

**APPROVED MINUTES¹
OPEN SESSION
435TH MEETING
NATIONAL SCIENCE BOARD**

National Science Foundation
Arlington, Virginia
February 26, 2014

Members Present

Dan E. Arvizu, Chairman
Kelvin K. Droegemeier, Vice Chairman
Arthur Bienenstock
Ray M. Bowen
Vinton G. Cerf
Ruth David
G. Peter Lepage
Alan I. Leshner
W. Carl Lineberger
Stephen Mayo
Douglas D. Randall
Anneila I. Sargent
Diane L. Souvaine
Arnold F. Stancell
Maria T. Zuber

Members Absent

Deborah L. Ball
Bonnie L. Bassler
France A. Córdova
Inez Fung
Esin Gulari
G.P. “Bud” Peterson
Geraldine Richmond
Claude M. Steele
Robert J. Zimmer

Cora Marrett, *ex officio*

¹ The minutes of the 435th meeting were approved by the Board at the May 2014 meeting.

The National Science Board (Board, NSB) convened in Open Session at 1:35 p.m. on Wednesday, February 26, 2014 with Dr. Dan Arvizu, Chairman, presiding (Agenda NSB-14-5, Board Book page 226). In accordance with the Government in the Sunshine Act, this portion of the meeting was open to the public.

AGENDA ITEM 10: Approval of Open Session Minutes, November 2013

The Board unanimously APPROVED the Open Session minutes of the November 2013 (NSB-13-58, Board Book page 264).

AGENDA ITEM 11: Chairman's Report

In the Chairman's Introduction and during the Chairman's Report, Dr. Arvizu announced and reported on several items.

a. 2014 Science and Engineering Indicators and Digest

The Chairman reported that the 2014 *Science and Engineering Indicators* and Digest were officially released on February 6, 2014. He thanked Dr. Ray Bowen, chairman of the Committee on Science and Engineering Indicators (SEI), and the staff involved with that successful effort. (See page 6)

b. Committee Announcements

Dr. Arvizu reported that during Plenary Executive Closed Session, Board Members were elected to the *ad hoc* Committee on Nominating for NSB Elections (NOMCOM), otherwise known as the Elections Committee. Members of the committee are: Drs. Bonnie Bassler, Ray Bowen, Vinten Cerf, and Douglas Randall. The Chairman asked Dr. Randall to lead this *ad hoc* committee.

Dr. Arvizu discharged the *ad hoc* Committee on Nominations for the NSB Class of 2014 – 2020 (NOMS), with thanks to Dr. Kelvin Droegemeier, who served as chairman; committee members Drs. Bonnie Bassler, Ray Bowen, Ruth David, Carl Lineberger, Douglas Randall, Anneila Sargent, and Arnold Stancell; as well as Mr. Brandon Powell who served as Executive Secretary.

c. Board Member Recognition

The Chairman announced that Dr. Geraldine Richmond was chosen to serve as President-elect of the American Association for the Advancement of Science (AAAS), the world's largest general scientific society. She began her 3-year term on February 19, 2014 at the 180th Annual Meeting of AAAS in Chicago. Dr. Richmond is the Presidential Chair and Professor of Chemistry at the University of Oregon.

He also indicated that the Royal Swedish Academy of Sciences will award the 2014 Crafoord Prize in Geosciences to Dr. Peter Molnar of the University of Colorado for his ground-breaking contribution to the understanding of global tectonics. Dr. Molnar has worked collaboratively with Board Member, Dr. Inez Fung, who is Professor of Atmospheric Science at the University of California, Berkeley.

Dr. Drogemeier, Vice Chairman, announced that Dr. Arvizu was elected to membership in the National Academy of Engineering, one of the highest professional honors accorded to an engineer. He was cited by the Academy for his leadership in the renewable and clean energy sectors, and for promoting national balanced energy policies. Dr. Arvizu is the Director of the Energy Department's National Renewable Energy Laboratory (NREL).

d. Board Office Staff

Dr. Arvizu welcomed back Ms. Kim Silverman, a Science Policy Analyst with the Board Office, who returned from working on Capitol Hill on a Brookings Institute Congressional Fellowship for the past year.

e. Webcast of Board Meeting

The November 2013 Board meeting was Webcast and simultaneously available to viewers through the Internet. The Webcast included the Plenary Open Session of the full Board as well as the Open Sessions of its committees. Available from the NSB and NSF Web sites: <http://www.tvworldwide.com/events/nsf/140225/>.

