

NIST Update

Visiting Committee on Advanced Technology

James K. Olthoff

Meeting Agenda

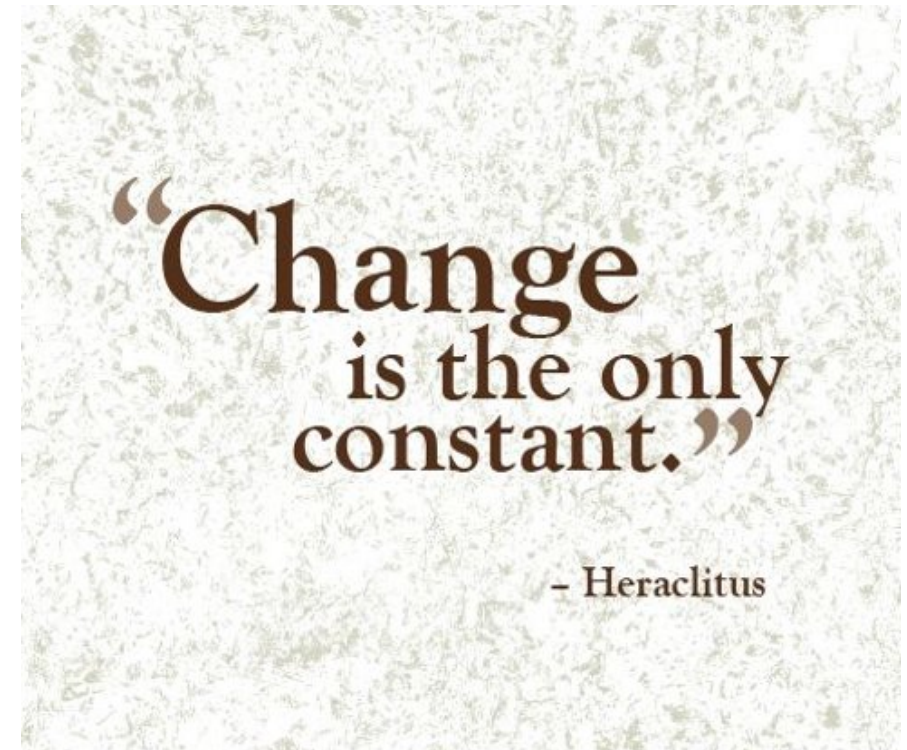
Session I: NIST Update – Programmatic Updates, Safety, and Infrastructure

Session II: Setting the Stage – Current Budget Situation, Incoming Priorities and New Mandates

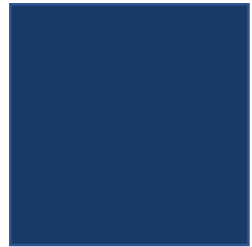
Session III: VCAT Working Session –

- Discuss Report and Recommendations
- Discuss Letter to the Incoming Administration

- NIST programmatic update
- Safety update – Keeping NIST staff safe during COVID
- Infrastructure update – Status of ongoing projects and priorities
- Discussion



