VISITING COMMITTEE ON ADVANCED TECHNOLOGY (VCAT or Committee)
MINUTES OF THE FEBRUARY 3RD, 2021
WEBINAR MEETING

ATTENDANCE:

Visiting Committee Members Attending
Adler, Allen
Alexander, Jay
Cerf, Vinton
Fischer, George
Ishak, Waguih
Jackson, Keoki
Kaler, Eric
Khan, Mehmood
Ku, Katharine
Sizer, Theodore (Tod)
Vasko, David (Dave)
Wasserman, Gail

Designated Federal Officer
Shaw, Stephanie

NIST Leadership Board

Bahar, Mojdeh
Boehm, Jason
Brockett, Del
Brown, Essex
Chin, Joannie
Dowell, Marla
Fangmeyer, Robert
Hooker, Stephanie
Ivester, Rob
Jenkins, George E.
St. Pierre, James (Jim)
Kushmerick, James
Lin, Eric
Mackey, Elizabeth (Liz)
Molnar, Mike
Olthoff, James K.
Sastry, Chandan
Vaughn, Robert (Skip)
Wixon, Henry

NIST Staff
Acierto, Linda
Alderman, David
Andrade, Dorianna
Andrews, Anne
Barbosa, Nicholas
Brown, Hannah
Capella, Greg
Dohne, Kirk
Evans, Heather
Fasolka, Mike
Fato, Hope
Gayle, Frank
Gillerman, Gordon
Glenn, Rachel
Greene, Kristen
Hanlein, Desiree (DiDi)
Hanna, Nancy
Healy, William (Bill)
Hight-Walker, Angela
Hoffman, Elizabeth
Huergo, Jennifer
Ivy, Nahla
Jahanmir, Said
Jeanette, Benjamin (Ben)
Kauffman, Leah
Keys, Mirta
Kim, Yekyung (Yennie)
Madsen, Mark
Mattson, Bruce
Meritis, Dimitrios
Nastus, Joseph (Joe)
Nist, Jennifer
Reidy, Kari
Rimmer, Catherine (Kate)
Rogers, Kelley
Rudnitsky, Robert
Saundry, Claire
Sberegaeva, Anna
Schlatter, Katie M.
Schroeder, Melissa
Schufreider, Jim
Seiler, Dave
Shyam-Sunder, Sivaraj
Silverthorn, Courtney
Strouse, Gregory
Sullivan, Suzanne
Tabassi, Elham
Teske, Michael
Ufford, Donald
Valdez, Zachary
VanLandingham, Mark
Wang, Tom
Wavering, Al
Wilkinson, Richard
Williams, Carl
Yuter, Stephen

Others
Alberts, Collin M. - Technology, Policy, & Legal Affairs - Freedom Technologies
Ambrose, Mitch – Science Policy News Institute of Physics
Brunswick, Shelli – Space Foundation
Buskirk, Howard – Communications Daily
Copan, Walter – General Public
Johns, Bethany – Association of Public and Land-grant Universities

Wednesday, February 3, 2021

Call to Order - *Dr. Alan Adler, VCAT Chair*

Dr. Adler called the meeting to order at 10:02 a.m., reviewed the meeting logistics and took roll call. Dr. Adler turned the meeting over to Dr. Olthoff.

SESSION I: NIST UPDATE – PROGRAMMATIC UPDATES, SAFETY, AND INFRASTRUCTURE

NIST Update and Agenda Review – *Dr. James K. Olthoff, Performing Non-exclusive Duties of the Under Secretary of Commerce for Standards and Technology and NIST Director*

Dr. Olthoff began by stating the theme for the day is "Change is the only constant." The two main takeaways are that the NIST staff has been extremely effective in adapting to the changes that the pandemic has caused and their ability to continue to advance NIST priorities is extraordinary and to be congratulated. Due to unforeseen circumstances, Dr. Olthoff turned the meeting over to Dr. Lin.

