

**APPROVED MINUTES¹
OPEN SESSION
419TH MEETING
NATIONAL SCIENCE BOARD**

National Science Foundation
Arlington, Virginia
May 10-11, 2011

Members Present:

Ray M. Bowen, Chairman
Esin Gulari, Vice Chairman
Mark R. Abbott
Dan E. Arvizu*
Steven C. Beering*
Camilla P. Benbow**
John T. Bruer
France A. Córdova**
Kelvin K. Droegemeier
Patricia D. Galloway
José-Marie Griffiths
Louis J. Lanzerotti*
W. Carl Lineberger*
G.P. “Bud” Peterson
Douglas D. Randall
Arthur K. Reilly
Diane L. Souvaine
Thomas N. Taylor
Richard F. Thompson

Subra Suresh, *ex officio*

Members Absent:

¹ The minutes of the 419th meeting were approved by the Board at the July 2011 meeting.

* Consultant

** Absent on May 11, 2011

The National Science Board (Board, NSB) convened in Open Session at 11:15 a.m. on Tuesday, May 10, 2011 with Dr. Ray Bowen, Chairman, presiding (Agenda NSB-11-25, Board Book page 154 and a revised Agenda in the Board Book Addendum). In accordance with the Government in the Sunshine Act, this portion of the meeting was open to the public.

AGENDA ITEM 1: Presentations by Honorary Award Recipients: Dr. Charles Vest, Vannevar Bush Award; and Dr. Casey Dunn, Alan T. Waterman Award

The Board heard a presentation by Dr. Charles Vest, the 2011 Vannevar Bush Award recipient. Dr. Vest is President of the National Academy of Engineering and President Emeritus of Massachusetts Institute of Technology. (Brief biography, Board Book page 181)

Dr. Casey Dunn, the 2011 Waterman Award recipient, also gave a presentation to the Board. Dr. Dunn is the Manning Assistant Professor of Ecology and Evolutionary Biology at Brown University. (Brief biography, Board Book page 182)

Dr. Bowen adjourned this portion of the Open Session at 12:05 p.m.

The Board reconvened in Open Session at 11:30 a.m. on Wednesday, May 11, 2011 with Dr. Bowen presiding (Agenda NSB-11-25, Board Book page 154 and a revised Agenda in the Board Book Addendum). In accordance with the Government in the Sunshine Act, this portion of the meeting was open to the public.

AGENDA ITEM 2: Presentations by Honorary Award Recipients: Dr. Moira Gunn, NSB Public Service Award – Individual; and Dr. Dennis Bartels for Exploratorium, NSB Public Service Award - Group

Dr. Moira Gunn, the recipient of the 2011 Public Service Award (Individual), gave a presentation to the Board. Dr. Gunn is the host of *Tech Nation* and *BioTech Nation* on National Public Radio. She is also the managing Director of Biotechnology Programs in the School of Business and Professional Studies at the University of San Francisco. (Brief biography, Board Book page 183)

The Exploratorium - the Museum of Science, Art, and Human Perception in San Francisco - received the 2011 Public Service Award (Group). Dr. Dennis Bartels, Executive Director of Exploratorium, gave a presentation to the Board on behalf of the Exploratorium. (Brief Information, Board Book page 184)

Dr. Bowen adjourned this portion of the Open Session at 12:15 p.m.

The Board reconvened in Open Session at 2:15 p.m. on Wednesday, May 11, 2011 with Dr. Bowen presiding (Agenda NSB-11-25, Board Book page 154 and a revised Agenda in the Board Book Addendum). In accordance with the Government in the Sunshine Act, this portion of the meeting was also open to the public.

AGENDA ITEM 9: Approval of Open Session Minutes, February 2011

The Board unanimously APPROVED the Open Session minutes of the February 2011 Board meeting (NSB-1117, Board Book page 157).

AGENDA ITEM 10: Chairman's Report

Dr. Bowen announced and reported on several items:

a. Annual Awards Ceremony and Dinner

The Board held its annual Awards Ceremony and Dinner at the Department of State's Diplomatic Reception Rooms. Dr. Bowen stated that the event is one of the few opportunities the Board has to recognize the distinguished contributions of individuals and organizations to the advancement of science. The Board was also honored to receive a message from President Obama.

The following 2011 honorary award recipients were recognized for their distinguished contributions:

- Dr. Charles Vest, President of the National Academy of Engineering and President Emeritus of the Massachusetts Institute of Technology, received the Vannevar Bush Award.
- Dr. Casey Dunn, a biologist in the Department of Ecology and Evolutionary Biology at Brown University, received the Alan T. Waterman Award.
- Dr. Moira Gunn, founder of the National Public Radio program, *Tech Nation*, and Managing Director of Biotechnology Programs at the University of San Francisco, received the individual NSB Public Service Award.
- The Exploratorium - the museum of science, art, and human perception in San Francisco received the group NSB Public Service Award.

