**APPROVED MINUTES
PLENARY OPEN SESSION
487TH MEETING
NATIONAL SCIENCE BOARD**

National Science Foundation (NSF)
In Person and Via Videoconference
February 21 - 22, 2024

Members Present:

Dan Reed, *NSB Chair*
Victor McCrary, *NSB Vice Chair*
Sudarsanam Babu
Deborah Ball
Dorota Grejner-Brzezinska
Vicki Chandler
Maureen Condic
Aaron Dominguez
Suresh Garimella
Darío Gil
Melvyn Huff
Matthew Malkan
Julia Phillips
Marvi Matos Rodriguez
Scott Stanley
Keivan Stassun
Merlin Theodore
Wanda Ward
Bevlee Watford
Stephen Willard

Members Absent:

Roger Beachy
Steven Leath
S. Alan Stern
Heather Wilson

Sethuraman Panchanathan, *ex officio*

There being a quorum, the National Science Board (NSB, Board) convened in Open Plenary Session at 10:00 a.m. EST on Wednesday, February 21, 2024, in person and via videoconference with NSB Chair, Dan Reed, presiding.

NSB Chair's Open Remarks

Welcome, Agenda Preview, NSBO Staff Update, and Chair's Activities
Reed welcomed Board Members, staff, and guests to NSB's 487th meeting and previewed the agenda. Reed's remarks included a request to NSF employees to respond to a survey by the NSB-NSF Merit Review Commission, an NSBO staff update, and a summary of his activities

since the November 2023 meeting highlighting meetings with congressional representatives to discuss AI and related issues, the House Science Committee to discuss NSF's progress in Antarctica, the Senate Commerce, Science, and Transportation Committee covering a variety of topics from AI to workforce development, diversity and inclusion activities, and the importance of the Directorate for Technology, Innovation, and Partnership (TIP) and Regional Innovation Engines to broadening access to research and technology transfer.

Antarctic Trip and Slideshow
Reed turned the floor to NSB Members that traveled to Antarctica, Aaron Dominguez, Bevlee Watford, and Keivan Stassun, for a brief presentation of highlights of their trip to Antarctica. All three members described the Antarctic as a challenging, interesting, and unique working environment. During their visit, they participated in a town hall meeting at the McMurdo Station and met with individuals at McMurdo and the South Pole stations to listen and learn more about the conditions and work environment. All three Members noted the level of commitment to the scientific mission expressed by the people with whom they met and emphasized the Board's duty to ensure a safe environment where people can thrive. The Members were highly complementary of and thanked the NSF staff involved in arranging and executing their visit to the Antarctic.

Acknowledgments and Tribute
Reed delivered remarks in honor of Black History Month and reaffirmed the Board's commitment to the historically marginalized missing millions in STEM and NSB's 2020 statement on racism in science and engineering. Reed concluded his remarks by acknowledging the contributions of the first Black NSF Director, Dr. John Slaughter, and former Chair of the House Science Committee Eddie Bernice Johnson, who both had recently passed away.

NSF Director's Remarks

The Director began his remarks with a tribute to Dr. John Slaughter, Representative Eddie Bernice Johnson and recognition of Black History Month. After a moment of silence, he proceeded with highlights of NSF investments and impacts. Exemplar investments included a Graduate Research Fellowship Program (GFRP) fellowship for research, design, and deployment the first battery-free and full autonomous microrobot, investments by the Geosciences Directorate aimed at broadening participation through the development of technology and practices allowing disabled people to participate in scientific fieldwork, and several NSF Engines Type-2 awards highlighting expansive partnerships and matching investments from state and local governments, other federal agencies, philanthropies, and private industry.

Senior Staff introductions
The Director concluded his remarks with an introduction of the newest senior staff in the following directorates:
- Saul Gonzalez, division director, Division of Physics in Directorate of Mathematical and Physical Sciences;
- Charles Cunningham, deputy division director, Division of Molecular and Cellular Biosciences in the Directorate of Biological Sciences;
- Kemi Ladeji-Osias, deputy division director, Division of Engineering Education and Centers in the Directorate of Engineering;

- Jesse Simons, deputy division director, Division of Financial Management in the Office of Budget, Finance, and Award Management; and
- Junping Wang, division director, Division of Mathematical Scientists in the Directorate of Mathematical and Physical Sciences.

