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 Gaithersburg
June 9, 2020

Meeting Agenda

June 9, 2020

Session I: NIST Update

Session II: NIST Efforts in Response to COVID-19

Session III: NIST and COVID-19 Safety and Operations

Session IV: Discussion with VCAT

NIST Update

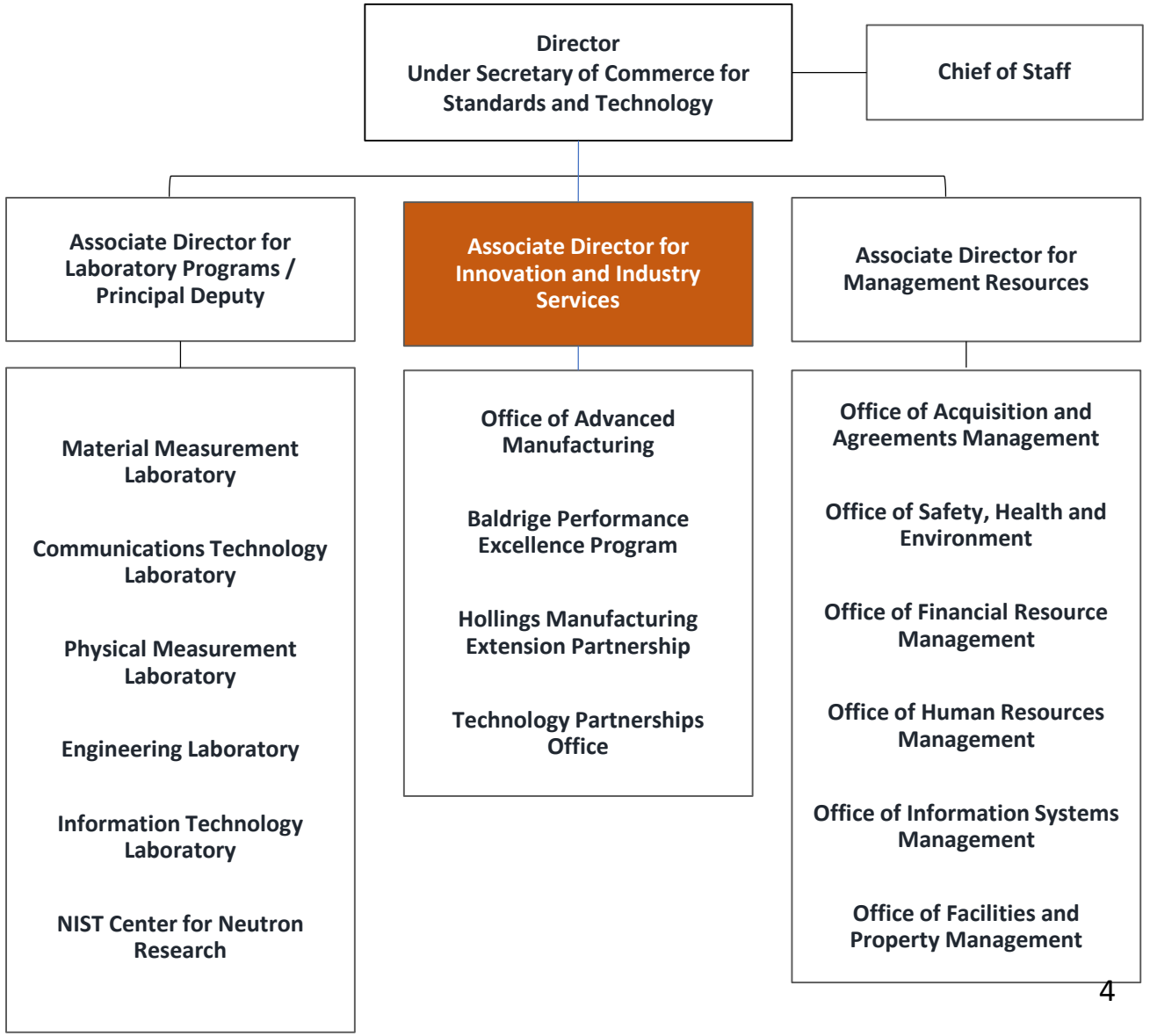
- Agenda Review
- NIST Leadership Changes
- Budget Update
- Programmatic Updates
- ROI Initiative Update
- Strategic Plan Update
- Discussion

NIST Leadership Changes: Welcome

Associate Director for Innovation and Industry Services

Mojdeh Bahar

- Joins NIST from Department of Agriculture, Assistant Administrator for Technology Transfer.
- Leader in IP, marketing, licensing, public-private partnerships.
- Served in leadership roles in the Federal Laboratory Consortium for Technology Transfer (FLC)

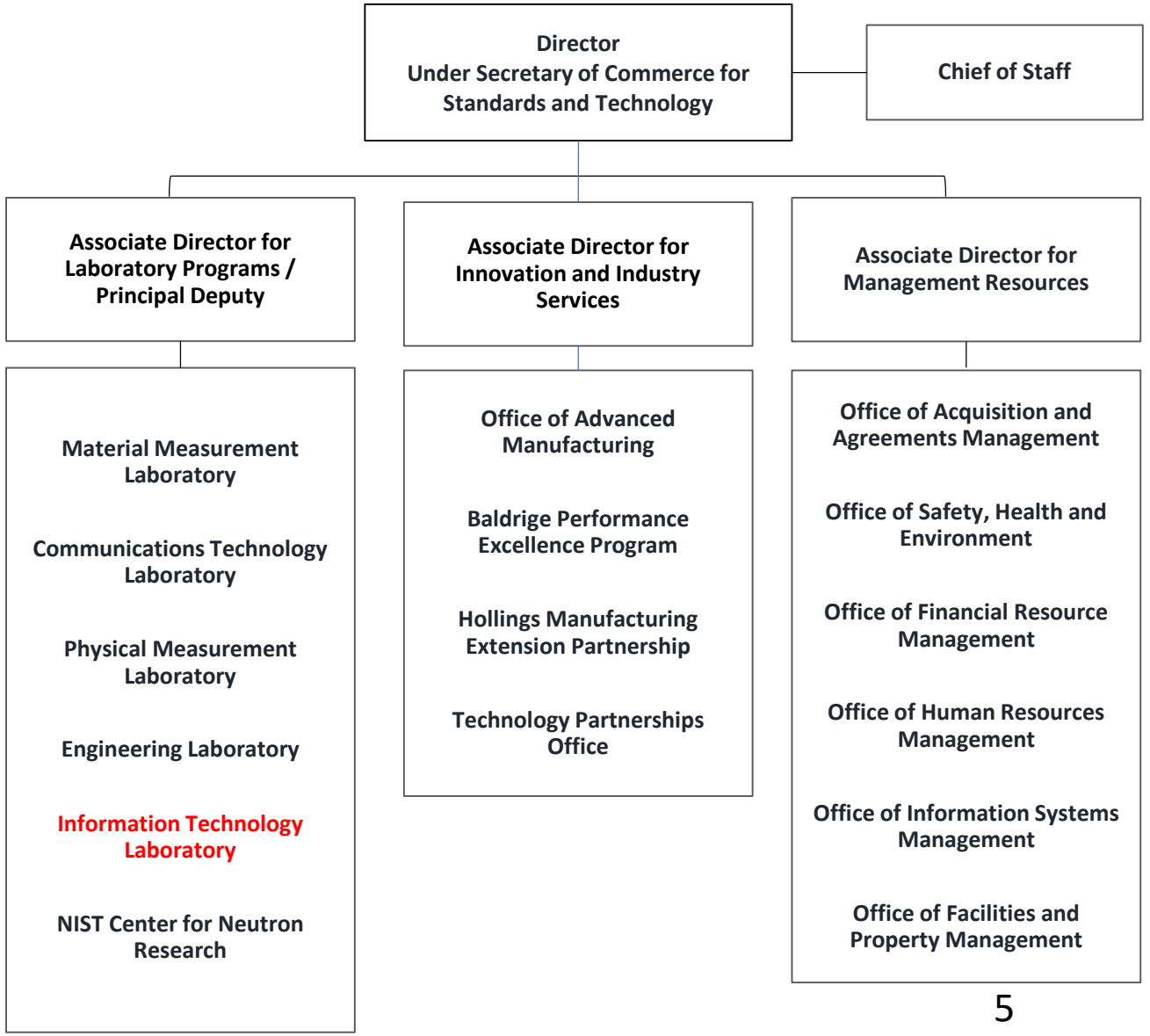


NIST Leadership Changes: Retirement

Chief Cybersecurity Advisor, Director of NCCoE, NIST Fellow

Donna F. Dodson

- Retired May 2020 after 33 years of federal service
- Leadership in many cyber areas, including AI, IoT, quantum-resistant cryptography, and privacy engineering
- Presidential Rank Award in 2019, finalist for the 2020 Samuel J. Heyman Service to America Medal: Safety, Security and International Affairs category