Dr. Bowen stated that it was an honor and privilege to present these awards to such distinguished, talented, and creative people. Dr. Bowen added that the Awards Ceremony and Dinner require a vast amount of preparation, planning, and coordination. On behalf of the Board, he thanked the Board Office staff and NSF staff responsible for the smooth operation of the wonderful event.

b. Results of Board Elections

Dr. Bowen announced the results of the Board elections, which took place in Plenary Executive Closed Session. The Board elected Drs. Kelvin Droegemeier and Diane Souvaine to the Executive Committee for the 2011 – 2013 term.

c. Committee Announcements

Dr. Bowen discharged the *ad hoc* Committee on Honorary Awards with thanks to Dr. France Córdova, chairman, and Drs. Bud Peterson and Richard Thompson.

He also discharged the *ad hoc* Committee on Nominating for NSB Elections (Elections Committee) with special thanks to Dr. Esin Gulari, chairman, and Drs. France Córdova and Douglas Randall.

Lastly, he established the *ad hoc* Committee on Nominations for the NSB Class of 2012 - 2018 (Nominations Committee), with Dr. Droegemeier as chairman, and members - Drs. Córdova, Randall, and Peterson.

d. Congressional Outreach

The Chairman reported that he and Dr. Subra Suresh, NSF Director, testified before the House Committee on Science, Space, and Technology on March 11, 2011. He presented concerns about U.S. leadership in science and engineering, and information on the FY 2012 Budget Request and NSB priorities. (Testimony, Board Book page 185)

e. NSF Strategic Plan

Dr. Bowen announced that the NSF Strategic Plan for FY 2011-2016, *Empowering the Nation Through Discovery and Innovation* (April 2011) was provided to Board Members. The publication is also available on the NSF Web site.

f. Board Member Nominations

Dr. Bowen made the following announcements regarding recent Board Member nomination activities:

- Dr. Kelvin Droegemeier was confirmed as a Board Member for the Class of 2016. This will be Dr. Droegemeier's second term.
- Drs. Dan Arvizu and Alan Leshner were nominated for re-appointment by the President, also for the Class of 2016.
- Dr. W. Carl Lineberger was nominated by the President for the Class of 2016. Dr. Bowen welcomed Dr. Lineberger to his first meeting. Dr. Lineberger replaced Dr. Kathryn Sullivan who was confirmed as an Assistant Secretary of Commerce.
- Dr. Robert Zimmer was nominated by the President for the Class of 2016, and replaced Dr. Jon Strauss. [Dr. Zimmer could not attend the meeting.]
- [Dr. Elizabeth Hoffman resigned from the Board in April 2011.]

g. Board Member Recognition

Dr. Bowen announced that Dr. Subra Suresh, NSF Director, was awarded the prestigious Padma Shri by the President of the Republic of India. The award is one the highest civilian honors bestowed by the Indian government, and honors service in any field to individuals from India as well as countries other than India. Dr. Suresh was recognized for his distinguished work in U.S. science and engineering.

h. Board Office Staff Introduction

Dr. Bowen welcomed Ms. Shirley Watt, who joined the Board Office on a detail (as of April 25, 2011). Ms. Watt serves as a Senior Program Analyst, Budget Division, Office of Budget, Finance, and Award Management (BFA), and is the project manager for the NSF annual Agency Financial Report. She has worked for NSF for 17 years with various teams throughout the agency and representing NSF in interagency working groups. Ms. Watt will be supporting the Committee on Programs and Plans (CPP).

i. Board Office Staff Departures

Dr. Elizabeth Strickland left the Board Office (as of March 11, 2011), and relocated to New Jersey where her husband was transferred. Dr. Strickland joined the Board Office in March 2006 as a Sigma Xi Fellow, and became a member of the staff in December 2007. She served as Executive Secretary for the NSB Commission on 21st Century Education in STEM, and was instrumental in the effort to compile *A National Action Plan for Addressing the Critical Needs of the U.S. Science, Technology, Engineering, and Mathematics Education System (NSB-07-114)*. Dr. Strickland was also the NSB Liaison to CPP, where she was active with the many endeavors of that committee.

Mr. Daniel Lauretano, who joined the Board Office in May 2010 and served as the Legal Counsel to the Board, left to pursue other interests (as of April 28, 2011).

AGENDA ITEM 11: Director's Report

Before his report, Dr. Subra Suresh, NSF Director, thanked NSF and Board Office staff for organizing the awards event at the State Department. He also thanked Board Members and NSF colleagues for attending the ceremony and dinner.

Dr. Suresh reported on the following items:

a. NSF Staff Introductions

Mr. Alan Blatecky began serving as Head, Office of Cyberinfrastructure (OCI) on March 15, 2011. Mr. Blatecky came to NSF on an IPA assignment in 2009 from the Renaissance Computing Institute of the University of North Carolina at Chapel Hill and served most recently as Acting Head for OCI. Mr. Blatecky holds four Masters Degrees including an MBA and a Master of Arts from Duke University and two Masters Degrees in Theology from Princeton Theological Seminary.

Dr. Machi Dilworth was appointed Head, Office of International Science and Engineering (OISE) on March 29, 2011. Dr. Dilworth came to NSF in 1990 and has held a number of Senior Executive Service positions, most recently as Acting Assistant Director, Directorate for Mathematical and Physical Sciences (MPS) and Director, NSF Tokyo Office. Dr. Dilworth received her Ph.D. in Plant Biochemistry and Physiology from the University of California at Los Angeles.

