

**VISITING COMMITTEE ON ADVANCED TECHNOLOGY (VCAT or Committee)
MINUTES OF THE WEDNESDAY, FEBRUARY 8, 2023 AND
THURSDAY, FEBRUARY 9, 2023
HYBRID MEETING**

ATTENDANCE: *in person

**Visiting Committee
Members Attending**

Cerf, Vinton*
Fischer, George*
Jackson, Keoki*
Johnson, Anthony M.
Kaler, Eric
Khan, Mehmood*
Ku, Katharine*
Parker, Michelle
Matusow, Jason*

Designated Federal Officer

Shaw, Stephanie*

NIST Leadership Board

Bahar, Mojdeh*
Boehm, Jason*
Brockett, Del*
Brown, Essex
Chin, Joannie*
Dimeo, Robert (Rob)*
Dowell, Marla*
Evans, Heather*
Fangmeyer, Robert
Folk, Alex
Hooker, Stephanie*
Jenkins, George E.
Kushmerick, James*
Locascio, Laurie*
Mackey, Elizabeth (Liz)*
Molnar, Mike*
Olthoff, James K.*
Raghavan, Pravina
Romine, Charles (Chuck)*
Sastry, Chandan
Vaughn, Robert (Skip)*
Wixon, Henry

NIST Staff

Adams, James*
Ayala, Mellissa
Battou, Abdella
Baxter, Laura
Boeckl, Kaitlin (Katie)
Boggs-Russell, Ashley*

Chang, Walter
Chukran, Melinda
Claussen, Monica
Cubert, Amy
David, Lindra
Dohne, Kirk
Doshi, Ravi
Fasolka, Mike*
Fato, Hope*
Fetsko, Melissa
Fraser, Jerry*
Fung, Juan
Gayle, Frank
Gendron, Cheryl
Gerskovic, Leon*
Gillerman, Gordon*
Glenn, Rachel
Greer, Chris
Griffith, David*
Gundlach, David
Hahn, Carina
Hardis, Jonathan
Harrington, Jeffrey
Hickernell, Robert (Bob)
Hildebrand, Jacqueline
Huergo, Jennifer*
Ivy, Nahla
Kagan Guthrie, Benjamin
Kauffman, Leah
Kelsey, Richard
Kramar, John
Lane, Anne
Lawson, Jeremy
Lin, Eric*
Madsen, Mark
Malhotra, Jyoti
Materese, Robin*
McAdams, Sherwin
Newhouse, William (Bill)*
Ng, Lisa*
Orr, Dereck
Parkhurst, Emily
Petersen, Rodney*
Pollack, Charles
Porch, Susanne
Reidy, Kari
Rouil, Richard
Rudnitsky, Robert
Ryan, Christopher
Sberegavaeva, Anna*
Schlatter, Katie M.

Scholl, Matthew
Schufreider, Jim
Seiler, David (Dave)
Sharpless, Kathy
Shyam-Sunder, Sivaraj
St. Pierre, James (Jim)*
Stambaugh, Corey*
Stephens, Michelle*
Saundry, Claire
Szuchyt, April
Vanek, Anita
Wasil, Charles
Wavering, Al
Whiteside, Theresa
Wu, Jo
Yao, Jue
Zangmeister, Rebecca

Others

Ambrose, Mitch – American
Institute of Physics
Antelman, Albert – Institute of
Responsible Infrastructure
Stewardship (IRIS)
Cassady, Amber – Lewis-Burke
Associates, LLC
Clayton, James B. – NASEM
Panelist/Institute for
Responsible Facility
Stewardship
Dillinger, Eric* – NASEM
Panelist/Woolpert
Ding, David (Xueding) – Univ. of
Wisconsin-Stout
Finn, Nathan – Lewis-Burke
Associates, LLC
Folena-Wasserman, Gail –
AstraZeneca Emeritus (former
VCAT Member)
Gigrich, James – Keysight
Technologies, Inc.
Latimer, Margaret* -
Montgomery College Retired
Mancuso, Mick – Alliance
Laundry Systems LLC
Mitchell, Adrienne – unemployed
exec. NY Dept. of Labor
Myska, James* - NASEM
Oskvig, Cameron* - NASEM
Peters, Mark – Battelle Memorial
Institute (NIST Safety
Commission)

Pierpoint, Mark – Keysight
Technologies, Inc.
Vasko, David (Dave)* - Rockwell
Automation (former VCAT
Member)

Wednesday, February 8, 2023

Call to Order – Dr. Mehmood Khan, VCAT Chair

Dr. Khan called the meeting to order at 9:00 a.m. and took roll call. First, he congratulated Dr. Locascio for being elected to the National Academy of Engineering, and then reviewed the meeting logistics.

Annual Ethics Briefing - Mr. Jeffrey Harrington – Senior Attorney in the Ethics Law and Programs Division, Office of the General Counsel, Department of Commerce (DOC)

Mr. Harrington provided the VCAT Members with their annual ethics briefing for the calendar year 2023, during which he reviewed changes in the interpretation of Federal Advisory Committee Act (FACA) regulations, conflict of interest rules, financial disclosures, lobbying, political activities, gifts, and other issues.

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

Discussion. VCAT members discussed the following topics:

- SGEs barred from political activity during duty hours and barred the entire day from political fundraising, and
- Gifts based on outside business relationship is an exception to the gifts rule.

SESSION I: PROGRAMMATIC AND OPERATIONAL UPDATES

NIST Update and Agenda Review – Dr. Laurie Locascio, Under Secretary of Commerce for Standards and Technology and NIST Director

After summarizing the agenda, Dr. Locascio discussed programmatic updates and personnel changes. NCNR (NIST Center for Neutron Research) Director, Rob Dimeo will be leaving NIST after 23 years of service and taking a position at Oak Ridge National Laboratory. Dr. James J. Adams will transition into his role as acting NCNR Director in March. Dr. Jim Olthoff will be taking on a newly created position at NIST as the Chief Metrologist, having served as the Associate Director for Laboratory Programs (ADLP). Dr. Chuck Romine will transition to be the ADLP position in late February, and Mr. James St. Pierre will serve as the acting Information Technology Laboratory Director. Dr. Marla Dowell, who has led the Communications Technology Laboratory, has been selected as the CHIPS Metrology Program Director and is awaiting confirmation from the Department of Commerce (DOC), and Mr. Dereck Orr will serve as the acting Communications Technology Laboratory Director.