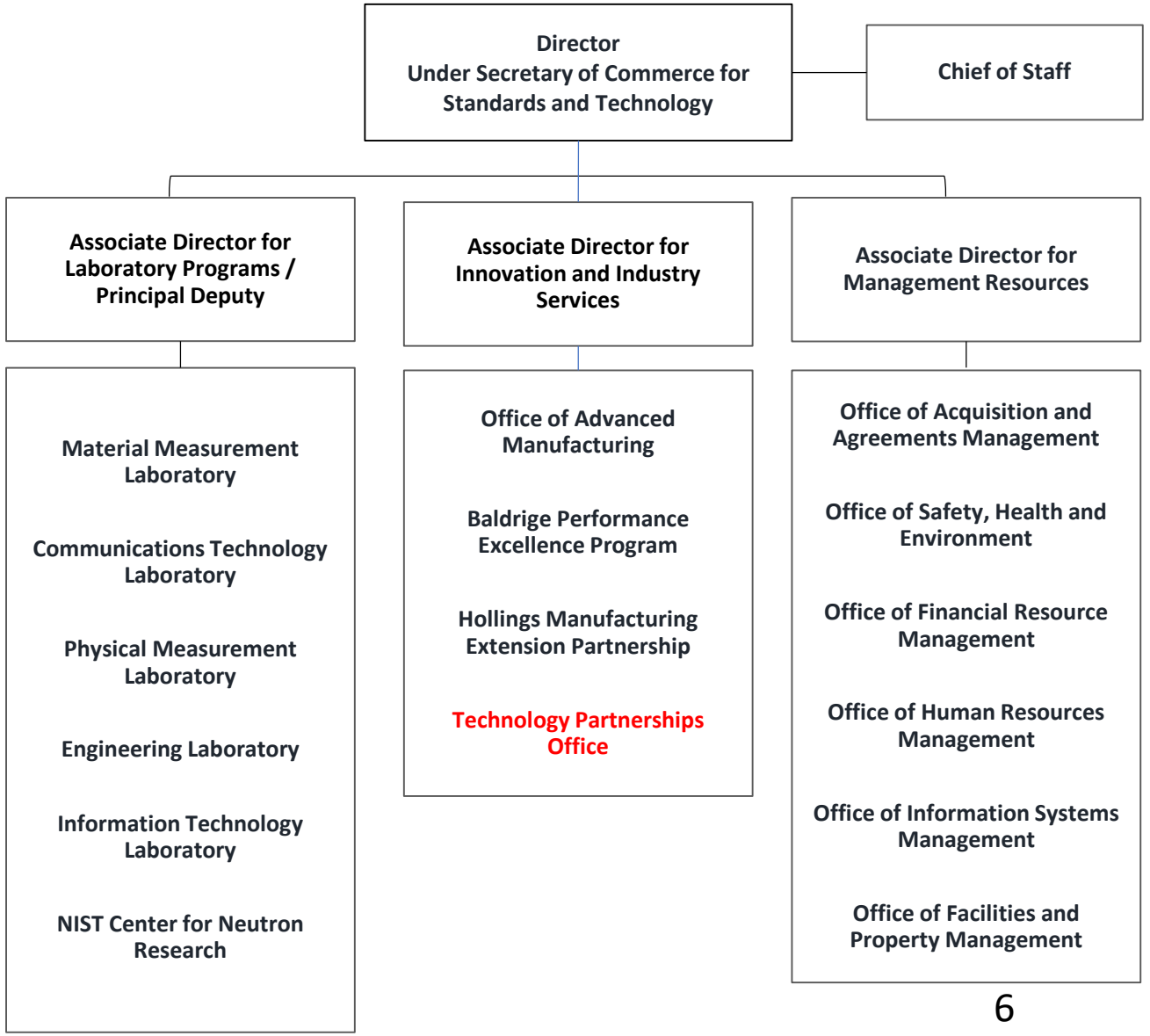


NIST Leadership Changes: Retirement

Director, Technology Partnerships Office

Paul Zielinski

- Retired March 2020 after 32 years of federal service
- National leadership roles in technology transfer, Federal Interagency
- Newly appointed as executive director, Federal Laboratory Consortium for Technology Transfer (FLC) now operated in partnership with AUTM

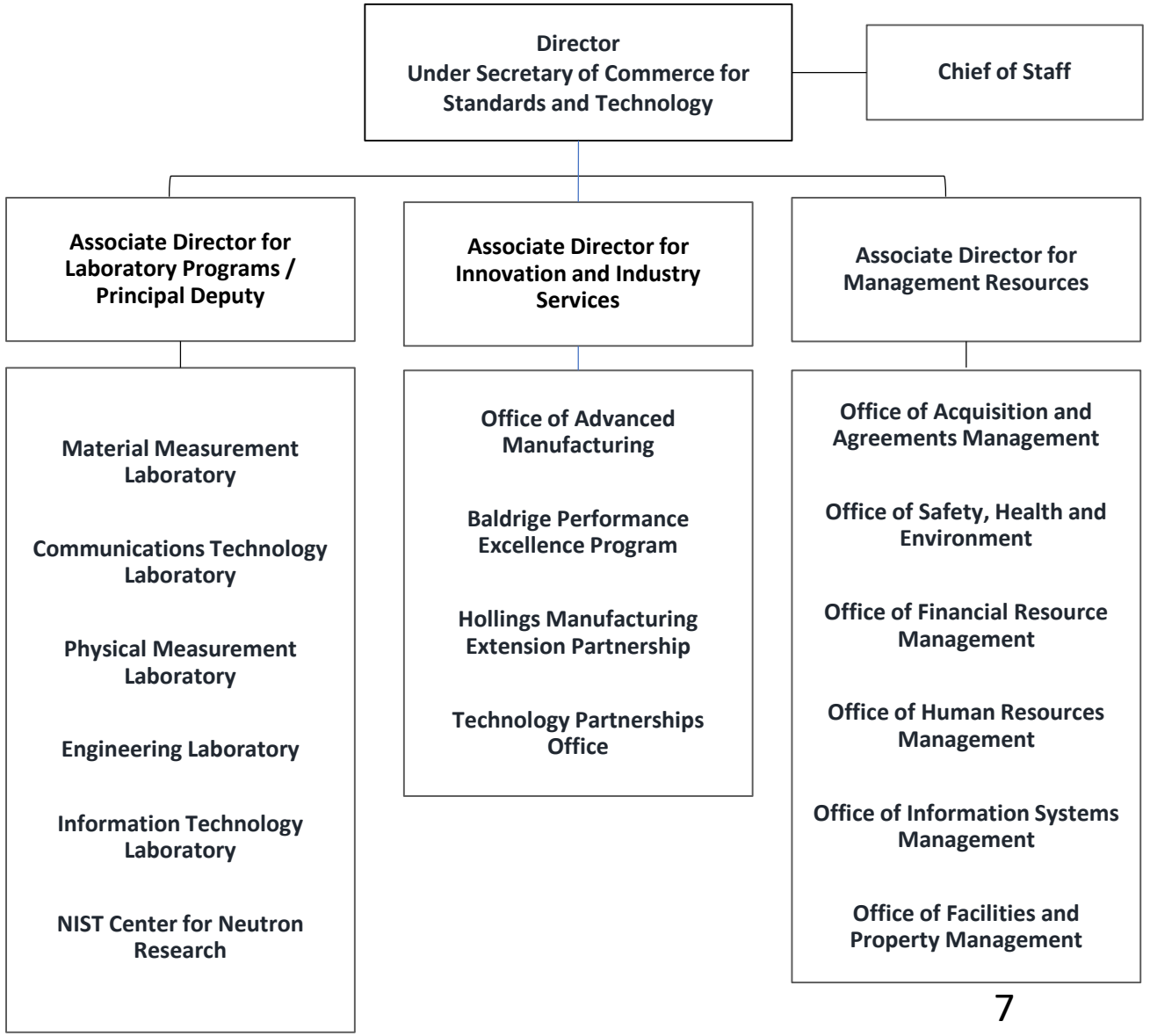


NIST Leadership Changes

Senior Policy Advisor for Standards and Digitalization

Ajit Jillavenkatesa

- Left NIST May 31, 2020 for position in industry
- Key policy advisor for NIST Standards Coordination Office (SCO) and Program Coordination Office (PCO)
- Leadership in many standards areas critical to NIST, such as 5G, IoT, etc.
- Shaped and informed USG's standards positions and policies domestically and in multilateral organizations



NIST Leadership Changes: Welcomes

Kevin Stine

Acting Chief Cybersecurity Advisor

Jeff Greene

National Cybersecurity Center of Excellence Director

NIST Leadership Changes: Welcomes

Courtney Silverthorn

Acting Director, Technology Partnerships Office

Rob Ivester

Deputy Director, Hollings Manufacturing Extension Partnership (MEP)

NIST Organization Realignment 2020

National Technical Information Service (NTIS)

Policy & Strategic Planning

NIST Director / Under Secretary of Commerce for Standards and Technology

Office of Chief Counsel

Chief of Staff

Associate Director for Laboratory Programs (ADLP)