NIST Leadership Changes



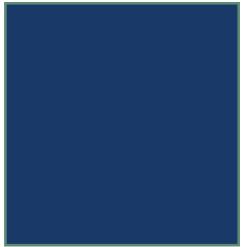
James K. Olthoff

Associate Director

performing the nonexclusive
duties of the NIST Director



NIST Leadership Changes



Chuck Romine
Acting Chief-of-Staff



Eric Lin
Acting Associate Director for
Laboratory Programs

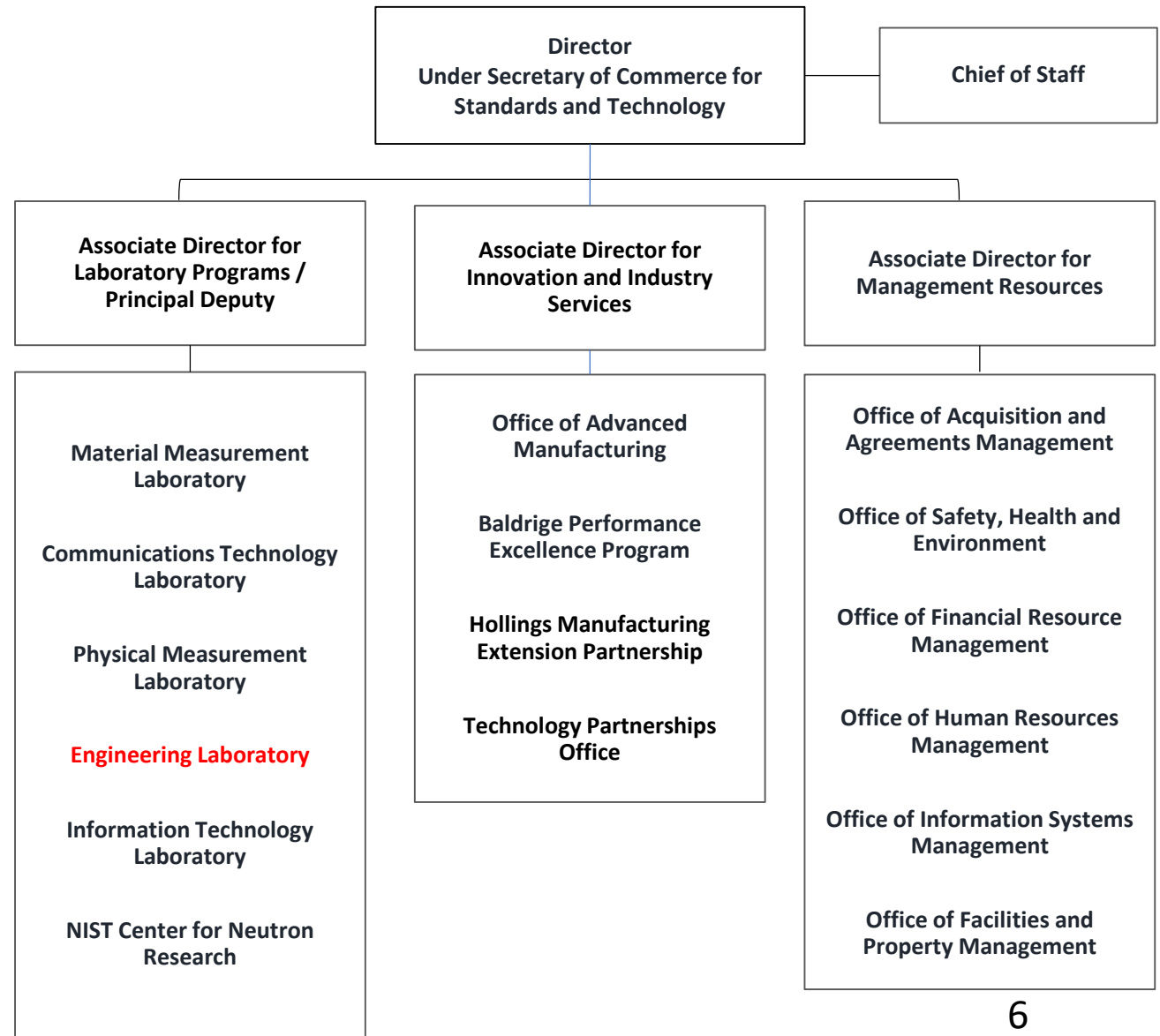


NIST Leadership Changes: Retirement

Director, Engineering Laboratory

Dr. Howard Harary

- Retired in December 2020
- **35 years at NIST** starting as a researcher in Dimensional Metrology
- Served as Director of Manufacturing Engineering Laboratory
- Served as Director of Engineering Laboratory since 2014



NIST Leadership Changes



Stephanie Hooker

Acting Director,
Material
Measurement
Laboratory



Joannie Chin

Acting Director,
Engineering
Laboratory



Jim St. Pierre

Acting Director,
Information
Technology
Laboratory



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

FY21

Appropriated

FY22

In Development

FY23

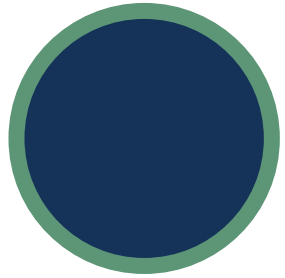
Early Stages

NIST Budget

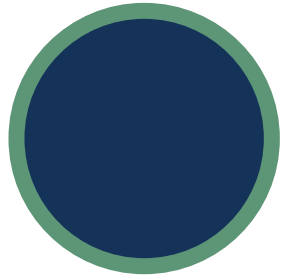


	FY 2020 Enacted	FY 2020 CARES Act P.L. 116-136	FY 2021 Request	FY 2021 House Mark	FY 2021 Senate Mark	FY 2021 Enacted	+/- over FY 2020 Enacted
STRS	\$754.0	\$6.0	\$652.0	\$789.0	\$786.5	\$788.0	\$34.0
Laboratory Programs	655.8	TBD	591.3	TBD	TBD	TBD	TBD
Corporate Services	17.3	0.0	12.0	TBD	TBD	TBD	TBD
Stds Coord & Special Pgms	80.9 *	TBD	48.7	TBD	TBD	TBD	TBD
ITS	\$162.0	\$60.0	\$25.3	\$170.0	\$165.5	\$166.5	\$4.5
Hollings Mfg Ext Partnership	146.0	50.0	0.0	153.0	149.5	150.0	4.0
Manufacturing USA	16.0	10.0	25.3	17.0	16.0	16.5	0.5
CRF	\$118.0	\$0.0	\$60.2	\$85.0	\$98.0	\$80.0	(\$38.0)
Construc & Major Renovations	43.0	0.0	19.6	10.0	8.0	TBD	TBD
Saf, Cap, Maint & Maj Repairs	75.0	0.0	40.6	75.0	90.0	TBD	TBD
Total, NIST Discretionary	1,034.0	66.0	737.5	1,044.0	1,050.0	1,034.5	0.5

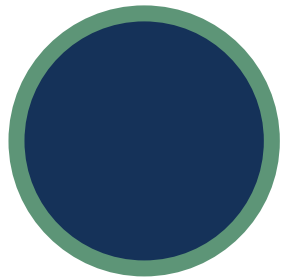
* Includes \$2.2M Baldrige Performance Excellence Program funding.



