NSB-2023-15
August 15, 2023

APPROVED MINUTES
PLENARY OPEN SESSION
484TH MEETING
NATIONAL SCIENCE BOARD

National Science Foundation (NSF)
In Person and Via Videoconference
May 9 - 10, 2023

Members Present:

Dan Reed, *NSB Chair*
Victor McCrary, *NSB Vice Chair*
Sudarsanam Babu
Deborah Ball
Roger Beachy
Dorota Grejner-Brzezinska
Vicki Chandler
Maureen Condic
Aaron Dominguez
Suresh Garimella
Melvyn Huff
Steven Leath
Matthew Malkan
Julia Phillips
Marvi Ann Matos Rodriguez
Scott Stanley
Keivan Stassun
S. Alan Stern
Merlin Theodore
Stephen Willard
Wanda Ward
Bevlee Watford
Heather Wilson

Sethuraman Panchanathan, *ex officio*

Members Absent:

Darío Gil

There being a quorum, the National Science Board (NSB, Board) convened in Open Plenary Session at 8:30 a.m. EDT on Tuesday, May 9, 2023, in person and via videoconference with NSB Chair, Dan Reed, presiding.

NSB Chair's Open Remarks

Reed welcomed Board Members, staff, and guests to NSB's 484th meeting and provided an overview of the agenda, a Board office staff update, and description of the Chair's activities since the February 2023 meeting including testifying jointly with the Director before the House Science Space and Technology Committee in April.

NSF Director's Remarks

Director's Engagement and Activities

The Director presented highlights of his/NSF's many Congressional engagements and other events including an event to launch the 2024 President's budget request, and a series of testimonies before Senate and House Commerce, Justice, Science appropriations and authorizing committees. The Director also participated in roundtables and visits to NSF-funded sites to meet with students, faculty, representatives of industry, and elected officials in Washington, New York, Missouri, Rhode Island, and California. Lastly, he provided some examples of international engagements with representatives of Australia and Ireland.

Programmatic Highlights

The Director highlighted examples of NSF programmatic events and activities in alignment with NSF's three strategic pillars and priorities of the Administration - strengthening established NSF (AI Institute awards), inspiring Missing Millions (EPSCoR awards) and accelerating technology and innovation (Technology, Innovation, and Partnerships/TIP awards, EPIIC- Enabling Partnerships to Increase Innovation Capacity awards, and the NobleReach Emerge Partnership).

Panchanathan further described the Technology, Innovation, and Partnerships (TIP) as a cross-cutting directorate with a symbiotic relationship with all other NSF directorates both energizing and leveraging all NSF programs and efforts. He referred to the Regional Innovation Engine program as the capstone of all TIP programs that brings academia, industry, government, and communities together to advance innovation. He reminded Members that by February 2023, the TIP program had received 700 concept papers from all 50 states demonstrating innovation everywhere. He noted that the day after this Board meeting, NSF would announce its Engines Development Type-1 awards covering more than 40 states.

NSF Leadership and Waterman Awardees

In April, NSF was named the second-best place to work among the Federal government's mid-sized agencies and recognized the strength of NSF's leadership team. He concluded his remarks by recognizing the three 2023 Alan T. Waterman award winners.

Executive Staff updates

Panchanathan introduced four new NSF Executives, including Angel Williams, General Counsel, Quadira Dantro, Division Director of the Office of Budget, Finance and Award (BFA) Management's Division of Institution and Award Support, Charlean Thompson, Deputy Division Director in BFA's Division of Acquisition and Cooperative Support, and finally Bernice Smith, Deputy Division Director in the Directorate for Biological Sciences' Division of Environmental Biology. Panchanathan concluded his remarks by acknowledging the passing of Dr. Kelly Craig-

Henderson, former Assistant Director of the Directorate for Social, Behavioral and Economic Sciences and her many contributions to NSF.

Approval of Prior Open Meeting Minutes

Reed presented the minutes of the February 2023, Open Plenary session for approval. The minutes were approved as presented.