Dr. Lin shared the latest NIST leadership changes:

- Dr. Olthoff will be stepping into the role of performing the non-exclusive duties of the Under Secretary of Commerce for Standards and Technology and NIST Director until the new administration changes are finalized;
- Dr. Eric Lin, Acting Associate Director for Laboratory Programs (ADLP);
- Dr. Charles Romain, Acting Chief of Staff while Mr. Kevin Kimball is on detail at the Baldrige Program;
- Dr. Howard Harary retired in December 2020 after 35 years at NIST. His career at NIST started as a researcher in Dimensional Metrology Group and culminated as the Director of the Engineering Laboratory since 2014;
- Dr. Stephanie Hooker, Acting Director of the Material Measurement Laboratory (MML);
- Ms. Joannie Chin, Acting Director of the Engineering Laboratory (EL); and
- Mr. James St. Pierre, Acting Director of Information Technology Laboratory (ITL).

NIST Budget. NIST is operating under three budgets for three fiscal years (FY), FY21 has been appropriated, FY22 is under development, and FY23 is in the early stages. He shared the newest information on FY21 budget:

- Net increase in STRS (Scientific and Technical Research and Services) for Laboratory Programs;
- Modest increases for Hollings Manufacturing Extension Partnership (MEP) and Manufacturing USA within the Industrial Technology Services (ITS); and
- Reduction of Construction of Research Facilities (CFR) budget

Program Updates. On Trustworthy Artificial Intelligence (AI), NIST is developing the vocabulary and measurements needed for technology requirements. A NIST report on bias in AI will be out in spring 2021. The Text REtrieval Conference Fair Ranking track will investigate bias in AI, and there are plans for an international campaign to coordinate efforts in AI standards in coordination with Office of Science and Technology Policy. A workshop was held January 26-28 on Explainable AI with 900 participants from 24 countries. Some examples of NIST application of AI include the Closed-Loop Autonomous System for Materials Exploration algorithm developed by MML researchers, which could help reduce the amount of trial-and-error time scientists spend in the lab, while maximizing productivity and efficiency in research. Collaborators in this effort include SLAC National Accelerator Laboratory, the University of Maryland, and the University of Washington.

Cybersecurity. Dr. Lin mentioned the SolarWinds cybersecurity breach affecting thousands of organizations including the Federal Government, though to date, NIST has not been affected. The attack demonstrated the

need for strong trust roots in information technology (IT) and foundational security such as trusted software updates and digital signatures.

The Privacy Framework celebrated its one-year anniversary. Since publication it was downloaded over 31,000 times, with more than 40 implementation resources available online. More than a quarter of the respondents to the International Association of Privacy Professionals and Fair Warning survey use the framework, and it is making a huge impact.

Quantum. Dr. Lin gave an update on the Quantum Network Grand Challenge, a new program to demonstrate end-to-end implementation of a practical quantum repeater based on trapped atomic and molecular ions. The project leverages NIST-developed methods for quantum logic between different types of atoms and provides excellent quantum memory, high-fidelity information processing, and long-distance telecom-fiber connectivity. It will also form the foundation of a growing quantum communication testbed for evaluating and improving related technologies. On the optical clock development, the portable ytterbium clock is in the final year of construction, anticipating an 10^{-18} level of performance for advanced applications. These breakthroughs demonstrate short-term stability that rivals the stability of a hydrogen maser.

Bioscience. NIST is establishing a Flow Cytometry Standards Consortium to accelerate the adoption of quantitative flow cytometry in biomanufacturing of cell and gene therapies. The Consortium will develop standards for flow cytometry applications and reference materials for instrument calibrations. A kickoff workshop with stakeholders will take place in February on generative medicine and advanced therapy fields.

Plans and priorities for the Administration transition. This phase brings renewed emphasis in many areas, including:

- Pandemic response;
- Environment and climate, mitigating climate change;
- Infrastructure for the country;
- Scientific integrity and reproducibility;
- Equity, a major topic of emphasis in the new administration;
- Economic growth;
- Advanced Manufacturing; and
- U.S. leadership in emerging technologies and standards, especially on the international stage.