- **Laboratory Programs**

Communications Technology Laboratory
Engineering Laboratory
Information Technology Laboratory
Material Measurement Laboratory
NIST Center for Neutron Research
Physical Measurement Laboratory

Deputy Director for Laboratory Programs
Strategic Relationships
Research Protections
Human Subjects Protection
Special Programs Office
Standards Coordination
International and Academic Affairs

Associate Director for Innovation and Industry Services (ADIIS)

Innovation and Industry Services
Baldrige Performance Excellence Program
Hollings Manufacturing Extension Partnership
Office of Advanced Manufacturing
Technology Partnerships Office
Technology Discovery Office

Senior Advisor Technology Innovation

Associate Director of Management Resources (ADMR)

Management Resources
Human Capital
Human Resource Management
Onboarding
Civil Rights and Diversity Office
Safety, Health and Environment
Financial Resource Management
Acquisition and Agreements Management
Information Systems Management
Facilities and Property Management

Information Services
Emergency Services
Fabrication Technology

Congressional and Legislative Affairs
Public Affairs
Executive Officer for Administration
Management and Organization Office

NIST Realignment Approved by DOC, Finalized with OMB

Principal function changes shown:
Green font – Complete
Red font – In progress

NIST Budget

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

FY20 Enacted, Spend Plans Approved

FY21 In Development, Delayed by COVID-19

FY22 Early Stages

NIST Budget

	FY 2019 Enacted	FY 2020 Enacted	FY 2021 Pres. Request
Laboratory Programs (STRS)	$724.5	$754.0	$652.0
Hollings Mfg Ext Partnership (MEP)	$140.0	$146.0	$0.0
Manufacturing USA	$15.0	$16.0	$25.3
Construction & Renovation	$106.0	$118.0	$60.2
Total	**$985.5**	**$1034.0**	**$737.5**

NIST Reauthorization Testimony Themes

Lab to Market (L2M), ROI & building a more entrepreneurial workforce

Industries of the Future and essential international standards

Adoption of smart manufacturing systems by U.S. manufacturers (MEP and Manufacturing USA)

NIST's work to accelerate the Bioeconomy

China and U.S. 5G technology competitiveness

Smart cities implementation and interoperability

Future of Neutron Science at NIST

U.S. HOUSE OF REPRESENTATIVES COMMITTEE ON
SCIENCE, SPACE, & TECHNOLOGY
Eddie Bernice Johnson, Chairwoman

March 11, 2020

Highlighted NIST's plans and accomplishments in critical U.S. technology areas to the Subcommittee on Research & Technology

NIST role in plumbing research and U.S. water quality

NASCTN to help address key 5G questions regarding 24 GHz band

AI and facial recognition

Impacts and risks of ailing infrastructure on NIST capabilities

Secure and private digital identity nationally and internationally (ex. currency)

New advanced manufacturing institutes

U.S. supply chain resilience, the importance of entrepreneurs and manufacturers

NIST Privacy Framework Update

Early Adopters of the Privacy Framework

EQUIFAX
TRUIST
athenahealth
FAIRWARNING
Medtronic
okta
ARLINGTON VIRGINIA
COMMODITY FUTURES TRADING COMMISSION 1975
LINE
THE COUNTY OF SANTA CLARA 1850

A Conversation on the NIST Privacy Framework

Wednesday, February 19, 2020 2:00 pm - 4:00 pm
CSIS Headquarters, 2nd Floor

CSIS | CENTER FOR STRATEGIC & INTERNATIONAL STUDIES

Join us at CSIS to hear **Dr. Walter Copan, Under Secretary of Commerce for Standards and Technology and NIST Director**, discuss the NIST Privacy Framework.

Cybersecurity: NIST Work in Encryption

Credit: E. Edwards/JQI

Post Quantum Cryptography
Moving to Round Three Selections in June 2020.

Lightweight Encryption
Down-selected from 57 to 32 potential candidate algorithms. Analysis ongoing.

Cybersecurity: Noteworthy Releases

SP 800-171 Rev 2
Protecting Controlled Unclassified Information in Nonfederal Systems

SP 800-207,
Zero Trust Architectures
Draft for public comment

Secure Software Development Framework

SP 800-53 Rev 5
Draft for public comment

CSF Manufacturing Profile
(NISTIR 8183 Rev 1 draft)

5G cybersecurity
FRN seeking formal industry collaborators.

Positioning, Navigation, and Timing (PNT): Responsible Use

EXECUTIVE ORDERS

Executive Order on Strengthening National Resilience through Responsible Use of Positioning, Navigation, and Timing Services

INFRASTRUCTURE & TECHNOLOGY | Issued on: February 12, 2020

★ ★ ★

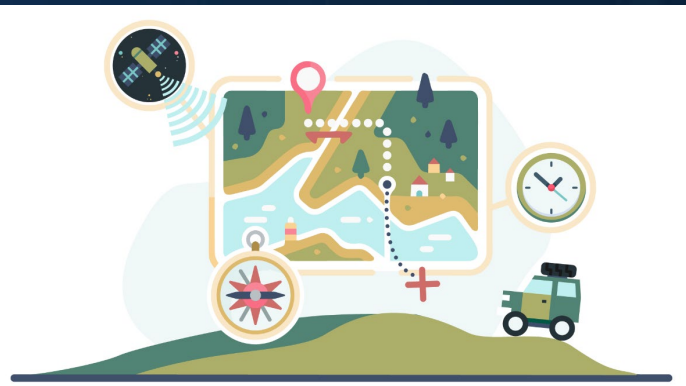
Request for Information posted in Federal Register May 27, 2020
NIST accepting responses through July 13, 2020

https://www.whitehouse.gov/presidential-actions/executive-order-strengthening-national-resilience-responsible-use-positioning-navigation-timing-services/

The Executive Order directs the Department of Commerce and other agencies to work with the private sector to identify and promote responsible methods of using PNT services that appropriately manage risks.

The Department of Commerce is also charged with making a global navigation satellite system (GNSS)-independent source of Coordinated Universal Time to enhance the resilience of and support the needs of critical infrastructure

PNT: Profile Approach



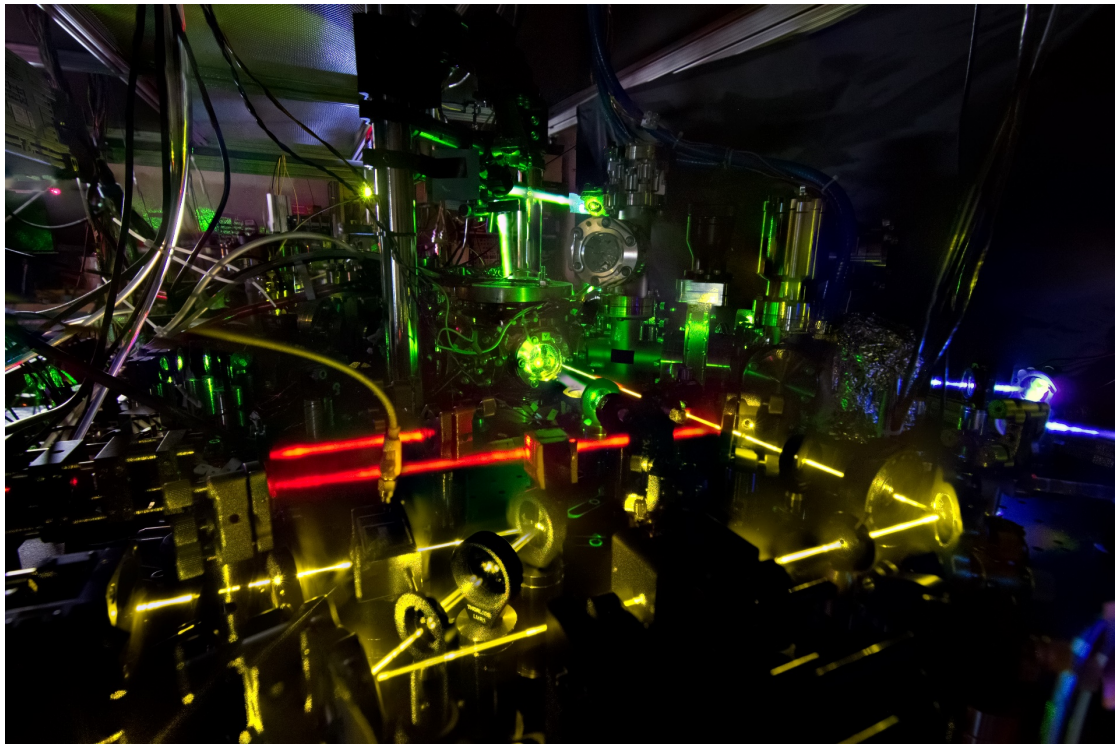
- Open, collaborative process
- Involve public & private sector stakeholders
- NIST will develop a foundational PNT profile to help organizations make deliberate, risk-informed decisions on PNT services use

Request for Information released May 27, 2020.