NCSES – Briefing of Diversity and STEM: Women, Minorities and Persons with Disabilities Report and Response from CEOSE

Maureen Condic introduced the session noting that NSF through NCSES is mandated by the *Science and Engineering Equal Opportunities Act* to publish a report every two years that specifically addresses the current state of diversity in STEM employment and science and engineering education. She emphasized the importance of the National Center for Science and Engineering Statistics (NCSES) data and the reliance on them as the gold standard of data driving policymaking. She noted this session would be crucial to the grounding of NSB's efforts to address the Missing Millions and development of a robust and diverse domestic STEM workforce.

NCSES Briefing and CEOSE Response

Rivers provided a brief description of NSCES' work and this recently released (2023) report, and explained that the new title, *Diversity and STEM* (formerly titled, *The Diversity and STEM, Women, Minorities and Persons with Disabilities*) reflects a broader understanding of the STEM workforce and now includes workers who do not have a four-year degree. She added, the report represents the most comprehensive collection of federal data on the participation of underrepresented groups in science and engineering and includes data from NCSES, the Federal Statistical System Agencies of the U.S. Census Bureau, and the National Center for Education Statistics. Amy Burke, NCSES Program Director for Science, Technology, and Innovation Analysis, proceeded with the presentation using slides and graphics to illustrate a sample of report findings that she offered could inform the Board's efforts related to Missing Millions.

Jose Fuentes, Chair of the Committee on Equal Opportunity in Science and Engineering (CEOSE) was invited to respond to NCSES' presentation. He outlined how CEOSE uses the data, both snapshots and trends in demographic statistics, to determine progress of broadening participation in science and engineering and formulate recommendations for CEOSE biannual reports. He highlighted the need for disaggregated data sets and to learn how to work with very small data sets, as well as to increase the data visualization and the data display.

Members engaged in a robust question and answer session with Rivers and Burke aimed at understanding the strengths and limitations of the data presented.

Committee Report

COMMITTEE ON NATIONAL SCIENCE AND ENGINEERING POLICY (SEP)

Chair of SEP, Maureen Condic reported on the Committee's work on *Indicators 2024* including reviewing the detailed narrative outline, "*Public Perceptions, Awareness, and Information Sources*" and draft reports. Condic previewed the remaining work ahead for this *Indicators* cycle calling special attention to the outline of the statutory deliverable, *The State of U.S. Science and Engineering*, and encouraged all Board members to review the outline and the draft report. She added that this work would enable NSB to maximize *Indicators* relevance and utility to policymakers in Congress and the White House, in addition to other major audiences.

Policy Work/Talent Development and National Security Teams

Condic reported that SEP would launch two policy working groups later this month – the Talent Development Team and the National Security Team. The two groups will collate Board work and interest around their respective topics and scope out 2-3 relevant policy-neutral or policy-forward topics. Julia Phillips agreed to steer the Talent Development Team and members include Victor McCrary, Suresh Babu, Bevlee Watford, Marvi Ann Matos Rodríguez, and Keivan Stassun. Marvi Ann Matos Rodríguez agreed to lead the National Security Team and include members Phillips and Suresh Babu. Following the work of the teams to identify policy topics, implementation teams will be established to take up topics of interest to SEP, pull from *Indicators* data, and produce products from now until May 2024.

Quadrennial Science and Technology Review

SEP members have been considering potential Board inputs into the Office of Science Technology Policy's (OSTP) Quadrennial Science and Technology Review, or QSTR, as required in the *CHIPS and Science Act*. The first QSTR is due at the end of this calendar year. SEP recognizes this as a major opportunity and explicit charge for the NSB to provide recommendations for the U.S. science and technology enterprise. She referred Members to a draft background document in the NSB digital board book containing potential Board contributions, drawn from *Indicators* and recent Board publications. Condic noted that four of the twelve statutory topic areas are particularly strong opportunities for Board input –

1. assessing global competition in science and technology, and identifying potential threats to U.S. leadership (topic #4),
2. STEM workforce (topic #5),
3. improving regional innovation across the U.S. (topic #6), and
4. the infrastructure and tools needed to maintain U.S. leadership and address societal and national challenges (topic #11).