COVID-19 Measurements Update. Ongoing Face Recognition Vendor Test (FRVT) Part 6B: A new study of face recognition technology created after the onset of the COVID-19 pandemic shows that some software developers have made demonstrable progress at recognizing masked faces. The new NIST report is called Ongoing Face Recognition Vendor Test (FRVT) Part 6B: Face Recognition Accuracy with Face Masks Using Post-COVID-19 Algorithms (NISTIR 8331). It is the agency's first study that measures the performance of face recognition algorithms developed following the arrival of the pandemic. A previous report (NISTIR 8311) from July explored the effect of masked faces on algorithms submitted before March 2020, indicating that software available before the pandemic often had more trouble with masked faces. A NIST workshop for challenges in digital proximity detection during a pandemic was held in January. The goals were to discuss successes and challenges of implementation of proximity detection technologies and to identify areas where additional effort is needed. Topics addressed real-world uses in the U.S. and abroad, privacy and cybersecurity concerns, technologies for proximity detection, implementation and public acceptance, role of government, and performance evaluation and verification.

Dr. Lin said another tool in conjunction with the Centers for Disease Control and Prevention is the software tool, Forecasting for Immunization Test Suite (FITS), that tests computer systems to make sure they're providing corrective vaccine timelines. The American Immunization Registry Association will start using FITS to test COVID-19 vaccine support.

Circular Economy. A workshop was held in January focusing on the high-tech industries including electronics, battery, and solar panel supply chains and supply chains. The goals of the workshop were to examine NIST's role in such an environment where a circular economy or sustainable practices are needed in areas specific to the high-tech industry. Another timely workshop focused on physical infrastructure based on the Engineering Laboratory expertise which was the Climate Science and Building Codes workshop. It brought together

thought leaders and experts in climate science and building codes examining what regulatory needs might be necessary, a timely meeting because of priorities expressed in the new administration.

Dr. Lin said the emerging needs of physical infrastructure and circular economy are being supported by investments through The Strategic and Emerging Research Initiative. The ADLP directed funding mechanism is looking at a portfolio of projects on a 1-to-3-year time scale.

MEP Update. The MEP Centers' response to COVID-19 involved forty states providing product and/or supplier-matching services, and twenty-nine states have assisted with retooling to produce personal protective equipment (PPE). Thirteen states have assisted manufacturers with PPE product testing and development. On the technology side, the cybersecurity programs and Industry 4.0 update, twenty-two states implemented a cybersecurity program, either as a direct response to the pandemic or as a complementary program, and five states either augmented an existing Industry 4.0 program utilizing CARES Act funding to support these initiatives. NIST was given $50 million from the CARES Act, which was distributed in less than 90 days to all fifty-one MEP centers.

Ms. Bahar stated MEP was active in improving workforce in order to make sure the small manufacturers would not need to lay people off but, instead leverage existing programs or develop new training programs to provide training opportunities so not many jobs would be lost or employees displaced. This would also ensure that apprenticeships and youth engagement would continue at these centers. In terms of outreach and needs assessment, forty-eight states provided new or expanded consulting services and performed needs surveys, forty-two states conducted informational webinars, and thirty-one-states created return-to-work guidelines. MEP serving U.S. manufacturers helped create or retain over 105,000 jobs. Eleven roundtables were held to hear from small- and medium-sized manufacturers about the pandemic issues and how MEP centers could help.

MEP CARES Act. Manufacturing USA responded to the COVID-19 through the NIST CARES Act funding of $12.4 million, which resulted in thirteen projects at four institutes. During the last couple of months, Manufacturing USA added two institutes, one of them CyManII, a Department of Energy sponsored cybersecurity institute and another one, BioMADE, a Department of Defense (DOD) sponsored synthetic biology institute.

National Institute for Innovation in Manufacturing Biopharmaceuticals (NIIMBL) has multiple COVID response projects ongoing, as well as leveraging the network to better serve manufacturers and the nation. NIST continues to benefit from the partnership with NIIMBL, and NIIMBL's success to date demonstrates the benefits of DOC/NIST-sponsorship for this Manufacturing USA institute in support of the nation's economic security. NIST is committed to letting US industry drive NIIMBL's priorities, consistent with the statutory purposes of the Manufacturing USA program.

Baldrige Awards. The Baldrige Awards for Performance Excellence were awarded to one small business in Tulsa, Oklahoma, MESA; two health care entities, Greater Baltimore Medical Center HealthCare System in Baltimore, Maryland and Wellstar Paulding Hospital in Hiram, Georgia; and two nonprofit recipients, AARP in Washington, D.C. and Elevations Credit Union in Boulder, Colorado. MESA was a three-time winner, and Elevations Credit Union was a two-time winner.