She then shared recent updates for five priority areas for NIST:

1. Critical and Emerging Technology Leadership
2. Standards Leadership
3. Manufacturing Leadership
4. Mission Delivery Enhancement
5. NIST Community

1. Critical and Emerging Technology Leadership. NIST priorities in this category discussed were artificial intelligence (AI); cybersecurity and privacy; advanced communications; quantum information science and technology; NIST and post-quantum cryptography (PQC); biotechnology; energy, climate, environment; and technology transfer activities.

- *Artificial Intelligence*: The AI Risk Management Framework Version 1.0 was released January 26th. The framework will help organizations understand how to gauge and manage the risks associated with AI. It will outline a process to address traditional technical measures like accuracy, robustness, and reliability. It acknowledges the human as an important component to AI systems. NIST is partnering

with the National Science Foundation (NSF) to launch an AI institute for building Trustworthy AI, which should be announced in April.

- *Cybersecurity and Privacy*: NIST updated the Cybersecurity Framework (CSF), and the CSF 2.0 concept paper was released January 19th. A workshop leading to the concept paper had over 4,000 participants representing 100 countries. NIST is requesting stakeholders to share feedback by March 3rd. The work has been adopted around the world and translated into 10 languages.
- *Advanced Communications*: NIST joined the Open Radio Access Network (O-RAN) Alliance in November 2022, which is a global consortium of carriers, vendors, and research institutions working to standardize the parts of the RAN and the interfaces that connect them. NIST's role is to design electrical calibration structures to measure and test electronic performance of photonic chips, which can lead to improved chip designs and accelerate the development of faster-next generation photonic chips. Photonic chips typically operate at speeds of 25 GHz, but the calibration structures NIST is designing are capable of measuring chips with speeds up to 110 GHz. NIST is working to integrate these structures into the AIM Photonics foundry process. A team in Boulder working on Rydberg atoms as receivers in communications systems received the Ron Brown Excellence in Innovation Award at the Department of Commerce (DOC).
- *Quantum Information Sciences*: Researchers recently demonstrated a new device that integrated a quantum source and low loss photonic circuit on one microchip, an important step in the realization of quantum photonic computers. A recent NIST paper described how scientists leveraged their developments in one area of quantum computing to push understanding dark matter. This was a collaboration between NIST researchers and Hebrew University of Jerusalem, UC Santa Barbara, UC Santa Cruz Institute for Particle Physics, and Massachusetts Institute of Technology (MIT). NIST Senior Fellow Emeritus Jan Hall's work on optical frequency combs was extended to achieve quantum limited time and distance measurements, which could form the basis for the future of the redefinition of the second. Dr. Jun Ye, a NIST and JILA (Joint Institute for Laboratory Astrophysics) Fellow, has been appointed to the National Quantum Initiative Advisory Committee to counsel the administration on leadership in quantum technologies.
- *NIST and Post-Quantum Cryptography (PQC)*: A NIST team introduced the technical specifications for upcoming PQC standards at the recent NIST Post-Quantum Cryptography Conference. Drafts of the standards are anticipated to be complete by the summer. This work is a critical part of the President's National Security Memorandum on Quantum Computing as well as a signed legislation, the Quantum Computing Cybersecurity Preparedness Act.
- *Biotechnology*: An Executive Order had directed NIST to develop a lexicon for the industry to allow different areas of expertise to use the same language related to the bioeconomy. This lexicon was delivered ahead of the mandate deadline, and the tool is now available publicly on the NIST website. The release of the first living standard reference material (SRM) called "NIST CHO" is a Chinese hamster ovary (CHO) cell line that was developed in collaboration with industry partners to provide benchmarking material for fermentation and other biotechnology processes. It is a well-characterized cell line now available to the public, which will make it possible to compare technologies as they're being developed and compare processes in cell growth phases.
- *Energy, Climate, Environment*: NIST received an additional \$11.5 million to further expand climate and energy-related activities. The area of focus, as directed by Congress, will be on advancing carbon dioxide removal and sequestration, reducing the impact of wildfires. A center of excellence in climate change measurement with a university partner will be established. In July, a detector fabricated by NIST using a novel nano material was launched on NASA's Compact Solar Irradiance Monitor to observe solar energy the Earth receives from the Sun, which will help scientists understand how solar energy influences the weather and impact on climate change. At the January 2023 American Meteorological Society meeting, small satellites using the NIST detectors from both this project and another project called the Compact Spectral Irradiance Monitor were discussed as the best option for measuring incoming solar energy to have a long-term climate data record.

- *Technology Transfer Activities:* In FY 22, NIST received 25 new patents. NIST granted an exclusive license to Wavsens, a Colorado company, to commercialize NIST technology to create real-time images and videos of hidden and moving objects, which will help firefighters escape from a smoke-filled room or victims trapped inside a building. In March, the NIST Technology Partnership Office will host another showcase, a forum to foster collaborative relationships with entrepreneurs and businesses.

2. Standards Leadership. NIST will partner with industry and governments in shaping technological standards that ensure quality, consumer safety, and global interoperability.

- *USG Standards Leadership:* NIST is working closely with the administration on developing a strategic approach to public-private cooperation in the U.S. international standards development activity. NIST will lead the interagency implementation plan. Private-sector, nonprofit, and academic stakeholder "listening sessions" will be announced soon.
- *International Engagement in Standards:* NIST is working with State and Commerce Departments to support standards discussions and cooperation across many international groups, e.g., Organization of Economic Development (OECD), U.S.-E.U. Tech and Trade Council, the Quad, and Indo-Pacific Economic Framework (IPEF). NIST is supporting development of an International Standards Cooperation Network designed to share information about standards activities around the world. NIST is also supporting efforts in the National Security Council related to software supply chain security.

