NSB-2022-40
February 15, 2023

APPROVED MINUTES
PLENARY OPEN SESSION
482ND MEETING
NATIONAL SCIENCE BOARD

National Science Foundation (NSF)
Via Videoconference
December 1 - 2, 2022

Members Present:

Dan Reed, *NSB Chair*
Victor McCrary, *NSB Vice Chair*
Sudarsanam Babu
Roger Beachy
Maureen Condic
Aaron Dominguez
Suresh Garimella
Darío Gil
Melvyn Huff
Matthew Malkan
Julia Phillips
Scott Stanley
S. Alan Stern
Stephen Willard
Heather Wilson

Sethuraman Panchanathan, *ex officio*

Members Absent:

Steven Leath

There being a quorum, the National Science Board (NSB, Board) convened in Open Plenary Session at 12:30 p.m. EST on Thursday, December 1, 2022, in person and via videoconference with NSB Chair, Dan Reed, presiding.

NSB Chair's Opening Remarks

Dan Reed welcomed Board Members, staff and guests to NSB's 482nd meeting and provided an overview of the plenary agenda.

Chair's/Members' Activities
Reed's activities since the August Board meeting included congressional and media engagements on the topic of appropriations and the *CHIPS and Science Act*. Reed highlighted the engagements of other NSB Members at the EPSCoR/IDeA Foundation covering geography

of innovation and Walsh University on STEM careers and the importance of developing STEM talent. Vice Chair Victor McCrary concluded the session with a summary of his engagements including attendance of the American Chemical Society Southeast Regional Conference in Puerto Rico where the focus was NSB's *Vision 2030*, specifically talent and workforce development. McCrary also served as a panelist at the annual meeting of the Public Land-grant Universities and at an event sponsored by the National Academies of Science, Engineering, and Medicine both on the need for research security.

NSBO Staff Updates
Reed introduced three new members of the NSBO staff, including Alexandra Surcel, a Science and Engineering Policy Analyst, and Vidalina Trevino and Danielle Taylor, both Albert Einstein Distinguished Educator Fellows.

Approval of Prior Open Meeting Minutes

Reed presented the minutes of the August 3-4, 2022 Open Plenary session for approval. The minutes were approved as presented.

NSF Director's Remarks

Director Sethuraman Panchanathan expressed appreciation for the Board's efforts to improve NSF and the overall science and engineering enterprise and acknowledged the passage of the *CHIPS and Science Act* on August 9, 2022) and summarized highlights of the legislation.

Cool Scientists
The Director acknowledged the connections between NSF-funded scientists, long-term NSF research investments and the accomplishments powered by those investments including Nobel prize winners, MacArthur Fellows, and 2022 R&D 100 Award recipients. The Director highlighted the benefits of funding engineering research centers (ERCs) and announced a new investment of $104 million over five years in four ERCs aimed at transforming technology for sustainable solutions that will impact agriculture, manufacturing, health, and urban planning followed by a video where NSB Members heard from scientists representing this work.

Panchanathan provided examples of NSF awards and investments by which NSF is aiming to prepare the workforce across all disciplines and demographics for emerging technologies such as AI and Quantum (ExpandQISE) and increase the number of diverse domestic graduate students pursuing research innovation careers and careers in science fields (CISE Graduate Fellowship Program/CSGrad4US).

The Director reported on his trip with NSB Members Reed, Julia Phillips, and Aaron Dominguez to Hawaii for the inauguration of the Daniel K. Inouye solar telescope (DKIST) in August 2022, including highlights of his meeting two Hawaiian engineers and the impact NSF has had on their careers and the Hawaiian community. He proceeded with a brief description of the SBIR program, including how programs like SBIR are needed to ensure the broadening of participation, followed by several examples of NSF investments via the SBIR program.

The Director updated the Board on NSF's efforts to expand the Technology, Innovation, and Partnerships (TIP) Directorate since the launch of the new directorate in March 2022. He highlighted a few examples of activities in pilot stages with aspirations of scaling up including I-Corp Hubs or Innovation Corps Hubs, the TIP Directorate entrepreneurial fellowship program, NSF Pathways, and the TIP convergence accelerator.