Return on Investment (ROI) Update. April 24, 2021, it will be two years since the Green Paper was published. There have been ten proposals to modernize the Stevenson-Wydler Technology Innovation Act of 1980 transmitted to congressional committees in November 2020. A notice of Proposed Rulemaking to revise Bayh-Dole regulations will be open for public comment through April 5, 2021.

Communications Technology Laboratory (CTL) Reorganization. A reorganization of the CTL is ongoing. NIST is increasing resources for advanced communication and have transparent, collaborative, and dedicated approach to create a model laboratory that accelerates connectivity and improves lives in the communications space. This is achieved through two parallel efforts, one with the logistics and one on strategic planning for the laboratory. Next steps include finalizing a strategic plan, continuing to increase focus on new administration priorities, and strategic communications to people and to stakeholders.

Strategic Plan Updates. The position for the Director of Diversity and Inclusion closed on December 22 and is now in the initial screening and interview stage. NIST has just completed a review and small pilot for leadership competencies model. A new funding mechanism will be launched to promote collaboration which will be implemented by the Special Programs Office consisting of $1 million with awards ranging from $100,000 to $250,000. There is a currently ongoing branding study that is collecting input from leadership and staff via interviews and external stakeholders.

The Program Coordination Office organized a Strategic Plan virtual showcase, which had almost 500 participants across NIST staff. Some of the key issues were covered are telework and remote work, leadership accountability, diversity and inclusion, aging infrastructure, and open office concept.

For more information, see Dr. Olthoff's presentation.

Discussion. The group discussed the following topics:

- More focus should be on all software, not just the AI and MML category;
- Applying lessons learned from SolarWinds to NIST Framework and update it accordingly;
- MEP program helping other manufacturers create resiliency and flexibility for crisis;
- Recommended best practices being developed from roundtables on COVID response and funding;
- Reorganization and changes in CTL for end-to-end support in U.S. communications infrastructure;
- Status of ROI Initiative and process for implementation via legislation;
- What VCAT can do to promote investment in renovation and maintenance of NIST facilities;
- Overreliance on MML and AI to speed things up at expense of discovery;
- Abuse of facial recognition technology and privacy;
- NIST taking a systems-level approach on building codes with respect to climate change; and
- Investing in super-fast heating systems for plumbing to save water.

NIST Safety Update – Keeping NIST Staff Safe During COVID - *Dr. Elizabeth Mackey, Chief Safety Officer and Director of Office of Safety, Health, and Environment*

Dr. Mackey stated many safety departments across the United States and world are working on pandemic management prevention and response protocols. The Office of Management and Budget (OMB) memorandum requirements for phased operations continue as does maximum telework. COVID-19 prevention protocols for staff, contractors, and visitors were established that included face mask use, distancing, occupancy limits, routine disinfection, daily health, and travel screening criteria. Protocols were also established for case response, disinfection, notification, and room ventilation evaluation. Weekly updates are provided to NIST leadership.

One struggle that large organizations encounter is communication. NIST communicates with staff continuous through townhalls, NIST Leadership Board meetings, website pages, and safe return-to-work training. Local health units were key in providing support by screening COVID-19 cases, consulting services for both campuses, specialized training for mission-essential staff, and conducting drive-through flu shot campaigns. Plans are under way to administer COVID-19 vaccines when they become available.

With respect to on-campus case management, the Office of Safety, Health, and Environment (OSHE) leads the response to on-campus COVID-19 cases, overseeing disinfection of potentially contaminated spaces and notification of close contacts when necessary, and monitoring case data for trends and potential transmission on campus. All staff are required to report to their managers if they have COVID-19-like symptoms. Data as of January 29th, 2021 show 260 cases were reported as symptomatic and 110 of these cases tested positive. Responding to 70 of the symptomatic cases who visited the NIST campus while potentially infectious, OSHE developed response plans for 63 of those, 41 required disinfection of spaces, 22 had close contacts on campus, and 11 were COVID-19positive. There were 10 cases tracked on the Gaithersburg campus and 2 on the Boulder campus. There has been no transmission on campus for any of these cases that were tracked.

