
Effective: January 2017



**Carl Williams**  
Acting Director, Physical  
Measurement Laboratory  
Effective: July 2017



**James Kushmerick**  
Acting Director, Center for  
Nanoscale Science &  
Technology  
Effective: May 2017





# Farewell to Laboratory Leadership – recent and imminent

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Dr. Robert Celotta  
Director, Center for Nanoscale  
Science & Technology  
Retired: April 28, 2017



Dr. Laurie Locascio  
Director, Material Measurement  
Laboratory  
Announced Retirement: October 1, 2017

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# NIST program highlights

# NIST Impacts: Lab Programs

NIST

Search NIST

NIST MENU

## Industry Impacts

As industry's national laboratory, NIST is dedicated to supporting U.S. competitiveness in areas of national importance from communications technology and cybersecurity to advanced manufacturing and disaster resilience. Below is a sampling of ways NIST's work in the areas of measurement science, standards and technology is helping to enhance economic security and improve quality of life.



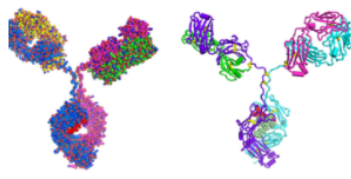
### NIST Impacts: 5G Wireless Communications

The next generation of wireless communications technology will allow many more devices to send information much faster, making possible everything from virtual reality to driverless cars. NIST works with industry and academia to understand how those technologies behave, so next generation wireless networks can be deployed sooner and with a better user experience.



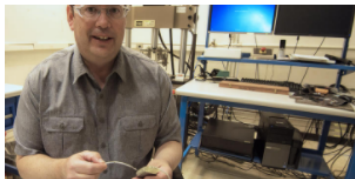
### NIST Impacts: Automotive Lightweighting

Automotive companies are increasingly using lightweight materials to improve vehicle fuel economy. However, incorporating those materials into new vehicles is time-consuming and costly. NIST data and models are helping automakers understand and predict how materials behave in the harsh conditions inherent to manufacturing.



### NIST Impacts: Biopharmaceuticals

Protein-based biologic drugs, which are increasingly used to treat cancers, autoimmune disorders and infectious diseases, are hard to produce, store and deliver reliably. Better measurement tools developed by NIST drive innovation and lower costs associated with these drugs.



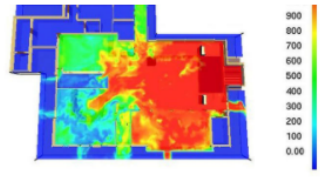
### NIST Impacts: Cardiac Devices

In the past decade, hundreds of thousands of patients were affected by two major recalls of



### NIST Impacts: Chemical Manufacturing

Chemical plants need access to consistent, reliable



### NIST Impacts: Commercial Building Fire Protection

Commercial buildings are over-engineered for fire

5

largest manufacturers of cardiac devices participate in a NIST consortium

In 7 months,

NIST developed a test procedure for cardiac leads that is now an industry-wide standard

3-4 months

development time saved by a major manufacturer by using NIST's data—its new vehicle is 700 lbs. lighter and 50% more fuel efficient

\$200 M/yr

estimated cost savings to major U.S.-based automakers if NIST helps reduce their number of trial designs by half

“NIST's technical contributions have been invaluable to our group, resulting in standards that will help American corporations compete in the \$4 billion global market for pacemakers and implantable defibrillators”

– Dan Cooke, R&D Senior Fellow, Boston Scientific, and Industry co-chair, AAMI CRMD Device Transvenous Cardiac Leads Working Group

“NIST operates with industry in mind. Their experts take the time to understand what we're trying to accomplish and tailor their response to what we need. They take critical eyes to our approach and make sure we're not wasting our time getting to where we want to go.”