SEP discussion around the QSTR has focused on generating ideas for additional Board inputs beyond the background material in the board book. Key highlights include STEM talent as a foundational issue that crosses all four topic areas, with keen interest on addressing the Missing Millions and challenges at the K-12 level as well as including the instructional workforce, the close relationship between items topics #6 and #11, opportunities to advance policy recommendations that could address both, and opportunities to elevate the Board's discussions on major facilities.

The Talent Development Team will be synthesizing messages and incubating new ideas which are anticipated to align well with the Quadrennial Review's workforce development topic (#2). Additional effort on the other three items will involve outreach to relevant Board members and committees as materials are developed, largely to synthesize and amplify Board messages that can be carried forward into a national science and technology strategy. Condic concluded her report by inviting Members to share their perspectives on top strategic needs and priorities for the U.S.

Q & A with 2023 Vannevar Bush, NSB Science and Society and, Alan T. Waterman Awardees

Dorota Grejner-Brzezinska congratulated all the award winners and introduced the Vannevar Bush award winner, Dr. Richard Garwin, the two NSB's Science and Society award winners – Engineer Girl (Dr. Simil Raghava accepting) and the New York Hall of Science (Dr. Margaret Honey accepting), and the three Alan T. Waterman award winners – Dr. Natalie King, Dr. Asegun Henry, and Dr. Bill Anderegg. Each award winner presented a brief personal background and description of their work followed by a question-and-answer session with Board Members.

NSF Update – Sexual Assault and Harassment Prevention Report

NSF Chief Operating Officer (COO) Karen Marrongelle outlined NSF's guiding principles including the need for NSF to be a model for teamwork, fairness, and equity. She added that NSF's investment in science, technology, engineering and education necessitates a safe environment free from harassment and a commitment to creating a safe and inclusive research environment.

Helpline

On April 10, 2023, NSF launched its U.S. Antarctic Helpline, a live confidential crisis support line to the U.S. Antarctic Program (USAP) community, available to all stations in Antarctica and on both research vessels. NSF will receive regular usage statistics from the helpline vendor. This resource is in addition to the on-ice victim advocate, the counselor, the chaplain, and the marshal. Information about the helpline was communicated to the USAP community via an announcement from the Director, and tailored support messages to the USAP Executive Management Board and to all participants at USAP stations and vessels, press releases, social media postings, ads in NSF newsletters, and notices on NSF and USAP websites for stations and vessels. To date, NSF has received 33 allegations via the helpline. The helpline only relays basic usage rates to NSF, such as number of calls, chats and wait times. People who answer the helpline are prepared with information about all SAPHR resources available in

USAP but there is no mechanism to connect a caller to the on-ice advocate. NSF intends to extend the helpline to all of NSF but at this time the contract for the helpline is limited to the Antarctic and NSF must first understand how it would complement work that is ongoing in other locations. Stassun asked whether there are currently any NSF-supported facilities where there is currently no resource like this (the Helpline) or its equivalent. Linnea Avallone, Chief Officer for Research Facilities, added that there is currently no NSF-funded major facility that does not have some type of resources for its staff and the people who work there.

Climate Survey

This summer NSF will launch its first ever USAP climate survey allowing NSF to establish a baseline of data on incidence of sexual assault and all forms of harassment and to begin to monitor the culture and environment in Antarctica. NSF is planning to conduct this survey annually which will allow NSF to do annual trend analysis. NSF does not conduct climate surveys at other NSF-funded facilities, but more than half the managing organizations do. NSF is currently tabulating summary level information from those surveys. NSB Member Julia Phillips expressed concern about a contractor conducting surveys who may not be aligned with NSF on this issue, as in the Antarctic for example or how contractors' surveys might skew results or participation rates.