Continued progress of NIST current priorities



New National priorities – anticipate and respond



Position next NIST Director for success

Laboratory Programs Updates –
continued progress on our priorities

Trustworthy AI Updates

NIST is developing the vocabulary and measurements needed for technical requirements of trustworthy AI



Bias in AI report by Spring 2021



TREC Fair Ranking track will investigate Bias in AI



Planning an international campaign to coordinate efforts in AI standards development with OSTP

NIST Artificial Intelligence (AI) Workshop Series January 26-28, 2021 – Explainable AI



EXPLAINABILITY

900 participants from **24** countries at NIST's workshop to discuss this component of trustworthy AI

Applications of AI: Highlight

MML researchers developed AI algorithm, CAMEO

- CAMEO discovered a potentially useful new material without requiring additional training from scientists
- The AI system could help **reduce the amount of trial-and-error time scientists spend in the lab**, while maximizing productivity and efficiency in their research
- Collaborators include SLAC National Accelerator Laboratory, University of Maryland, and University of Washington



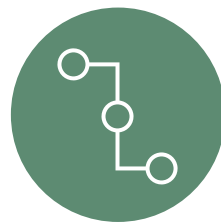
SolarWinds Cybersecurity Breach



Credit: Pixabay



Highly sophisticated cyberattack and data breach: 1,000s of organizations affected globally, including U.S. Federal Government



Supply chain attack demonstrates need for strong trust roots in IT and foundational cybersecurity, such as trusted software updates and digital signatures

Privacy Framework: One-Year Anniversary



One-year anniversary of the NIST Privacy Framework release on January 16th, 2021

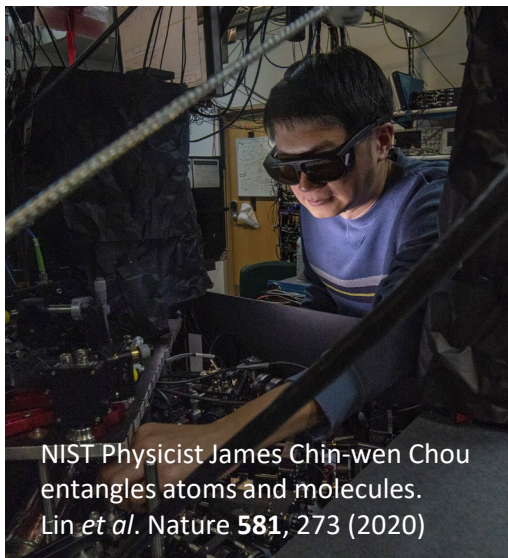


31,000 downloads and climbing – more than 40 implementation resources available online



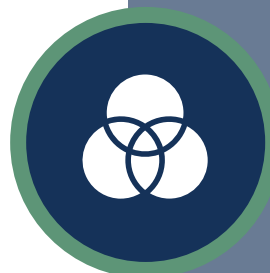
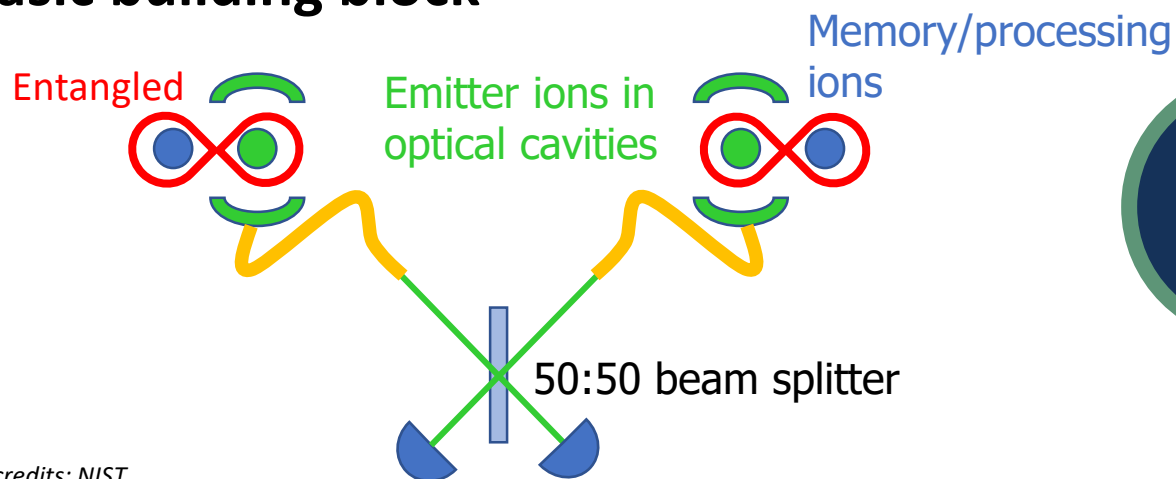
More than a quarter of respondents to International Association of Privacy Professionals and FairWarning survey use the Framework

Quantum Network Grand Challenge Update: Quantum Network Repeater



NIST Physicist James Chin-wen Chou entangles atoms and molecules. *Lin et al. Nature 581, 273 (2020)*