–Dr. Katherine Avery Vozar, Ford Research and Innovation Center

<https://www.nist.gov/industry-impacts>

# NIST Impacts: Hollings Manufacturing Extension Partnership

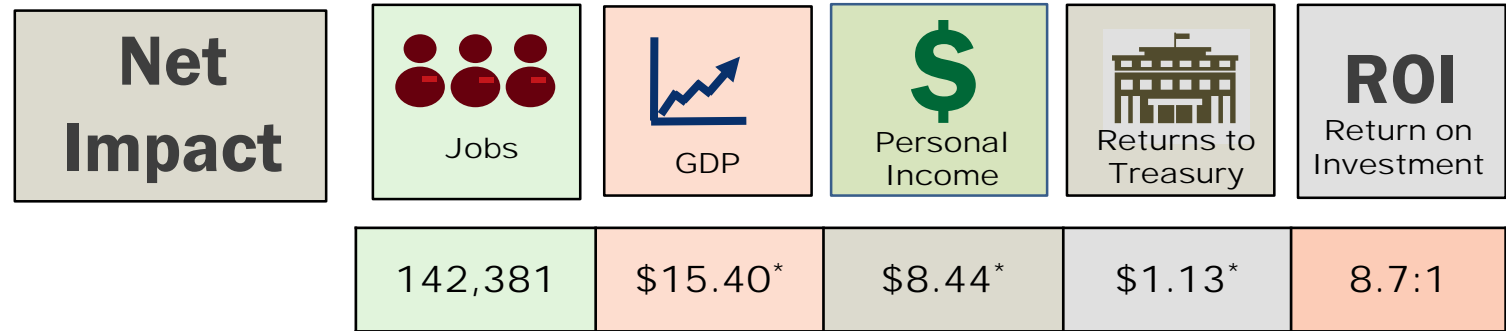
March 2017 Report: The Upjohn Institute used the 2016 results from an independent survey of MEP clients to estimate the net impact of these activities on the U.S. economy.

Used the REMI<sup>®</sup> model, a sophisticated econometric model, to forecast two scenarios:

- One with MEP activities included
- One without.

The difference between the two forecasts is the **NET IMPACT** of MEP activities on the U.S. economy:

- Jobs
- Personal Income
- GDP
- Returns to U.S. Treasury



\*Dollars in billions

The REMI<sup>®</sup> model uses current data on the economy to estimate the indirect and induced effects of the direct impact of MEP activities on jobs.

- Resulting in an ROI of 8.7 to 1.

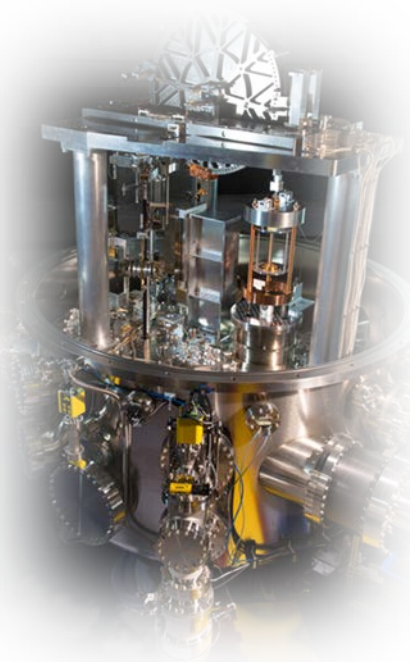
Note: Estimates are considered conservative:

- Displacement effects of businesses included
- Used only personal income tax

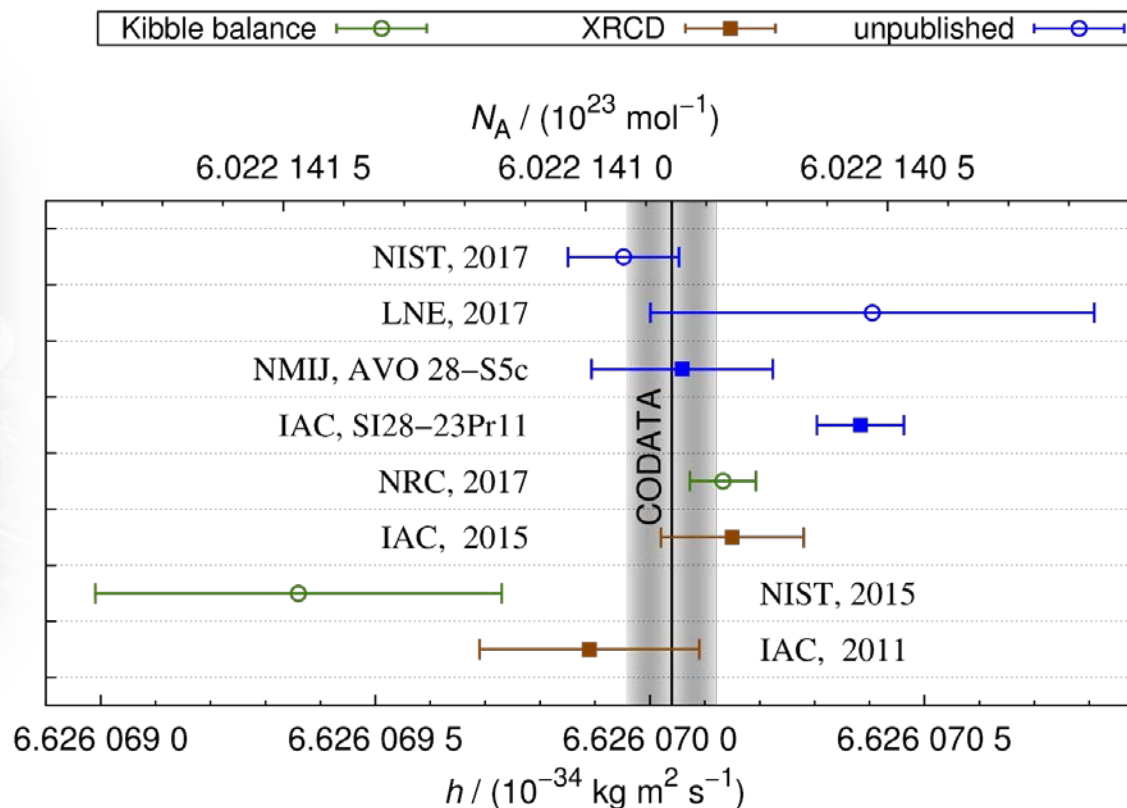
# Redefinition of the SI

The world is on schedule for a major redefinition of the International System of Units in the Fall of 2018.

- Jul 2017 ● NIST led CODATA Task Group for Fundamental Constants
- Oct 2017 ● CIPM will meet to decide whether to proceed
- Mar 2018 ● CGPM shares formal proposal with the Treaty Nations
- Oct 2018 ● CGPM vote agreement goes into effect
- May 20, 2019 ↓ International Metrology Day



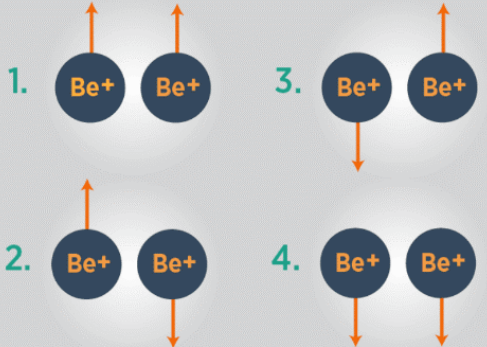
Status of  $h/N_A$  measurements shortly before the deadline to calculate a “world-average” number for the four defining constants.



# Highlight: Science Breakthrough

## NIST Physicists Show Ion Pairs Perform Enhanced 'Spooky Action'

FOUR POSSIBLE OUTCOMES



1.  $\text{Be}^+$   $\text{Be}^+$  (both up arrows)  
2.  $\text{Be}^+$   $\text{Be}^+$  (left up, right down arrows)  
3.  $\text{Be}^+$   $\text{Be}^+$  (left down, right up arrows)  
4.  $\text{Be}^+$   $\text{Be}^+$  (both down arrows)

The researchers measure whether the **spins** are the same or different. The measurements indicated **“non-spooky”** classical physics can explain the ions' behavior during at most 33% of the measurements.

**Conclusion:**  
The ions are **67% SPOOKY!**

In the experiment, two beryllium ions are **“entangled”** in a trap. This means their **spins are correlated** or interlinked.



Entangled, separated, then manipulated spin

Adds recent demonstrations (Bell's Test) in photons of Einstein's “spooky action at a distance”

# Highlight: Technology Breakthrough

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## Making an Airtight Case for Freedom



President Abraham Lincoln's first handwritten draft of the Preliminary Emancipation Proclamation will be encased in a new high-tech "home."

Like many of the nation's most precious historical documents, including the Charters of Freedom, it will be protected by an encasement system custom-designed and constructed by NIST.

# Highlight: National Fire Research Laboratory CLT test

Composite Laminate Timber (CLT) show promise for tall wood building potential

Burn studies help with development of fire and building codes in these new structures



The expanded facility can hold structures up to two stories tall and contain fires up to 20 megawatts of peak energy





# National Institute for Innovation in Manufacturing Biopharmaceuticals

**Lead: U. Delaware for USA Bio**

*Institute launch 03/01/2017*

**Funding: \$70 M NIST, \$129 M match**

## The NIIMBL mission:

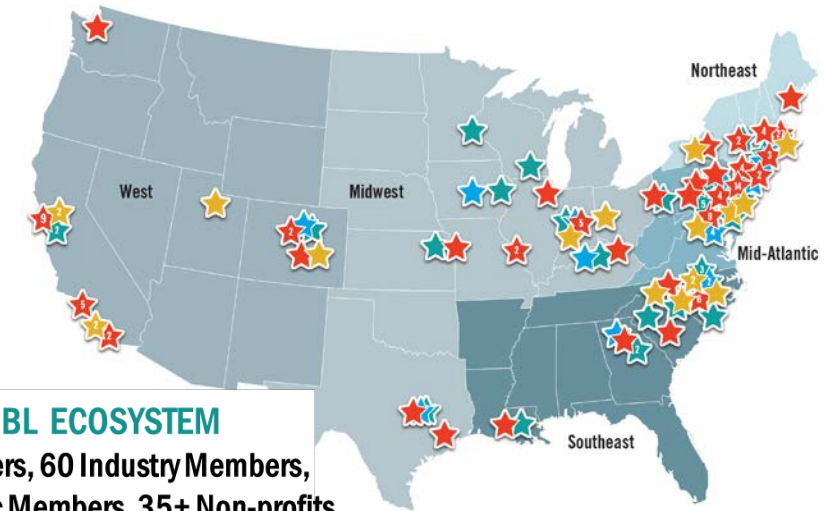
accelerate biopharmaceutical manufacturing innovation