New Actions – 2022/2023

After the issuance of the Sexual Assault and Harassment Prevention Report in August 2022, NSF developed and implemented an 8-point action plan. During this session, Marrongelle outlined the new actions NSF plans to take this upcoming season and beyond, building on the original 8-point action plan, including broadening action to other research environments. The action plan includes developing a communications plan for the coming year, including improving channels of communication, continuing to emphasize prevention and training activities, continuing to ensure the presence of the victim's advocate, exploring expanding the victim's advocate at sites beyond McMurdo Station, and evaluating command options and opportunities for an expanded NSF presence in Antarctica having already dedicated full time equivalents to that effort.

Highlights of Recent Activities by the SAHPR Program Office

NSF established the SAHPR office in 2022 with a goal of handling all reports consistently and transparently, with equity, fairness, timeliness, and due process. The SAHPR incident review Team, within the SAHPR office, monitors every report it receives, assigns unique case identifiers allowing for follow up with the contractor, and has made progress on developing a case management system. NSF now has points of contact with all federal and military partners for reporting and monitoring follow-up activities and is evaluating how the award terms and conditions in cooperative agreements could be modified noting this will require extensive outreach and coordination with the academic community which NSF is teeing up to do. NSF has already put into place enhanced contracting requirements with contractors related to sexual assault and harassment prevention and response.

SAHPR Pilots

NSF will assess which SAHPR pilots such as the helpline and the climate survey, can be used in other settings, outside USAP and in the broader community.

Session 2 **(May 10, 2023, 8:31 – 9:12 a.m. EDT)**

There being a quorum, the National Science Board (NSB, Board) convened in Open Plenary Session at 8:30 a.m. EDT on Wednesday, May 10, 2023, in person and via videoconference with NSB Chair, Dan Reed, presiding. Members Suresh Garimella and Darío Gil were not present.

NSB Chair's Opening Remarks

Reed previewed the day's agenda and introduced the Inspector General and the next agenda item.

NSF Office of Inspector General, Report

Inspector General (IG) Allison Lerner gave an overview of the roles and responsibilities of the NSF Office of Inspector General (OIG) and noted the shared passion between OIG and NSB – curiosity and the best stewardship possible of NSF funds.

IG Authority, Reporting and Role

The IG Act of 1978 first established IGs across the federal government and today there are 74. About half of all IGs are appointed by the President and rest are appointed by agency heads. The NSF IG is appointed by the NSF agency head, which in her case is the NSB. The NSB also has the authority to remove the IG. All IGs report to the head of the agency they oversee and to Congress.

OIGs are independent agencies, nonpartisan, and responsible for oversight. Different from other oversight bodies - Congress and the Government Accountability Office – the NSF IG is internal to the Foundation resulting in a deeper understanding of NSF's work. The OIG, by statute, is required to work to prevent fraud, waste, and abuse and promote economy and efficiency in the programs and operations of the agencies they oversee. OIGs have access to all agency records and information as well as to the records of those who receive funds from NSF including contractors and grant awardees. IG's have subpoena power.

OIG reports, including semi-annual reports, are submitted to Congress, the agency they oversee, and are posted to their public websites. In the case of the NSF OIG, the NSB also approves the semi-annual report for submission to Congress. All OIGs are also subject to an external peer review every three years and results are posted to their websites.

Organization

The NSF OIG includes an Office of Audits and Office of Investigations, both supported by the Office of Management and Office of Council.

IG Budget and Level of Effort

NSF OIG budget requests are first submitted to the NSB Committee on Oversight, then to the full board and finally to the Office of Management and Budget. The NSF OIG's funding is about 2% of NSF's overall budget.

OIG Impact
NSF makes about 40,000 awards a year across 2,000 institutions. NSF OIG, with its current resources, audits about 20 entities a year. To amplify its impact, NSF OIG conducts robust outreach with the research community, including producing bimonthly articles in a publication known to be widely read by research administrators with information about what can be done to prevent fraud and mismanagement of funds.