AGENDA ITEM 12: Director's Report

Dr. Cora Marrett, Acting NSF Director, reported on the following items:

a. NSF Staff Introductions

Dr. Sambasiva Kosaraju, Division Director, Division of Computing and Communication Foundations (CCF), Directorate for Computer and Information Science and Engineering (CISE), joined NSF on January 2, 2014. Dr. Kosaraju came to NSF from Johns Hopkins University where he was the Edward J. Schaefer Professor of Computer Science and Department Chair for Computer Science. He is a Fellow of the Association for Computing Machinery and the Institute of Electrical and Electronics Engineers. Dr. Kosaraju received his Ph.D. from the University of Pennsylvania.

Ms. Mercedes Eugenia, Division Director, Division of Administrative Services (DAS), Office of Information and Resource Management (OIRM), joined NSF on January 27, 2014. Ms. Eugenia transferred to NSF from the Department of State, Agency for International Development, where she has held several executive and managerial positions, most recently as Director of the Office of Management Services, Headquarters. Ms. Eugenia holds a Master's Degree in Business Administration from Loyola College, Baltimore.

Dr. Michael Vogelius, Division Director, Division of Mathematical Sciences (DMS), Directorate for Mathematical and Physical Sciences (MPS), also joined NSF on January 27, 2014. Dr. Vogelius came to NSF from Rutgers University where he served as Chair, Department of Mathematics and Professor of Mathematics. Dr. Vogelius received his Ph.D. from the University of Maryland.

Ms. Jolaina Jeff-Cartier, Labor Relations Officer, joined NSF on September 13, 2013. Ms. Jeff-Cartier came to NSF from the Department of Transportation, Office of the Secretary, where she served as the Program Manager of Labor and Employee Relations. Prior positions included those at the Office of Collective Bargaining, Federal Aviation Administration, where she was responsible for union contract negotiations and at the University Hospital in Cincinnati, Ohio, where she served as the Director of Human Resources. Ms. Jeff-Cartier holds a Master's Degree in Human Resources and Bachelor's Degree in Psychology from the University of Cincinnati.

b. NSF Staff Retirements

Dr. Joann Roskoski, Deputy Assistant Director (AD), Directorate for Biological Sciences (BIO), would retire from NSF on March 31, 2013 after 25 years of service to NSF. Dr. Roskoski had a record of sustained excellence in her contributions to NSF. She was a key program and management strategist and innovator. Her expertise was instrumental in formulating a research investment agenda within NSF, and she played a significant role in advising cross-agency discussions through the Office of Science and Technology Policy (OSTP) and the National Science and Technology Council (NSTC). Dr. Marrett stated that Dr. Roskoski leadership and knowledge were greatly appreciated.

Also on March 31, 2014, Dr. Kesh Narayanan, Deputy AD, Directorate for Engineering (ENG), would retire after 20 years of service to NSF. Dr. Narayan joined NSF in 1994 and was a visionary leader, seeking continual improvements in the mechanisms by which Federal agencies can enhance innovation and economic development. Dr. Marrett commented that his performance had been exemplary and that NSF owes him a debt of gratitude for his exceptional leadership.

c. Graduate Research Fellowship (GRF) Program Virtual Panels

NSF conducted the review of the FY 2014 GRF through virtual panels held during January and February 2014. More than 13,500 applications were reviewed involving over 1,300 panelists. This review was accomplished by the efforts of program offices, administrative and technical staff, and science assistants; and was a model for effective cross-NSF teamwork.