support development of standards that enable more efficient and rapid manufacturing capabilities

educate and train a world-leading biopharmaceutical manufacturing workforce

*Fundamentally advancing U.S. competitiveness in this industry.*

# NIIMBL



## NIIMBL ECOSYSTEM

**150+ Partners, 60 Industry Members,  
35+ Academic Members, 35+ Non-profits**

## Biopharmaceuticals

Cells or other biological materials or products used for medical treatment

- *not* chemically produced drugs.

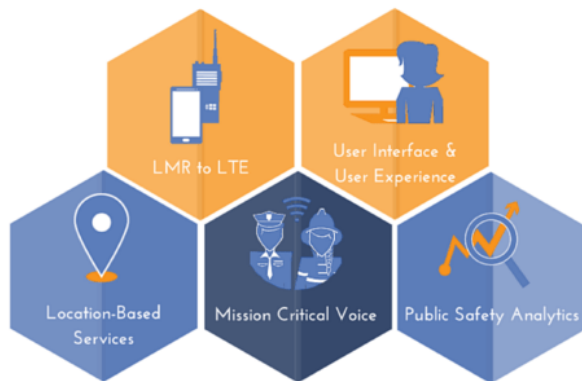


# Highlight: Public Safety Innovation Accelerator Program

The **Public Safety Innovation Accelerator Program** grant provides funding for R&D in:

- Mission Critical Voice
- Location Based Services
- Public Safety Analytics
- Public Safety Communication Demand Model
- Research and Prototyping Platforms
- Resilient Systems

First round awarded \$38.5M to 33 projects



**NIST Virtual Public Safety Test Environment Challenge** crowdsources ideas and designs for measurement environments

- Immersive virtual reality tools in conjunction with physical spaces
- Simulating first responder scenarios for accurate and repeatable testing of new first responder interfaces and technologies
- \$45,000 in prizes



# NRC Reviews - Center for Nanoscale Science & Technology

Key conclusions and recommendations from the National Academies 2016 report.

- Most programs are well conceived with impressive accomplishments
- CNST has some leading-edge, best-of-kind equipment and extremely competent research and technical staff
- More transparent metrics for fab usage
- Operating below capacity
- More effort in strategic planning and coordination within existing NIST programs

**AN ASSESSMENT OF THE  
NATIONAL INSTITUTE OF STANDARDS  
AND TECHNOLOGY  
CENTER FOR NANOSCALE SCIENCE AND  
TECHNOLOGY**

**FISCAL YEAR 2016**

Panel on Assessment of the Center for Nanoscale Science and Technology at the  
National Institute of Standards and Technology

Committee on NIST Technical Programs

Laboratory Assessments Board

Division on Engineering and Physical Sciences

A Report of

*The National Academies of*

SCIENCES • ENGINEERING • MEDICINE

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Washington, DC

[www.nap.edu](http://www.nap.edu)



\*The National Academies recently reviewed MML and EL – update to come in a future VCAT meeting.

# Executive Order 13800: Strengthening The Cybersecurity of Federal Networks and Critical Infrastructure (May 11, 2017)

## Cybersecurity of Federal Networks

### **1.c: Risk Management**

Federal agencies shall use the Cybersecurity Framework (CSF) to manage cybersecurity risk

**Lead Agencies: OMB and DHS**

NIST Role:

- Raise agency awareness of the CSF;
- Update existing suite of NIST cybersecurity risk management guidelines to integrate CSF support.

*NIST issued draft guidance (NIST IR 8170) on federal use of the Cybersecurity Framework one day after the EO was issued*

## Cybersecurity of Critical Infrastructure

### **2.d: Resilience Against Botnets and Other Automated, Distributed Threats**

Lead an open and transparent process to:

- Identify and promote action by stakeholders to improve resilience, and
- Encourage collaboration with the goal of dramatically reducing threats perpetrated by automated and distributed attacks.

**Lead Agencies: Commerce (NIST, NTIA) and DHS**

## Cybersecurity for the Nation

### **3.d: Workforce Development**

- Assess efforts to educate & train the American cybersecurity workforce;
- Provide report to the President within 120 days on recommendations for growth and sustainment of the cybersecurity workforce.

**Lead Agencies: Commerce (NIST) and DHS**