Director's Engagements
Director Panchanathan concluded his remarks with highlights of his more than 50 engagements with members of the Biden administration, including the President, congressional members, federal agencies, committees and organizations, entrepreneurs, and university faculty across the nation.

Committee and Working Group Reports

Committee on Oversight (CO)
Committee Chair Stephen Willard reported that since the August NSB meeting, the Committee on Oversight (CO) met in September and October.

The September meeting was a joint CO and Committee on Awards and Facilities (A&F) joint meeting where NSF's Chief Operating Officer (COO) presented NSF's response to the sexual assault and harassment prevention response report (SAHPR) released to the public in August 2022. NSF's Office of Equity and Civil Rights (OECR) is leading the development of a SAHPR office to coordinate agency resources for victims and will be implementing a 24-hour hotline for victims to report incidents of harassment and assault. OECR will also coordinate with various agency offices, including the Office of Polar Programs (OPP), the Office of General Counsel, and the Office of Inspector General (OIG), for criminal or administrative actions, as appropriate. NSF is also establishing a harassment task force, developing a needs assessment report to explore additional actions, and planning for agency leadership to visit the Antarctic this season to oversee and promote installations of support structures, conduct listening sessions, and meet one-on-one with personnel.

Board members discussed their concerns about the challenges of coordinating with multiple jurisdictions and establishing clear lines of authority, comprehensive harassment training, appropriate medical services, and counseling and legal support. The A&F Committee Chair led a discussion on the Board's statement on sexual harassment and assault and unanimously approved the Board Statement by a vote.

CO met again on November 28, 2022, and Chair Willard expressed a continued commitment to working with the A&F Committee to monitor NSF's response to the SAHPR report. Before this meeting the Members' trip to Antarctica was cancelled due safety concerns and implementation of mitigation protocols around a spike in COVID cases. Members will continue to monitor the situation and possibly reschedule a visit to soon.

Members also received a presentation from OIG on their work related to NSF's annual financial statement audit. Inspector General (IG) Allison Lerner informed Members that her office has begun an inspection in Antarctica focused on sexual assault reporting, response and investigations.

The committee also received a report from the auditing firm Kearney and Company about NSF's fiscal year 2022 financial statement audit results. For the 25th year in a row, NSF received an unmodified opinion with no material weaknesses or significant deficiencies. NSF's Chief Financial Officer (CFO) and Head of Budget Finance and Award Management (BFA) updated the committee on NSF's financial performance and highlighted opportunities for early BFA engagement to encourage proactive responses to budgetary issues.

Establishment of CO Commission for Merit Review Reexamination
Willard provided a brief history of the development of NSF's merit review digest in 1981 and modifications and assessments since then. He noted that the merit review process has not been comprehensively assessed for almost 12 years and outlined several reasons why it should be done now, including new requirements in the *CHIPS and Science Act* (CHIPS). He described the effort as a major project and anticipates that it will involve numerous listening sessions with relevant stakeholders. The project will be led by board members and NSF leadership will be invited to engage. CO will involve external consultants with experience and expertise in areas such as data collection, boarder impacts, and translational research. CO included the full draft charge for the commission in the Board book. Willard anticipates the commission will develop a final report and present policy recommendations at the May 2024 Board meeting. CO recommended the establishment of a commission to carry out a reexamination of the merit review process to the full board for consideration and vote.

Reed reiterated some of the reasons why Merit Review reexamination is needed now and opened the floor to discussion by Members. Discussion ensued on topics including the importance of striking a balance between intellectual merit and broader impacts criterion, the need for a culture change toward broadening the base of the STEM ecosystem through greater inclusion in the STEM workforce, and how a reexamination of and change to the Merit Review process might contribute toward that change. Challenges associated with culture change were acknowledged by several Members. Members recommended understanding the changes to review processes that other agencies, institutions and organizations have made and basing changes to the NSF process on evidence of what works and developing clear expectations and guidance as it relates to broader impacts.