Dr. Marrett acknowledged and publicly thanked the following NSF staff:

- Directorate for Education and Human Resources (EHR), Division of Graduate Education (DGE): Dr. Gisele Muller-Parker and Dr. Pushpa Murthy.
- OIRM, Division of Information Systems (DIS): Ms. Dorothy Aronson, Ms. Teresa Guillot, Ms. Joan Goetzinger, and Ms. Abigail Marchetti
- OIRM Division of Administrative Services: Ms. Katherine Otts and Ms. Susan Houser.

d. Congressional Update

Since the last meeting of the Board, Congress completed its work on the FY 2014 spending process. Dr. Marrett indicated that the FY 2015 rollout would be held on March 10, 2014, and that the FY 2016 budget preparation will also begin.

The House Committee on Science, Space, and Technology was updating the “Frontiers in Innovations, Research, Science and Technology” (FIRST) Act draft legislation and would likely consider the revised legislation in the upcoming weeks. NSF provided feedback on the draft version of the legislation, and looked forward to seeing what provisions would be modified as the Committee moves forward. Senator John Rockefeller (R-WV) is also drafting an authorization measure, and NSF provided input into that process as well.

Dr. John Wingfield, AD BIO, was invited to testify before the House Committee on Appropriations, Subcommittee on Commerce, Justice, Science, and Related Agencies on March 6, 2014 to discuss the NSF role in the Brain Research through Advancing Innovative Neurotechnologies (BRAIN) Initiative – a new Presidential focus aimed at revolutionizing the understanding of the human mind. Board Member, Dr. Alan Leshner, would also testify at the hearing.

AGENDA ITEM 13: Open Committee Reports

(Note: The Executive Committee (EC) and the Committee on Education and Human Resources (CEH) did not meet in February 2014.)

a. Committee on Audit and Oversight (A&O)

Dr. Arnold Stancell reported on behalf of Dr. Bud Peterson, A&O chairman. He stated that Ms. Allison Lerner, NSF Inspector General (IG), introduced Mr. Sal Ercolano, Clifton Larson Allen and Partner-in-Charge of the NSF financial statement audit, to present the results of the final report. The audit report issued an unqualified opinion and found no material weaknesses; however, the auditors again repeated the significant deficiency: monitoring of construction type cooperative agreements. This refers to the findings in several Defense Contract Audit Agency (DCAA) reports and OIG reviews that questioned the validity of \$223 million in contingency costs in pre-award cost proposals. Mr. Ercolano acknowledged that some progress was made and was hopeful that because the Office of Management and Budget (OMB) issued new regulations clarifying the relevant issues, the matter will be resolved this coming year.

Regarding the Federal Information Security Management Act (FISMA) report on the NSF IT security program, Mr. Ercolano reported that although there were no significant deficiencies, 8 new “other weaknesses” were found and 11 others were continued. Additionally, this year’s management letter raised a new issue regarding the NSF grant accrual methodology - a finding with which NSF disagrees.

Ms. Lerner then introduced Dr. Brett Baker, Assistant Inspector General for Audit, who presented the Office of Inspector General (OIG) FY 2013 Audit Plan (Presentation Book

page 51). He discussed how the plan was developed, the sources from which it drew, and noted that it was adjusted throughout the year. This coming year, the OIG expects to focus on more than 20 American Recovery and Reinvestment Act (ARRA) projects, in addition to various financial and program accountability reviews.

Ms. Martha “Marty” Rubenstein, Chief Financial Officer, noted that ARRA reporting requirements were no longer in effect. She also discussed plans for implementing the NSF new financial commercial off the shelf (COTS) system at the beginning of FY 2015. The Board had questions on the details of the NSF risk mitigation strategy, and Ms. Rubenstein will provide the Board with follow up information. (Board Book page 207)

b. Committee on Science and Engineering Indicators (SEI)

Dr. Ray Bowen, SEI chairman, reported that the committee meeting focused on the successful release of *Science and Engineering Indicators (Indicators) 2014* and the *Indicators Digest*. On February 5, 2014, the report was transmitted to Congress and the White House; on February 6, 2014 Drs. Arvizu, Bowen, and Droegemeier participated in a virtual briefing with members of the press; and on February 11, 2014, Drs. Arvizu, Bowen, Marrett, as well as Dr. Joanne Tornow, Acting AD, Directorate for Social, Behavioral, and Economic Sciences (SBE), participated in a public briefing for Senate staff and other S&E stakeholders and, later in the day, a private briefing with House staffers.

