

**VISITING COMMITTEE ON ADVANCED TECHNOLOGY (VCAT or Committee)**  
**MINUTES OF THE October 29<sup>th</sup> and 30<sup>th</sup>, 2019 MEETING**  
**GAITHERSBURG, MD**

**ATTENDANCE:**

**Visiting Committee  
Members Attending**

Adler, Allen  
Colwell, Rita  
Garvey, Michael (Mike)  
Ishak, Waguih\*  
Jackson, Keoki  
Kaler, Eric  
Khan, Mehmood\*  
Ku, Katharine  
Sizer, Theodore (Tod)  
Vasko, David (Dave)

**Designated Federal Officer**

Shaw, Stephanie

**NIST Leadership Board**

Boehm, Jason  
Brockett, Del  
Copan, Walter  
Dimeo, Rob  
Dowell, Marla  
Fangmeyer, Bob  
Harary, Howard  
Jenkins, George  
Kimball, Kevin  
Kushmerick, James (Jim)  
Lin, Eric  
Mackey, Elizabeth  
Molnar, Mike  
Olthoff, James  
Porch, Susanne  
Romine, Charles  
Schiller, Susannah  
Singerman, Phillip  
Thomas, Carroll  
Vaughn, Robert (Skip)  
Wixon, Henry

**NIST Staff**

Acierto, Linda  
Alderman, David  
Allocca, Clare  
Andrade, Dorianna

Bald, Kevin  
Banovic, Stephen  
Carnahan, Lisa  
Chin, Joannie  
Conn, Andrew  
Corwin, Kristen  
Dohne, Kirk  
Espinal, Laura  
Evans, Heather  
Fasolka, Michael  
Gayle, Frank  
Gillerman, Gordon  
Gloster, Gerald  
Goldstein, Barbara  
Golmie, Nada  
Hight-Walker, Angela  
Hoffman, Elizabeth  
Hughes, Colleen  
Jillavenkatesa, Ajit  
Lawson, Jeremy  
Lefkovitz, Naomi  
Lin-Gibson, Sheng  
McBride, Timothy  
Merkel, Warren  
Newton, Thomas  
Phelps, Amy  
Porter, Gail  
Puskar, Erik  
Saundry, Claire  
Sberegavaeva, Anna  
Schlenoff, Craig  
Schufreider, James  
Sedgewick, Adam  
Seiler, David  
Sharpless, Katherine  
Shyam-Sunder, Sivaraj  
Sokol, Annie  
St. Pierre, Jim  
Stieren, David  
Strouse, Greg  
Szakal, Christopher  
Tabassi, Elham  
Vanek, Anita  
Wade, Bryan  
Wang, Tom

Weiss, Brian  
Williams, Carl  
Zielinski, Paul  
Zimmerman, Neil

**Others**

Ambrose, Mitch – American  
Institute of Physics\*  
Heather, Sean – US Chamber  
of Commerce  
Kallmer, Jonathan –  
Information Technology  
Industry Council  
Milliken, Lindsay – Lewis-  
Burke Associates LLC  
Nawrocki, Mike – ATIS  
Rohlfing, Celeste – University  
of Oregon/COACH  
Weiss, Jeffrey – Venable LLP

\*Participated Remotely

Tuesday, October 29, 2019

## **Call to Order - Dr. Rita Colwell, VCAT Chair**

Dr. Colwell called the meeting to order at 8:30 a.m. and reviewed the meeting logistics. Mehmood Khan, Waguih Ishak, and some NIST staff from Boulder Campus attended the VCAT meeting via webinar. Dr. Colwell turned the meeting over to Dr. Copan.

## **SESSION I: NIST UPDATE**

### **Special Presentation to Dr. Rita Colwell – Dr. Walter Copan, Under Secretary of Commerce for Standards and Technology and NIST Director**

Dr. Copan presented Dr. Colwell with two plaques recognizing her service to NIST and the nation as Chair and member of the VCAT from January 2014 to January 2020. He also signed and presented her with a letter of gratitude, as well as a sapling from the NIST Newton apple tree, grown from a cutting of the original tree that inspired Sir Isaac Newton.

### **NIST Update and Agenda Review – Dr. Walter Copan, Under Secretary of Commerce for Standards and Technology and NIST Director**

Dr. Copan summarized the program agenda items for both days of the VCAT meeting. He then provided a NIST update covering 5 major areas.

1. NIST Leadership Changes:

Dr. Phillip Singerman has been with NIST since 2011 and will be retiring, though he will remain for the rest of the year to support a smooth transition and assist in preparing his successor. Dr. James Kushmerick has been selected to be Director of the Physical Measurement Laboratory. He previously served as Director of the Center for Nanoscale Science and Technology.

2. Budget Update:

Currently under a Continuing Resolution through the coming months, NIST is dealing simultaneously with three budgets—the current one for FY (fiscal year) 2020 and the development of the FY2021 budget, as well as making initial plans for the FY 2022 budget. FY 2020 marks from House and Senate total a little over \$1 billion, including \$120 million for construction and renovation to support ongoing renovations in Boulder and maintenance and repair work across both NIST campuses.