Basic building block



New program to demonstrate end-to-end implementation of a practical quantum repeater based on trapped atomic and molecular ions



Leverages NIST-developed techniques for quantum logic between different types of atoms and molecules, providing excellent quantum memory, high-fidelity information processing, and long-distance telecom-fiber connectivity



Will form the foundation of a growing quantum communication testbed for evaluating and improving related technologies

Quantum: Optical Clock Developments

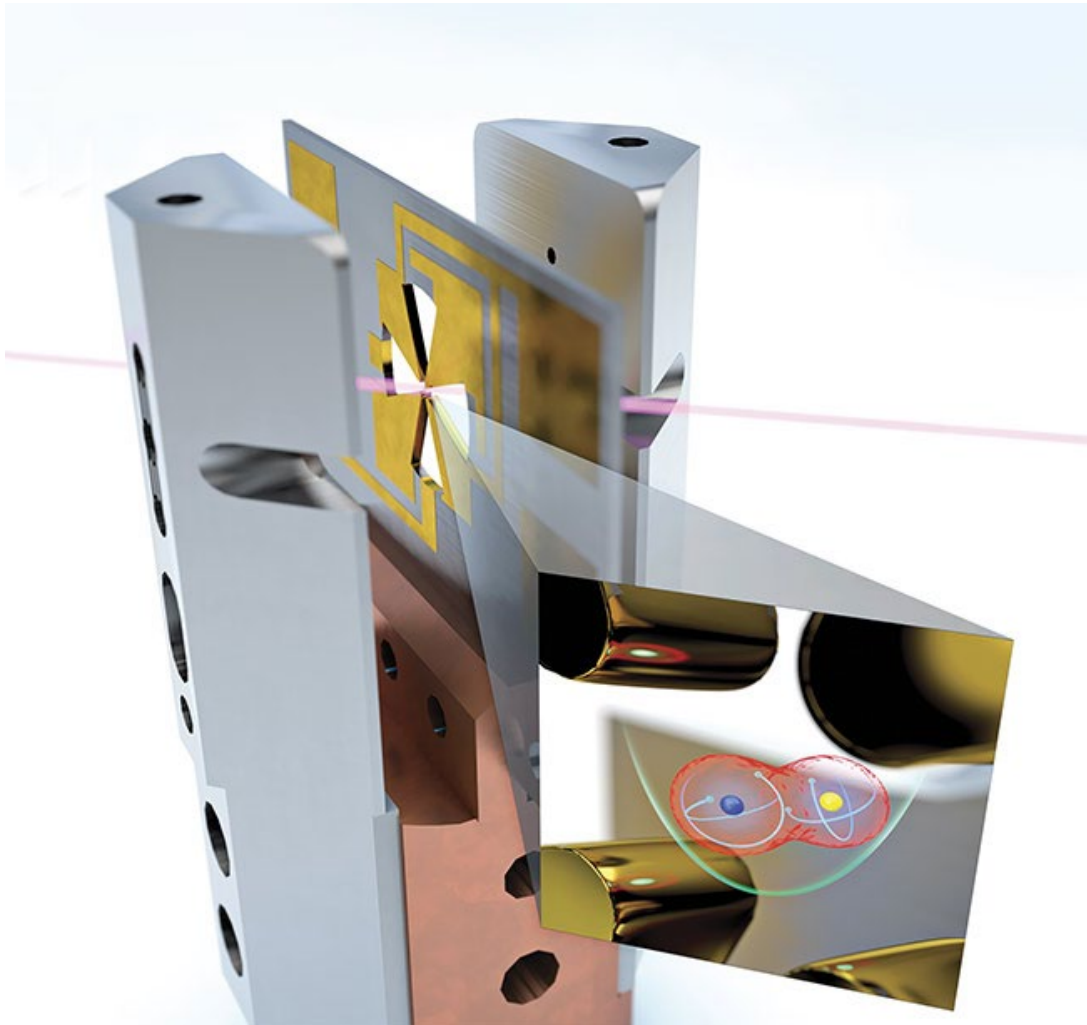


Image Credit: Steve Burrows, JILA



NIST is home to the most accurate optical clock measurements in the world



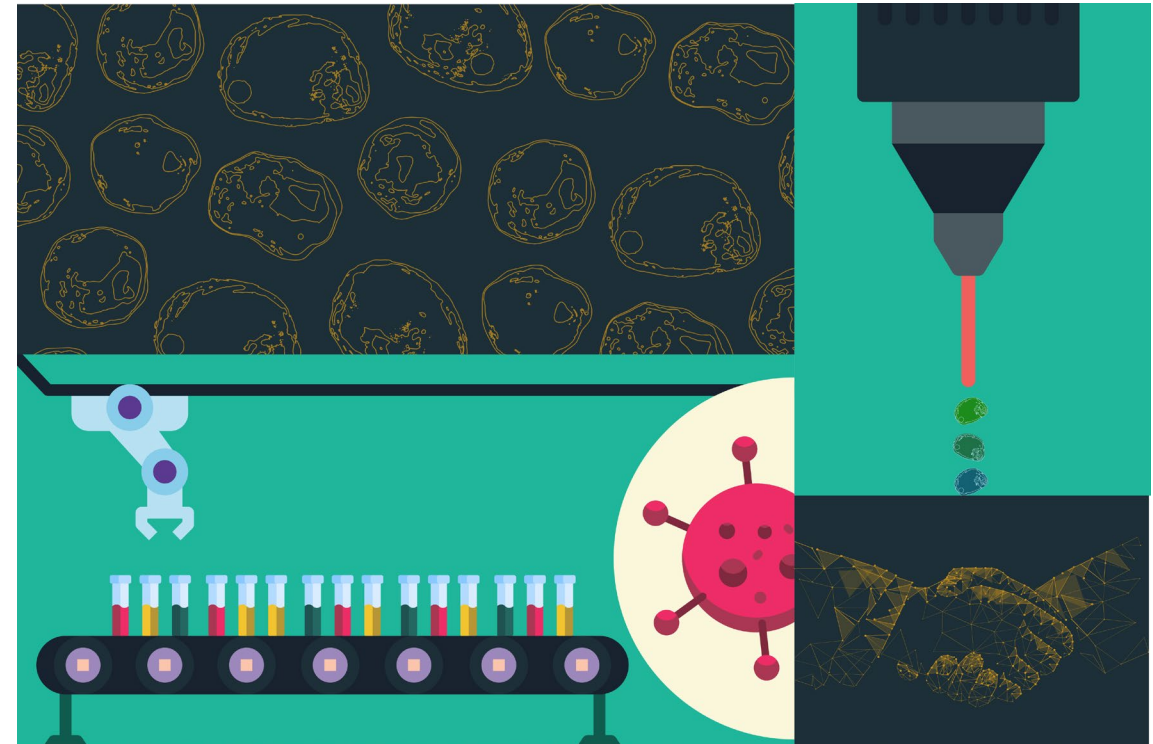
A portable Yb clock is in the final year of construction, anticipating 10^{-18} level performance for advanced applications



A photonic integrated and compact two-photon rubidium clock has demonstrated short-term stability that rivals the stability of a hydrogen maser

Flow Cytometry Standards Consortium

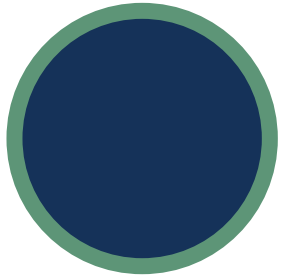
- Flow cytometry is used to characterize and test advanced cell and gene therapies
- Critical tool in diagnostics, and vaccine and drug development
- Standards will enable more accuracy, reproducibility, and comparability of results