Dr. David Stonner, who has headed the NSF Paris Office, will be assuming the role of OISE Deputy Director in July 2011.

Dr. Farnam Jahanian joined NSF on March 2, 2011 as Assistant Director, Directorate for Computer and Information Science and Engineering (CISE) on March 1, 2011. Dr. Jahanian came to NSF from the University of Michigan, where he is Professor and Chairman of Computer Science and Engineering. He is co-founder and Chairman of Arbor Networks, Inc. Dr. Jahanian received his Ph.D. in Computer Science from the University of Texas at Austin in 1989.

Mr. Brian Stone was appointed Division Director, Antarctic Infrastructure and Logistics, Office of Polar Programs (OPP) on February 27, 2011. Mr. Stone joined NSF in 2000 and has held a number of positions in OPP, most recently as Deputy Director, Division of Antarctic Infrastructure and Logistics. Mr. Stone received his MBA from the George Washington University in 2005.

b. NSF Congressional Update

Dr. Suresh reported that the major development since the February 2011 Board meeting was the passage of a full year FY 2011 continuing resolution. NSF was provided with \$6.8 billion, a 1 percent, or approximately \$66 million reduction from the FY 2010 level.

He reported that he testified at three hearings on the FY 2012 budget request to Congress. On March 10, 2011, he was the sole witness before the House Appropriations Subcommittee on Commerce, Justice, Science, and Related Agencies. On March 11, 2011, he testified before the House Committee on Science, Space, and Technology, along with Dr. Bowen. Additionally, on March 17, 2011, he testified before the Senate Committee on Commerce, Science, and Transportation, along with Dr. John Holdren, Director, Office of Science and Technology Policy (OSTP); Dr. Patrick Gallagher, Director, National Institute of Standards and Technology (NIST), and Dr. Waleed Abdalati, Chief Scientist, National Aeronautics and Space Administration (NASA). Although strong support was expressed for NSF and its mission, members of the committee also sent a clear message on the austerity of this year's budget environment.

Dr. Suresh noted two upcoming hearings in May and June 2011. The first is scheduled for May 25, 2011 before the House Science, Space, and Technology Committee. This will be a joint hearing between the Research and Science Education Subcommittee, and the Technology and Innovation Subcommittee on cybersecurity research. Dr. Jahanian will be testifying on behalf of NSF. The second hearing is scheduled for June 2, 2011. It will be before the Science, Space, and Technology Committee's Subcommittee on Research and Science Education on Social Sciences. Dr. Myron Guttman, Assistant Director, Directorate for Social, Behavioral, and Economic Sciences (SBE), will testify on NSF's behalf.

AGENDA ITEM 12: Open Committee Reports

a. Executive Committee (EC)

Dr. Subra Suresh, EC chairman, recommended that the Board accept the 2010 Executive Committee Annual Report, covering the period from May 2010 through April 2011.

The Board unanimously ACCEPTED the 2010 Annual Report of the Executive committee (NSB/EC-11-3, Board Book page 153). (Attachment A)

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

Mr. Arthur Reilly, A&O chairman, reported that Dr. Pamela O'Neil, Mr. Brandon Stephens, and Ms. Beth Velo gave a presentation on the FY 2010 Merit Review Report (Board Book Addendum, Presentation Book page 221), which details proposal and award trend data, success rates, variations of success rates and the increasing use of virtual panels. Board Members were interested in hearing more detail about funding rates and success rates across NSF. As indicated by data in Appendix 1 of the report (Board Book Addendum), the average funding rate varies by NSF directorate. There is an even greater variation of funding rate by program as well as variations by level of researcher experience. Additional information describing funding rate by program will be provided to the Board at a later date. Board Members also expressed interest in hearing more about the ways that NSF encourages Small Grants for Exploratory Research (SGERs), Grants for Rapid Response Research (RAPIDS), and EARly-concept Grants for Exploratory Research (EAGERs). Questions were asked about American Recovery and Reinvestment Act (ARRA) funding. Additional information about ARRA will be provided in an update to the online version of the Merit Review Report.

Ms. Allison Lerner, NSF Inspector General (IG), briefed the committee on the Office of Inspector General's (OIG's) recent activities in support of the OIG community. Since the fall of 2009, she has co-chaired a working group with the IG for NASA to improve the community's ability to identify and investigate instances of fraud within the Small Business Innovation Research (SBIR) program. The group has initiated changes to the SBIR database that will help to prevent duplicate funding of awards. It also provides a channel of communication through which separate OIGs can share best practices. These improvements have resulted in a significant increase in the number of SBIR fraud cases opened over the past 18 months. The OIG staff has also contributed language to the new SBIR re-authorization legislation to require awardees to certify their understanding of grant requirements. Ms. Lerner also noted that a new financial statement audit contract was awarded to Clifton Gunderson.