3. Recent NIST Highlights:

The recent Executive Order on Artificial Intelligence calls out the role of NIST and required NIST to develop a plan for federal engagement in technical standards and related tools. After collecting broad input from stakeholders through an RFI and workshops, NIST developed the plan the final version of which was issued on August 10<sup>th</sup>. and recommendations for the federal government to bolster standards-related knowledge, leadership,

NIST is one of the co-leads of the National Quantum Initiative (NQI) and has made steady progress in a number of areas including the development of the Quantum Economic Development Consortium (QED-C). The QED-C is managed in partnership with Stanford Research Institute and is intended to provide access to common tools and systems and user facilities, as well as to support the ability to create purpose-driven devices, subcomponents, and performance standards. Over 90 organizations have signed letters of intent to engage in this effort of the QED-C. The use of Other Transaction Authority (OTA) will provide flexibility in future engagements needed for the NQI.

In the area of Precision Navigation and Timing, NIST in partnership between JILA (Joint Institute for Laboratory Astrophysics), PTB (Physikalisch-Technische Bundesanstalt, National Metrology Institute of Germany), and Crystalline Mirror Incorporation has produced dramatic enhancements of the latest generation of atomic clocks, to include the JILA strontium clock, which dramatically improves error rates. One of the goals is to look at the resilience of Global Positioning System (GPS) and ensure that in GPS-denied environments, there is access to alternatives to the current atomic clock time dissemination strategies. This exciting development points to the importance of international collaboration with regard to standardization and time dissemination.

Progress is ongoing in the development and deployment of 5G capabilities and NIST has several relevant programs including:

- Support for standards activities in 3GPP
- Partnership with industry through the NIST 5G mmWave Channel Model Alliance, which currently contains over 175 members developing the modeling tools necessary to enable effective 5G technology development and deployment.
- NIST's Public Safety Communications Program (PSCR) is an important part of the negotiation of 5G standards. Deployment by one of the PSCR awardees, Spectronn, of a mobile edge-computing-in-the-box system was used in the 2019 Boston Marathon, which enabled high-performance networks to support public safety through reliable data streams.

With respect to IoT Technologies:

- A draft Cybersecurity Feature Baseline for IoT (Internet of Things) has been issued as a NIST report, which complements recent publication under consideration for managing the IoT, cybersecurity, and privacy risks. This document is out for comment.

An example of international collaboration was the issuance of the Smart and Secure Cities and Communities Challenge (SC3). This is a joint effort of NIST, Department of Homeland Security (DHS), and the National Telecommunications Information Administration (NTIA), to bring together cities and communities worldwide working on secure and privacy-enhancing technologies in public and private sectors.

On October 7, 2019, over 100 biotech researchers, industry executives, and government officials met at the White House to discuss the U.S. bio-economy, which spans health care, information systems, agriculture, manufacturing, national defense, and more. The U.S. must continue to foster an ecosystem that puts innovative research first, in addition to promoting strong infrastructure, workforce development, data access frameworks, and security.

NIST is working closely with the Food and Drug Administration (FDA), instrument manufacturers, and the Manufacturing USA network through NIIMBL (National Institute for Innovation in Manufacturing Biopharmaceuticals) to enhance trust in the bio-economy. Utilization of the Genome in a Bottle program has been one of the most successful standard reference materials in NIST's history.

In early September, NIST hosted a workshop on Space Commerce at the Boulder site, a collaboration between NIST, Department of Commerce (DOC) Office of Space Commerce, National Oceanic and Atmospheric Administration (NOAA), NTIA, National Aeronautics and Space Administration (NASA), University of Colorado-Boulder Laboratory for Atmospheric and Space Physics, and the Department of Defense (DoD) Space Command. NIST has partnered with the DOC Office of Space Commerce to develop the landscape assessment of standards and where to go next, enhancing space situational awareness, including management of devices in space.

The Manufacturing Extension Partnership (MEP) National Network Summit was held in Atlanta and attended by Deputy Secretary of Commerce Karen Dunn Kelley. Special recognition was given to the late Tab Wilkins, the Center Director for MEP in the Pacific Northwest. The network provided collaboration and the ability to leverage development of tools and cybersecurity guidance, with access to resources on a shared level.

Over \$7 million in funding has been provided to MEP centers in special funding awards. Select awards include \$992,050 to New Jersey MEP for food safety training, \$1 million to Oregon MEP for

Industry 4.0 Tech Acceleration Program, \$498,845 to Workcred for research examining Return on Investment (ROI) of manufacturing credentials, and \$1.074 million for cybersecurity for defense manufacturing.

#### 4. International Engagements:

NIST is seen as a global leader in metrology and has engagements in many projects around the world. It is important that NIST maintain strong relationships with other metrology institutes in order to maintain a consistent and standardized systems of weights and measures.