Dr. Mackey said plans for coronavirus vaccines and mitigation strategies are ongoing, working with the Maryland Department of Health to make vaccines available to mission-essential Federal employees who work at the Gaithersburg campus. Plans are under way to administer vaccines in the NIST health unit in Gaithersburg and the National Oceanic and Atmospheric Administration health unit in Boulder. The current COVID-19 precautions will remain in place, including for vaccinated staff. OSHE continues to monitor the latest information on pandemic conditions, the virus and its variants, and mitigation strategies including vaccinations.

Safety work has been ongoing, even though a lot of emphasis has been placed on COVID-19 prevention. The goal is to be consistent with ISO-45001 standard and communicate safety requirements to all programs. About 75 percent of the safety management system directives suborders are complete for formalizing the requirements and directives space. The programs fall into four policy areas (occupational safety and health, environmental management, fire and life safety, and radiation safety) and currently there are 16 programs under development. Contractor and electrical safety are big concerns; there are not formal programs, but there is information regarding requirements on the website.

Out of 32 reported injuries, 8 were Occupational Safety and Health Administration recordable in FY2020. Workplace inspections were suspended last March, but as work is brought back up, it will slowly bring back the workplace inspections. Chemical and electrical safety are two of the top things seen for safety incidents, as well as hazard signage, housekeeping and slips, trips, and falls.

On safety-related risks and opportunities, Dr. Mackey said risks include emergency and pandemic readiness and changes in COVID-19-related risks. Opportunities include improvement of the Continuity of Operations Plan and Pandemic Plan and active management of operational phases of vaccinations. Aging infrastructure continues to be a problem. A robust contractor safety program needs to be developed and implemented. Though the safety management system is not fully developed and implemented, the requirements are on the website. Safety complacency is also an area that needs reinforcement.

For more information, see Dr. Mackey's presentation.

Discussion. The group discussed the following topics:

- Modulation of occupancy standards by doing airflow evaluations;
- Publishing lessons learned to be used more broadly around the country;
- Proposal on risk data for aging infrastructure to point out urgent needs; and
- Having sufficient maintenance resources to maintain safety.

Infrastructure Update—Status of Ongoing Projects and Priorities—*Robert "Skip" Vaughn, Chief Facilities Management Officer and Director of Office of Facilities and Property Management*

Mr. Vaughn provided a facilities overview, which focused on the deteriorating conditions of NIST facilities. Decades of underfunding as well as an emphasis on new construction at the expense of maintenance contributed to the decline. Campus facilities are 60-70 years old with around 58% of facilities in poor to critical condition according to Department of Commerce standards. Deferred maintenance backlog has increased by $60 million to a total of $834.5 million due to completing estimates for projects in the past year. The number of major utility infrastructure failures is increasing, and older labs are unable to support controlled environments required for advanced research. The two campus master plans were strategically consolidated and prioritized into a single list that prioritizes capital improvement. The sequencing of projects aims to have a fair balancing of going back and forth between the two campuses, allowing temporary relocations during laboratory building renovations. One important point in the executive summary of the report showed the cost of time. In completing the top 11 priority projects at $80 million vs $60 million per year results in the cost saving difference of about $500 million due to inflation.

Mr. Vaughn discussed priority projects per campus that are planned and/or ongoing:

- B245 Modernization and Addition, scheduled to finish in early 2024;
- B222 Renovation and Addition Project;
- B207 Robotics Addition starting soon after sale of Nike missile site;

- B101 Lower Levels Renovation and Addition;
- Gates A and F, low-cost projects, with Gate F being a priority for improving campus security;
- B1 Wing 4 Renovation;
- B1 Wing 5 Renovation;
- B1 Spine West Renovation; and
- B3 Addition

The General-Purpose Laboratories modernization program focuses on 7 of 11 prioritized projects in Gaithersburg. The number one NIST project is Building 222, which was renovated over a decade ago for office space. NIST made a strategic decision to convert the main building to exclusively laboratory space.

In the last year, NIST awarded work for both Wings 4 and 5 of Building 1 in Boulder. Wing 5, the number two priority, is the largest portion of the building. There is an option to renovate the West Spine; however, the Building 3 addition project would need to be completed to move CTL's laboratory spaces. The program of requirement for this project has finished and will allow $30 million for this project to be design-build and shovel-ready when funded. Action is being taken to vacate underperforming buildings—vacating Building 24 completely and demolishing Building 2A. Utility infrastructure is the biggest component of the NIST backlog and the number one priority, with over 60 percent of our annual SCMMR (Safety, Capacity, Maintenance and Major Repairs) budget aimed specifically at these types of projects.