At the invitation of the President’s Science Advisor, Dr. John Holdren, the SBE National Center for Science and Engineering Statistics (NCSES) staff briefed OSTP on *Indicators* on February 5, 2014. Dr. Arvizu joined the call via phone and highlighted a few major themes from the 2014 edition.

Ms. Nadine Lymn, NSB Communications Director, provided details on the release activities. She reported that to date, nearly 100 articles appeared in the press, with much of the coverage centered on the shifting scientific global landscape storyline and another large wave of stories focused on public understanding of science.

Dr. Nirmala Kannankutty, NCSES Senior Advisor, presented highlights from Web analytics of the *Indicators 2014* Web site traffic. She reported that although the traffic after the initial release was slower than in 2012, it increased in the subsequent 2 weeks due to several press articles focused on the public attitudes chapter. The full online interactive version of *Indicators* and the State Data Tool was expected to be released by February 28, 2014, and the SEI 2014 Mobile App was targeted for release at the end of March 2014.

Dr. Bowen thanked the staff of the Board Office, NSF Office of Legislative and Public Affairs (OLPA), SBE, and NCSES, as well as Dr. Marrett for their contributions to the production and release of *Indicators 2014*.

Ms. Jeri Mulrow, NCSES Deputy Division Director, provided an update on the project to redesign *Indicators* as a primarily digital document (Presentation Book). She summarized the stages

of the project that had taken place to date, and provided an update on options for the design prototype. NCSES requested feedback from the Board on these design options as the project continues. It was expected that some portions of the redesign to a more digital version of *Indicators* will be implemented for 2016, and those decisions would likely be made by the end of summer 2014. Members suggested exploring the possibility of creating an underlying data infrastructure that would allow the user-community direct access to the data.

The committee also heard an update on the planned Companion Report to *Indicators* 2014, “STEM and the American Workforce.” The Companion Report will seek to put policy issues relating to the workforce, such as the long-standing STEM workforce glut vs. shortage debate, and to present a more complete picture of the pathways from STEM degree to career. Staff drafted an introduction and detailed outline of the report, and the working group planned to hold a series of teleconferences to hear the perspectives of various experts in the upcoming weeks. The committee expects to review a draft Companion Report in May 2014 and to finalize the report by summer 2014.

Dr. Droegemeier remarked on the need to better understand the relationship between tuition and research funding. He suggested that this should be a topic for future Board consideration, in association with future *Indicators* projects.

Dr. Arvizu commented favorably on the successful rollout of *Indicators* 2014, largely due to Dr. Bowen’s leadership, and complimented the contributions from NCSES.

c. Joint Committee on Programs and Plans / Committee on Strategy and Budget (Joint CPP-CSB)

Dr. Diane Souvaine reported for the Joint CPP-CSB, which she co-chaired with Dr. France Córdova, CSB chairman, and Dr. Carl Lineberger, chairman of the CSB Subcommittee on Facilities (SCF).

She stated that Joint CPP-CSB received the NSF Annual Facility Plan (Board Book Addendum, Presentation Book), which provided important information for both committees and the full Board. For CSB, the Plan helps to execute budget oversight responsibilities. For SCF, the Plan helps assess the long-term prospects for the facilities portfolio and potential future investments. For CPP, the Plan helps the Board think about potential projects, sunseting of other projects, and tradeoffs between facilities and operation expenses and the like. SCF relies on the NSF Annual Facility Plan as background for its NSF Annual Portfolio Review (APR) of Facilities.

Mr. Scott Horner, Acting Deputy Director, NSF Large Facilities Office, presented the NSF Annual Facility Plan in the joint meeting and highlighted future trends in the Major Research Equipment and Facilities Construction (MREFC) account.