Mike Molnar and Frank Gayle visited China in light of the Made in China 2025 Initiative. They visited Chinese manufacturing institutes modeled after the Manufacturing USA Institutes. The Chinese institutes are part of an integrated plan and investment in advanced manufacturing capabilities on the order of \$300 billion over a 5-year period. There are currently 12 manufacturing innovation centers in China covering a broad range of manufacturing technologies. Manufacturing USA institutes are being mirrored not only in China but in other parts of the world.

#### 5. Recent Awards:

Since the last meeting NIST received multiple awards on national and international levels which Dr. Copan summarized.

### Discussion

The group discussed the following topics:

- Report on wildfire prevention recommendations after 11/8/2018 Camp Fire tragedy;
- Trend of Manufacturing USA extensions being copied by China;
- Path forward on 800-171B standards and coordination with other agencies on implementation; and
- Involvement and communication with Google, Microsoft, and other leading companies in AI space.

For more information, see Dr. Copan's [presentation](#).

### **[NIST Safety Update - Dr. Elizabeth Mackey, Chief Safety Officer and Director of the Office of Safety, Health and Environment](#)**

Dr. Mackey provided an update of safety actions at NIST.

#### 1. Safety Management System Assessments:

The Safety Management System is delineated in the Directives Management System at NIST, which consists of policies, high-level orders, responsibilities, and basic requirements. Safety suborders contain technical and operational details of safety management system, regulatory requirements and include information on safe work practices. They were built to a standard called OHSAS 18001, an international standard, which has been replaced with ISO 45001 by the International Standards organization in a Safety Management System document.

A National Research Council (NRC) Routine Inspection of the SNM-362 license was conducted in FY2019. It was a very thorough inspection, including NCNR (NIST Center for Neutron Research) material use locations as well as Building 245. All self-identified violations from previous inspections were closed. Colleagues from the National Institutes of Health performed an audit in FY2018. There was one finding, refuted based on version of applicable standard and ALARA (As Low As Reasonable Achievable) considerations, and 13 observations were suggestions for improvement. Gaithersburg Radiation Safety Division (GRSD) has developed a corrective action plan.

Under way now is the Ionizing Radiation Safety Committee assessment of Gaithersburg Radiation Safety Program which assesses radioactive waste management and handling and disposal of associated procedures and records.

Boulder Radiation Safety Program undergoes an internal audit each year by the Boulder Radiation Safety Officer. An external audit is planned for FY2020. Reviews of the Gaithersburg and Boulder X-ray Programs were conducted in FY2019. Results were generally favorable, with a final report coming soon.

2. FY2019 Metrics:

• Incident and Near-Miss Data

There were about 150 cases reported at NIST in FY2019. Slips, trips, and falls are our number one source of injury, which is a good sign because it means NIST is doing a good job of controlling more serious hazards. Injury and event types are examined to ascertain if safety programs are being adhered to and if people have been properly trained. NIST total recordable cases and DART (Days Away, Restricted, or Transferred) rates are comparable to those of the Department of Energy (DOE) labs and similar industry sector peers.

• Leading Indicators

NIST has a robust hazard assessment program where individual scientists are required to look at their work, look at the types of hazards, document how to mitigate hazards, and have these findings reviewed and approved by line managers. To date, over 2,500 individual hazard assessments have been written by about 900 NIST scientists. Improvement is needed in NIST employees and associated completing the General Safety Training. Workplace deficiencies also is an area needing remediation and improvement. Updates on safety management system and metrics are given to the Executive Safety Committee every 6 weeks. Both Radiation Safety Officers provide annual reviews of general safety, radiation safety, and environmental management to Dr. Copan.

3. Strengths and Opportunities:

Leadership is committed to safety excellence at NIST. Managers are committed to protecting workers and ensuring the safety of workspaces. Safety Management System Plan is comprehensive with respect to ISO 45001 and applicable regulatory requirements. Staff members participate in hazard identification, mitigation and risk assessment for work activities. A robust inspection process is in place, collaboration between technical and safety staff, and 8,000 deficiencies for workplace inspection have been corrected since the program launched in 2016. Incident rates are comparable to other similar federal labs and comparable sectors, and corrective actions to address incidents are completed in a timely manner.

Opportunities for improvement would be a push to fight against complacency in the safety culture. A new survey will be performed in 2020 to gauge how the culture is improving on each of the campuses. Two-thirds of the Safety Management System is completed, and improvement is needed there. On website and tools, staff does not like downloading PDFs and Word documents to read requirements. Putting the information in HTML format for easy access is being examined. Risk is assessed for activities via hazard assessments but not for incidents, inspections and other data. Improvement in timeliness of closing out inspection deficiencies is needed. Aging Infrastructure is associated with potentially serious incidents, to include contractor safety.