NSF's Role in the Future of Artificial Intelligence

Reed outlined some of the challenges in connection with basic research in artificial intelligence (AI) including access to AI hardware – it is expensive and in short supply - and talent often leaves academia to pursue opportunities in the private sector. He noted that the federal role in AI is extensively tied up with the *CHIPS and Science Act* and semiconductors access and national security issues are a big part of that.

NSF's Tess DeBlanc-Knowles, staff associate for Technology Policy and Strategy with TIP and Michael Littman, division director, Division of Information and Intelligent Systems joined the board to provide an overview of the ways that NSF supports AI research, education, and innovation nationwide and also how NSF is integrating into some government-wide initiatives.

AI – What's Changed?
Littman began by noting that NSF has been supporting AI research for about 60 years and highlighted technologies that have developed due in large part to the NSF's investment in basic research behind these technologies. He believes that the current focus on AI points to two major shifts -
1) implications of scale (scaling up what was already in use is shattering expectations for difficult problems that scientists have been working on for a very long time which then raises new scientific questions that require larger investments to run larger studies); and
2) managing the sociotechnical boundary (now that some interesting and hard problems have been solved after decades of research, technological solutions are being put out into the world which raises complex interactions with people and institutions).

NSF AI strategy and investment
NSF's overall strategy to invest in AI is to support access to research infrastructure and develop the AI workforce of the future including through education. AI Institutes and NSF's Regional Innovation Engines are two examples that demonstrate these investments. Investments in AI Institutes come to about $500 million over five years, with $300 million ($20 million into 15 AI Institutes) from NSF and the remaining $200 million from interagency partners such as the U.S. Department of Agriculture, NIST and industry partners including Microsoft, Google, Intel, and Accenture.

Types of Support
DeBlanc-Knowles described NSF's support for the AI innovation ecosystem as holistic and specifically for AI infrastructure, data, and talent.

Infrastructure
NSF plays a central role in connecting researchers to resources they need to fuel AI research – data and computational resources, algorithms and talent. With the advent of machine learning, access to high-quality data sets and computational resources is required to work on the cutting

edge. Other NSF-supported AI infrastructure resources include the CloudBank Pilot and the NSF Frontera supercomputer. Hundreds of U.S. researchers use the supercomputer each year which is equipped to accelerate AI and machine learning research.

Data
NSF is developing a prototype of an open knowledge network through a partnership with five other federal agencies.

Talent
NSF is supporting the cultivation of talent through support for K-12 education, experiential learning opportunities, and access to advanced degrees with a focus on advancing AI expertise and knowledge that NSF predicts will be needed to integrate AI into society and workforce. Members asked what types of research institutions NSF is engaging and supporting to ensure inputs into language models are diverse. While no specifics were offered, the Director noted that all 25 AI Institutes have outreach components and some AI Institutes have partnerships with K-12 institutions and MSIs.

Executive Order (EO), Safe, Secure, and Trustworthy Development and Use of AI (signed in October 2023)
Under the EO, NSF's tasks are to:
- Launch NAIRR Pilot;
- Fund 1 NSF Engine focused on AI;
- Establish 4 new AI Institutes;
- Prioritize resources to support AI education and workforce development;
- Fund privacy-enhancing technologies (PETs) research coordination network; and
- Prioritize support for developing PETs solutions.

NSF's Supporting Role
NSF also supports the Department of Commerce in its role to develop test beds for AI and works closely with the Department of Energy to train scientists in AI and the U.S. State Department and the U.S. Agency for International Development as they develop a global AI research agenda. NSF is also fielding inquiries and interest from Congress on issues ranging from the NAIRR pilot, AI education, semiconductors, and cybersecurity.