3. Manufacturing Leadership. MEP (Manufacturing Extension Partnership) released a new strategy with a focus on supply chain and workforce. MEP was appropriated \$17 million over FY 22 funds for a total of \$175 million for the network. An additional \$13 million was appropriated as a disaster supplemental. Manufacturing USA was appropriated additional funds in FY 23 as part of the CHIPS and Science Act to develop three new manufacturing institutes related to semiconductors. Staff conducted three public webinars, and a public report is expected to be released in March on the findings.

4. CHIPS Update. A Notice of Funding Opportunity will be released by the end of the month that potential applicants need in order to apply for CHIPS manufacturing incentives, which is a \$39 billion portion of the appropriation DOC and NIST is working with. The focus is on commercial leading edge, current and mature nodes, semiconductor fab facilities, including both front end semiconductor manufacturers and backend packaging facilities. There will be an additional funding announcement in the spring that will focus on material suppliers and equipment manufacturers, and in early fall, there will be a third funding announcement to support construction of semiconductor R&D facilities. NIST is currently in the process of hiring a CHIPS R&D Director. Dr. Locascio asked the VCAT for their suggestions to add to the CHIPS team. The Industrial Advisory Committee had a public meeting in December and a second one in February, and their focus is R&D programs for the CHIPS Act.

5. Mission Delivery Enhancement. \$40 million in supplemental funding came in FY 23 to complete three disaster investigations: Hurricane Fiona, to understand impacts of power and water infrastructure damage to mitigation activities as well as examine compounding effects on the recovery of schools and hospitals and businesses and supply chains from Hurricane Maria; Hurricane Ian, to investigate storm surge damage to improve building codes and standards as well as study emergency communications and evaluation actions to improve emergency preparedness and response practices; and Champlain Towers South, to secure primary evidence warehouse and development of draft final report with recommendations for changes to codes, standards, and practices.

- *NCNR Update:* NRC has completed the Technical Evaluation Report (TER) and is now in concurrence at NRC. NRC will hold a public meeting to inform public of basis for restart decision. NRC will then issue the TER report to NIST with a restart authorization decision. When NIST is given approval for restart, it will conduct a period of reactor testing, then it will operate the reactor for about four or five cycles for about a year. Then the reactor will be shut down for planned facility upgrades to improve cold neutron capabilities and conduct other facility updates that will yield more performance improvements.
- *Expanding NIST Reach (Visibility):* The Public Affairs Office (PAO) brought Veritasium to NIST to produce two pieces of work, how to measure the tiniest forces in the universe, which has received 3.5

million views, and how the world depends on a collection of strange items in NIST's standard reference materials program, which has received 6.3 million views.

6. NIST Community. Dr. Locascio went over two of three NIST Community areas, DEI (diversity, equity, and inclusion) Strategic Plan and return to campus, saving the third area of safety for a more thorough discussion later in the meeting.

- *DEIA Strategic Plan*: NIST is on track with growing the DEIA office, with the DEI Director position posted and hiring new people to join that office. A new DEIA dashboard allows the DEI office to track efforts across the campus. Outreach is being made with organizations for recruitment to bring in people from other communities, through the NIST Strategic Recruitment Program led by OHRM in partnership with the International and Academic Affairs Office.
- *Return to Campus*: A community building group was recently started to bring together staff from Gaithersburg, Boulder, and Charleston to brainstorm and implement ideas on how to encourage institutional pride post pandemic.

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

Discussion. VCAT members discussed the following topics:

- Why an exclusive license was granted to a private-sector company, Wavsens, when the patent development was publicly funded,
- Exclusive licensing is granted when warranted,
- Investors will not do business with an entity that does not have exclusivity, especially small companies,
- Founder of Wavsens is a former NIST employee, NIST has a program that encourages former employees to develop technologies that will not be further developed at NIST, and exclusive licenses are preceded by public notice so others can respond with their own license applications
- NIST supports biomanufacturing at a Manufacturing USA Institute (NIIMBL),
- Risk factors associated with AI large language models, and that they are a sociotechnical issue,
- Detecting dark matter by looking for the effects of its creating new particles when it passes through special structures in superconducting single-photon detectors,
- NIST CSF acceptance by other countries with ISO (International Organization for Standardization)/IEC (International Electrotechnical Commission) label easier to adopt,
- How disaster investigations relating to building codes and standards come to NIST,
- No dedicated source of funding NCST (National Construction Safety Team), and
- Social scientists involved in disaster response investigations.

Safety Update – Dr. Elizabeth Mackey, Chief Safety Officer and Director of Office of Safety, Health, and Environment (OSHE)

Dr. Mackey provided a status update of the investigations into the 9/26 fatality incident, the interim actions that NIST is taking following that event prior to getting the final incident investigation and recommendations for corrective actions, the new NIST Safety Culture Program, basic safety performance metrics, IT application integration, and end with the basic risks and opportunities in safety at NIST.

First, Dr. Mackey provided an update on the OSHA investigation relating to the 9/26 incident involving an individual who fell 12 feet from the second story of a research structure at the National Fire Research laboratory and died from sustained injuries. OSHA report will come on March 26th. The fact-finding phase of the NIST safety incident investigation and root cause analysis team has been detailed and is ongoing. A draft report will be followed by the development of a corrective action plan, which will be analyzed by Dr. Mackey and several NIST executives for review to ensure the plan has enough depth, breadth, and sustainability.

NIST interim actions to improve safety started with a safety standdown on October 7, 2022, followed by a director's initiative to re-review hazardous activities. A hazard review program is in place that requires all hazardous activities to be documented, analyzed, and re-reviewed, usually every three years, except for highly hazardous activities which are reviewed annually; everything will be re-reviewed in FY 23 under a new regime.

The NIST Director FY 23 initiative focuses on re-review of hazardous activities. An external FACA Safety Commission was established to look at safety program implementation and culture. A subcommittee of this FACA will be looking at the NIST internal investigation when it is completed. Dr. Locascio engaged the National Academies to convene a workshop to evaluate the effects of post-pandemic hybrid work on safety culture practices, training, and mentoring in a research laboratory environment.

The internal re-review of hazards focused on activities in the RHI (Relative Hazard Index) Matrix, which was adapted from the ANSI Z10 safety management standard. RHI-4 activities are not permitted at NIST, so the focus is on anything with an RHI of 3 and RHI of 2 where the potential severity is either catastrophic or severe. Staff are being asked to include outside experts in these assessments. OU directors will be tracking the progress of this work and then reporting to associate directors to ensure accountability.