Dr. Marrett introduced Dr. Fleming Crim, AD MPS; Dr. Roger Wakimoto, AD, Directorate for Geosciences (GEO); and Dr. John Wingfield, AD BIO. The ADs discussed several important topics as they relate to facilities, including science drivers, how communities prioritize future projects, how projects are coordinated across agencies and international collaborators, and

associated risk. SCF and NSF will work together to better define important facility information that should be available in the NSF Annual Facility Plan in time for the May 2014 meeting.

d. Committee on Programs and Plans (CPP)

Dr. Diane Souvaine, CPP chairman, provided brief reports - in an effort to save time and allow for discussion - on the following items:

Written Information Items

(Board Book pages 141, 147, and 148)

The committee considered three written items: (1) an annual update on the Arctic Support Contract, (2) a status report on the National Ecological Observatory Network (NEON), and (3) the annual status report on progress for operations and management of the Gemini Observatory. CPP members had the opportunity to ask questions about each of these programs.

NSB Information Item: iPlant

(Presentation Book page 3)

Dr. Wingfield, AD BIO, presented an update on the status of the iPlant Collaborative. He provided a summary of NSF's oversight of the project, and briefed the committee on the resources that were available to the community, including user data and training events. Dr. Bassler asked for the context behind the described trends in usage, and whether they met expectations. BIO will provide another update in August 2014 in anticipation of a Board action in November 2014.

NSB Information Item: Large Synoptic Survey Telescope (LSST)

(Presentation Book page 9)

Dr. James Ulvestad, Division Director, MPS Division of Astronomical Sciences (AST), presented an update on LSST, which was a pending new construction project. He noted that there was a December 2013 Final Design Review for LSST and that NSF expects to bring an action item to the Board in May 2014.

NSB Information Item: Atacama Large Millimeter Array (ALMA)

(Presentation Book page 15)

Dr. Philip Puxley, MPS ALMA Program Officer, presented an annual update on ALMA. He reported on the process of preparing a solicitation for the management and operations of the National Radio Astronomy Observatory (NRAO), which was delayed about 12 months. The delay was largely due to the nature of the international project and the complexities caused by separation of the Green Bank Telescope and the Very Long Baseline Array project from the competition. He also described some of the exciting science coming from ALMA, and noted that the solicitation was scheduled for release in April 2014.

CPP Program Portfolio Discussion: Transformative Research to Innovating for Society through Talented People

(Presentation Book page 24)

CPP continued the ongoing series of Program Portfolio Planning discussions, using the new approach piloted in August 2013, which led to a productive discussion. Dr. Pramod Khargonekar, AD ENG, took the lead for this discussion, with other ADs participating. He discussed the importance of a convergence between NSF disciplines and how that could help maximize long-term societal benefit as well as solve education problems.

The committee discussed many topics surrounding interdisciplinary research and collaborations. They also touched on issues related to researchers bridging the valley of death, the necessity of social scientists to address ethics and policy questions, and the ability to predict where collaborations will be needed in the future.

e. Committee on Strategy and Budget (CSB)

Dr. Arnold Stancell reported on behalf of Dr. France Córdova, CSB chairman. The committee heard updates related to the NSF Merit Review Report and the NSF Strategic Planning processes. The new NSF Strategic Plan will be released with the FY 2015 Budget. Dr. Marrett provided an update on the FY 2014 Budget, which was signed into law on January 17, 2014. She stated that the appropriations bill highlighted several NSF-wide research investments and gave guidance on STEM education reorganization. Congress encouraged coordination across agencies in STEM, but did not agree to consolidation of agency budgets (Presentation Book). NSF anticipated that there may be higher expenses associated with the upcoming move to Alexandria, Virginia during FY 2014.

Dr. Marrett reported on panel reviews for FY 2014 GRF competition (see also Director's Report). Dr. Córdova commended staff for this impressive undertaking, and suggested that the Board hear more about lessons learned from this ambitious innovation at a future meeting.

CSB approved the draft *NSB Annual Portfolio Review of Facilities FY 2013* (APR) (Board Book page 16) submitted from SCF for transmittal to the full Board. Based on this recommendation:

The Board unanimously APPROVED the *NSB Annual Portfolio Review of Facilities FY 2013*, subject to final edits approved by the SCF chairman, CSB chairmen, and Board Chairman (NSB-13-72).