- Feb 16-17: Kickoff workshop with stakeholders in regenerative medicine and advanced therapy fields



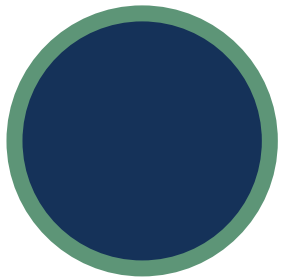
Credit: B. Hayes/NIST



Continued progress of NIST current priorities



New National priorities – anticipate and respond



Position next NIST Director for success

Renewed emphasis in many areas, including:

- Pandemic response
- Environment and climate
- Infrastructure
- Scientific integrity and reproducibility
- Equity
- Economic growth
- Advanced Manufacturing
- U.S. leadership in emerging technologies and standards

VCAT Agenda

Upcoming talks on:

Budget update

Congressional direction

Biden Administration priorities

NIST infrastructure

Face recognition software shows improvement in recognizing masked faces

- NIST analyzed 65 algorithms newly submitted by developers
- Used image database of 6.2 million images with masks digitally applied
- In some cases, error rates decreased by a factor of 10



Credit: B. Hayes, M. Ngan/NIST



NISTIR 8311 - Face Recognition Accuracy with Face Masks Using Pre-COVID-19 Algorithms (Jul 2020)



NISTIR 8331 - Ongoing Face Recognition Vendor Test (FRVT) Part 6B: Face Recognition Accuracy with Face Masks Using Post-COVID-19 Algorithms (Nov 2020)

NIST Workshop: Challenges for Digital Proximity Detection in Pandemics Jan. 26-28, 2021