NIST hosts public webinar on June 4 to share our tasks, objectives, and approach.

https://www.nist.gov/itl/pnt

PNT: Precision Time Approach



NIST ytterbium lattice clock

Time distribution over optical fiber – Initial goal : 1 μs accuracy with eventual improvement to < 100 ns.

- A fiber installation in progress from Gaithersburg to a customer facility in VA.

Optical Clock Development – NIST continues development of transportable optical clocks based on ytterbium atoms and is starting a new program for a optical clock based on a single strontium ion.

AI Standards Coordination

Outreach **connecting** all known Federal efforts related to AI standards development & use.

Goal: Participants leverage learnings from successes of other participants.

Facilitate ongoing discussions between U.S. private sector and Federal agencies. Strengthen private-public sector coordination

AI: Future Events

- Develop shared understanding of what constitutes **Trustworthy AI** (e.g., accuracy, security, explainability, reliability, free from bias).
- Establish the needed scientific foundation for design, development, and assessment of **Trustworthy AI.**

Bias in AI: Workshop on August 19, 2020.

Secure AI: Terminology and Taxonomy; 2nd draft for public comment in July.

Use-Inspired AI:
Call for proposals closes June 29, 2020.

Quantum: Interagency Coordination

Multi-agency Quantum Networking Coordination Meeting held on May 11th and 13th to discuss long-term goals

Participants:

NIST

NASA

NSF

Department of Energy

Department of Defense

Executive Office of the President, Office of Science and Technology Policy

5 year plan:

- Gain technical knowledge needed to build useful quantum networks
- Fundamental research to explore use-cases
- Basic R&D for manufacturing key components not available yet

Opportunity Areas:

- Engineering approaches to bring R&D to market-ready technology
- Application studies
- Testbeds for technical benchmarking
- Unified strategy across agencies & for international standards engagement

Roadmap Status:

- Too early to develop this, but gap analysis and bottleneck identification will help shape future roadmap
- Will be developed with community input across sectors and go from R&D up to commercialization

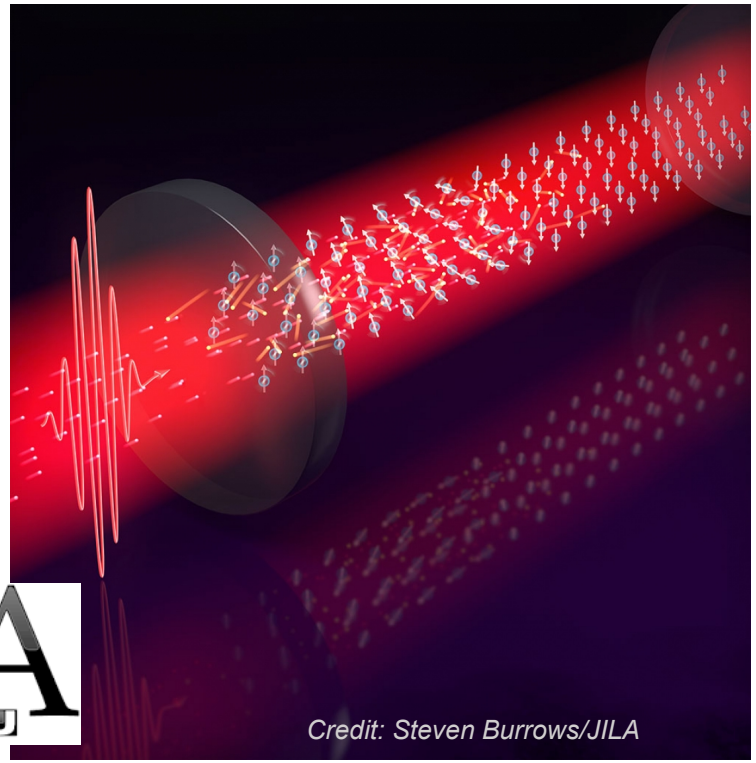
Quantum: Interactions of Atoms and Light

Article | Published: 29 April 2020

nature

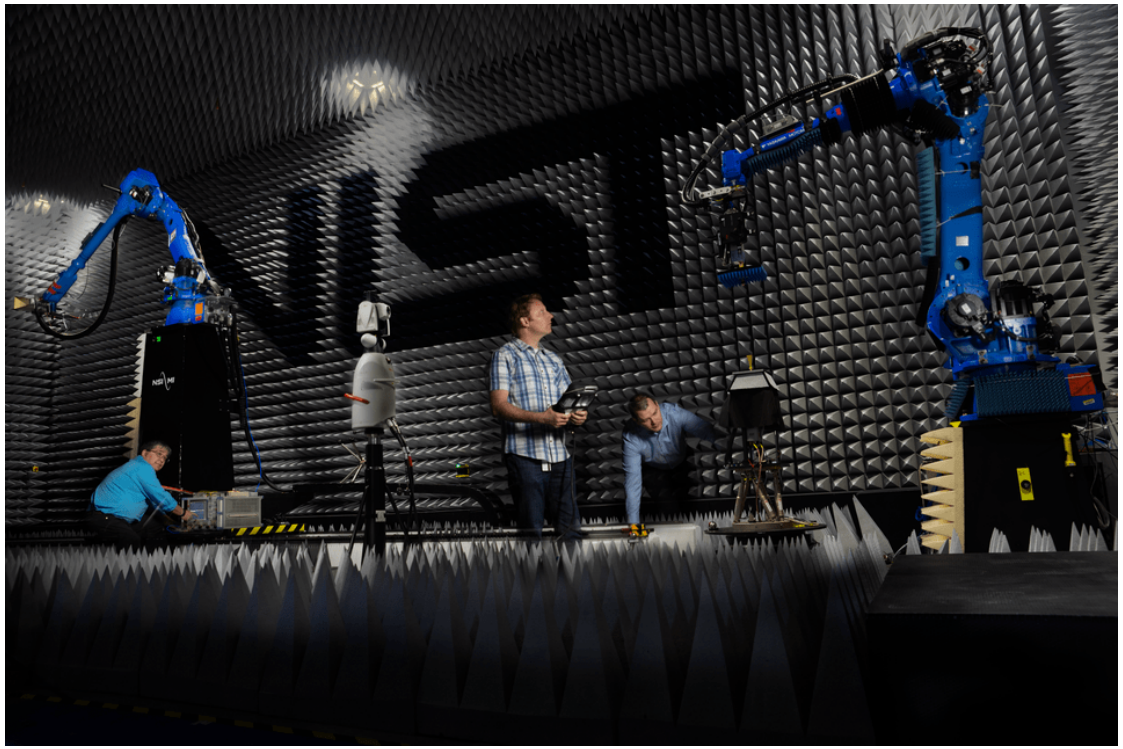
Exploring dynamical phase transitions with cold atoms in an optical cavity

Juan A. Muniz, Diego Barberena, Robert J. Lewis-Swan, Dylan J. Young, Julia R. K. Cline, Ana Maria Rey & James K. Thompson



- JILA researchers developed a controllable, non-equilibrium system with tunable parameters that could lead to a new understanding of fundamental physics
- The phase diagram observed (all possible phase changes) were different than those seen in equilibrium systems – out of equilibrium systems organize with different principles
- Could lead to better insight on how to generate entangled quantum states in state-of-the-art quantum clocks