The NIST Safety Culture Program elements are the following:

- Define safety culture attributes,
- Conduct a survey to assess beliefs,
- Develop action plan,
- Assess actions and behaviors,
- Recognize and reward safety improvements,
- Encourage engagement and participation, and
- Sustain and improve through learning environment and questioning attitudes.

A safety culture survey was done in 2011, 2014, and 2017, but after COVID hit in 2020, this practice fell by the wayside. It's been reintroduced and is now sponsored by the National Safety Council instead of being done in-house. The survey went out to 3,440 federal employees when issued, and it received 61 percent participation.

The communications data had a 70 percent average click rate and the webpage views were increased. The results for the course completion on safety culture are not yet available. The workplace inspection data update will be provided to VCAT in June. There is a 92 percent completion rate on the corrective action data associated with incident reporting and investigation data.

The safety culture program has been approved. Training is planned to be on the safety culture attributes. A draft on the change management program developed collaboratively with the Executive Safety Committee is now available. The corrective and preventive action program is in draft within OSHE. Two environmental programs are in draft phase, and one will be issued within a week and the second within the coming week. Progress is ongoing with 11 programs still under development.

Dr. Mackey provided a review of the communications in FY 23 to date. The Safety Minute is issued every month or so, and email updates on incident summaries to NIST Leadership Board go out weekly providing what investigations are outstanding as well as lessons learned. NIST emails go out regularly to notify staff of changes in the COVID community levels. NIST continues to follow the CDC's (Centers for Disease Control and Prevention) requirements for following community levels. A Safety Standards Newsletter with a combination of the third and fourth quarters was disseminated, and an incident prevention communication entitled "Safely Dispose of Sharps" and a wintertime focus on slips, trips, and falls reminders were issued. The NIST library suggested to have safety equipment available to borrow in the library during poor weather.

On safety education and training, the cumulative data shows 4,130 people who work at NIST have completed the general safety training, but there is still 1,000 outstanding. There will be a push to do some outreach. For NIST leadership training, 509 have done so, and 16 are outstanding.

Comparison with industry standard and Department of Energy (DOE) laboratories, the total recordable case and days away, restricted or transferred rates, NIST with peers very well, typically lower in all categories.

Dr. Mackey showed a graph of the impact COVID had in 2020 and 2021. Incident reporting was way down, as was the decreased occupancy on-site. FY 22 numbers are going back up again. There have been 32 reports in FY 23 for OSHA recordable cases. Reportable illness cases were 9 COVID illnesses, and all were travel-related; we report these because they are work-related, and OSHA requires reporting them. There were three recordable injuries: a slip-fall in a restroom, possibly due to wet footwear, a back and shoulder strain during

removal of barrel from fuel oil burner, and a laser eye injury caused by diffuse scattering. A corrective action email was sent to staff on the slip-fall injury, and the back and shoulder strain and eye injury are still under investigation. The laser injury prompted a change in the alignment procedure.

Manny Mejias, OSHE Radiation Safety Officer, is now serving on the Reactor Restart Subcommittee, and OSHE has a Radiation Safety staff member who's now embedded within the NCNR to take care of health physics activities associated with the operation of the reactor.

On IT applications, the Material Measurement Laboratory (MML) has a data system for hazard review, but it falls outside of the OSHE umbrella of operations. A safety dashboard link is under development to determine whether or not a person is appropriately qualified to do the work they are assigned and has taken the necessary training. And integration of door signs; they are now linked to the Chemical Inventory to update National Fire Protection Association (NFPA) information.

Finally, on safety-related risks and opportunities, to address the risk of aging infrastructure, prioritization of funding to address facilities issues is needed. The Safety Management System is not fully integrated into operations, and this is an opportunity to strengthen partnership to provide services in a manner to facilitate integration and implement the Change Management Program. Another risk is there is no formal audit or assessment program in place, so development of a final audit program, a formal process to look at the quality and efficacy of the programs. Safety complacency can be addressed by creating conditions to strengthen the safety culture NIST-wide at all levels.

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

Discussion. The group discussed the following topics:

- COVID cases uptick in FY 22 if NIST still in hybrid mode,
- Strengthening of safety culture and accountability for mandatory safety training,
- The role of insufficient hazard reviews in incidents, and
- Technical safety training is more widespread than general safety training.

Budget Overview - Dr. Heather Evans, Director (acting), NIST Program Coordination Office

Dr. Evans provided a synopsis of the FY 23 budget. The funding is in, but the spend plan has not been approved yet. The President's Budget Request for FY 24 is targeted for release March 9, 2023. In the coming months, NIST leadership has begun discussing FY 25 funding.

In the 2006 and 2007, the Bush administration proposed double funding for key physical science agencies, followed by appropriations to nearly double NIST's budget over a 10-year period. In recent years, the increase has been more gradual, with many swings due to construction funding. The NIST for the Future Act, included in the CHIPS and Science Act, authorizes funding levels for and codifies NIST's role in bioscience, cybersecurity, greenhouse gas, advanced communication, international standards, and more. The Act provides additional NIST flexibilities for hiring and operations. Starting in FY 22, Congress brought back earmarks for the first time in 10 years, which added \$394.8 million to topline budget in FY 23, that NIST has to distribute.

The big increases in top-line funding for FY 21-23 budget was in construction, due to construction earmarks, external projects, or directed funding. Total appropriations are approximately \$1.6 billion, and that goes across several different accounts. The laboratory funding tops out as the largest contributor to the budget, \$78 million, and there was an increase of \$17 million for MEP. There was an increase of \$20.5 million for Manufacturing USA. There was an increase of \$50 million for construction of research facilities. Disaster relief supplemental funding was \$40 million for studies of disasters.

A challenge is that only in one or two areas did NIST get the money asked for at the same level as the President's Request, but most of the others are less. Decisions about how to implement this is in progress. It is noteworthy that NIST received \$8 million for standards for critical and emerging technologies.

On earmarks, the STRS (Scientific and Technical Research and Services) community project funding, NIST was asked to support 34 projects ranging from \$400,000 to \$5 million in a total amount of \$62.5 million. The NIST construction community project funding had 31 projects, which are much larger, potentially up to \$45 million, with a total amount of \$332.3 million.