Mr. Sal Ercolano of Clifton Gunderson, partner-in-charge of NSF's financial statement audit, presented an overview of the audit plan for FY 2011. Mr. Ercolano said that although they were getting a late start this year due to the timing of the award, it would not affect the audit. In addition to their usual audit procedures, auditors will focus on the status of corrective actions regarding the monitoring of cost reimbursement contracts. This year's IT security review will emphasize enterprise business systems and evaluate the status of the U.S. Antarctic Program (USAP) deficiencies noted in the 2010 report. Mr. Ercolano listed the major challenges facing NSF as budget constraints, resource limitations, and aging financial systems. (Presentation Book page 238)

Ms. Martha Rubenstein, NSF Chief Financial Officer (CFO), reported on the work her office was doing to assure that there is a successful FY2011 financial statement audit, which included work on addressing FY2010 audit findings as well as an updated internal control quality assurance program. She described the progress being made on the procurement of a new financial system for NSF, which is critical to maintaining NSF's clean audit opinion and operational effectiveness. Ms. Rubenstein also reported on the status of the internal audit that the OIG is doing on NSF's handling of contingency budgeting and expenditures for large facility construction. At this point, OIG was working on identifying a specific expired award to audit. Managing contingencies will be a topic at the Board's July 2011 meeting as well, and the committee will hear from the OIG and the CFO on this important issue. Lastly, Ms. Rubenstein gave a brief update on ARRA funding oversight. (Presentation Book page 256)

Dr. Judith Sunley, Interim Chief Human Capital Officer, reported on human capital management. She noted that NSF is making progress on addressing the recommendations of the Office of Personnel Management (OPM) evaluation of NSF's human capital systems. Additionally, NSF is working on developing a structured process for assessing and acting upon recommendations for improving workforce management and the work environment as recommended in the recent OIG audit report on this topic. A number of process issues are being addressed. Key substantive issues include topics related to improving performance management and executive development, but the list of challenges is long. She noted that while she is reporting on human capital management as the interim director of the Division of Human Resource Management (HRM), the efforts taking place involve staff throughout the agency, with key decision making coming from the NSF Director and significant input from NSF's senior management groups.

The committee voted to recommend approval by the full Board of the draft transmittal letter and management response for the March 2011 *Office of Inspector General Semiannual Report to the Congress*.

The Board unanimously APPROVED the draft transmittal letter and management response to the March 2011 *Office of Inspector General Semiannual Report to the Congress*.

c. Committee on Education and Human Resources (CEH)

Dr. Patricia Galloway reported for Dr. Camilla Benbow, CEH chairman. She stated that the committee resumed its consideration of near-term steps that NSF might take in response to recent STEM education policy reports, including the Board's report, *Preparing the Next Generation of STEM Innovators: Identifying and Developing Our Nation's Human Capital* (NSB-10-33).

CEH reviewed a list of Priority Action Items that was developed during its teleconference in April 2011. (NSB/CEH-11-10, Board Book page 118) These Priority Action Items would implement strategies to: (1) prepare teachers to be more effective at identifying, inspiring, and developing creativity and innovation in students; (2) provide students with authentic, mentored research experiences either through supplements to existing research grants or through cohort sites; and (3) develop new methods for talent identification and development.

The committee felt that these efforts can be implemented quickly by NSF, without additional resources, by adding language to emphasize these priorities in existing program solicitations and making them focus areas for planned solicitations associated with the Science, Engineering, and Education of Sustainability (SEES) and Cyberinfrastructure Framework for 21st Century Science and Engineering (CIF21) initiatives. The committee recommended that the Board forward the list of Priority Action Items to the NSF Director for consideration.

The Board unanimously APPROVED forwarding the list of STEM Education Priority Action Items to the NSF Director for his consideration.

CEH had an extended discussion on strategic directions for NSF's education portfolio, within the context of other Federal investments in STEM education. Dr. Carl Wieman, OSTP Associate Director for Science, briefed the committee on the activities of the newly-formed National Science and Technology Council (NSTC) Committee on STEM Education, of which he and Dr. Suresh are co-chairmen. This new committee significantly elevates the status of STEM education within the NSTC structure.

Dr. Wieman described the committee's two main tasks. The first task is to establish a detailed inventory of Federal STEM education programs. A major consideration in conducting this work has been to develop better parameters and definitions for the inventory to improve program characterization. This will help the committee identify the focus of specific programs and more correctly distinguish those that are truly unique from those that might benefit from a more synergistic approach, particularly with regard to evaluation design and metrics.

The second task is to develop a 5-year strategic plan for Federal STEM education programs and investments by August 2011. The goal is to create a more coherent and better aligned portfolio that helps the Government understand what works and why, and then foster utilization of the most effective approaches. Dr. Wieman shared some preliminary insights from this effort, noting NSF's dominant role in the Federal Government for research on STEM education and practices. He expressed concern about the lack of evidence guiding practices and policies behind other agency STEM education efforts, and urged NSF to lead the way in answering some of these fundamental questions, particularly with regard to preparing STEM teachers to be more effective, and promoting adoption and scale-up of best practices.