Standards: 5G Spectrum Sharing Testbed



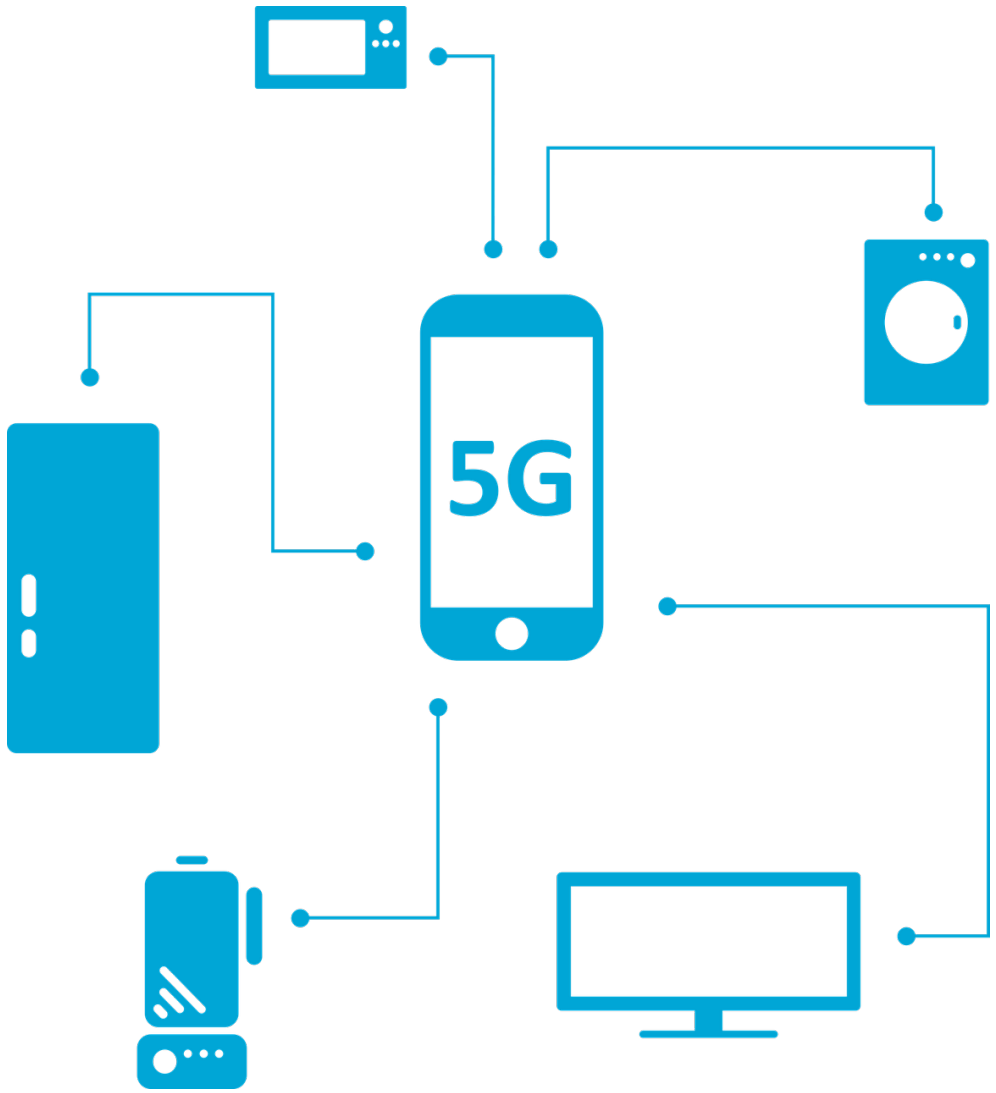
NIST ML Formula May Help 5G Wireless Networks Efficiently Share Communications Frequencies
https://www.nist.gov/news-events/news/2020/05/nist-formula-may-help-5g-wireless-networks-efficiently-share-communications

An adaptable network that can measure how well 5G and older systems operate without interfering with each other

Will help clarify how thousands of possible network settings / environments impact interference on the same frequency band

NIST Interoperability Test Bed (NITB) undergoing 5G update to better understand how different systems interact.

Emerging Tech Standards: 5G



Credit: Pixabay

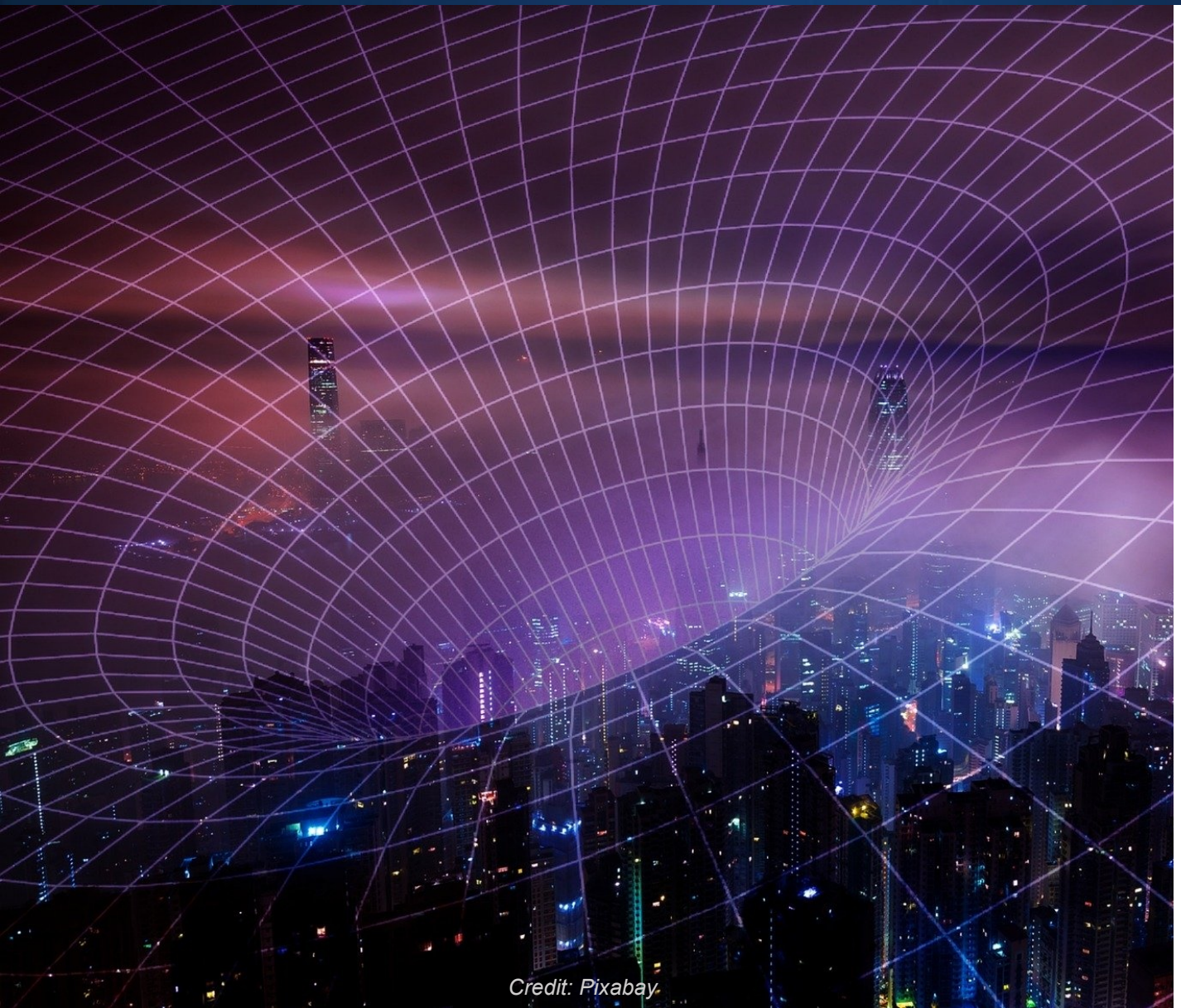
Significant focus for the Administration with engagement at highest levels of government – Congress, Executive Branch

March 2020: "Secure 5G and Beyond Act" signed. Administration released "National Strategy to Secure 5G"

NIST engaged in whole-of-government effort in support of the National Strategy. NIST plays a leading role in standards-related efforts in strategy development

Commerce Department established 5G Working Group to help coordinate DOC bureau activities relating to 5G

Emerging Tech Standards



US industry and standards organizations confused following 2018 Huawei Export Administration Regulations Entity Listing and following standards exemption by BIS

NIST raised awareness about unintended impacts of these rules on US effectiveness in digital technology standardization

US companies pulling back from standards engagements involving Huawei; some standards/specifications organizations moving abroad

NIST worked closely with BIS/DOC to provide clarity on standards engagement; BIS ultimately decides

Advanced Communications: Update

National Advanced Spectrum and Communications Test Network (NASCTN) Factor Screening Project with U.S. Air Force/Edwards Air Force Base:

- Assembled interagency team (NIST, NTIA & NASA, with MITRE Corp) to chart LTE impacts on aeronautical mobile telemetry (AMT)

- Performed one of the largest factor screening experiments ever completed at NIST. Analysis results will be used to lower interference risk with government systems and support increased spectrum availability for commercial operators.

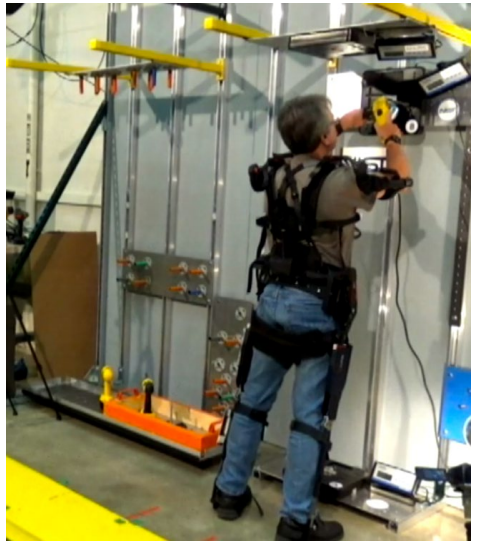
May 1: Public Safety Communications Research (PSCR) "Tech to Protect" Challenge

- Move to 100% Virtual attendance, 277 online participants, 25 teams presented, over $1M to date awarded to support innovative solutions to help first responders.