Audit Work
Real impacts are a result of the OIG's body of work rather than a single audit. The Office of Audit directs its internal efforts at NSF's programs and processes, and externally at grant recipients and use of funds. Their most impactful internal audit work is of major facilities, Intergovernmental Personnel Act programs, and NSF's response to SAHPR. NSF OIG is beginning to review the new public/private sector projects of the new TIP directorate, IUCRC or the Industry University Cooperative Research Centers Program.

The OIG develops audit plans each year based on input from NSF and NSB and they use data analytics to determine risk. For example, auditors review the general ledgers of institutions and apply indicators of risk to identify risky transactions to focus their work. They also get requests to audit programs or institutions by Congress.

Investigative Work
The Office of Investigations is three-pronged. The Division of Public Integrity is led by a criminal investigator and focuses on criminal and civil wrongdoing including false statements and claims made by NSF grant recipients. The Research Integrity and Administrative Investigations group is led by investigative scientists responsible for conducting investigation into research misconduct, fabrication, falsification, and plagiarism. Both groups are supported by a third group of investigative attorneys. Investigative work is initiated based on complaints received via the OIG hotline.

Because investigations can take years to come to conclusion, as soon as the OIG has sufficient evidence that NSF funds are at risk, the OIG makes administrative recommendations to NSF to protect those funds such as suspension or termination of an award, and even government-wide suspension or debarment. When there is evidence of wrongdoing, NSF OIG collaborates with other law enforcement entities focused on fraud and other areas unique to the research community. In response to a question about the process for investigating a less experienced Principal Investigator (PI) making an error on a grant application, for example, the IG assured Members that the OIG is not looking for mistakes and when the OIG receives an allegation of a possible problem, investigators conduct their due diligence quietly as they try to determine whether the error was a mistake or reflects more intentional misbehavior.

Condic asked of the 14 referrals the OIG made to the Department of Justice for criminal prosecution last year, how many were moved forward to actual prosecutions. The IG responded that not all referrals are accepted and for various reasons including not being meritorious or because DOJ may not have the resources.

Other products

Over the last several years, the OIG began compiling management issues across NSF-funded projects to help improve NSF programs more broadly, for example a capstone report on the EPSCoR program, the *Law Enforcement Perspectives in Antarctica,* and the *Promising Practices Report,* a compilation of good practices identified in financial audits. The NSF OIG surveyed other OIGs for lessons learned on the use of "Other Transaction Authority" which is an authority that TIP has. The OIG is currently in the process of developing a piece on reporting and responding to sexual harassment. Suresh Babu asked whether the OIG has best practices on how to manage risks associated with international collaborations. The IG responded that currently her office does not and added it would be a good idea to produce such a piece. The OIG works closely with NSF's Chief of Research Security Strategy and Policy.

Session 3 **(May 10, 2023, 10:40 a.m. to 1:54 p.m. EDT)**

There being a quorum, the National Science Board (NSB, Board) convened in Open Plenary Session at 10:40 a.m. EDT on Wednesday, May 10, 2023, in person and via videoconference with NSB Chair, Dan Reed, presiding. Members Suresh Garimella and Darío Gil were not present.

Committee/Commission Reports

COMMITTEE ON EXTERNAL ENGAGEMENT (EE)

Committee Vice Chair Heather Wilson reported that EE met on April 21, 2023 to discuss how NSB can advance domestic STEM talent. Discussion was focused on the U.S.'s heavy reliance on foreign talent and vulnerabilities stemming from a reduction of the number of foreign students coming to the U.S. EE Members also discussed how to identify NSF-funded initiatives with a high return on investment. Members also discussed a draft strategy for fiscal year 2024 on STEM talent including actions to raise awareness of the significance of the challenge. Members noted the importance of drawing from and aligning with the Board's work on *Indicators 2024* being released in the fall. Condic added that these forthcoming *Indicators* reports will be related to STEM talent and encouraged Members to explore the best way to use the data to advance this issue.