Dr. Joan Ferrini-Mundy, Assistant Director, Directorate for Education and human Resources (EHR), commented that the aggressive timeline of the NSTC process, as well as the benefit of Dr. Suresh's additional encouragement and input to accelerate NSF's internal discussions on strategic focus and where NSF fits within the spectrum of Federal STEM education efforts. She emphasized a focus on how to incorporate the issue of taking projects to scale at the front-end, as projects are being designed, as well as using research directorate activities and facilities as test-beds for exploring how NSF models might work in the 'real world.'

In discussion, committee members were pleased that these combined planning efforts might finally position the Federal Government for rapid progress in bringing high quality STEM education resources into widespread practice. Several strategies for getting best practices to the local level were identified, including: synergistic integration of informal and formal STEM

education approaches, taking NSF's knowledge about 'return on investment' to state and local levels through the Department of Education's networks, and capitalizing on the significant interest and resources available in the private sector as both a venue for testing scale-up strategies and dissemination.

The final agenda item, which was to be a discussion on potential longer-term responses to the STEM Innovators report, was deferred until the July 2011 meeting. The committee agreed to hold a teleconference in the next few weeks to clarify what steps should be taken to make the July 2011 discussion most effective.

d. Committee on Science and Engineering Indicators (SEI)

Dr. José-Marie Griffiths, SEI chairman, reported that the committee considered the Board and expert reviews of chapter drafts for *Science and Engineering Indicators 2012*. Dr. Griffiths thanked all of the Board reviewers who submitted reviews of the drafts. Ms. Jean Pomeroy, SEI Board Office Liaison, summarized data on the impact of the *Indicators* Companion Piece and other Board reports. The committee discussed possible avenues for changing the presentation so that the content would reach more people and have more impact. A working group, consisting of Drs. Griffiths, Gulari, and Louis Lanzerotti, and Mr. Reilly will meet to discuss ideas for a Companion Piece focused on innovation and workforce issues. The committee approved an overall cover design for *Indicators* and asked the staff to improve the design by depicting more up-to-date technologies in the background drawings. Dr. Griffiths also asked Board members to send their suggestions to her and the SEI Executive Secretaries.

e. Committee on Programs and Plans (CPP)

Dr. Mark Abbott, CPP chairman, reported that the CY 2011 Schedule of Action and Information Items for NSB Review was modified to reflect the revised threshold policy enacted in February 2011. He also noted that there will be a joint CPP-CSB teleconference scheduled for June 2011 to discuss input and recommendations received from the portfolio review by the Subcommittee on Facilities (SCF), and to continue discussions on the programmatic planning and review issue.

Discussion Item: CPP Portfolio Reviews

Dr. Abbott reported that changing the threshold policy meant that the committee has more time to incorporate into the CPP agenda program planning and reviews to reflect the broader CPP charge. At the February 2011 meeting, a small working group was formed that included Drs. Mark Abbott, Droegemeier, and Souvaine, and Mr. Reilly, which prepared a draft outline for a programmatic review process for discussion by CPP. Several members of NSF leadership joined the committee for discussion on the draft, including Mr. Michael Sieverts, Director, BFA Budget Division; Dr. Clifford Gabriel, Acting Director, Office of Integrative Activities (OIA), and Drs. Dilworth and Ferrini-Mundy. The committee discussed what level of Board involvement will be most useful to NSF and at what stage in the program planning process this might take place. The committee asked the members of NSF leadership to think about barriers NSF faces, and any concerns they have when trying to develop and prioritize projects, and to let CPP know how the committee could be helpful. Dr. Abbott suggested that the committee continue this discussion

throughout the summer, including a possible retreat prior to the July 2011 meeting with NSF leadership maybe in conjunction with the Committee on Strategy Budget's (CSB's) discussion on the NSF budget.

Discussion Item: Continuing Discussion on Recompetition Policy Implementation

Dr. Mark Coles, Deputy Director, BFA Large Facilities Office, gave a presentation that included overarching business and administration issues with recompetition in terms of the business and administration side. Dr. Coles informed the committee that the NSF Business and Operations Advisory Committee (BOAC) will meet next week, and will be asked to approve formation of an *ad hoc* subcommittee to provide expert advice to NSF on these business and administrative issues. A written public report will be requested before the end of the calendar year. CPP members were asked to provide comments to Dr. Coles on the proposed plan. The committee asked that Dr. Coles provide periodic updates if available, and report back to the committee on the recompetition issue before the report is published in December 2011. (Presentation Book page 101)

NSB Information Item: Status Update on National Research Council Report on Deep Underground Science and Engineering Laboratory (DUSEL)

CPP heard a status update on the National Research Council (NRC) report on DUSEL. Dr. Edward Seidel, MPS Assistant Director, introduced Dr. Andy Lankford, Chairman of the NRC committee writing the report. Dr. Lankford told CPP about the NRC report, its charge, and the participants; and gave highlights of the DUSEL program. Because the report is currently in review, none of the findings or recommendations could be reported yet.