Near-term priority areas for FY21 through FY25 on both campuses focus on utility infrastructure and IT infrastructure. For the Gaithersburg campus, there are five priorities: the NIST Center for Neutron Research (NCNR) complex completion, B101 Complex upgrade, roofing replacements, modernizations to comply with Americans with Disabilities Act (ADA) and life safety and fixing the road and parking lot conditions across campus. For the Boulder campus, there are four priority areas: Master Plan completion, improvements in Wing 2, ADA and life safety compliance, and improving the roads and parking lots across campus.

Mr. Vaughn said to improve and sustain facilities, a two-pronged approach is taken to complete major capital projects – the utilization of the Construction of Research Facilities funding, and SCMMR funds. For FY21, NIST received $74 million in SCMMR. Twenty-seven percent of the NIST building square footage has been added in the last 20 years without matching funds to maintain them, which does not include Building 245. Future funding requests need to ensure that NIST is pursuing appropriate funds to maintain facility investments.

For more information, see Mr. Vaughn's presentation.

Discussion. The group discussed the following topics:
- Good response by NIST adhering to Biden administration's themes of Build Back Better and Create Jobs;
- Realization of NIST employees working at home, potential changes to maintenance plans going forward;
- NIST looking at expanded telework and remote work capabilities for the future;
- VCAT expressing concern to incoming NIST Director about maintenance, repair, and renovation priorities;
- Capital revolving fund allowing NIST to build up the funding;
- Supporting collaborative and flexible workspace, as in the recent AstraZeneca model; and
- Providing success stories to annual budget request to illustrate true value of world-class research.

SESSION II: SETTING THE STAGE – CURRENT BUDGET SITUATION, INCOMING PRIORITIES AND NEW MANDATES

Budget Update - *Dr. Jason Boehm, Director NIST Program Coordination Office*

Dr. Boehm stated the NIST budget overall was flat in FY19 and FY20. For FY21 Presidents budget NIST did get an inflationary increase and some programmatic increases for the Laboratory Programs. The ITS

increased by $4.5 million over FY20, and there was a reduction to the Construction of Research Facilities (CRF) budget of $38.8 million.

The STRS received a $34 million increase, providing several targeted increases to NIST Laboratory Programs, including increased funding for quantum information science and AI work. It also provided $16.35 million of inflationary adjustments to base, to keep up with increasing cost of inflation and salaries. Adjustments are being made with discretionary funds to cover some of the new activities. The National Cybersecurity Center of Excellence received a significant increase for a new program looking at cybersecurity of genomic data. Other program areas that receiving an increase are forensic sciences, UAV (unmanned aerial vehicle) challenges and credentialing, pyrrhotite in concrete aggregate, Plastics and Polymeric Grant Program, Greenhouse Gas and Urban Dome Initiative, and the Baldrige Performance Excellence Program.

Dr. Boehm stated NIST wanted to double the investment in AI, but it would have required $25 million and only $6.5 million was received for this effort. The increased funding will allow for data characterization and data standards research in support of Trustworthy AI, to support the development of a Framework for Trustworthy AI, as called for in the National Defense Authorization Act (NDAA), and to support increased engagement in international standards development activities relevant to AI.

Quantum continues to be a priority for NIST, with a key role in the National Quantum Initiative. Additional funding received in FY20 helped to expand efforts to the Quantum Economic Development Consortium. In FY21, the additional $6.5 million will expand projects at the Joint Institute for Laboratory Astrophysics and the Joint Quantum Institute by providing additional funding support to increased standards engagement.

On carbon air capture, there is some new work by way of a collaboration between MML and NCNR, which fits in nicely with the incoming administration's priorities.

The FY21 ITS budget provides $166.6 million for MEP and the Manufacturing USA programs, a $4.5 million increase over FY20 levels. Manufacturing USA will continue $10 million funding support for NIIMBL as well as $1 million for a competitive grant program to develop technology roadmaps for promising advanced manufacturing clusters.