4. Plans for FY2020:

A Safety Climate Assessment will be done in FY2020 through an internal survey to benchmark progress. A Safety Day will be held at the Boulder campus in January 2020, giving NIST leadership an opportunity to express commitment and expectations to staff. Management safety observation visits will be held. Improving access to safety information with a new website and information and easy-to-access HTML format in bite-size chunks will be implemented, along with fact sheets to convey key points, so that people can get their information quickly. More programs will be put out for the Safety Management System in regard to the management side of things and data analysis. Internal assessments by program managers will be examined by pulling the data together a bit better and communicating on a regular basis. Dr. Mackey and Dr. Vaughn have formed a partnership to prioritize and keep on top of aging infrastructure and safety-related challenges that are facilities-based.

**Discussion:**

The group discussed the following topics:

- Updating safety training approaches for user groups on campuses;
- Suggestion to have a safety moment in the form of a slide shown before every meeting;
- Managers should give feedback immediately when staff is not utilizing safety measures;
- Monthly tours should be conducted to inspect for safety adherence; and
- Doing the shorter safety survey every year instead of a long one every 3 years.

For more information, see Dr. Mackey's [presentation](#).

## **SESSION II: ADMINISTRATION'S PRIORITIES FOR SCIENCE AND TECHNOLOGY**

### **Overview of the Administration's Priorities for Science and Technology - Dr. Jason Boehm, Director of NIST Program Coordination Office**

Dr. Boehm reviewed NIST's programmatic planning processes and resultant priority areas of engineering biology, IoT, quantum information science, and AI.

Dr. Boehm then provided an overview of the Administrations R&D Priorities and how NIST programs align with those priorities, which are summarized below:

#### 1. American Security:

A major focus of the Administration under the goal of American Security is in the area of critical infrastructure resilience. NIST has a major effort in this space with EL conducting work on community resilience activities including: WUI (Wildland-Urban Interface), NEHRP (National Earthquake Hazards Reduction Program), structural performance, engineered materials, timely public safety communications, advanced composites, and MEP's support and assistance to local manufacturers after disasters.

#### 2. Leadership in Industries of the Future:

The Administration is prioritizing work in the "Industries of the Future", which includes AI, Advanced Manufacturing, Quantum Science, 5G/Advanced Communications, and the bio-economy. NIST has significant efforts in each area. Artificial intelligence and quantum information science are top priorities for NIST and are slated to receive increased funding if the FY2020 Appropriations Bill is passed, with an additional \$10 million for quantum information science and an additional \$8 million in AI. NIST has significant programs in advanced communications and networks, which includes next-generation wireless, spectrum sharing where NIST engages with other agencies to develop test capabilities for a variety of wireless and next-gen communications applications through CTL's National Advanced Spectrum and Communications Test Network (NASCTN). NIST has a portfolio of about \$155 million worth of research in the advanced manufacturing space, which is going to be relevant for a long time into the future.

#### 3. Energy and Environmental Leadership:

Dr. Boehm stated there are relevant NIST activities in the environment arena in collaboration with NOAA and NASA for earth-observing satellites. Other efforts are greenhouse gas monitoring and prediction, water quality, working with Hollings Marine Laboratory (HML) on marine environment and looking at the marine specimen bank, work oceans and plastics. On energy, ongoing research is taking place on net-zero energy, high-performance business, embedded intelligence in buildings, smart grid, and biofuels and sustainability.

#### 4. Health and Bioeconomic Innovation:

In biomedicine, investment is aimed at combatting the opioid crisis and working with the first responder community, rapid detection and contamination of infectious diseases, gene therapy and pharmaceuticals. Work is ongoing with interagency partners at National Institute of Health (NIH), DoD, and DHS.

#### 5. Space Exploration and Commercialization:

The administration has made the development of a vibrant Space Commerce Industry a top priority. NIST supports a lot of the work in the aerospace and space industries through its work in advanced manufacturing and materials development, advanced sensor systems, and calibrations. NIST held the first ever workshop to identify the R&D needs of space commerce.

For more information, see Dr. Boehm's [presentation](#).

## **Overview of NSTC Joint Committee on Research Enterprise and NIST Engagement – Dr. Walter Copan, Under Secretary of Commerce for Standards and Technology and NIST Director**

Dr. Copan gave an update on JCORE (Joint Committee on Research Environment). NIST has been closely engaged with the White House Office of Science and Technology Policy (OSTP). The objectives are to elevate research environment issues, convene and lead by example, and engage with the external community. The definition of research environment is professional research settings including but not limited to laboratories, field sites, institutions, any physical or virtual location where scholarly colleagues interact and carry out the business of research.

The Subcommittee on Rigor and Integrity in Research is a program that looks at managing conflicts of interest, identifying challenges, addressing research misconduct, and looking at incentives for research, while ensuring that rigor in research is embedded culturally. At the heart of NIST's mission is the area of open science, and this subcommittee covers standards and validation for materials and methods, training and messaging, and effective mechanisms for peer review. The JCORE provides a convening resource across the federal science and technology complex.