Securing Cyber Supply Chains

- Advanced Manufacturing Goal: Reduce the cybersecurity risk in global supply chain
- Address risks inherent in components making up modern information and communications technology products
- Outlines eight key practices to minimize risk

Exoskeleton Performance Measurement



- Advanced Manufacturing systems: measurements of joint rotation axis locations
- Test method to evaluate performance of humans wearing exoskeletons
- Standardized taxonomy and measurements

Infrastructure: EDGe$ Resilience Tool

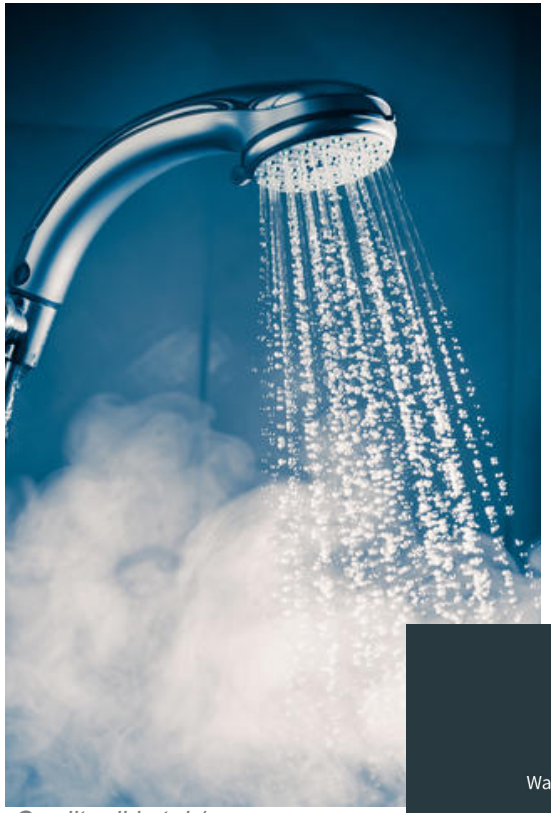
Credit : Delaware Department of Transportation

***E**conomic **D**ecision **G**uide **S**oftware Online Tool*

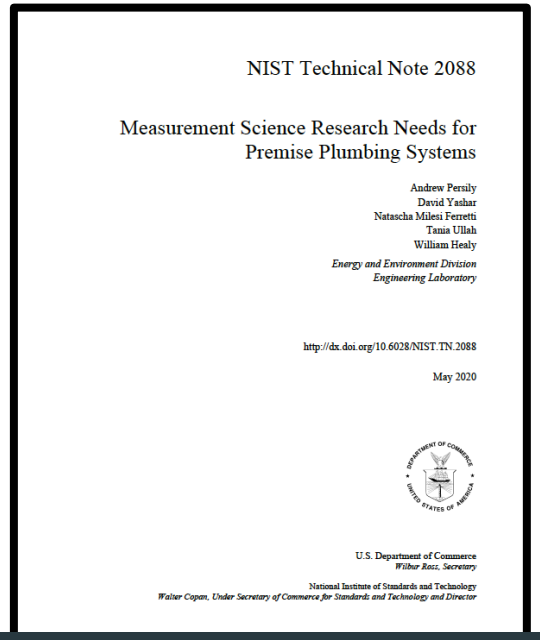
Provides a method of evaluating and comparing community projects to improve resilience

Calculates several important figures that indicate the value of investments

Infrastructure: Plumbing Research Needs



Credit: nikkytok/ Shutterstock



NIST Technical Note 2088

Measurement Science Research Needs for Premise Plumbing Systems

Andrew Persily
David Yashar
Natascha Milesi Ferretti
Tania Ullah
William Healy

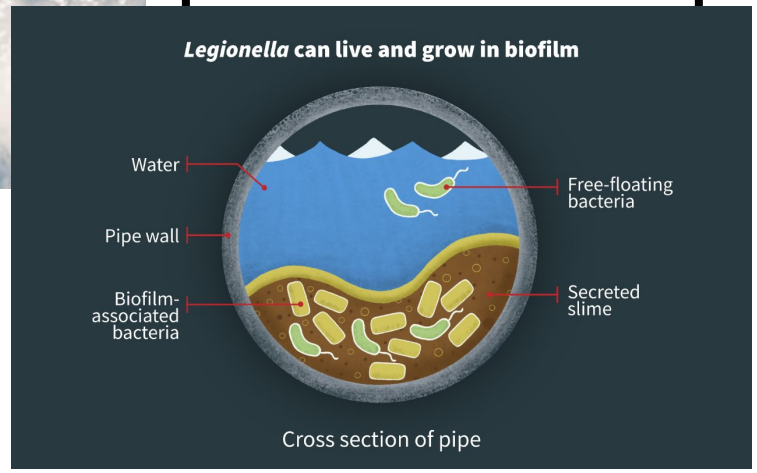
Energy and Environment Division
Engineering Laboratory

http://dx.doi.org/10.6028/NIST.TN.2088

May 2020

U.S. Department of Commerce
Wilbur Ross, Secretary

National Institute of Standards and Technology
Walter Copan, Under Secretary of Commerce for Standards and Technology and Director



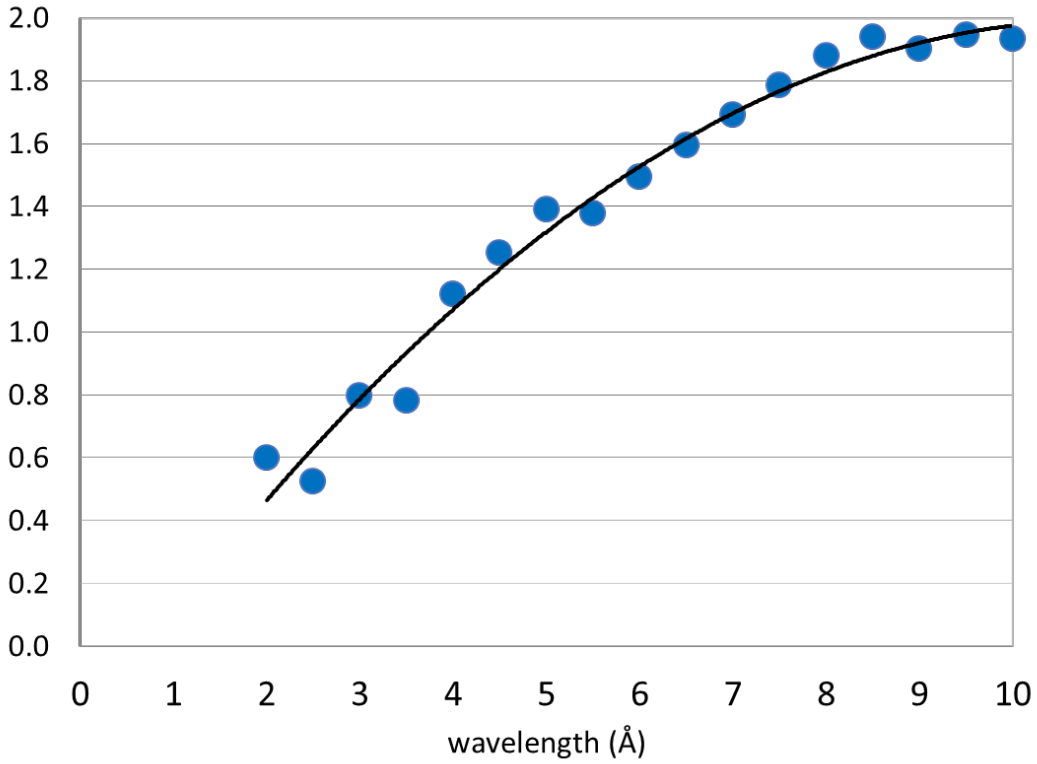
Credit: B. Hayes/NIST

- Report identifies research needs critical to design and operation of premise plumbing systems
- Current plumbing codes based on data that are nearly 100 years old
- Drive to improve water efficiency needs to be balanced with preservation and improvement of water quality

NCNR Upgrade Plans

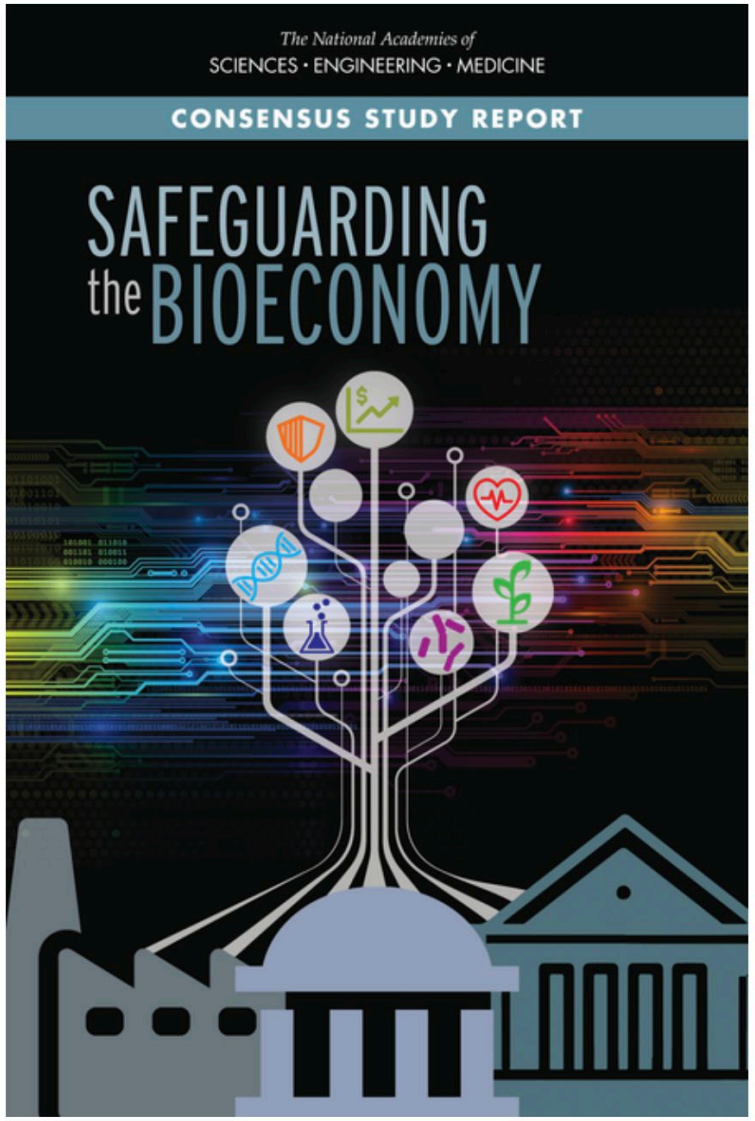
New liquid D_2 cold neutron source will double cold neutron flux at long wavelengths.
NIST Cryostat expected to be purchased this year