NSB Information Item: New High Performance Computing Acquisition

Dr. Irene Qualters, OCI Program Director, presented an information item on the new High Performance Computing (HPC) acquisition. Dr. Qualters informed the committee that proposals for a new HPC were due at the beginning of March 2011, and a panel review was conducted at the end of March. NSF anticipates a single award for a new HPC investment in September 2011, and expects to bring an action for NSB review to the July 2011 meeting. (Presentation Book page 107)

NSB Information Item: Update on DataNet Program

Mr. Alan Blatecky provided an update on the DataNet Program. DataNet awards are partnerships that are responsive to user communities, and form coordinated networks to provide national interdisciplinary data models and infrastructure. Mr. Blatecky noted that DataNet is a key piece of NSF's new Foundation-wide investment in CIF21. He also highlighted the impacts of current DataNet awards, and provided some future directions for DataNet in 2011 and 2012. (Presentation Book page 115)

NSB Information Item: LIGO - Science Results

Drs. Edward Seidel and Thomas Carruthers, MPS Program Director, gave a science update on the Laser Interferometer Gravitational Wave Observatory (LIGO). Dr. Seidel noted that LIGO had its last science run in October 2010, and Advanced LIGO is expected to come online in 2015. Dr. Carruthers informed the committee about the most recent LIGO science run, and some of the significant discoveries and advances produced by LIGO during the past few years. (Presentation Book page 127)

In response to a question from Dr. Bowen, Dr. Abbott noted that there was a data management plan on the LIGO Web site, but the data has not been released to the public outside the LIGO community. CPP would like to pursue this topic further with NSF. Dr. Abbott agreed with Board Members that it would be worthwhile for the committee to have a focused discussion on LIGO, especially the data management policy, at the July 2011 meeting.

CPP Subcommittee on Polar Issues (SOPI)

Dr. Abbot reported that the Dr. Thomas Taylor, SOPI chairman, and subcommittee members heard an update by Dr. Karl Erb, Director, Office of Polar Programs (OPP), on the status of the Blue Ribbon Panel, which is the second phase of the study of the U.S. Antarctic Program. The preliminary NRC report is expected in June 2011, and the Blue Ribbon Panel will begin meeting shortly thereafter. Drs. Suresh and Holdren identified a panel chairman and his appointment will be announced by both OSTP and NSF.

Dr. Erb also commented on budget constraints, especially rising fuel costs, and the impact on Antarctic logistics, including deferment of planned infrastructure improvements. He reported that the availability of the icebreaker *Oden* has not been confirmed for the McMurdo Station breakout mission, and the U.S. Coast Guard's *Polar Sea* and *Polar Star*, which is being reconditioned, will not be available in the coming season. It is unclear whether the *Healy* is capable of completing the break-in, and OPP is preparing a Request for Information for icebreaking services as a backup plan.

Dr. Alexandra Isern, Program Director, OPP Antarctic Earth Sciences, described research at the Central Transantarctic Mountains (CTAM) camp. (Presentation Book page 201)

Mr. Peter West, Program Manager for Polar Education and Outreach, briefed the subcommittee on new and ongoing education and outreach activities supported by OPP, including PolarTREC, which places K-12 school teachers with researchers in the field; the Antarctic Artists and Writers Program; and the Joint Science Education Project (JSEP), an international collaborative polar science-education effort involving Greenland, Denmark, and the U.S. with the goal of building the next generation of polar scientists. (Presentation Book page 211) OPP also found that hosting Einstein Distinguished Educator Fellows is an effective way to build and leverage education and outreach activities. The current Einstein Fellow, Ms. Laura Lukes, has been an instrumental participant in the JSEP program.

CPP Task Force on Unsolicited Mid-Scale Research (MS)

Dr. Abbott reported that Dr. Diane Souvaine, MS chairman, welcomed Dr. Droegemeier as co-chairman of the task force. Dr. Souvaine reported on the findings of two discussion groups that the task force held in February and March 2011 with the investigator community.

Dr. Droegemeier highlighted the importance of NSF's engagement with the research community about mid-scale research opportunities. He also noted the value of university administrations assisting faculty on how to take advantage of these opportunities. Additionally, Dr. Droegemeier posed a key question for the task force regarding what proposals were not submitted to NSF and why those remain missing; this issue will be addressed through discussion groups, an upcoming Workshop, and an upcoming survey.

The Workshop would be held at NSF on June 5-7, 2011, with participation from the MS members, researchers, university administrators, representatives from other Federal agencies, and NSF management and staff. Dr. Suresh encouraged the Workshop organizers to discuss the NSF budgetary constraints and tradeoffs between supporting mid-scale activities and other projects. Dr. Matthew Wilson, MS Board Office Liaison, provided an update on the proposed mid-scale research survey, which would target a few hundred researchers, following clearance by the Office of Management and Budget (OMB).

f. Committee on Strategy and Budget (CSB)

Dr. Diane Souvaine, CSB chairman, reported that the FY 2011 budget was officially approved on April 15, 2011 resulting in total NSF funding of \$6.81 billion, which was 1 percent below the FY 2010 funding level. Based on this outcome and the current negotiations in Congress concerning the Nation's debt ceiling and deficit reduction, the passage of the encouraging FY 2012 Budget Request was in serious question. The committee heard updates from Mr. Sieverts on both of these issues during the meeting.