Key Challenges
Key challenges include funding, depth and breadth of education and workforce needs, integrating AI into areas of science and engineering, and pace of innovation when measured against government funding and decision-making.

Discussion following the presentation ranged widely and included NSF's approach to fielding concerns associated with AI (from Congress, the community), NSF's coordination with other federal agencies, and whether NSF programs supporting and targeting AI graduate studies, if prioritized might disadvantage other disciplines. Members asked whether data sets accessible through the NAIRR Pilot would remain open and accessible and limited to Americans, about NSF's approach to issues of technology product life cycle (physical) and data / information pollution, and NSF's approach to encouraging collaboration versus competition as it relates to cloud services, network services, open data, open knowledge. The discussion ended with one

Member asserting that NSF could not support AI research that NSF presenters described as societal decision-making or content recommendation and filtering due to issues related to the First Amendment.

Approval of Prior Open Meeting Minutes

The minutes of the November 2023 Open Plenary session were approved as presented.

Committee Reports

Committee on External Engagement (EE)
Committee Chair Darío Gil reported that NSB Members continue to communicate with Congress and others about the urgency needed to address the STEM talent crisis and meet critical needs, both across government and industry. He shared two examples of data that highlight the urgency and reminded members that NSB would soon be releasing the 2024 State of the U.S. Science and Engineering report (Indicators or summary report) and accompanying policy pieces underscoring the urgency to develop U.S. domestic talent and welcome international talent.

Committee on National Science and Engineering Policy (SEP)
Committee Chair Maureen Condic gave an overview of the committee's work and goals for this cycle including the release of Indicators thematic reports and the mid-March release of Indicators 2024. SEP is also leading the development of policy companion pieces that reflect the board's consensus, align with the board's priorities, and are rooted in the data and analysis stemming from Indicators 2024.

Condic invited feedback to the Committee's draft "Talent is the Treasure" policy document noting that it was subject to further copy-editing and design improvements. Members discussed how best to amplify the message and ensure the message motivates action and gets political traction. Nadine Lymn, NSBO Communications Director joined the discussion and described the plans for the rollout of Indicators 2024 and accompanying policy pieces including virtual and in-person public and congressional press briefings. Members offered ideas such as:
- including influential members from the private sector;
- engaging local actors and governments;
- messaging around the potential impact on U.S. national security, economic welfare, and competitiveness;
- improving the long-term usefulness of these products including developing action items for users of talent (e.g. action items for industry such as partnering with academia); and
- developing evidence-based reports to help people understand why certain problems persist and how certain investments or implementation practices help or do not help.

Members unanimously approved the policy piece entitled "Talent is the Treasure", pending minor edits.

Following the vote, Condic reported on Committee discussions with the National Center for Science and Engineering Statistics on potential changes to Indicators for 2026 and reminded Members that the goal of the changes is to make Indicators maximally useful for everyone and to expand the scope of users. Without revisiting all previously offered feedback, she invited

Members to provide additional feedback for NCSES about the remodeling of Indicators for the 2026 cycle. One Member felt that it would be important to understand more about the taxonomy between the 2024 and 2026 publications and receive feedback from current and prospective stakeholders about the proposed changes. Another Members suggested that a video tutorial on the NSB website about how to use Indicators could be helpful.

National Security Working Group
Team Lead Marvi Ann Matos Rodriguez reminded the Board of the working group's two focus areas: the urgent need for STEM workers with security clearances and foreign-born talent to U.S. national security.

Domestic workforce issues
Working group members identified opportunities for improved data analytics and predicting the supply and demand of STEM workers via models. Members suggested conducting listening sessions with the national security sector, especially industry; making a stronger case to increase appropriations for the GRFP; and challenging industry partners to co-invest in the GRFP.

International Talent
To continue attracting international talent, the working group suggests increasing H-1B visa numbers; and using best available data to match retention strategies with workforce needs. Members suggested that the U.S. look to South America or Africa for talent, rather than Asia and that the group keep in mind that there is benefit to the nation if foreign-born individuals return to their home country after working and studying in the U.S. (i.e. "brain circulation"). Members also suggested that, as they develop their recommendations, the working group keep in mind where NSF has control and influence to "move the needle."