The CRF budget was reduced by $38 million, but Mr. Vaughn is working on a plan to develop a program of requirements of Building 222 modernization, and $700,000 will be used to develop an integrated master plan for Gates A and F modernization on the Gaithersburg campus. The bulk of this funding will go to SCMMR targeting investments based on risk and assessment of utility infrastructure, life safety and roofing projects, and some IT infrastructure upgrades.

Lastly, Dr. Boehm stated NIST is waiting for a pass back from OMB for FY22. There have been supplemental appropriations in the form of a current COVID-19 relief bill that could include additional funding.

For more information, see Dr. Boehm's presentation.

Discussion. The group discussed the following topics:

- Funding distribution for STRS and ITS, how much is contracted out;
- How much of the quantum research funds go towards error-correcting processes;
- How is NIST addressing known barriers to increasing manufacturing that goes on in the U.S.;
- Changing acronym of SCMMR because of pronunciation reflecting negative connotations;
- Possible interest in reprioritization of capital allocation for maintenance;
- Appropriations staff requests assessment of study for FY22 budget regarding facilities; and
- Manufacturing USA and MEP programs addressing U.S. competitiveness with skills development.

NIST Alignment with Administrative Priorities – *Dr. Heather Evans, Senior Analyst, NIST Program Coordination Office*

Dr. Evans mentioned four key themes of the NIST programs and mission that align with the administration priorities; COVID-19, climate, racial equity, and economy.

COVID-19. On COVID-19 response, NIST is making an impact with different projects at the laboratories as well as the MEP National Network and Manufacturing USA.

Climate. NIST efforts to address climate change cross the areas of infrastructure resilience, the environment, and energy. To help address major environmental issues currently facing the country and those of the future, NIST develops measurement capabilities that are fundamental to measuring environmental change, such as how much carbon came from fossil fuels and using measurements from space to develop better climate models. NIST makes valuable technical contributions to infrastructure sectors through measurement science and standards development to support the management, repair and rehabilitation of at-risk buildings and other infrastructure including research to update plumbing systems to meet current and future water needs.

Additionally, NIST develops new measurement techniques and disseminates reference materials and data that help monitor current energy impacts and support the development and commercialization of new energy production, distribution, and efficiency technologies. For example, the NIST Net-Zero Energy Residential Test Facility is a highly instrumented facility modeled after a single-family home but is outfitted with many of the most forward looking and efficient technologies in the residential market. NIST also hosts a Smart Grid testbed and Solid-State Lighting Metrology Program and efforts are underway to better understand and advance battery technologies.

Racial Equity. We conduct scientific research in several forensic disciplines, including DNA, ballistics, fingerprint analysis, trace evidence, and digital, among others. We provide physical reference standards and data that help forensic laboratories validate their analytical methods and ensure accurate test results. The Forensic Science Program is strengthening the forensic practice with research and development in measurements and standards tools for forensic science disciplines. The program is engaging with stakeholders to disseminate tools to forensic science practitioners and jurists. A new methodology was developed to train canines to sniff narcotics or explosives in a much safer way. Another way NIST is contributing to racial equity is through the technology measurements and standards work, such as the Face Recognition Vendor Test. NIST conducted tests to measure performance of algorithms and the accuracy with which the software can identify people of varied sex, age, and racial background. NIST is also trying to move discussion forward around understanding bias through artificial intelligence.

Recent highlights on the NIST workplace on racial equity include: new NIST-wide position of Director of Diversity and Inclusion; a contract with COACh and University of Oregon which will produce recommendations on the promotion criteria and equity in career advancement tracks; monthly peer-to-peer Bystander Intervention Training sessions; conclusion of two staff detail assignments studying inclusivity; and a third conference for Undergraduate Underrepresented Minorities in Physics hosted in January. In addition, there are active employee groups on various topics of racial equity, including the newly reinvigorated NIST Association for Black Staff. NIST senior leadership has increased communication on racial equity, and the NIST library has already issued some guidance to NIST authors on how to avoid biased language.

Economy. NIST programs are most solidly rooted in the manufacturing and innovation space. The NIST role includes supporting national manufacturing networks and workforce development; driving discovery in emergency technologies using AI, robotics, and additive manufacturing; securing the supply chain through new research, measurements, standards, and other tools; as well as continued effort to support quantum information science, synthetic biology, and other linchpins of future innovation.