Projected gain over current cold neutron source



NIST will provide world class measurement capability with a new superconducting Neutron Spin-Echo spectrometer.
Superconducting coils purchased

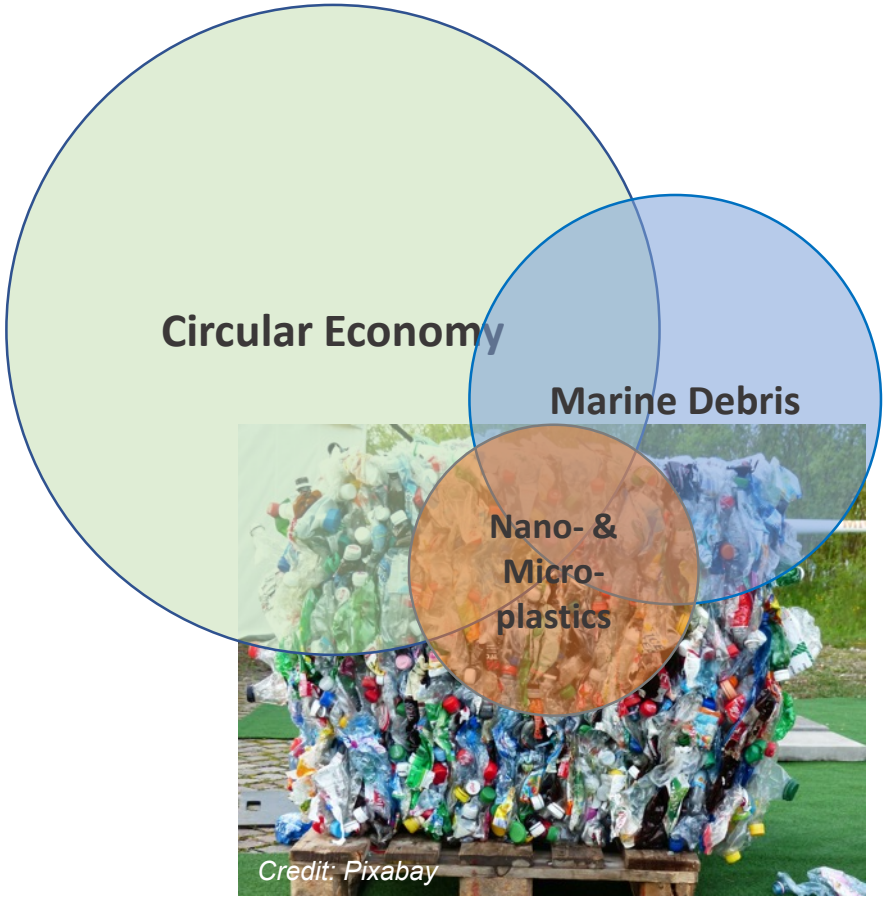
NIST's Critical Role in Bioeconomy Growth



https://www.nap.edu/catalog/25525/safeguarding-the-bioeconomy

- Recent efforts in House, Senate, and OSTP to strengthen America's Bioeconomy. NIST a key contributor to white paper on U.S. Bioeconomy directions
- NIST recognized as major contributor to advance Bioeconomy efforts: standards, measurement science and data in Biomanufacturing & Engineering Biology
- NIST MML expanding focus on design/build/test/learn cycles for living cells and systems, helping to translate technologies for commercialization

NIST and the Circular Economy



Support US manufacturers and recycling industry in response to global waste and emerging international trade crises

Develop new measurements/ data/ tools to improve efficiency of materials recovery/utilization and decision-making for circular pathways

NIST MML major program development:

1) $6M Plastics Recycling Center grants to develop workforce (aligning with DOE Manuf. USA Institutes REMADE, RAPID)

2) Internal seed funding for multiple new efforts across NIST sites

Forensics Center of Excellence Renewal

- NIST has renewed support with commitment of $20 million for the next phase of CSAFE starting June 1st
- West Virginia University joins as 6th University in the consortium for CSAFE 2.0
- CSAFE 2.0 will expand from R&D to piloting in the field a systematic training and education program

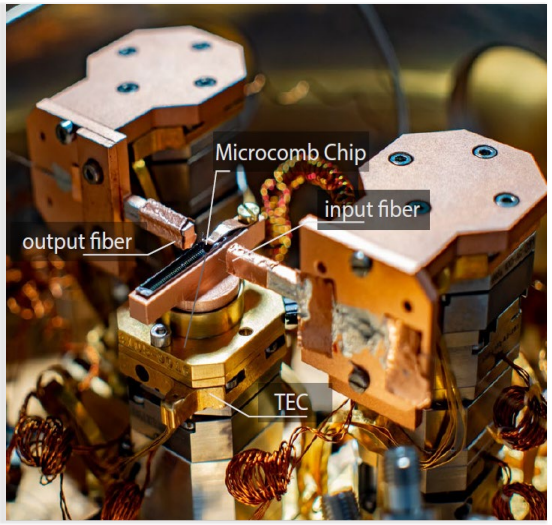
U.S. Voting Standards and Guidelines

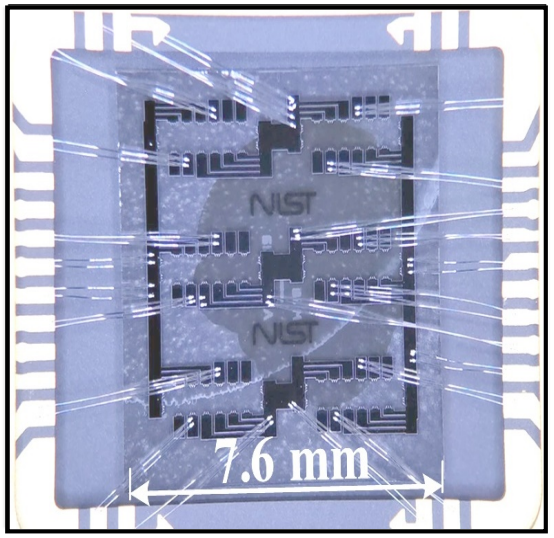
EAC Commissioner Ben Hovland with NIST Director Walt Copan

- NIST led the Technical Guidelines Development Committee (TGDC) for the new Voluntary Voting Standards and Guidelines, Version 2.0 (VVSG 2.0)
- VVSG 2.0 and enhancements for voting standards governance and transparency were issued by EAC for public comment, ratification
- EAC, NIST, DHS/CISA and FBI jointly issued report: "Risk Management for Electronic Ballot Delivery, Marking and Return"

NIST on a Chip: Highlights

Breakthrough measurements related to new micro-comb platforms for low power systems (*with UCSB*)





Ohm dissemination for the US Air Force through graphene Quantum Hall Standard

DoD established Tri-Service Advanced Technology Group within the Calibration Coordination Group

New $25 million / 5-year NIST-wide agreement signed with the US Air Force. Navy and Army agreements in progress

Laying the foundation for international adoption of NIST on a Chip

Baldrige Performance Excellence Program

EXECUTIVE ORDERS

Presidential Executive Order Expanding Apprenticeships in America

EXECUTIVE ORDERS

Executive Order Establishing the President's National Council for the American Worker

- Pledge to America's Workers Presidential Award
  - Baldrige-informed effort to recognize excellence in workforce education, training, and reskilling
  - Developed in response to E.O.'s 13801 and 13845
  - BPEP leads on design and implementation – first awards this September

- Communities of Excellence
  - Communities using a modified Baldrige Framework to enhance quality of life through education, healthcare, and economic opportunity
  - Sharing best practices to enhance community resilience

ROI Initiative Progress Continues!