Discussion of ideas and challenges

Following the report, Board Members engaged in discussion around how to craft a strategy and nuanced near and long-term message welcoming international students while simultaneously encouraging and creating pathways aimed at growing domestic STEM talent. Some of the ideas included creating partnerships with state actors and exploring the use of block grants. Other ideas included demonstrating what works by identifying NSF-funded programs with a high return on investment and strengthening the STEM talent message by linking *Indicators* data and other data that demonstrate systemic factors at play. Finally, Members suggested finding ways to communicate information about STEM jobs and possibilities through university networks working in public schools and joining forces with other federal agencies such as Department of Defense and NASA who also have STEM talent development programs.

Some of the challenges raised by Members included the need for data that would allow for the identification of initiatives with a high rate of return, crafting a message that universally resonates with populations and elected officials across the country and one that links success to education, and finally, NSF's ability to scale its efforts due to budgetary constraints despite being *the* STEM talent agency.

New Tools

Julia Phillips encouraged Board members to speak with Charles Barber, NSF's Chief Diversity and Inclusion Officer who has in-depth experience in this space. Barber was invited to talk about a data model his office is working on mapping federal civilian occupational specialties, including STEM specialties, to a civilian analog with data provided by the Census Bureau, Bureau of Labor Statistics, and the Department of Labor. This model includes a predictive analytic tool designed to help NSF understand how long it will take to close the gap for each occupational specialty. Barber explained that NSF has shared this model with NASA, National Institutes of Health, the Smithsonian, and the Department of Energy and the Office of Management and Budget (OMB). He concluded by adding that OMB is now is considering scaling this tool across the entire Federal government.

Upcoming opportunities

Victory McCrary requested that a future Board meeting include a briefing from NSF's Office of International Science and Engineering to help the Board understand where NSF has partnerships and where the gaps are. Condic reminded Members that NSB's participation in OSTP's Quadrennial Review will be a good opportunity to demonstrate NSF as a model in the space of talent development.

COMMITTEE ON OVERSIGHT (CO)

Chair Stephen Willard reported out on the Committee's March and April 2023 meetings.

March 2023 CO meeting

During the March CO meeting, Members discussed the fiscal year (FY) 2021 Merit Review Digest with Alicia Knoedler and Erica Rissi of the Office of Integrative Activity (OIA). Members learned about how the pandemic impacted the FY21 results and how NSF pivoted in response. The committee also explored the slightly lower funding rate in FY21 as compared to FY20, 28% down to 26%. Members also discussed the differences in both proposal and funding rates for different groups of researchers. NSF, OIA, and the NSB continue to focus on the need for and availability of data when making decisions. Rissi indicated her office had instituted new ways to track demographic data. CO looks forward to the implementation of those data sets into NSF reports and oversight material.

April 2023 CO meeting

Merit Review Digest

During the April meeting, CO Members were again joined by Rissi and Knoedler and continued the discussion on the Merit Review Digest, and CO Members approved the Overview to the Digest (included in the May NSB Meeting Board book). The Overview takes stock of certain changes in the numbers of proposals and awards during the pandemic and notes NSF made several changes to its merit review process last year to reduce burden on proposal submitters. In

support of the Board's focus of talent development, the Overview urges the collection of actual expenditures on participants in funded research awards. Collectively, CO Members, Rissi and Knoedler continued their discussion of the Merit Review Digest, and of ways to disseminate it and the accompanying NSB Overview most effectively. CO decided to continue to keep the Overview and Digest together.

OIG Semiannual Report (SAR)
During the second half of the April CO meeting, Assistant Inspector General for Audits, Mark Bell and Chief of Staff, Lisa Vonder Haar presented a summary of the OIG's SAR, information salient to the Committee's review of the SAR, and context for the information and tables that are prominently addressed throughout the document. CO recently received the Spring 2023 draft SAR which will be shared with the full Board shortly. Willard also called the Board's attention to the Chief Financial Officer's report in the board book for Member's situational awareness and noted that it would be the subject of a future CO meeting.

Motion to Adopt the Merit Review Digest Overview and full Board Vote
Willard made a motion that the board adopt the Merit Review Digest Overview which was seconded by McCrary. Reed asked Members if they desired any discussion or had questions about the overview and hearing none, he asked Members to vote. The vote to adopt the Merit Review Digest Overview was passed with one abstention.