Talent Development Team Working Group
Team Lead Julia Phillips reported that the Talent Development Team working group has divided into several groups and is focusing on pre-K through 12 STEM education, financial obstacles to getting a STEM bachelor's degree, the role of community colleges in growing the STEM workforce, and the Skilled Technical Workforce (STW). The STW group is revamping the key policy messages from the earlier report and plans to share a draft text with the Board later in the month.

NSF Chief Diversity and Inclusion Officer, Charles Barber – Diversity Equity, Inclusion, and Accessibility Program Overview and Discussion

NSF Chief Diversity and Inclusion Officer (CDIO) Charles Barber gave an overview of the agency's diversity, equity, inclusion, and accessibility (DEIA) programs. He discussed the links between DEIA, psychological safety, and culture and noted that DEIA is an outcome and not a process.

Barber described the Under-Representation Model and five-part DEIA Maturity Model. The former is aimed at harmonizing diversity and meritocracy without compromising either. He said the Under-Representation Model has been well received by District of Columbia Court Chief

Justices and could align with the recent Supreme Court decision on affirmative action. The Maturity Model is designed to help organizations better operationalize inclusion. Barber also described a Leadership Reflection Tool that has been piloted at NSF. The tool aims to operationalize restorative practices and could become part of executive development programs to build and bolster inclusive leadership.

He reported that NSF recently launched a culture assessment, which presented an opportunity to align the agency's mission with strategic planning.

He mentioned a partnership with the Office of Personnel Management, in which NSF will help define policy recommendations related to collecting sexual orientation and gender identity data from federal employees. At the same time, the Agency wants to help NSF staff feel more comfortable with reporting on these matters.

Members expressed appreciation for the presentation and efforts to improve NSF's culture, including the use of data. Questions focused on where NSF currently lies in the five-part Maturity Model, trends identified in recent NSF employee surveys, and whether NSB employee surveys had been disaggregated. Barber noted that NSF had not yet launched the five-part Maturity Model and that he would report back to the Board when he had more information. Recent surveys reveal gaps in trust in leadership and the perception that NSF is moving away from its mission of supporting basic research. Employee surveys have been disaggregated by race and division or office, but no conclusions have been made from such analyses.

Members also asked whether faith identity is included as a dimension of diversity and the underlying rationale for increasing diversity. Barber noted that other agencies are considering how to address faith identity and hopes to include that in future efforts. The rationale for increasing diversity is to increase organizational effectiveness.

Lastly, Reed asked how the Board can help the CDIO's efforts, to which Barber replied that given concerns about legal and political scrutiny of DEIA efforts, he appreciates the Board's support and continuing dialogue.

NSF Update – Sexual Assault and Harassment Prevention Response (SAHPR)

Renee Ferranti, Special Assistant to the Director for SAHPR provided NSB with operational updates, a synopsis of her recent and first visit with the U.S. Antarctic Program in the Antarctic, and the SAHPR program strategy and framework for work going forward, applicable to all locations where NSF activities are conducted.

Operational Updates
Ferranti outlined the regular meetings between NSF leaders and staff members for purposes of coordination and collaboration. She also shared the many connections she made during her trip to the Antarctic for purposes of raising awareness, improving coordination, gathering feedback, and building trust – including DoD, the U.S. Navy, Air National Guard, ASC leadership/weekly town hall, and the NSF Office of Inspector General.

Antarctic Support Contract

For purposes of informing the next contract, Ferranti shared language with NSF's Division of Acquisition and Cooperative Support requiring role-specific training for HR personnel, supervisors, and managers to address areas of sexual assault and harassment with regard to bystander intervention reporting and proper response when disclosures are received.