Mr. Sieverts reported that the FY 2011 Appropriation was approved 194 days after the start of the fiscal year. The NSF FY 2011 enacted funding level of \$6.806 billion was 8 percent below the 2011 requested level and 1 percent below the 2010 enacted level. Mr. Sieverts reviewed the impacts for each NSF account as a result of the overall decreased funding level for the agency. The Major Research Equipment and Facilities Construction (MREFC), Agency Operations and Award Management (AOAM), OIG, and NSB accounts will be decreased by 0.2 percent below the 2010 enacted level. However, the Research and Related Activities (R&RA) and EHR accounts will be decreased by 1.0 and 1.3 percent respectively below the 2010 enacted level.

Mr. Sieverts also reviewed the key issues associated with the 2011 funding levels, including an MREFC allocation, which was substantially below what was included in the FY 2011 budget request. There were three budget hearings to date on the FY 2012 budget request, which were generally supportive of NSF; however, there was a clear message that the Nation was in a constrained budget environment. Mr. Sieverts also detailed key dates and issues that will impact the outcome of the FY 2012 budget process, which includes the Nation reaching the debt limit on Monday, May 16, 2011 and the subsequent anticipated default date of August 2, 2011.

Additionally, the committee discussed its interest in ensuring future solicitations related to recompetitions provide a "level playing field" for all proposers.

Ms. Rubenstein, NSF's Chief Financial Officer, presented information on the status of the fiscal year ARRA funding. Ms. Rubenstein reviewed the organizational structure instituted to implement ARRA activities, and NSF successfully obligated all ARRA funds. As a result of ARRA activities, NSF has procedures in place for the reversal of declines and mining of declined proposals. Also, as a result of ARRA reporting requirements, NSF can now monitor expenditure rates.

CSB Subcommittee on Facilities (SCF)

Dr. Souvaine reported that the SCF chairman, Dr. José-Marie Griffiths, and SCF members performed the Annual Portfolio Review of Large Facilities as specified in the subcommittee's charter. The findings and recommendations from the review will provide input to MREFC decisions and inform CSB as part of the budget process. The discussions included an examination of the facilities portfolio, the policies used by NSF to move large facility projects forward, and an assessment and characterization of the health of the overall portfolio.

Responding to a request from the subcommittee in February 2011 related to horizon projects, Dr. Fae Korsmo, Office of the Director, gave an overview of the process to be used, which divides the pre-conceptual design review (CDR) phase into two segments. Horizon projects originating within the NSF Directorates will require approval by the MREFC panel before entering the pre-CDR stage. The subcommittee discussed the new process and raised questions about the composition of the MREFC panel and the factors that it will consider in approving horizon projects. The subcommittee was invited to provide advice on the appropriate composition and functions of the MREFC panel to better accomplish this new gating process for horizon projects. Dr. Griffiths presented the Annual Portfolio Review, which included a description of the goals and context of the review, the categories of facilities considered, the input to the review and the factors considered in portfolio assessment. The presentation concluded with a review of the NSF Facilities Plan, issues and challenges, and progress on the mid-scale infrastructure study. The subcommittee intends to have a teleconference to discuss matters further prior to the July 2011 Board meeting.

Questions about the scope of the review led to a discussion of the study on mid-scale facilities to be completed by SCF in January 2012. The meeting ended with a status report on the mid-scale study. Subcommittee members reiterated the importance of including mid-scale facilities to properly assess the health of NSF's overall facility portfolio.

CSB Task Force on Data Policies (DP)

Dr. Souvaine also reported that the DP chairman, Dr. José-Marie Griffiths, and the task force discussed preliminary findings of a Workshop held at NSF on March 27-29, 2011. The Workshop included a series of expert panel discussions with a variety of stakeholders. The task force will use the results to develop, implement, and assess data sharing and data management policies for NSF-funded activities. The Workshop summary identifies data sharing priorities, and recommends NSF support for nurturing standards and interoperability that will enable data-intensive science (NSB/CSB/DP-11-5, Board Book page 135). The report also emphasized the need to recognize and support computational and data-intensive science as a distinct discipline. Dr. Seidel stated that this was also a key recommendation coming from the NSF Advisory

Committee on Cyberinfrastructure. Finally, the Workshop summary recommended support for data stewardship and cyberinfrastructure to support data-intensive science.

Two near-term action items for the task force include: (1) agreement to move quickly and develop policy language for including citable data in biographical sketches, which has been under consideration by NSF liaisons, and (2) convene in a teleconference where task force members can compile a set of actionable data policies from the stakeholder recommendations for consideration by the full Board.

Dr. Griffiths welcomed Dr. Jahanian as a new NSF liaison to the task force. Dr. Seidel provided an update on activities within NSF related to both open data and open publications. In particular, he described ongoing discussions and joint activities with the Max Planck Society, which set up a similar group looking at open access to scholarly publications. Dr. Seidel stated that the NSF and Max Planck groups began discussing a joint set activities including: development of shared science principles that will guide their activities, examination of the 8-year old Berlin Declaration, and possible approaches and business models for making all results of publicly funded research (data and publication) available to the public. NSF is considering the possibility of a joint statement with the Max Planck Society for the Berlin 9 conference to be held at the nearby Howard Hughes Medical Institute in November 2011.

g. Task Force on Merit Review (MR)

Dr. John Bruer, MR chairman, reported that the task force was working on an aggressive schedule during the past several months to meet the goal of developing draft recommendations for the merit review criteria in time for the full May 2011 meeting of the Board. The task force met monthly since December 2010, either in person or via teleconference. In the course of the deliberations, the task force identified issues for consideration related to the criteria, and focused on identifying important underlying principles upon which the merit review criteria should be based. MR also reached out to a wide range of stakeholders, both inside and outside NSF, to understand their perspectives on the current criteria, and looked at additional sources of data for information about how the criteria are being interpreted and used by the NSF community.