NSB-NSF MERIT REVIEW COMMISSION (MRX)
Chair Willard outlined the MRX charge and provided a brief overview of accomplishments since the February Board meeting including establishing leadership and membership of the commission.

In March, MRX and NSB staff led a listening session at the annual summit of the Center for Advancing Research Impact in Society (ARIS) in Baltimore, Maryland. Highlights of the information gathered at the summit included the importance of accountability, the integration of community partners in the process from project development to evaluation, and the challenges of institutional buy-in with respect to Broadening Impacts (BI) and how if the institutions do not incentivize and reward good BI, PIs will not prioritize it. He noted the leadership role and opportunity that funding agencies can play in recognizing and incentivizing good BI.

In April, MRX met to discuss the Commission's workplan and timeline. The Commission plans to collect data through surveys and interviews and will analyze proposals, annual and final reports, and Committee on Visitors reports to assess trends in proposed, reviewed, awarded criteria, and related pilot studies. The Commission anticipates delivering a summary of initial findings and preliminary policy recommendations to the board at the November 2023 Board meeting and final recommendations by May 2024. The Commission also aims to develop implementation and accountability guidance. Going forward, the Commission will hold biweekly virtual meetings and quarterly in person meetings.

Ward gave a summary of the discussion at the Commission's February meeting. In her summary she described the three phases of the review, starting with understanding and assessing the NSB policy that lays the groundwork of the merit review process. The second phase will entail

working through implementation of the policy and the last phase is about accountability – how we know the policies are successful in fulfilling NSF's statutory mission, NSB's *Vision 2023* and NSF's 2022-2026 strategic plan. Ward then gave an overview of the merit review criteria, elements, and principles of the merit review process and shared many of the discussion questions.

Ward pivoted and asked the full Board – How is potential to advance knowledge different from potential to benefit society? Feedback and suggestions from Members included a suggestion to speak with other federal agencies about their merit review process, suggestions to use artificial intelligence tools to review proposals and other data for potential biases beneath the data, understanding what good and bad BI is, and being able to compare proposals that were awarded with proposals that were not awarded. One Member offered that IM criteria is subservient to BI criteria because one of the desired societal outcomes would be an advance in knowledge, but only one. Ward concluded her report saying that it was clear from the February MRX meeting, that the written policy may currently be confusing and may benefit from a revision to improve it.

Stassun emphasized the importance of the merit review reexamination activity and how it is the mechanism by which ideas, projects, and activities are selected and supported. Willard ended the MRX report by inviting Members to attend MRX meeting when possible.

Working Group Reports

SOCIOECONOMIC STATUS WORKING GROUP (SES)

Working Group Lead, Julia Phillips began her report with a summary of the background of the working group and how over the last year, SES members and staff worked to identify priority areas, assess relevant data landscapes, and articulate opportunities for Board action. She thanked Reed and Condic who chaired the initial launch of the group last winter and thanked members Suresh Babu, Maureen Condic, Matt Malkan, and Steve Willard for joining the effort and NSBO staff member Amanda Vernon for her support. She also recognized former NSB member Arthur Bienenstock for his advocacy for those from low SES backgrounds and how his thoughtful analyses of the issues at play were instrumental in bringing the Board's attention to this challenge.

Phillips summarized the major activities the working group undertook which included developing a white paper on financial barriers facing graduate students from low-socioeconomic status backgrounds. She added that these efforts gave the Working Group considerable insight into opportunities the Board has for greater inclusion in STEM of those from low-socioeconomic status backgrounds and referred to a more detailed account in the Board book.

SES working group concluded:

- Lack of access to and persistence in higher education for those of low-socioeconomic status backgrounds is a major concern for developing a robust STEM workforce.
- the NSB should be committed to increasing the participation of those from low-socioeconomic status backgrounds in STEM.