The Subcommittee on Safe Inclusive Research Environments (SIRE) serves as the primary coordination body for federal agencies to share promising practices, challenges, and activities regarding harassment of all types in the research environment. It recognizes the importance of stakeholder involvement, including strong engagement with professional societies, institutional leaders, and governing boards by building upon previous and current interagency and agency-specific efforts. Equity and diversity are very high priorities for the NIST organization and leadership team.

The Subcommittee on Reducing Administrative Workloads ties in with the ROI initiative for technology transfer. This was recognized by the American Innovation and Competitiveness Act (AICA) in a piece of legislation that reauthorized NIST's programs and activities. In coordination with OSTP, an interagency work group was established to reduce administrative burdens on federally funded research. A report was submitted to Congress in May of 2018 with a set of initiatives outlined for reducing the federal administrative and regulatory burden.

The Subcommittee on Research Security is a primary coordination body for federal science and technology agencies to share, coordinate practices, and look at strengthening the security of America's research enterprise across the nation.

### **Discussion**

The group discussed the following topics:

- What government activity is needed to reduce administrative workload; and
- NIST attention to balance between openness and national security when it comes to recruiting.

## **Discussion Regarding NIST Engagement with JCORE – Dr. Heather Evans, Subcommittee on Safe and Inclusive Research Environments; Dr. Gregory Strouse, Research Security; and Dr. Katherine Sharpless, R&D Administrative Burdens**

Dr. Boehm opened the discussion and invited Dr. Evans, Dr. Strouse, and Dr. Sharpless to provide some in-depth details about the activities of their subcommittees.

Subcommittee on Safe and Inclusive Research Environments:

Dr. Evans stated that SIRE is working with the Science and Technology Policy Institute (STPI), which conducted a promising practices report. This may open opportunities for NIST to address the problem of sexual harassment and create a more inclusive research environment.

Subcommittee on Research Security:

Dr. Strouse stated the subcommittee's goal to ensure the integrity of the research enterprise rests on the principles of openness, transparency, reciprocity, and meritocracy. The effort is to create a research ecosystem. It is important to protect the ecosystem and ensure that other nations will not exploit the enterprise. Disclosure of what is going on with conflicts of interest and conflicts of commitment is needed. Retaining personnel and keeping them from participating in talent recruitment programs is also an area of focus, which goes back to training. This is an area NIST is working on by increasing the amount of training that scientists and upper-level staff get, which will put NIST in a good place to promote and protect their international collaborative research and science efforts. A discussion ensued about how to protect open research without compromising the results. One attendee suggested NIST should make a value-based appeal that it's not about suspecting people and instead should be about upholding values. Dr. Boehm added that NIST takes its role on values and integrity seriously.

Subcommittee for Reducing Administrative Workloads:

Dr. Sharpless listed the three objectives of the subcommittee as standardizing reporting requirements, collecting financial conflict of interest requirements across all agencies, and standardizing the bio-sketch information that PIs submit with their proposals.

## **SESSION III: NIST STRATEGIC PLAN – POSITIONING FOR A CHANGING S&T ENVIRONMENT**

### **NIST Strategic Plan Update/Overview - Dr. Jason Boehm, Director of NIST Program Coordination Office**

Dr. Boehm provided the VCAT with an update on NIST's strategic planning efforts and the progress made to date. As of the October meeting NIST had developed the following goals and objectives and was working on identifying potential strategies for immediate implementation.

Goal 1. Position NIST to advance U.S. science and innovation has three objectives to meet this goal:

- Increase agility, promote collaboration, and maintain technical excellence;
- Develop and leverage flexible approaches to attract, retain, retrain, and grow talent; and
- Develop creative models that strategically expand external engagement and impact, maximizing value of NIST technologies.

Goal 2. Maximize NIST's stakeholder impact through high-value service delivery has three objectives to meet this goal:

- Facilitate the transfer of NIST knowledge, inventions, and technologies from laboratory to marketplace;
- Provide high-quality products and services that NIST's customers and key stakeholders value; and
- Strategically communicate NIST's key messages so stakeholders can identify and share NIST's priorities, capabilities, and value.



Goal 3. Create the infrastructure for a 21st century research institute has four objectives to meet this goal:

- Facilitating next-gen research infrastructure;
- Develop and implement plans for major facility upgrades;
- Upgrade NIST's IT infrastructure and develop a sustainable plan to support future growth; and
- Adopt and transition to modern business systems and operational practices.

Goal 4. Build at One NIST culture has four objectives to meet this goal.

- Ensure NIST has accountable leaders/managers with broadly defined, recognized, and implemented competencies;
- Create an engaged, empowered, and agile NIST workforce aligned with the One NIST vision and NIST core values;
- Strengthen the workplace environment at NIST making NIST a welcoming institution that empowers its employees and rewards innovation; and
- Diversity and inclusion, to attract, develop, and retain a diverse workforce that's representative of the nation NIST serves.