Vote on CO Commission for Merit Review Reexamination
Members voted to establish a commission to undertake a reexamination of NSF's Merit Review Policy, the associated criteria, and process. The vote passed with one abstention. (See NSB-2022-43, Major Actions and Approvals, December 2022)

Committee on External Engagement (EE)
Committee Chair Darío Gil reported that EE met three times since the August Board meeting and focused on engaging with Congress on NSF appropriations, developing and implementing a streamlined nominations process for the NSB's 2023 Vannevar Bush and the Science and Society Awards, and facilitating an external panel of experts on the STEM workforce, specifically on workforce shortages in critical technologies, to be presented at this Board meeting.

Gil outlined the committee's activities related to engagement with Congress including activating over 30 tech Chief Executive Officers to send a single letter to congressional leaders calling on Congress to fully fund NSF as authorized by CHIPS, meeting with over a dozen congressional offices and crafting similar messages for an op-ed and several articles. Going forward, EE will pivot from its "seizing the moment" approach, converting authorizations to appropriations, to designing the strategy for the next year to include a focus on the importance of the foundation to the national security of the U.S., innovation, and economic activities. This was followed by several Members offering ideas and examples of ways to facilitate and encourage NSF-funded researchers to share their stories, continued NSF branding, and interactions with industry.

Committee on Science and Engineering Policy (SEP)
Committee Chair Maureen Condic reported that SEP met several times since the August Board meeting and is about halfway through the review and approval of detailed narrative outlines for four of the nine *Indicators* thematic reports. SEP will revisit the suite of *Indicators*-related products in early 2023 to continue making improvements and adding value for key stakeholders regarding S&E policy issues. Condic invited Members to submit ideas and suggestions to structure *Indicators* more effectively for policy-making decisions.

Panchanathan emphasized the importance of "bite-sized consumption making it easier to users to review and use the information. Gil expressed interest in a coupling of *Indicators* data and some EE priorities. Finally, Julia Phillips recommended the "rule of three" suggesting that board messages with complimentary data be communicated at least three times in strategic intervals, rather than once, making them more likely to "sink in". NSB should think about what themes to focus on such as missing millions, international talent, K-12 and Technology, Innovation, and Partnerships and Geography of Innovation for example and hit those frequently and in a coordinated manner along with summaries or stories to compliment and aid the raw data. Condic posed a challenge to all Members to think about how to take a topic such as jobs and come up with three perspectives to communicate from three different angles.

Explorations in STEM K-12 Education (ESKE)
Matt Malkan reported that since the August Board meeting, ESKE met with Dr. James Moore, Assistant Director for NSF's STEM Education directorate to learn about his vision on what NSF and NSB can do together to create change in the K-12 education space. Malkan outlined ESKE's guiding questions over the last year including whether NSB has levers in the K-12 STEM education space and if so, how they can be used to move the needle in a positive direction. Panchanathan offered that there is a lot more that can be done and summarized his recent engagement with Jim Simons of the Simons Foundation regarding Math for America and Noyce Fellowships. ESKE plans to present a list of recommendations to the Board at the February 2023 meeting.

Socioeconomic Status (SES)
Phillips reported that since August the working group's effort to identify available data for socioeconomic status has been challenging. Phillips explained that while graduate students are critically important, the pipeline for graduate students is already constricted compared to the broad pool of potential STEM talent. For now, SEP has chosen to focus on undergraduate students who are a bit further back in the pipeline and for whom the pipeline is not as

constricted. Phillips outlined two requirements in the CHIPS legislation that will provide more information and data to the discussion around the socioeconomic status in STEM, a study to be commissioned by NSF on graduate student funding and data collection requirements on a suite of socioeconomic background indicators, including STEM faculty.

NSB Chair's Closing Remarks

Reed opened the floor to any additional comments and question from Members. There being none, he turned the floor to the Director for his closing remarks to the Open Plenary session.

NSF Director's Closing Remarks

Panchanathan introduced NSF's newest cohort of senior executives:

- Jason Bossie, Deputy Office Head of the Business and Finance Affairs
- Don Millard, Deputy Assistant Director of the Directorate for Engineering
- Dr. Anne Johansen, Division Director, Division of Atmospheric and Geospace Sciences
- Denise Dearing, Division Director for the Division of Integrative Organismal Systems in the Bio Directorate
- Dr. Joan Sereno, Division Director, Behavioral Cognitive Sciences Division, in the Social and Behavioral Sciences Directorate
- Dr. Alan Moore, Division Director, Division of Environmental Biology in the Biosciences Directorate
- Dr. Behrooz Shirazi, Deputy Director, Division of Computer and Network System in the Directorate for Computer and Information Science and Engineering.