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

Discussion. The group discussed the following topics:

- Adequacy of current allocation of funding for facilities maintenance and improvement,
- National Academies' study of NIST facilities from 2001 through 2022 contains escalating seriousness of underfunding to NIST facilities and mission,
- Source of funds to bring NCNR reactor back up if existing \$5 million plus-up is not enough,
- Critical and emerging technologies are fast moving which presents a challenge,
- VCAT advice relating to cost overhead in administering grants for research and construction, as well as looking at administering grants as an opportunity for increased visibility for NIST
- Differential in House and Senate marks than what was enacted in NIST budget lines, and
- Making Congress aware of NIST core mission for appropriations on all technology areas, including standards, and not only critical and emerging technologies.

SESSION II: NIST SAFETY COMMITTEE UPDATE

Invited Speaker – Dr. Mark Peters – NIST Safety Committee Chair

Dr. Mark Peters, the NIST Safety Committee Chair provided the VCAT members with an overview of the NIST Safety Committee. Dr. Peters mentioned the six other members of the Committee (list can be viewed from the attached presentation). He began with the charge for the Committee, which is to assess the state of NIST's safety culture and how effectively the existing safety protocols and policies have been implemented across NIST.

The Commission will evaluate:

- the quality and completeness of NIST safety directives and programs,
- the performance of safety protocols and the responses to recent incidents and near misses, and
- the impacts of the pandemic and hybrid work environment on safety.

The Commission should consider:

- perspectives of NIST staff and management,
- NIST's responses to significant safety-related incidents and near-misses,
- findings from investigations and reviews of incidents, and
- implementation of corrective actions to prevent future incidents and improve safety performance, as well as actions taken to strengthen safety culture at NIST facilities.

Dr. Peters stated that the Committee will hold three meetings. The first meeting was held January 4-5, 2023 in Gaithersburg, MD, their second meeting is scheduled for March 9-10, 2023 in Boulder, Colorado, and their third meeting is to be scheduled late April or early May in Gaithersburg, Maryland. In late March the Committee will provide the NIST Director with a preliminary oral report and the final written report with their findings and recommendations by June 2023.

The Committee has and will continue to interact with the NIST senior leadership and various NIST staff. At the January meeting there were a set of focus groups with multiple NIST staff and managers to view and discuss safety-related data and documents, and tours of the National Fire Research Laboratory, the NCNR, and the NIST NanoFab at the Center for Nanoscale Science and Technology. Dr. Peters stated the Committee will continue to do listening sessions during our Boulder meeting in March.

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

Discussion. VCAT members discussed the following topics:

- Should psychological and emotional safety be a concern as well as physical safety,
- Support to NIST by Captain Rathke from the National Oceanic and Atmospheric Administration (NOAA) who organized special sessions,
- Anonymous reports of safety to commission for those not comfortable speaking publicly,
- Reporting incident safety anonymously exists in some OUs but should be expanded NIST-wide, and
- Employee Concerns Program being deployed at NCNR.

SESSION III: NASEM FACILITIES STUDY

Invited Speaker – Mr. Eric Dillinger – NASEM Panelist

Dr. Cameron Oskvig, Board on Infrastructure and Constructed Environment (BICE or Board) Director at NASEM (National Academies of Science, Engineering and Medicine) introduced Mr. Eric Dillinger, a panelist of the Board after he provided the reason and focus of the study which, is on energy and climate and sustainability as they pertain to buildings, assessment and prioritization of infrastructure investment, and safety in indoor environments. He stated that NASEM also administers the Federal Facilities Council, which will release a report soon on a strategy to renew federal facilities. In 2017, the Board reviewed the NIH (National Institutes of Health) Bethesda campus to assess the facilities in greatest need, which resulted in a report entitled "Managing the NIH Bethesda Campus Capital Assets for Success in a Highly Competitive Global Biomedical Research Environment." In 2021, Congress had the same scope for NIST resulting in the report that Mr. Dillinger will report on.

Mr. Dillinger explained that although the board is contracted by NIST, they are not working on behalf of NIST, so there is no bias. At the request of the NIST Office of Facilities and Property Management (OFPM), the National Academies has four focus areas:

1. Identifying NIST facilities and utilities infrastructure in greatest need of recapitalization, repair, and impacts of the research mission,
2. Assessing composition of individual capital and repair projects and support facilities and utilities infrastructure to current standards,
3. Evaluating the completeness, accuracy, and relevance of cost estimates, and
4. Identifying potential factors and approaches NIST should consider in developing a comprehensive capital strategy for its two campuses.

Mr. Dillinger shared a critical observation that NIST is doing world-class research in subpar, poor-to-fit facilities. Data suggest NIST is losing 10 to 40 percent of productivity by researchers because of it. A board recommendation is OFPM's entire NIST Coordinated Recovery Plan, both the Sub-Plan for Recapitalization and the Sub-Plan for Stabilization, SCMMR (safety, capacity, maintenance, and major repairs) should be fully funded and approved beginning in FY 2023. The impacts of humidity control, as an example, go well beyond the facility conditions or the cost when it comes to a cost-benefit ratio. The condition of a facility not operating becomes critical. Solving NIST's unsatisfactory facilities situation requires immediate, top-down attention and resolute action.

OFPM uses good practices for planning, programming, and budgeting. The committee believes the formulated plans to address the facilities situation is the right approach and should be funded and implemented as soon as possible. Failing to repair and recapitalize NIST's facilities puts NIST's mission at risk, impacting public safety, national security, and the U.S. economy. Mr. Dillinger gave an example of how a roof leak creates loss of output through cascading effects that together cost more than the cost of fixing the roof.

Looking at a 20-year history of NIST capital funding, the ARRA (American Reinvestment and Recovery Act) dollars should be directed to take care of facilities and not let them fall into disrepair. He said the reason NIST moved from D.C. to Gaithersburg was the prior organization failed to take care of the facilities, and it was deemed cheaper to rebuild a new campus in Gaithersburg than to correct the D.C. campus.

Physical condition and functional adequacy need to be merged to get a repair or replacement that is fit to purpose for the research. Good infrastructure on the campuses to support the facilities is an important takeaway.