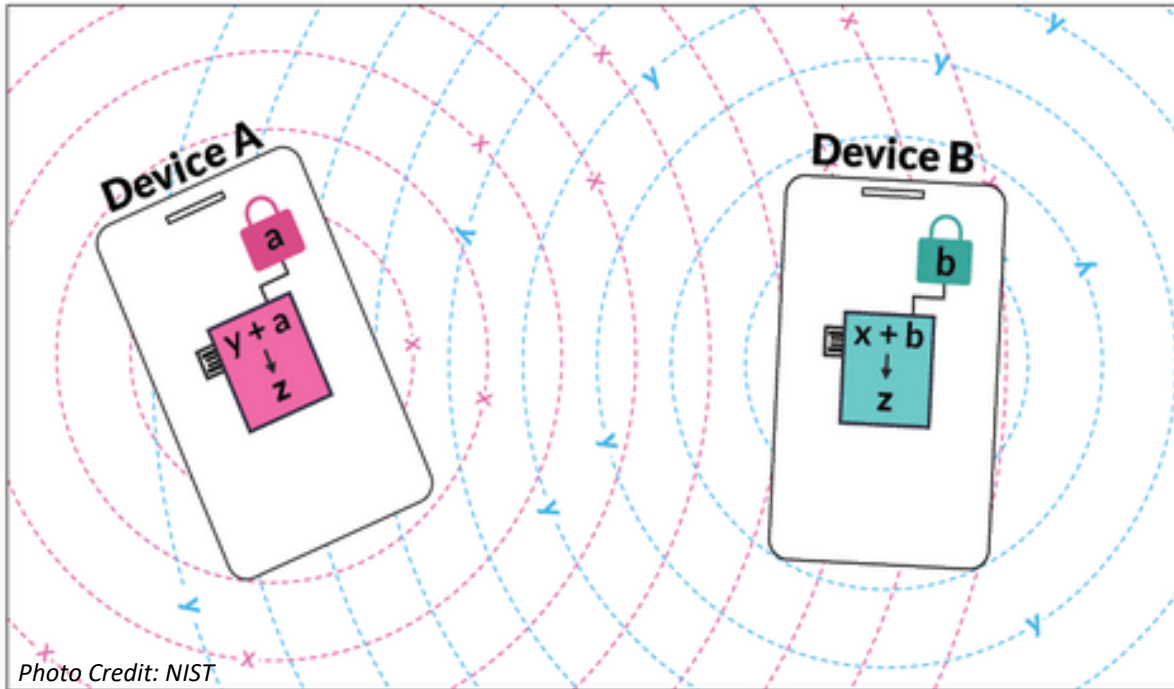


Photo Credit: NIST

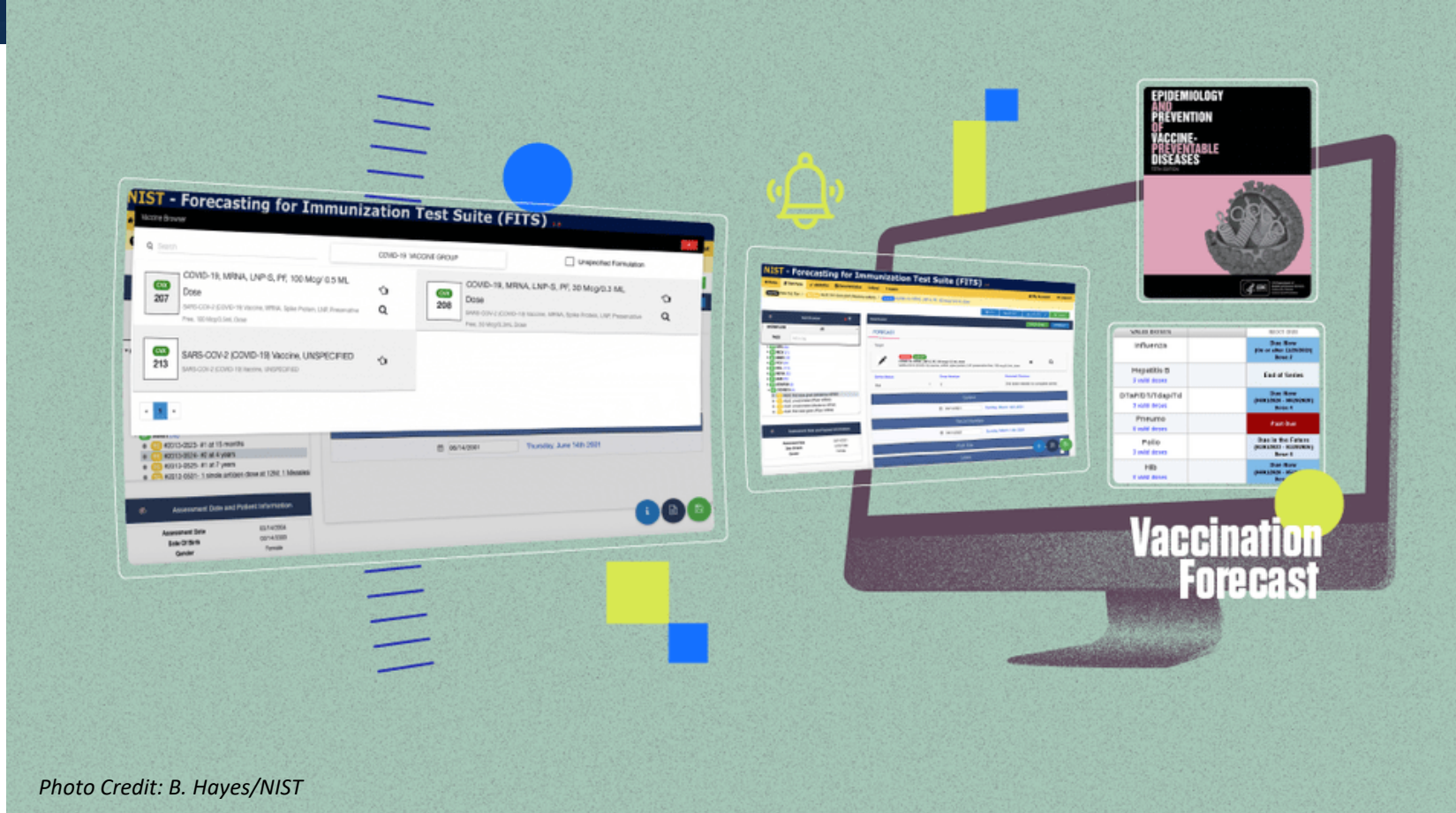
Goals:

- Discuss successes and challenges of implementation of proximity detection technologies
- Identify areas where additional effort is needed

Topics addressed include:

Real-world uses in U.S and abroad
Privacy & cybersecurity concerns
Technologies for proximity detection
Implementation and public acceptance
Role of government
Performance evaluation and verification

COVID-19 Update: Forecasting for Immunization Test Suite (FITS)



In conjunction with the CDC, NIST researchers developed a software tool that tests computer systems to make sure they're providing correct vaccine timelines based on a patient's circumstances and updated recommendations from the medical community. The American Immunization Registry Association will use FITS for testing COVID-19 vaccine support.

NIST Workshop: The Circular Economy in a High-Tech World

January 27-28, 2021



Goal: Define NIST's role in the transition to a circular economy



Focus: High tech industries including electronics, battery, and solar panel supply chains



Broad industry representation for consensus building

NIST Workshop on Climate Science and Building Codes

January 26, 2021



Challenge: Ensure infrastructure is ready for conditions and hazards of today... but also, those expected in 50 to 100 years

- **Brought together leaders in:**
 - Climate Science
 - Building Codes
- **Explored**
 - Climate Data
 - Climate Models & Tools
 - Building Regulatory Needs

Workshop Report forthcoming

Strategic and Emerging Research Initiatives (SERI) FY 2021 Update

ADLP-directed funding mechanism to address emerging needs through a project portfolio of short-term (1-3 years) projects

Bringing Premise Plumbing into
the 21st Century (FY 20-21)



Physical Infrastructure
(new)



Circular Economy
(new)



Innovation and Industry Services –
powerful NIST programs to support
pandemic response and drive
economic growth

PPE & SUPPLY CHAIN

Product & Supplier Matching, PPE Retooling, and PPE Product Testing

- 42 states provided product and/or supplier matching services.
- 29 states have provided assistance with retooling to produce PPE.
- 13 states have assisted manufacturers with PPE product testing and development.

TECHNOLOGY

Cybersecurity Programs and Industry 4.0/Technology Uptake

- 22 states implemented a cybersecurity program, either as a direct response to the pandemic, or as a complementary program.
- 5 states either augmented an existing Industry 4.0/Technology Uptake program, or utilized CARES funding to support these initiatives.

WORKFORCE

Layoff Aversion, Displaced Worker Support, Online Worker Training, and Apprenticeships & Youth Engagement

- 20 states leveraged existing programs or developed new training programs to provide training opportunities.
- 8 states implemented layoff aversion strategies to prevent or minimize job loss.
- 4 states provided support for displaced workers.
- 3 states identified opportunities to provide apprenticeships and youth engagement opportunities.

OUTREACH & NEEDS ASSESSMENTS

Need Surveys & Consulting, Informational Webinars, and Return to Work Guides(s)

- 48 states provided new or expanded consulting services or performed needs surveys.
- 42 states conducted informational webinars.
- 31 states created return to work guides.

MEP serving U.S. manufacturers

RESULTS FOR U.S. MANUFACTURERS

According to clients surveyed¹ in FY 2020, the MEP National Network helped these manufacturers achieve:

105,748 jobs created or retained



\$2.7 billion
cost savings



\$13.0 billion
new and retained sales



\$4.9 billion
new client investments

MANUFACTURERS' TOP CHALLENGES AS REPORTED BY CLIENTS



65%
Cost
Reduction



54%
Employee
Recruitment



51%
Growth



42%
Product
Development

In Fiscal Year (FY) 2020, the MEP National Network interacted with **27,574 manufacturers**



New Web Page:

ManufacturingUSA.com/covid-19-response

MFG USA Network Responds to COVID-19

- \$12.4M in NIST CARES Act funding = 13 response projects at 4 institutes
- \$60M more for 13 DoD-sponsored COVID projects at institutes
- Spring 2021 Congressional Briefing + fast-track special report

MFG USA Network Grows to 16 Institutes

CYMANII

- DOE-sponsored cybersecurity institute
- Led by The University of Texas at San Antonio
- Includes 24 major universities

BioMADE

- DoD-sponsored synthetic biology institute
- Led by Engineering Biology Research Consortium, St. Paul, MN
- Includes 30 companies, 33 universities, 24 community colleges, 6 nonprofits across 31 states



Multiple COVID Response Projects

- ⚙️ Scaling production of SARS-COV-2 antigens and automating screening of convalescent sera and monitoring immunity profiles
- ⚙️ Deploying a new class of meltblown filters to increase domestic manufacturing capacity for surgical masks and N95 respirators
- ⚙️ Validating protocol for overnight decontamination of spaces using vapor hydrogen peroxide