When asked to prioritize efforts based on cost implications, the majority of the Goal Teams and NIST leadership thought that developing and implementing plans for major facility upgrades and efforts to develop and leverage flexible approaches to attract, retain, retrain, and grow talent ranked the highest priorities. From a culture perspective, increasing agility, promoting, collaboration, and maintaining technical excellent; developing and leveraging flexible approaches to attract, retain, and retrain, and grow talent; and ensuring NIST has accountable leaders/managers were the objectives that the Goal Teams and NIST leadership thought that NIST should focus on addressing right away.

## Discussion

The group discussed the following topics:

- Employee engagement survey to improve business processes;
- Need for better program management and integrated teams across the organization;
- Getting people to think about building processes to drive a change in thought and culture; and
- Focusing on process improvement and process optimization in the NIST culture.

For more information, see Dr. Boehm's [presentation](#).

**There was no quorum for SESSION IV: NIST's Role in a Rapidly Changing Technology World and Session V: NIST and Equity. These topics will be summarized at the next VCAT meeting.**

**Wednesday, October 30, 2019**

## **SESSION VI: NIST and Technology Transfer**

### **Overview and Introduction - Dr. Phillip Singerman, Associate Director for Innovation and Industry Services**

Dr. Singerman gave a brief introduction and overview of NIST's Technology Transfer portfolio. Technology transfer, broadly defined, fulfills NIST's mission "to promote U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology in ways that enhance economic security and improve our quality of life." NIST has the responsibility for policy formulation, reporting an interagency coordination of the federal government's intramural research which is governed by the Stevenson-Wydler legislation, NIST also has the responsibility for policy promulgation through formal regulations for extramural research governed by Bayh-Dole legislation.

## **NIST Technology Transfer Activities - Mr. Paul Zielinski, Director, Technology Partnerships Office**

Mr. Zielinski briefed the VCAT on NIST's technology transfer efforts focused on its intramural research programs. Mr. Zielinski highlighted the efforts of the NIST Technology Transfer Policy Committee to inform the Technology Partnerships Office's efforts to strengthen technology transfer at NIST. A major focus has been streamlining the CRADA process. CRADAs are an integral part of the ability to partner with a private industry, which can bring resources to bear. It is now simpler to put in place a CRADA agreement or a material transfer agreement than before. One of the biggest improvements has been reducing the paperwork requirements, making it beneficial in increasing the level of collaboration. A new system called Service Now has been deployed for people to request and process agreements. There will be training sessions in both the Boulder and Gaithersburg sites. The process has been simplified to focus on the broad spectrum of NIST work and how to get that out into the commercial marketplace working through small businesses.

Mr. Zielinski also reviewed ongoing NIST efforts on technology maturation focused on developing a comprehensive pathway to advance NIST products and services towards commercialization and adoption by private companies. There is a push for strategic investment through programs like the Technology Maturation Accelerator Pilot, NIST Science and Technology Entrepreneurship Program (N-STEP), and NIST Small Business Innovation Research Program (SBIR). The goal of the Technology Maturation Accelerator Pilot program is to prove feasibility. It's an internal competition and the money stays within NIST, a million-dollar program with up to \$250,000 awards. There are 69 proposals from NIST laboratories.

For more information, see Mr. Zielinski's [presentation](#).

## **Progress on Implementation of the NIST Green Paper - Mr. Henry Wixon, Chief Counsel**

Mr. Wixon provided the VCAT with a status update on NIST's efforts to advance the policy proposals outlined in the Return on Investment Green Paper.

The Green Paper was developed with the support of STPI, the Science and Technology Policy Institute, with support from the White House OSTP. The paper addressed review with various interagency working groups and was published as NIST Special Publication 1234 in April 2019. There were fifteen key findings. The goal of the Green Paper is to raise issues for further discussion and consideration and strictly adheres to the CAP Goal structure.

The findings of the Green paper are in support of the five Lab-to-Market CAP Goal strategies:

1. Identify regulatory impediments and administrative improvements in federal tech transfer policies and practices;
2. Increase engagement with private-sector technology development experts and investors;
3. Build a more entrepreneurial R&D workforce;
4. Support innovative tools and services for technology transfer; and
5. Improve understanding of global science and technology trends and benchmarks.

Several of the ROI findings would require legislative change to implement. Those include copyright restriction for federal laboratory software and extension of the current CRADA information protection period.

NIST has worked with the interagency community to develop a series of legislative amendments to realize several of the findings outlined in the Green Paper. This "legislative package" is currently under review at the Department. NIST hopes that it can be submitted to Congress before the end of the year.

For more information, see Mr. Wixon's [presentation](#).

## **Assessment of the Boulder Innovation Ecosystem - Dr. Shyam Sunder, Senior Science Advisor**

Dr. Sunder provided the VCAT with an update on his efforts to assess the Boulder Innovation Ecosystem, and NIST's role therein.

The charge from the Director of NIST is twofold:

- To engage - recommend purposeful and regular mutually beneficial engagements needed to strengthen NIST's innovation and entrepreneurial ecosystem; and
- To act - recommend actions NIST should take for the benefit of American society through ecosystem engagement.