NIST and DOC leadership should ensure that the leadership of the DOC, OMB, Office of Science and Technology Policy (OSTP), and the House and Senate Appropriations and Oversight Committees are fully aware of NIST's facility needs and the national consequences of not meeting those needs. NIST should improve its communication of the impacts on taxpayers and consumers of inadequate appropriations of CRF (construction of research facilities) funding. OFPM should continue refining and updating its Draft Coordinated Recovery Plan.

NIST should develop and maintain facility and infrastructure total cost of ownership standards for each unique facility and infrastructure type. NIST should expand its current real property asset management system and strategy beyond condition assessment and deferred maintenance reporting and provide a proactive, life-cycle approach to real property ownership for the NIST real property portfolio. Mr. Dillinger suggested to VCAT that instead of just saying NIST has poor facilities, it should push the business impacts and lost investment as to why the funding is needed.

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

Discussion. VCAT members discussed the following topics:

- Examine balance of OpEx and CapEx investment,
- Impacts to retention and recruitment on research staff due to inadequate facilities,
- The acronym "SCMMR" sounds too similar to "skimmer" and could be perceived negatively, and
- Optimization of space on Gaithersburg and Boulder campuses and not investing in costly infrastructure repairs of old buildings, decommissioning of old buildings according to the NIST Master Plan.

SESSION IV: CHIPS Updates

NIST's CHIPS Overview—Dr. Jason Boehm, NIST Chief of Staff; Dr. Eric Lin, Interim CHIPS R&D Program Director; and Dr. Laurie Locascio, Under Secretary of Commerce for Standards and Technology and NIST

Dr. Boehm stated the three pillars of what the CHIPS R&D Vision is – one, U.S. technology leadership to invent, develop, and deploy the foundational semiconductor technology of the future; two, accelerate ideas to market, a thriving ecosystem that is focused on getting the best ideas to commercial scale as quickly and cost effectively as possible; and three, talent, a new generation of skilled workers, inventors, designers, researchers, technicians, and others able to build and sustain semiconductor manufacturing in the U.S.

The CHIPS R&D NIST is responsible for are building around four program areas: National Semiconductor Technology Center (NSTC), National Advanced Packaging Manufacturing Program (NAPMP), Manufacturing USA Institutes, and Metrology R&D at NIST. They will be implemented through public-private partnerships with industry, academic, and government. The CHIPS R&D team will be informed by the Industrial Advisory Committee (IAC), consisting of three working groups: one focused on public-private partnerships, one on workforce needs, and one on R&D gaps and challenges. The program development approach is to build a national-scale ecosystem to help connect the programs.

The timeline for the NSTC program is a major focal point. Input from the community, IAC, and PCAST has weighed in. A comprehensive white paper is being developed and should be released first quarter FY 23 to lay out the vision. NAPMP is working on a program strategy that should be finished later this year. Manufacturing USA has finished their RFI (Request for Information) and is beginning to select topics for the proposal process, and Dr. Marla Dowell will be taking over the implementation of the Metrology programs.

Some of the elements of the NSTC will include the operation of prototyping facilities and capabilities, with a research focus on engineering challenges and projects with the time horizon beyond five years. The NSTC white paper will summarize the results of the landscape analysis, outline a governance structure, and describe a preliminary operating and financial model.

NAPMP is intended to strengthen the semiconductor advanced test, assembly, and packaging capabilities in the domestic ecosystem, as packaging is going to be key to the future of this industry. Ninety-seven percent of

packaging is done offshore, mainly in Asia. Building a robust domestic ecosystem is the key linchpin. The two target areas are technology innovation and ecosystem support.

Manufacturing USA institutes has a strong network of industry, academia, and other companies across different manufacturing ecosystems. Funding from the CHIPS Act gives NIST the ability to work on this effort, building up to three new public-private partnership institutes, advancing research and commercialization of semiconductor manufacturing technologies, and workforce training.

NIST metrology research and development brings together the community and covers measurement science for new materials and packaging, physical metrology for next-gen microelectronics, computation and data, virtualization and automation, reference materials and calibrations, and standards for processes, cybersecurity, and test methods.

The impact of the CHIPS R&D program is maximized when integrated with programs across the government. NIST is working closely with DOD, NSF, DOE, and other agencies to realize the integration with guidance and support from the White House and OSTP. DOD launched the Micro Electronics Commons. Key goals of the interagency coordination are unified messaging on agency roles and responsibilities, program coordination across agencies, IP and unique capability access across agencies, and fluid partnering with other agencies and federally funded institutions. A standardized MOU (memorandum of understanding) between federal agencies is being developed to enhance the fluid partnering.

Further updates will be on CHIPS.gov. The notice of funding opportunity will be announced at the end of February. Dr. Locascio mentioned the NSTC and NAPMP are multi-billion-dollar programs for five years. The Manufacturing USA Institutes and metrology R&D are both multi-hundred-million-dollar programs. The metrology program was a large program bump-up for NIST.

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

Discussion. VCAT members discussed the following topics:

- New fab capability provided by the program; ASML in Netherlands produces two-thirds of all chip manufacturing activity,
- \$39 billion incentive program to encourage buildout of new fab and manufacturing capacity in U.S.,
- Machine learning tools can help with efficiency in chip design,
- Twin scan NXE:3600D operating at 13.6 nanometers requires 40 shipping containers, 20 trucks, and three B-747s to ship one fab capability is expensive,
- IP sharing agreements between major companies, an area flagged by IAC,
- Avoid duplication of efforts by leveraging existing industry capabilities and partnerships, and
- Individual VCAT members send in suggestions, rather than discuss as a group, on how to balance \$11 billion funding for CHIPS programs and keep the rest of NIST healthy.

SESSION V: PROGRESS ON CULTIVATING A THRIVING NIST COMMUNITY

Updates on NIST-wide community building efforts – Dr. Michael Fasolka, Deputy Director, Material Measurement Laboratory

Dr. Fasolka stated he was tasked by the NIST Director to form a group, the NIST Community Building Group (NCBG), to discuss campus culture and community building at NIST. He said that there are 32 volunteers from across NIST (Gaithersburg, Boulder, and Charleston) that make up the NCBG. The group consists of associate directors (ADs), organizational units (OUs), and liaisons to Hawaii as well as liaisons from groups such as postdoctoral and early career group (PEAR), Sigma XI, and WiSTEM, who are already doing work in this area.