It became clear through this careful and deliberative process that the two review criteria of Intellectual Merit and Broader Impacts were the right criteria for the evaluating NSF proposals, but that revisions were needed to clarify the intent of the criteria and to highlight for the community that they were grounded in NSF's core principles. During the past few months, MR drafted and edited a set of guiding principles and recommended revisions for the criteria, which were the focus of the MR discussion. (Board Book Addendum)

To set the context for the discussion of the draft document, the task force heard a presentation summarizing the major themes that emerged from the data-gathering activities to date. One of the most striking observations that emerged from the data analyses was the consistency of the results, regardless of perspective. All of the stakeholder groups identified similar issues, and often offered similar suggestions for improvements. Data were presented related to the strengths and weaknesses of the merit review criteria and how the criteria are being used by principal investigators (PIs), reviewers, and NSF staff. The presentation also included some perspectives from both NSF staff and NSF PIs on how to engage the PIs' institutions in supporting activities

designed to have a broader impact. The task force and several other members of the Board engaged in a discussion about the data and the issues that were revealed through these analyses.

The task force also discussed the draft recommendations document. There was general agreement that the guiding principles articulated in this document were the right ones. As a result of the ensuing discussion, a principle was added to the list that describes the importance of assessing the application of these criteria, using reasonable metrics that are developed over a period of time. The task force then discussed the recommended revisions for the merit review criteria. There was general acceptance that these were the right criteria; however, there was an extended discussion on how to describe the review elements underlying each criterion.

Finally, MR discussed issues surrounding the implementation of the criteria. The task force proposes that NSF should be given the lead in developing an implementation plan for applying the revised criteria, and to provide opportunities for the task force to provide input on the draft plan. Through its deliberations, the task force already identified important issues related to the use of the criteria, and recommends that NSF consider these when developing the implementation plan. Following the task force meeting on May 10, 2011, the principles and review criteria were revised, taking into account the input from all of the participants, and distributed to all Board Members for review. The task force was sensitive to the NSF Director's need for input from the Board on the merit review criteria so that he can be responsive to Congress. Therefore, the task force recommended the release of these preliminary documents, subject to final clearance by the Board, not as NSB policy, but as a proposal for broader discussion inside and outside of NSF.

The Board unanimously APPROVED the release of the revised Merit Review Principles and Review Criteria for a broader discussion inside and outside NSF.

The task force also recommended that NSF be asked to report on the development of its implementation plan at the December 2011 meeting of the Board.

Before ending the meeting, Dr. Bowen expressed his appreciation for all the work done by the Board Office staff and the NSF staff. He adjourned the Open Session at 3:10 p.m.

[signed]
Ann A. Ferrante
Executive Secretary
National Science Board

Attachments:

Appendix: 2010 Annual Report of the NSB Executive Committee ([NSB/EC-11-3](#))

**2010 Annual Report of the Executive Committee
National Science Board**

In accordance with the requirements of 42 U.S.C. § 1865 (d), I hereby submit this annual report of the National Science Board (Board, NSB) Executive Committee, as approved by the Executive Committee on May X, 2011. This report covers the period from May 2010 through April 2011. Dr. Arden L. Bement served as Director of the National Science Foundation (NSF) and the Board's Executive Committee chairman during May 2010, Dr. Cora B. Marrett served as acting NSF Director and chair of the Executive Committee from June 2010 through September 2010, and I served as Director of the NSF and chairman of the Board's Executive Committee for the remainder of the period covered by this annual report.

The elected Board membership of the Executive Committee during the past year was as follows:

Dr. Ray M. Bowen
Dr. Esin Gulari
Dr. Camilla P. Benbow
Dr. Patricia D. Galloway

Dr. Clifford J. Gabriel, acting Director, Office of Integrative Activities, served as Executive Secretary of the Executive Committee during this time period.

The Executive Committee met once during this period (May 4, 2010). This meeting was held in conjunction with the meeting of the full Board at the National Science Foundation headquarters in Arlington, VA. During this meeting, the Executive Committee approved the minutes from the previous meeting and approved the 2009 Executive Committee Annual Report.

The Executive Committee's powers and functions are based on a delegation of authority to it by the Board according to 42 U.S.C. § 1865(a). The Board's current delegation to the Executive Committee (Attachment B to NSB-99-158) authorizes the Executive Committee to approve awards on behalf of the Board when an immediate decision is required between Board meetings and when the necessary action is not within the authority of the Director of the National Science Foundation. The Executive Committee did not act on behalf of the Board during this reporting period.

/s/
Dr. Subra Suresh
Chairman
Executive Committee