It is important to leverage strengths and best practices by partnerships, entrepreneurship, Lab-to-Market, and learning and support. Entrepreneurship is at the heart of innovation. Half of the people working at NIST are associates, postdocs, and graduate students, which are the seed corn of the innovation activities.

Benchmarking with selected research universities and federal laboratories is an approach that was utilized. A review of potential innovation and entrepreneurship partners was obtained from the Boulder, Colorado, region. An assessment was made of how NIST fits into the regional innovation ecosystem that will fulfill NIST's equities and needs.

A scope of the assessment was made to better understand the perspectives of NIST staff and managers as well as NIST stakeholders about the existing state and future opportunities. Most of these are one-on-one meetings held by Dr. Sunder. This assessment phase is still in progress and will be slowly going to the analysis phase. There have been conversations with 60 people—30 at NIST in Boulder and 30 stakeholders.

For more information, see Mr. Sunder's [presentation](#).

### **Discussion**

The group discussed the following topics:

- Reduce bureaucratic impediment to collaboration by delegating decision authority to division level;
- Conflict of interest challenges with inventors, employees, and grad students;
- Opportunities created through the authority to establish a foundation of 501(c)(3);
- Nonprofit foundation would accelerate partnering with industry and entrepreneurship activities;
- Positive barriers reducing patent numbers;
- Next steps after entrepreneurial awards are given;
- Facilities funded by tax-exempt bonds and restrictions on sponsored research not federally funded; and
- Creating incentives for innovation and high-risk investments complement output of the Green Paper.

## **Technology Transfer Subcommittee Update - Ms. Katharine Ku, Subcommittee Chair & VCAT Member**

Ms. Ku gave a review of the objectives for the VCAT Subcommittee on Technology Transfer policies and practices, which aims to provide individual technical assessments for effectively engaging the business community, communicating with stakeholders, as well as assessing NIST's performance and recommending improvements in specific areas, such as development and use of intellectual property and collaborative research.

The VCAT Subcommittee members and subject-matter experts had a conference call on August 14, 2019, to discuss various aspects of the technology transfer. Primarily, the call looked at the NIST-on-a-Chip program and discussed IP strategies within the NIST organizations. The members were asked to share information on how their organization has approached various items such as finding licensees and partners for further commercial development and portfolio management. The advantages and benefits of a non-exclusive license were discussed.

Finding partners for commercial development is challenging. NIST must market and make itself known to companies. Most companies do not have the bandwidth to look at each individual lab. Marketing is key in this endeavor.

Portfolio management is a challenge. The IP strategy must go with the research products and look 3 to 7 years ahead, monitoring, and predicting trends and needs in the form of problems, which is not easy. Though NIST technology is generally in the physical sciences, the physical science companies are very disparate.

The agenda for the meeting on October 30th is to talk about the NIST Technology Maturation Fund, best practices for how to identify partners, how to market the inventions, how to find industry, and if there are any plans for doing potential site visits.

## **Discussion**

The group discussed the following topics:

- Having dedicated people to market the technology in easy-to-understand language;
- How inventors could benefit from back-and-forth discussions with patent attorneys;
- Leveraging CRM tools to empower scientists in first stage of marketing;
- Should marketing people be incentive-based or employees;
- Maintaining a long view on technology transfer as a culture-building initiative;
- Caution if NIST's focus moves from fundamental research to commercialization;
- Fundamental and basic research should be primary focus; and
- The goal is to ensure more of the basic research gets translated into value for the nation.

For more information, see Ms. Ku's [presentation](#).

## **SESSION VII: NIST International Engagements**

### **Overview of NIST's International Role and Activities - Dr. Claire Saundry, Director of International and Academic Affairs**

Dr. Saundry provided the VCAT with an overview of NIST's international engagements. NIST works internationally through a variety of mechanisms, which include global, regional, bilateral partnerships, peer-to-peer and scientist-to-scientist research collaborations. NIST associates and guest researchers work in the laboratories and contribute to the research programs. International agreements are really a tool rather than a mechanism. They are used to facilitate collaboration when an agreement is needed. NIST is very engaged in international organizations and advancing the NIST mission through these activities.

Many of NIST staff participate and have leadership roles in international standards organizations, including the International Standards Office (ISO) and International Electrotechnical Commission (IEC). Areas of focus are priorities for NIST, such as AI, nanotechnology, advanced manufacturing, resilience, biotechnology, forensics, and cybersecurity. NIST provides technical expertise and support for the standards-setting community.

NIST serves as the U.S. Inquiry Point and Notification Authority for the World Trade Organization (WTO) Technical Barriers to Trade Agreement. This is done in the Standards Coordination Office. NIST works closely with the Office of the United States Trade Representative (USTR) in support of trade negotiations. NIST is a signatory to the International Laboratory Accreditation Cooperation, which allows for recognition of accreditation processes in other countries and accredited laboratories.