- April 24, 2020 – one-year anniversary of release of NIST Special Publication 1234
- Moving from findings to implementation through the Lab-to-Market NSTC Subcommittee and CAP Goal
- Progress in Legislation, Regulation, Tools, and new programs

ROI Progress: Bayh-Dole

Green Paper Findings Addressed in Proposed Regulation:

Finding 1	Government Use Rights
Finding 2	March-In Rights
Finding 3	Preference For US Manufacturing
Finding 8	Streamlined Partnership Mechanisms
Finding 13	Federal IP Data and Reporting Systems
Finding 15	Benchmarking and Metrics

Current Status:
Notice of Proposed Rulemaking in DOC clearance before being sent for formal agency review.

Publication of final rule expected November 2020.

ROI Progress: Stevenson-Wydler

Green Paper Findings Addressed in Proposed Legislation:

Finding 4	Copyright of Government Software
Finding 5	Proprietary Information
Finding 6	Strengthen Technology Transfer at Federal Labs
Finding 7	Presumption of Government Rights to Employee Inventions
Finding 8	Streamlined Partnership Mechanisms
Finding 9	Expanded Partnership Mechanisms
Finding 14	Access to Federal Technologies, Knowledge, and Capabilities
Finding 15	Benchmarking and Metrics

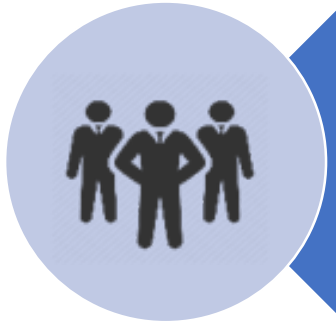
Current Status:

LRM comments from agencies received; completed review and adjudicating responses with OMB.

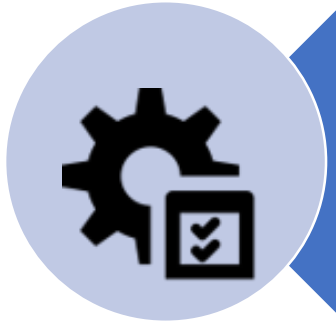
Delivery to Congressional Committees expected Summer 2020.

ROI Progress: Other Areas

NIST Presidential Innovation Fellow examined barriers limiting Angel / VC investment into Federal technologies; Recommendations to be published in NAI Journal, *Technology and Innovation*

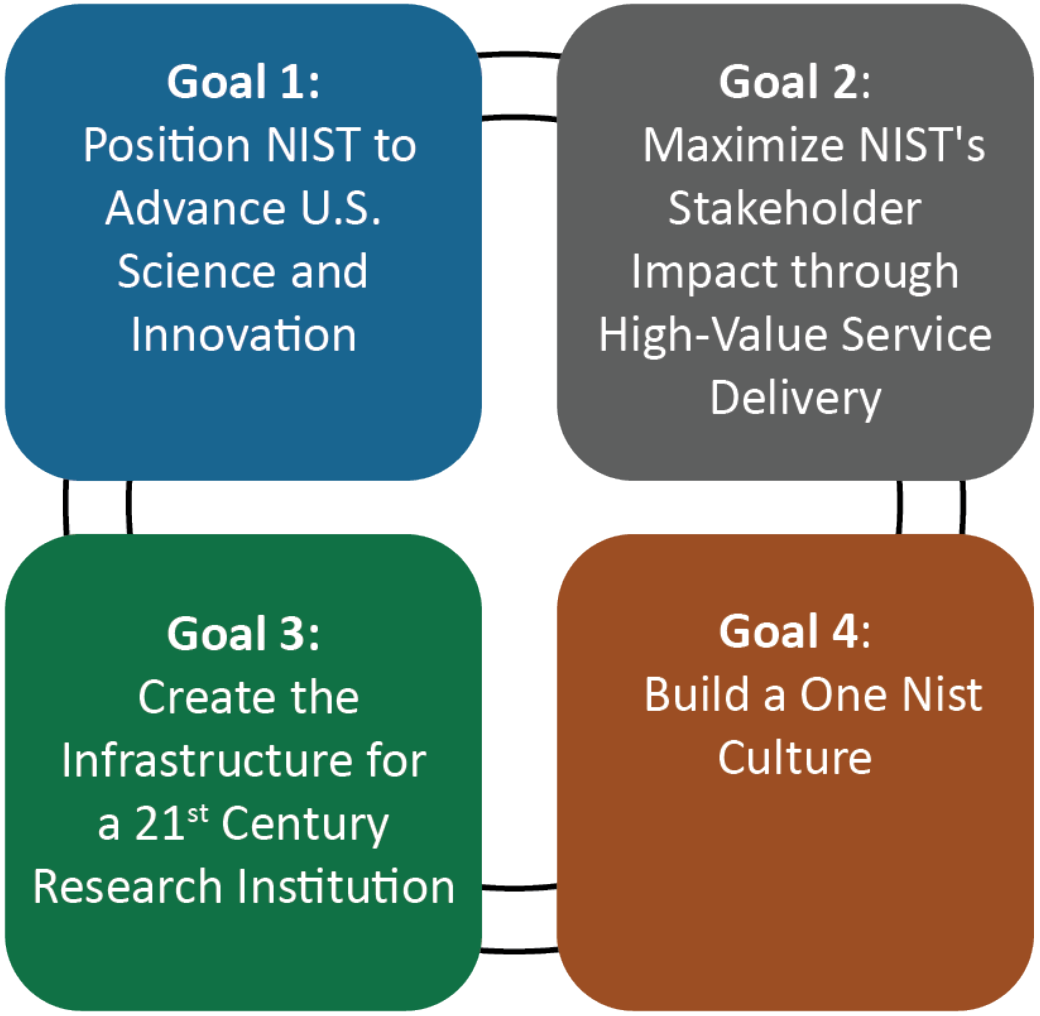


Government-wide, new working group for Entrepreneurial Training; Technology Maturation Acceleration Program at NIST



Rebuild of the interagency Edison system for reporting Bayh-Dole inventions being transferred from NIH and rebuilt at NIST; estimated to launch in mid-FY22

NIST Strategic Plan: Goals



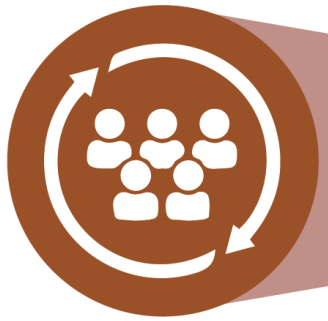
Position NIST to Advance U.S. Science and Innovation – NIST will make sure that it has the workforce, organizational structures, and partnerships to support the development and adoption of emerging technologies critical to innovation and the economic competitiveness of the United States.

Maximize NIST's Stakeholder Impact through High-Value Service Delivery – NIST will optimize service delivery, streamline processes, and strengthen stakeholder engagement to transform technology transfer.

Create the Infrastructure for a 21st Century Research Institution – NIST will make sure that it has both the physical and IT infrastructure to carry out its programs.

Build a One NIST Culture – Ensure that our workforce of federal staff and NIST associates are united around NIST's mission and are valued for the expertise they bring.

NIST Strategic Plan: Immediate Actions

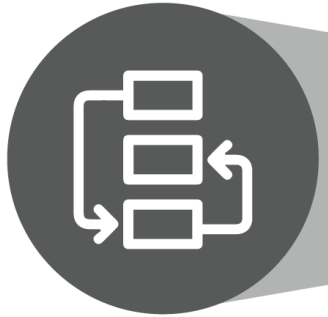


Workforce

1. Improve collaboration and agility across NIST programs by restructuring performance plans to provide flexibility for collaborative work.
2. Establish a new ADLP funding mechanism to foster cross-OU collaboration.
3. Appoint a NIST Diversity coordinator to lead efforts to improve the diversity of NIST's workforce.
4. Strengthen NIST's leadership corps by developing and implementing a NIST leadership competencies model and increase support for development and growth of existing leaders at NIST.

Infrastructure

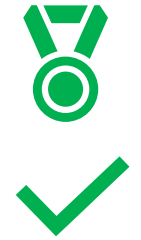
5. Develop a prioritized implementation plan of the NIST Campus Master Plan.
6. Optimize ongoing repair activities through the utilization of a predictive facilities maintenance tool to guide future SCMMR investments.



Operations and Procedures

7. Increase the successful transfer of NIST-developed technologies by applying best practices to streamline and enhance customer and stakeholder engagements.
8. Improve stakeholder awareness of NIST by clarifying and sharpening NIST's strategic communications and initiating an effort to rebrand.

- Team members selected
- Initial meetings held / scheduled



- Prioritized and Integrated Master Plan developed
- Discussing best approach

- Discussing best approach
- Working towards contract implementation

NIST Strategic Plan: Implementation Cycle

DISCUSSION

Meeting Agenda

June 9, 2020

Session I: NIST Update

Session II: NIST Efforts in Response to COVID-19

Session III: NIST and COVID-19 Safety and Operations

Session IV: Discussion with VCAT