President Biden has nominated Dr. Eric Lander from the Broad Institute to be his science advisor to work with the science community on these issues:

- Lessons learned from the pandemic;
- Addressing climate change;
- American leadership in technologies and industries of the future;
- Ensuring S&T results are fully shared across America; and
- Ensuring long-term health of S&T, especially through science, technology, engineering, and mathematics education and other programs

For more information, see Dr. Evans' presentation.

Discussion. The group discussed the following topics:

- NIST and the American Physical Society efforts on inclusivity in undergraduate education in physics; and
- Possibility of an award program for integrity champions in the bystander training program.

NIST and the NDAA (Chart)—*James Schufreider, Director, NIST Congressional and Legislative Affairs Office*

Mr. Schufreider stated the NDAA is the only bill guaranteed to pass Congress each year, but last year it almost did not happen. The NDAA specifies budget, expenditures, and policies for the DoD.

The Public Law 116-283 contains a lot of provisions related to the Department of Commerce and NIST programs and activities, with NIST having the largest amount of work of any other Commerce bureau. Though this bill mandates programs and policies, it does not actually provide the money to carry those provisions out. Many provisions mandate consultation, coordination, and collaboration activities with other agencies.

Legislation on NIST programmatic activities, included in whole or in part in the final bill, are the following:

- Quantum;
- AI;
- Semiconductors;
- Microelectronics;
- 5G;
- Advanced Manufacturing; and
- Supply chain

According to the chart on NIST provisions in the NDAA of 2021, there was significant focus on ITL. Sections 9902 through 9906, however, related to semiconductors. There was a lot of activity focused on authorizing the standing up of a Manufacturing USA Institute on semiconductor manufacturing, a National Advanced Packaging Manufacturing Program, and a Microelectronics Research Program. Though these are mandates, they do not come with funds and are subject to availability of appropriations.

Section 9414 mandates a study on Chinese policies and influence in the development of international standards, which was important to Senator Rubio and others who wanted NIST to carry out this study. The programs and activities of NIST are well regarded, but funding is always a challenge.

For more information, see Mr. Schufreider's presentation.

Discussion. The group discussed the following topics:

- Funding in the bill for microelectronics manufacturing mandates not appropriated;
- What activities NIST can perform at this time without additional funding;
- Challenges of implementation without additional funding;
- Increasing gap between expectations of NIST and NIST budget;
- Characterizing barriers and roadblocks that NIST faces in achieving mandates;
- Acquisition of data from Internet Engineering Task Force on Chinese standards engagement; and
- Approach for a study on supply chain database.

SESSION III: VCAT WORKING SESSION

Review Draft NIST Report and Discuss Recommendations and Discuss Draft Letter to Incoming Administration—*Dr. Allen Adler, Chair, VCAT*

The VCAT conducted a working session to discuss both the Letter Report to the incoming Secretary of Commerce as well as the 2020 Annual Report to Congress. They added suggestions, comments, and recommendations to both documents which will be finalized over the next several weeks by email before sending.

Public Comment – Brief Comments from Dr. Walter Copan

Dr. Copan thanked the VCAT members for being such a tremendous resource for the mission of NIST. He praised the members at NIST for carrying the torch of a One NIST culture, which will fully leverage reach in all its programs. He feels positive that the institute reflects the priorities of the new administration.

He thanked the NIST team for nominating him as Laboratory Director of the Year, and he has also been named Federal Laboratory Consortium Director of the Year. Association of University Technology Managers named him the Bayh-Dole Award winner as well in moving forward innovation and legislative policy position of the United States. The VCAT members thanked him for his service, stating that his awards are well-deserved.

Administrative Business

Dr. Adler thanked the NIST leadership for the thought-provoking presentations and discussions at the virtual meeting. He also stated the updated materials for the upcoming VCAT report and letter to the incoming Secretary should be circulated via email to members to be finalized.

Dr. Adler thanked Dr. Copan for his leadership, contributions, and service to the nation. The VCAT members also expressed their appreciation.

Adjournment

The meeting was adjourned at 4:00 PM.

I hereby certify that to the best of my knowledge; the forgoing minutes are accurate and complete.

Stephanie Shaw, Designated Federal Officer, NIST Visiting Committee on Advanced Technology

Dr. E. Allen Adler, Chair, NIST Visiting Committee on Advanced Technology