- access to STEM for those of low socioeconomic status is both a concern in and of itself and an issue that cuts across other Board priorities, especially expanding the Geography of Innovation and addressing the Missing Millions
- As the Board has increasingly focused on the urgent issue of developing STEM talent, the SES working group felt this was an opportune time to bring options to the Board and its committees for considering or addressing SES issues in broader STEM talent efforts.

Phillips then outlined the suggested next steps to be carried forward by the following standing NSB committees and emphasized that the recommendations are intended to fit within existing committee priorities and activities and designed to augment rather than add new issues. This was also an effort to apply the SES lens across board efforts because it crosses so many issues and has come up repeatedly in Board Member discussions.

- SEP
    - Highlight socioeconomic status-related data and analysis in *Science & Engineering Indicators* in current and future cycles, especially with a geography lens when the data make it possible to do so. Where there are major gaps in available data, explore opportunities for NCSES surveys to fill these gaps.
    - Examine institutional issues preventing increases in STEM graduate student stipends and other financial barriers to low SES participation in graduate study across the Federal landscape and advocate for solutions and collective action at the Federal level.
    - Incorporate analyses of STEM pathways for those of low socioeconomic status into the overall body of work undertaken by SEP's new "Talent Development Team."
- EE:
    - Incorporate challenges and solutions related to socioeconomic status when engaging stakeholders on STEM talent development and STEM careers. One potential focal point is the urgent need to expand access to college and attract STEM graduate students – as was described in Dan's recent testimony to the House Science, Space, and Technology Committee.

- Committee on Strategy:
    - Consider adequacy of graduate student stipend levels when assessing NSF strategy on STEM talent development. Doing so effectively may require enhanced administrative data collection and reporting on graduate students that NSF funds.

- CO:
    - Consider effectiveness and impact of NSF programs directly related to recruiting and retaining low-socioeconomic status individuals in STEM education, training, and careers.

And finally, SES suggests that the Board as a whole pursue opportunities for increasing participation of low-socioeconomic status individuals in STEM, potentially including fostering discussions with OSTP on the need to increase minimum stipends across Federal agencies.

Several Members offered suggestions as it relates to SES including the importance of analyzing the intersectionality of race and societal class, understanding the legal environment and changes occurring with respect to underrepresented minorities, and considering the perspectives of rural populations. Ward recommended reviewing existing work from professional associations such as AAAS who have traditionally examined this issue among multi-sector stakeholders. Ward recommended a report that examined tradeoffs in terms of which criteria one would use in discussion about the legal scrutiny of using one group or indicator as opposed to another. ("Losing Ground: Science and Engineering Graduate Education of Black and Hispanic Americans", Malcom, Shirley M.; Virginia V. Van Horne; Catherine D. Gaddy; Yolanda S. George, 28 June 2013)

EXPLORATIONS IN STEM K-12 EDUCATION (ESKE)

Working Group Lead Matt Malkan reported that since the February meeting, ESKE Members scored the 14 recommendations presented at the February meeting to narrow down the number of recommendations and categorize them into internal – things that could be done by NSF- and external – things that could be done possibly by other or with partners, federal or private.

Ward presented the four categories areas: 1) instructional workforce (teacher training, professional development, curriculum content, and access to best practices), 2) translation of NSF research into classrooms (STEM content created specifically to the Pre-K grade); 3) lack of accessibility (impoverished schools, getting fewer teachers, and tutoring disparities based on socio-economic status); 4) accountability (the need for data, evidence-based decisions, data assessments for all parts of STEM and standards). She noted that the four topical areas align well with the NSB's *Vision 2023,* the *CHIPS and Science Act,* and OSTP's Quadrennial Review. Ward offered that ESKE could develop a final report, similar to the final SES report, with recommendations for other standing NSB committees to carry forward.

Generally, Members were in favor of a final report that would help focus and contextualize the four categories for an organized approach for the path forward. One Member suggested that the categories include measurable and specific objectives, venues of implementation, and specific agencies or departments with the control to make implementation possible.

There being no further business, the meeting was adjourned at 1:54 p.m. EDT.

X

Andrea I. Rambow

Andrea I. Rambow
Executive Secretary to the National Science Board