One area NIST is very engaged in is global metrology through the Treaty of the Metre, which was signed in 1875 and included 38 countries. It now includes 61 member states, and they meet every 4 years through the General Conference on Weights and Measures. The U.S. Department of State is the official member of the Treaty of the Metre. They typically delegate the authority to NIST and participate in the meetings. NIST has folks who participate in all the consultative committees, and they are technical experts. Each of the consultative committees focuses on a different unit of measurement.

There was a meeting of National Metrology Institute (NMI) directors in Paris 2 weeks ago, which is a panel on addressing and improving inclusivity and equity among NMI staff. There was a screening of "The Last Artifact." A Governance Working Group was established. Dr. Copan made a presentation that focused on NIST efforts.

The International Committee of Weights and Measures (CIPM) Mutual Recognition Arrangement (MRA) provides the technical basis for worldwide acceptance of measurement standards and calibration and measurement certificates of its signatories. This is important for trade and demonstration of technical competence and acceptability of its measurement results. NIST laboratories are heavily invested in this activity. They participate in comparisons and then in cooperation with other countries to ensure that the mutual recognition arrangement is robust and has accurate reflection of all measurement capabilities. As of this year, there are now 106 signatories to this agreement from 61 member states, 41 associates, 4 international organizations, and 156 designated institutes.

NIST, as of FY2019, has a total of 1,450 foreign NIST associates working in the NIST laboratories. This is a program that brings expertise to NIST to contribute to ongoing projects. Most of the foreign NIST associates are coming from U.S. institutions. They are either graduate students, postdocs, or employees of U.S. institutions, that collaborate with NIST.

Dr. Copan signed a new agreement with the NMI in Germany and a new agreement with the National Institute of Advanced Industrial Science and Technology or AIST in Japan earlier this year that allows for NIST to collaborate with all the institutions under that umbrella. Dr. Copan recently participated in the Science and Technology in Society Forum in Japan. This is a forum of international science, technology, and policy leaders that's convened by Japan's prime minister. He participated in a panel on Cybersecurity and Connected Society, which included eight leaders, discussing the opportunities and challenges of information and communication technologies. Japan is one of the countries that's been engaged with NIST on the Cybersecurity Framework for a long time.

NIST is active in information exchange and benchmarking. This can include people coming to visit NIST to meet with staff, but it also includes conferences. Some other benchmarking activities that have taken place in the information and innovation and industry services part of NIST, the Office of Advanced Manufacturing.

The Baldrige Program has been engaged with the Global Excellence Council, which was created in the year 2000. The purpose of this organization is to increase visibility and impact of business excellence worldwide and improve the effectiveness of excellence programs. They benchmark, share best practices, and meet annually.

MEP is a member of the Trade Promotion and Coordinating Committee Small Business Working Group. They participate in Trade Finance Advisory Council meetings, and they receive foreign delegations and collaborative exchanges with the Organisation for Economic Co-operation and Development (OECD). They work very closely with the Foreign Commercial Service in developing ExporTech, a program that gives small- to medium-size enterprises the support they require while expanding the reach of their export assistance resources.

A new grant opportunity, NIST provided funds to the National Conference of Standards Laboratories International and to the International Bureau of Weights and Measures (BIPM) to support training for regional metrology organizations. The first training at the BIPM is on optimizing the MRA.

The Technology Partnerships Office is also engaged in information exchange, benchmarking, and international engagements supporting USTR and the United States Patent and Trademark Office on trade matters. They are working with the Commercial Law and Development Program, have done work in educational tech transfer, and have been studying global S&T trends and benchmarking. They also participate in Licensing Executives Society Standards Committee for the development of international standards on innovation management and provide guidance on Bayh-Dole implementation.

## **Discussion**

The group discussed the following topics:

- How are choices made on what to engage in;

- NIST's NMI foreign guest researcher program is much larger than the rest of the NMIs in the world;
- NIST's relationship globally opens the door to trade and diplomatic opportunities;
- NIST is judicious in prioritizing requests for international assistance and capacity-building; and
- Long-lasting impact of friends when sending young scientists abroad and bringing young scientists to NIST.

For more information, see Dr. Saundry's [presentation](#).

## **Administrative Business**

In closing, Dr. Colwell made some closing remarks about her 6 years on the VCAT and as VCAT Chair, that it was an honor and pleasure to work with the team. She urges VCAT to address the fundamental research being done at NIST, to maybe appoint a leading fundamental researcher to head this effort.

Dr. Copan thanked Rita for her service, counsel, and leadership to VCAT as Chair. He stated one of the areas that has been very effective under Dr. Colwell's leadership is the outreach on Capitol Hill and the stakeholder community.

Dr. Copan shared some upcoming insights, stressing the international impact cannot be underestimated. Future VCAT meetings will be about academic relationships and the future of the NIST pipeline as part of the ongoing theme of building a diverse workforce and providing opportunities proactively.

There were no public comments offered.

## **Adjournment**

The meeting was adjourned at 11:06 AM.

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. Rita Colwell, Chair, NIST Visiting Committee on Advanced Technology