October 2023 – January 2024

Ferranti provided some statistics on what she categorized as "what is working":

- On-ice Victim Advocate actions: Had contact with approximately 100 clients and community members, facilitated 25 in-person trainings reaching about 1,400 people; and conducted two South Pole visits (20 days), numerous work center outreach presentations and dozens of briefs to new deployers upon arrival.
- Saferscience notifications: NSF received 12 notifications from Leidos using the community incident form developed by Leidos to ensure streamlined communications and 3 individuals reached out directly for information.
- Climate Survey: NSF received approval from the Office of Management and Budget and is finalizing the communication for the rollout of the U.S. Antarctic Program climate survey.

Facilities improvements underway:

- Construction of the new dorm;
- Upgrade of existing dorms to include new mattresses and higher quality bedding;
- Renovation of the chalet to provide additional lounge and recreation space and a new coffee house setting; and
- Replacement of the ice cream machine.

Vision Going Forward

Ferranti stressed the concept of prevention as it relates to getting at the root causes of sexual violence, focusing on the environment as a whole, and the morale of the community rather than just responding to bad actors. NSF should focus on what is within its control and sphere of influence and strengthen the support for the impacted person.

Ferranti presented the SAHPR Program Framework approach and foundation she is establishing which is driven by evidence and research-informed best practices in the sexual violence field that have evolved over the last 20 years. The framework includes standards, many of which have been implemented by the Department of Defense, NOAA, the U.S. Coast Guard, the Peace Corps, USAID, and others and optimally, will be intersectional, multidisciplinary, and established using a public health prevention lens. The approach should be victim and survivor-centered, placing the rights, confidentiality, wishes, needs, safety, autonomy, and well-being of the victim at the center. The key processes and support mechanisms for victims include the criminal justice system, the HR process, medical care, and access to the victim advocate. Finally, the approach should be trauma-informed, seeking to actively resist re-traumatization.

The foundation includes comprehensive prevention and response procedures that establish standards for communication, roles and responsibilities, and transparency. It also focuses on providing trauma-informed and victim-centered support to ensure accountability. The program is sustainable with dedicated staff and funding, increased awareness, and partnerships with

stakeholders. Continuous quality improvement is ensured through quality reviews, community feedback, site visits, and ongoing commitment to improvement.

Next Steps
- Continue to strengthen and expand SAHPR functions;
- Refine and improve reporting, notification, and follow-up procedures;
- SAHPR program oversight on victim services, training development, and data collection; and
- Tighten coordination with the OIG on response to sexual assault report.

Following Ferranti's presentation, one member asked for an estimate of how many actions were taken against NSF staff or contractors after being credibly accused of sexual assault or harassment or retaliating against a victim. Another NSB Member offered that the question could be reframed to whether victim survivors are satisfied with the services and support provided. Ferranti agreed that would be valuable information and offered that the climate survey results might reveal this.

There being no further business, the open session was adjourned at 3:30 p.m. EST.

Session 2 **(February 22, 2024, 9:00 to 9:20 a.m. EST)**

There being a quorum, the NSB convened in Open Plenary session at 9:00 a.m. EST on Thursday, February 22, 2024, in person and via videoconference with NSB Chair, Dan Reed, presiding. Members not in attendance were Roger Beachy, Alan Stern, and Heather Wilson.

Chair's Remarks

Chair Reed welcomed Board Members, staff, and guests to the second day of the meeting and introduced the next agenda item.

Commission Report

MRX Commission Chair Stephen Willard summarized the activities of the Commission since the NSB's November 2023 meeting and noted that the Commission had pivoted to developing preliminary recommendations and suggestions for delivery at the NSB's May meeting. Willard gave a preview, including the agreement that NSF should keep the two existing criteria: Intellectual Merit and Broader Impacts, and discussion about a potential new name for BI (Societal Benefits) and the concept of a BI sub-score.

There being no further business, Reed adjourned this Open session at 9:20 a.m. EST.

5/3/2024

X   Andrea I. Rambow

Andrea I. Rambow

Signed by: ANDREA I RAMBOW

Andrea Rambow
Executive Secretary to the National Science Board