STEM Workforce - NSB Panel

Building on prior NSB external panels focused on talent development, this panel featured four experts that examined the stressors, deficits, and gaps in the U.S. STEM talent pool. Panelists were drawn across different critical technology areas with unique workforce needs, namely the defense industrial base (James Moreland, Raytheon Technologies), the semiconductor industry (Falan Yinug, Qualcomm Incorporated), the advanced manufacturing sector (Adele Ratcliff, Department of Defense), and the bioeconomy sector (Catherine Woteki, Iowa State University/University of Virginia). They shared their economic and national security perspectives, sector-specific data including of training and education requirements for their workforce, and possible ways that NSF, bolstered by increased appropriations, can address the talent gap.

NSF Update - Sexual Assault/Harassment and Prevention Response (SAHPR)

NSF COO Office Karen Marrongelle presented an update on NSF's SAHPR Task Force and progress to implement NSF's action plan for Antarctica. The team working to implement the action plan span across the Office of the Director (OD), OECR and OPP. The plan consists of eight components of which she shared implementation highlights including:

- Establishing an agency-wide office to manage NSF's prevention and response activities
- Establishing a 24/7 on-ice advocate
- NSF held seven listening sessions
- Revised screening procedures for contractors and subcontractors to be consistent with those for federal employees
- Established points of contact with all federal and military partners for reporting and monitoring follow-on activities
- Delivery of improved training modules with follow-on communication to reinforce training throughout the season
- Established additional vetting procedures for individuals with key access, additional satellite phones and SAHPR resource contact information provided to field teams and plans to install keyholes in all lodging rooms by the end of the season.
- Established an agency-wide task force of which Marrongelle is the lead. The task force meets weekly and reports to the Director on all aspects of the plan.

Marrongelle then provided a summary of highlights from NSF's listening sessions with the USAP community conducted in late October and early November 2022. NSF, including senior executives from NSF's OPP and OECR, held seven listening sessions at McMurdo Station for the purpose of hearing the community's input on the SAHPR report recommendations and on NSF's plans. The listening sessions conducted to date were voluntary and consisted of about 200 people across the seven listening sessions. Additional listening session will be conducted in mid-December and will include personnel from field sites. Initial observations from NSF staff and Leidos staff, were both positive – personnel were thankful that NSF was taking this issue seriously – and skeptical of the steps taken so far. Marrongelle offered some specifics which included calls for a needed change in culture to that of prevention, how to use the existing and new SAHPR information resources, needed training for managers and PIs around retaliatory behavior, and improved follow-up when incidents occur. Marrongelle reported that these were initial observations and that a more holistic approach to analyze the input would be taken upon the completion of the remaining listening sessions in December.

Upon the conclusion of the presentation, topics of discussion included the importance of a clear and recognized authority or chain of command to implement change and ensure accountability and the need for one adjudicating authority. Members raised the importance of communicating that disciplinary action is part of NSF's action plan, as appropriate and ensuring that messages against sexual assault and harassment include all types of harassment, sexual, ethnic, gender or racial, so as not to diminish other types of harassment.

Office of Science Technology Policy (OSTP), Arati Prabhakar, Director and Assistant to the President for Science and Technology

Reed introduced Dr. Arati Prabhakar who provided a brief introduction to her professional background and reasons for her interest in leading OSTP. The dialogue between Prabhakar and NSB Members focused on the mission and vision of NSF and NSB, how best to work with OSTP to leverage the organizations' collective science and technology expertise for the benefit of the country, and possibilities of culture shift via NSF's new Technology, Innovation, and Partnerships (TIP) directorate.

There being no further business, the meeting was adjourned at 5:00 p.m. EST.

X Andrea Rambow

Andrea I. Rambow

Executive Secretary to the National Science Board