Subcommittee on Facilities (SCF)

Dr. Carl Lineberger, SCF chairman, reported that the subcommittee approved the 2013 APR and discussed potential associated recommendations.

Subcommittee members expressed concerns that if the MREFC account falls sharply after 2016, the change might be hard to reverse. Dr. Marrett stated that, in her view, appropriators see NSF's bottom line as the key factor, instead of the six individual components of the budget.

SCF members also discussed the information NSB needs to make recommendations and decisions about MREFC health over time. They agreed that there is a need for a 1-2 page summary on each facility that includes science drivers and risk assessment.

The subcommittee also discussed draft recommendations, which were distributed. Dr. Lineberger explained that SCF separated the draft recommendations from the APR in order to allow more deliberation about recommendations and the best path forward, following the model that Dr. Bowen set for the *Indicators Companion Piece* that contains analysis.

Dr. David noted that the trends in utilization would be helpful, and Dr. Droegemeier asked if the Board could see how facilities serve multiple disciplines. It was agreed that the subcommittee would continue discussions with NSF about how to best proceed, with the aim of gathering some of this information for the May 2014 meeting.

f. Task Force on Administrative Burdens (AB)

Dr. Arthur Bienenstock, AB chairman, reported on a discussion led by Dr. Droegemeier on the recent streamlining of OMB circulars into a set of Uniform Guidance. The task force heard a presentation on this Guidance from Ms. Mary Santonastasso, Director, Division of Institution and Award Support (DIAS). She discussed the background behind the Presidential Directives for agencies to review and reduce administrative burden, which led to the formation of the Council on Financial Assistance Reform (COFAR) tasked with consolidating and harmonizing eight circulars into a single Uniform Guidance.

Ms. Santonastasso and key staff from the Office of Budget, Finance, and Award Management (BFA) provided the task force with an overview of the process for developing the Guidance and what the issuance would mean for NSF and the research community. She discussed the three overarching reform areas that were of key interest: (1) increased clarity in language, (2) fewer administrative requirements, and (3) increased stewardship and oversight.

The task force discussed the draft report, *Reducing Investigators' Administrative Workload for Federally-Funded Research* (Board Book page 173). Dr. Bienenstock provided an overview of the report's overarching recommendations which include: (1) calling for greater focus on the science, (2) eliminating or modifying ineffective regulations, (3) harmonizing and streamlining requirements, and (4) increasing university efficiency and effectiveness.

Board Member feedback on the report was positive. Members inquired about the level of engagement on the recommendations with other agencies and NSF staff to ensure that the recommendations will have the desired effect of reducing administrative burden. The task force will continue to engage staff at NSF and other Federal agencies and offices.

Ms. Lerner was asked to comment on how the current payroll certification pilots that were underway with the Research Business Models Subcommittee and the Federal Demonstration Partnership might impact effort reporting. She indicated that since the aforementioned pilots were currently undergoing an audit, it would not be appropriate at that time to comment on the merit of the findings.

Dr. Arvizu stated that with respect to audits, once the IG completed an audit, it was NSF management's role to react and resolve any findings. At that point it is important to recognize the NSB role in understanding the NSF IG's and NSF management's respective positions on a particular audit as the NSB fulfills its role of informing Congress.

With no further comments, the task force voted to approve the draft report, subject to final edits approved by the AB chairman and the Board Chairman. Based on this recommendation:

The Board unanimously APPROVED the report, *Reducing Investigators' Administrative Workload for Federally-Funded Research*, subject to final edits approved by the AB chairman and the Board Chairman (NSB-14-18).

Dr. Bienenstock noted the major work of his colleagues and NSF staff in developing the report, and especially recognized the work of Dr. Lisa Nichols, Board Office staff lead, and Mr. Jeremy Leffler, the AB Executive Secretary.

AGENDA ITEM 14: Chairman's Remarks

As there were no further comments or business of the Board, the Chairman adjourned the Plenary Open Session at 2:17 p.m.

[signed]

Ann A. Ferrante
Executive Secretary
National Science Board