Viewpoints of problems and concerns are that NIST is losing valuable workplace attributes it had before the pandemic. Elements of a healthy work community and a great employee experience are key to the NIST mission. Many of these are better and more easily fostered with in-person interaction. The newer staff to NIST have never experienced the vibrant NIST culture pre-pandemic.

The goal of the NCBG is to try to jumpstart NIST work culture in ways that spur interaction and enhance workplace attributes that staff want to experience. Creating programs of events, practices, and spaces designed to support and enrich workplace culture needs to be developed.

A simple model of workplace culture would have commonly held values, behaviors and practices that support those values, and spaces to support those practices. Many NIST in-person events were paused due to the pandemic and not restarted. Some of these have transitioned to virtual events. Spaces that used to exist at NIST are under renovation, in planning, closed, or do not exist anymore. When the group had a brainstorming activity, over 100 creative ideas were generated with diverse themes, such as events, practices, spaces, wellness activities to support these values.

Three initial takeaways just from listening to staff:

- Working on NIST campuses is difficult, e.g., no food on campus,
- NIST campuses lack neutral space, welcoming spaces where staff can gather, and
- News about activities and campus improvements is not reaching staff, especially on campus.

Some of the NCBG program proposals in development are getting good-tasting water to buildings, central eating places on main campuses, coffee service, activities, and events. On wellness and work-life balance, there is a gym, but making a broad wellness program for people on campus with group activities is needed.

On staff campus experience, an observation is there are many organizations at NIST that are partly responsible for the staff campus experience, but no one is responsible for the big picture or for coordinating efforts needed to shape workplace culture. Two recommendations are to make the staff campus experience a focus and put a body in charge of managing staff experience, such as an employee experience officer.

NCBG ideated activities and discussions showed the staff wants to know more about the work of their colleagues, how NIST works, and Associate Director for Management Resources (ADMR) staff want a connection to the science they support and the opportunity to celebrate their work too. A recommendation is to create activities about NIST and NIST work, such as a movie night. Public Affairs Office (PAO) has videos of movies coming out about NIST, NIST history, and NIST work. Events like this bring people together.

A common theme noticed by the group of volunteers was inclusion not being addressed by simply inviting everyone to every event, and NIST should create more events that reach more people. A recommendation is to think about inclusion as a design factor when developing programs with good communication that will reach all NIST staff. Diversity strategies for better communication with posters and flyers for on-site staff. Vertical support is essential by top leadership, ADs, and OUs to emphasize the importance of community. There are current and planned community events by various groups like PEAR, Sigma Xi, and WiSTEM.

Next steps for NCBG are to discuss work and recommendations with ADs, plan paths for priority areas, secure support from NIST leadership, compete and refine programs, and get feedback from staff.

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

Discussion. VCAT members discussed the following topics:

- What is the current named policy for return to work for government,
- Cafeteria renovation, Building 101 closure, and shutdown of other facilities,
- Need for cafeteria roof repair, which contains asbestos, and addressing safety and utility issues,
- Mobile app for NIST communication about upcoming events,
- Development of a Friends of NIST group could help with better communication,
- Work-life flexibility and not work-life balance is a better message to staff,
- Create a gathering of colleagues sharing what they are working on instead of social event,
- Communicate advantages of balance of flexibility of working at home and on-site,
- Provide scientific-backing data to prove working in a collaborative environment is important, and
- The generational nature of employee attitudes toward telework and workplace interactions.

SESSION VI: SUBCOMMITTEE RECOMMENDATIONS TO VCAT

Subcommittees – Findings and Final Recommendations – Mr. David Vasko, Chair of Subcommittee on Alignment of Manufacturing Efforts; Dr. Vinton Cerf, Chair of Subcommittee on Visibility Efforts; and Dr. Gail Folena-Wasserman, Chair of Subcommittee on Workforce Efforts

Subcommittee on Alignment of Manufacturing Efforts

Mr. Vasko began by stating the subcommittees were given a charge that had five focus areas and they focused on three of them: visibility improvement, workforce development, and manufacturing.

Mr. Vasko acknowledged and thanked the Visiting Technical Experts who served on the Subcommittee on Alignment of Manufacturing Effort. Its three areas of focus are to establish alignment via the strategic use of the CHIPS Act, benchmarking against Fraunhofer and other organizations, and developing a matching concierge surface to help make connections.

The first charge of the group was the strategic use of the CHIPS and Science Act to establish alignment. One recommendation is combining MEP and Manufacturing USA workforce development by using the MEP programs to push things out to the manufacturing community. Also, improve the comprehensive information on existing federal programs for small and medium manufacturers to allow them to see everything that's going on. Development of national viewpoints of standardization and manufacturing is needed in the U.S., since most other countries are doing this, and expanding manufacturing.gov can help in this effort.

Mr. Vasko said Dr. Molnar's team is doing a remarkable job with benchmarking, and it is one that needs continued support, with continued benchmarking of how we're doing versus entities like Fraunhofer.

In dealing with the concierge, it is important to support the growth of the MEP advanced tech teams by building out all 51 of them. Also, initiate MEP-led projects for small and medium manufacturers. On-the-ground coordination at MEP with federal SME assistance programs is another recommendation. Also, building out the verticals that the MEPs are doing from one with three in progress to five.

Subcommittee on Visibility Efforts

Dr. Cerf said NIST has a lot of good materials, but the problem is finding a way to deliver them to the right channels, locating the best audiences, about how NIST can help others achieve success. Breaking down the possible targets of interest consisting of public industry, academic, and Congress. An important message is for Congress to appreciate what NIST has done with public funds, by giving them stories to tell about how what they voted for benefitted their constituents. This is hard and may require engaging with Congressional staff more.

Getting the Public Affairs Office and the rest of NIST more closely connected, with PAO providing more content, is a subcommittee recommendation. A high-impact message to Congress about the successes at NIST and how NIST does produce is difficult to achieve, and so starting with the staff is one way to start. Friends of NIST is another vehicle to get better visibility as well as making use of social media. NIST is doing good things with social media engagement, but it appeals to a small, tech-focused subset of the public, so expanding to content with broader appeal is something to look at.