Leveraging the Network to Better Serve Manufacturers and the Nation

- ⚙️ Technology showcases connecting small biotechs with major vaccine manufacturers
- ⚙️ 'N-mAb' Case Study: industry-led consensus control strategy for manufacturing protein therapeutics
- ⚙️ Workforce development resource portal

2020 Baldrige Awards for Performance Excellence



Small Business

- MESA (Tulsa, Oklahoma)

Health Care

- GBMC HealthCare System (Baltimore, Maryland)
- Wellstar Paulding Hospital (Hiram, Georgia)

Nonprofit

- AARP (Washington, D.C.)
- Elevations Credit Union (Boulder, Colorado)

ROI Implementation Progress



April 24, 2021 will be the 2-year anniversary of the NIST Green Paper



10 proposals to modernize the Stevenson-Wydler Technology Innovation Act of 1980 transmitted to congressional committees November 25, 2020



Notice of Proposed Rulemaking to revise Bayh-Dole regulations open for public comment through April 5, 2021

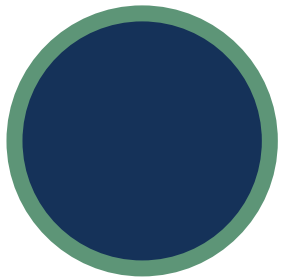
Plans and Priorities for Transition Phase



Continued progress of NIST current priorities



New National priorities – anticipate and respond



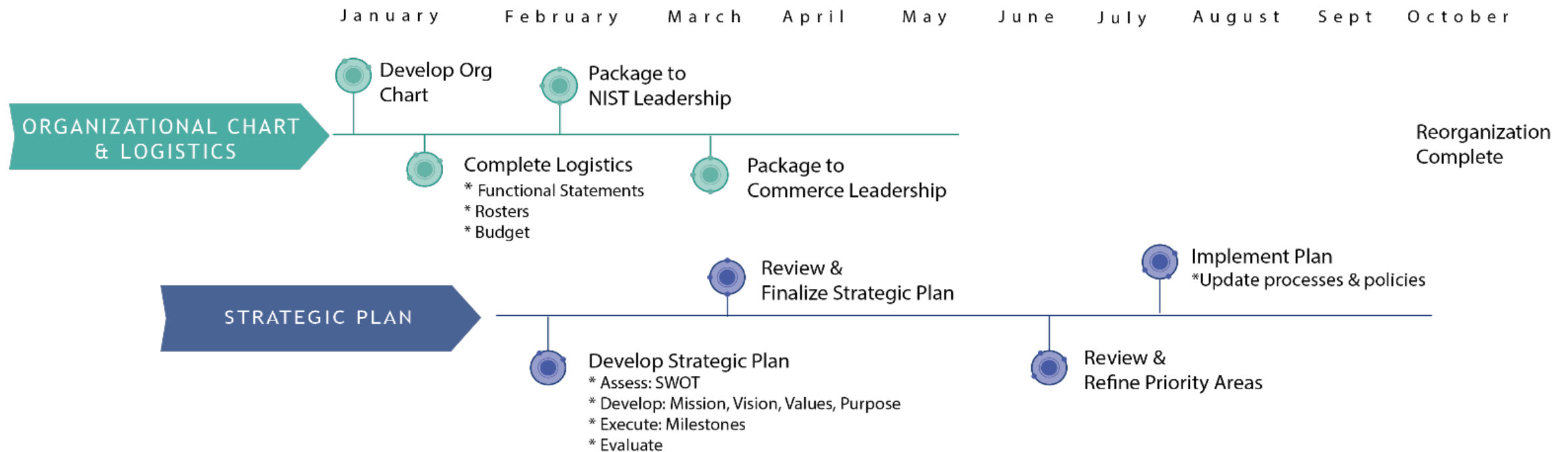
Position next NIST Director for success



BUILDING A NEW CTL

- **Goal:** increase resources for Advanced Communications
- **Approach:** transparent, collaborative, and dedicated to creating a model laboratory that accelerates connectivity and improves lives
- **Process:** Parallel efforts in...
 - (1) Logistics
 - (2) Strategic Planning

CTL Reorganization: Timeline & Next Steps



Next Steps

- Finalize Strategic Plan continuing to increase focus on new administration priorities.
- Start implementing with particular focus on strategic communications and people and culture.



Position for Director of Diversity and Inclusion closed on December 22, initial screening and interview stage.



Leadership Competencies Model is piloted in selected OU.



New funding mechanism to promote collaboration will be implemented by Special Programs Office: \$ 1M total for awards ranging \$100-250K.



Branding study collecting input from leadership (interviews) and staff (survey).

Strategic Plan Virtual Showcase December 16, 2020



Participants
476



Questions
92



Active users
287



Poll votes
1746

Some of the Key Issues that Staff care about:

- Telework and remote work
- Leadership accountability
- Diversity and inclusion
- Aging infrastructure
- Open office concept

DISCUSSION

The background features a complex network of interconnected nodes and lines. The nodes are represented by small circles in various colors, including blue, green, and orange. The lines connecting them are thin and light-colored, creating a web-like structure. The overall aesthetic is modern and technological, with a dark blue gradient background.

Meeting Agenda

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