Leveraging the breadth that the MEPs have with 33,000 manufacturers with the depth of manufacturing centers to roll out workforce training and development is a recommendation that it was felt could have the biggest possible impact. Also ensuring that Manufacturing USA and MEP are recognized as part of NIST.

Another recommendation, providing the concierge service to allow the manufacturers to reach back into NIST to find things via Manufacturing USA or the laboratories would help small and medium manufacturers navigate the system and develop connections.

Subcommittee on Workforce Efforts

Dr. Folena-Wasserman ended with the recommendations for the Subcommittee on Workforce Efforts. These recommendations were made on academic programs and what NIST could do to nurture science as well as elevate the STEM (Science, Technology, Engineering, and Mathematics) workforce and expanding Manufacturing USA training efforts. Also, a pilot program to help women return to the workforce after a prolonged absence is needed.

There were four areas of recommendations. The first covered how can NIST efforts be used to increase STEM awareness and better focus on bringing science elements to underserved populations. One strategy is to expand STEM outreach to grades K-12. The second is building the partnerships with educators on creating knowledge around basic skills. The summer high school intern program and SURF (Summer Undergraduate Research Fellowship) can target underserved populations, along with paid internships and career events. Another recommendation is to find a way to expand the NIST talent pool, possibly through apprenticeships or partnerships with community colleges. A rotational program within NIST for students to gain skills is another avenue to explore. A third area is increasing the science bridges with academic institutions. Market the grants and call out for proposals like an open challenge to create more visibility and open innovation in different areas, which will provide engagement opportunities for NIST employees as well. The fourth area is increasing science bridges with industry. The CHIPS and Science Act is supporting this for semiconductors, but NIST needs to make sure that they are doing this across full range of industries. Expand the postdoc programs such as one that NIST has with AstraZeneca.

The impact of the four recommendations would have a positive influence on the NIST external scientific reputation. It will help to recruit, training, and retain staff in STEM areas as well as help build a diverse talent pool.

Expanding Manufacturing USA training efforts to increase diversity and capacity of qualified talent for manufacturing jobs is needed. Though jobs are going away for many in manufacturing, the skill sets can be used in other areas. Increasing outreach for re-skilling could provide benefits in the long run.

Establishing a publicly accessible repository of information about academia, industry, and government initiatives related to manufacturing and workforce development would be helpful. Establish nationally recognized portable certifications. Industry is not that engaged in certifications. This could be a huge opportunity for the semiconductor work to come out with some established training that's nationally recognized.

The impacts would be the ability to revitalize interest in a manufacturing career path, establish bench-ready workforce with portable skills, enabling re-skilling in job transitions, and create talent ecosystems.

Finally establish a pilot program to help women return to the workforce. A panel of women having been out of the workforce for months up to 20 years shared experiences, and there were three common features: résumé development, hard to get acclimated to work environment, and critical role of first-line supervisors. To address these, a workshop for women to retool their résumés, develop competency assessment tools, and allocate a specific number of opportunities each year to bring women back into the workforce is one avenue to take. Good program visibility to encourage applicants is needed to bring women back into the workforce. Be sure there is robust onboarding and support. Having Science Days may be one way to target not just women, but other underserved communities. Provide managers with training on best practices to ease the transition. A NIST rotational program where women can rotate through several laboratories would be a way to involve NIST staff and maybe become peer mentors. This program could be expanded to additional underserved communities.

Discussion. VCAT members and NIST Leadership discussed the following topics:

- Overlapping resources can be mutually reinforcing for visibility and communication areas,
- Social media path to reach different cohorts and target a multiple-audience approach in this effort,
- Creating a foundation, such as Friends of NIST or a nonprofit, could be a real benefit to NIST,
- Find existing programs that have availability for engagement,
- Piggyback with private/public sector company programs utilizing NIST scientists to attract STEM interest,

- Reach out to community colleges, universities, and local high schools that may have existing programs that NIST could tap into, as well as economic development and state agencies,
- Contact Boys and Girls Club CEO, Jim Clark, who is a big advocate of bringing STEM interest to youth,
- Social influencers and creators with million-plus viewership could help showcase NIST activities, and
- MATTR and MATTR+ programs can be a collaboration between scientist and small manufacturer and them navigate NIST labs more efficiently.

Next Steps – Dr. Laurie Locascio, Under Secretary of Commerce for Standards and Technology and NIST Director

Dr. Locascio thanked the subcommittee members and accepted their recommendations and stated NIST takes them all very seriously and will work with the teams to find out which ones are actionable for integration into the programs. Dr. Locascio then stated another priority of hers is international standards, and she made a request to VCAT to consider charging a subcommittee in international standards.

SESSION VII: CLOSING SESSION – DAY 1

Meeting Wrap-up

There were no public comments. In closing for the day, Dr. Khan thanked all the participants, invited guest speakers, and especially Dr. Folena-Wasserman and Mr. David Vasko for their time and valuable expertise.

Adjournment

The meeting was adjourned at 4:45 PM.

Thursday, February 9, 2023

Call to Order – Dr. Mehmood Khan, VCAT Chair

Dr. Khan called the meeting to order at 9:00 a.m., reviewed the meeting logistics and took roll call.

SESSION VIII: REPORT WORKING SESSION

VCAT Annual Report – Working Session – Dr. Mehmood Khan, Chair, VCAT

Dr. Evans and Dr. Khan opened the working session with a request for discussion on the draft topics of the Annual Report. It was decided the VCAT would go through it in a section-by-section format and finalize the report by email which will then be submitted to Congress through the Secretary of Commerce.

Meeting Wrap-up

In closing, Dr. Locascio thanked the VCAT for their robust discussion and time spent on the annual report. Dr. Evans said the release of the President's budget will be March 9, 2023. Dr. Locascio gave a special thank you to Dr. Gail Wasserman and Mr. David Vasko for their valuable input and time.

Adjournment

The meeting was adjourned at 11:04 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. Mehmood Khan, Chair, NIST Visiting Committee on Advanced Technology